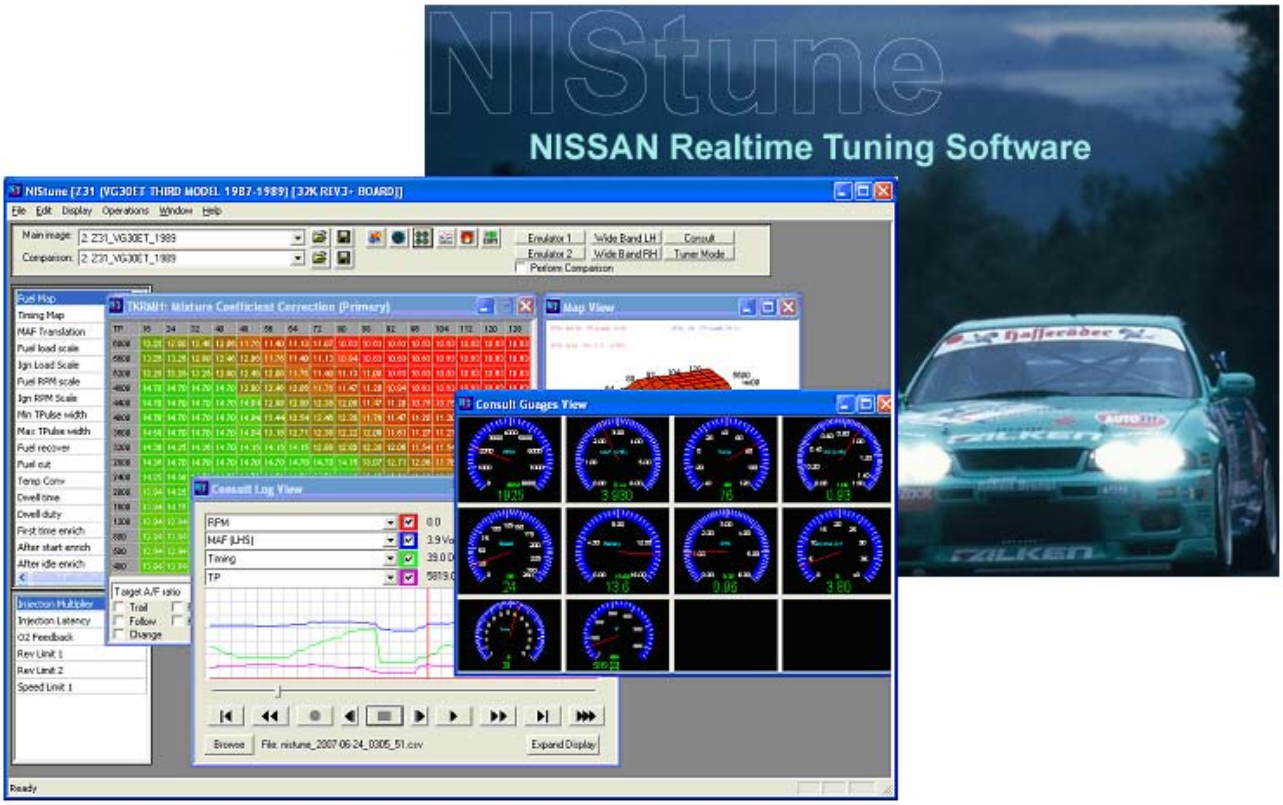
NISTUNE

REALTIME ECU TUNING



Users Manual V1.3

INTRODUCTION

Welcome to NIStune.

The NIStune hardware and software solution provides a means for the car enthusiast to retune their vehicle whilst retaining the factory ECU and its default programming.

This solution provides many advantages over aftermarket ECUs in that the factory default tuning is maintained once the NIStune board is installed. Upon installation of the board the vehicle will be operational as usual.

NIStune provides real-time tuning and maptracing. It provides the ability to make changes on the fly to the factory ECU and when the desired results are achieved, save these permanently in non-volatile memory on the programmable board.

Contained in this manual are the instructions for getting started with the NIStune software.

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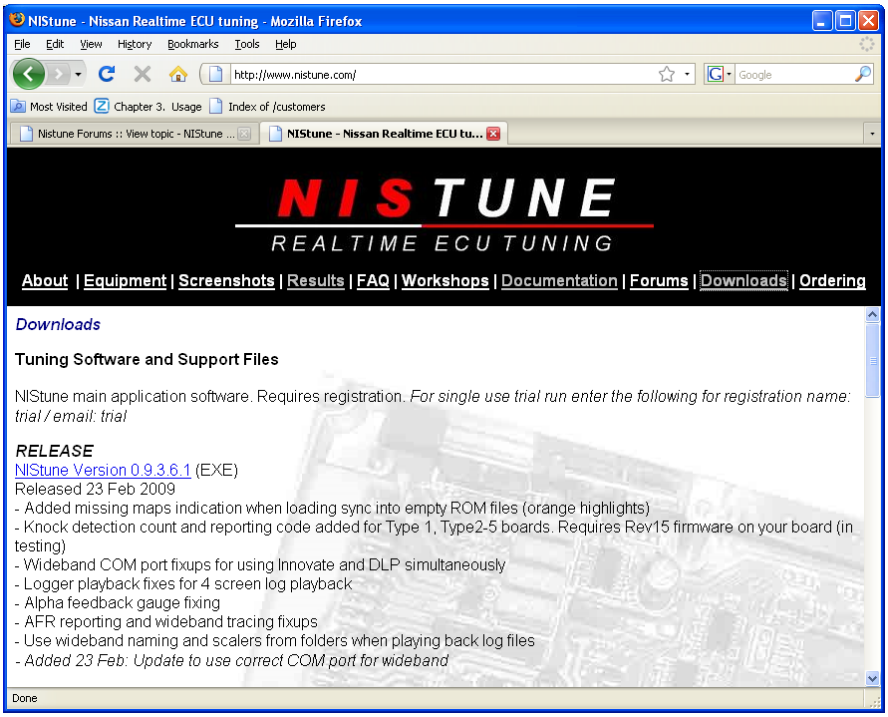
TABLE OF CONTENTS

1. Downloading NIStune 6
2. Software Registration 6
3. Initial Startup 7
4. Open Address File 8
5. Loading ROM Files 9
   - Load ROM Image from file 9
   - Load ROM Image from ECU 13
6. NIStune Real-time Tuning Boards 15
7. Using Emulators with NIStune 17
   - Configuring NIStune for your emulator 17
   - Connecting to emulator 18
   - Maptracing with emulators 18
8. Using Consult 19
   - Resync Maps 19
   - Consult Display 22
   - Consult Gauges 23
   - Log Player / Recorder 23
   - Burn permanent changes 25
   - Copy selected maps 26
9. Map Grid Operations 26
   - General 26
   - Map Editing 28
   - Graph Editing Functions 28
10. Resize Injectors 31
11. Injection Multiplier adjustment (AKA K Constant) 33
12. Injector Latency Adjustment 36
13. Change Mass Air Flow Meter 37
14. MAF pinouts 39
15. Configuring Wideband Auxillary Inputs 41
16. Change Base Injector CC size or AFM Offset in Address file 46

1. Downloading NIStune

1. Download the latest NIStune software from our website, under the **Software Download Directory.**



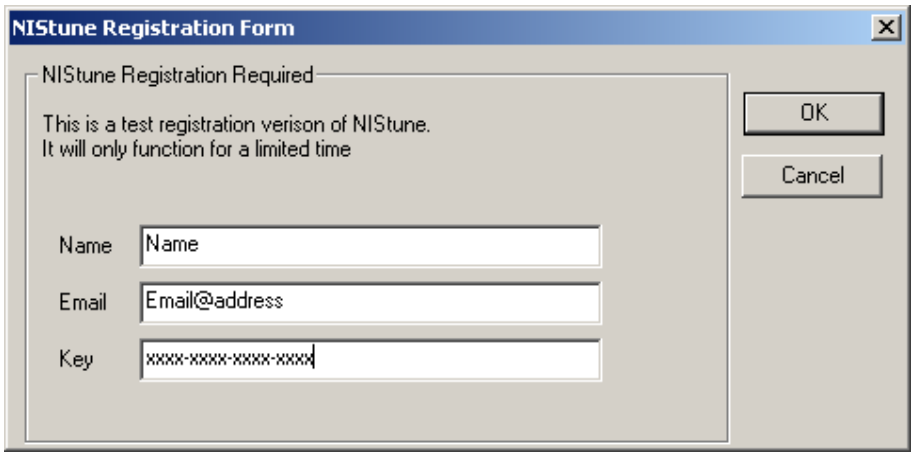
2. The latest version will be called **NIStune_X.XXXX** in this directory. Click to download. Save this file onto your laptop computer and execute (double click) to install. The software will install and create a desktop icon.

After installing NIStune, double click the NIStune icon from your Windows menu or desktop to start.

2. Software Registration

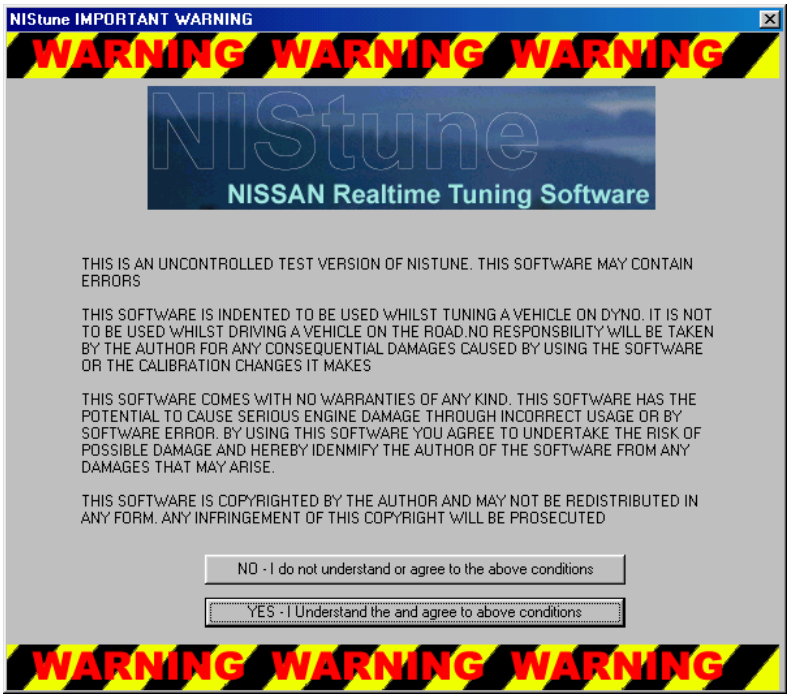
The first time you run NIStune, you will be required to register your software.

Enter your Name, Email and key provided in your NIStune Registration email and click ***OK***.

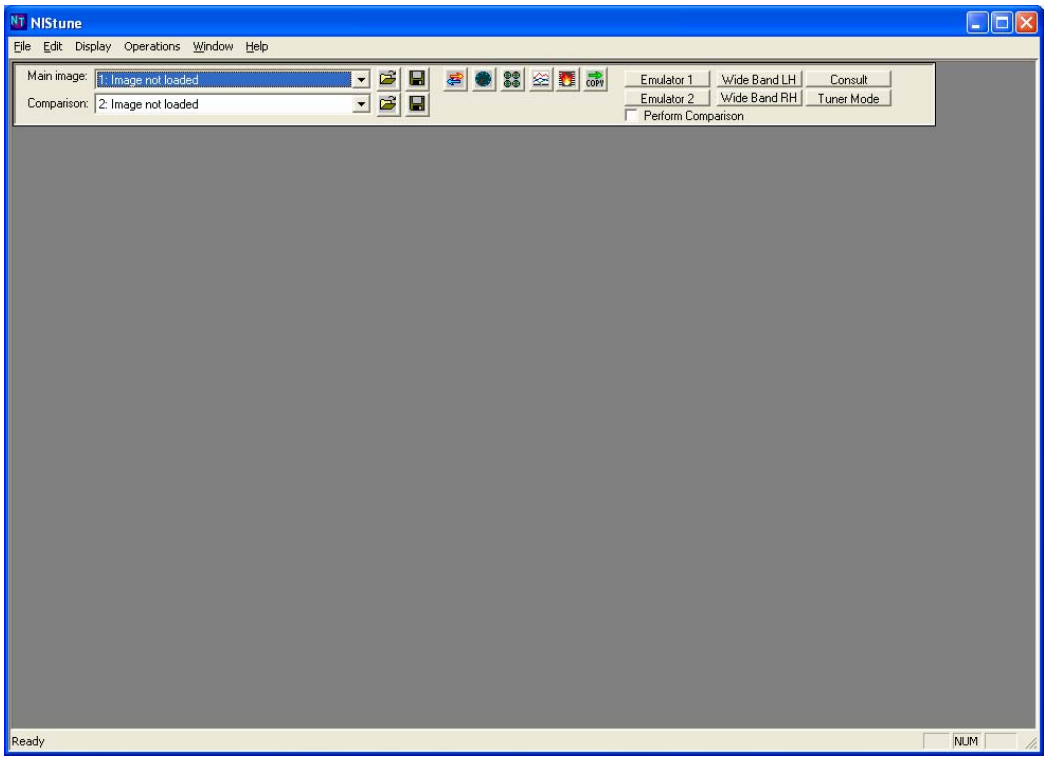


3. Initial Startup

Read the agreement on the WARNING page and click ***YES*** if you understand and agree to the conditions.

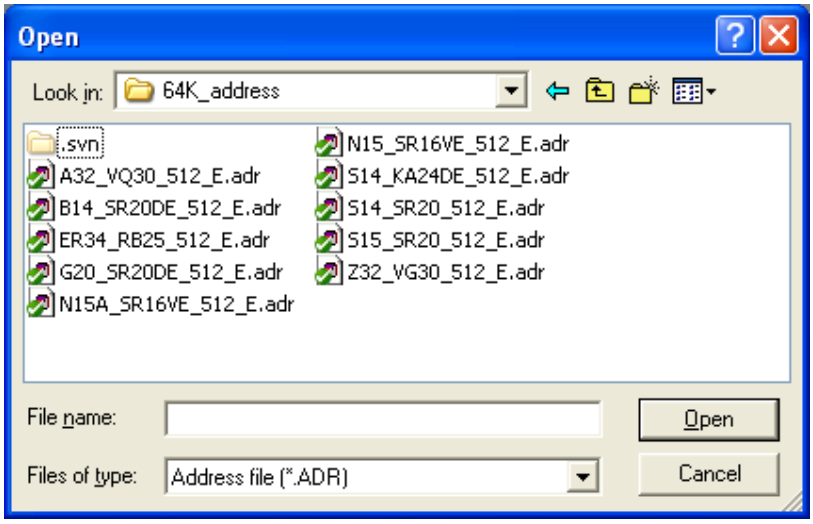


The following screen is the main screen for NIStune. You need to open an **address file** and **image** for your ECU type before doing anything else.



4. Open Address File

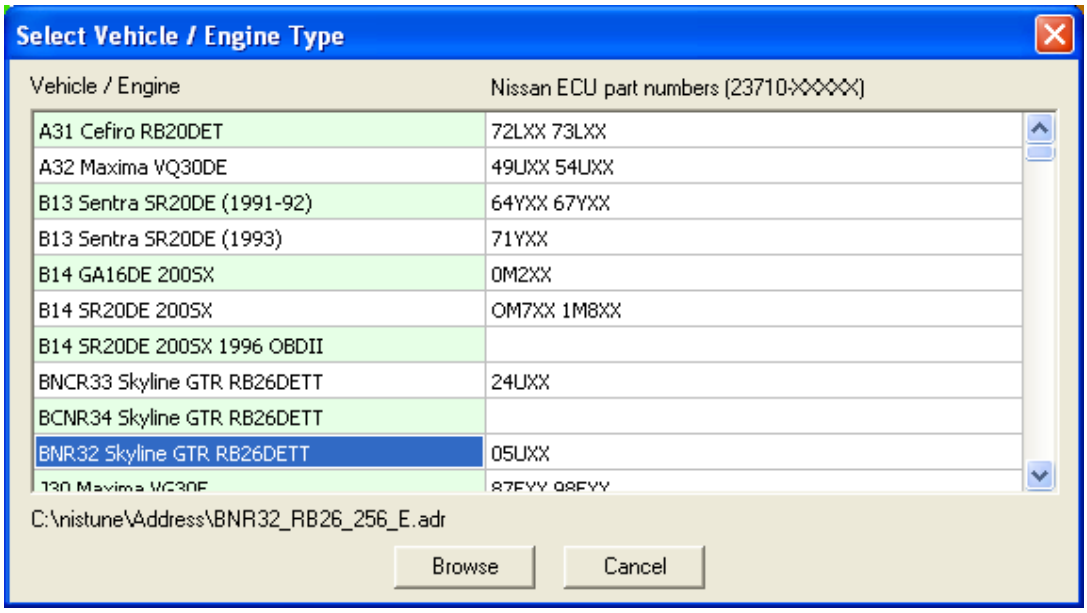
Select ***File, Open Address File*** and open the address file (xxxxx.adr) for your ECU. This is a file format based on an extended version of the original ROM Editor address files.



Next, load the ECU ROM data into NIStune.

Note: Updated Nistune versions now have an ECU selection window which will list the vehicle / engine types and select the address files to use for you. These versions come supplied with address files as part of the installation package and separate address files are no longer required

Address selection screen below:



There are several ways to do this, depending how you plan to use the software.

5. Loading ROM Files

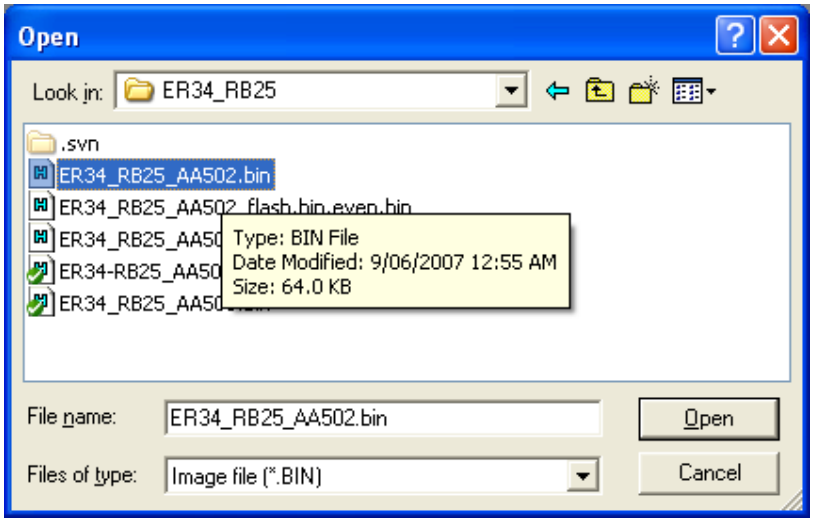
To either edit a ROM file that you already have from an ECU, or to use an emulator compatible with NIStune, you will need to load the ROM file first.

