CREDITS

(incomplete!)

Purpose: To give credit where due.

A lot of people put their blood sweat, tears and countless hours of time and fuel just for us to have the info on these pages. I would like to publicly thank the following people for their contributions that made this site possible.

If you feel that your name should be on the list and it is not, please let me know and it would be my pleasure to add it. Though I will try to make sure this list is as complete as possible, no one is perfect. Send me a PM on the club or an email, and it will be my pleasure to add your name to this list of distinguished people who made higher levels of tuning possible for all of us.

DHP forum user names are used in no special order other than being alphabetically sorted:

Blemke
CCB (Colorado Cool Breeze)
Eddie-98GTP
Electric97
Foghorn
Gibson
JeffsGTP
JerryH
MAPEX
Webracin'

Many others contributed here but their names are unfortunately missing

Gentlemen, thank-you all !!

INTRODUCTION

Info: This site is made using a few special fonts. If you want to see this website as I have designed it, using the fonts here, I have prepared a page where people may download and install the fonts files from. It is located **HERE**.

Purpose: To outline the process that I used to custom tune my PCM to my standards. In the past, I was plagued with massive flash KR and finally after trying out a suggestion of starting out with a 2002 GTP bin, this file in conjunction with a 3.4 pulley, I had incredible success with. We are talking WOT O2s of 920-930, idle/cruise timing of 45, WOT timing of 22 degrees (+6 over stock!) and no KR. **All this was made on 87 octane fuel!!** I was totally impressed and satisfied with the results, but wanted to try out a smaller 3.2 inch pulley and still see how far the results can get and still use 87 octane fuel. Let me warn you in advance... in most circumstances, moving down 2/10ths of an inch in pulley size (from 3.4 to 3.2) will make a very noticeable difference, both in performance increase and absolute need to make the tune more conservative to prevent knock. Add in the very low 87 octane into the mix, and the situation turns into a much greater challenge.

One of the main goals of this tune is to see how well we can improve the tune on my car yet make my car and still use regular 87 octane fuel consistently and safely in the winter while still getting reasonable performance envelope out of it. Note that I said reasonable, not maximum performance. One can make some sacrifices one way or the other depending on what your goals are... performance or fuel economy.

You see, I want a car that basically does honest and consistent 35+ MPG on the highway but does consistent 13.X second times on my big, bulky, heavy, over-tall street tires.

I have since met my personal goals of getting into the 13's on a mileage tune. On August 6, 2006, I made 4 runs, one 14.0 @ 103 run on the 3.4 pulley and three 13.8 @105 runs with the 3.2 (with a sad 2.4 60-foot!!). Unfortunately, the tune went bad due to a tuning error on my part and I was running tremendously rich on the 3.2 pulley (970+ O2s). Not having the time to correct or enjoy additional passes, I was still very satisfied with the results.

Disclaimer: The information on these pages comes as the result of me tuning my 1999 Grand Prix GTP in conjunction with the modifications I had on the car at the time that I did this tune. It may or may not be applicable to your application. You may also see tables that your bin doesn't have, or visa versa. **I bear NO responsibility for the results of these tuning methodologies (good or bad) from this process as it applies for anyone else other than me and my car. Anything you use from these pages, YOU USE AT YOUR OWN RISK.**

The tools used to accomplish my tuning goals:
- My 1999 Grand Prix GTP Sedan and all the modifications done to it.
- The DHP Power Tuner cables and related hardware to allow it to connect to the car and laptop.
- The DHP Power Tuner software.
- A laptop that will run the Power Tuner software.
- A 100% stock bin for my application (as of this point, I have successfully used 1998, 1999 and 2002 bins).
- Eddie's Table Modifier Thingy program

Now, I spent most of 2005-2006 with a massive flash KR situation that I had a very hard time resolving and I tried many things in an attempt to cure this issue without much success (I am talking as much as **14** degrees of displayed KR at **35-55** % TP!!). In an effort to completely eliminate it, I decided to do a complete custom tune starting from a 100% stock 2002 GTP bin (a fantastic hint from **CCB**, thanks **Bob**!!) and beginning the process with a VE (Speed Density) tune.

My plan of attack was to dive into the PCM tuning process in the following seven stages:

1 - Address most basic issues concerning Torque Management/Torque Abuse/Injector disabling in my bin.
2 - Prepare my bin for completing a VE tune.
3 - Do a Speed Density (VE) tune via optimizing the VE table.
4 - Optimize the fuel trims via the MAF table.
5 - Look at O2 readings at WOT and address fueling issues where needed.
6 - Remove any KR and raise timing for additional throttle response, power and MPG.
7 - Address transmission settings used to set up the car to my personal preferences.

The Process: I decided to start with a VE table or Speed Density tune. I am not going to explain what this is, if you need to find out, please do an internet search. Also, I will be using a table modifier created by a DHP forum member (**Thanks Eddie**!). From there, I did a MAF tune, adjusted the O2s, adjusted the timing and finally completed the overall tune with some serious modifications of the settings in the transmission tables. When it comes to this last section, I am not going to talk much about it, but rather I will suggest that you can safely start from the DHP v.1.5 bin files and modify things to the needs of your car. However, I will touch on some hints that may help you get your car to perform better.

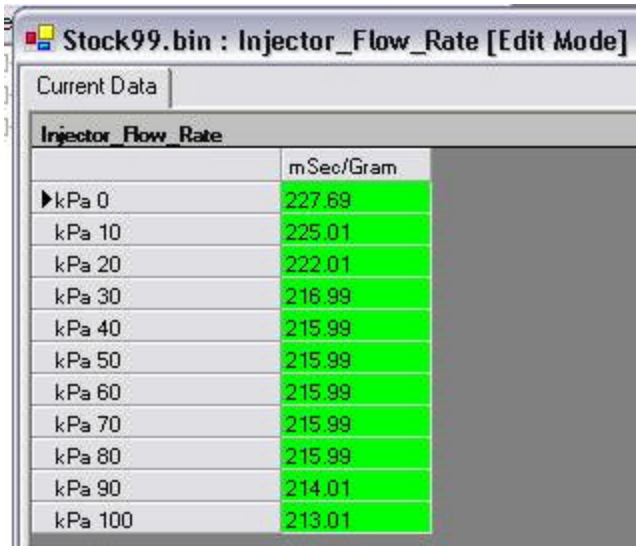
BIN PREPARATION - STAGE I

Purpose: To address most basic issues concerning Torque Management/Torque Abuse/Injector disabling in my bin.

We are going to assume that you have an understanding of how to work the basics of the Power Tuner, so I am not going to go through this, but rather mention table and values to change from stock. Also, I cannot stress enough that all settings that I talk about in this notebook are pertinent to a 1999 GTP bin and there may be tables you see here that you do not have, or you may have tables that my car doesn't have access to.

Before I could even start using a stock bin, there are three modifications that for me are absolute musts. First, because I have larger 42.5 pound injectors, the Injector Flow Rate (or IFR) table needs to be modified, and because I have a LQ4 MAF, the appropriate stock LQ4 MAF table needs to be imported. Last, because I have a XP HOT cam, I modified my idle characteristics table so that it idles a little smoother with this cam.

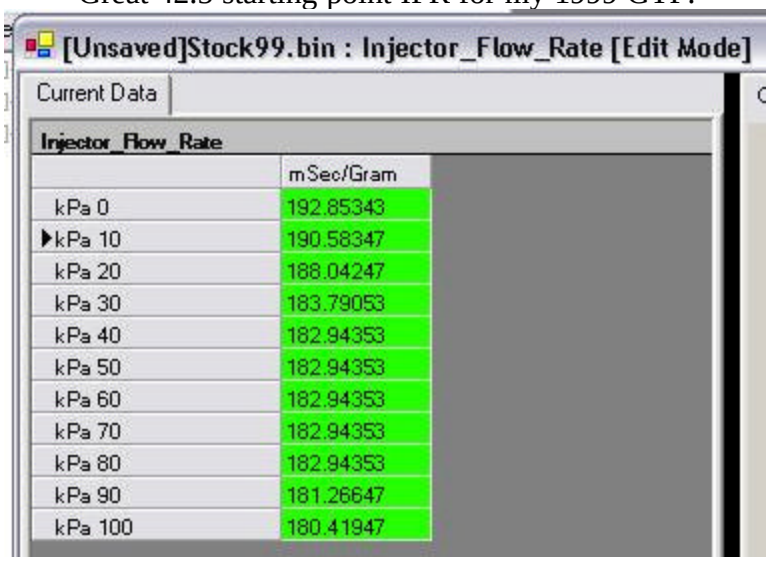
Stock 1999 IFR looks like this:



Hint #1: So, we know that the stock injectors are 36 pound, I have new, bigger 42.5 injectors. How do I calculate the perfect IFR for my car? Well, there is no ONE perfect table for all cars, but here are a few tips... Stock injectors? **STOCK IFR**! You have a GTP and are moving from 36 to 42.5 injectors? Math is your friend... divide your old injector size by the new injector size to get the variance. For example: 36 / 42.5 = 0.847. So... your new IFR table shall be 84.7% of the old table (highlight all cells in the IFR table, right-click, select CUSTOM, click on PERCENT, enter 84.7, click ok... Voila, your new IFR table near perfectly matched

in a few seconds!). Using this technique, I came up with the following table:

Great 42.5 starting point IFR for my 1999 GTP:



Even with this table, it will run a little on the rich side, which it is always better to be a bit rich rather than lean when it comes to tuning anyway. Richer is safer... but too rich is sometimes as bad as being too lean (I will discuss optimal numbers to shoot for in tuning situations at each stage later on). Again, optimal numbers for me, may not be optimal for you, it will be your responsibility to find out what is right for your car and/or situation.

My second necessary change was to import a stock LQ4 MAF table and lastly, because of my XP cam, I modified my idle table

New Desired Idle RPM table:

IAC_Desired_Idle_RPM

	Trans not Enga	Trans Engagec
ECT Deg C -40	1400	1200
ECT Deg C -30	1400	1200
ECT Deg C -20	1300	1200
ECT Deg C -10	1300	1100
ECT Deg C 0	1200	950
ECT Deg C 10	1050	950
ECT Deg C 20	1050	950
ECT Deg C 30	950	875
ECT Deg C 40	950	850
ECT Deg C 50	850	800
ECT Deg C 60	850	800
ECT Deg C 70	850	800
ECT Deg C 80	850	800
ECT Deg C 90	850	800
ECT Deg C 100	850	800
ECT Deg C 110	850	800
ECT Deg C 120	850	800
ECT Deg C 130	850	800
ECT Deg C 140	850	800

Once I did this, I was ready to get into the next step.

Now, on to the fun part of fixing some things concerning torque management and injector disabling that GM deemed necessary to have. In our cars, in a performance tune, leaving these things there could likely result in either sub-par performance at the least. At most, it places you in a dangerous situation where serious engine and/or transmission damage is the result.

In the CALIBRATION DATA > FUEL > TORQUE MGMT folder:
- Torque Abuse A/F - change it to 11.7
- Torque Abuse Differential Score A/F - change it to 11.7
- Traction Control Desired A/F - change all cells to 11.7
- Torque Abuse Drive Injector Disable - change it to 0
- Torque Differential Score Injector Disable - change it to 0
- Traction Disable Injectors - change all cells to 0
- Disable All Injectors High MPH - change all cells to 255
- Disable 1 Injector High MPH - change it to 255
- Disable 2 Injector High MPH - change it to 255
- High RPM PN Fuel Cutoff:
  High Threshold: change it to 4005 RPM
  Low Threshold: change it to 4000 RPM
- High RPM Rev Fuel Cutoff:
  High Threshold: change it to 3505 RPM
  Low Threshold: change it to 3500 RPM
- High RPM Fuel Cutoff:
  High Threshold: change it to 7005 RPM

Low Threshold: change it to 7000 RPM

In the CALIBRATION DATA > SPARK > TORQUE MGMT folder:
- Torque Abuse Spark - change it to 0
- Traction Spark Retard:
  - TCS Mode 1 - change it to 0
  - TCS Mode 2 - change it to 0
  - TCS Mode 3 - change it to 0
  - TCS Mode 4 - change it to 1
  - TCS Mode 5 - change it to 2
  - TCS Mode 6 - change it to 3
  - TCS Mode 7 - change it to 4
- Traction Extra Spark Retard: change all cells to 0
- Torque Differential Score Retard - change it to 4
- Torque Abuse Speed Enable - leave at stock setting
-Torque Abuse Throttle Enable - leave at stock setting
-Torque Abuse RPM Enable - leave at stock setting
-Torque Abuse Time Enable - leave at stock setting
-Torque Abuse Spark Retard - leave at stock setting
-Torque Abuse Differential Score MPH Enable - leave at stock setting

In the CALIBRATION DATA > TRANSMISSION > TORQUE MGMT folder:
- For the time being, leave all settings as per stock or if you have it, DHP v.1.5 settings.

BIN PREPARATION STAGE II

Purpose: To prepare my bin for completing a VE tune.

We are now going to make temporary changes to your BIN that are specific to a VE tune.

- First thing I want to do is to make sure that the car doesn't go into PE (Performance Enrichment) mode. To do that we modify the following table so that all cells read 100.

