DIGITAL HORSEPOWER INCORPORATED

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REVISION HISTORY

Revision	Change Date	Change Description
1.00 Original Release		First Version
1.01 Pre Release		
1.02 Pre Release		
1.03 Pre Release		
1.1.9A		
1.1.9B		
1.1.9C		Current Version

1 *Introduction*

1.1 Overview

Thank you for purchasing the Digital Horsepower (DHP), Incorporated PowrTuner Portable Computer (PC) Programming package. The DHP PowrTuner is the most powerful and affordable programming package available for your vehicle. With over 200 user-selectable parameters and its wide variety of features, you can modify your power control module (PCM) to fit just about any possible application.

The DHP PowrTuner integrates three separate software programs into one package:

- **Flash Programming**
- **PCM Editor**
- **PCM Scantool**

1.2 Flash Programming

The Flash Programming software allows you to upload and Download the Binary code stored within your PCM. The Flash Programming can work in a low speed or High Speed mode depending on your hardware, using a 9 PIN Serial Port with a PC Computer.

The process used to FLASH is the same process your dealership uses to flash a PCM.

It is possible to damage your PCM when there is a loss of power or communications during the PCM uploading process. If you follow the recommended steps and minimize power use of your vehicle during the programming process, there is little chance of problems occurring.

The flash programming software also allows you to update the *Vehicle Identification Number* (VIN) stored on your Power Train Control Module and use any core PCM that is of the same hardware type. This is especially convenient if you want to work with a spare PCM instead of your original.

We recommend stocking an extra PCM to ensure that you have a backup in the event of a power or communications loss.

1.3   PCM Editor

The PCM Editor software allows you to edit one or more binary files concurrently. You can drag and drop calibration data from one file to another, which facilitates quick editing for common calibration changes. You can import and export calibration data to XML, CSV, HTML, and pure binary. The editor also incorporates a strict bound check to ensure that you do not enter invalidl data. In addition to bound checking, the software compares the changes made against the original values, and if they exceed a fixed percent, you receive a warning.

The Editor has multiple field selection and scaling options, which facilitates convenient editing. If you want to scale a few columns by 10%, you simply highlight the cells, right-click, and then select the *Scale by 10%* option. Custom value and filling are supported as well.

1.4   PCM Scantool

The PCM Scantool software allows you to read/clear diagnostic trouble codes and log PCM sensor data for later analysis.

The current Scantool allows you or a third party to easily log the most important data parameters for analysis. The data logged is exportable to HTML, CSV, and XML formats. In addition to data logging, you can use the Scantool to Read and Clear DTCs.

1.5 Main Menu Options

When you load up the Powrtuner software, you have the following options to select from the pulldown menu.

File	
Open Calibration File	Loads up your Binary File
Exit	Exit the Powrtuner Software
PCM Flash	
Read PCM	Download PCM Code
Upload PCM	Upload PCM Code
Vin Maintenance	Change or View PCM VIN
PCM Information	Gather data about PCM
Scan Tool	
DTCs	View/Clear DTC Codes set
Scan Vehicle	Scan Vehicle
Logs	View or Save Log Files
Options	
General Options	Change Comport Enable Comm Window Disable Connection Reminder Screen Change Interface Baud Rate
Scantool Options	Class II Data Acquisition Speed Setting Use Disable Normal Communications Auto-Restore Scan Config Auto-Save Scan Config
Programming Options	Programming Speed Programming File Size Bootloader Block Size Recovery Mode
Editor Options	Parameter Nag Disable Units / English / Metric Enable Data Color Mapping
Window	
Tile	Tile loaded binary windows
Cascade	Cascade loaded binary windows
Help	
About	Powrtuner Version and Information

2 *System Requirements*

PowrTuner has the following minimum system requirements:

- Pentium II 300 or faster laptop or desktop

- One DB9 Serial Port, or available USB port w/ USB to Serial Adapter, or PCMCIA Serial Adapter Card

- 100 MB of free disk space for PowrTuner install

- Screen resolution of at least 800 × 600; however, 1024 × 768 is preferred

- Windows 95, 98, ME, 2000, or XP operating system

- JET DB 4.0

- NET Framework 1.1

- MDAC 2.8 or newer

- Internet Explorer 6 SP1

- UART 16550 Chipset or better (Check with manufacture)

DHP has tested this software to run on a Pentium 90 machine, but we do *not* recommend anything slower than a PII 300. Theoretically, this would work as long as you meet all of the other requirements. We prefer that you use a machine with a true DB9 serial port; however, we have successfully used this software with both USB to serial adapters and PCMCIA adapters. Refer to the DHP website (http://www.digitalhorsepowerinc.com) for a complete list of tested hardware.

If you have any questions regarding supported hardware or if you have successfully used the program on an unlisted piece of hardware, contact us so we can update the list and assist future end users.

3 *Installation*

The first step to installing the software is to download the latest version from the DHP website. The program is located on the PowrTuner Help Forum page (http://www.gmv6pcm.com). If you received a CD Rom (Version 2.0 and later), start the installation by inserting the CD into the drive. Internet-based download users need to download the appropriate file and then double-click on it to start the installation. The installation process takes approximately 5 to 10 minutes to complete, excluding file download time. Once you have installed the program, go to Start, Programs, select Digital Horsepower, Inc. menu, and then click on PowrTuner to start the software.

WARNING
The first time you run the software, you must synchronize your machine to the cable. This requires that the cable be connected to the computer and to an OBD-II data port to supply power to the interface. After completion, you do not need to do this again unless you need to reinstall or upgrade your software. Failure to follow this procedure might result in damage to the program and the equipment.

When you start the program for the first time, the License Agreement window (Figure 3-1) appears. You must accept the license agreement; otherwise, you will not be able to use the software. Read the license agreement completely. When you have finished, select the Yes, I agree option and then select the Continue button.
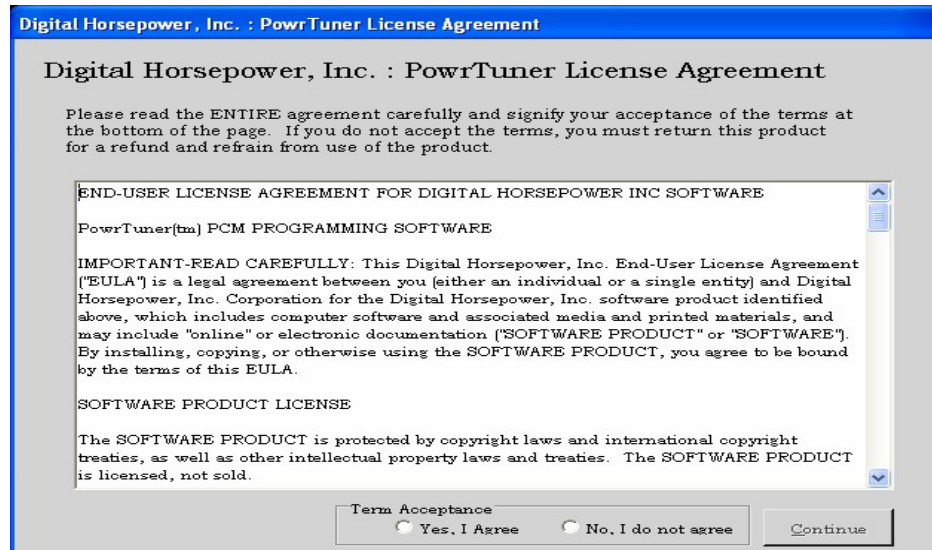
Figure 3-1. License Agreement Form Screen

After accepting the license agreement, the software attempts to synchronize with your cable. You are prompted to select your COM port (Figure 3-2). The COM port refers to the Serial port you have connected the cable to. Most computers use Com Port 1 or 2, and most USB adapters use a higher port such as 4 or 5. Verify which serial port you are using; select it from the list and then select *Save*.
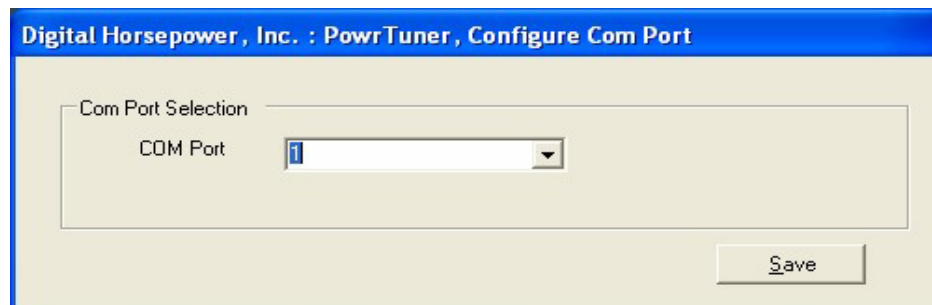
Figure 3-2. Select Serial Port Screen

Once you have saved your COM Port settings, the program attempts to connect to your cable. Before you select OK, make sure that the cable is connected to both the computer being used and the vehicle (Figure 3-3) Also, ensure that the key is in the ON position. The interface does not power up until the key is in either the ACCESSORY, ON, or RUN position. After this completes, you will then be able to use the Editor, Scantool, and Programmer.

WARNING:
If the PC system that you are using DOES NOT have a serial port to connect your Powrtuner to, you will then need to use an adapter cable. DHP only recommends the KEYSPAN© High-speed Serial to USB Adapter model # USA-19HS. After the adapter is installed check what comport it is using and select that comport in the comport selection screen.
Owners with Firmware 2.4 or higher should select 115,200bps. Users with firmware 2.2 or older should select 57,600bps.
The firmware version is written on the label of the interface box, etc.

If the computer fails to recognize the cable or you received an error message, take a screenshot of the error, record any Other details and then contact DHP.

Figure 3-3. First Time Registration

If you are unable to connect to a Vehicle at said time, you can select IGNORE on the error message window and then select YES when prompted to bypass the registeration. This will activate the DEMO mode. You will not be able to read/write/flash, only view files.

4 **PCM Reader / Writer**

One of the first things you need to do after successfully installing the program is to read a data file. You cannot edit your PCM until you read it or you contact DHP for a base file to start with. When you purchased your programmer, you selected a specific vehicle make, model, and year. You are restricted to editing only the model you purchased support for.
Files you have not purchased cannot be read. If the file is unknown by the programming system, you can read it, but you must send the file to DHP for assistance. If the file is a valid file and was omitted from the system, DHP adds it to the list so you can work with it. If the file is protected or otherwise unsuitable for editing, DHP does not support it in the system. All users who purchased this package and who have a DHP PCM of any kind should use this package to read the file and then email it to us. We update it to the latest code revisions and send you back a file that you can work with unrestricted.

We recommend to use only a serial port that has a 16550 or higher UART Chipset. If you do not know this, you will need to check with the manufacture of the system. Usually this is not a problem with systems made after 2000. If you have under 16550 you will most likely run into problems. For example a 16450 UART can only store up to 2bytes of data, if it overflows, data is lost.   If you have this problem and need to upgrade, we recommend only the KEYSPAN HI SPEED USB to SERIAL Adapter.

4.1   Reading PCM

You must run the PCM Information option before you attempt to read the file. This is located in the PCM Flash menu. All of the PCM screens look very similar to the PowrTuner PCM Information screen (Figure 4-1).

The fields on this screen are:
- VIN # displays the currently stored VIN # of your PCM
- Block 0A displays the OS Identifier for your PCM.
- Base Model and End Model are also OS identifier fields.
- Seed reflects part of the PCM security information

- Interface Ver # reflects the version of the DHP Interface. The current version is 2.0 for the interface. If you have a previous version, contact DHP for a firmware upgrade.
- Comm Window displays comm. Message activity.

This will help check to make sure you can communicate with the PCM in a quick manner.
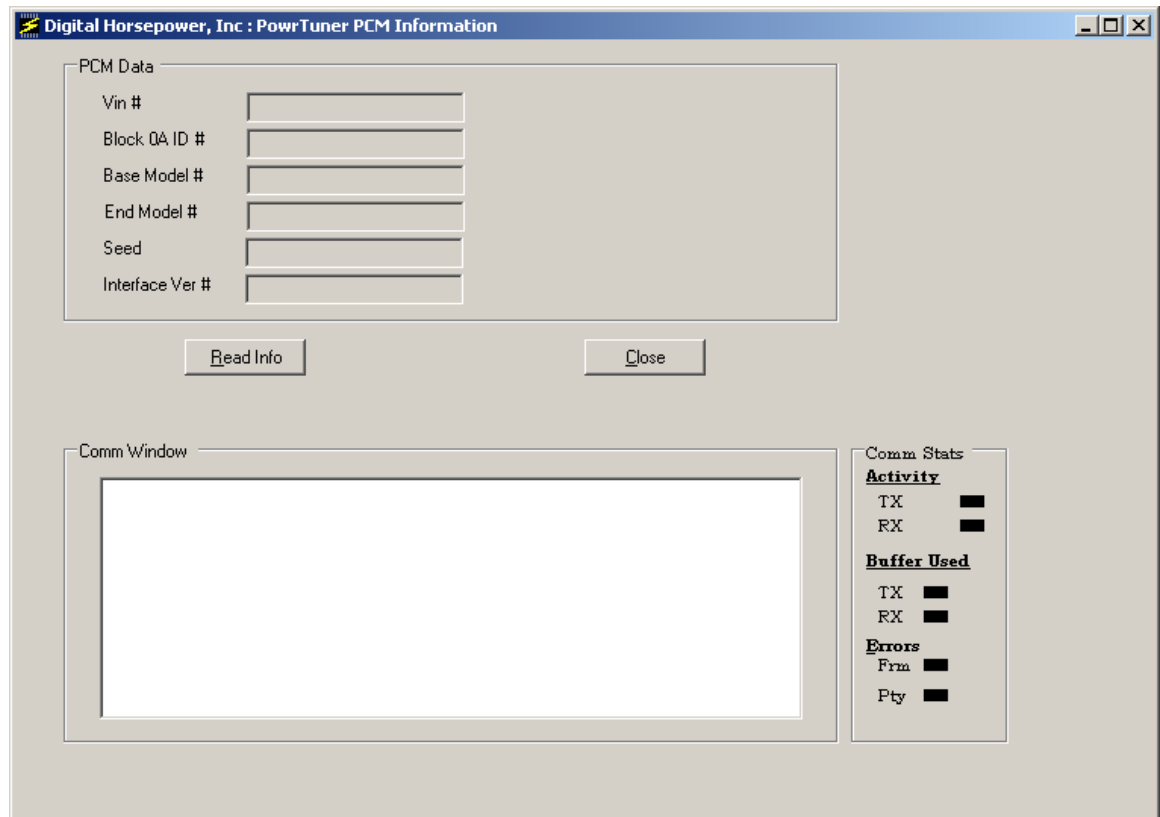
Figure 4-1.   PowrTuner PCM Information Screen

You are now ready to read your PCM. In High Speed mode, the reading process takes approximately 3 minutes to complete and Low Speed mode transfer takes approximately 7 minutes to complete. By default, the software attempts to use Low Speed mode because it is usually more reliable on older machines. If you want to run in High Speed mode, select the Options menu, Interface, and then High Speed.