NIStune has two methods of opening ROM files. Either load the file directly from your hard drive/memory device or connect to your ECU and download directly from ECU.

- **Load ROM Image from file**

Normal Files

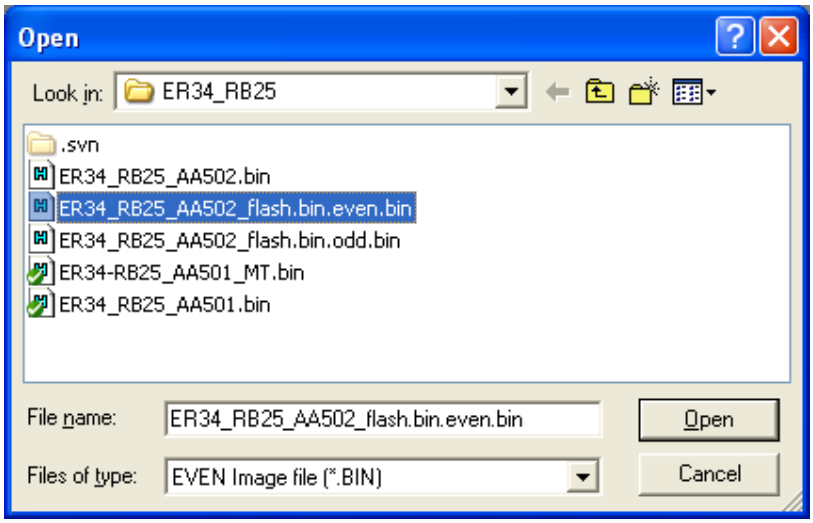
Select ***File, Open***



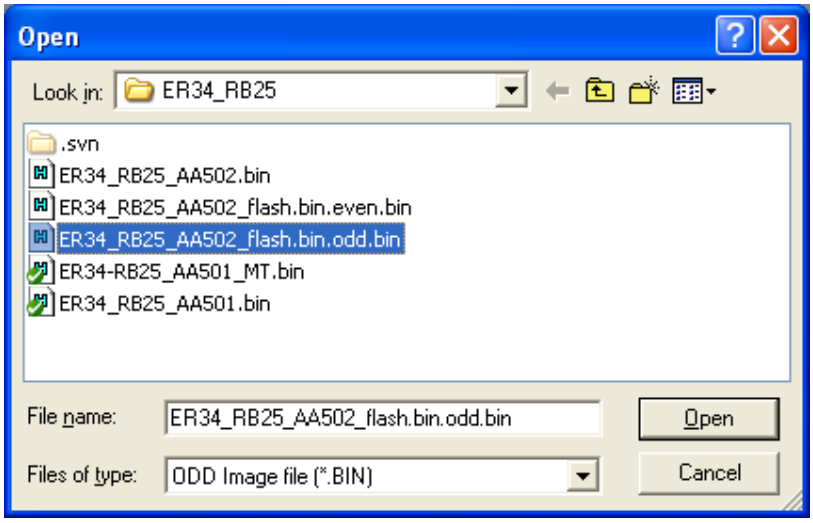
Odd/Even Files

If you have a daughterboard which takes ODD/EVEN chips for 16 bit ECUs then you might have two separate ROM images that need to be loaded.

Select ***File, Open Odd/Even Files*** - First selecting the ***EVEN*** file:



And then the ***ODD*** file:



The files will automatically be merged together.

Important Notes on Loading Synced Files

Why are these notes important?

We recently identified an issue in which users were using updated address files, and were also loading BIN files that came from previously synced images read from the ECU (using older address files).

This resulted in new maps being populated with empty data (i.e. the value 255).

This can result in problems, because empty maps uploaded using newer address files can in some cases cause flooding, improper timing values or excessive charge time for coils.

What are synced files?

Synced files are files which are blank ROM images (i.e. a file filled with 255) that only has ***some*** of the available maps in the ECU stored in it.

These synced files are created when a user loads an address file and uses the Nistune sync button to read from the ECU into an empty ROM image. It has been common practice until recently to do this.

How are synced files identified?

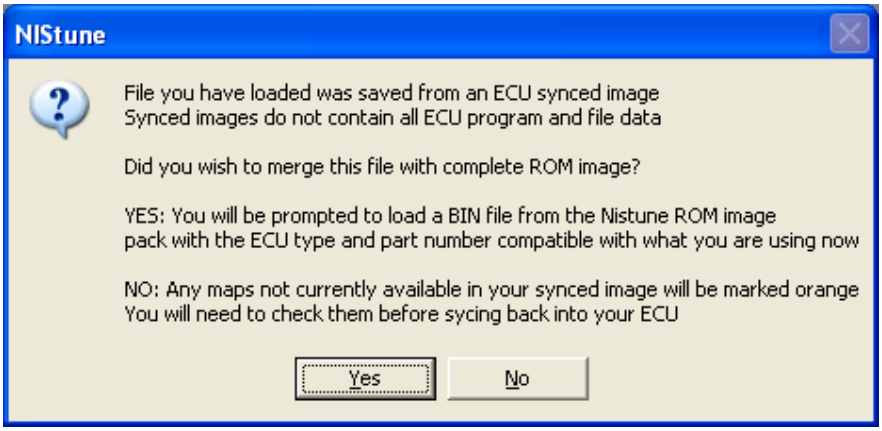
Synced files are identified by missing ECU firmware normally contained within and other miscellaneous maps and tables which aren't listed on the screen for the address file you have selected inside Nistune. We identify the image as being synced by checking the end of the file (vector tables) to see if they are empty. If they are empty then the user will be prompted when using the later versions of Nistune

How is the user notified of synced images?

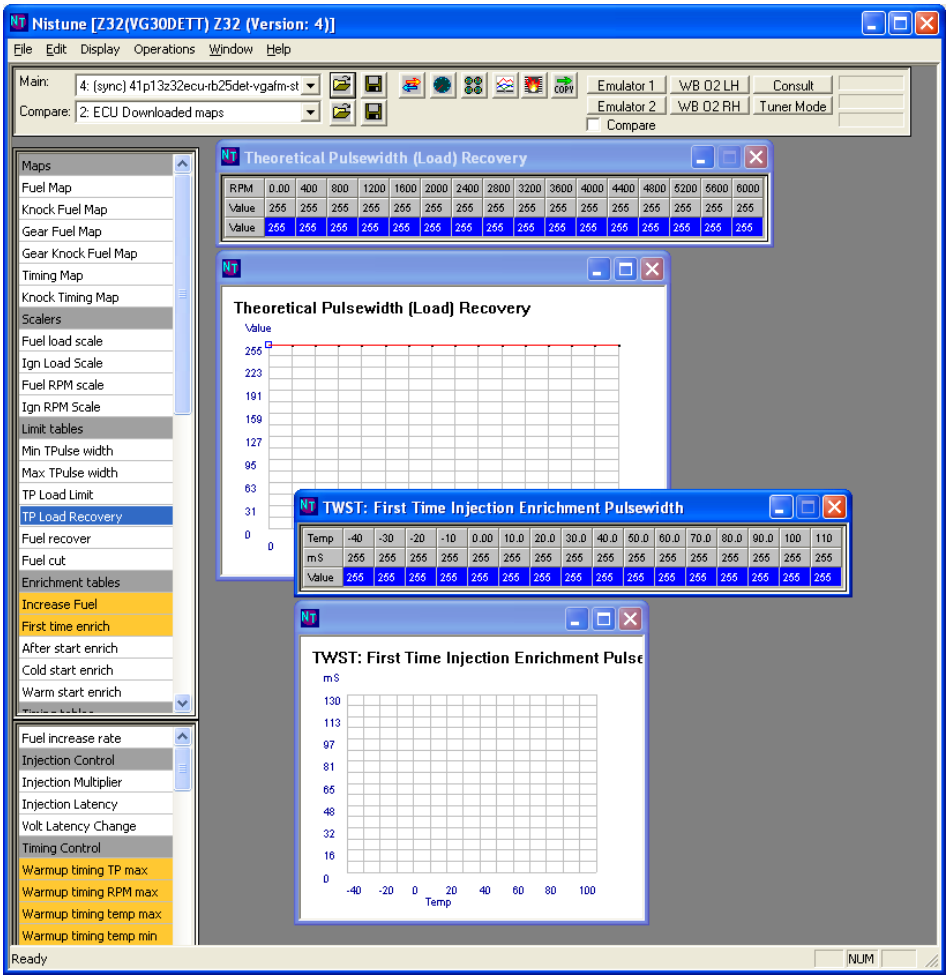
The user will be notified when first opening the file that the file is a synced image. They will be given a choice to either continue with the synced file, or to merge with an existing ROM image

We recommend that the user merge with an existing ROM image so that they do not run into the danger of uploading empty maps to the ECU and stopping the vehicle from running or otherwise causing potential damage.

The prompt box below will be displayed:



If the user clicks 'No' then the filename will be appended with (sync) at the start. Any maps which have been identified as possibly being blank will be highlighted in ORANGE.



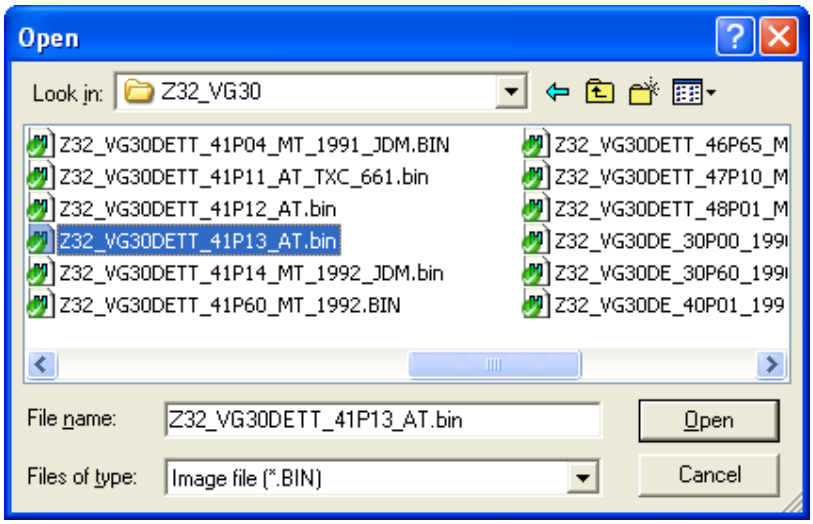
As can be seen from this Z32 ROM image loaded, we have updated address files to include TP Load Recovery, First Time Enrich and Warmup Timing tables. These type of tables are now empty and filled with the 255 value.

If this image was uploaded then the warmup timing functionality would not work properly and first time injection may result in flooding of the engine.

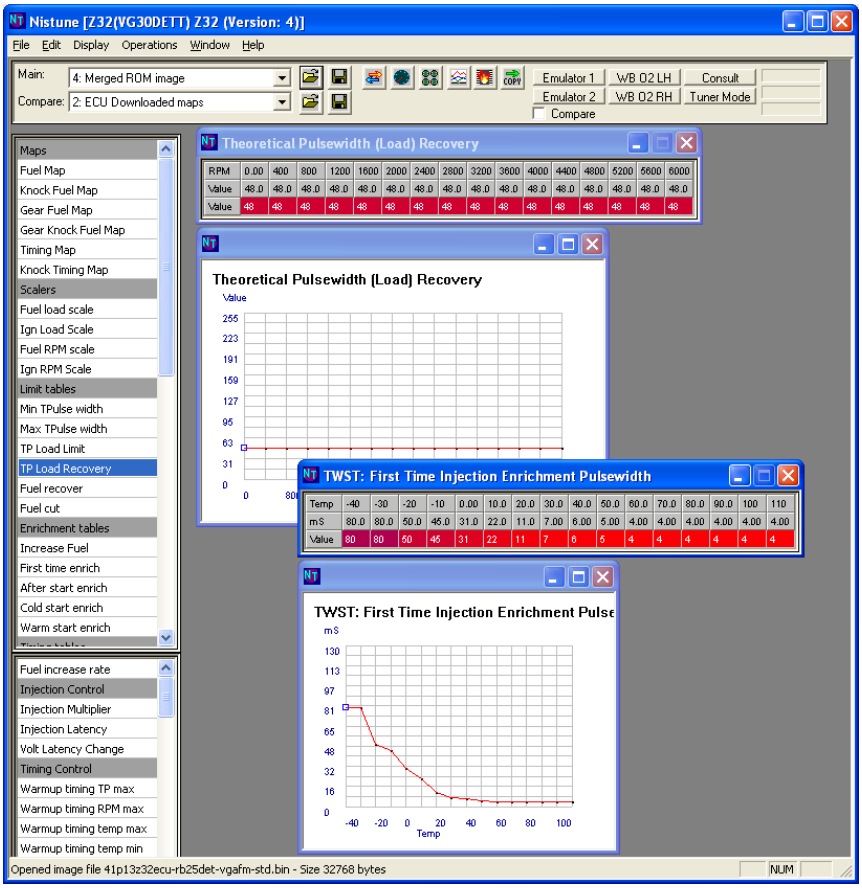
Those identified potential problematic tables are highlighted in orange and require fixing. We suggest using the merging feature when first opening the file to fix this. The merging feature will attempt to automatically load (if possible) or prompt the user for a complete base image ROM file.

These ROM files are available from the Nistune ROM image pack available on our downloads page at www.nistune.com

Clicking 'Yes' on merge question above after loading the synced file, in this case prompts us to load a file:



After doing this, those orange tables are fixed up properly as can be seen in the screen shot below.

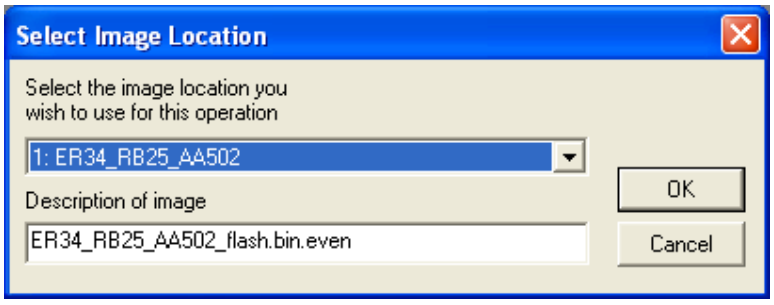


- **Load ROM Image from ECU**

You must be connected to the ECU before this operation is possible: **see Ch 6 "Connecting"**

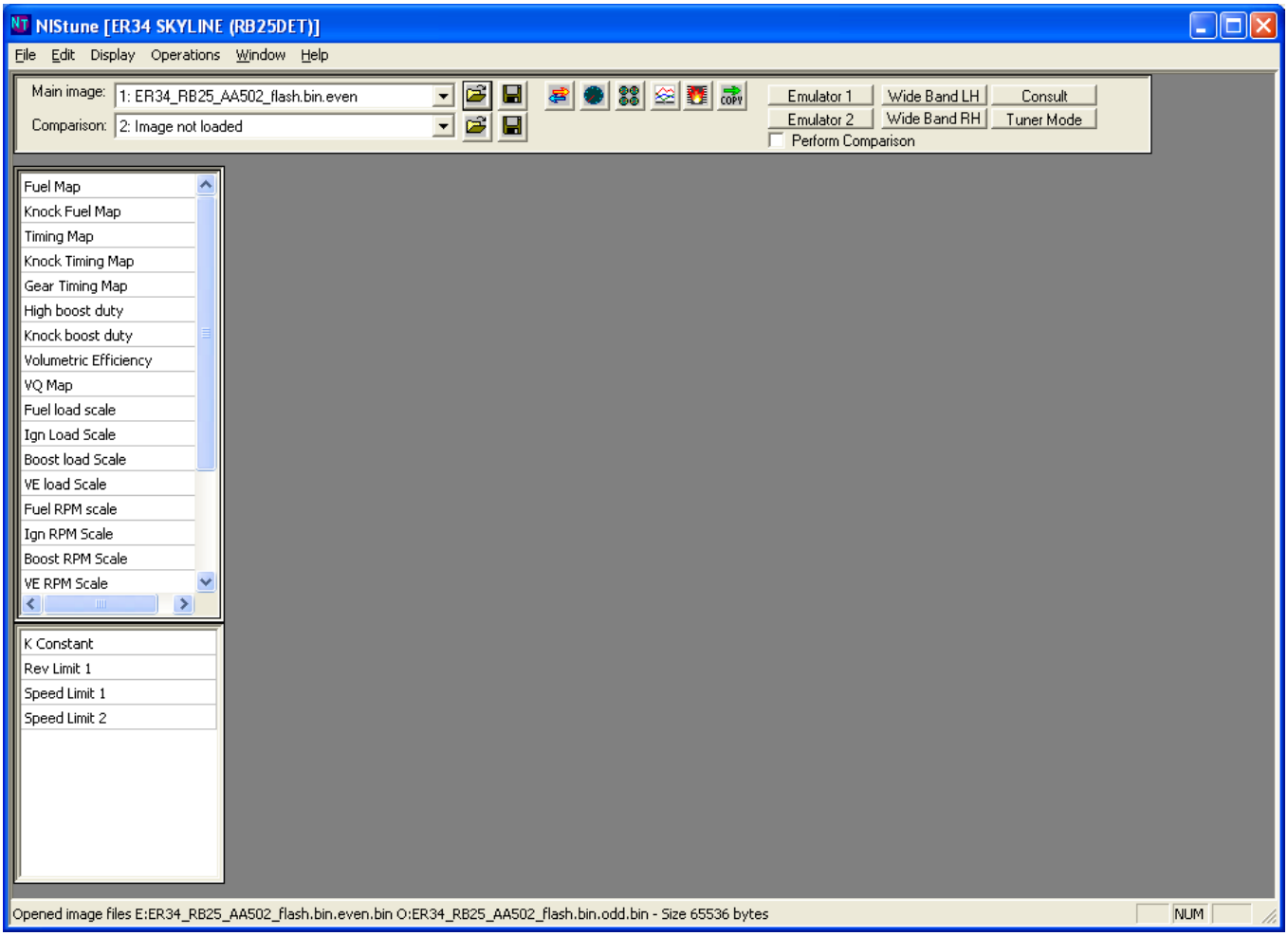
To upload the entire ROM image from the ECU select ***"Operations, Consult Download".***

NIStune can provide up to 5 ECU image locations for storage and comparison. When more than one image has been updated you will be asked where you wish to load subsequent images. You can change the description of your image file if you wish.



Tip : Avoid overwriting your original ECU image. If you will be modifying your maps then always save the image under a new name as your first step.