In the CALIBRATION DATA > FUEL > PE > PE Enable TPS table:

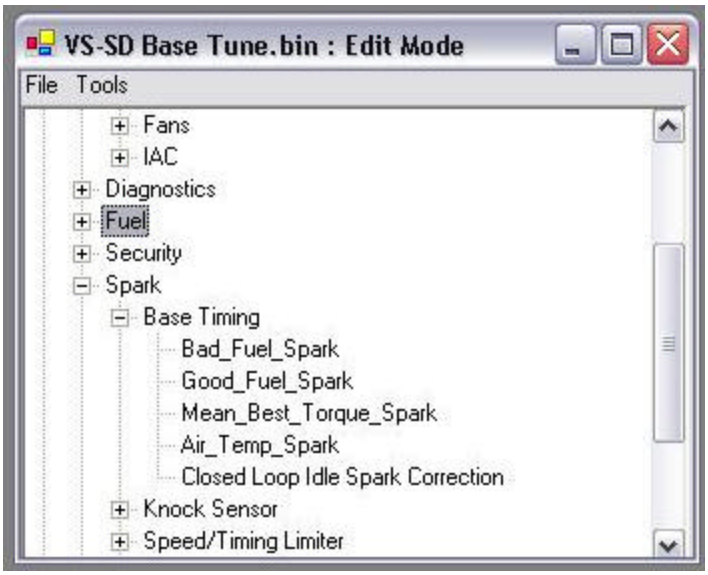
VE ready PE Enable TP% table

PE_Enable_TPS	
	Percent
RPM 0	100
RPM 400	100
RPM 800	100
RPM 1200	100
RPM 1600	100
RPM 2000	100
RPM 2400	100
RPM 2800	100
RPM 3200	100
RPM 3600	100
RPM 4000	100
RPM 4400	100
RPM 4800	100
RPM 5200	100
RPM 5600	100
RPM 6000	100
RPM 6400	100

- Next I copy our Good Fuel Spark into the Bad Fuel Spark table. You can do this easily by clicking on the GFS table once, then clicking and dragging it on top of the Bad Fuel Spark (BFS) Table

In the CALIBRATION DATA > SPARK > BASE TIMING folder:

Timing folders:



- I disconnected my MAF. Expect to see the occasional SES light as the PCM no longer can see a signal from your MAF, but you can either clear the code as it pops up, disable it in the PCM temporarily, or ignore it during this portion of the tuning process. I chose to clear it as it came up in between partial writes to the PCM during the tuning process.

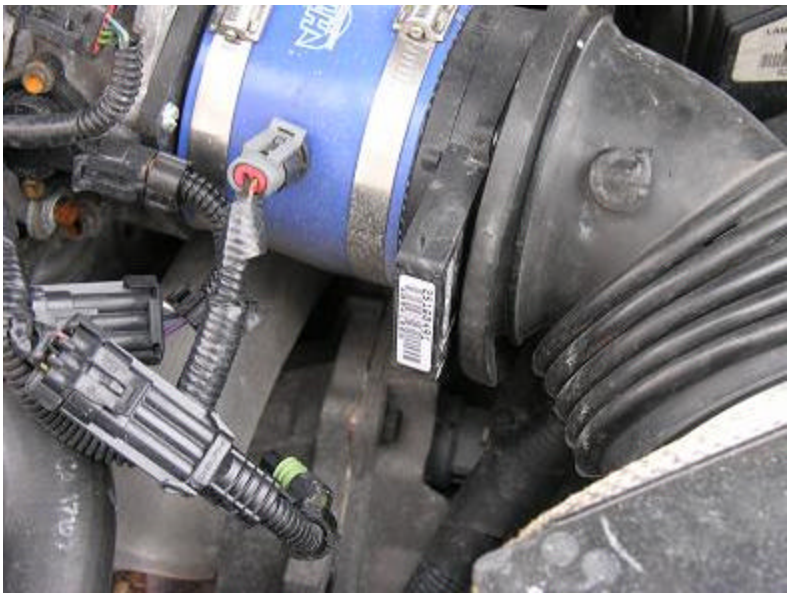
- I then saved the bin with the name "VE-TUNE1.BIN" (without the quotations, of course). During the start of this process, I created a folder called SD-TUNE on the desktop and that's to put all logs, bin files, utilities... everything associated with this process, in this one place.

- You are now almost ready to do some scans. Before you do your first scan, you must upload this bin to your PCM and reset your fuel trims. There are several ways to reset your fuel trims:

- Disconnect the battery for 15-20 minutes.
- Do a full write of the bin to your PCM.
- If you have V.1.1.9E or later of the Power Tuner software, you can do a fast partial upload of the BIN to your car and then use the Fuel Trim Reset from the Real Time Controls section. This was my preferred method.

Next I unplugged the MAF sensor. I have an LQ4 MAF, so the plug is not exactly in the same location as a stock MAF sensor.

MAF Unplugged



- Before we do a VE tune, we need to know how to get a good scan.

HOW TO GET A GOOD SCAN
1- If you have a Performance mode button, turn it ON. If you do not have one, don't worry about this line.

2- If you have flashed the PCM recently, you need to reset the fuel trims by either:
A-doing a FULL write OR
B-doing a partial write and disconnect the battery for 10-15 minutes.
C- using the REAL TIME CONTROLS and selecting RESET FUEL TRIMS (PT software v.1.1.9E and later!)

I suggest "**C**" because it is safer (less chance of something going wrong) on the PCM with partial writes. You MUST reset the fuel trims EVERY TIME you change anything fuel related (anytime anything changes in the FUEL folder of your bin)... either this, or drive the car a few days (at least 10-15 hours or more of driving) and wait till the new trims are relearned. You will notice when the trims are learned when the LTFT and STFTs are close to being the same (but never exactly the same).

3- After resetting the fuel trims, it takes anywhere from 15-30 minutes driving at VARYING speeds and TP% levels and at least 1-3 restarts (let the car sit a few minutes before restarting). During this cycle, touch everything from 0-50% TP settings. If your KR is 0, push it to 75% once or twice... if KR is still 0, touch WOT at least once for a few seconds (2-3 seconds is all that is needed, but no matter what, **DO NOT GO WOT DURING VE TUNING AS THERE IS NO PE MODE**!!). During the first 10 minutes I religiously avoid WOT as in my case it does NOTHING except burn fuel uselessly and show a little more KR than after the trims

are settled down.

4- OK, we've done our fuel trim reset cycle and the fuel trims have settled down. We can tell when it is because the STFT and LTFTs are close (but they are never exactly the same, unless when on a proper tune both at locked in at 0 anytime while in PE mode) or the values that were in the STFT gauge are now on the LTFT side and values in the STFT gauge are greatly reduced.

5- **ONLY NOW IS IT TIME TO START LOGGING**. We're now in 3rd gear, performance mode (if available) is activated and if idle and cruise LTFTs are our goal for this scan I scan using the following parameters as a minimum: **gear, IAT, IPW, KR, LTFT, STFT, MAF Hz, Map kPa, MPH, O2, RPM, Spark, Current Gear, Fuel Cell and TP%**.

6- Here is the secret to getting a good scan... you need a VERY slow progression from low Map kPa values up to 110 Map kPa or so. **This is done by very slowly rolling into the throttle**. Remember we are still in 3rd gear because it gives you a much better resolution than 4th. **The slower and more gradual climb in Map kPa, the better**. The reason you want to go a LITTLE into boost is that you see what the LTFTs and STFTs are locking in at once you are in boost. If you have a boost gauge, it should be starting from whatever position a slow cruise is at for you and swing SLOWLY upwards into just about 3-5 PSI of boost.

7- If you haven't seen any major KR up to this point, do the same up to 50% TP... and again the same thing to 75% TP... and finally the same thing to WOT. WOT does not need to be held long, perhaps for 3-5 seconds. **ANYTIME there is more than 5 degrees of KR, back off!!** I have setup my PT so that the text in the KR field is a larger font and that all KR from 0.5 to 1.5 degrees goes yellow and from 1.51 degrees to 20, it goes red. It's easy to see out of the corner of your eye as I place the gauge in the center of my screen.

8- Save the scan using a logical name. I like to use the date and run number format (2005-09-12-R1, 2005-09-12-R2, etc...)

TUNING YOUR VE TABLE

Purpose: **To do a Speed Density (VE) tune via optimizing the VE table.**

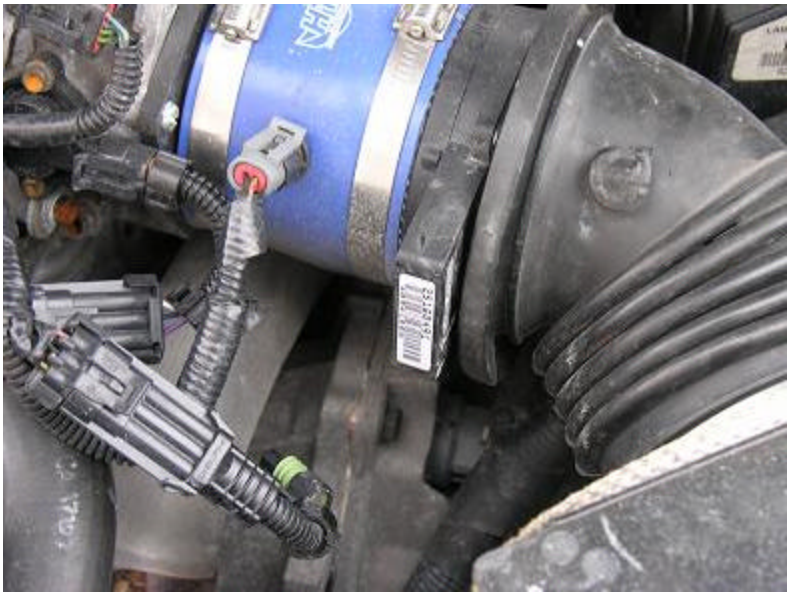
We are going to be modifying the VE table in this section. The VE table that we are going to be modifying is located:

In the CALIBRATION DATA > FUEL > MAF folder: Volumetric Efficiency Table

The main tool that we will be using to modify this table is the Table Modifier Thingy courtesy of Eddie over at the DHP forum. The process will be outlined only once on this page, but you may need to run it anywhere between 2 to 12 times for optimal results.

In the Bin Prep Stage I and II pages we created a bin in preparation for this step. Now is the time to take that bin, and flash it to your car. Make sure that you checked the CLEAR FUEL TRIMS before flashing this bin to your PCM, it is important that the fuel trims be erased before moving on to the following step.

Next step is to physically disconnect the connector from your MAF sensor. In this stage of the tune, you remove it and leave it removed until the goal of this stage of the tuning process are accomplished.



With the MAF disconnected, the bin we created flashed into your PCM and your fuel trims cleared (done either while you flash the bin or afterwards, it doesn't matter when, but it is important that you reset the fuel trims **before** you start driving), you are ready to do some driving. Remember we cleared the fuel trims. Well, now it's time that we gave the car a chance to relearn them. Because of the disconnected MAF, your car may be running either a little rough or like crap, and if you happen to be scanning, you will note

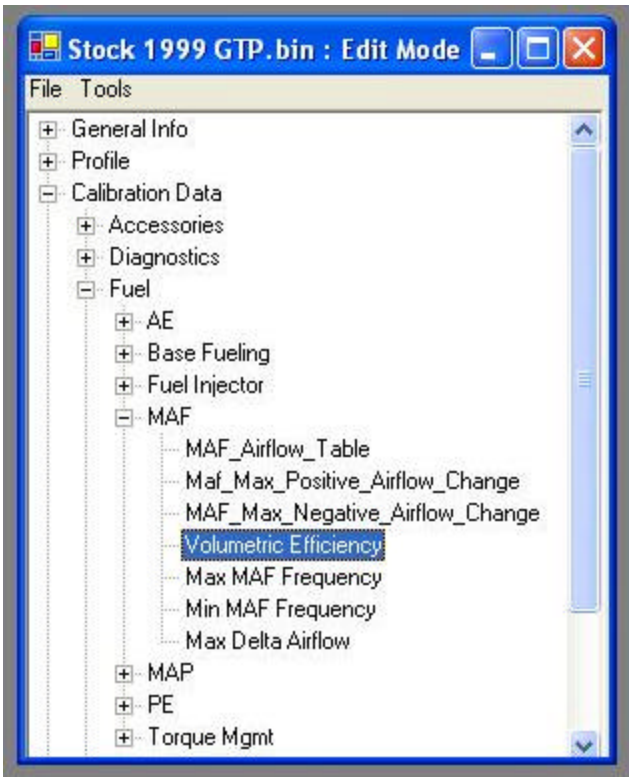
double digit negative numbers because by default, the factory setup is to run very rich in the event of a MAF failure. We'll be correcting for this very phenomenon. Learn time varies from car to car and year to year, but as a minimum, I would suggest that you drive at least 15-60 minutes, stop and turn off the car for at least 30 seconds, drive another 15-60 minutes and check to see if the trims have settled in. In general, it is not uncommon to drive for several hours and throw in a couple of restarts. The longer you give it to learn, the better the results.

How do you know if your trims are settled in? When we first reset the trims, the STFTs were the larger numbers and the LTFTs were the small ones. Once the numbers that you first saw in the STFTs are more or less transferred in the LTFT gauge, your trims are pretty much learned and we can move on to the next step.