The PCM requires a constant voltage of greater than 11.5 volts to remain active. If the voltage falls below this value, the PCM shuts down and it could be damaged. Always verify that your battery is in good operating condition before reading or writing your PCM. Also, disable any power consuming devices, such as headlights, before reading and writing.

To read your PCM, make sure you have the cables connected properly to the vehicle and your computer, turn the key to the ON position, turn off any unnecessary power draining items, select the PCM Flash menu, and then Read PCM. After selecting the Read PCM, a prompt appears asking you to verify that the cable is connected and the vehicle power is ON. Once you confirm this, the PCM Read/Write Utility 1.0 screen (Figure 4-2) appears. This status bar informs you what step is currently executing as well as the status of the entire process. In the event of a communications error, the software attempts to retry the communication when possible. If there are multiple failures, the name of the step updates to indicate how many retries.
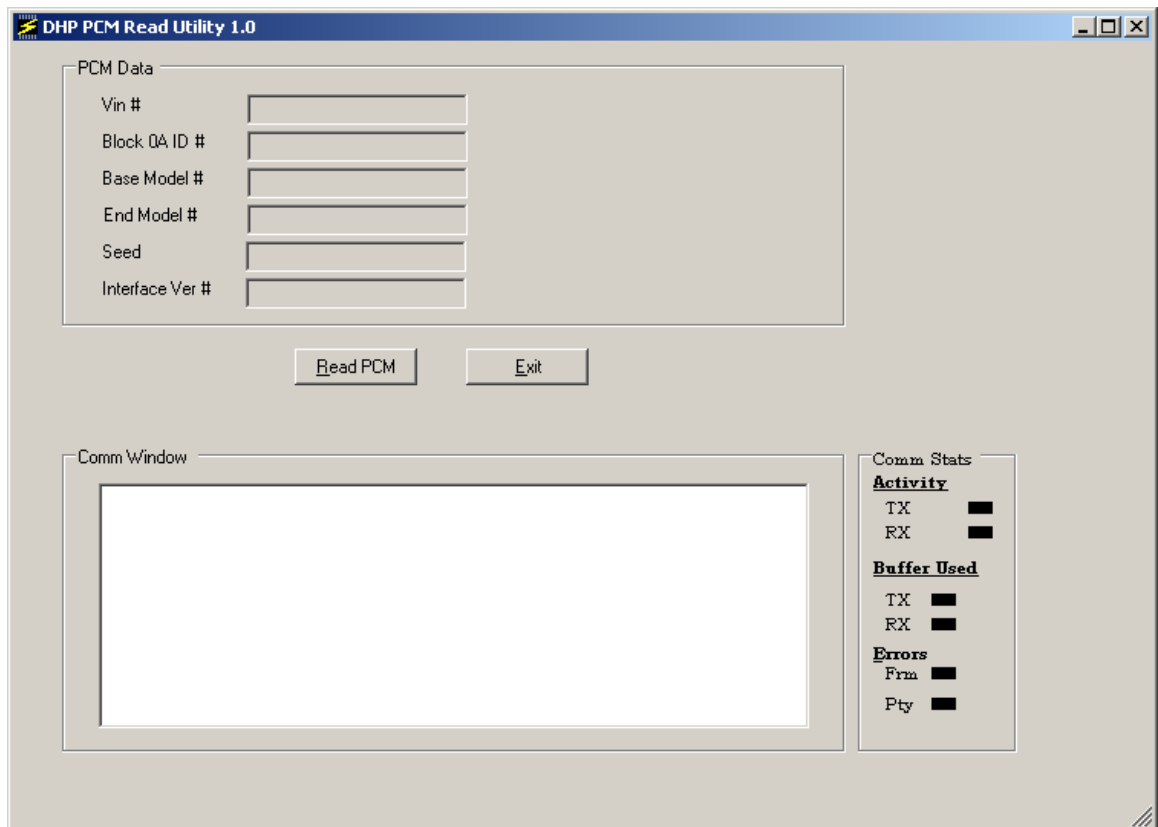
Figure 4-2.   PCM Read/Write Utility 1.0 Screen

After a few steps have completed, you need to switch to a new status bar. The new status indicator shows you the Read or Write progress. The Progress bar shows the current block being transferred, the total number of blocks to be transferred, the overall percent completed, the current estimate byte per second transfer speed, and the total elapsed time for the operation.

When the read completes successfully, you receive a Save File Output screen (Figure 4-3), which prompts you to choose a location and filename

for the file you read. You can use Long File naming to describe the file. Choose a directory; enter a valid Windows Long File Name, and then select Save. After saving, the Programming Complete screen (Figure 4-4) appears. The purpose of this screen is to inform you that the operation completed successfully. It also prompts you to undo any modifications you made to the car to conserve power (such as unplug headlights, and so forth)
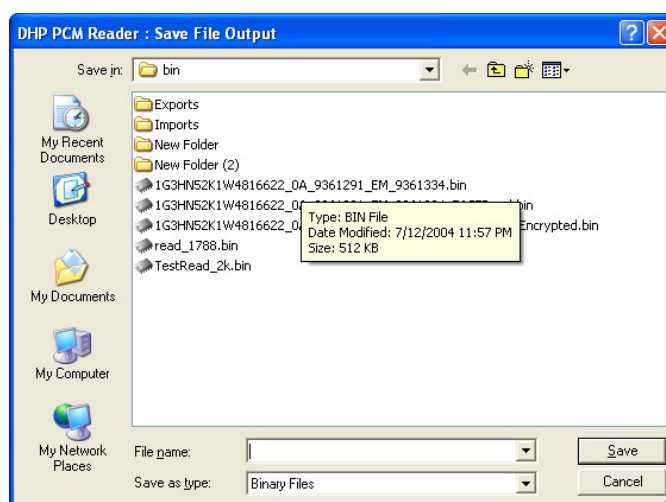
Figure 4-3. Save File Output Screen

Figure 4-4. Programming Complete Screen

In the event that you try to read an unknown PCM, you receive a screen that asks you for input in order to properly read the PCM. If you know what type of PCM core you have, select it from the list and then select Continue. However, if you do not know what type of core it is or it is not listed in the drop down list, do not continue. If the PCM type is not in the

list, cancel the read operation and then select the PCM Information command from the PCM Flash menu. Email DHP with the information retrieved from the PCM Information command and we will notify you if the PCM is supported, and if so, which year to pick. If you incorrectly guess the type of PCM, you risk causing damage to the PCM.

In the event that you attempt to read a PCM that you did not purchase support for, you receive a rejection message (Figure 4-5) stating that you are not authorized to download the file. If you wish to download this PCM, you need to purchase the proper year type to do so.
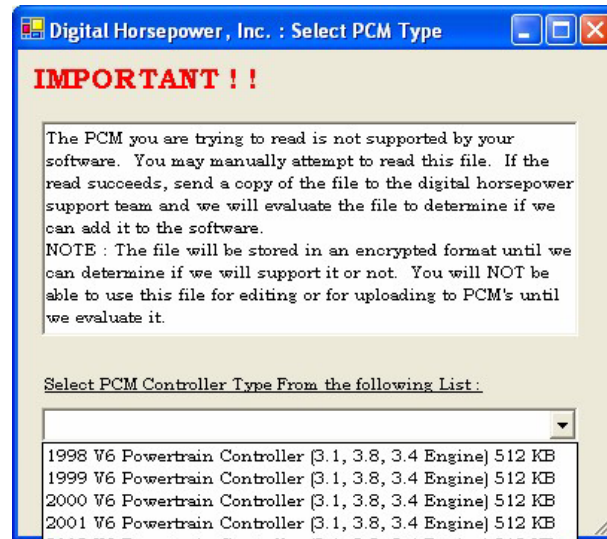
Figure 4-5. Rejection Message Screen

4.2   WRITING PCM

Writing a PCM file is basically the same operation as the Read PCM.

However, instead of taking information from the PCM, we send it new data. Also, as with reading, the write procedure requires the electrical system to be in tip top shape; a power failure during a write process can cause your PCM to become unusable.

The PCM Read/Write Utility 1.0 screen is shown in Figure 4-6
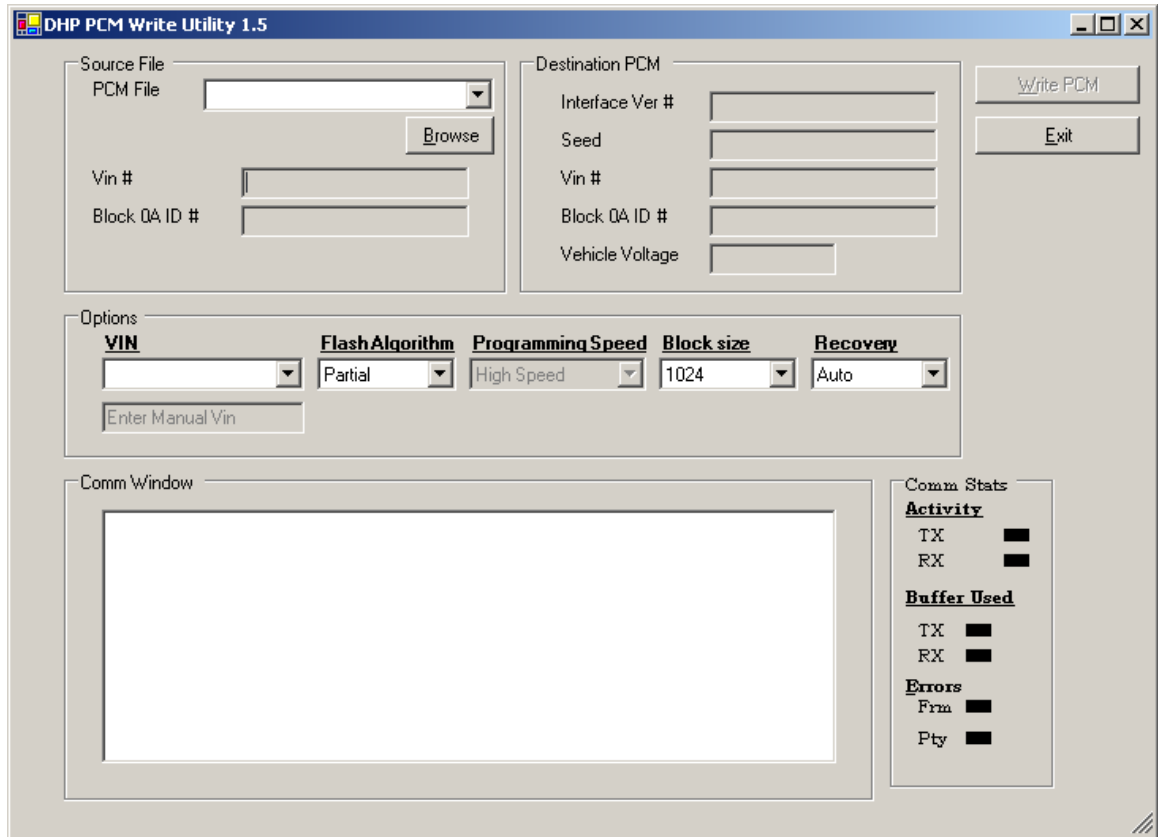
Figure 4-6. PCM Write Utility 1.5

To write a file to the PCM, go to the PCM Flash menu and then select Upload File. This screen is a lot more advanced then the PCM download screen.

You can Click on the BROWSE button to get a file listing window to choose the file you want upload. If you have previous files already uploaded the arrow in the PCM File box will let you select previous files to make the process quicker.

Once the file is loaded, the VIN # box and Block 0A ID # box will have the info from the loaded file.

Before you upload the file you can change the following options.

1. **VIN**
   USE PCM File VIN – Use VIN stored in the File
   USE PCM VIN – Use VIN stored in the PCM
   Manual Entry – Input a new VIN
2. **Flash Algorithm**
   Auto – Software Decides
   Full – Write the PCM Fully, OS and Data

Partial – Writes only the data section of the PCM

3. **Programming Speed**
   High-speed – Enable HIGH Speed transfer
   Low-speed – Enable LOW Speed transfer

4. **Block Size –** Select size of block Packets to send

5. **Recovery**
   Auto – Software decides
   No Recovery – Does not try to Recover PCM
   Force Recovery – Forces Software to try and Recover

Once your file is loaded, and options are set, click the WRITE PCM button.
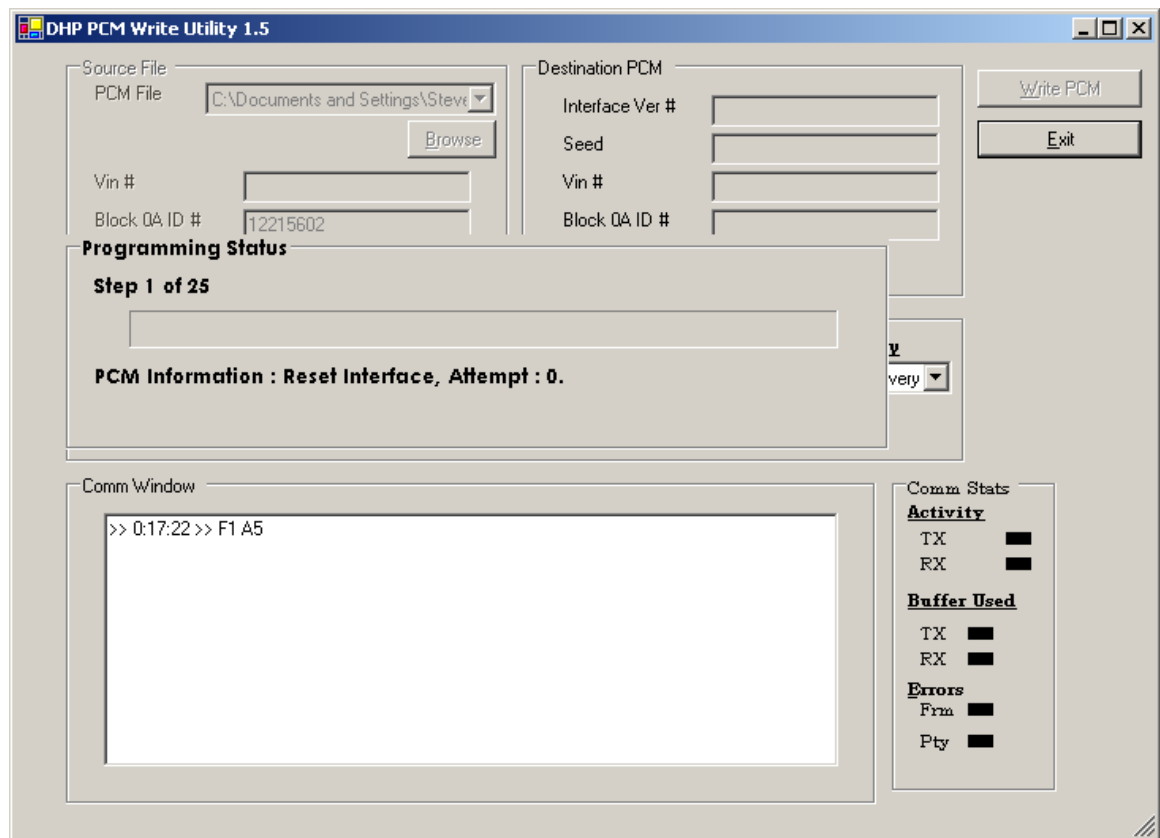
Figure 4-7. Upload File Screen

Figure 4-8. Upload Complete Screen

After the writing is complete, be sure to power down the key to key *OFF* and let it sit for approximately 20 seconds before starting the vehicle. If you see a SES light, it is most likely due to the DTC P1336, which means you need to perform the Crankcase Position Variation Learn Procedure to ensure that your PCM accurately detects misfire events.