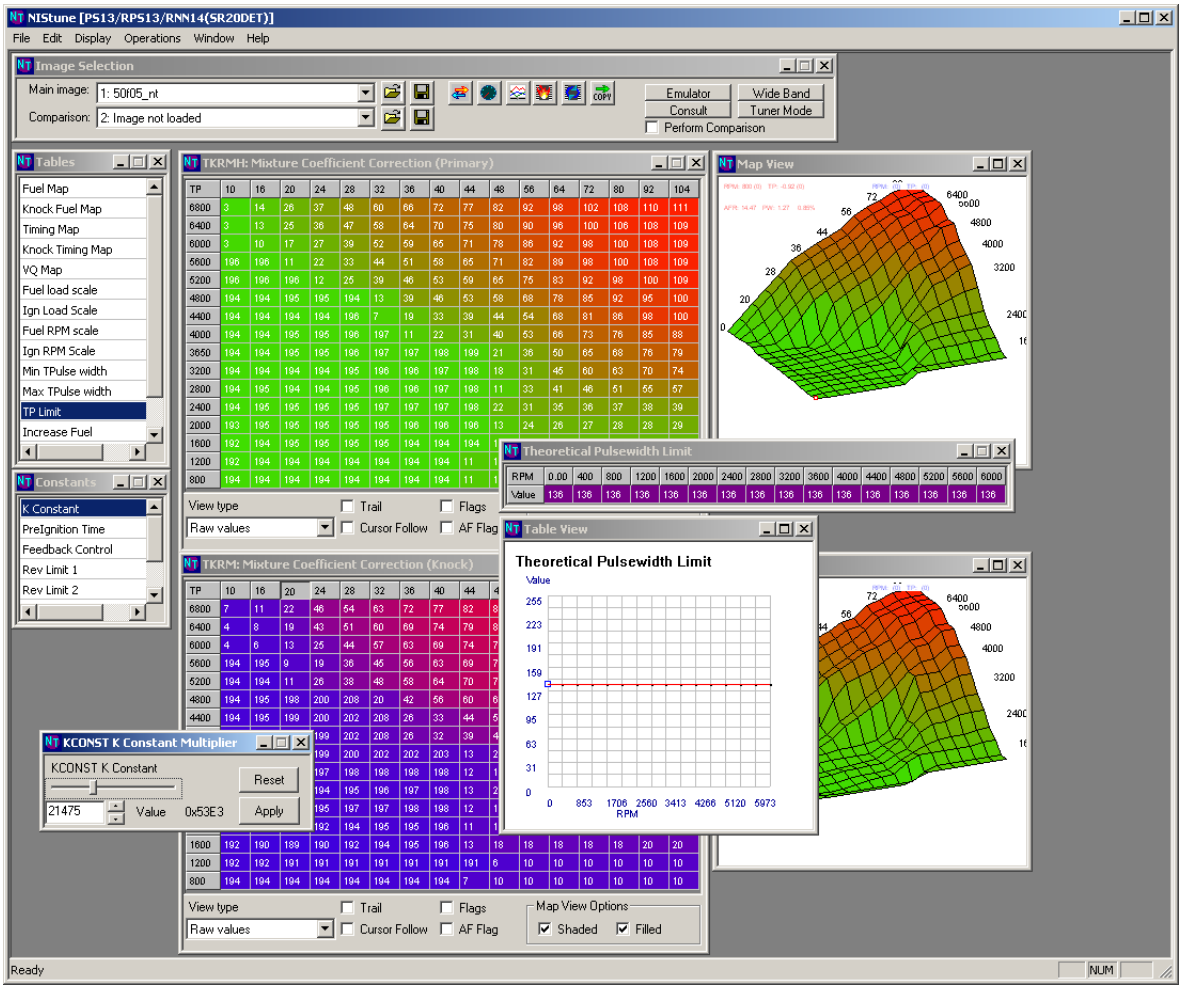
Lists of constants, tables and maps of the ECU are now available for viewing. Click on the object of interest to view the data.



6. NIStune Real-time Tuning Boards

If you have purchased NIStune with a Real Time tuning board, then you are able to tune without loading a binary file onto your ECU or the need for using an emulator or EPROM chips.

Your NIStune board comes pre-programmed with a base ROM file, matching the part number for your Nissan ECU (or closest match to your vehicle). Use the ***Re-sync*** button to retrieve the maps from your vehicle.



Ensure that ECU is connected to vehicle, IGNITION switch is on, Consult connected.

Type 1, Rev 1/2 boards:

*Ensure Pocket Romulator connected and click the **romulator** button in NIStune. This should autodetect which serial port the Pocket Romulator is connected to and establish communications. It will highlight **red** when connected.*

*Next click on Operations – Romulator Upload. A progress bar replacing the **romulator** button will be shown until upload is completed. This will put the NIStune maptrace modified ROM image into the romulator for the ECU and NIStune board to use.*

Type 1 (Rev3), Type 2, 3 or 4 boards:

Your board is already loaded with a base image from factory. No uploading to the board is required

Next switch the IGNITION signal to ON to turn on the ECU, so NIStune can communicate with the board.

Press the Consult button, this will change to Consult / USBConsult and turn RED to indicate things are connected. A consult display window will appear. You may now start the vehicle

Known issues:

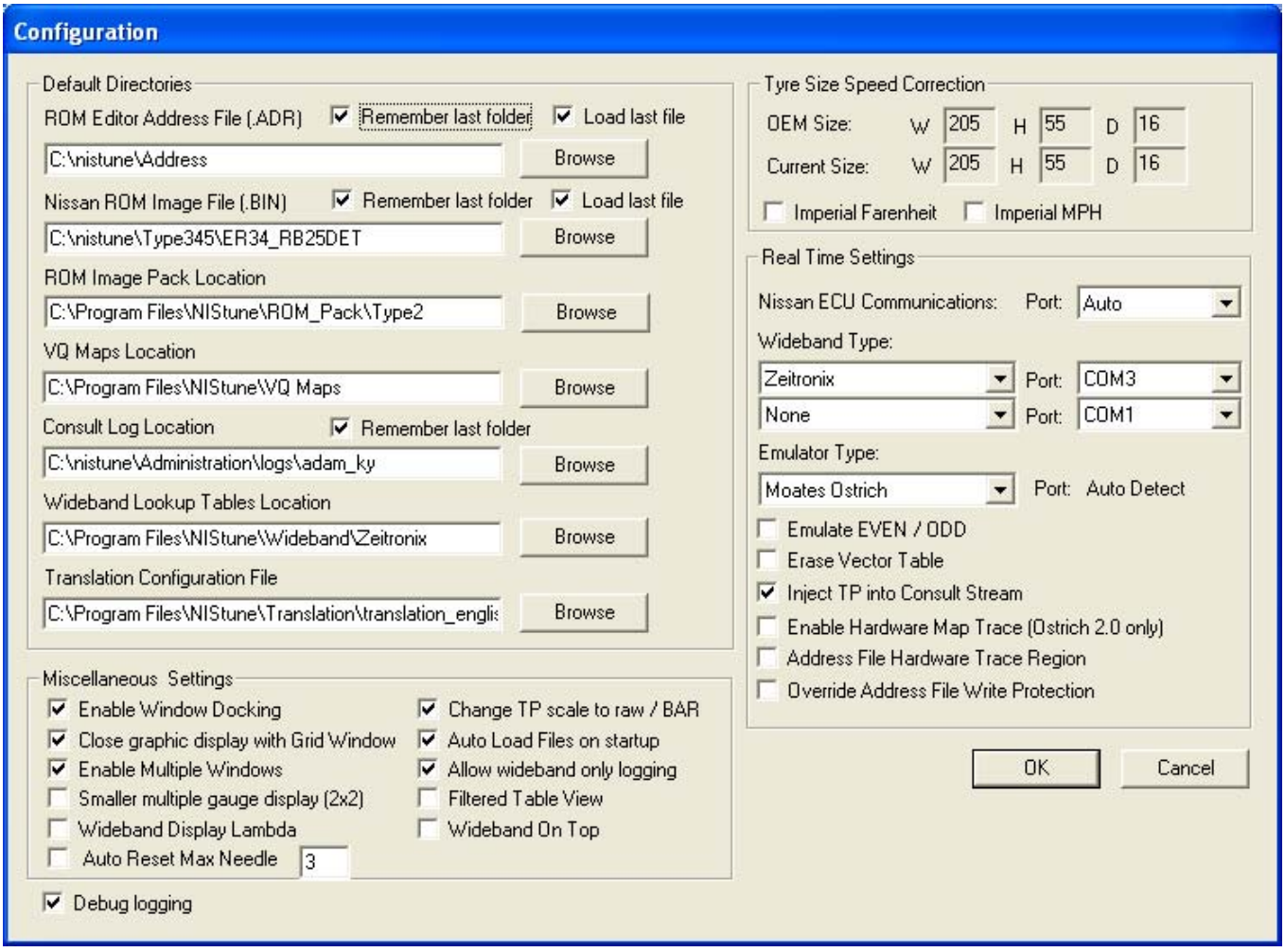
USB Consult: There have been problems starting the vehicle first and then connecting.

Consult: It has been noticed during testing that Nissan consult / eXtended Consult may disconnect during starting the engine.

7. Using Emulators with NIStune

• Configuring NIStune for your emulator

Configure your emulators from the ***File, Configuration*** window



Select your emulator type. This can either be the Moates Ostrich, Pocket Romulator or CalumSult emulator board. You can then configure how you want to use your emulators:

8 bit ECUs (single EPROM chip)
Leave "***Emulate EVEN/ODD"*** off. Use the Romualtor/Ostrich and ensure ***"Erase Vector Table"*** is ticked. This stops the ECU functioning when performing an upload.

16 bit ECUs (aftermarket daugherboard)
If your daugtherboard uses the same EPROM image on both chips, then it is a SPLIT mode daughterboard. Leave ***'Emulate EVEN/ODD'*** turned off.

If your daughterboard uses an ODD chip in one socket, and EVEN chip in the other socket, then tick ***'Emulate EVEN/ODD***'.

Calum Daughterboard
This is a 16 bit daughterboard which is compatible with some Romulator commands. Select 'Romulator Compatible' from the Emulator type. Ensure 'Erase Vector Table' is not ticked.

- ## Connecting to emulator

You can use the Emulator buttons to connect to your emulator (or multiple emulators for 16 bit ECUs) and upload your ROM images to them, and then start the vehicle, ready for real-time tuning.

NOTE: When using 16 bit Even/Odd boards, you need to get the order correct when connecting the emulators. It is suggested that you connect both emulators to the ECU first, only then connect the serial port of the EVEN emulator to your PC. Click 'EVEN' emulator button first and get this to connect. Next connect your ODD emulator to your PC and then click 'ODD' emulator button to connect.

The address file provides all the information to tell NIStune where your maps, tables and constants are located in the ROM file. It also provides a lookup index for real-time maptracing facilities inside the NIStune software.

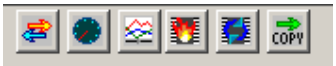
- ## Maptracing with emulators

For later model vehicles which support Nissan Consult, maptracing will be performed via the consult port. This is automatically configured based on address file selected for the vehicle you are tuning.

To increase maptracing speed, it is suggested that you select fewer registers for display/logging to that data overhead is reduced.

8. Using Consult

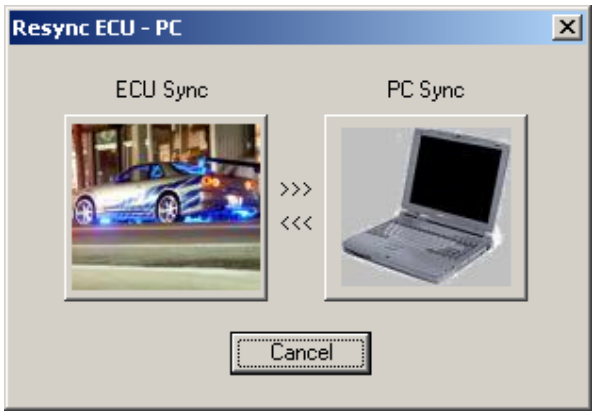
In the ‘Image Selection’ window are a series of buttons to be used with consult:



- Resync Maps
- Consult Display
- Log Player
- Burn changes
- Retrieve last burnt changes
- Copy maps (primary to comparison)

• Resync Maps

Pressing the ***Resync*** button will display the following window



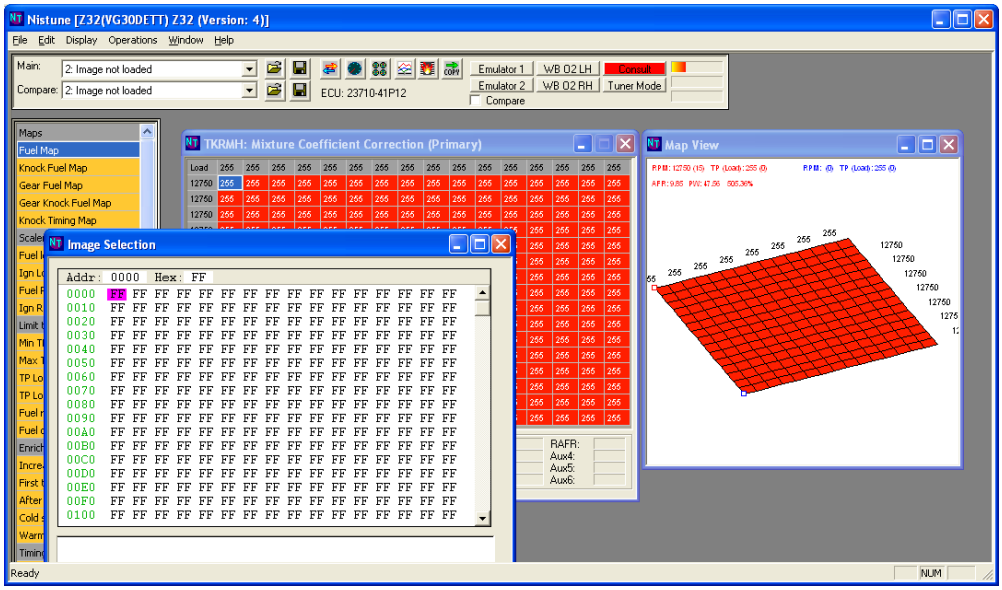
*** ECU Sync :** Copies all current maps, tables and constants from NIStune to your ECU daughterboard RAM. This is not a permanent “burn” – if power is removed then this data is lost unless a “Burn” is performed.

*** PC Sync :** Copies all current maps, tables and constants from ECU to the NIStune software (copies to ‘Main image’). NB: previous main image contents will be overwritten

* Only for use with a NIStune daughterboard or standard Consult at this stage. Emulators will be supported later.

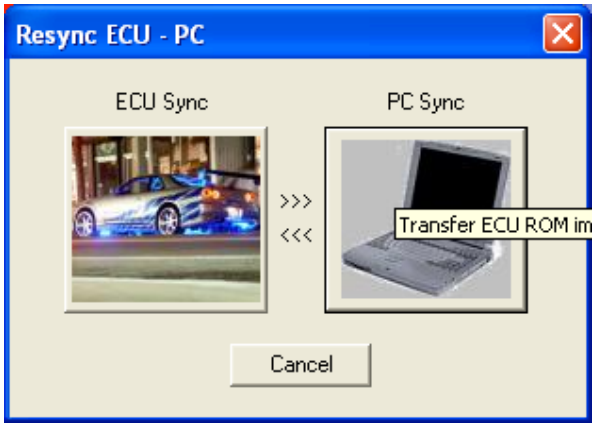
Important notes for resyncing

When you first start Nistune you will be presented with blank maps, they will look like the following



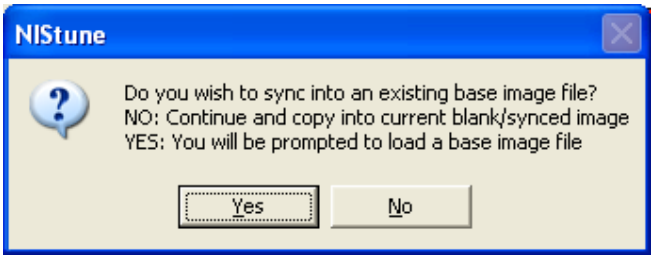
All blank values will have the value of 255 (hex value 0xFF)

When you press the PC sync button



You will copy the maps, tables and constants defined in the currently specified address file. Note:You will *not* be copying everything that is in the ECU.

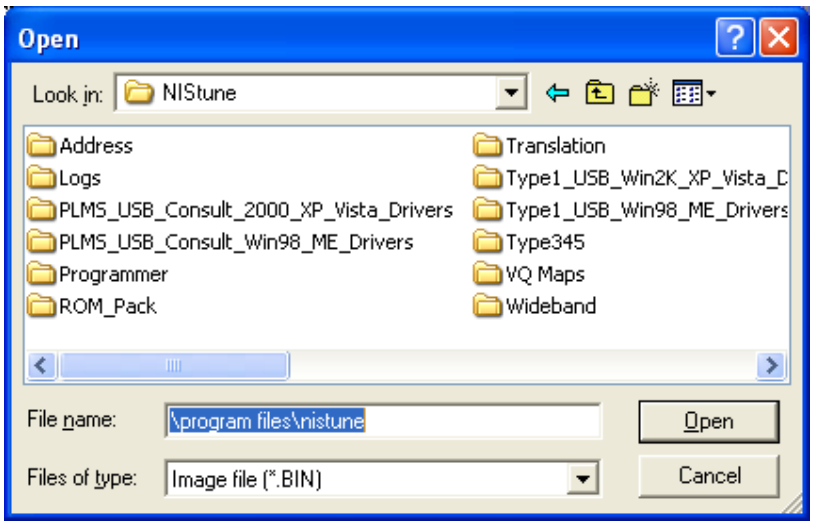
Given this as of Nistune 0.9.5B and later you may be prompted the following:



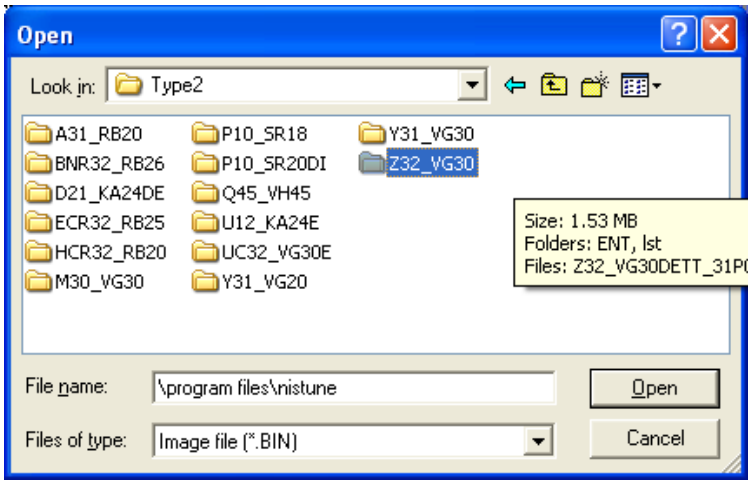
This will prompt you to load a base image for your ECU into Nistune prior to reading your maps out of the ECU. This is to ensure that when you save your ROM files later that they have the ECU program, undefined maps *and* the maps you are now syncing from the vehicles ECU into your laptop.