Ok, trims are learned and it's time to create a log of the current state of the car's tune. On the Bin Prep Stage II page, I outlined how to do a good scan. Now is the time to use this information and make a good scan. You want to go driving for at least 30 minutes and put the car through as many throttle positions and gear variations between idle and 100 kPa permit. Remember, you do not have PE mode enabled, so large KR numbers are a strong possibility. You do NOT want to induce KR, you want to gently get the car to be put through different gears as you gent;y accelerate and different throttle position ranges from 0 to 50% (different cars will permit more or less throttle, but there is NO reason to go WOT at this stage!). Drive on the highway with the car in 3rd gear and in 4th as well to hit as many MAF hz/gear/MAP(kPa) variations as possible.

Once you are done scanning, save the scan as per the naming convention outlined in the "How to do a good scan". Before I start a new tune, I create a subdirectory on my desktop and this is where I place all the files associated with the process in. This is where I've then saved my scan log.

After that, I need to export the current VE table and the MAF table from the current bin, saving it in CSV format in the same directory. I use a convention of VE-1.csv, MAF-1.csv and VE-2.csv, MAF-2.csv and so on, as is needed. How do you export a table, you ask? Starting with the VE table, this is how:

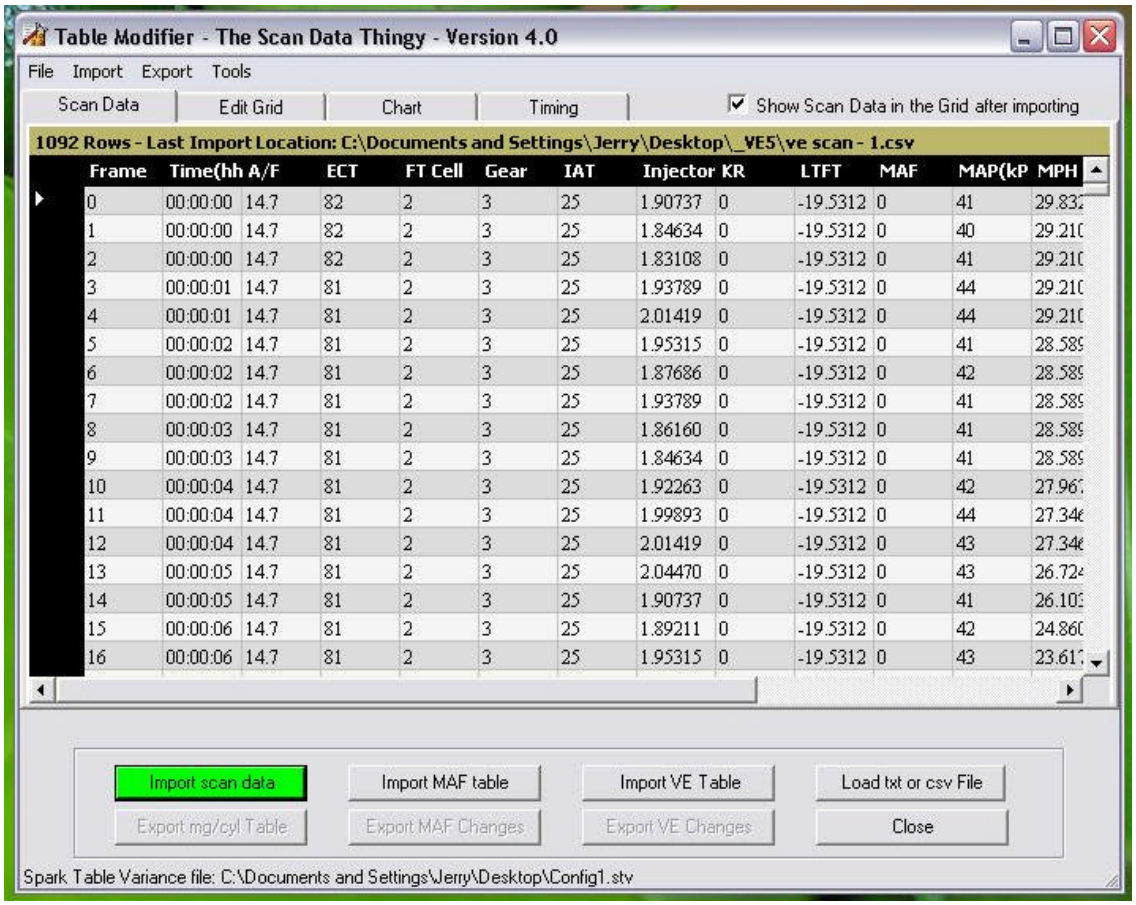


Highlight the VE table as shown above, it MUST be highlighted else it will not export properly. Next, right-click the highlighted area and select EXPORT. From there, navigate to the same folder where you are holding all your other related files for this tune, enter a name like VE_TABLE1 and for a file type, don't forget to select CSV and save it.

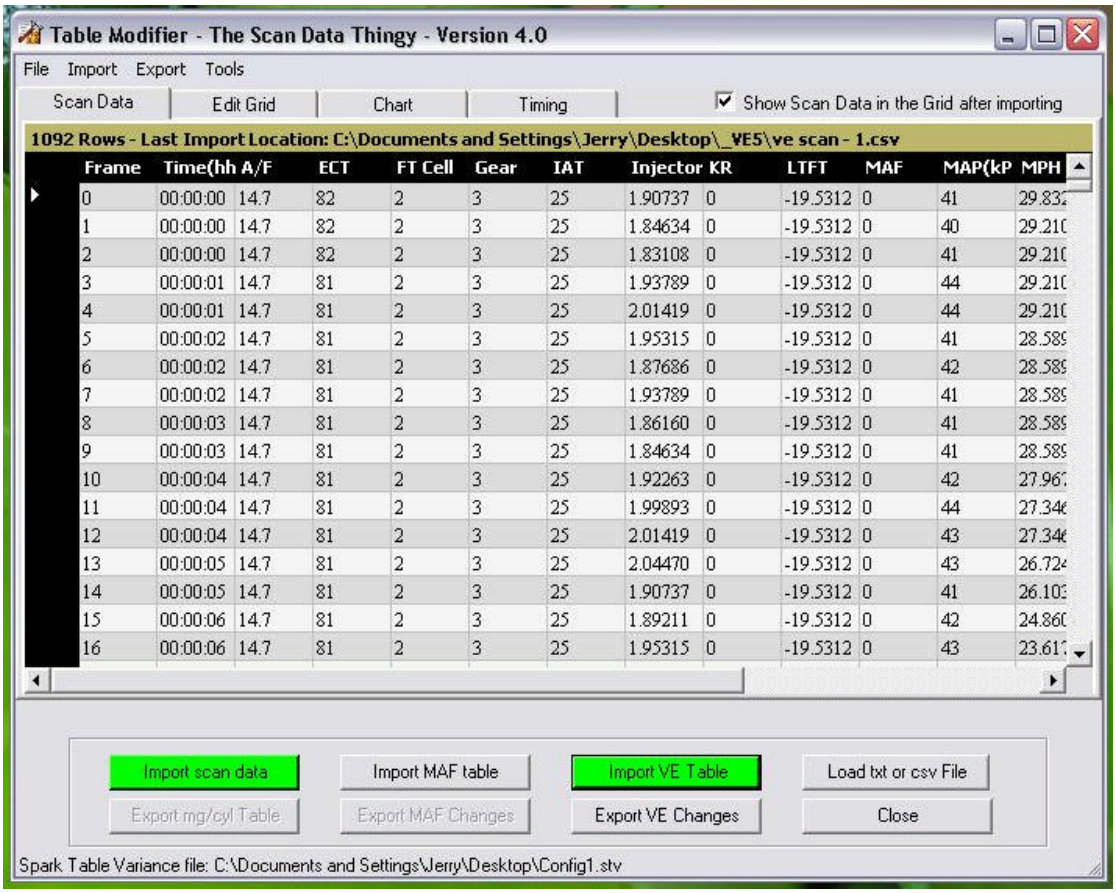
Do the same thing for the MAF table, but of course, name it something like MAF_TABLE-1.csv for now (we are not using it in this section, but do it anyways. It is needed in the MAF and TIMING tune sections, so why not be ready?). What I like to do is that the next time I do a VE or MAF export, I increment the name value like so... MAF_TABLE-2.csv, MAF_TABLE-3.csv, etc... that way I can always easily go back one step if for whatever reason I overshot or made an error and needed the original exported table again.

Next is where we take the accumulated info, and create a new VE table using the Table Modifier.

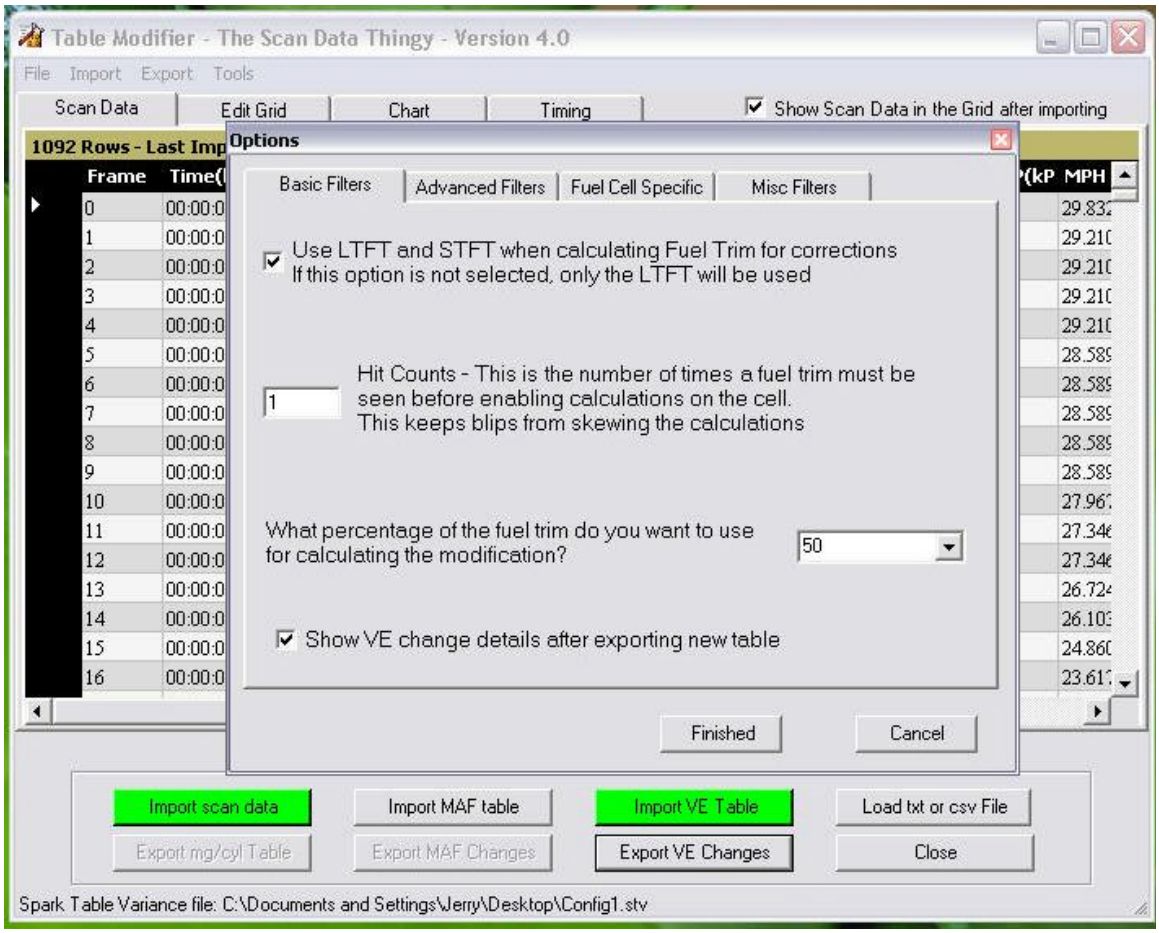
Import the data from the scan into the program