If the car does not start after upload, check to make sure there are no DTCs set. If DTCs are set, make a note of which ones. If the car does not start, but you can still read data from PCM Information, then attempt to reprogram it back to your original file. A common problem is if you do a partial write over a PCM that had a different OSID.

Some people will prime the fuel system 2 or 3 times before starting the car. To do this just turn the key to accessory made but don't start the car. Do this a few times and then start the car.

If you still cannot get the vehicle to start, contact DHP support immediately for assistance.

4.3   VIN Maintance

Vin Maintance (Figure 4-9) will allow you to view and change the VIN stored in your PCM. All you need to do is Click on the READ INFO button and the VIN # and Interface Ver # boxes will fill with data. Once the VIN # is loaded, you can change the VIN and click the UPDATE VIN button to make the change.
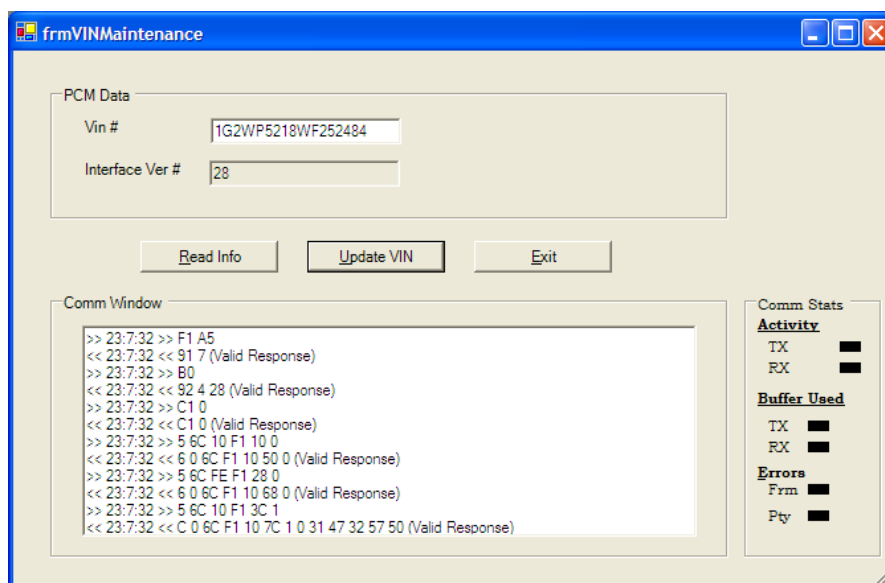
Figure 4-9. Vin Maintenance

5 *Editor*

The editor is the main part of the program. To edit a file, select the File menu and then select the Open Calibration File option. When the file comes up, open the Dialog box, Select your file from the proper location, and then select Open.

After you have selected a supported file, an Explorer View screen (Figure 5-1) does not come up for that file. The Explorer View screen is the main screen that you use for interacting with the PCM file and consists of the following:

- General information
- Profile
- Calibration data
- Scantool data
- Real-Time control
- Change log
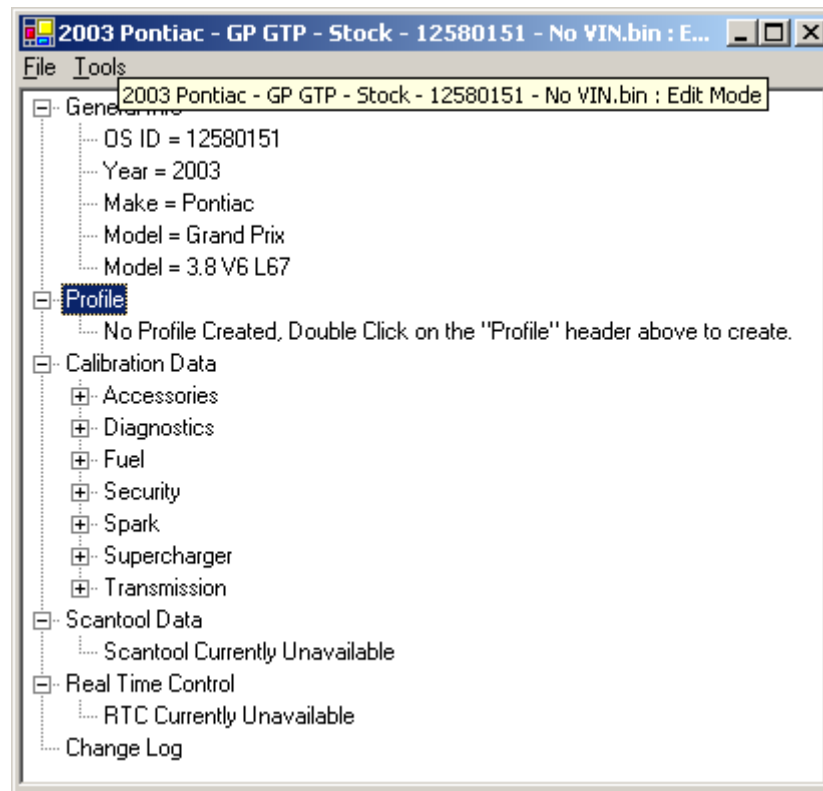
Figure 5-1. Explorer View Screen

5.1 General Information

Contains information about the PCM ID
and what vehicle it is for.

5.2 Profile Section

The section contains data about the car and its modifications. You can link your calibration file to a vehicle profile.

To create a profile or edit your current profile, double-click on the item labeled Profile in the Explorer View screen. The Profile Editor screen (Figure 5-2) allows you to enter some information about your vehicle and its modifications. You can specify the Vehicle Profile Title, VIN #, and Vehicle Description. In addition to those user-entered fields, you can also associate modifications to your vehicle profile. The purpose of this is to allow you to associate your Scantool log information versus your modifications. The DHP Scantool.NET service allows you to upload your Scantool logs and compare them to other user's Scantool logs with similar modifications. Once you have filled in all of your information, select Save and Exit, which returns you to the Explorer View window.

Figure 5-2. Profile Add/Edit Screen

5.3   Calibration Data

This section gives you the available sections of the PCM
That you can change. The following are the Main sections
Of each area available.

- **Accessories**
Deals mainly with accessory type subsystems on the engine.
Examples are A/C, EGR, ALT, Fans, and IAC
- **Diagnostics**
Deals with DTC codes to Enable / Disable
- **Fuel**
Relates to any fuel controls. This includes fuel injectors, fuel cutout points, MAF table, and so forth.
- **Security**
Change options for your vehicles Factory Security system
- **Spark**
Relates to timing advance, timing retard, timing limiters, and so forth.
- **Supercharger**
Relates to the superchargers boost, gain, and protection
- **Transmission**
Relates to shift points, shift time, shift pressure, torque management, and so forth.

To edit a parameter, expand the category and then double- click on the variable you are looking for. Figure 5-3 is a screen for the 1st to 2nd gear up shift while in Performance Shift mode. You should immediately notice that there are two panes in this window. The pane on the left is the current data stored in the PCM for the parameter. The pane on the right shows the General Properties for the calibration item you are editing. The Parameter Class signifies what type of data you are editing. This category indicates what class of parameters the parameter belongs to, the min and max values are the low and high bounds for the parameter, the value units refers to what type of data we are working with. You should also note that the panes are adjustable, so if you need more room for the data you are editing you can slide the pane over to produce more room. Also, notice that there is a second tab on the right-hand pane. (Figure 5-4) shows the pane adjusted to the right.
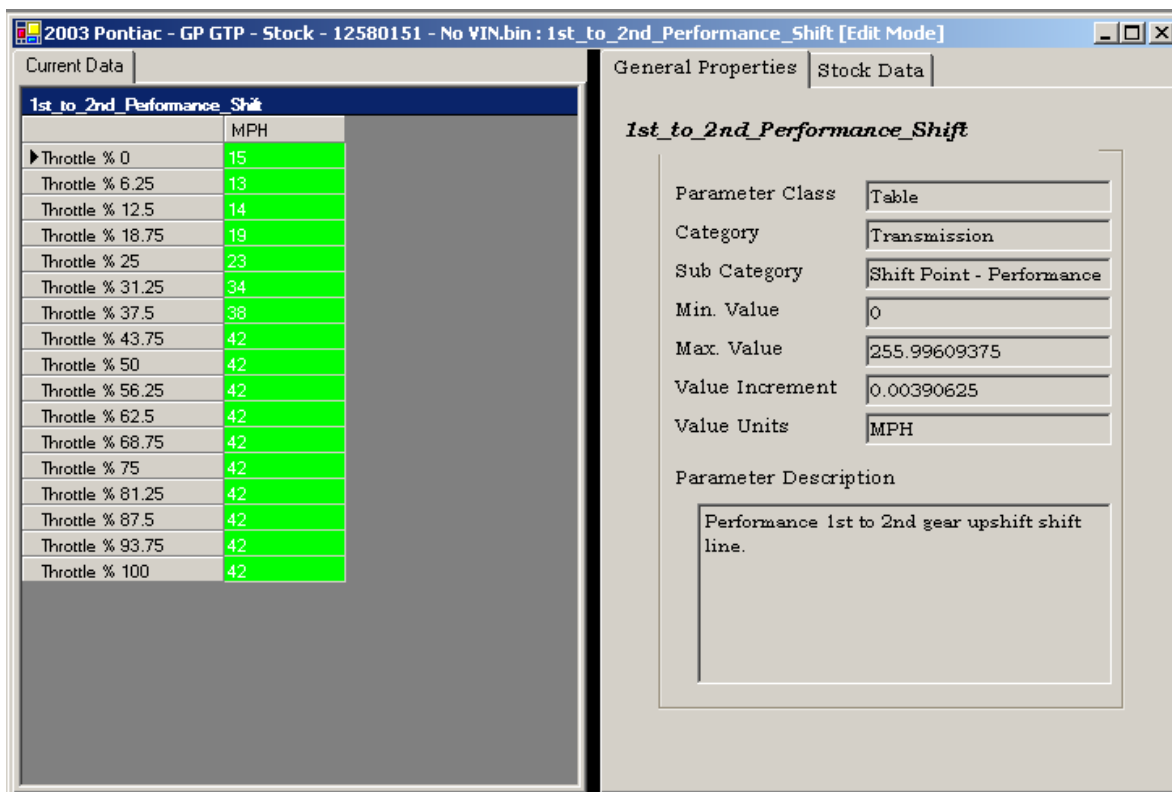
Figure 5-3. Edit 1st to 2nd Gear up shift in Performance Shift Mode
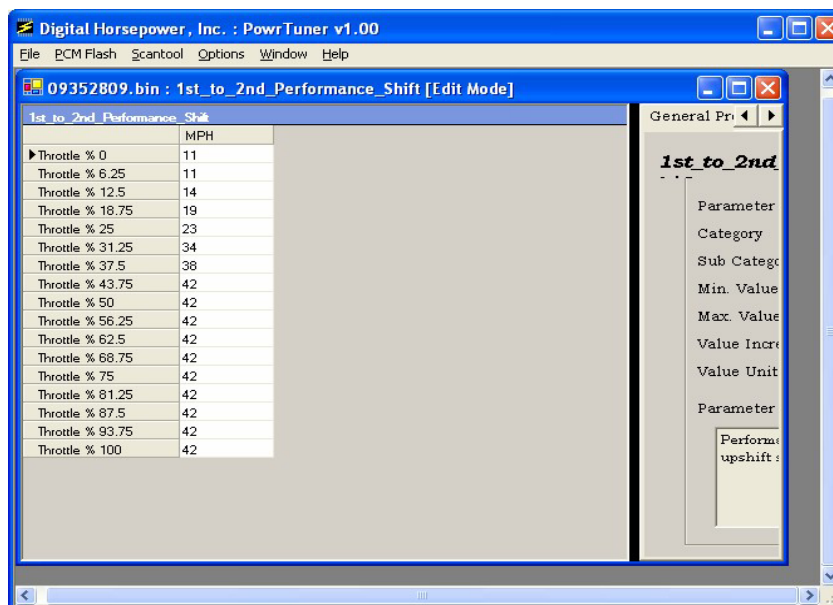
Figure 5-4. Pane Adjustable to the Right

When you select on the Stock Data tab, you see a second table (Figure 5-5). This table is the original stock data for the file you are editing. If you ever need to refer to stock data, open that tab.
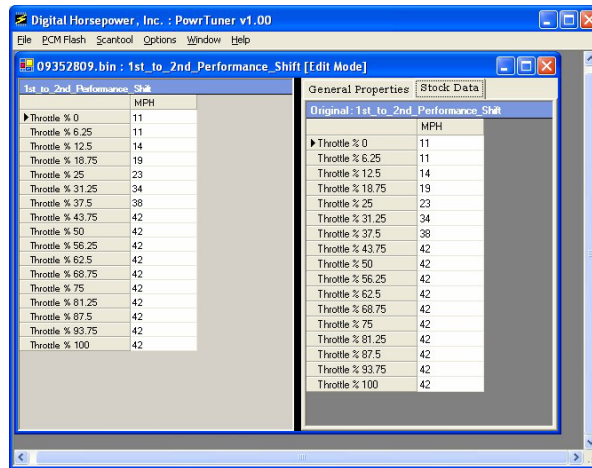
Figure 5-5. Stock Data in Right Pane

There are many methods of editing the data while in the Edit window. The most basic way to edit data is to go into each cell and just type in a new value. The software has built-in bounds checking (look at the General Properties tab). If you enter in a value that is outside of the limits, you receive an error message (Figure 5-6) and you must fix the error before continuing.

Figure 5-6. Illegal Value entered, Out of Bounds Screen

In addition to checking for out-of-bounds a condition, the program also watches for extreme changes between the stock value and the new value. If the program determines that the change is too high, it displays a warning (Figure 5-7). This is a warning message only and it does not prevent you from saving the value.