Note: If Nistune has automatically found a base image in your ROM Image Pack Location (under File - Configuration) then it will look in this folder for a matching ROM file.

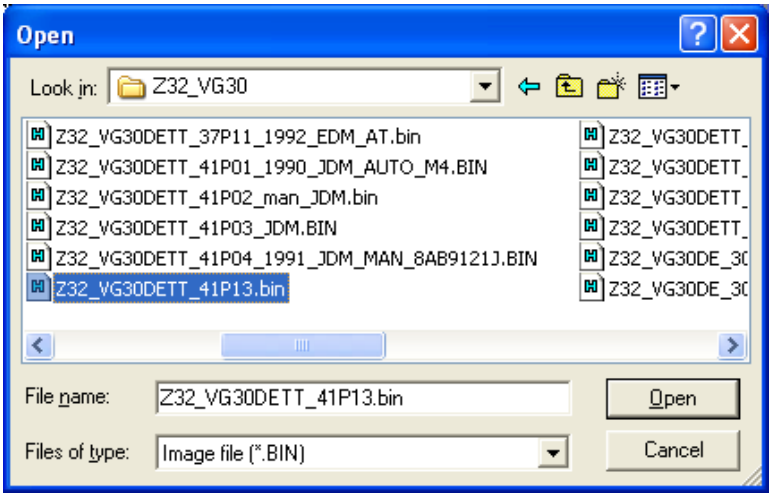
In the case of this Z32 ECU with the part number 23710-41P12 we will click 'YES' and then be prompted with a browse window



We will browse in the ROM_Pack subfolder which gets installed for the ROM Image Pack. If you have not installed, this then install this first and then Nistune afterwards



Our Z32 ROM images are located in the C:\Program Fiels\Nistune\ROM_Pack\Type2\Z32_VG30 folder



Select the closest ROM image for your ECU. The Nissan ECU part numbering scheme works like the following:

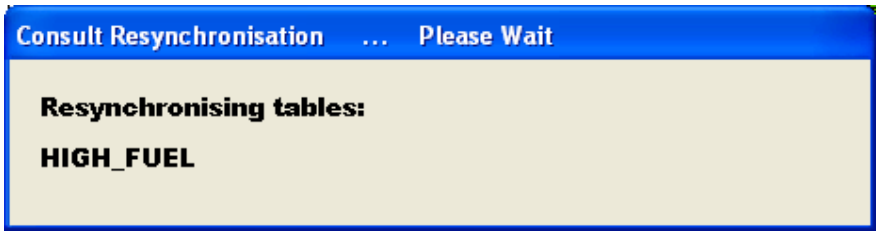
23710 - XXXYZ

Notes on part number:

23710 = Nissan ECU Part number (2371M = remanufactured unit)
XXX = Particular vehicle part number (may differ between different markets for same vehicle, eg Australian Domestic Market [ADM], Japaneese Domestic Market [JDM], European Dometic Market [EDM] and United States Domestic Market [USDM])
Y = Transmission Type (0,6 = manual and 1,7 = automatic)
Z = ECU firmware revision identification (starting at 0 and increasing for later revisions)

So you can use the same XXX number if it has an earlier / later ECU firmware revision number at the end or if you don't care if the maps are for auto/manual transmission then can use a different Y number.

After selecting the required ROM image, then the maps from the ECU will be copied over those specified areas of your base image which you have selected.



You can then save your ROM file to disk for later use.

- **Consult Display**

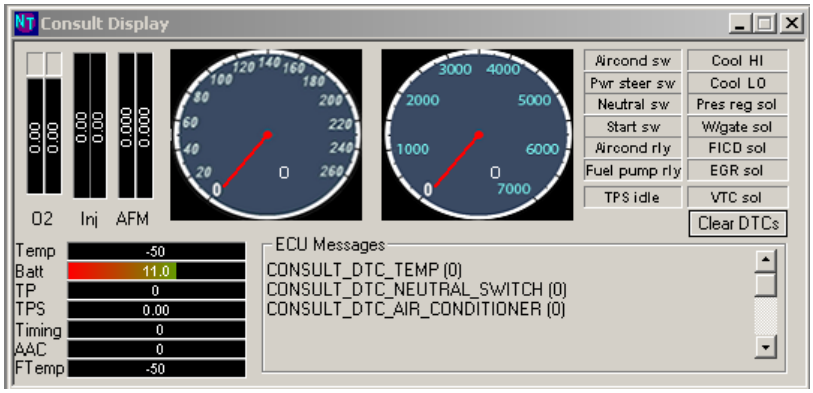
This will firstly prompt for which consult registers you wish to view. More registers selected means slower response times. It is recommended you only view what you need to use.

There are two modes of display for consult,

- Tuner mode and Stream Mode work the same for Type 1 boards.

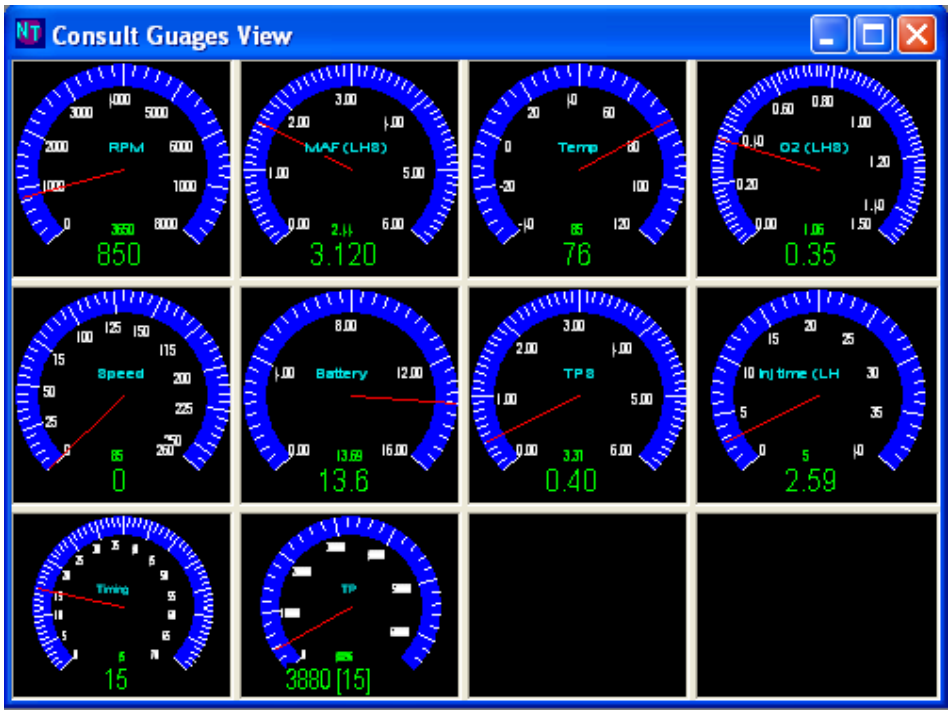
- There may be some items which your vehicle does not support, these will be off by default and not displayed in the available register selection list.

ECU Diagnostic Terminal Code (DTC) messages may be displayed and cleared by using the ***Clear DTCs*** button.



- ## Consult Gauges

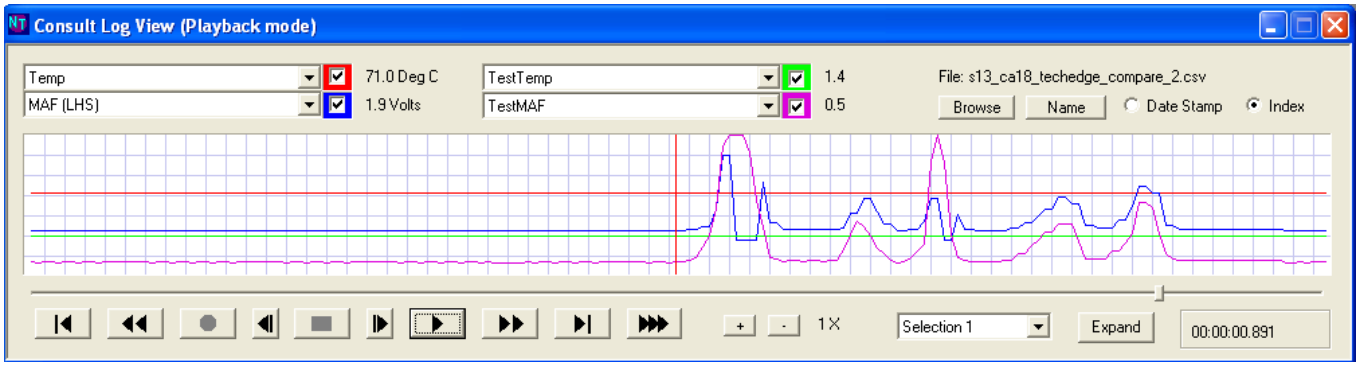
These display in a graphical format the gauges for all the parameters which are available for display



- ## Log Player / Recorder

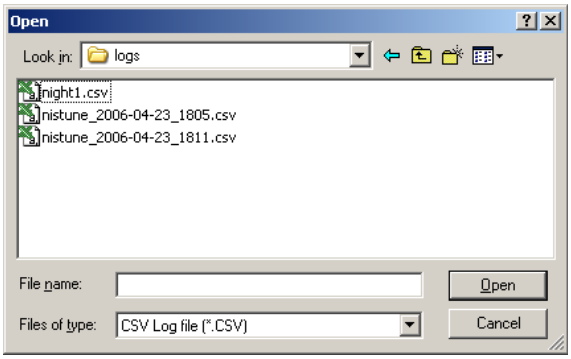
The Consult Log Player / Recorder is an integrated feature with NIStune which allows you to record the vehicle parameters and then play them back at a later time. It is important to note that there are two modes of operation – Record Mode and Playback Mode. By default when consult is connected, the logger is in Record Mode.

If consult is disconnected or the log is stopped, then it will resort to playback mode. This will allow you to review the log just recorded. To record again, reconnect consult, by clicking the ‘consult’ botton in the Image Selection Panel.



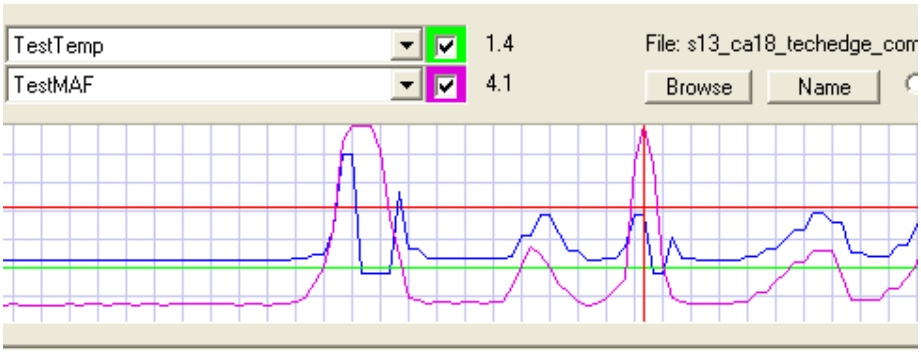
To record data from consult, simply press the record button to record to a standard time/date stamped file or click 'Browse' to call it a specific file name. Select the parameters you wish to change from the drop down lists and tick which ones you wish to see.

To play back data, when in Playback Mode (consult disconnected), click browse and select a log to open.



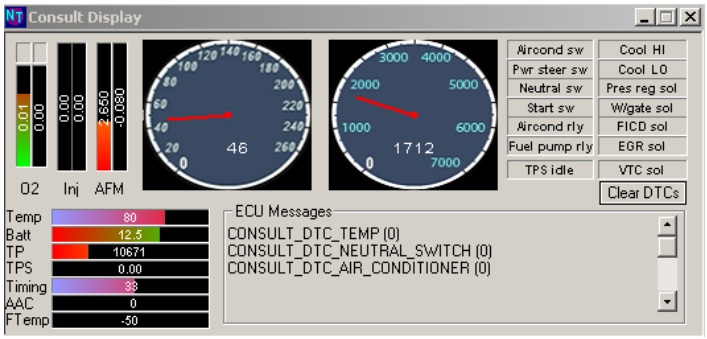
Once the log file is opened, pressing the play button will start the logging. You are able to use the navigation controls or the sliding bar to move around the log. There is a timestamp at the top of the log to indicate the position during duration.

Clicking on the red indicator will highlight at that particular point in time the values and time of that position.

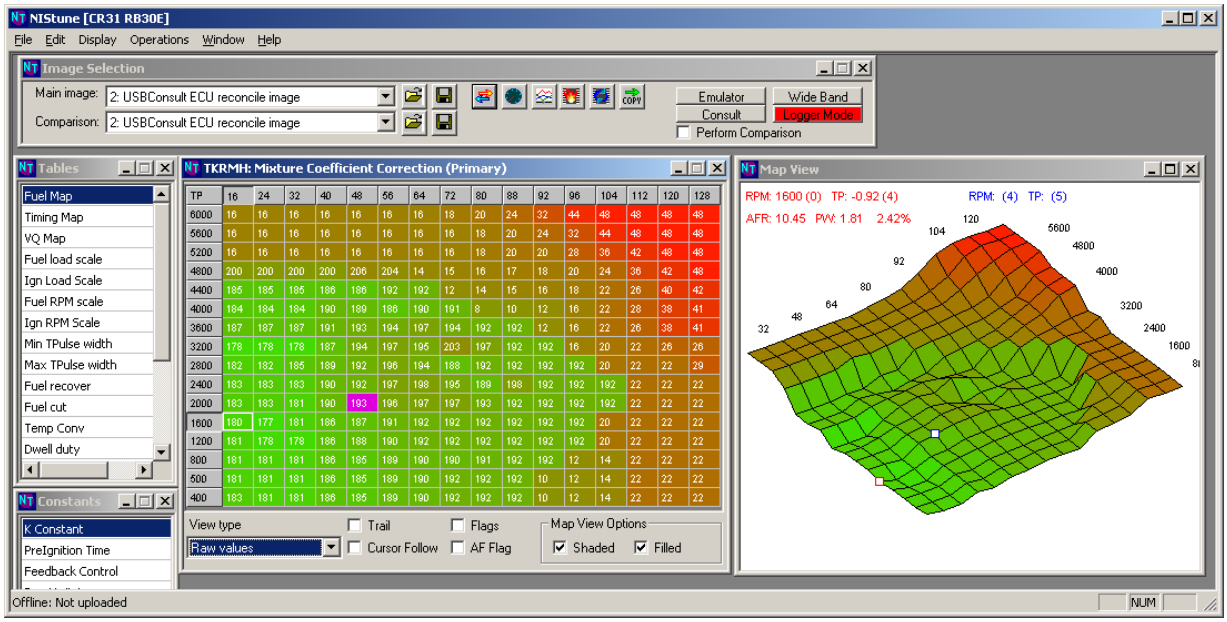


Using the logger in conjunction with the consult display and standard maptrace features provides powerful reviewing facilities.

Below is the consult log display being played back. All items apart from DTC codes are played back from the log file.



Below is the maptrace being played back from the log file. The purple cell on the grid and blue dot on the graphic map indicate the interpolated position of the ECU reading that particular map.



- **Burn permanent changes**

Modifications made to the maps on a NIStune daughterboard are always temporary until they are commited by the user. This allows for provision against operator error and accidental corruption of daughterboard memory contents.

When the user is satisfied with the changes they have made to the vehicle. It is highly recommended they firstly review those changes. This is done by selecting Reconcile – PC to read back current temporary data stored on the daughterboard.

Once changes have been reviewed and the vehicle performs satisfactory, clicking the Burn changes button will store this to NIStune daughterboard non-volatile memory.

Note: If the ECU is powered off and changes are not burnt those changes will be lost

Retrieve last stored changes
This will clear out any current changes to the NIStune daughterboard and restore last stored/powered on changes.

This is used to reset to the known state of mapping stored in the ECU. Use this feature to reset the maps to last saved state. Then Reconcile – PC to see what these changes are.

- **Copy selected maps**

  This feature allows you to copy maps from one ECU binary image to another. Selected maps, tables and constants of Main image are copied to Comparison image.

  This provides the ability to copy maps, tables and constants from other ECU binary images to your NIStune daughterboard or emulator.

  When selecting this option you will see a map copy screen. Tick the applicable items you wish to copy and then click OK. These will be copied immediately. You can view these changes by selecting the current comparison image as 'Main image'

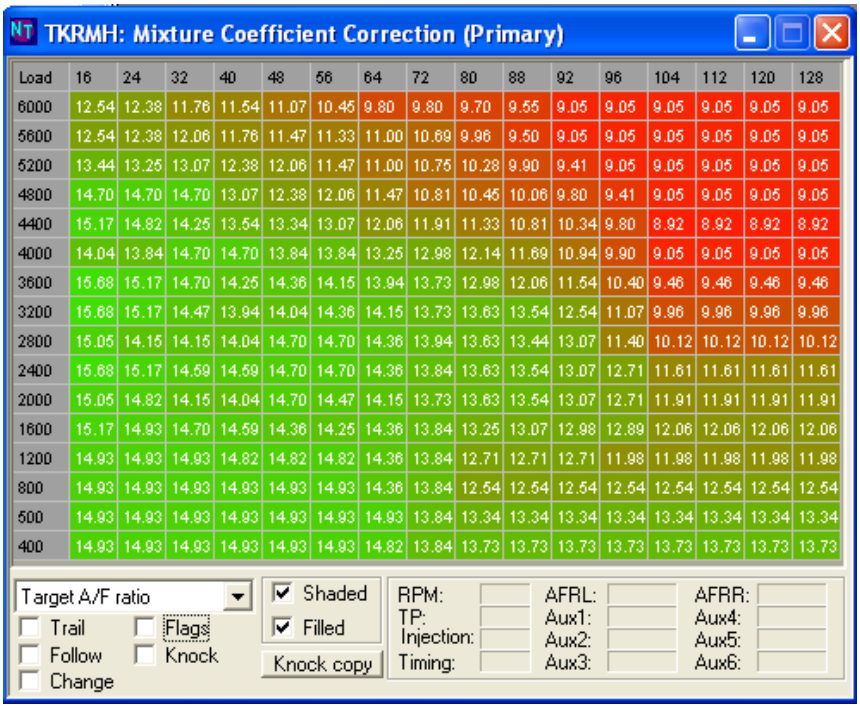
From the Operations menu is also the ability to download the entire consult image. This is only available for Nissan Consult (Not applicable to Type 1 boards).