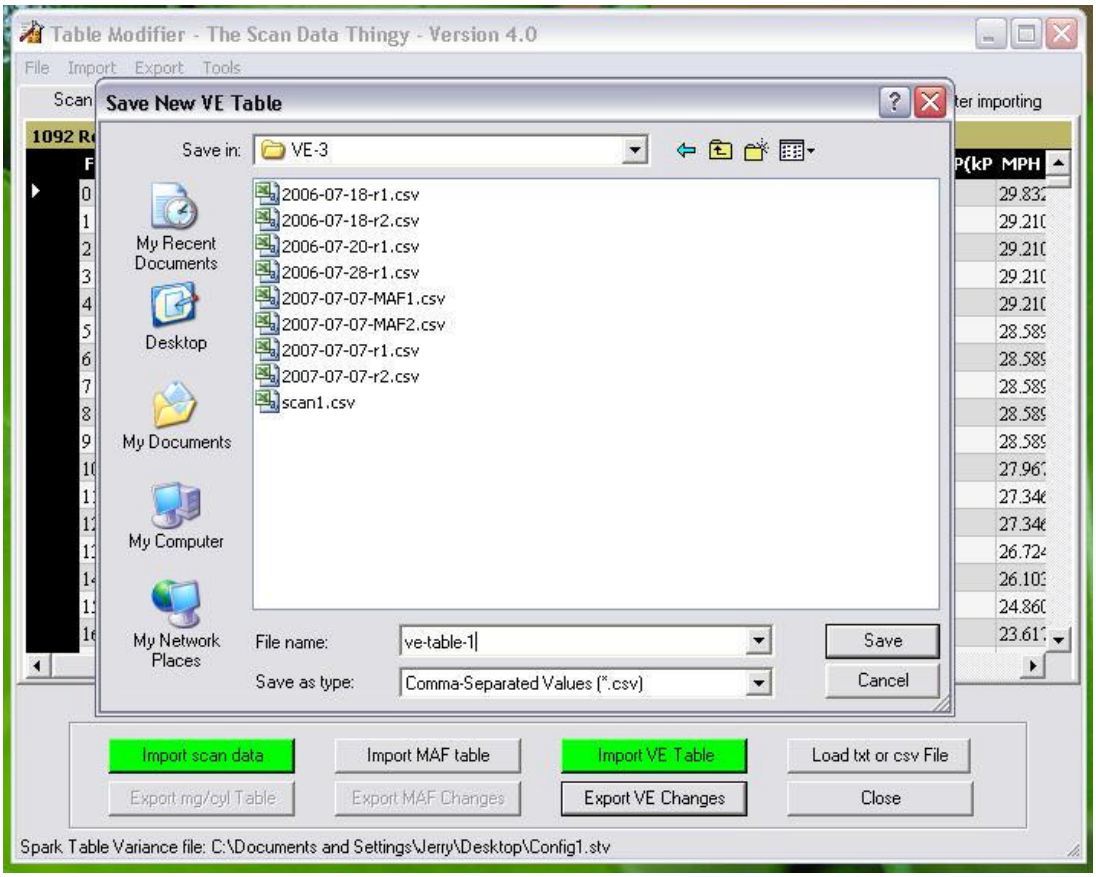
Import the current VE table into the Table Modifier Thingy



Clicking on Export VE table brings you this screen above. We select the parameters we want. Keep the hit counts at 3 or more, and percentages at 50% for the first time and then use 30% or less so as not to overshoot your goals. I sometimes use the fuel cell specific option and tune in order of fuel cell 2 and 4 until I get the results I want, then exclusively FTC 3, then finally FTC 0. Yes, it is longer, but the results are much better. If you wish, you do not need to use this option and as you learn, just make global changes, you can come close with some care.



Save the file to a known location.



Once you have a new VE table, import that back into your BIN. To do that, here is the procedure:

Select the table you want to import the new settings into. Then right-click it, select IMPORT, then FROM FILE, navigate to the directory where the file you want to import is located, in the FILE TYPE select CSV, click on your file and select OPEN, click on YES and then on the OK. After this, save your BIN under a new name (**Note: Always save your new BIN before uploading it to the PCM.**), flash it to your car, **and don't forget to clear the trims**... and we start the entire complete process all over (flash, learn the new trims, then scan, then make BIN changes).

Now, what are we trying to attain? We are trying to get the LTFTs to be between 0 and -3 at all MAP(kPa) readings between idle (35-50) and 110 MAP(kPa) How much higher above 110 will depend on how far you can press he pedal and NOT get KR. The closer to 0 the LTFTs get, the better. Different cars will feel differently. For example, 97's will have a very hard time idling at all if you get the trims under -3 while in VE mode, so let them sit at that level. Here again, anything between 0 and -3 is excellent. On my 1999 car the idle seems to be virtually unaffected, and you can really push the envelope and go for trims between 0 to -0.78, but anything between - and -1.5 is excellent.

Please note, we are always going for trims lightly in the negatives or 0, but never into the positives. This means that the PCM is adding fuel because our settings are making it go

too lean. Better to be slightly rich than lean.

It is common to repeat this process anywhere between 4 to12 times. Once you get down to your goal, don't push further. It is easy to overshoot and have it give you positive numbers, which is undesirable and then you are faced with taking a step back in the tune instead of advancing.

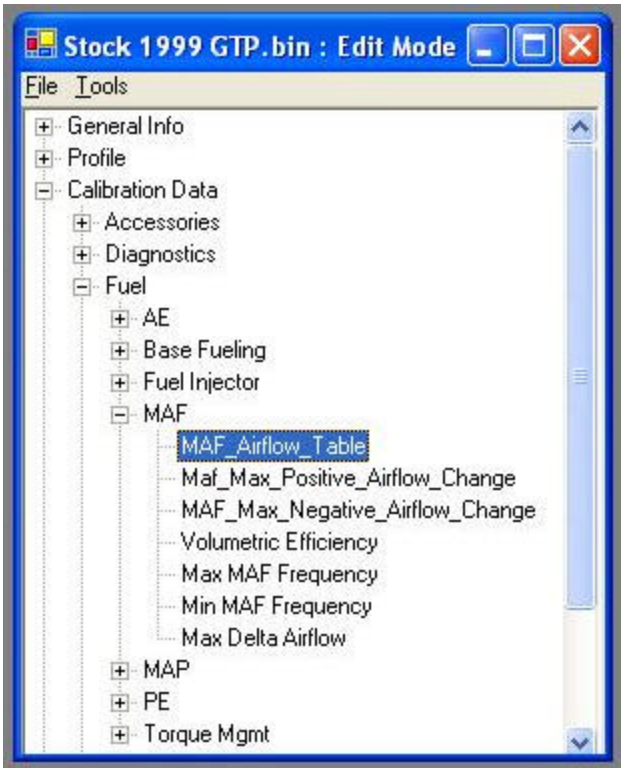
If you have completed your VE tune, don't forget to plug in your MAF before proceeding on to doing a MAF tune.

TUNING YOUR MAF TABLE

Purpose: **To optimize the fuel trims via the MAF table.**

We are going to be modifying the MAF table in this section. The MAF table that we are going to be modifying is located:

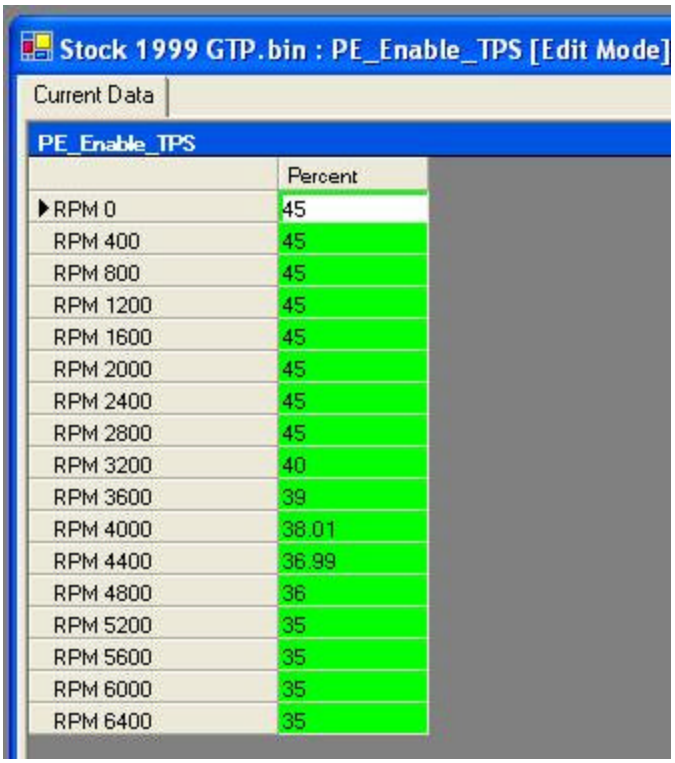
In the CALIBRATION DATA > FUEL > MAF folder: MAF Airflow Table



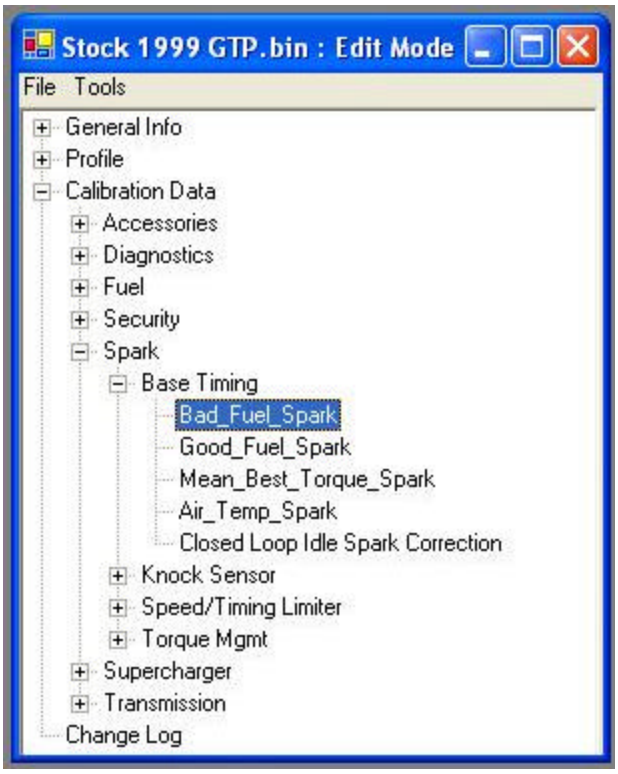
The main tool that we will be using to modify this table is the Table Modifier Thingy courtesy of Eddie over at the DHP forum. The process will be outlined only once on this page, but you may need to run it anywhere between 2 to 10 times for optimal results.

In the VE Tuning page we created several bins during that phase. We will now need to make a few changes to start this phase of the tune. First step is to make sure that you physically reconnect the connector back to your MAF sensor. In this stage of the tune, you put it back on and leave it connected from this point onward.

You also need to return your Base PE back to stock... to do this, navigate to the: **CALIBRATION DATA > FUEL > PE folder: PE_Enable_TPS Table**



Don't forget to reset your BFS or Bad Fuel Spark table back to stock. As a reminder, the BFS is located here:
CALIBRATION DATA > SPARK > BASE TIMING folder: Bad_Fuel_Spark Table
You want to click once on this table to select it (as shown in the pic below), right click it, select IMPORT > STOCK VALUE and click on the YES button.



You should now save this file under a new name... how about something like MAF-0.bin? Once it is saved, we are ready to start. Flash this bin to your PCM and make sure the fuel trims are reset using any method you want... just make sure that you do **not** forget this step.

It's time to go for a scan. About this moment you are thinking "damn, how did we do that good scan thing again?". Well, here is a reminder:

HOW TO GET A GOOD SCAN

1- If you have a Performance mode button, turn it ON. If you do not have one, don't worry about this line.

2- If you have flashed the PCM recently, you need to reset the fuel trims by either:
A-doing a FULL write OR
B-doing a partial write and disconnect the battery for 10-15 minutes.
C- using the REAL TIME CONTROLS and selecting RESET FUEL TRIMS (PT software v.1.1.9E and later!)

I suggest "**C**" because it is safer (less chance of something going wrong) on the PCM with partial writes. You MUST reset the fuel trims EVERY TIME you change anything fuel related (anytime anything changes in the FUEL folder of your bin)... either this, or drive the car a few days (at least 10-15 hours or more of driving) and wait till the new trims are relearned. You will notice when the trims are learned when the LTFT and STFTs are close to being the same (but never exactly the same).

3- After resetting the fuel trims, it takes anywhere from 15-30 minutes driving at VARYING speeds and TP% levels and at least 1-3 restarts (let the car sit a few minutes before restarting). During this cycle, touch everything from 0-50% TP settings. If your KR is 0, push it to 75% once or twice... if KR is still 0, touch WOT at least once for a few seconds (2-3 seconds is all that is needed). During the first 10 minutes I religiously avoid WOT as in my case it does NOTHING except burn fuel uselessly and show a little more KR than after the trims are settled down.

4- OK, we've done our fuel trim reset cycle and the fuel trims have settled down. We can tell when it is because the STFT and LTFTs are close (but they are never exactly the same, unless when on a proper tune both at locked in at 0 anytime while in PE mode).

5- **ONLY NOW IS IT TIME TO START LOGGING**. We're now in 3rd gear, performance mode (if available) is activated and if idle and cruise LTFTs are our goal for this scan I scan using the following parameters as a minimum: **gear, IAT, IPW, KR, LTFT, STFT, MAF Hz, Map kPa, MPH, O2, RPM, Spark, Current Gear, Fuel Cell and TP%**.

6- Here is the secret to getting a good scan... you need a VERY slow progression from low Map kPa values up to 110 Map kPa or so. **This is done by very slowly rolling into the throttle**. Remember we are still in 3rd gear because it gives you a much better resolution than 4th. **The slower and more gradual climb in Map kPa, the better**. The reason you want to go a LITTLE into boost is that you see what the LTFTs and STFTs are locking in at once you are in boost. If you have a boost gauge, it should be starting from whatever position a slow cruise is at for you and swing SLOWLY upwards into just about 3-5 PSI of boost.