Figure 5-7. New Value is Above Warning Threshold Screen

In addition to manually editing a single field, you can do a multiple select and perform operations on the selected fields. To multi-select fields; place the cursor over a field you are not currently editing, depress and hold down the left mouse button and it drag over the range of cells you want. When you have the cells highlighted, right-click and the Edit menu (Figure 5-8) appears. There are pre-made options such as Increase by 1, 3, 5%, 10% and Decrease by 1, 3, 5%, and 10%. In addition to those, there is a Custom option at the bottom, which allows you to specify how to handle the selected cells.
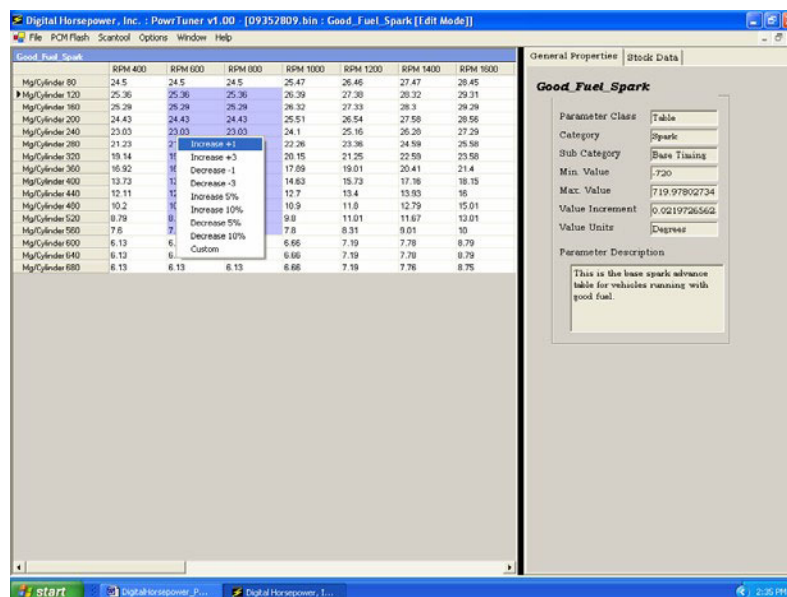
Figure 5-8. Edit Menu Screen

The Custom Field Edit Screen (Figure 5-9) allows you to enter in your own scaling for the selected cells. You can specify a percentage, a fixed amount of units, or a fill value. To increase all the cells by 10%; select the Percent Type and then enter value of 110.

To fill all cells with a value of 25; select the FILL Type, enter a value of 25, and then select OK

Note: Bounds checking also applies to the fields you custom edit in this fashion.

Once you have finished editing the data in the Edit Window, you are prompted to save the changes you have made. If you wish to save your changes, select Yes. You have now successfully edited calibration data; however, there are more ways you can modify calibration data.

Figure 5-9. Custom Field Edit

In addition to directly editing values, you can make changes via the Explorer window. Right-click on a Calibration Parameter and a screen appears (Figure 5-10), that allows you to Import data.
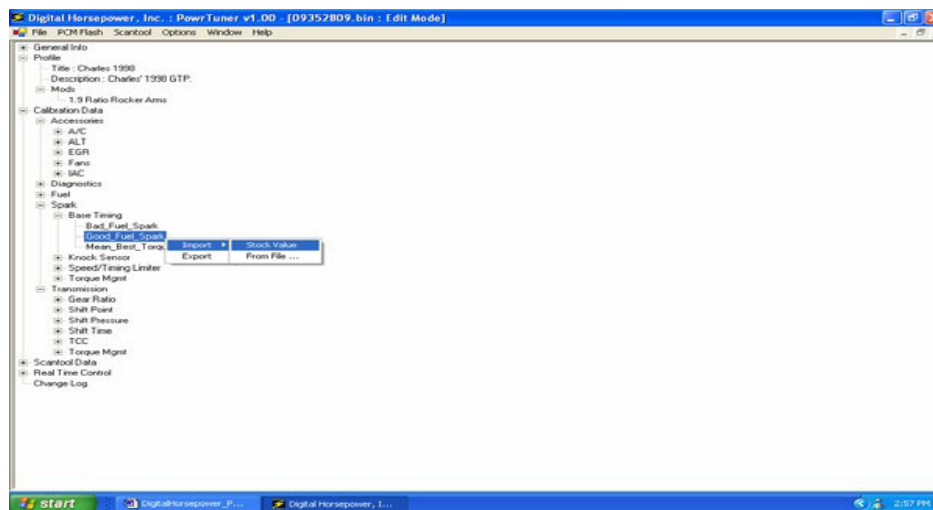
Figure 5-10. Right – Click Import on a Calibration Variable Screen

You have a few options. If you choose Import From Stock, the program resets the Parameter to its original stock form. If you choose Import From File, you have the choice of importing data from a CSV, Binary File, or XML file.

When you attempt to import from CSV or XML, the software checks to make sure the data is of the correct data type and the proper data size. With a pure binary import (Figure 5-11), it can only verify that the size matches.
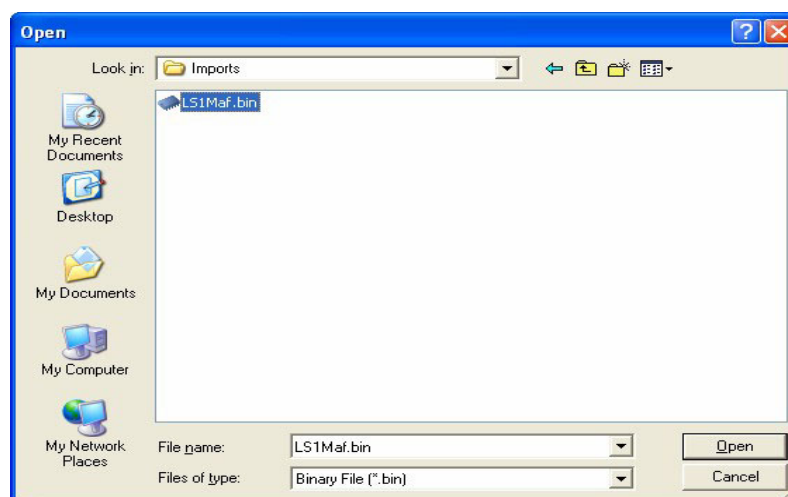
Figure 5-11. Import from Binary File Screen

The final method of editing calibration data is the Drag and Drop method (Figure 5-12). You can modify parameters by dragging and dropping a similar size and data type parameter. Select and hold on the parameter to copy, drop it to the parameter you want to replace, and then release the mouse button. A window will come up (Figure 5-13) that will display the status of copying over the data to the other file. Here it will tell you if data was copied successfully or not.
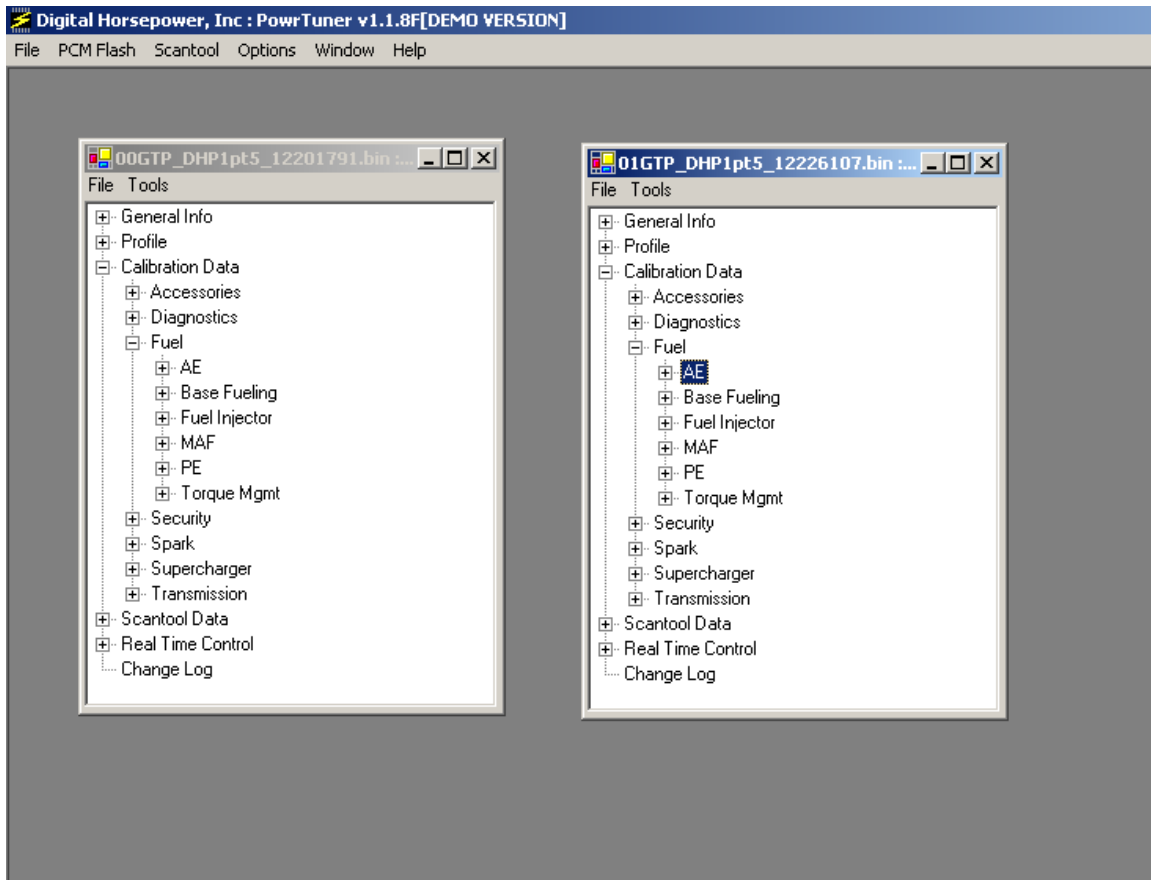
Figure 5-12. Drag and Drop Between Two Calibration File Screens
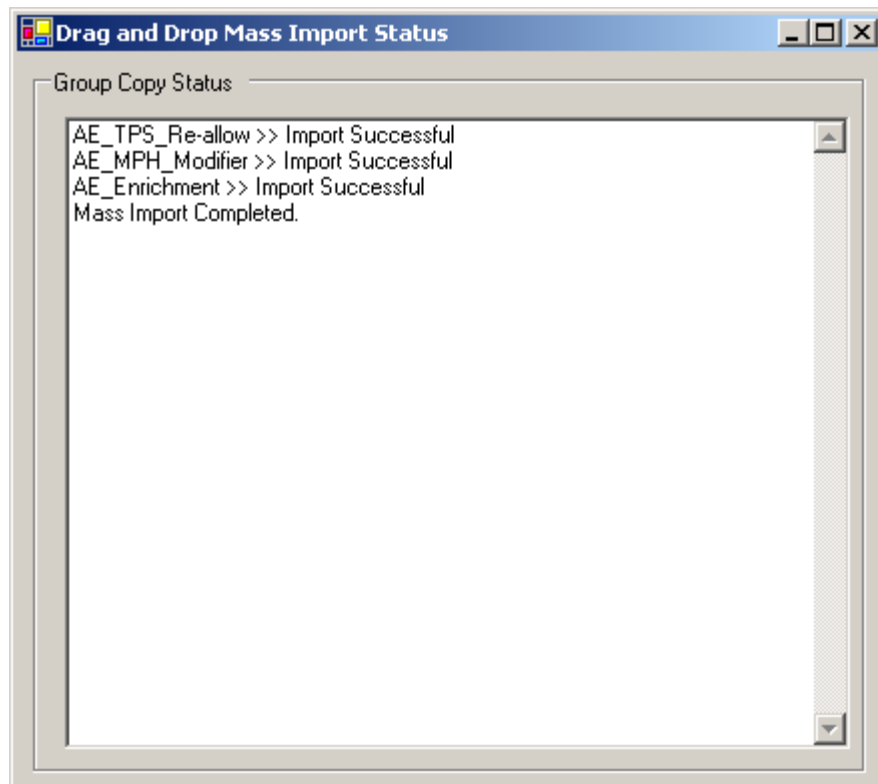
Figure 5-13. Mass-Copy Screen

There are also a few more features available. With your opened files, you have the following options. (Feature 5-14)

- **Close**

  This will close the file
- **Save**

  This will Save the File and any changes made
- **Save As**

  This will Save the File and any changes made, and also give you the option to save the file with a new file name.
- **Upload to PCM**

  This will load the PCM Uploading feature to upload this currently loaded file.
- **Reset File to Stock**

  This will reset the Entire file back to stock values.
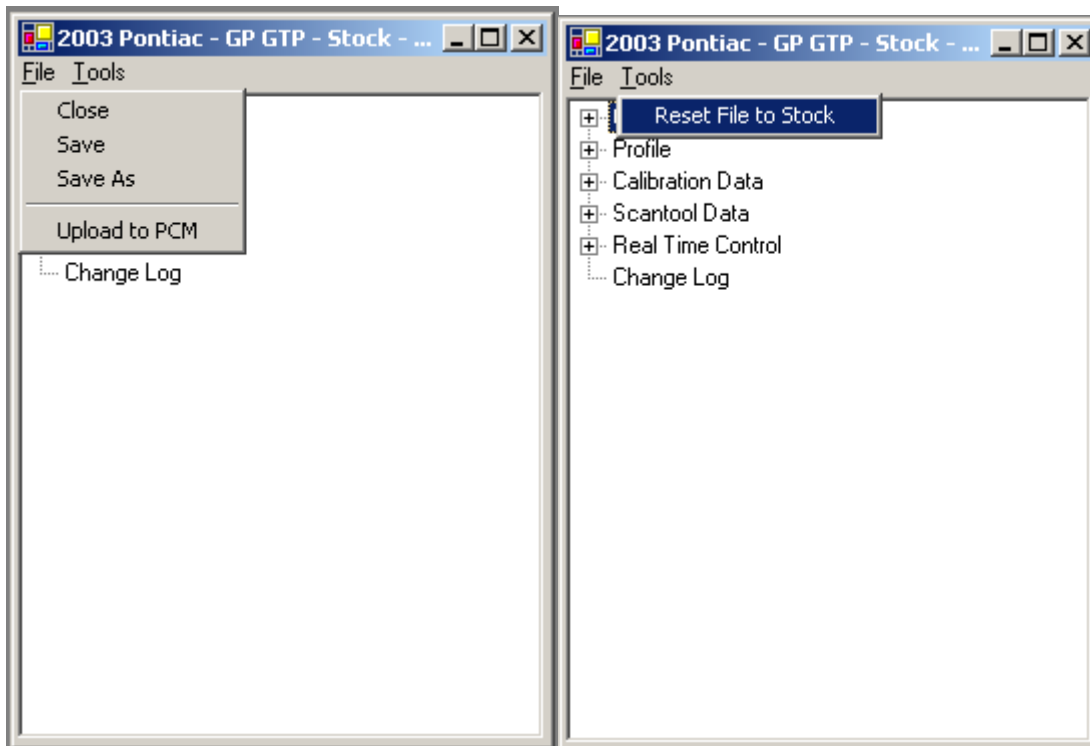
Feature 5-14. File Options

5.4 Scantool Data Section

This current section is Disabled.

5.5 The Real-Time Control Section

This current section is Disabled.

5.6 Change Log Section

The change log section houses a record of all modifications performed on the file. You can also save line item descriptions of each individual change.

The change log allows you to track all of the changes you have made to the file and add line documentation for each item. The file is stored in the same folder/path as the PCM binary file. If you move or rename the binary file, you must move/rename the change log file as well; otherwise, you no longer have access to the change log information. The change log file is the same as the PCM binary file except for the file extension. The change log extension is .CLG.