9. Map Grid Operations

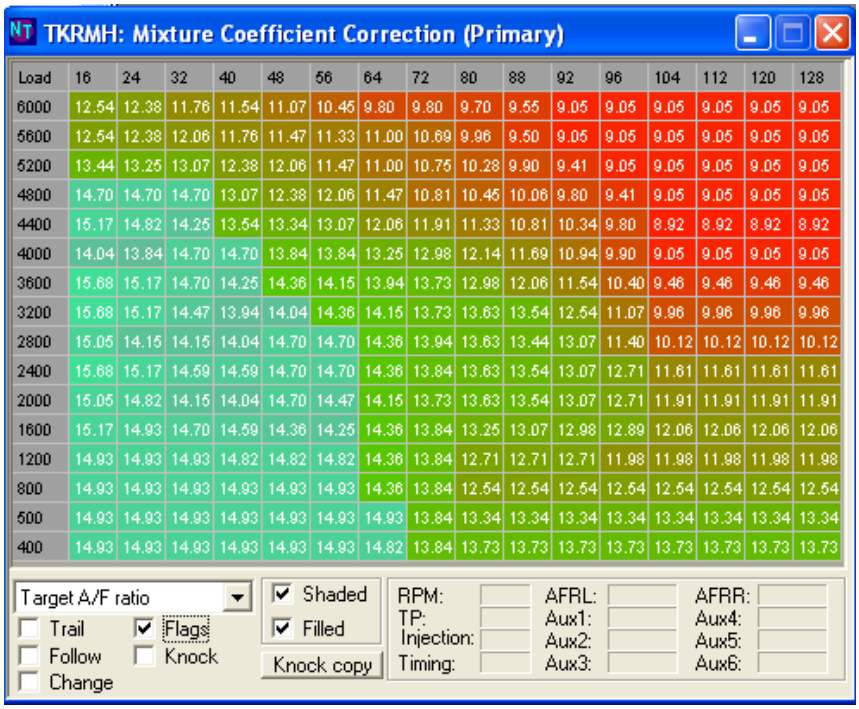
- **General**

The map grid views will be the basis of most of your tuning. These are accessible by clicking on Fuel, Timing etc maps from the Tables window on the left side.

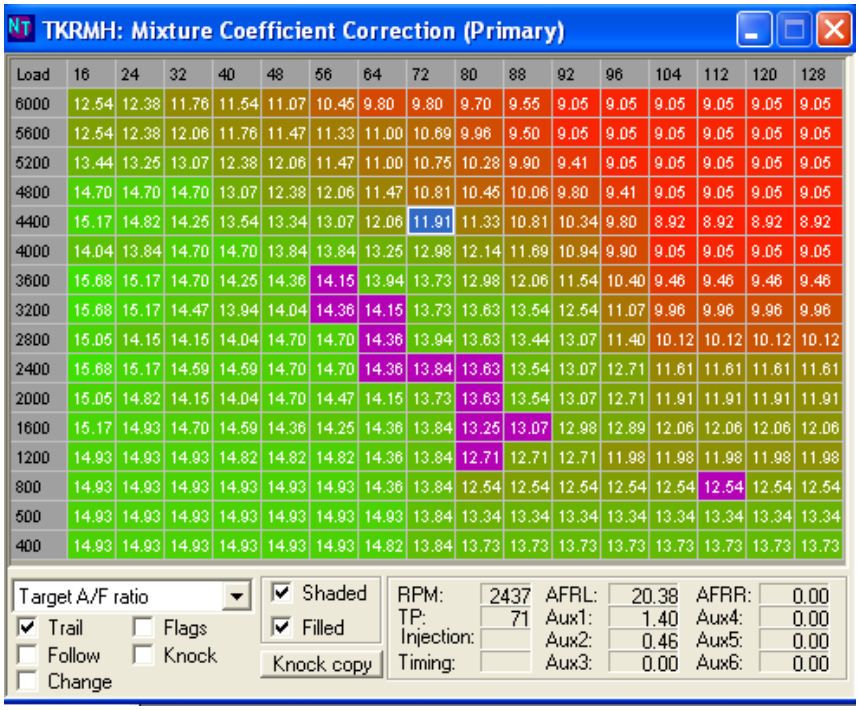
Such a grid as below will be displayed. Correct address file selection and matching binary file will ensure correct display. Any obviously incorrect Load/RPM scales or map data indicate an address file/binary image mismatch. For fuel maps more green means leaner mixtures and more red means richer mixtures. Currently only values in raw/filtered modes can be directly edited.



For the Fuel maps, selecting other modes such as Target A/F ratio, duty cycle and injector pulsewdith give a better picture of how these coefficient ratios affect the injection of fuel. Nissan ECUs use knock sensor and O2 flags in the data to indicate where the sensors should be utilised. These can be highlighted by clicking 'Flags' from the tick box in the view.



Map tracing will display as a purple cell. A trace can be left to see where the map has been accessed by clicking ‘Trail’



‘Follow’ makes the adjustment cursor follow the maptrace cursor so values may be adjusted as the engine is accessing the cell. You can make adjustments whilst the cursor is following on the maptrace.

'Change' will mark cells in a different colour as they are changed

‘Knock’ is reserved for future use when knock detection is fully implemented. It will mark cells red where knock is detected

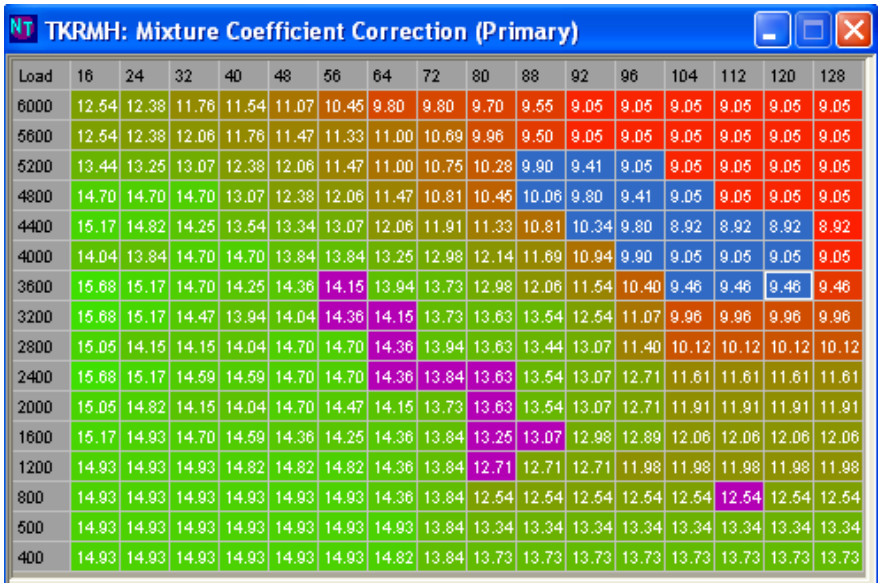
- **Map Editing**

  - CTRL + Mouse click will select individual cells
  - Mouse drag or [SHIFT + Arrow keys] will select a block of cells
  - CTRL-A will select the entire
  - "+" or PAGE UP will increase values
  - "-" or PAGE DOWN will decrease values
  - Pressing K will toggle the knock flag (IGN maps)
  - Pressing O will toggle the O2 feedback flag (fuel maps)

Raw / Filtered view only:

- CTRL-F will fill the entire area with the value in the white selected box cells values
- CTRL-A will select the entire grid area. Useful for copy/paste
- Pressing a key on a cell value in raw/filtered view will put the cell into edit mode. You may edit the value of that cell with an integer value.
- SHIFT-DEL will delete the selected cell contents (replacing with 0) and put the items onto the clipboard
- CTRL-COPY will copy the selected cell contents and put the items onto the clipboard
- SHIFT-INSERT will paste the items from the clipboard at the cursor position.

The cut, copy, paste features also are available from the edit menu .

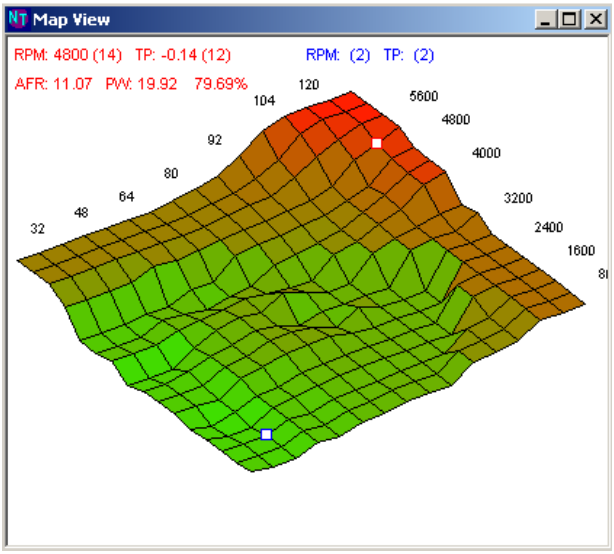


Load	16	24	32	40	48	56	64	72	80	88	92	96	104	112	120	128
6000	12.54	12.38	11.76	11.54	11.07	10.46	9.80	9.80	9.70	9.55	9.05	9.05	9.05	9.05	9.05	9.05
5600	12.54	12.38	12.06	11.76	11.47	11.33	11.00	10.69	9.96	9.50	9.05	9.05	9.05	9.05	9.05	9.05
5200	13.44	13.25	13.07	12.38	12.06	11.47	11.00	10.75	10.28	9.90	9.41	9.05	9.05	9.05	9.05	9.05
4800	14.70	14.70	14.70	13.07	12.38	12.06	11.47	10.81	10.46	10.06	9.80	9.41	9.05	9.05	9.05	9.05
4400	15.17	14.82	14.25	13.54	13.34	13.07	12.06	11.91	11.33	10.81	10.34	9.80	8.92	8.92	8.92	8.92
4000	14.04	13.84	14.70	14.70	13.84	13.84	13.25	12.98	12.14	11.69	10.94	9.90	9.05	9.05	9.05	9.05
3600	15.68	15.17	14.70	14.25	14.36	14.15	13.94	13.73	12.98	12.06	11.54	10.40	9.46	9.46	9.46	9.46
3200	15.68	15.17	14.47	13.94	14.04	14.36	14.15	13.73	13.63	13.54	12.54	11.07	9.96	9.96	9.96	9.96
2800	15.05	14.15	14.15	14.04	14.70	14.70	14.36	13.94	13.63	13.44	13.07	11.40	10.12	10.12	10.12	10.12
2400	15.68	15.17	14.59	14.59	14.70	14.70	14.36	13.84	13.63	13.54	13.07	12.71	11.61	11.61	11.61	11.61
2000	15.05	14.82	14.15	14.04	14.70	14.47	14.15	13.73	13.63	13.54	13.07	12.71	11.91	11.91	11.91	11.91
1600	15.17	14.93	14.70	14.59	14.36	14.25	14.36	13.84	13.25	13.07	12.98	12.89	12.06	12.06	12.06	12.06
1200	14.93	14.93	14.93	14.82	14.82	14.82	14.36	13.84	12.71	12.71	12.71	11.98	11.98	11.98	11.98	11.98
800	14.93	14.93	14.93	14.93	14.93	14.93	14.36	13.84	12.54	12.54	12.54	12.54	12.54	12.54	12.54	12.54
500	14.93	14.93	14.93	14.93	14.93	14.93	14.93	13.84	13.34	13.34	13.34	13.34	13.34	13.34	13.34	13.34
400	14.93	14.93	14.93	14.93	14.93	14.93	14.82	13.84	13.73	13.73	13.73	13.73	13.73	13.73	13.73	13.73

- **Graph Editing Functions**

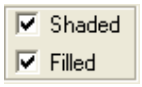
Graph editing provides a 3D graphical representation of the maps. The display shows current selected and maptrace cursors in addition to details associated with the cursor position. The raw TP (load) scales are on the left and RPM on the right.

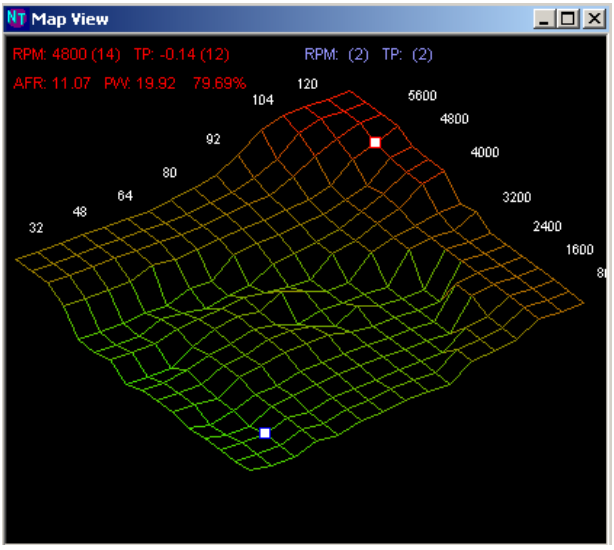
Use a combination of the Arrow Keys and CTRL/SHIFT keys to adjust tilt/rotation/scaling of the 3D map view.



Arrow keys are used to move the red cursor through the maps. The map grid view will match what is selected in this map.

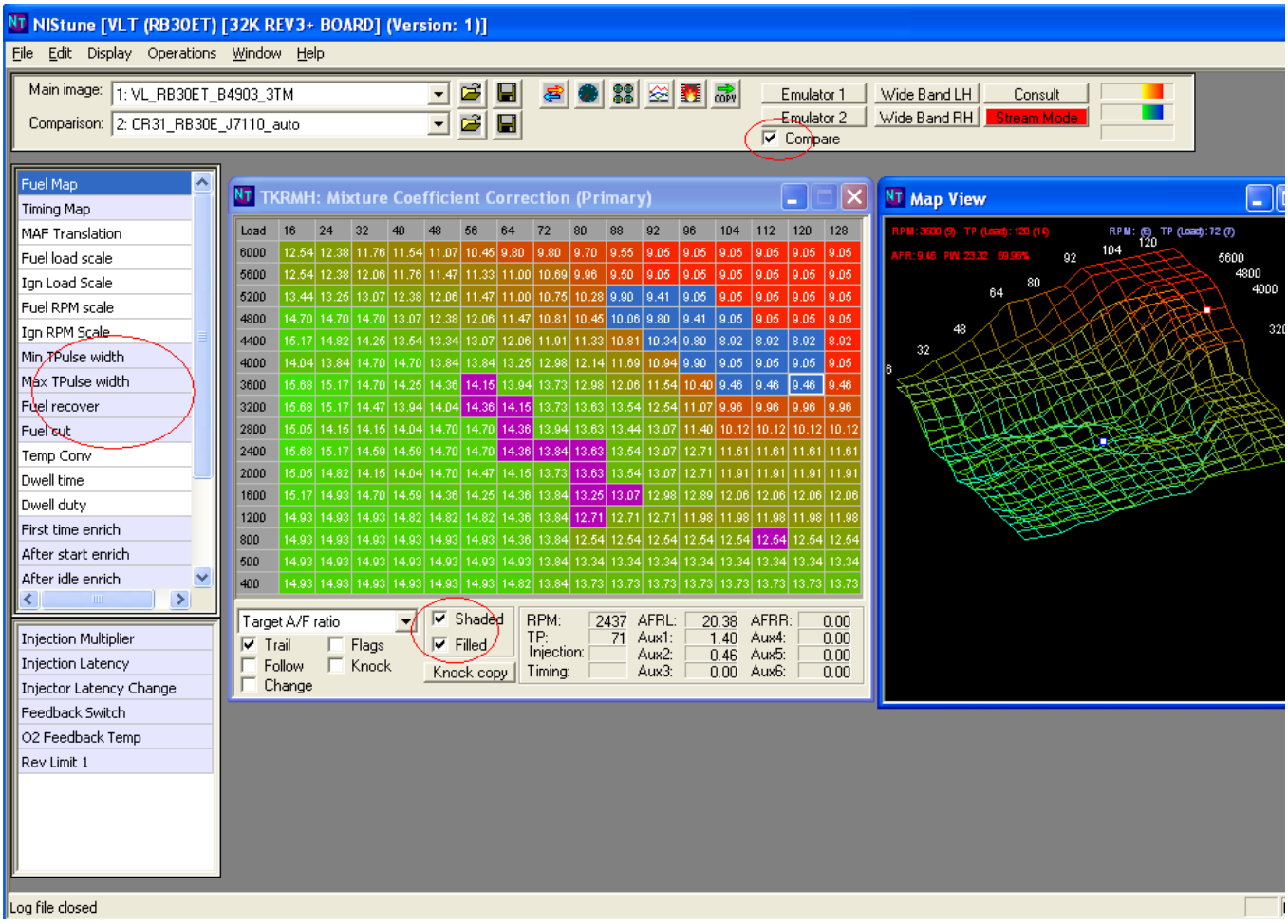
Map View Option tick-boxes on the grid view panel allow on/off control of the shading (colourisation) and solid-fill/wire-frame options.





Ticking the '***Perform Comparison***' option on the Image Selection window will display the main image against the comparison image. This can be used with the 'delta' option to see the difference between two maps.

Also all the maps which have differences are highlighted in light blue in the tables/constant windows.