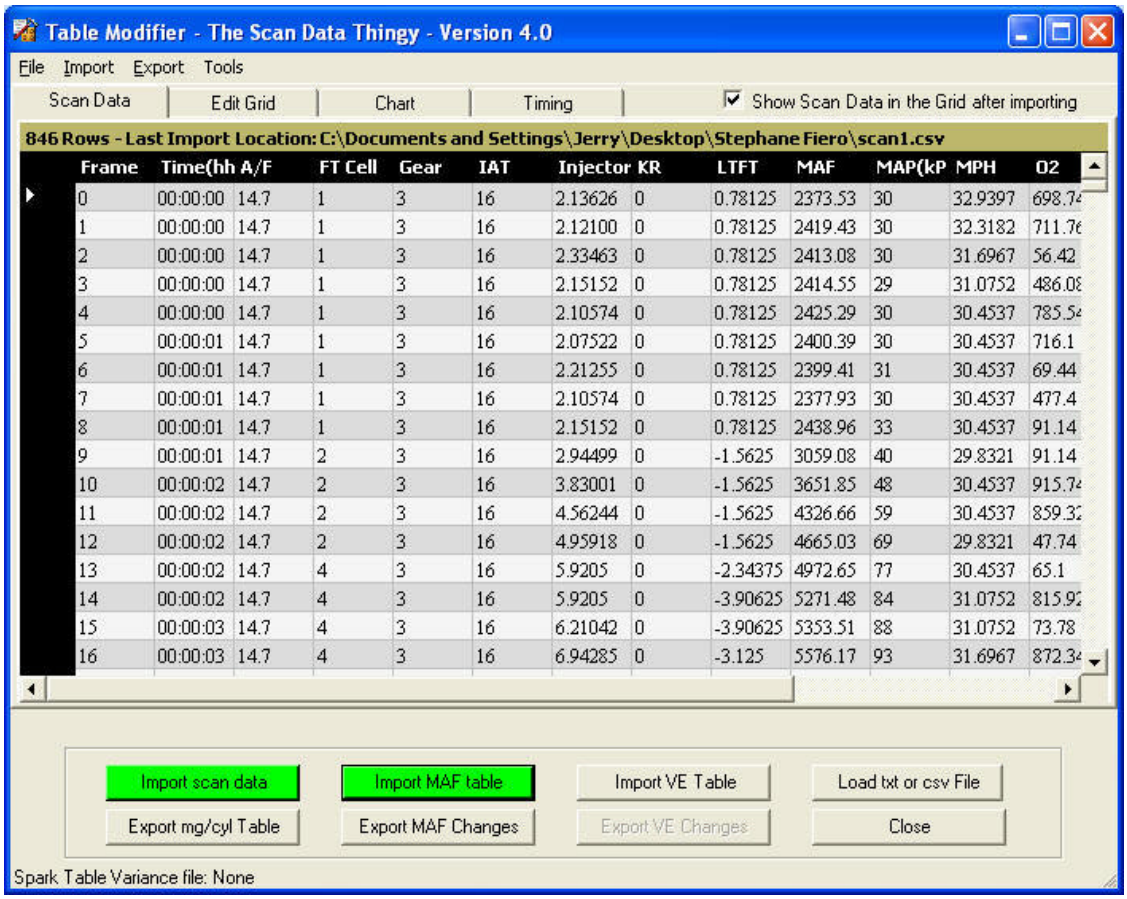
7- If you haven't seen any major KR up to this point, do the same up to 50% TP... and again the same thing to 75% TP... and finally the same thing to WOT. WOT does not need to be held long, perhaps for 3-5 seconds. **ANYTIME there is more than 5 degrees of KR, back off!!** I have setup my PT so that the text in the KR field is a larger font and that all KR from 0.5 to 1.5 degrees goes yellow and from 1.51 degrees to 20, it goes red. It's easy to see out of the corner of your eye as I place the gauge in the center of my screen.

8- Save the scan using a logical name. I like to use the date and run number format (2005-09-12-R1, 2005-09-12-R2, etc...)

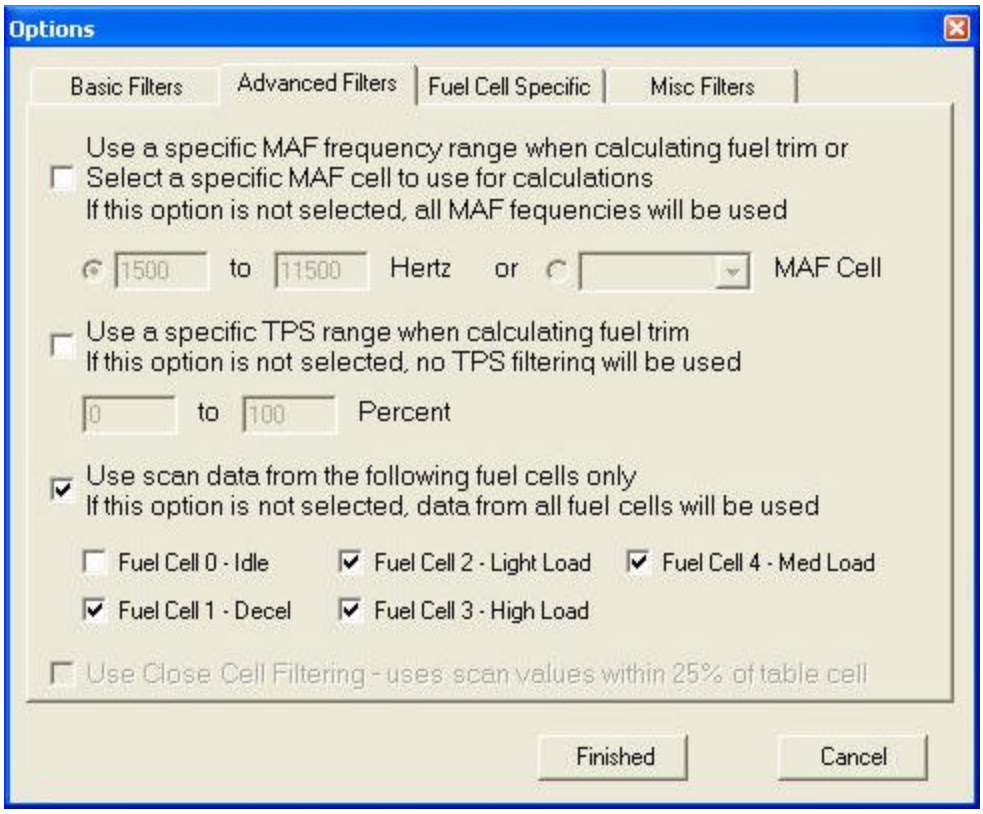
Ok, so now we have a good scan and are ready to start modifying the MAF-0.bin (or whatever else you decided to call it). Let's go back and use your friend and mine, Eddie's Table Modifier (By the way, since you are using it, have you taken the time of thanking the man for this tool, amongst others, and all his hard work so that we can make tuning a breeze for us?)

So, at this point we have a scan, and we need to export the current MAF table (see the

VE tune section in case you forgot how to export a file). Let's open up the Table Modifier Thingy:



Import the scan data and the current MAF table, and click on EXPORT MAF CHANGES.



Using the advanced filters, I sometimes choose to tune a particular fuel cell and as a general rule, it's not a bad idea to split your tune up into 3 sections... fuel cell 1, then 4, and then 2 and 3 together (or whatever you choose)... but I have done all without filters successfully but a little extra care and experience in knowing what to look for is needed.

Once you click on the FINISHED button, a file that is the new MAF table will be created using the name and location of your choice. You then import the new table to your BIN (forgot how? Refer to how to import a table in the VE Tune section!), save it to a new file name and flash that new bin to your PCM file. Reset your fuel trims either during the flash process or later, but do **NOT** forget to reset the fuel trims in between MAF table changes. Then we go through the complete process all over again (flash, learn the new trims, then scan, then make BIN changes).

Now, what are we trying to attain? We are trying to get the LTFTs to be between 0 and -3 at all MAP(kPa) readings between idle (35-50) and 110 MAP(kPa) How much higher above 110 will depend on how far you can press he pedal and NOT get KR. The closer to 0 the LTFTs get, the better.

One goal we also need to set during this section is what are the proper settings for your PE to enable? In your scans, if you do several scans in 3rd gear on the highway, and you slowly roll into the throttle, you will see a slow rise in the MAP(kPA) numbers. Note at what throttle settings we GENERALLY hit 100 MAP(kPa). That is the

suggested PE Enable point.

Another goal that we are trying to attain is that we want the STFT and LTFT parameters to be locking in at nothing other than a 0 anytime you are in PE mode. We know at what throttle position PE mode starts in us becuase we have noted it while we reimported the original PE_ENABLE_TPS table earlier during the the start of this section, or we have modified that table to know where we want it to start. If you are an apprentice tuner, don't be afraid to set this table to the same number from top to bottom. For stock throttle bodies, a number between 30-35 is average. For an LQ4 or LS1 TB, numbers between 25-30 are common. Once you get your base tune in place, over time you may want to optimize this table so that it starts off at a higher number at the top of the table, and gets smaller (to a point) the lower you go. Many things will affect this, but as your knowledge and experience with your car and tuning grow, so will your way of deciding how this table best serves your needs will change.

Please note, we are always going for trims lightly in the negatives or 0, but never into the positives. This means that the PCM is adding fuel because our settings are making it go too lean. Better to be slightly rich than lean.

It is common to repeat this process anywhere between 3 to10 times. Once you get down to your goal, don't push further. It is easy to overshoot and have it give you positive numbers, which is undesirable and then you are faced with taking a step back in the tune instead of advancing.

TUNING YOUR O2's

Purpose: To look at O2 readings at WOT and address fueling issues where needed.

Basically, there are 4 ways to raise O2s on our cars… and obviously if you wanted to lower things, you could just do the opposite of what I say below. Those 4 ways are:

1 - Increase your Base PE A/F

2- Increase the MAF hz range from 7000-11500… but always feather in those changes. By that I mean that if you (for example) do a 1% increase at the 7000hz and up range, don't forget to do a 0.5 percent increase in the cell just UNDER 7000hz and a 0.25 percent increase at the cell just under that. We do not want to introduce any dips or bumps into the MAF curve!

3 - Increase the PE_RPM_vs_TIME table at strategic points

4 - Increase the 100kPa cell of the IFR table by adding 5 to whatever number is there and scan to see the results. Don't go beyond +15 as a general rule. I've not found the need to go over 10 on any tune to get the results that I wanted.

What O2 levels are good for my car?

So, what is the best O2 reading for your car? The answer to that depends on so many factors its not even funny, but as a general guideline here are some suggestions based on modification levels:

Different mod levels on cars can use different maximum O2 values.
Here are some <u>suggested guidelines</u>:
- Supercharged cars without an intercooler - 930-945 is considered a good range
- Supercharged cars with an aftermarket cam - 920-935
- Supercharged cars with an intercooler - 915-925 is considered a good range
- Supercharged cars with an intercooler and aftermarket cam - 905-915 is considered a good range
- Nitrous injected cars - 925-935
- Cars running water or alcohol injection - 915-935
- Turbocharged cars seem to be a little more fuel hungry than the supercharged crowd. Turbo or turbo/intercooled cars like the 945-970 range.

Now, on top of this, O2s will be different in a Texas summer versus a Canadian

winter. Because of the much colder winter air, I can get away with running a much leaner (lower O2 readings) in the winter than the summer. Taking my car as an example (Supercharged (or turbocharged) cars with an aftermarket cam) I say that 920-935 O2s are good. In the winter, on the same car, I could easily go down to approximately 915-925 without any increase in KR. If you live in a hotter climate, you may need to add 10% to the O2 numbers that I suggest. These are approximate O2 numbers and nothing is set in concrete... your car, tune and KR numbers will ultimately dictate what A/F ratio your car runs best at.

Also be aware that at this point a Wide Band O2 sensor and setup would be beneficial, it is not absolutely 100% mandatory. We can come close enough to our targets without one. An important point to consider is that low O2 values are not always the final solution. For better HP results, it is often better to raise O2 levels higher a little and raise timing to increase HP and throttle response. Since timing is something discussed in another part of this site, for the moment, stick with the concept of running the lowest O2s possible without any KR showing anywhere (using the stock timing tables) and the timing issues will be touched on later in this website.

Bottom line: What's the best O2 level for my car? Its the O2 level that is the LEANEST/LOWEST number you can get at WOT without getting KR within the constraints of the suggestions above. You can go higher if you wanted to increase timing and still eliminate KR and increase power (increased timing to a certain extent is FREE horsepower!), but try not to go higher than 945-950 for any supercharged application (960-970 for turbocharged applications), no matter what. If you still get KR at stock timing levels, you are either running too much boost (too small a pulley), do not have enough supporting mods, or have a mechanical issue to resolve.

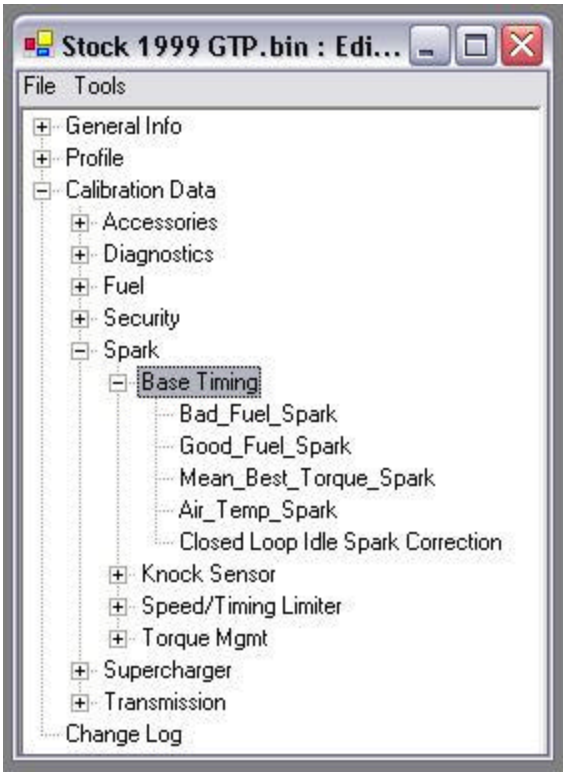
TUNING YOUR TIMING TABLES

Purpose: To Remove any KR and raise timing for additional throttle response, power and MPG.