When you first start working on a new file, the change log only has one entry (Figure 5-15).
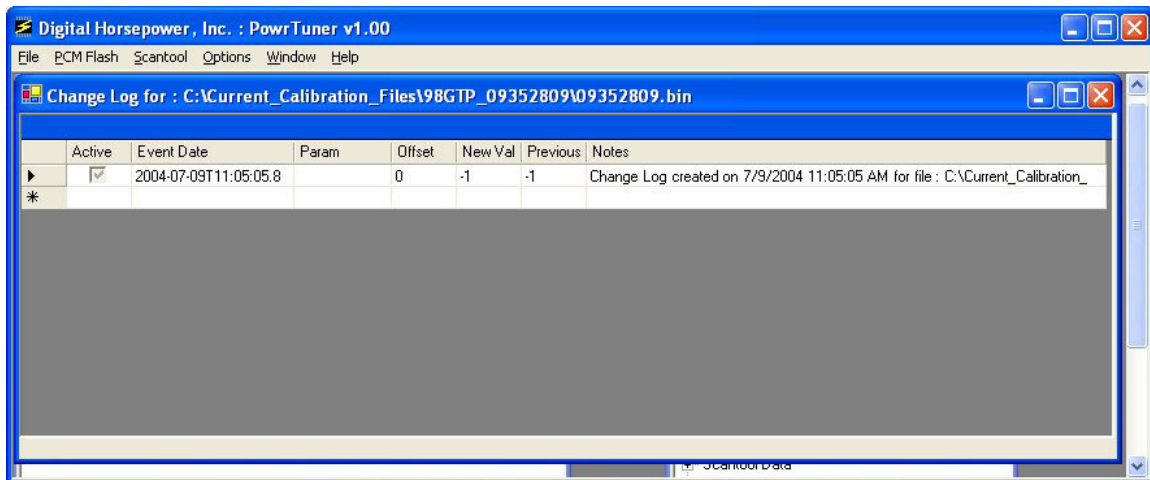
Figure 5-15. New Change Log Screen

As you perform work to the file, the log populates with data (Figure 5-16)
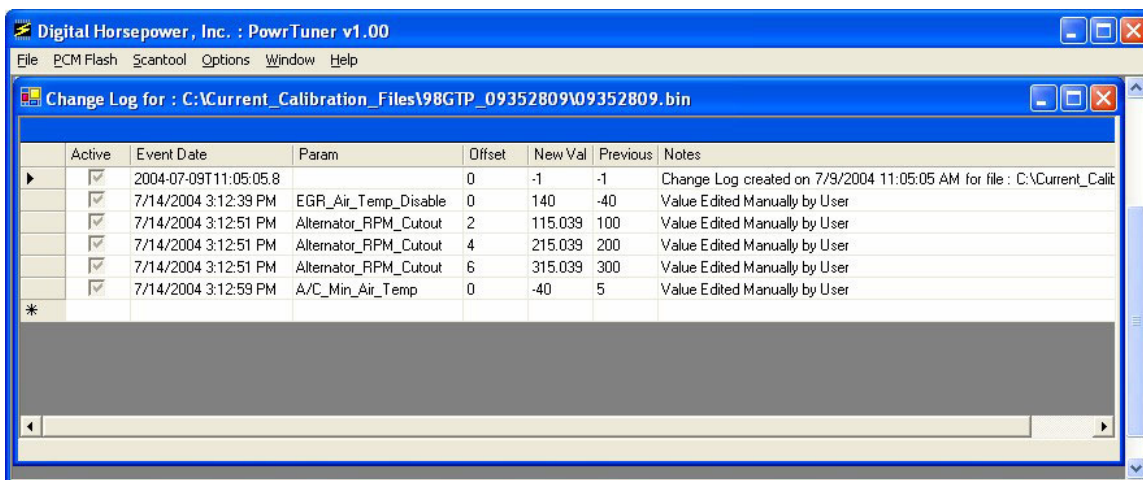
Figure 5-16. Change Log After Editing File Screen

The change log has the following fields: Active Flag, Event Date, Param, Offset, New Val, Previous, Notes.

Active Flag signifies if the event is still active. The 2.0 release allows you to deactivate an item to revert back to the previous state. Currently, the items are always active.

Event Date points to the time the change was made to the PCM file.

Param refers to the name of the calibration variable.

Offset Is currently set to 0

New Val refers to the value that was entered into the field.

Previous refers to the value before the field was edited.

Notes (Figure 5-17) is a user-editable field that allows you to store notes such as:
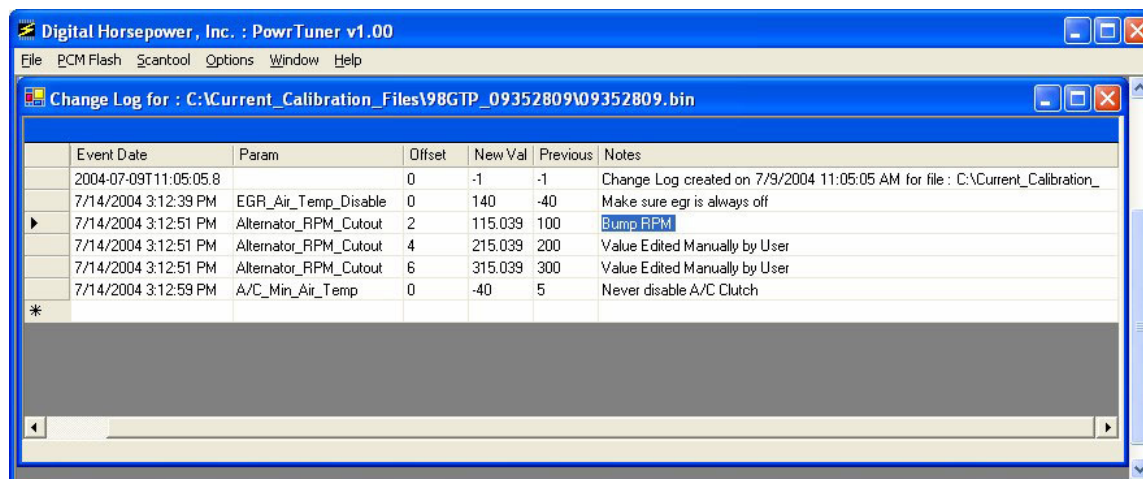
Figure 5-17. Change Log After Editing Notes Screen

6 *Scantool*

The Scantool features in the Powrtuner, is a very useful and powerful tool. The Scantool allows the user to view and log data being tracked by the PCM. This data is needed so one can view for tuning. With out this, the user is blind to what is actually going on with the vehicle.

The Scantool pull down menu gives you three options.
- DTCs
- Scan Vehicle
- Logs

6.1 DTCs

This Option gives you the access to view and clear any DTC codes that are currently flagged in your PCM. Figure (6-1)
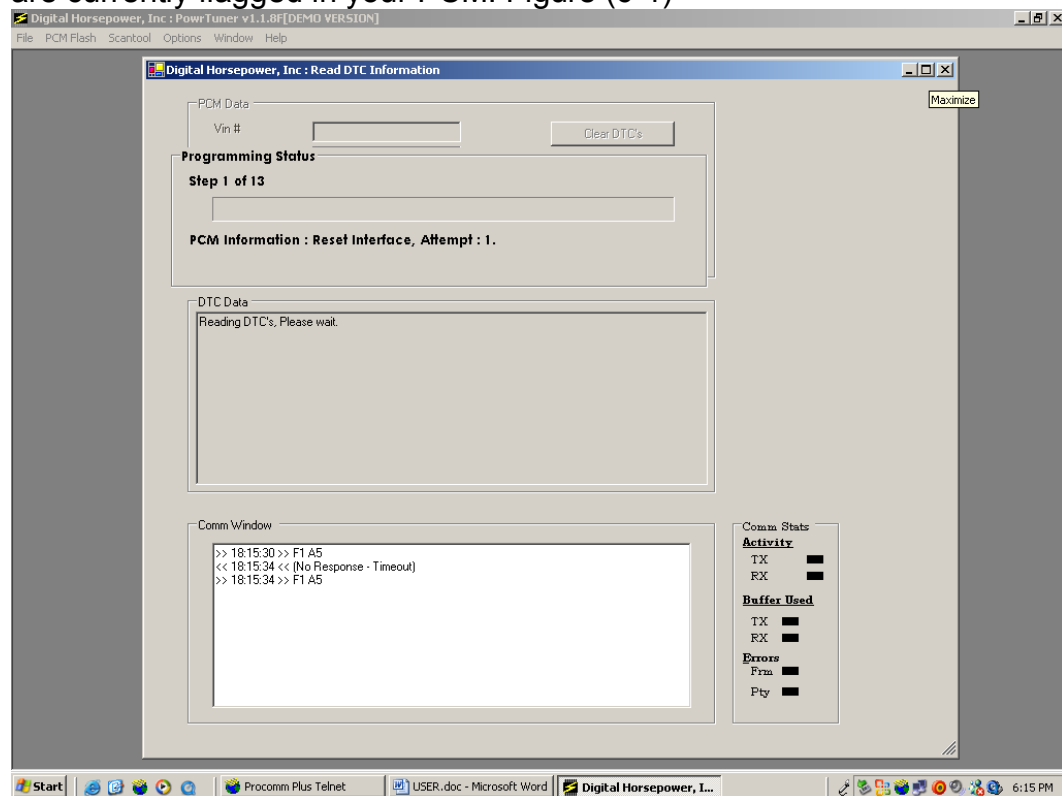
Figure 6-1. Read DTC Information Screen

Once any and all DTC's are recovered, here you can scroll through a list of codes set and get the actual DTC code and description. Once you are finished with them, you can then lick on the CLEAR DTC button to have them removed.

6.2 Scan Vehicle

This Option loads the actual SCANTOOL feature. (Figure 6-2)
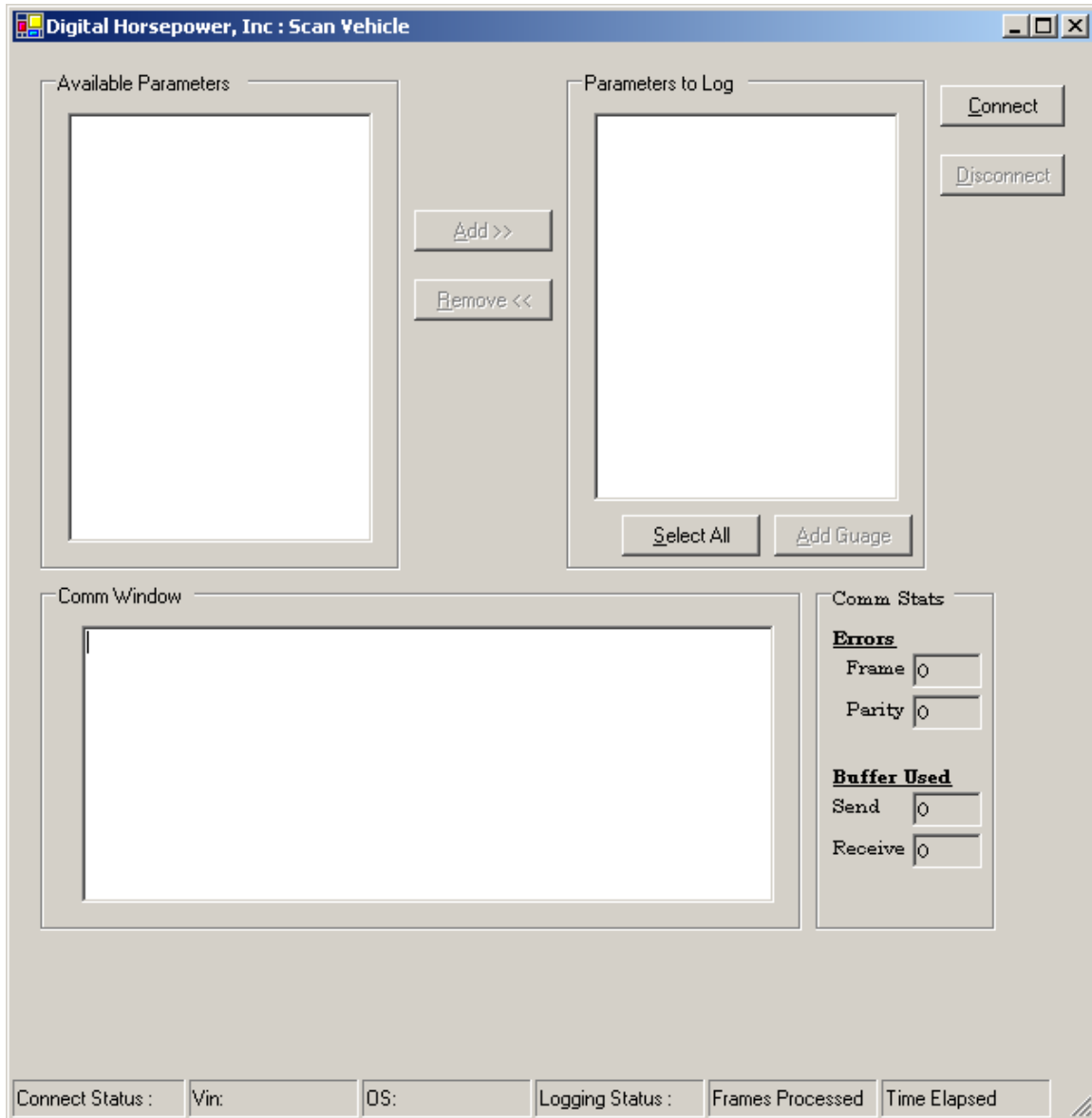
Figure 6-2. Scan Vehicle Screen

This is the start of the tuning process. Here you be able to scan for vehicle and collect data that the PCM is currently reading.

To start the process plug your POWRTUNER unit into your PC and into the OBDII port on your vehicle. Once connected, Click the CONNECT button and the software will start to connect to your vehicle and collect the available items that can be logged. Make sure the key is in the ON position.

Depending on what vehicle you have and what is currently supported, you may have a basic list of parameters or have many items that can be logged.
If you only have a basic list of items, it maybe due to running an Generic DHP 1.0 PCM where the tuner can not gather a complete and proper list or
that vehicle currently doesn't have all the items ready in the software. If this is a problem please contact DHP directly.

You will notice that there is a status bar on the bottom of the SCANTOOL window. It has the following values

- **Connecting Status**
  This shows the current status of trying to connect to the vehicle.

- **VIN**
  This shows the stored VIN within the PCM

- **OS**
  This shows the OSID code of the PCM

- **Logging**
  This shows the Logging status if its Active or Inactive

- **Frames**
  This shows how many Frames of DATA has been currently stored

- **Time Elapsed**
  This shows how long the SCANTOOL has been connected for.