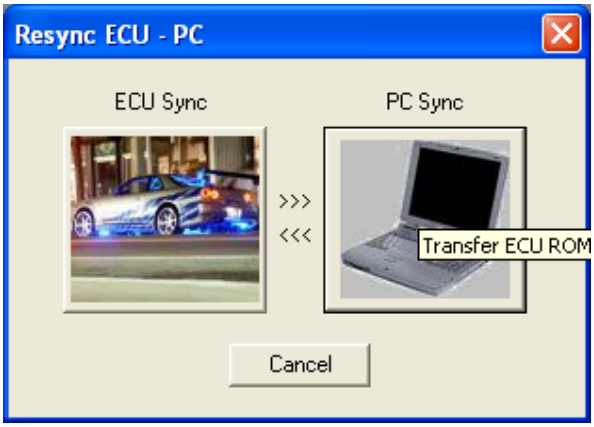

NIStune [VLT (RB30ET) [32K REV3+ BOARD] (Version: 1)]
File Edit Display Operations Window Help
Main image: 1: VL_RB30ET_B4903_3TM
Comparison: 2: CR31_RB30E_J7110_auto
Emulator 1
Emulator 2
Compare
Wide Band LH
Wide Band RH
Consult
Stream Mode
Fuel Map
Timing Map
MAF Translation
Fuel load scale
Ign Load Scale
Fuel RPM scale
Ign RPM Scale
Min TPulse width
Max TPulse width
Fuel recover
Fuel cut
Temp Conv
Dwell time
Dwell duty
First time enrich
After start enrich
After idle enrich
Injection Multiplier
Injection Latency
Injector Latency Change
Feedback Switch
O2 Feedback Temp
Rev Limit 1
TKRMH: Mixture Coefficient Correction (Primary)
Load 16 24 32 40 48 56 64 72 80 88 92 96 104 112 120 128
6000 12.54 12.38 11.76 11.54 11.07 10.46 9.80 9.80 9.70 9.55 9.05 9.05 9.05 9.05 9.05 9.05
5600 12.54 12.38 12.06 11.76 11.47 11.33 11.00 10.69 9.96 9.50 9.05 9.05 9.05 9.05 9.05 9.05
5200 13.44 13.25 13.07 12.38 12.06 11.47 11.00 10.75 10.28 9.90 9.41 9.05 9.05 9.05 9.05 9.05
4800 14.70 14.70 14.70 13.07 12.38 12.06 11.47 10.81 10.46 10.06 9.80 9.41 9.05 9.05 9.05 9.05
4400 15.17 14.82 14.25 13.54 13.34 13.07 12.06 11.91 11.33 10.81 10.34 9.80 8.92 8.92 8.92 8.92
4000 14.04 13.84 14.70 14.70 13.84 13.84 13.25 12.98 12.14 11.69 10.94 9.90 9.05 9.05 9.05 9.05
3600 15.68 15.17 14.70 14.25 14.36 14.15 13.94 13.73 12.98 12.06 11.54 10.40 9.46 9.46 9.46 9.46
3200 15.68 15.17 14.47 13.94 14.04 14.36 14.15 13.73 13.63 13.54 12.54 11.07 9.96 9.96 9.96 9.96
2800 15.05 14.15 14.15 14.04 14.70 14.70 14.36 13.94 13.63 13.44 13.07 11.40 10.12 10.12 10.12 10.12
2400 15.68 15.17 14.59 14.59 14.70 14.70 14.36 13.84 13.63 13.54 13.07 12.71 11.61 11.61 11.61 11.61
2000 15.05 14.82 14.15 14.04 14.70 14.47 14.15 13.73 13.63 13.54 13.07 12.71 11.91 11.91 11.91 11.91
1600 15.17 14.93 14.70 14.59 14.36 14.25 14.36 13.84 13.25 13.07 12.98 12.89 12.06 12.06 12.06 12.06
1200 14.93 14.93 14.93 14.82 14.82 14.82 14.36 13.84 12.71 12.71 12.71 11.98 11.98 11.98 11.98 11.98
800 14.93 14.93 14.93 14.93 14.93 14.93 14.36 13.84 12.54 12.54 12.54 12.54 12.54 12.54 12.54 12.54
500 14.93 14.93 14.93 14.93 14.93 14.93 14.93 13.84 13.34 13.34 13.34 13.34 13.34 13.34 13.34 13.34
400 14.93 14.93 14.93 14.93 14.93 14.93 14.82 13.84 13.73 13.73 13.73 13.73 13.73 13.73 13.73 13.73
Target A/F ratio
Shaded
Filled
Trail
Flags
Follow
Knock
Change
Knock copy
RPM: 2437
TP: 71
Injection:
Timing:
AFRL: 20.38
Aux1: 1.40
Aux2: 0.46
Aux3: 0.00
AFRR: 0.00
Aux4: 0.00
Aux5: 0.00
Aux6: 0.00
Map View
Log file closed

10. Resize Injectors

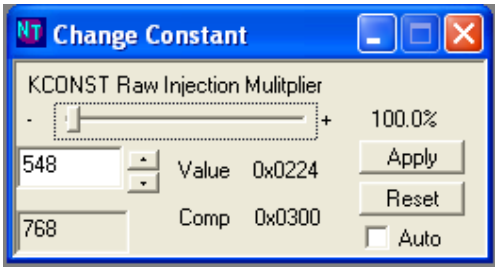
This option allows you to resize your injectors. The base injector size displayed in this section comes from a parameter in your address file called INJECTORCC. You can change the base injector size temporarily inside NIStune or edit the address file directly (see next section).

Ensure the engine is not running while performing this operation otherwise damage may result

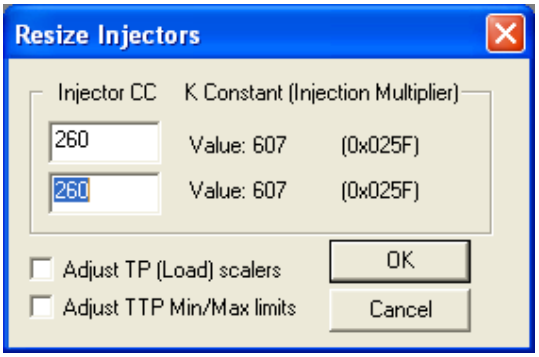
1. Re-sync maps from ECU to PC



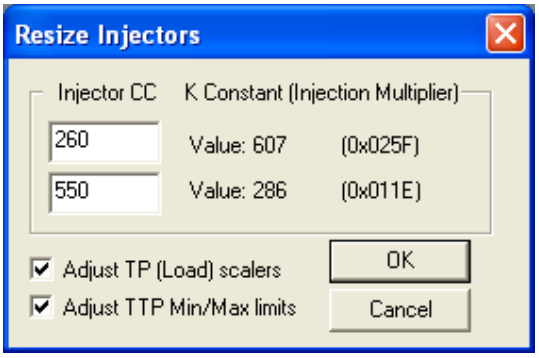
2. Note the value of your Injection Multiplier (K Constant) before adjustment



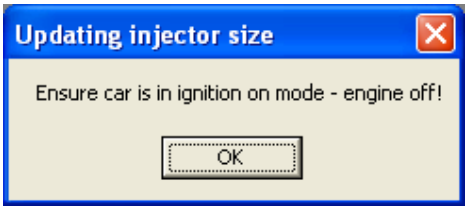
3. Select ***Operations - Resize Injectors***



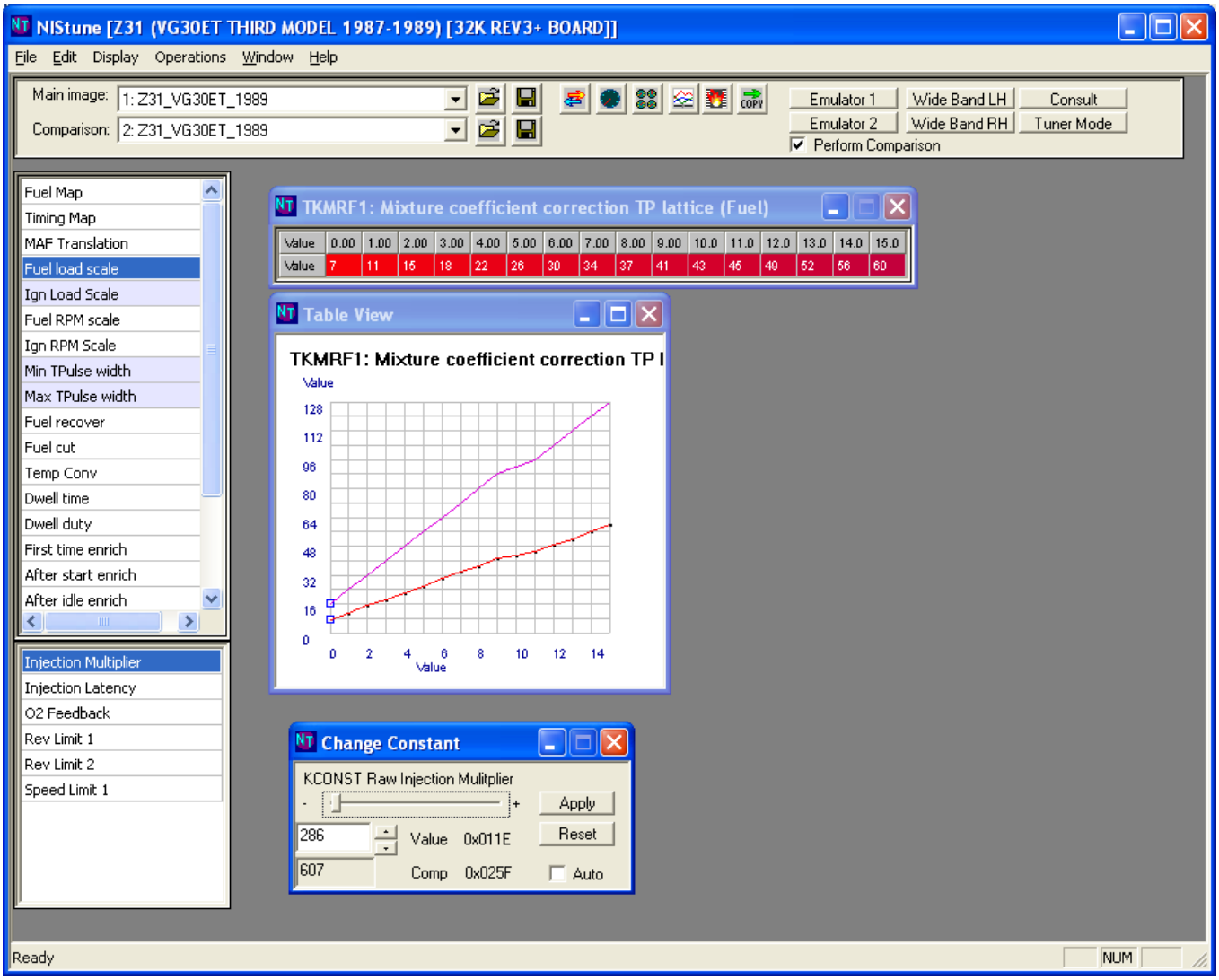
Tick the boxes if you wish to adjust the scalers and limiters. K Constant (Injection Multiplier) should be the new value you have changed to (0x011E in the example) when you have made this change.



4. Click OK.



5. Open ***Injection Multiplier*** window and check that it contains the value you entered. If you opted to adjust ***TP Scales*** and /or ***TTP Min/Max*** then check these values also.



11. Injection Multiplier adjustment (AKA K Constant)

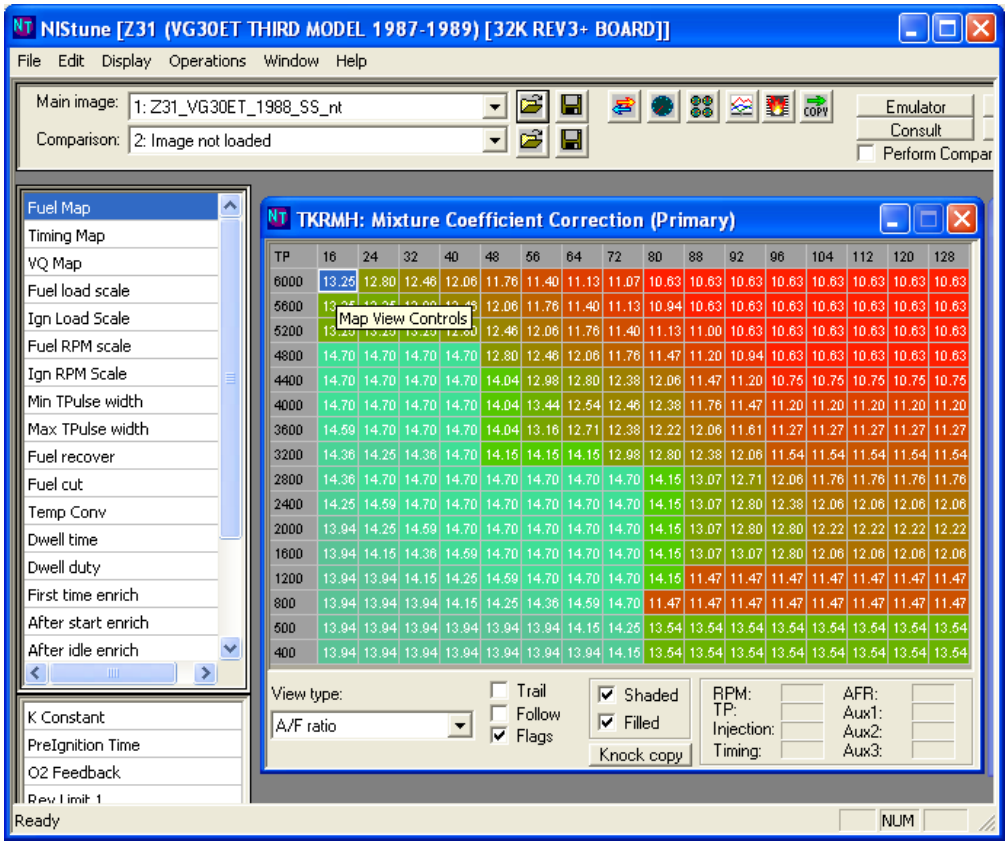
The following steps will show you how to use your AFR meter to monitor and assist you with making adjustments to Injection Multiplier

1. Open your fuel map and tick the 'Flags' box and select ***'View type'*** to ***'A/F ratio'.***

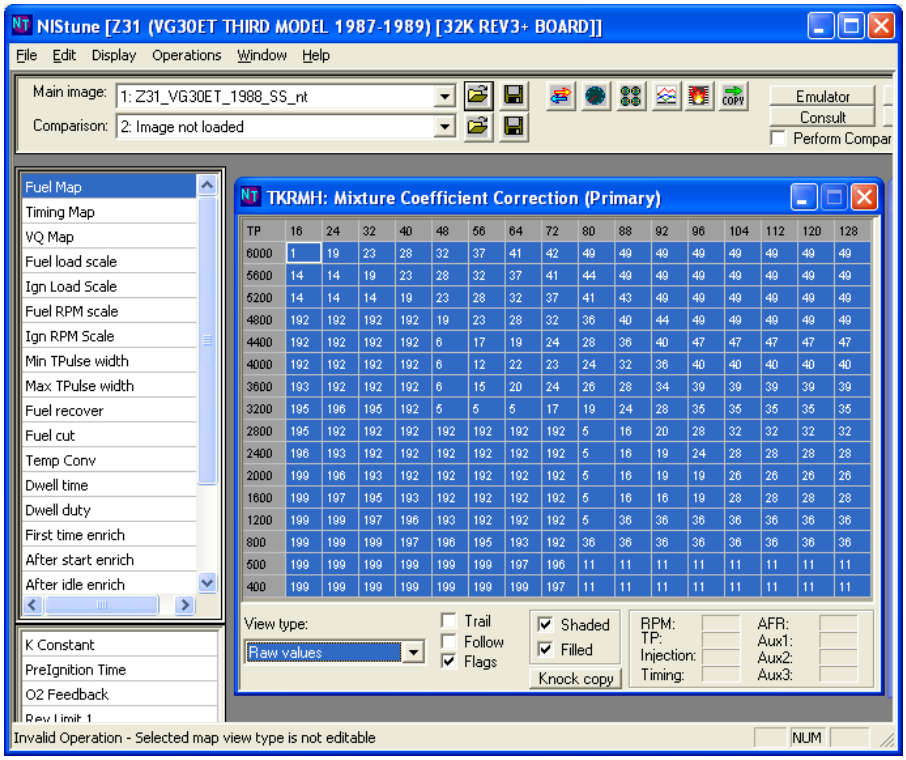
2. Disable your O2 sensor feedback by disabling the flags in the O2 Feedback window or setting O2 Feedback Temperature to maximum value

3. Tick the 'Flags' button to highlight your 'closed loop' area. This are is used to tell the ECU to use its Oxygen Sensor for feedback to keep the car running around stoichiometric (14.7:1 AFR) when in closed loop mode

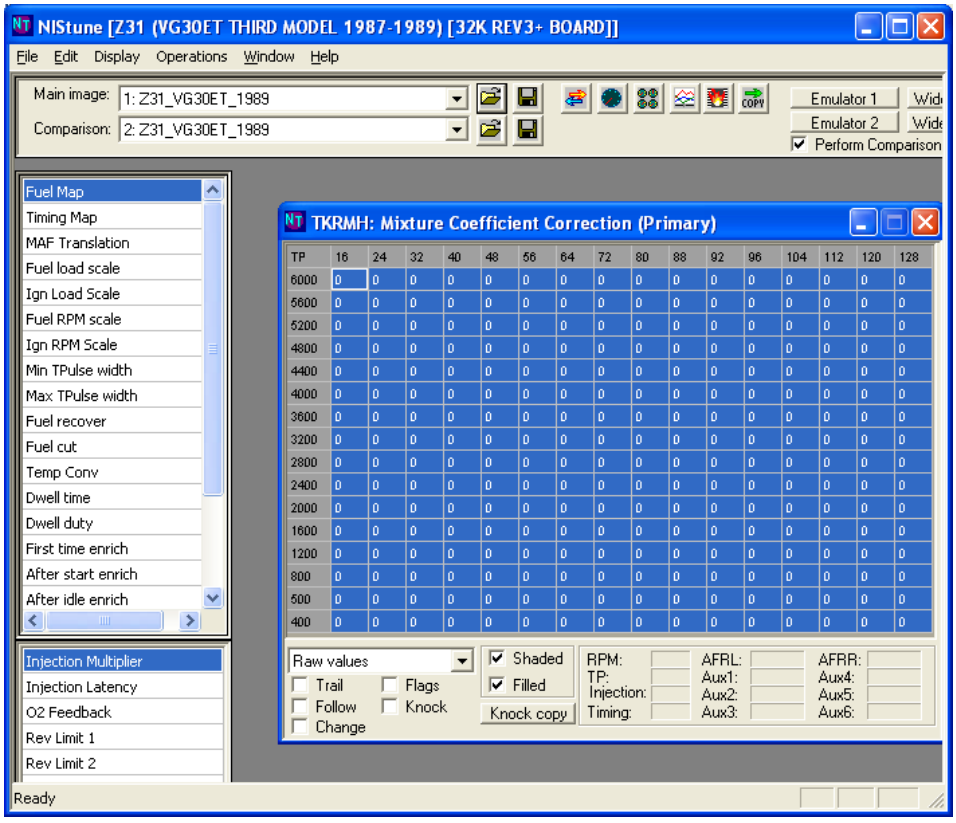
4. Change the ***'View type***' to ***'Raw Values'***. This is necessary to use cut/paste and fill operations.