We are going to be modifying multiple timing tables in this section. The tables that we are going to be modifying are located:

In the CALIBRATION DATA > SPARK > BASE TIMING folder: the GFS, BFS and MBTS TABLES

To clarify GFS, BFS, MBTS stand for:
- GOOD FUEL SPARK
- BAD FUEL SPARK
- MEAN BEST TORQUE SPARK



Now, the BFS kicks in when KR rises to a trigger point and lowers timing across the board and it stays active a while (great for those times that you have a 94 octane race tune, and the gas attendant fills your car with 87 octane!). This table is a protection mechanism. In terms of changes, we do not want to be changing this one too far. The GFS table is what is normally used and will dictate how much spark under various loads/speeds we will be commanding. The MBTS is a reference table that affects commanded spark based on load and other conditions. One table that I will discuss here

for a few seconds but is not within the context of this website tune, is the Air Temp Spark. This is a table that modifies the current spark tables according to ambient temperatures. Perhaps in the future I will discuss this table here and display it's benefits (such as no worries about maximum timing will be no matter what the outside temps are), but for now, lets concentrate on our three main tables.

The factory spark tables from a 97-03 GTP are pretty conservative from the factory for a good reason. They need to safely accommodate a GP running in Texas summer heat as well as Alaska winter cold. We, because we have a tuner and the option to optimize beyond these limitations, can make some nice improvements in this area. At stock factory settings of 36 degrees of cruise timing and 16 degrees at WOT, the average PT'er will be able to improve on this. Of course our goals are always to be running zero KR everywhere... but that doesn't mean that we need to always drop timing. Increased timing is free extra HP, but only if there is no knock. There is a close relationship between the maximum spark we can run and our O2 levels. During the MAF and O2 tuning phase we optimized the tune to get us close to our sweet spot. This O2 range may change if we increase spark and we may find some benefit to increasing O2 levels so that we can run additional spark advance.

Before we get into the process of doing a timing tune, I am going to present an idea here. The stock timing tables of a 2005 GTP are significantly more aggressive than a stock 97-03 setup. I think that copying over the BFS, GFS, MBTS and ATS (air temp spark) tables from a 2005 GTP over to your 98-03 GP make an excellent starting point. In fact one could do just this, and feel a nice increase in throttle response. Cruise timing up to a maximum of 42 degrees and WOT timing approaching 21.5 degrees under a good tune is an excellent increase.

One final point about timing tuning... to do a full timing tune, just like when doing WOT MAF tuning, we will be hitting some extreme throttle positions and the chances that we will be speeding is very high. Please be careful about when and where you choose to do your high-speed runs.

Let's get into making a scan. Now our goals are to get some nice timing increases without introducing KR into our tune. Let's set some boundaries before we start:

- Anything over a maximum of 20-21 degrees of WOT timing is a waste of time on a supercharged car, so that's your WOT limit. NA cars can and should go higher before they hit KR.

- Light load, highway speeds stock is around 28-33 degrees. You should aim for 35-45... yes some cars can get that high.

- Under decel, do not be shocked to see 50 degrees (the maximum hard coded value that you will ever see with our L67 engines). Don't permit more than 50 to appear anywhere in your GFS and MBTS tables.

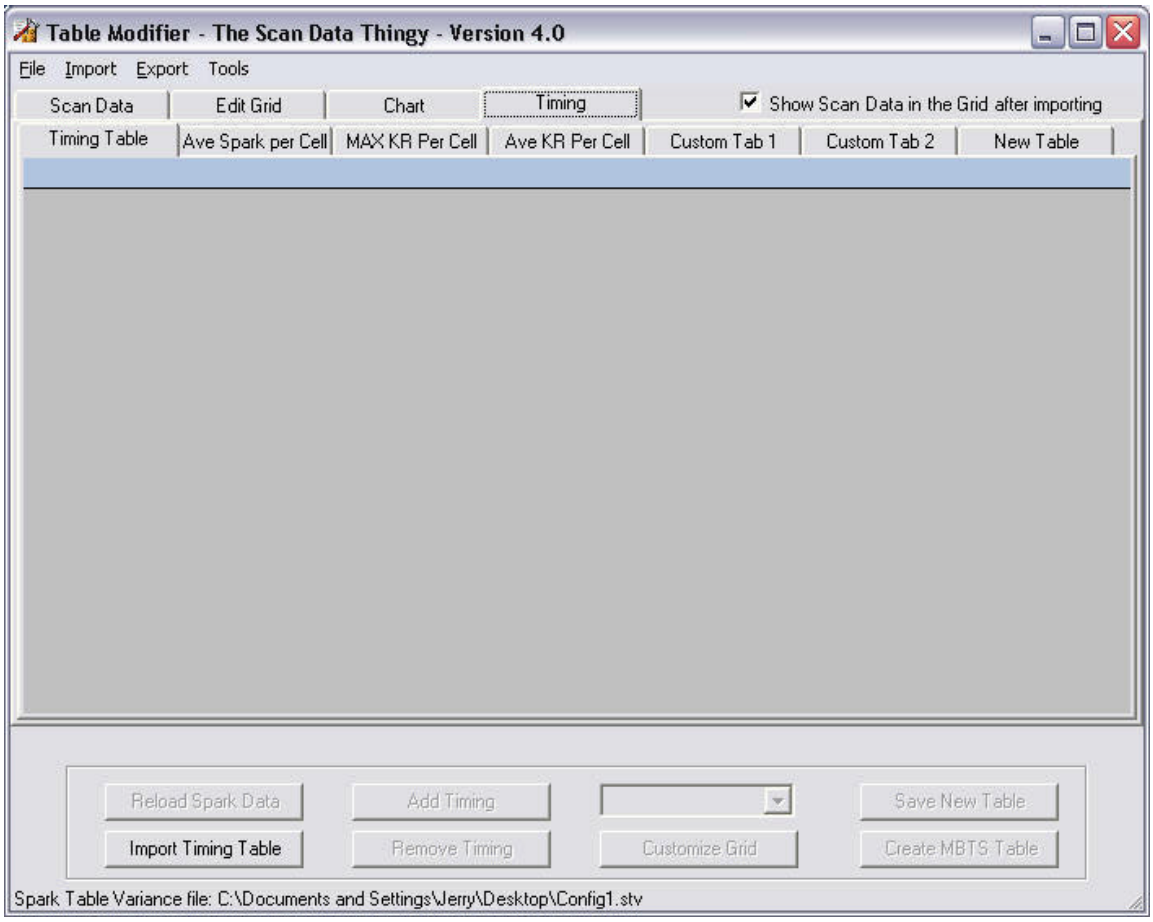
- Keep the BFS stock or slightly less. What I liked to do, to maintain that consistency, is work only with the GFS, maintain the factory ratio differences between the GFS and MBTS table to create my MBTS table and my BFS is around 6-7 degrees less across the board from my GFS.... both of the recommendations not to be surpassed even if KR still doesn't show up. If it doesn't, even at these elevated timing settings, I will suggest that you SLOWLY start to lean out your tune (lower O2 values) for extra HP until KR begins to show up, and then add back a little fuel for safety.

The first things that we need to make a timing tune is a scan. We will need to do some varied driving. Try to do a little of everything, or take advantage of a little used feature of Eddie's Table Modifier Thingy, and import 2-3 different scans at once into the program that cover different aspects of your timing scans. Things like:
- low RPM, low to high engine loads
- mid RPM, low to high engine loads
- high RPM low to high engine loads

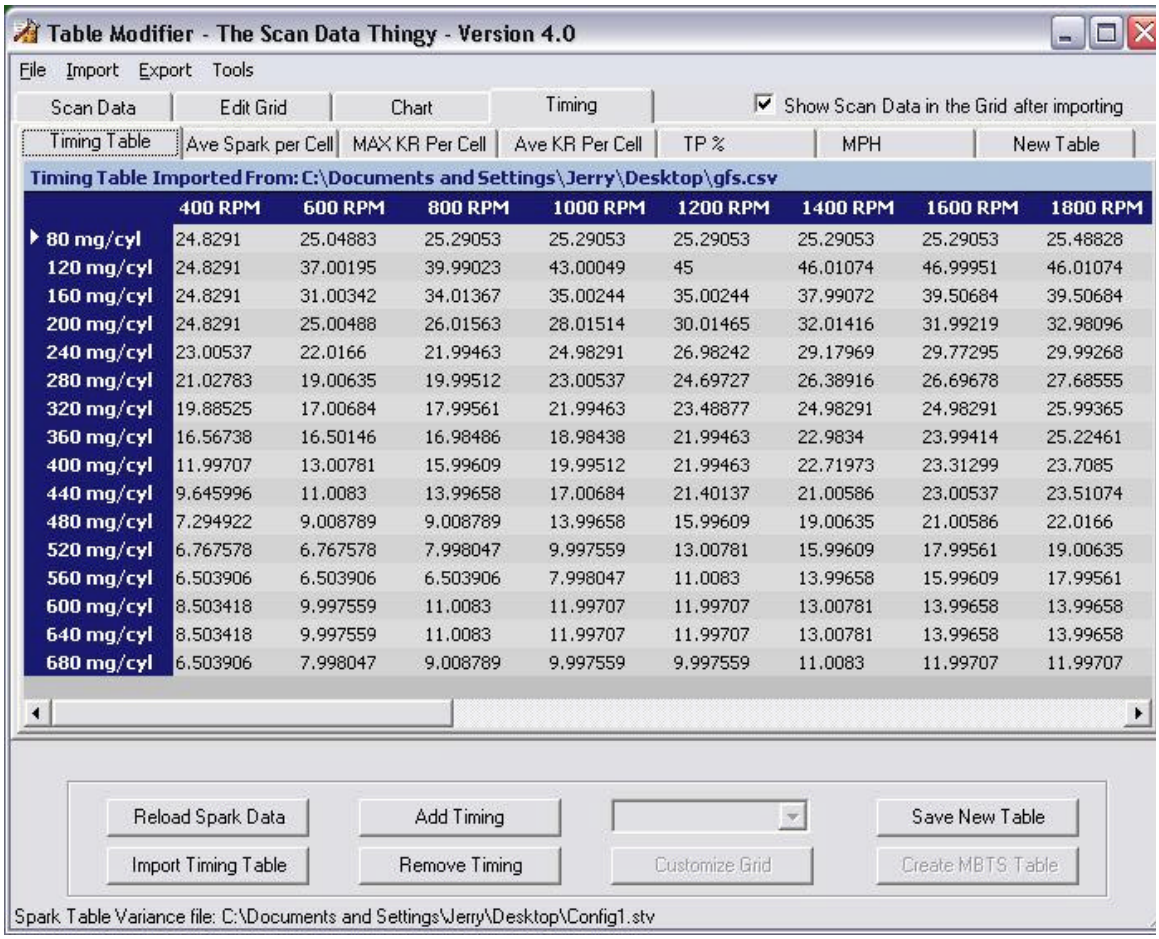
If you are scanning using all the standard parameters outlined in "how to do a good scan", all the right parameters are already in place for you. Next, let's prepare for the timing tune by exporting into CSV format the following files:
- GFS
- MTBS
- MAF

Once you have done this and created the log(s) of your scan in CSV format, there is one file to create before creating a new timing tune... and this is called a Spark Variance Table. What this is, is simply a file that looks at the % variations in the fields between the GFS and MBTS tables. When you make changes to the GFS table, the program will create a new MBTS table for you based on the same variances that exist on the stock tables. It is disputed whether or not this has any advantages, but it certainly has no apparent disadvantages and it offers me a level of comfort knowing that these % differences between the stock GFS and MBTS tables are maintained in the newly created tables. You create this variance file by making sure that the TIMING tab is selected and then clicking on FILE and NEW SPARK VARIANCE TABLE FILE. Follow the prompts after that.