Once connected you will have a list of items in the left had box (Figure 6-3)
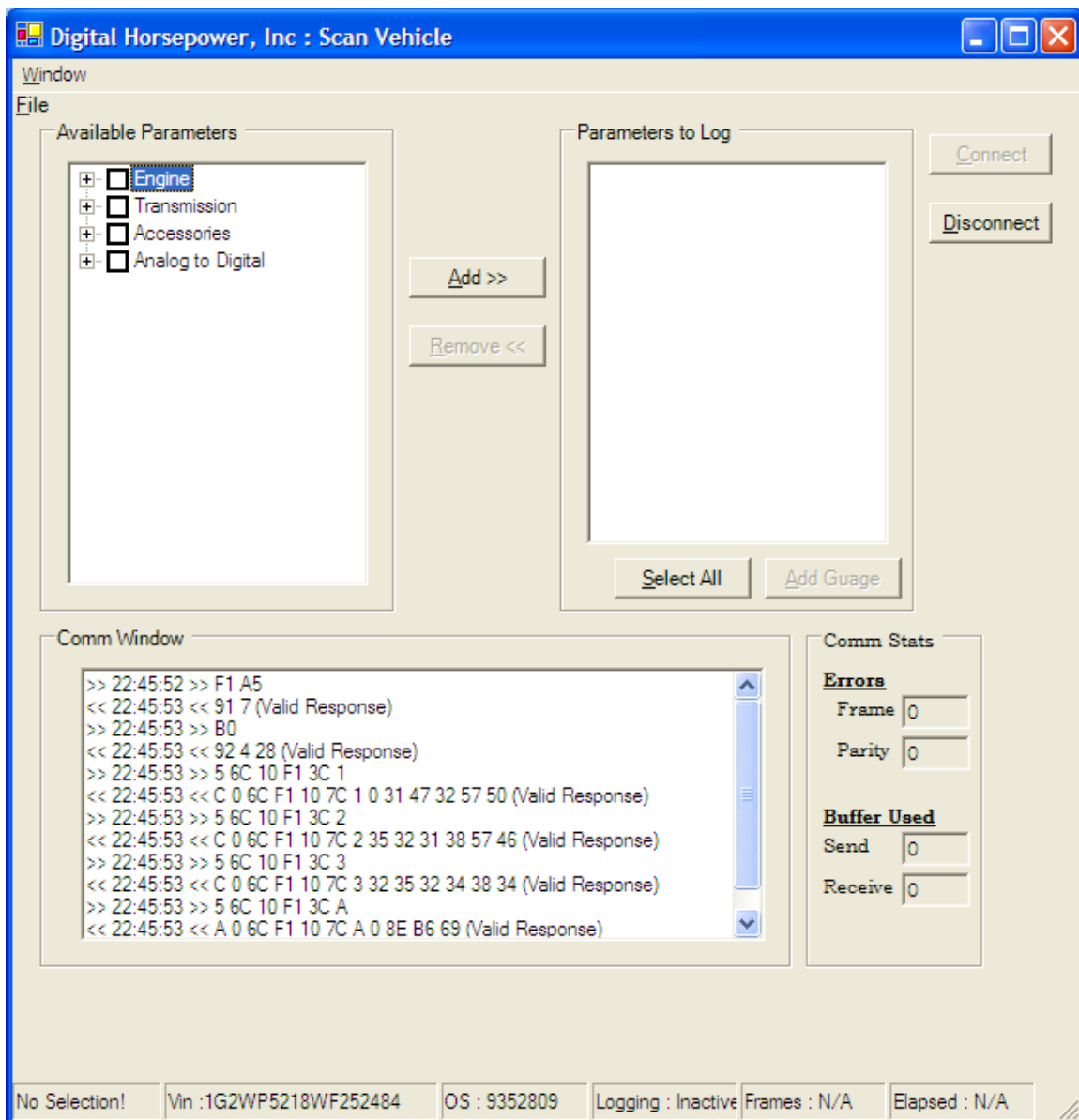
Figure 6-3. Logged items

You will need to scroll through the items and expand each category by clicking the check box. It will then expand and show you much more items that you can check individually. Once you have checked all the items you want, click the ADD button and those checked items will appear in the right hand side box (Figure 6-4). This box contains all items being currently logged.
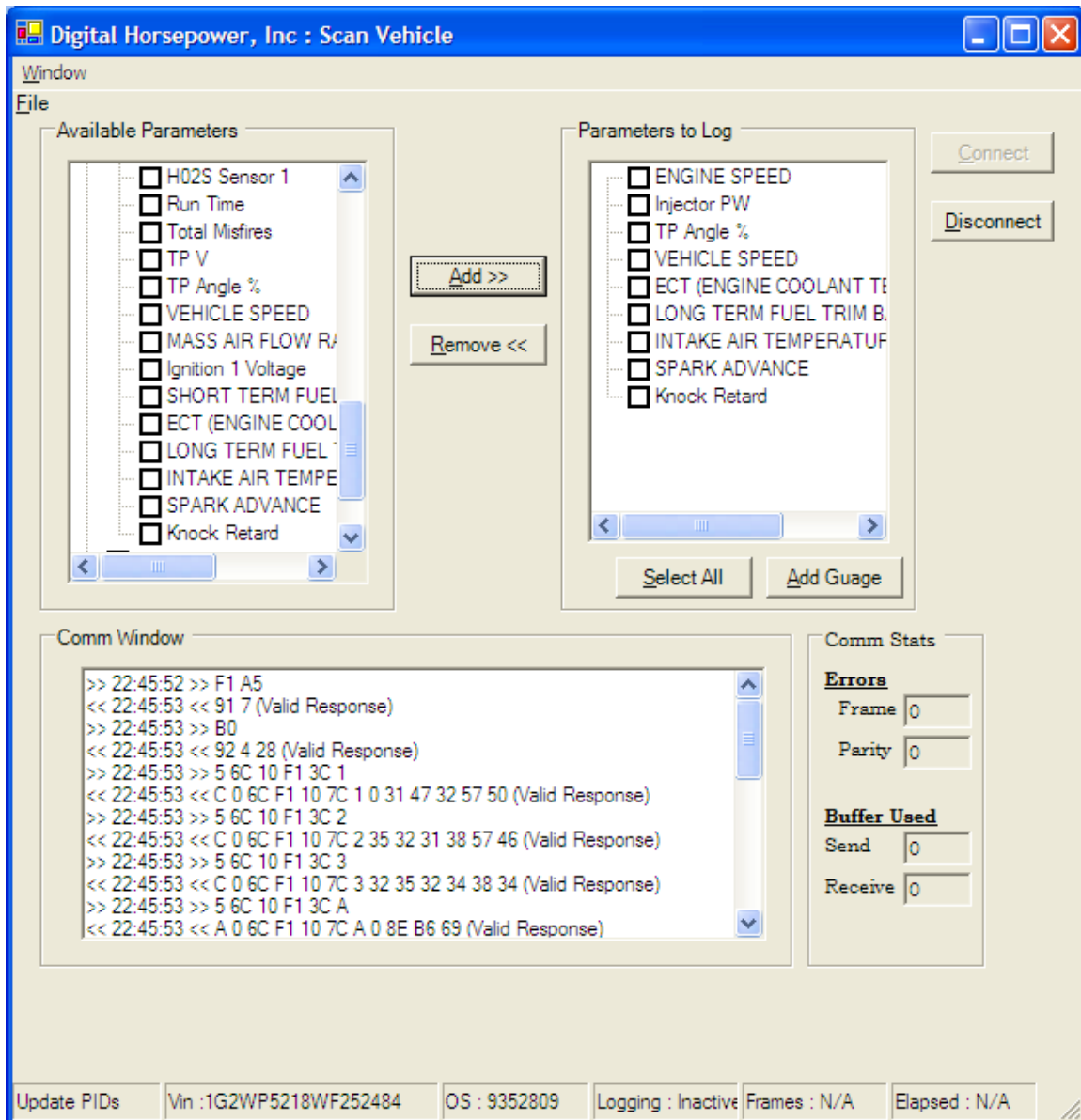
Figure 6-4. Added Items

You will see that each item in this box will also have a check box. If you check mark one or a few or even all, you can then click on the ADD GAUGE button and it will bring up a graphical gauge for each of these items. (Figure 6-5) You can also click on the SELECT ALL button and this will then check mark every item.

If there is an item you wish not to keep track of, just click on that item in the right hand box, and then click the REMOVE button.
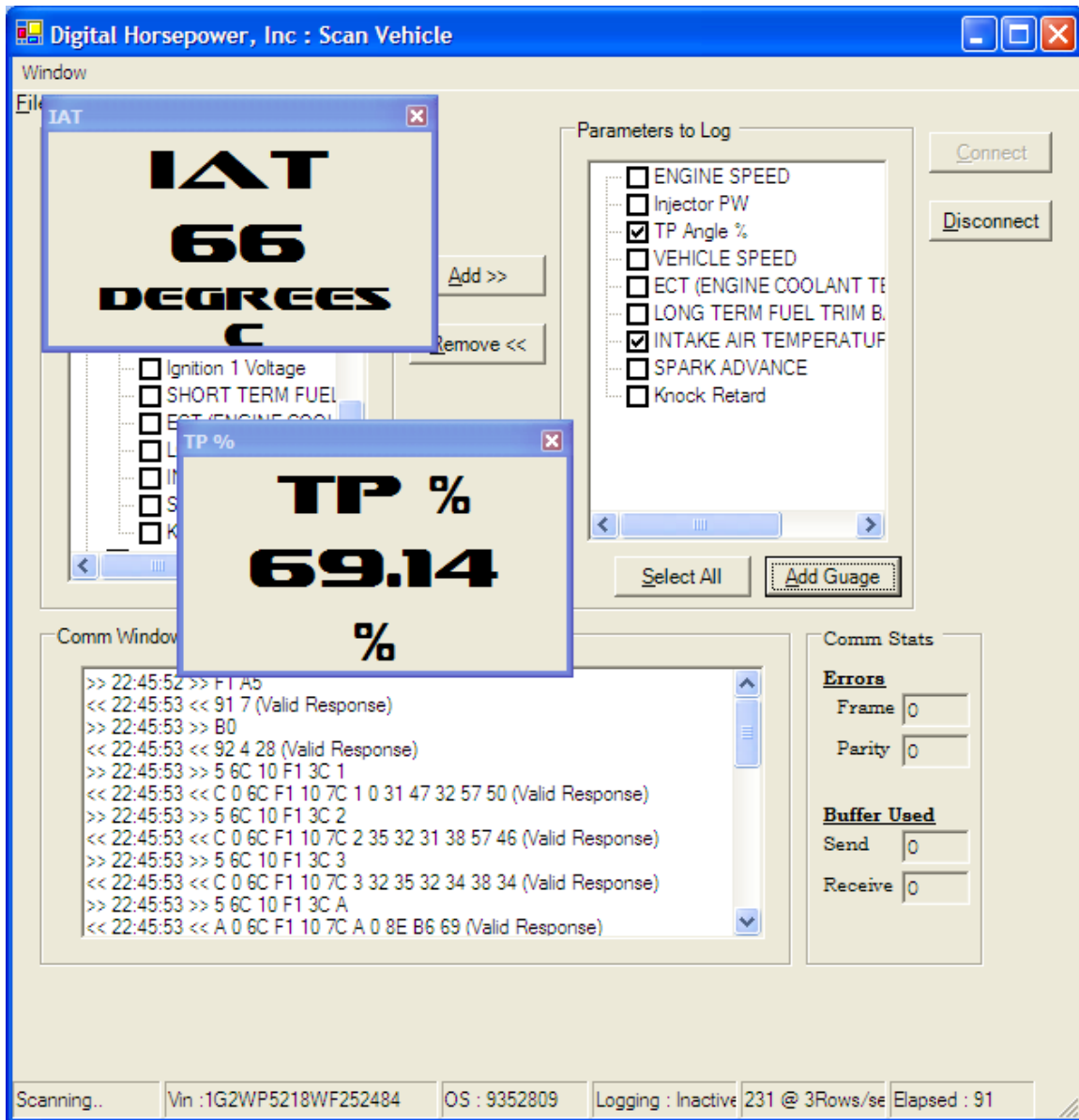
Figure 6-5. Gauge Boxes

These Gauge boxes are very helpful for visually seeing the values live as they are being reported by the PCM. If you are to click on the gauge box, you will then be able to modify some options of how this Gauge Box works, and looks. (Figure 6-6) If you have an A/D unit you can also bring up these values also (Figure 6-8)