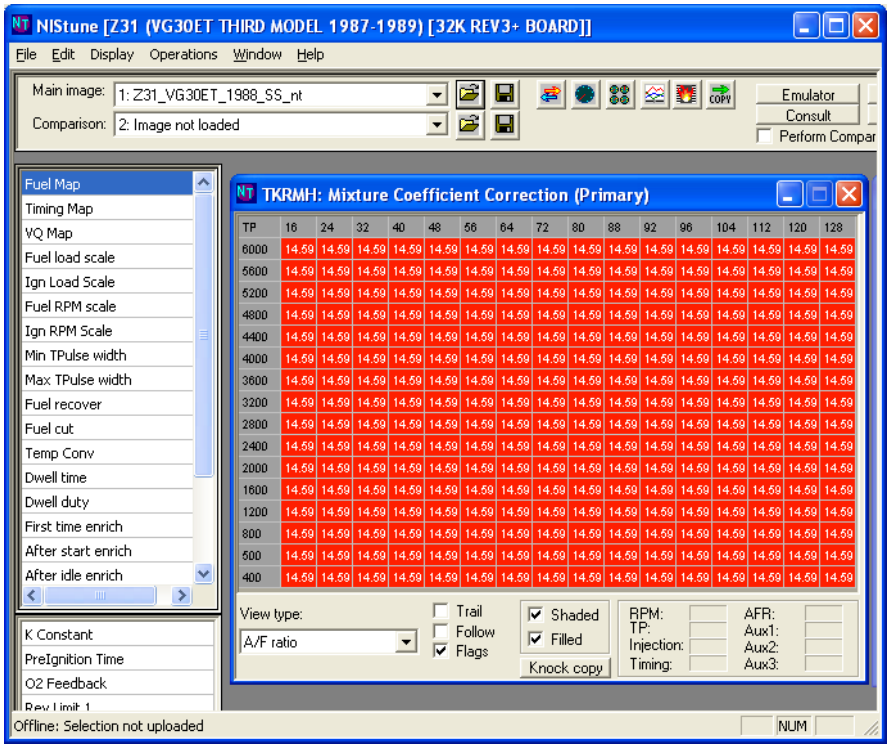
4. Move to top left field. Set this to **0** value in raw mode (14.7:1 AFR)



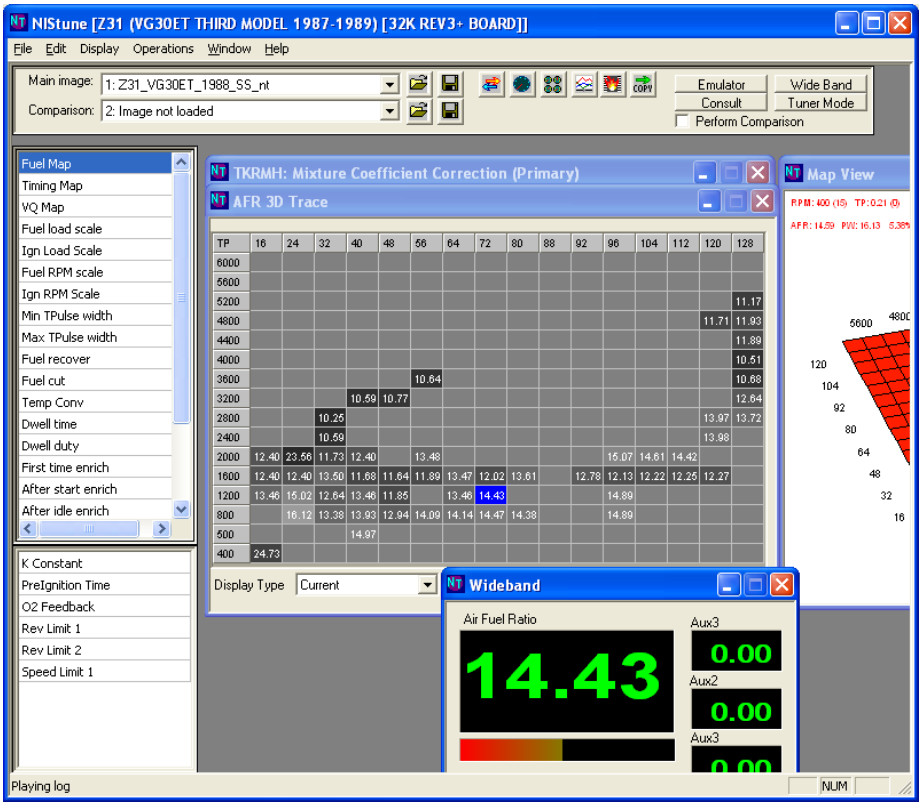
5. Use CTRL-A to select the whole window and then CTRL-F to fill with **0**



6. Set ***'View Type'*** to be ***'A/F Ratio'*** to see what you've done



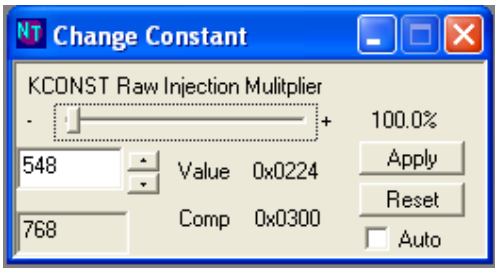
7. From the menu select ***Operations - Air Fuel Trace***



This will display your current AFR and keep track of it on the trace map.

8. Now from the constants list you can fine tune things by adjusting Injection Mulitplier (K Constant) for the global AFR settings and Injector Latency for the opening/closing latency difference with the new injectors you have installed

Ticking the 'Auto' button will make changes to the engine on the fly. You can use the + and - keys to make adjustments in increments of 100 or the up/down buttons in this window to make adjustments by 1.



9. Once you have finished making fine tuning adjustments to try and reach your target AFR of 14.7 throughout the map then take note of the values used for K Constant and PreIgnition Time.

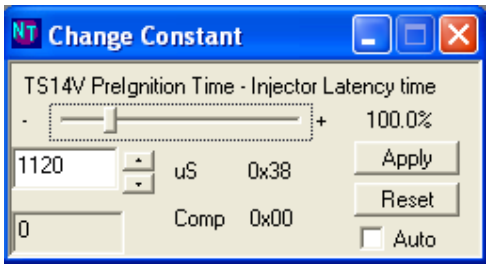
Load up your original fuel map (either from loading from a file or switching off the car for 10 seconds and getting the original one from your ECU)

Further tweaking can be applied to areas of the fuel map. However make sure that you use 'O' key to switch off O2 sensing around cells which have this enabled. Otherwise it will use the O2 sensor to trim the fuel map back to 14.7

Only when you are happy with the changes, click the BURN button which will make those changes available next time you start the car.

12. Injector Latency Adjustment

If AFRs are correct except around idle, then where larger injectors are used, sometimes latency will require adjustment. Latency is the opening/closing time of the injectors. This varies depending what type of injectors you use. Bigger injectors generally have a longer latency, so this constant may require adjustment (will mainly affect around idling range).



NOTE: Always tune using K Constant/values in the main fuel maps before adjusting Injector Latency. Just because you have fitted larger injectors doesn't mean that you will have to adjust Injector Latency.

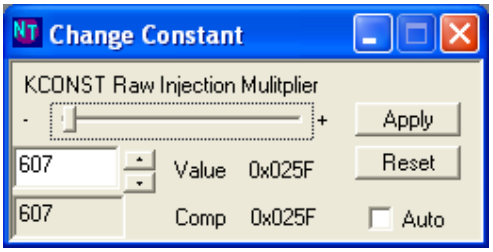
Injector Multplier is a total mutliplier to get the final injecton opening time. Latency is a value in microseconds (uS) which is added to the total injection time. It has more affect around idle (due to smaller opening time) than when the injectors are open longer during higher load / RPM points.

13. Change Mass Air Flow Meter

This option will allow you to select a new VQ map to use in place of the current one. HP figures are estimates only and affect the Injection Mulitplier (K Constant). This may need to be adjusted after performing the Change MAF operation to obtain correct AFRs

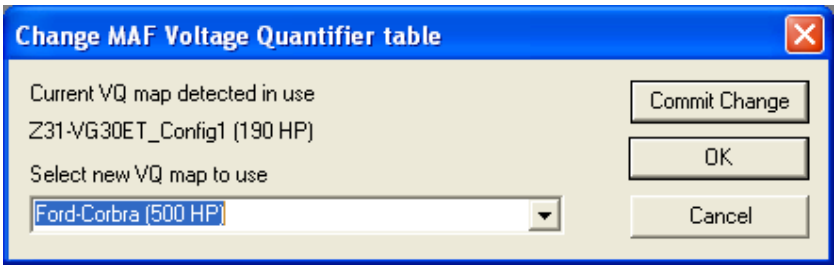
Ensure the engine is not running while performing this operation otherwise damage may result

1. Note your original Injection Multplier (K Constant) value



2. Select Operations - Change Mass Airflow Meter. This should detect your current MAF and allow you to select a new one from the dropdown list.

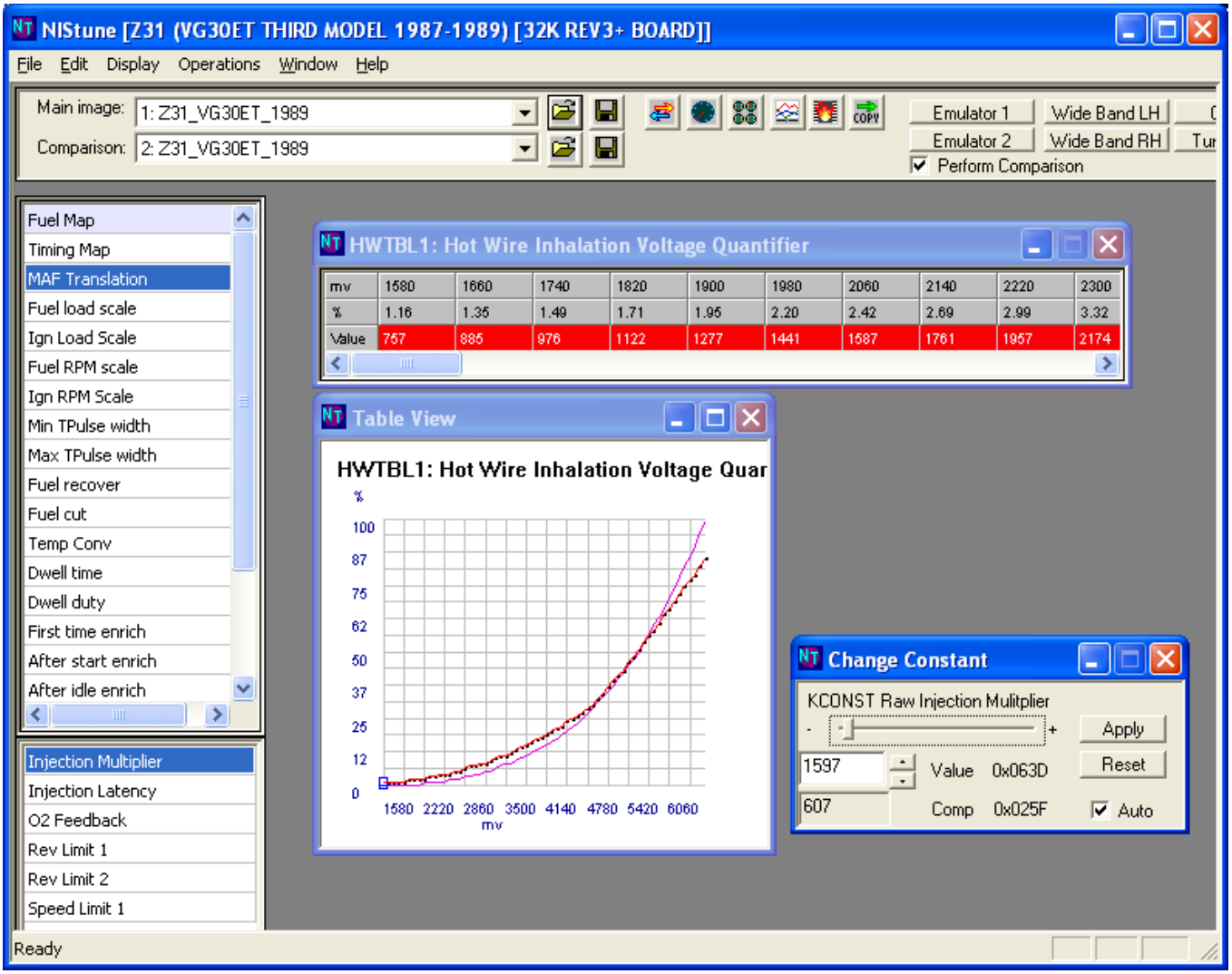
Here we have selected a Ford Cobra



3. Click ***Commit Change*** to verify that it will work. The status bar at the bottom of NIStune will say '***VQ Map Ford-Cobra committed'*** for example. Then click OK to close the window and make the change

4. You will now get a warning window

5. The MAF Voltage Quantifier map (used for MAF calibration) and Injection Multiplier (adjusted for the different size MAF) will be changed. The screenshot below shows the difference:



6. Now start your vehicle and see if it runs OK. If it does not run smoothly you will need to adjust the injection multiplier.

Use your AFR meter as per Ch10 **Resize Injector** to get your AFRs correct with the new MAF.

Special Note: R31 and Z31 ECUs. Upgrading to a larger MAF such as the Z32 will require hardware modifications. See Type 1 installation manual about these. The K constant (Injection Multplier) calculated from the above has been specially adjusted to get a ball part figure. You will need to tune this to get proper results

Only once you are satisfied with the changes, click "***Burn***" to permanently store them in your NIStune board.

14. MAF pinouts

Pinout information is located at
http://paulr33.skylinesaustralia.com/diagrams/airflow-meter-wiring.html

CR31 RB30 (2 -7 volt)

Pin 1. Sensor ground (black)
Pin 2. Chassis ground (black)
Pin 3. AFM output (white shielded - 2-7 volts)
Pin 4. Hot wire cleaning (red - not used with Z32 MAF)
Pin 5. 12 volts from ECCS relay (thick white - ignition)
Pin 6. Calibration pot (yellow/red - variable resistor)

* Sensor and Chasis grounds are the same and are connected together

* Calibration pot must either use a 500 ohm variable resistor set to 382 ohms or 1/4 watt resistor 370 ohm or a value closest to this. Connect this resistor between pin 6 (Calibration pot line) and pin 1 (sensor ground).

Z31 VG30 (2 - 7 volt)

Pin A = Calibration pos (variable resistor)
Pin B = output voltage (black shielded 2-7 volts)
Pin C = ground (black - chassis)
Pin D = ground (black - ECCS)
Pin E = battery source (12V black striped)
Pin F = self cleaning mechanism (not used with Z32 MAF)

* Sensor and Chasis grounds are the same and are connected together

* Calibration pot must either use a 500 ohm variable resistor set to 382 ohms or 1/4 watt resistor 370 ohm or a value closest to this. Connect this resistor between pin 6 (Calibration pot line) and pin 1 (sensor ground).

Z32 VG30 (80mm)

Wire A - Not Connected (orange)
Wire B - Signal (shielded white)
Wire C - 12v Ground (black)
Wire D - Signal Ground (shielded black)
Wire E - 12v Power (white)
Wire F - Not Connected

S13 CA18 (65 mm)

Pin A - nothing / not needed
Pin B - +12v power
Pin C - ground
Pin D - air flow signal out

S14 SR20 (65mm)

Pin A - nothing / not needed
Pin B - +12v power

Pin C - ground
Pin D - air flow signal out

R32 RB20 (80mm)

Wire A - Not Connected
Wire B - Signal
Wire C - 12v Ground
Wire D - Signal Ground
Wire E - 12v Power

R33 RB25 Series 1 (80mm)

Wire A - Not Connected
Wire B - Signal
Wire C - 12v Ground
Wire D - Signal Ground
Wire E - 12v Power

R33 RB25 Series 2 (80mm)

White with Blue Trace - Ground
Orange with Black Trace- Signal
Black with White Trace - 12v Power

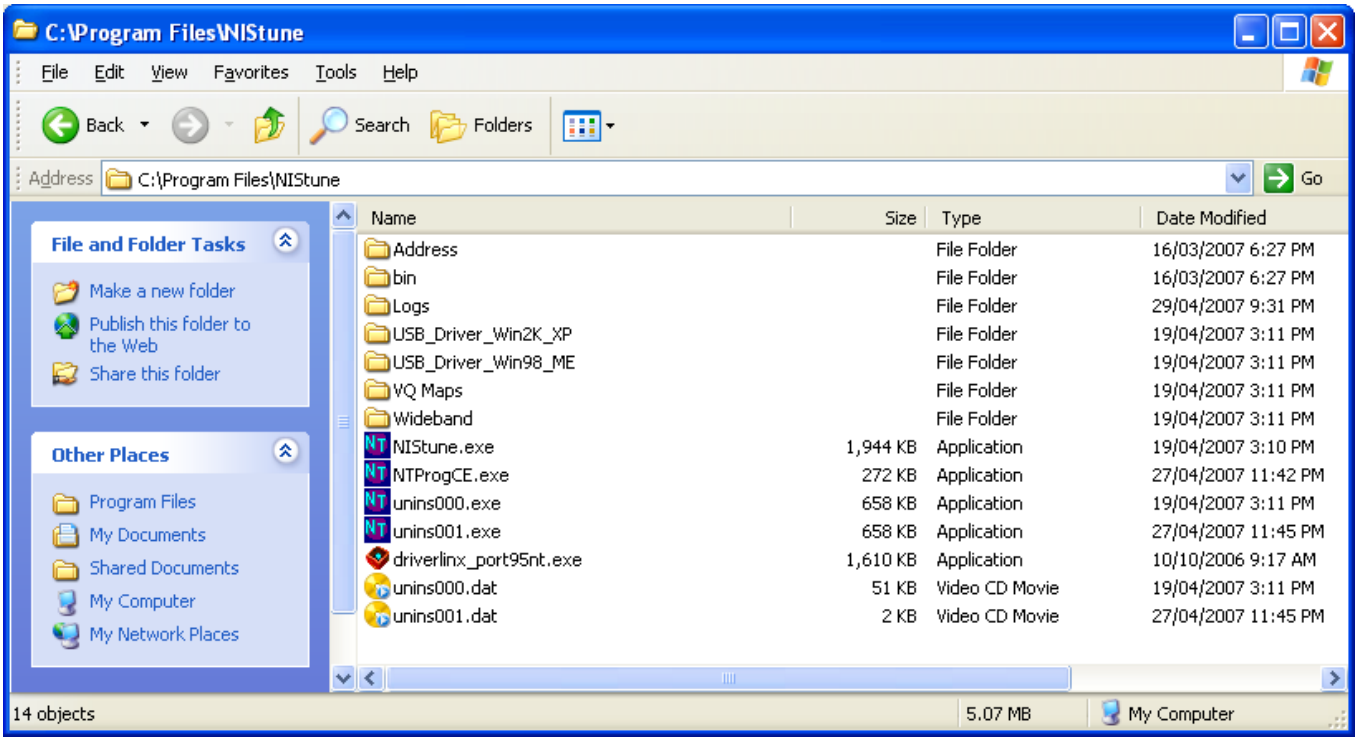
Q45 VH45 (90mm)