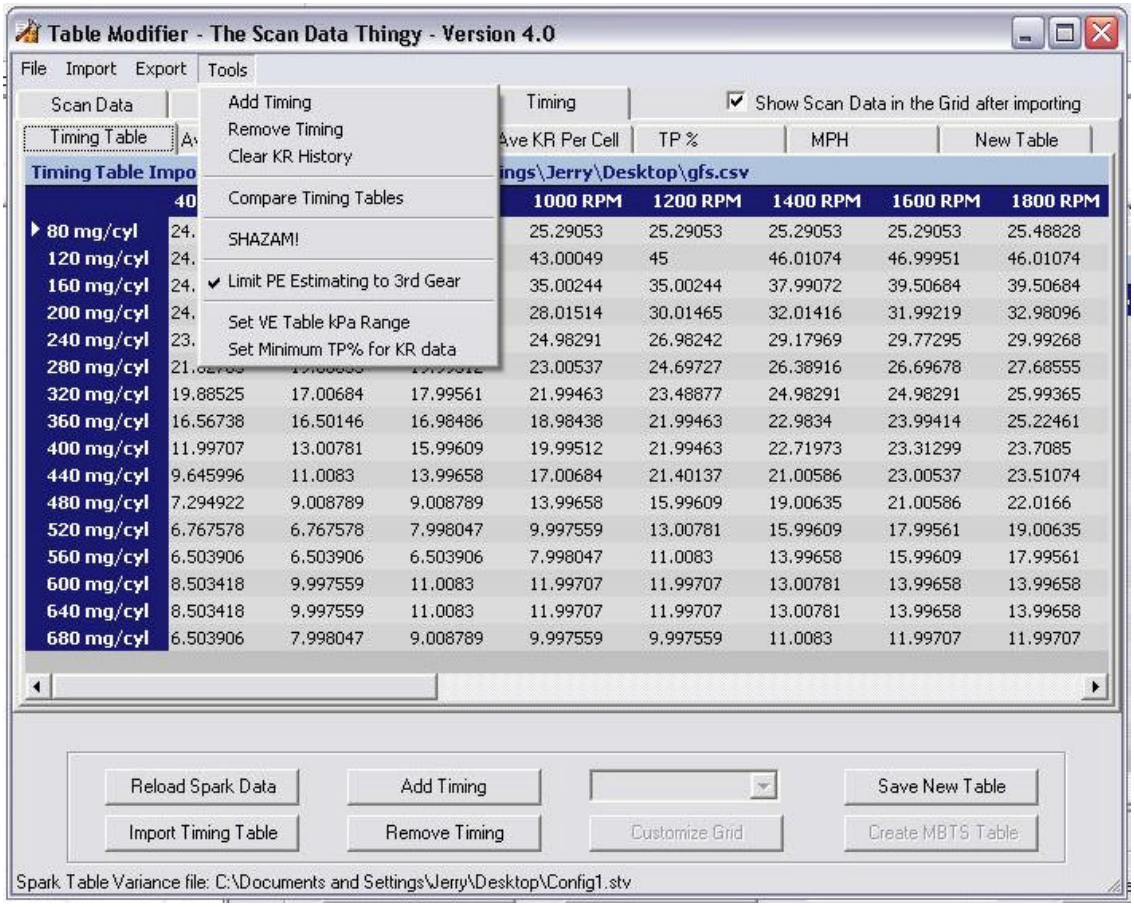
So, lets do a single timing tune. Import your scan log(s) and MAF table into the Table Modifier Thingy and click on the TIMING tab:



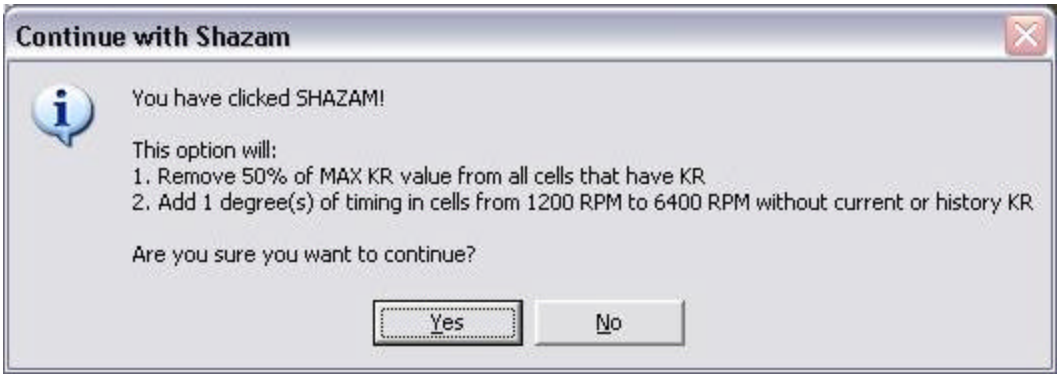
Next click on the Import Timing Table button, and the program asks you to locate and import your GFS table. At that point you can see some info, as displayed in the picture below:



The next little trick for the people who are less experienced in timing tuning is to use a little utility that Eddie put in here for us called "SHAZAM!". What it does is remove 50% of the timing in all the cells that have KR in them and raises timing in all other cells by (the default value is) 1. We can do it in jumps of 2 or more degrees, but PLEASE don't.

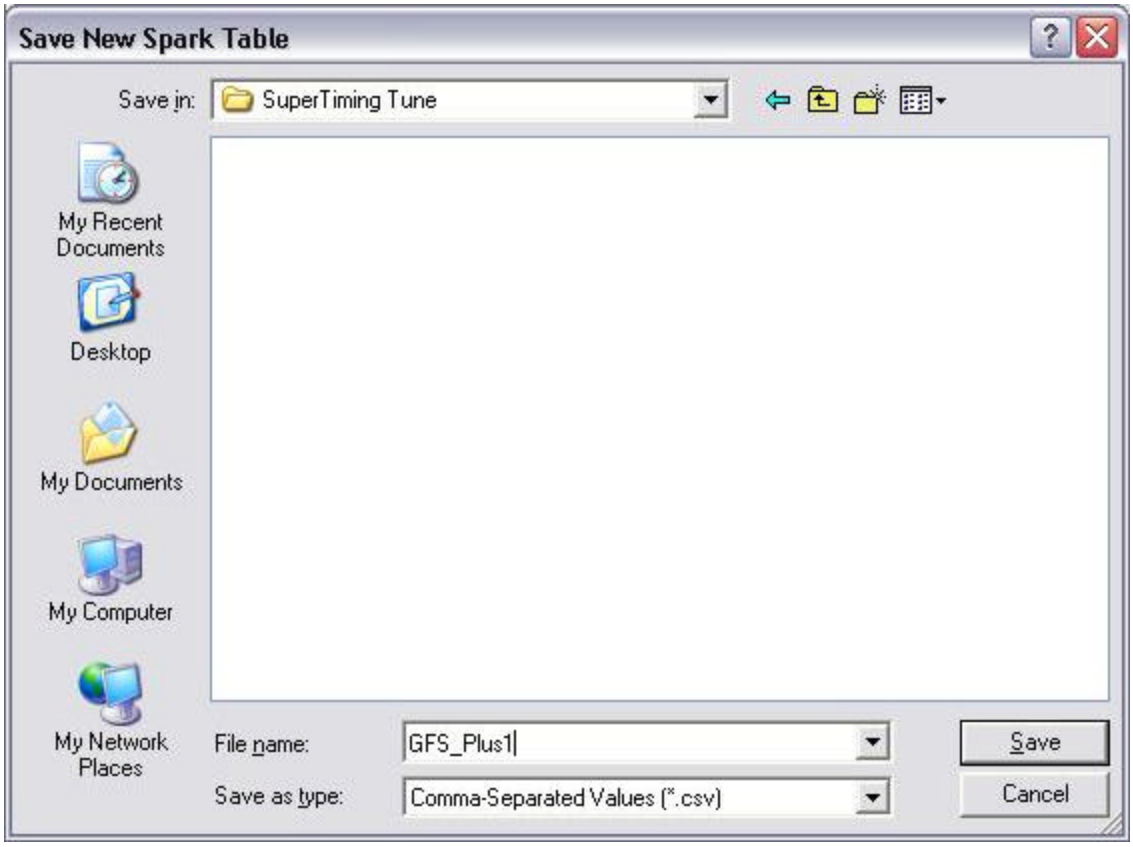


You can select more than 1 degree increase, but if you are new to timing tuning, stick with 1 degree increases.



By default, the PCM will pull around 2 degrees of timing for every degree of knock it detects. This is important to know so we remove just enough timing to reduce or eliminate KR.

Once the new table is created, we save the new GFS into a known location all ready to be imported into the BIN via the PT.



You are now ready to import the new Good Fuel Spark table into your BIN and the process starts all over with a scan. Since we are not modifying the fuel tables, there is no reason to reset the fuel trims between flashes. Start a scan, and do this process over until you are within the parameters outlined above.

Advanced users will not need the Shazam option but will alternately use the RAISE

TIMING or LOWER TIMING individually and via experience and knowledge of how their car responds, and will get excellent results as well. In a future addition to this page, I plan to add one cycle of a timing tune based on a real scan.

Nov 22/06: I've noticed that no matter what the table values are, if they are over 50, the maximum permitted timing is 50 and never over. This is good because there are currently cells in my MBTS table that are over 60, in an attempt to maintain the stock ratio between the GFS and MBTS tables. Normally I can catch that 50 degrees of timing on deceleration or very low RPM and low loads along with nearly no throttle. I found that adding timing in increments of 1 degree at a time is safer, if a little longer, but the results are better. If you add timing, never add it to cells that contain KR and in fact, as a second step, remove 50% of the KR values from the timing to get rid of the KR in that cell.

TUNING YOUR TRANNY TABLES
(incomplete)

Purpose: To **Address transmission settings used to set up the car to my personal preferences.**

Just a temporary place to save this info that I found on the DHP site... This is not the page as it will be when completed!

One needs to be aware of a couple things

First of all, there are two MPH settings for shifting PER SHIFT MODE TYPE.

A shift mode is 'performance', 'normal', 'cruise', etc.

Performance mode is when you have the performance shift pin configured and engaged.

Normal mode is no Performance shift and normal driving

If you have a performance shift button, I recommend using the Performance trans options when editing as that way you'll have 100% stock settings for your "normal" shift patterns when you are not in performance shift.

If you don't have performance shift and don't want to figure out how to wire it up, etc, etc, you need to edit the "normal" shift properties.

Now to adjust shift points, there are two things to consider : MPH and RPM.

Lets start with MPH.

In the 'Normal" section of the trans categ ory you will see settings for 1-2 Shift MPH, 2-3, 3-4, 3-2, 4-3, 2-1, etc, etc.

1-2,2-3,3-4 are upshift while 4-3,3-2,2-1 are downshift.

When you open the table, you will notice that it has multiple values. These values are by TPS %. Essentially the lighter you are on the gas, the sooner it shifts (and the softer the line pressure). Modifying this table will affect your PART THROTTLE MPH shift settings.

When you got WOT, this table is notused. IF you look carefully there is another setting in there called 1-2 WOT Shift, 2-3 WOT Shift, 3-4 WOT SHIFT, 4-3 WOT SHIFT, etc. THESE are looked at in a WOT condition. When you open this value, it is a single MPH. This is the MPH that is looked at to determine if you need to shift when at WOT.

(NOTE : Based on what you are saying, I think that THIS setting is wrong or too high for your setup. The reason why it shifts when you let off the gas is you are no longer looking at THAT value and you are falling into the upshift table and at x% tps, you have met the MPH and it upshifts)

Now, the other area to look at is RPM. As with the shift mph there will be a 1-2, 2-3,3-4 RPM variables. These ONLY applly to WOT. Some cars ignore these values and solely go off of MPH settings. Some cars take an average, and some cars go off of RPM... You should set these to a value that is the equivalent of the MPH you set in the WOT MPH values that correspond.

Other things to consider .... Rev / Fuel Limiters.

Realize that in cars that make a lot of power, there is a very real possibility that the engine RPM will exceed what you are setting the shift at in the PCM. The reason for this is while the trans is working on shifting, you are still accelerating the engine (if you are at wot) and it will continue to climb RPM's.

A lot of modified 3800 SC's with higher gears see this a lot on the 1-2 shift as climbing a couple hundred RPM is nothing for them. If you have the ign/fuel "rev" limiters set very close to the expected shift point's RPMl, you are asking for trouble.

For instance, if you have a SC 3800 with a 1-2 shift point of 50 MPH (6050 RPM) and your rev limiter is 6200 RPM, there is a very real chance that you are going to hit that rev limiter. You have two options here : either increase the limiters or lower the shift points and realize that the engine is actually going to rev up higher and that will get you to where you need to be..

Tuning For Mileage
(never quite complete)

Purpose: **To discuss tips and ideas on how to tune for increased mileage**

Well... this is going to be a page of suggestions because nowhere will you find greater variations from car to car than in discussions concerning fuel mileage and economy. There are a slew of things that you can do that help you increase fuel mileage. I do them mostly during the winter months for a few reasons:
- I decided to use lower cost 87 octane in the colder Canadian winters because I can get away with it successfully.
- I use narrower winter tires and cannot put the power to the ground, so why waste it fuel and tire life even trying?

So, in point form, here are some ideas that you can implement to increase your fuel mileage. Enjoy!

Tuning Tips:

- VE will change in colder winter months, its a good idea to optimize it for the colder air, so do it again. Make the trims as "perfect" as you can.

- Check your LTFT/STFTs after doing the VE, you will likely need to do a complete MAF tune afterwards as well. Make sure the trims always lock in at zero anytime you are in PE.

- Keep out of PE as long as possible! Reset your PE ENABLE TPS % back to stock or as close to stock as KR permits.

- Use the stock 195 degree thermostat. Not only will it aid in making the car heater significantly warmer, the car will give you better mileage with a hotter T-stat than with a 180, more so if temps drop under the 20F or -10C ballpark. While we are on the topic, never ever use a 160 any time of the year, unless you live somewhere that the average winter temps during the winter are over 85F and the summer months are much hotter. No matter what T-stat you use, make sure the PT has the correct temperature ranges for the T-stat that is installed in your car.