You can also toggle warnings (Figure 6-7) to change the gauge windows color at certain ranges. If you set the range from 0 – 10 and if the current value is 5 the window will change to whatever color you have it set for (Figure 6-9).
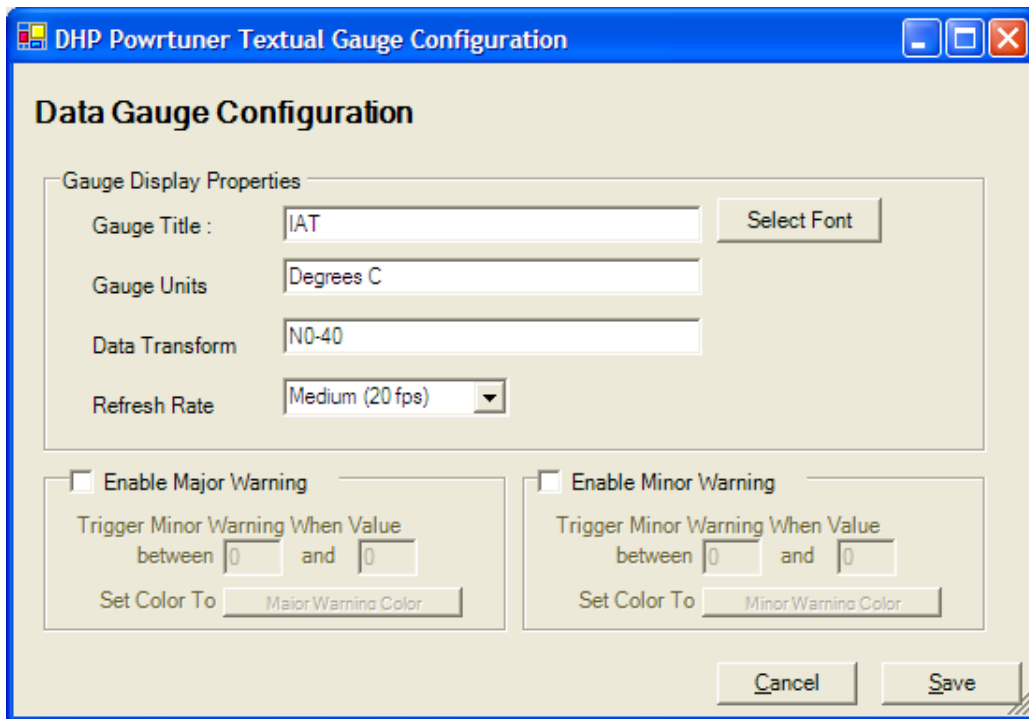
Figure 6-6. Gauge Box Editor
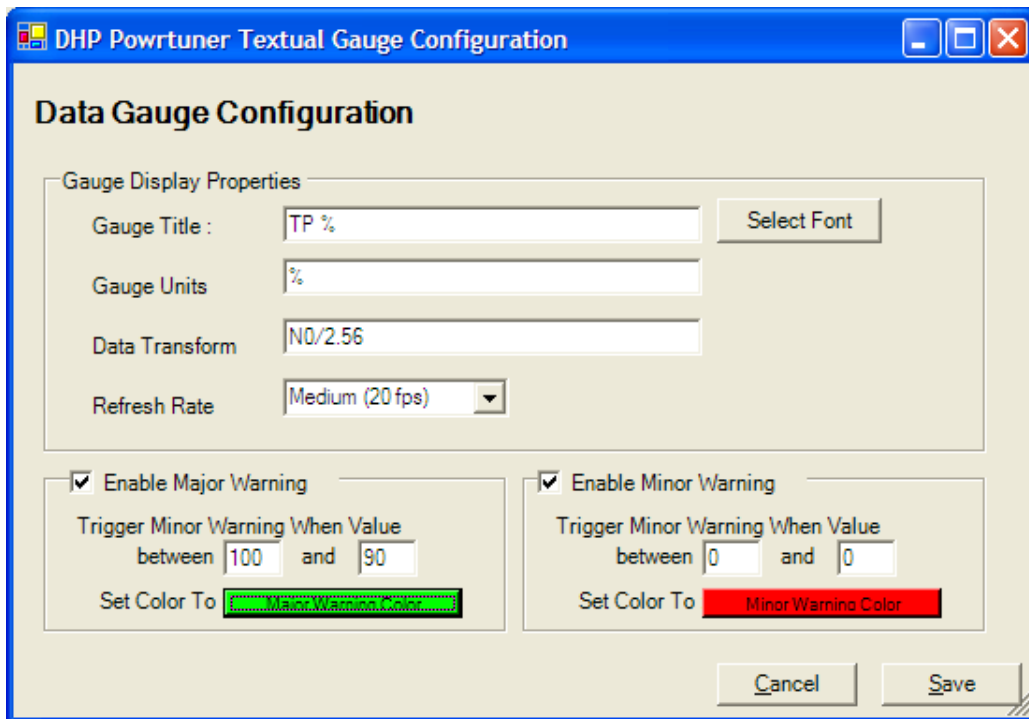
Figure 6-7. Warning Boxes Set
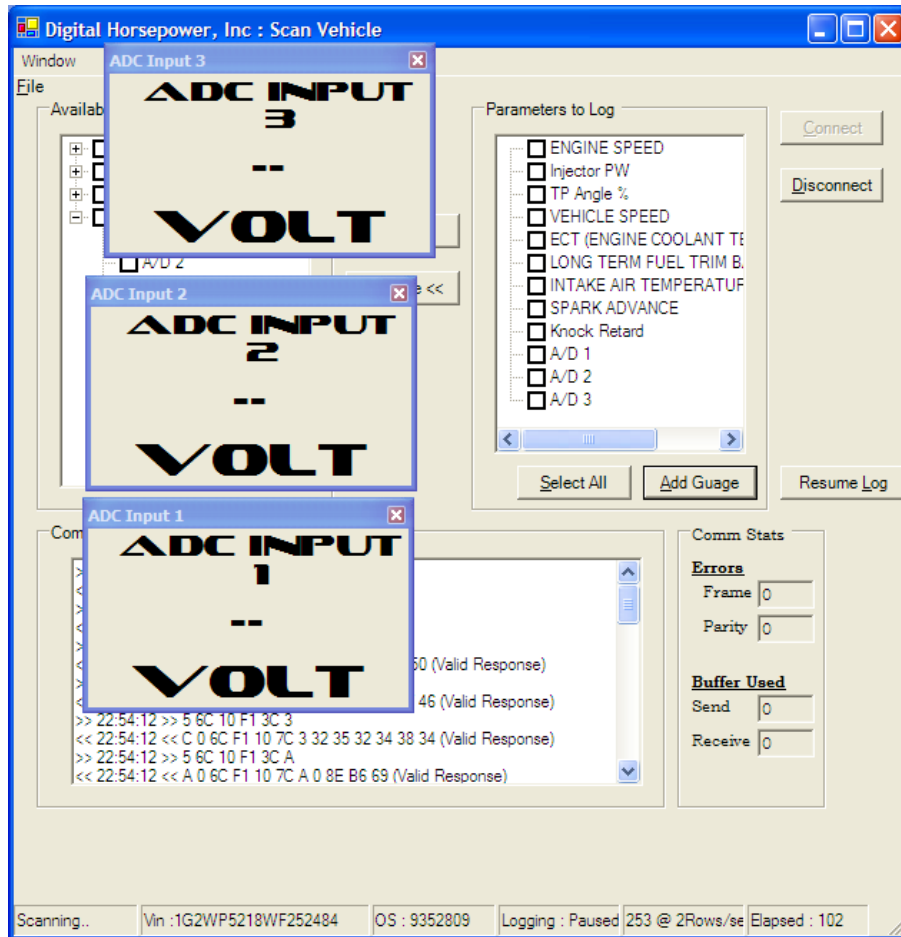
Figure 6-8. AD Gauges
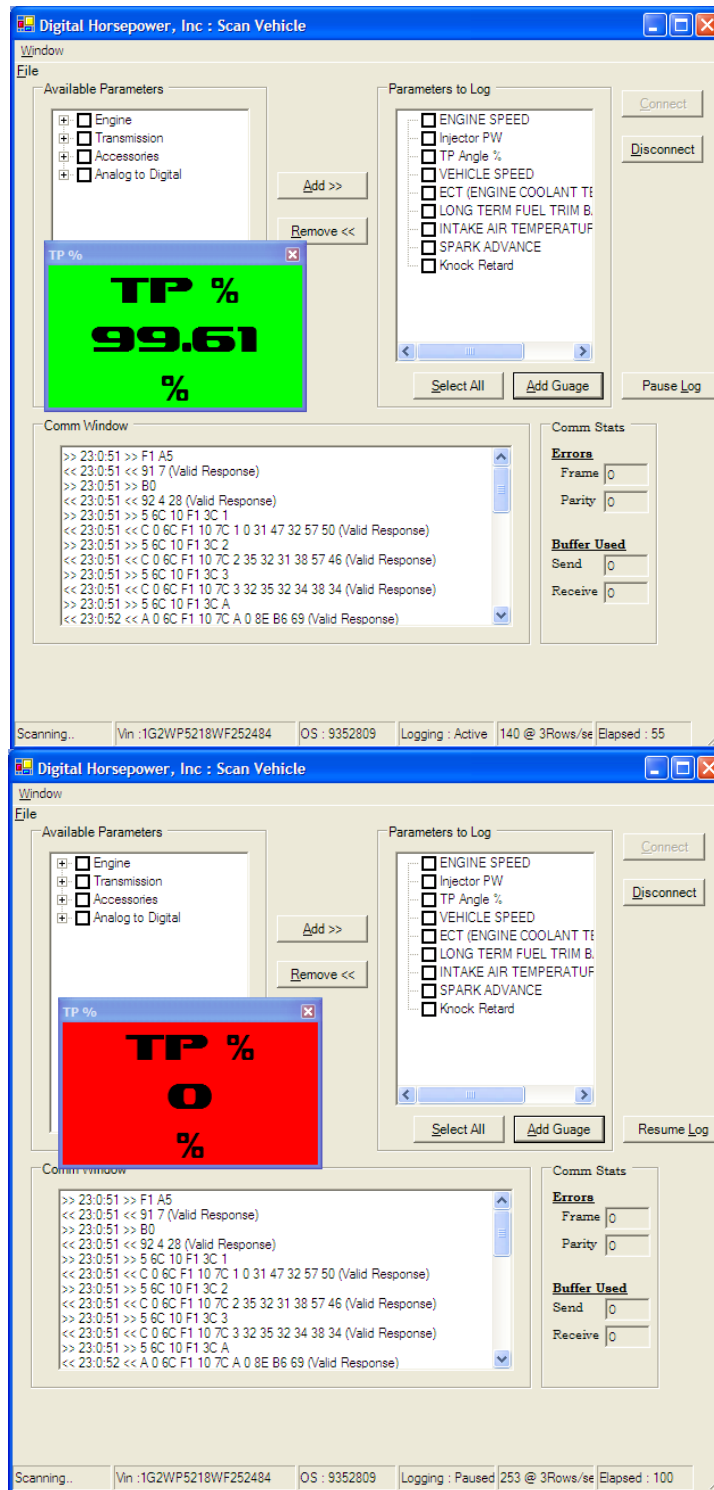
Figure 6-9. Gauge Color Toggled

Once you are finished with the SCANTOOL, click the DISCONNECT button. From here the SCANTOOL will save all your logged data during being ACTIVE and store in with all the other saved log files. Depending on the length of time of being actively logging this may take a few seconds to a few minutes depending on the size. Once the status bar at the bottom of the window shows 100% it is safe to close the Scantool window down (Figure 6-10).
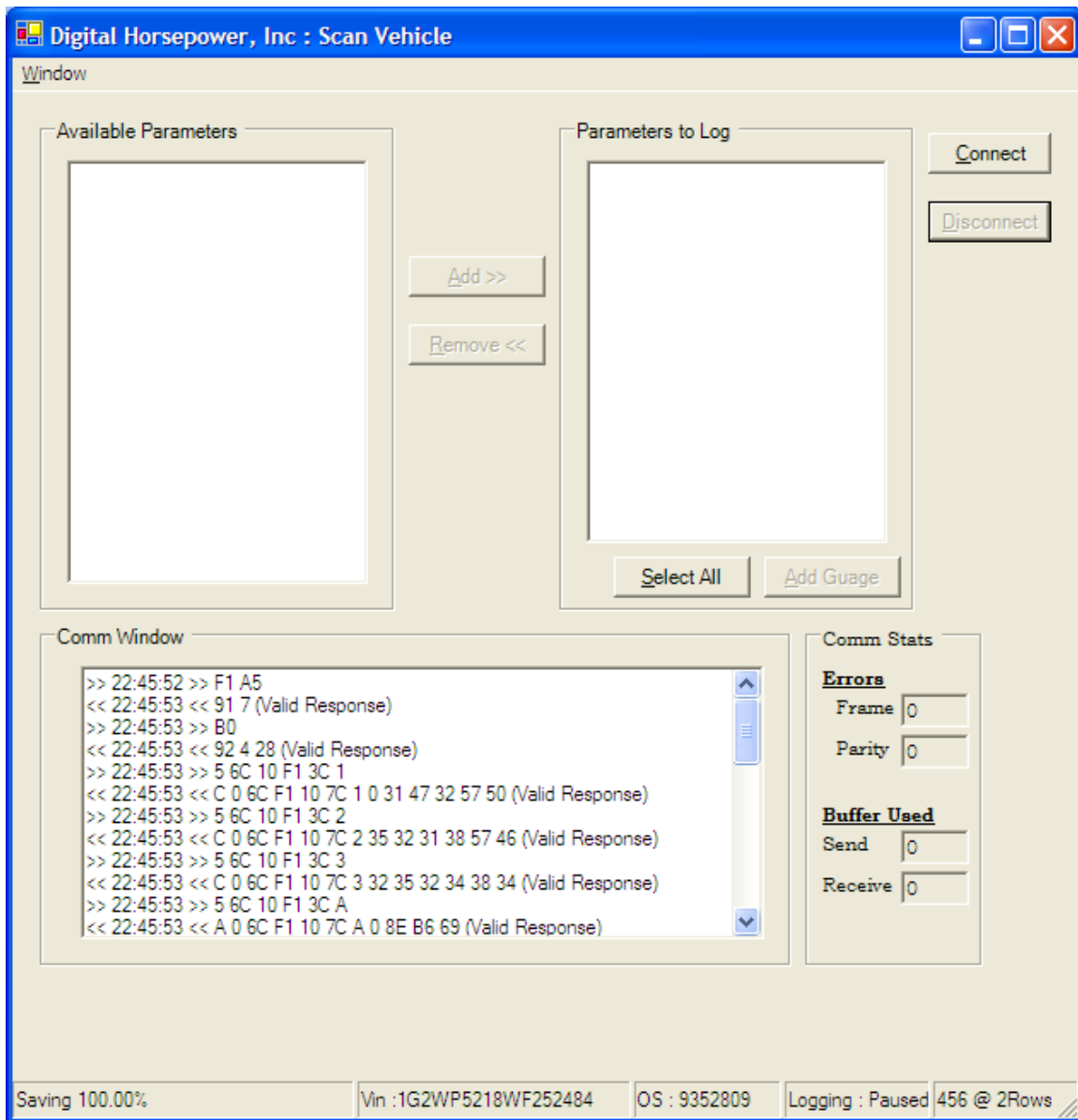
Figure 6-10. 100% Saved Log File

6.3   Logs

This Option loads the form for accessing currently saved LOG files. From here you can export the files out to XML or CSV file formats.

You have two options under this.

- **Playback Logs**
  This option will open up an external program set to playback log files that are currently saved. This is currently unavailable at this time.

- **Export Logs**
  This will bring up a new for exporting your log files. Figure (6-11)
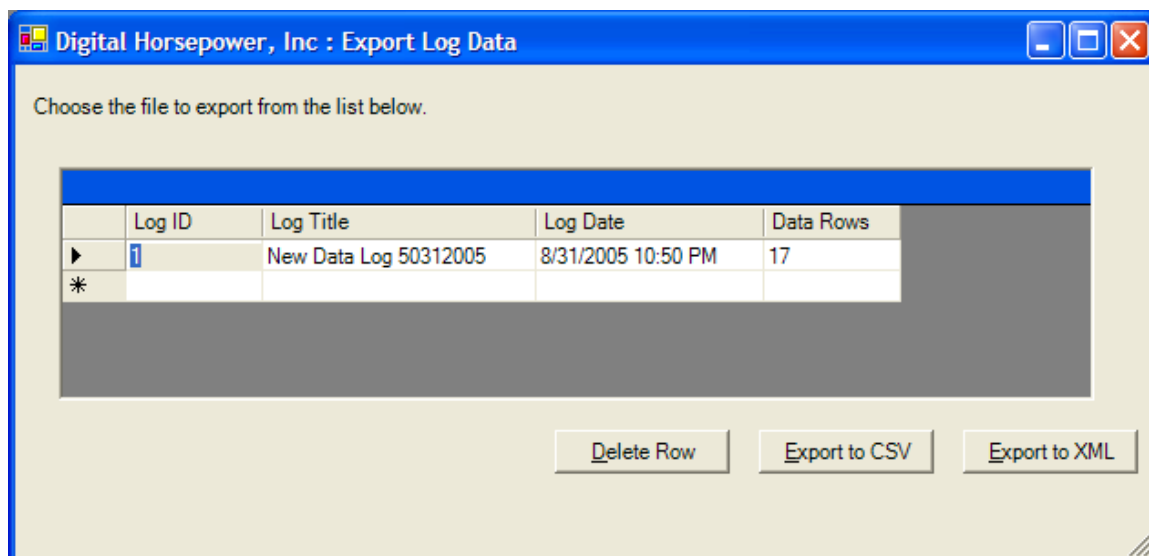
Figure 6-11. Export Log Window

7 Troubleshooting

While we do not expect things to go wrong, this is a complex program and there are many different computer/software combinations; therefore, you can never guarantee that trouble will never arise.