Wire 1 (White) - Signal
Wire 2 (Black) - Ground
Wire 3 (Red/White & Black) - 12v Power

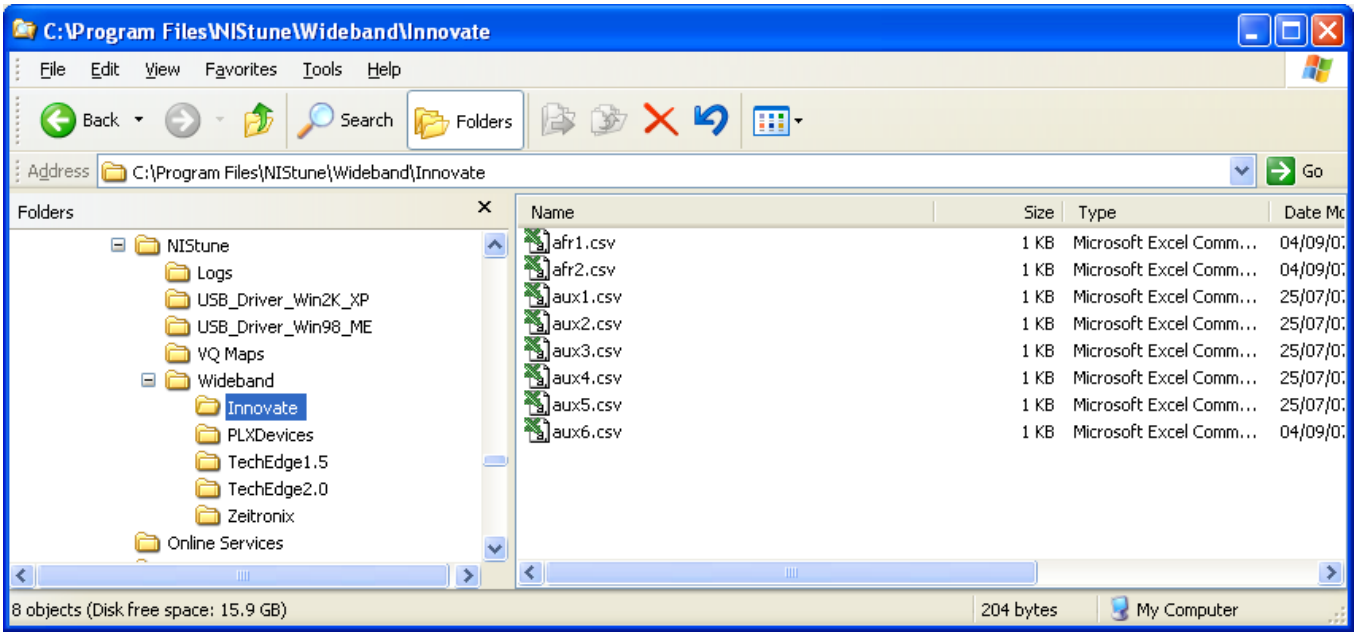
Ford Cobra MAF
Wire A - 12V
Wire B - Ground
Wire C - Ground
Wire D - Signal

15. Configuring Wideband Auxillary Inputs

Files for Wideband Auxiliary inputs are located in the Wideband Folder under your NIStune installation



C:\Program Files\NIStune\Wideband



There are eight files you can modify, depending on Wideband Type:

```
afr1.csv
afr2.csv
aux1.csv
aux2.csv
aux3.csv
aux4.csv
aux5.csv
aux6.csv
```

These are used by

DLP A/D Converter

Select Wideband directory
C:\Program Files\NIStune\Wideband\DLPADConverter

- AFM Auxiliary input 1 (0 - 5 volts, Ground) - **afr1.csv**
- Auxiliary input 2 (0 - 5 volts, Ground) - **aux1.csv**
- Auxiliary input 3 (0 - 5 volts, Ground) - **aux2.csv**
- Auxiliary input 4 (0 - 5 volts, Ground) - **aux3.csv**
- Auxiliary input 5 (0 - 5 volts, Ground) - **aux4.csv**
- Auxiliary input 6 (0 - 5 volts, Ground) - **aux5.csv**

TechEdge

Version 1.5 Select Wideband directory
C:\Program Files\NIStune\Wideband\TechEdge1.5

Version 2.0 Select Wideband directory
C:\Program Files\NIStune\Wideband\TechEdge2.0

- Auxiliary input 1 (0 - 5 volts, Ground) - **aux1.csv**
- Auxiliary input 2 (0 - 5 volts, Ground) - **aux2.csv**
- Auxiliary input 3 (0 - 5 volts differential input) - **aux3.csv**
- Auxiliary input 4 - **aux4.csv**
- Auxiliary input 5 - **aux5.csv**
- Auxiliary input 6 - **aux6.csv**

Zeitronix

Select Wideband directory
C:\nistune\NTpackaged\Wideband\Zeitronix
- Exhaust Gas Temperature *(no lookup file)*
- Boost *(no lookup file)*
- TPS *(no lookup file)*
- Auxiliary input - **aux1.csv**

AEM UEGO

No lookup files

Innovate MTS

Select Wideband directory
C:\Program Files\NIStune\Wideband\Innovate

Configurable inputs:
First allocated auxiliary 5 volt input - **aux1.csv**
Second allocated auxiliary 5 volt input - **aux2.csv**
Third allocated auxiliary 5 volt input - **aux3.csv**
Fourth allocated auxiliary 5 volt input - **aux4.csv**
Fifth allocated auxiliary 5 volt input - **aux5.csv**
Sixth allocated auxiliary 5 volt input - **aux6.csv**

PLX R-Series

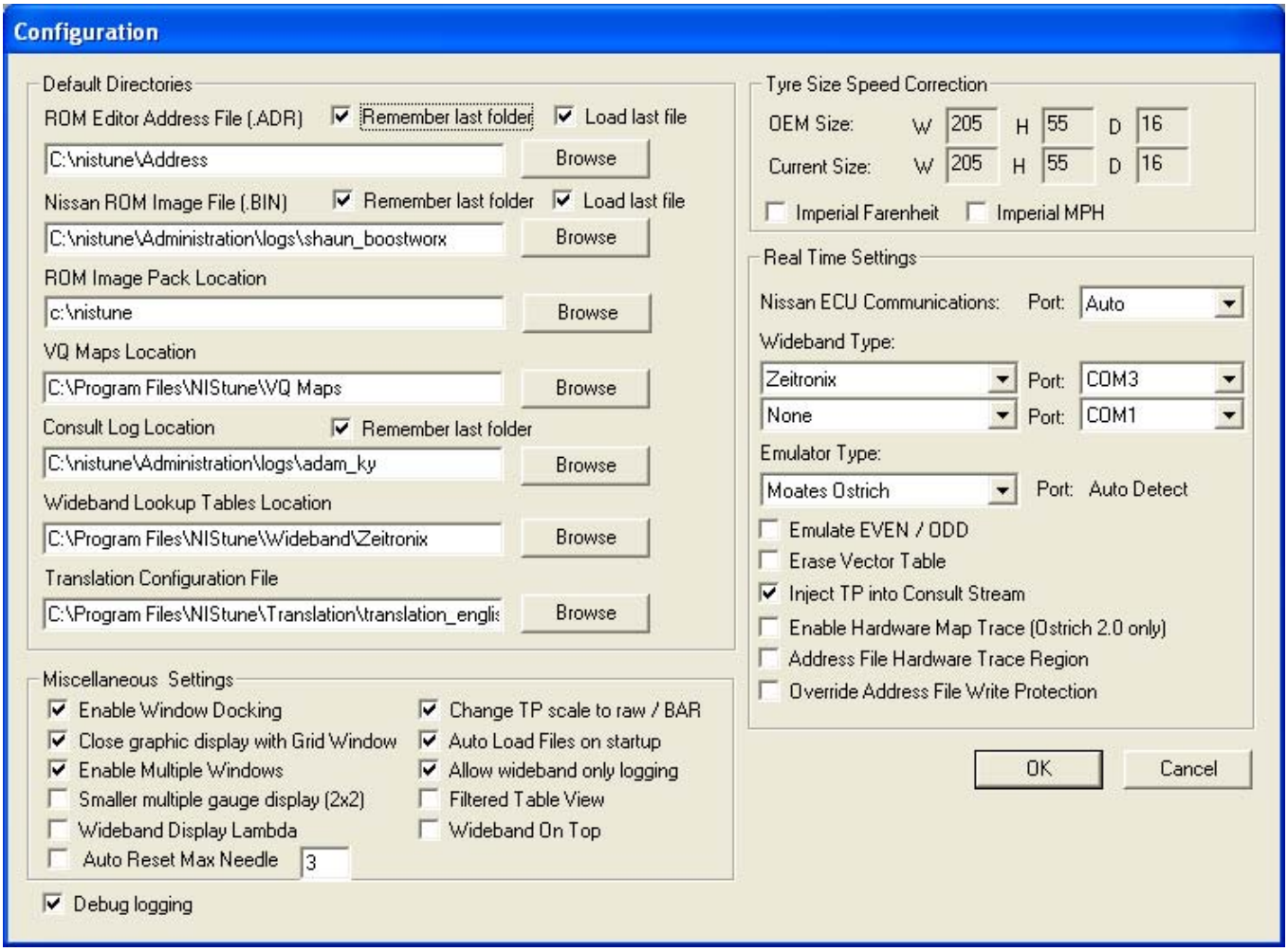
Select Wideband directory
C:\Program Files\NIStune\Wideband\PLXDevices

- Auxiliary input 1 - 5 volt input - **aux1.csv**
- Auxiliary input 2 - 5 volt input - **aux2.csv**
- Auxiliary input 3 - 5 volt input - **aux3.csv**

Ensure that auxiliary input 4 of your unit is configured to be AFR. This is what NIStune uses.

Setting up Wideband

First setup your Wideband Type and Wideband Lookup Tables location.



The above example sets up Wideband for Zeitronix with the correct Tables Location, Wideband Type and Communiations port (COM3 in this case)

Opening one of these files in a text editor (or Microsoft Excel and ensuring you save as CSV format) will show something similar to the following:

```
Aux1
0000,0
1000,1
1500,1.5
2000,2
2500,2.5
3000,3
3500,3.5
4000,4
4500,4.5
5000,5
```

This is an interpolation table. The voltages (in millivolts) are on the left hand side, and the onscreen value they translate to on the right hand side

You may have an auxiliary device which maps 0 - 5 volts into a temperature range or other measurement for example. The table can be changed to change reporting from raw voltages to something useful by adjusting this table. Values between those specified are linearly interpolated to give an estimated figure between.

The name of the input on your display can be changed, by altering from 'Aux1' for example to your own input description. This will be displayed as such within NIStune, next time you start the application.

There are also CSV files for your AFR which are reported. This is used by TechEdge and PLX units. Sample base files are provided for both units, so copy those into the files below when using the sensors.

`afr1.csv` (Wideband 1 AFR)
`afr2.csv` (Wideband 2 AFR)

NIStune now supports a second AFR sensor for two AFR inputs. All auxiliary inputs come off the first sensor unit.

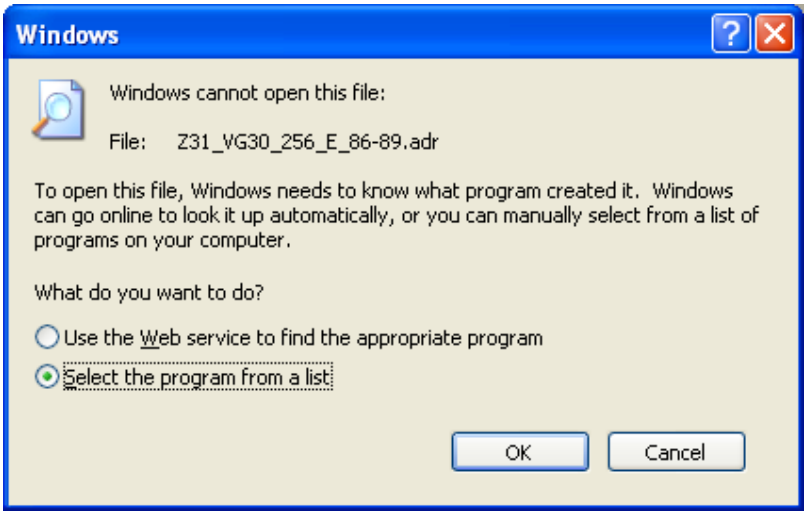
If you require additional serial ports, we recommend a decent quality USB-Serial converter. Those with good quality chipsets such as FTDI usually give good results. Cheaper varieties sometimes do not transfer data correctly as per RS232 specifications.

16. Change Base Injector CC size or AFM Offset in Address file

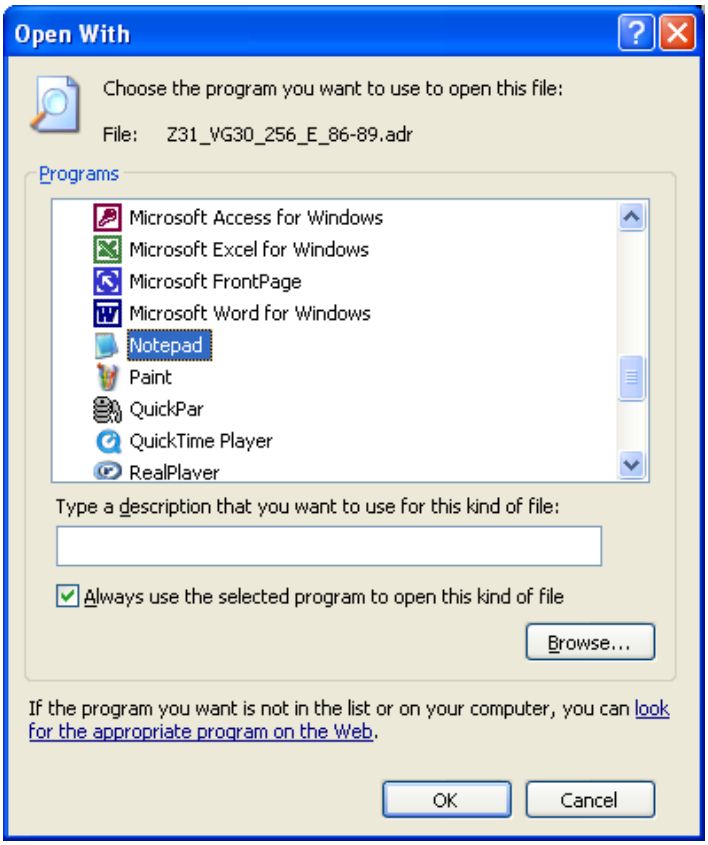
Note: As of Nistune version 0.9.5.1b the AFM offset will use the currently selected VQ map for the ROM image to determine what the AFM_OFFSET should be. If it is different from factory image for Z31, R31, VL Turbo and HR31 then the AFM_OFFSET will be set to zero. This way tuners do not need to modify the address files for different vehicle setups

To change these address file entries, you can edit the .ADR file with Notepad. To do this

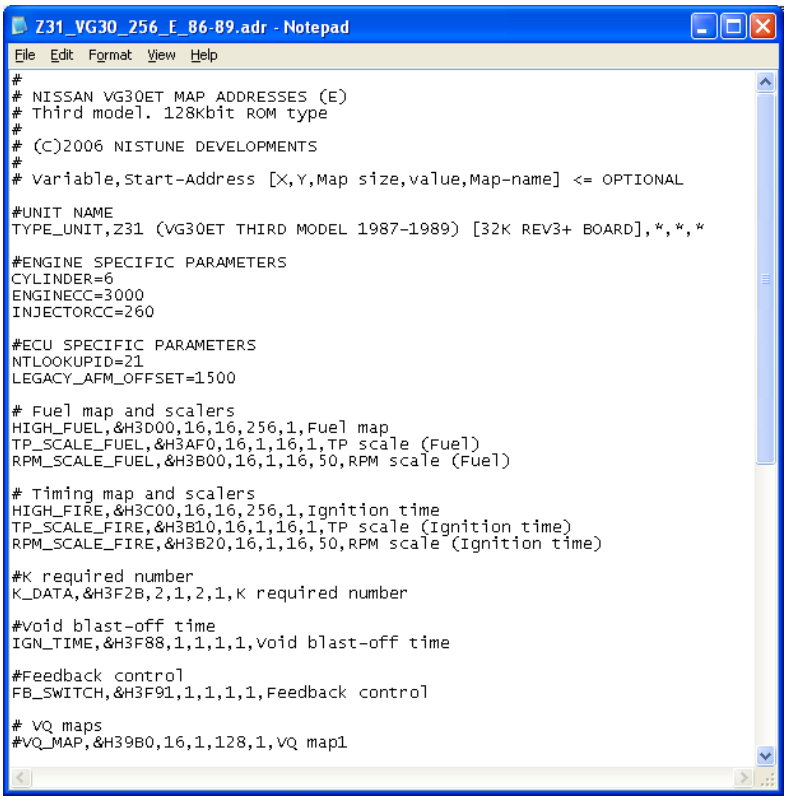
1. Double click your address file.
2. Select the program from a list



3. Scroll down to Note Pad



4. Ensure ***'Always use the selected program to open this kind of file'*** is ticked and click OK.



5. At the top of the file is an entry ***INJECTORCC=260*** for the Z31 for example. You can change this to match your current injector size.

6. If you have a R31/VLT/Z31 then there will be an entry **LEGACY_AFM_OFFSET=1500**. This is the amount of millivolts added to the raw AFM signal input inside the ECU to indicate the actual AFM voltage. Change this to 0 or remove altogether if you have changed the AFM in these vehicles

REVISION HISTORY

DATE	VERSION	DESCRIPTION	AUTHOR
24APR06	1.0	Document Creation	MB
03MAR07	1.0.1	Updates to use template and newer software screens	MB
29APR07	1.0.2	Updates for wideband configuration	MB
02JUL07	1.2	Updates for Injection and AFM resize	MB
10AUG07	1.2.1	Improve Formatting, readability etc.	PL
20NOV07	1.2.2	Updates based on latest software and wideband	MB
12MAY08	1.2.3	Update with AFM zener diode. Configuration page	MB
14JUN08	1.2.4	Add HR31 zener diode	MB
10JUL08	1.2.5	Update AFM Z32 and R31/VLT information	MB
13AUG08	1.2.6	Update address file for R31/VLT/Z31 information	MB
24MAY09	1.3	Moving AFM info, address selection, syncing files	MB