- Make sure your IFR is the correct one for your car. This does 2 things. First is that your DIC indicated mileage indicated will be pretty accurate, and second is that it will be better able to meter the fuel out more accurately. Stock injectors = stock IFR.

- Run the biggest pulley you can. I run a 3.4 in the winter, but if I still had my original 3.8, that's what would be on the car.

- The boost valve mod is reversed. Meaning that most lower the boost valve so that boost comes on sooner. Mine is raised as far up as I can make it. This not only reduces the chances of part throttle KR but makes it a little more difficult to get into the boost at lower throttle settings, hence increasing mileage.

- Addition to the above boost valve mod... disconnect the connector so that you are limited to a maximum of 3-4 PSI of boost

- Run the narrowest snow tires and lightest rims you can for mileage reasons and the fact that narrower tires run through deeper snow better than wide ones.

- Make sure all 4 tires are at 35PSI. An under inflated tire not only runs hotter, it increases drag significantly.

- Reset your tranny settings to stock (if you have performance shift, just reset the NORMAL mode). The stock factory settings are already designed with economy in mind and are quite good. I would not play with the TCC to lock up any earlier nor get the car to shift into 4th sooner. Its not always the best to be lugging the engine at low RPMs. In fact, what I still suggest is that 4th gear low RPMs still disengage the TCC a little sooner than factory because I found that I can get up the steep hills at lower TP% levels then of the TCC was locked, car is in 4th and the engine is lugging. Experimentation on your end will decide what is best for your car. Another related hint is to decrease shift speed. Slow, smooth shifts mean slipping the clutches longer and that is keep you from applying the power sooner. Perhaps decrease them so that they are quicker than stock but NOT harsh.

- Limit boost to as low as possible by disconnecting the boost solenoid. This limits you to 2-3 PSI of boost. Watch your O2s, they may rise a lot and you may have to increase the Base PE A/F (lean it out). While you are playing with the Base PE A/F, you may need to lean it out a little more due to the cooler air and less boost, so feel free to lower your summertime optimum O2 numbers by at least 10-20 (KR will be your deciding factor as to how much you can lean things out).

- You may wish to lean out the fueling only slightly and increase timing. The O2 vs timing is a juggling act... be careful to not go to the extremes with either parameter.

- Timing: You can likely get it 2-3 degrees higher during cruise during the cooler winter months than in the summer heat. In low RPM and low load situations you should be able to touch 40-43 degrees of timing. If you can maintain 39-40 degrees of timing while at a steady 60MPH cruise, consider that excellent. The stock timing for my 99 was between 25-28 at 70 MPH. I realized quickly that I could easily run 35-38 degrees without KR. That's a **HUGE** increase, and was worth an easy DIC indicated 2.5 MPG increase for my car right there! I found that the 05GTP timing tables are near perfect for my car in the winter months running on 87 octane. The only thing is that I reduce WOT timing from 21.5 to between 17-18 degrees as a safety factor because I use 87 octane. I then tweak areas between 1600-3500 RPM

for slightly additional timing without inducing KR. Makes the job that much easier. I avoid the low RPM areas underneath 1600 for the simple reason that the stock 05GTP tables are already much more aggressive than my '99 tables and I do not wish to introduce the chance of low RPM/high load KR. You can make it even more aggressive on the low/no throttle or decel settings of 50 degrees timing. This is about the maximum permitted by the PCM.

- Insulated air intake. The colder the air coming in, the better. This goes for the summer months too!

- Setting your AE tables back to stock or as close to stock as possible is great. Nowhere will we use greater fuel than at acceleration and during the winter months, we should be able to do more with less. Get those tables back to as close to stock as your car permits.

- PE RPM vs TIME: A very difficult one to suggest for the simple reason that there can be wild variations between the stock tables and the "CCB Vrooom v.1" type tables. I will make a suggestion for you to try though... it is often better (and definitely is safer!), to run a little richer and increase timing than it is to lean things out and lower timing to accommodate. Use that tip to your advantage.

- PE A/F vs TPS table: For me, I used to have massive flash KR using a 1999 bin, but this table in stock form, contributed to good mileage. A fair compromise would be to leave it at the stock settings between 0-25% TP and then drop it drastically to 2002 bin values at TP % values of 30% and higher (this is still theory as I have not tested this yet).

- Remove things from the car that unnecessarily add weight (do you really need those 200lb subs in there during the winter?)

- Try a lower grade of octane (when possible, not everyone has cold winters and can get away with this one). I run 87 in the winter safely enough, but with lower timing across the board, and definitely very difficult to go over 18 degrees timing at WOT without an intercooler.

- Very cold days making your car take longer to warm up? Use a block heater. Add a 5 dollar timer and a nice 30-45 minutes of the block heater turned on will make your car's warm-up time drop by 50-100% depending how cold it really is.

Driving technique is paramount and can likely make the biggest difference in your quest for good fuel economy. You have suddenly just started driving almost like a little old lady. By this I mean:

- No burnouts, no races, heck no hard acceleration (nothing over 25-35% TP). This one has to be the hardest to accomplish for us performance enthusiasts.

- No hard braking.

- Any throttle movement is slow and steady, you learn to compensate by looking farther ahead. This is a proper/safer way to drive anyways. If you want to take it to an extreme, imagine a raw egg between your foot and the gas pedal (lol).

- Hill coming up? Increase speed a few MPH now instead of fighting to maintain speed going up the hill. Going down that hill, do not go over your speed unless there is another hill right after that. If there is no other hill, do not let the car accelerate over your cruising speed by more than 2-3MPH and slowly regain your cruising speed.

- Your cruise control will never give you economy as good as your right foot can for the simple reason that it cannot look down the road and predict in advance and plan for changing conditions and road elevation changes.

- Speeding will cost you big MPG losses fast. Approximate an easy loss of 5-7 MPG drop between 60MPH and 75MPH. In a rush? Leave earlier and don't speed. A 15MPH difference over the average 30 mile commute saves you a mere **7.5 minutes but costs you 5MPG or more!** Leaving 15 minutes earlier gives you the theoretical equivalent (in terms of arrival times) of you having traveled over 90MPH with a **ZERO** loss in fuel economy!!

TUNING Hints

(Always in a state of growth!)

Purpose: To outline all those little pieces of info that I have picked up here and there over time either via experience or from the many excellent people that I have met in the tuning world.

-> Here is a scan, what do I do?: Generally there is an order to tuning. That order is:
- Get the LTFTs under control
- Set PE to enable at the right point
- Get the LTFTs to lock in at 0 consistantly
- Get anything that leans fuel out or disables injectors out of your bin
- Get your WOT O2's dialed in for your car
- Address any torque management or torque abuse issues
- Remove the speed limiters
- Raise timing without increasng KR
- Address transmission parameters to increase performance and/or mileage

This is the general order of things. Some may want to change the order a little to suit their tuning style... your car, your tune.

-> How do I calculate the perfect IFR for my car?: There is no ONE perfect table for all cars, but here are a few tips... Stock injectors? STOCK IFR! You have a GTP and are moving from 36 to 42.5 injectors? Math is your friend... divide your old injector size by the new injector size to get the variance. For example: 36 / 42.5 = 0.847. So... your new IFR table shall be 84.7% of the old table (highlight all cells in the IFR table, right-click, select CUSTOM, click on PERCENT, enter 84.7, click ok... Voila, your new IFR table near perfectly matched in a few seconds!). It may or may not need to be touched up. It depends on your car.

-> Why do I want to be anal about my idle/cruise LTFT/STFT trims?: When the PCM doesn't need to correct for large variances, it responds faster. The less correction it does, the less chance unwanted tuning artifacts like flash KR appear. You want to have the idle/cruise values lightly negative. Less chance for flash KR if you are starting out from an over rich condition versus an over lean condition. The car is also closer to a perfect state of optimization. Now... how important is this and will it make my car any faster or slower if my idle and cruise trims are way off? Hell no, it will not completely kill WOT performance, thats a different part of the tune... but f I know its starting off from a massively lean or massively rich condition, it cannot be very optimized. If lean, it invites the potential for KR and/or flash KR. If rich, I sit at red lights with fuel pouring out my exhaust tips... But it *is* important for the LTFT and STFT to be NOTHING BUT 0 anytime in PE mode, though!

-> Why do I want my trims to consistently lock in at 0 while in PE?: The amount

that they lock in, if other than 0, is the amount that the entire tune is off by. This can cause several annoying to dangerous conditions. If your perfect theoretical O2 is 940 and you are locking in at -5, your O2s will be lean and locking in at around 890. Not only that... now you want to compensate for that low O2 and raise your Base PE. This may raise your O2s but can often cause your injectors to work harder or possibly cause them to go static. We all know what happens to an engine that runs out of fuel at high load/RPM conditions.

-> How to get your trims to consistently lock in at 0 while in PE? : To get the best possible results, your trims NEED to be as good as you can get them beforehand. That means that your idle and cruise trims should be between -5 and 0. If you do not know how to do this now, LEARN how before proceeding any further. Also, reference either here on in the tuner guide HOW to do a proper scan. Bad scan, bad tune, simple as that. Concept: The moment your forced induction car passes 100 MAP(kPa), you should enter PE mode and the amount by which your trims are off is the locked in amount that your tune will be off from that point all the way up. Minimum to scan for this: MAP(kPa), LTFT, STFT, MAF Hz. You want as much resolution at the 90-110 Map(kPa) as possible. Right at 100kPa reference your LTFTs and at what MAF Hz things are happening. If you are locking in at -1.5 (as a random example), you will want to see at what Hz you are hitting 100kPa and at that point in the MAF table remove 0.5 to 0.75 percent for every percent the trims are off by. Feather in the changes above and below as many as 2-3 cells in each direction on that MAF Hz cell in the MAF table so as to not get any big dips or spikes. If your car locks in at 100kPa, awesome. 99% of the time it will now stay locked in all the way up. If it skews off again higher up, I believe that either your original MAF table is not the right one for your car or you made un-needed changes to the MAF at that level or your car is doing something different. Repeat the process but at the point where the trims stray away from 0. My belief is that if this "straying" happens, either your IFR, VE, MAF or any of several other tables could be doing something to make it harder for you to lock in consistently. Experience with my LQ4 and N* as well as stock TB and MAF tell me that once you are locked in, it STAYS locked in and doesn't vary up higher. You have it right when the LTFT and STFTs are both 0 consistently anytime you touch PE mode.

-> How do I know where to set my PE_Enable TP% at?: You want to get into PE the moment you are at 98-100 MAP(kPa). Reference your scan (good scan, good tune!) and see where your Map consistently touches 98-100... cross reference your throttle position % at that line and make that your position that PE is enabled at. This may be great for a performance tune, you may wish to consider raising it 10-15 % for a gas mileage tune in situations where doing this will NOT cause any form of KR to appear.

-> My idle and cruise trims are great, but I need to raise my O2s, what are the ways that I can do this?: Assuming that your car is in GOOD MECHANICAL TUNE, there are 4 ways to raise O2s:
1 - Increase your Base PE

2- Increase the MAF hz range from 7000-11500... but always feather in those changes!
3 - Increase the PE_RPM_vs_TIME table at strategic points
4 - Increase the 100kPa cell of the IFR by adding 5 to whatever number is there and scanning. Don't go beyond +15 as a general rule.

Recently someone on the club had issues raising their O2s. A good MAF cleaning and suddenly their O2s raised by 20 points. Although there are many products on the market, no matter what you use, make sure that your product is O2 sensor and fuel injector safe. I highly recommend the GM CLEENS product.

-> CCB's VROOOM V.1.0 PE_RPM_vs_TIME Tables

It is important that we maintain steady O2 levels throughout a WOT run and in this tables, I suggest that if you are N/A, I would ask that you start the first column off at 0 and DECREASE each cell to the right by .1 (ie: 0, -0.1, -0.2, -0.3, all the way to -1.25, etc...). If you are supercharged or turbocharged, the decreases drop by .2 (ie: 0, 0.2, 0.4, 0.6, all the way to -1.25, etc...). I found that on my car, drops of 0.1 were perfect with a 3.4 pulley, but as soon as I put on the 3.2, the drops of 0.2 were needed to maintain an even O2 at WOT. Of course, these are baseline suggestions and it is possible that you will need to touch up the files to suit the performance characteristics of your car based on your needs. It is also **VERY** important to note that since we are basically starting out from a 0 instead of a -0.5 or so, to drop your BASE_PE_A/F by at least 0.5... as an example, if you were previously at 11.7, you will have to decrease your BASE_PE_A/F to 11.2 for best results.

CREDITS
(incomplete!)

Purpose: **To give credit where due.**

A lot of people put their blood sweat, tears and countless hours of time and fuel just for us to have the info on these pages. I would like to publicly thank the following people for their contributions that made this site possible.

If you feel that your name should be on the list and it is not, please let me know and it would be my pleasure to add it. Though I will try to make sure this list is as complete as possible, no one is perfect. Send me a PM on the club or an email, and it will be my pleasure to add your name to this list of distinguished people who made higher levels of tuning possible for all of us.

DHP forum user names are used in no special order other than being alphabetically sorted:

Blemke
CCB (Colorado Cool Breeze)
Eddie-98GTP
Electric97
Foghorn
Gibson
JeffsGTP
JerryH
MAPEX
Webracin'

Many others contributed here but their names are unfortunately missing

Gentlemen, thank-you all !!