In the event of a problem, follow the steps listed below:

1. **Record any error messages that appear (screen shots if possible are even better).**

2. **Make a mental note (and text file note) of exactly what the conditions were that led to the error.**

3. **If the error occurred on a PCM interaction screen, copy the contents of the Comm Window and send those to DHP support.**

4. **If the error involves editing a file or uploading a file, submit a copy of the file as well as the change log (if applicable) to DHP support.**

5. **If the error occurs during the read process (*transferring data blocks*), shut down the vehicle and wait 20 seconds.**

6. **Attempt to start the vehicle.**

7. **If vehicle does not start or doesn't communicate with software, contact DHP Support.**

8. **If in High Speed mode, set to Low Speed mode and attempt to read again.**

If the programming error occurs during the write process follow these list of steps:

1. **Do not turn off the vehicle.**

2. **Close the Write window.**

3. **Open the Write option from the Main menu and attempt to write a file that is known to be good (such as original file).**

4. **If completion is successful, shut down the car for 20 seconds and then start vehicle.**

5. **Contact DHP and be prepared to send us a file that is known to be good and the not-so-known good file for analysis.**

6. **If you cannot upload any file to the PCM, shut down the vehicle, wait 20 seconds, and then start it.**

7. **If you are still having problems / issues, please visit our DHP Helpdesk at HTTP://digitalhorsepower.corphelp.net and submit a trouble ticket explaining your problems with as much details as you can.**

8 *Hardware/Software Specifications*

Hardware/Software	Specifications
Interface Dimensions	5 ¼ x 3 ¼ x 1 1/16
Interface Temperature Range	0C to 100C
Interface Baud Rate	57600 & 115200
Interface Minimum Packet Size	1,024
Interface Maximum Packet Size	4,096
Interface Ports	J1850, DB9 Serial RS232
PCM Read Time Low Speed	~7.5 Minutes
PCM Write Time Low Speed	~7.5 Minutes
PCM Read Time High Speed	~3 Minutes
PCM Write Time High Speed	~3 Minutes
PCM Write Time Partial Mode Low Speed	~2 Minutes
PCM Write Time Partial Mode High Speed	~1 Minute

9 *Error Code Listing*

The Powrtuner Software has a set list of Error codes that will set if there are any problems while running. These error codes range from Database accessing, to Communications, to file accessing. These are to help the user determine a possible cause of the problem, and to assist DHP on trying to help fix any problems that occur.

Message ID	Description
31	Database Error – IsEmpty Master Failed
32	Database Error – UnEqual Master and System
33	Database Error – Registry Mismatch
34	Registry Error – Key entries are missing or invalid, reinstall software or contact DHP
35	Registry Error – Invalid Com Port specified.
36	Registry Error – License Confirmation missing
37	Registry Error – License Confirmation missing
38	Database Error – Master Agree Confirmation error
39	Database Error – System Agree Confirmation error
40	Database/Registry Error – Inconsistent Confirmation, reinstall
41	Unable to Connect to Database – contact DHP or reinstall software
55	Invalid Interface Checksum – Interface Corruption, contact DHP for assistance
56	Invalid Serial Block 1 – Interface Corruption, contact DHP for assistance
58	Registry – Missing Security GUID
59	Registry Error – Unable to Initialize
60	Database Error – Unable to Initialize Master
61	Database Error – Unable to Initialize System

Message ID	Description
62	Registry Error – Unable to retrieve key1
63	Registry Error – Unable to retrieve master key
64	Registry Error – Unable to retrieve system key
65	Registry/Database Error – Keys do not match, tamper mode
66	Database Error – Unable to Init AC List
67	Database Error – Unable to get master quick start
68	Database Error – Unable to get system quick start
69	Registry Error – Unable to get quick start
70	Registry/Database Error – quick start invalid/mismatch
71	File – Invalid File Size
72	Valid OS ID – Failed with unspecified error, contact DHP
73	Unsupported File Type, contact DHP
74	Read Vin Year failed
75	Read Vin Model Failed
76	Read Vin Make, failed
77	Retrieve Vin Engine, failed
78	Retrieve Profile Title, failed
79	Retrieve Profile Description failed
80	Empty Profile failed
81	Init Tree View failed
82	Get OS File Failed
83	Unable to load calibration data from DB
84	Bad Address Specified
85	Engineering Format Error
86	Import Binary File Size != Cal Size
87	XML Parameter Mismatch
88	Invalid XML File Format
89	Invalid Size DB != XML
90	Unable to Load Cal data for CSV Import

Message ID	Description
91	Incorrect CSV format
92	Value Error in CSV Imports (Value out of Range)
93	CSV Import has more columns than destination
94	Copy and Paste Source data not found
95	Copy and Paste Destination data not found
96	Calibration Lengths do not match for copy and paste
97	Calibration Data Types do not match
98	Edit Form cannot load DB Date
100	Error Init About Screen
101	Unable to Create Cal Parameter Edit Instance
102	Column Header Creation Error
103	Unable to bind Data grid to table
104	Data Grid Row database bind error
105	Unspecified Error in Edit Cal Parameter
106	Data Grid Row Header Update Failed
107	Error Updating Row Headers for Stock Data
108	Error loading data grid top row
109	Error Validating data grid cell
110	Edit Cal Save Data Close Failure
111	General Error Saving Changes edit cal parameter
112	From Edit Manager Unspecified Loading File
113	Error Clear from Edit Variables
114	From Edit Manager Error setting filename
115	Error Reading Short File Name
116	Updating Profile Tree
117	Edit Manager General Export Error
118	Edit Manager Error Retrieving Get Col Value
119	Edit Manager Error Get Stock Value
120	Edit Manager Convert to Binary Error
121	General Export to XML Error

Message ID	Description
122	General Export to HTML Error
123	Error Export to CSV
124	Error Exporting to Binary File
125	Store binary Block Error
126	Binary Import Stock Data Failed
127	Import from Binary Failed
128	Error Importing from stock binary
129	Error Importing from Drag and Drop operation
130	Error Generating Import Menu
131	Error Importing from XML Document
132	Error Importing CSV File
133	Error Saving Changes to Cal File
134	Error closing Edit Manager
135	Error Generating License Agreement Page
136	Error Closing Main Form
137	Error Initializing Main form
138	Error displaying About us form
139	Error Opening calibration File
140	Error in Opening Drag and Drop File
141	Error Initializing Com Port Selection Form
142	Generic Error InitfrmSplash
143	Unable to communicate with cable
144	Unable to Init Tree view for Profile Edit Mod
145	Error Saving Vehicle Profile
146	Error Inserting Profile
147	Error Locating ID for new Profile Record
148	Error Inserting Profile Mod
149	Unable to Enter Diagnostic Mode
150	Unable to disable normal message transmission
151	No cable signal / Vehicle Not Responding

Message ID	Description
152	Cannot Retrieve Cable Version
153	Unable to set interface low speed VPW
154	Unable to retrieve VIN Part 1
155	Unable to retrieve VIN Part 2
156	Unable to retrieve VIN Part 3
157	Enter Diagnostic Mode Response 7F
158	Unable to retrieve Module 0A
159	Unable to retrieve End model
160	Unable to retrieve base model
161	Unable to retrieve Seed
162	Get PCM Info failed
163	Exists OS ID Error
164	PCM Read Failed. Unauthorized PCM Type
165	Unable to retrieve binary file id
166	Unable to Authenticate to PCM, invalid key
167	Request A0, High Speed, No response
168	Set A1 Has failed
169	Mode 34 Upload Failed.
170	Missing Read Boot loader
171	Unable to retrieve DB Binary
172	Mode 36 Failure
173	Unable to Return DTC Description

10 *Supported Parameter List*

This section contains all the supported parameters that the Powrtuner can change. Not every single Parameter will be listed for your Vehicle. This is a complete list of every single parameter for all support vehicles. So if you do not see one of these in your file, its either due to not being mapped out yet in your files support, or its just not supported at all.

The Parameter List will be broken up into categories for each section.

- Accessories
- Diagnostics
- Fuel
- Security
- Spark
- Supercharger
- Transmission

If you think there is a parameter that you see here, but does not show up for you while editing your PCM Binary, feel free to contact us at our helpdesk website at http://digitalhorsepower.corphelp.net to find out more information.

Accessories

AC	
A/C Min Air Temp	Ambient air temperature must be greater than this to allow A/C.
Alt	
Alternator RPM Cutout	The alternator is commanded off when the engine speed is less than this value.

EGR	
Egr Air Temp Disable	If the air temperature is below this disable EGR.
Fans	
Fan1 Ambient Temp	Ambient air temperature must be greater than this to turn fan 1 on due to air conditioning.
Fan1 Coolant Temp	Fan 1 is turned on if coolant temp greater than this and turned off if lower than this.
Fan1 Pressure	Fan 1 is turned on if AC pressure is greater than this and turned off if lower than this.
Fan1 Coolant vs. Vehicle Speed	Fan 1 is turned off if vehicle speed is greater than this and turned on if vehicle speed is less than this and coolant is hot.
Fan1 Pressure vs. Speed	Fan 1 is turned off if vehicle speed is greater than this and turned on if vehicle speed is less than this and AC pressure is high.
Fan1 Key off Coolant	Fan 1 is turned on for Fan1_Keyoff_Time if the coolant temperature is greater than this.
Fan1 Key off Time	Fan 1 is turned on for this amount of time after key-off if the coolant temperature is greater than Fan1_Keyoff_Coolant.
Fan2 Coolant Temp	Fan 2 is turned on if coolant temp greater than this and turned off if lower than this.
Fan2 Pressure	Fan 2 is turned on if AC pressure is greater than this and turned off if lower than this.
Fan2 Coolant vs. Speed	Fan 2 is turned off if vehicle speed is greater than this and turned on if vehicle speed is less than this and coolant is hot.
Fan2 Pressure vs. Speed	Fan 2 is turned off if vehicle speed is greater than this and turned on if vehicle speed is less than this and AC Pressure is high.
Fan 1 Keyoff Coolant	Fan 1 is turned on for Fan1_Keyoff_Time if the coolant temperature is greater than this.
Fan 1 Keyoff Time	Fan 1 is turned on for this amount of

	time after key-off if the coolant temperature is greater than Fan1_Keyoff_Coolant.
Fan 1 Coolant Temp	Fan 1 is turned on if coolant temp greater than this and turned off if lower than this.
Fan 2 Coolant Temp	Fan 2 is turned on if coolant temp greater than this and turned off if lower than this.
IAC	
IAC Desired Idle RPM Trans Not Engaged	The desired engine speed due to the transmission being engaged or not with an air pump on.
IAC Desired Idle RPM Trans Engaged	The desired engine speed due to the transmission being engaged or not.

Diagnostics

Case Learn	
Case Learn Override	Used to enable the learning when no other means are available.
Fault Reporting	
DTC Fault Type	0 = 1 trip SES on, 3 trips SES Off. 1 = 2 trips SES On, 3 trips SES off. 2 = Service On. 3 = No Reporting.
DTC Fault Enabled	0 = Fault disabled 1 = Fault Enabled
Security	
Ignore Flash Checksum	If True, FLASH checksum errors are ignored.
Disable Flash Security	PCM will disable security if value is set to 255.
Flash Checksum	Checksum for the PCM File

Fuel

AE	
AE TPS Re-allow	Throttle position must fall below this to allow AE to become enabled again.
AE MPH Modifier	Multiplier to acceleration enrichment vs. vehicle speed.
AE Enrichment	Percentage of extra fuel for acceleration enrichment as a function of maximum observed increase to throttle position.
Base Fueling	
Closed Loop Desired A/F	The Desired A/F Ratio specifies the air / fuel ratio where the catalytic converter is the most efficient.
Open Loop AF by RPM vs. Air Mass	Adjustment to the base open loop air/fuel ratio as a function of cylinder air mass and engine speed.
Cat Protection Coolant	Coolant temperature that must be exceeded before catalyst protection air/fuel mode is allowed.
Engine Runtime for Closed Loop	Amount of time that the engine must run before allowing use of the closed loop air/fuel ratio.
Fuel Injector	
Injector Flow Rate	Injector flow rate as a function of engine manifold vacuum.
Injector Skew Percent	Percentage used to enrich or enlean individual injectors.
Injector Skew Percent Rough Idle	Injectors can be enriched or enleaned with this table for Rough Idle Correction.
MAF	
MAF Airflow Table	Lookup table of measured mass airflow based on the mass airflow input frequency.
MAF Max Positive Airflow Change	Lookup table of maximum POSITIVE mass airflow change per reference

	pulse.
MAF Max Negative Airflow Change	Lookup table of maximum NEGATIVE mass airflow change per reference pulse.
Volumetric Efficiency	Lookup table of volumetric efficiency per reference pulse.
Max MAF Frequency	The mass air flow sensor has a high frequency failure if the frequency is greater than or equal to this.
Min MAF Frequency	The mass air flow sensor has a low frequency failure if the frequency is greater than or equal to this.
Max Delta Airflow	The maximum delta between the mass air flow reading and the mass air flow calculation. The rationality test is failed if the delta is over the specified value.
Default Air Table	Lookup table of airflow contribution due to throttle position and engine speed for use in the default mass airflow calculation. This table is used for a sanity check. If variance is too high, DTC 1514 will be set causing reduced power.
PE	
Open Loop Base AF by Coolant Temp	Base open loop air/fuel ratio as a function of coolant temperature.
Base PE A/F	Base power enrichment air/fuel ratio as a function of coolant temperature.
PE RPM vs. Time A/F	Defines the modification to the base power enrichment air fuel ratio as a function of engine speed and time in power enrichment.
Startup A/F Adjustment by Coolant Temp	Enrichment applied to air/fuel ratio when the engine has just started as a function of startup coolant temperature and the state.
PE Enable TPS	Throttle position above which power enrichment is allowed as a function of engine speed.
Torque Mgmt	
Torque Abuse A/F	Air/fuel ratio used when drive train abuse mode is active.
Torque Abuse Differential Score A/F	Air/fuel ratio used when in differential score protection.
Traction Control Desired A/F	Air/fuel ratio used when traction control is active.

Torque Abuse Drive Injector Disable	Number of injectors disabled during abusive maneuver in drive: 0, 1, 2, 3, or 6.
Torque Differential Score Injector Disable	Number of injectors disabled during differential score protection.
Traction Disable Injectors	Number of injectors to disable as a function of the traction control mode.
Disable All Injectors High MPH	Vehicle speed thresholds above which all 6 fuel injectors are disabled.
Disable 1 Injector High MPH	Vehicle speed above which one fuel injector is shut off.
Disable 2 Injectors High MPH	Vehicle speed above which two fuel injectors are shut off.
High PRM PN Fuel Cutoff	Engine speed above which all fuel injectors are shut off if the PRNDL is in park or neutral.
High RPM Rev Fuel Cutoff	Engine speed above which all fuel injectors are shut off if the PRNDL is in reverse.
High RPM Fuel Cutoff	Engine speed above which all fuel injectors are shut off.
Torque Abuse Drive RPM	If engine speed is greater this and in drive turn off TRQ_Abuse_Drive_Inj_Off injectors.

Security

Vehicle Theft Deterrent	
VTD Present On Car	This determines if VTD system is present on this vehicle.
VTD Auto Learn Timer	Time allowed for auto learn procedure.
VTD Auto Learn Counter	# of cycles to complete for auto learn procedure
VTD Disabled / Enabled	This determines if VTD is disabled on this vehicle application. The value TRUE disables VTD. The value FALSE enables VTD.

Spark

Base Timing	
Bad Fuel Spark	The base spark advance table for when low octane fuel is being used.
Good Fuel Spark	This is the base spark advance table for vehicles running with good fuel.
Mean Best Torque Spark	This is the mean best torque spark advance table. **
Air Temp Spark	The spark modifier table based on cylinder air mass and ambient air temperature.
Closed Loop Idle Spark Correction	The amount of spark correction needed due to engine speed error.
Closed Loop Idle Spark Correction - AP On	The amount of spark correction needed due to engine speed error, when air pump on.
Closed Loop Idle Spark Correction - AP off	The amount of spark correction needed due to engine speed error, when air pump Off.
Coolant Temp Spark	The spark modifier table based on cylinder air mass and coolant temperature.
Knock Sensor	
Knock Retard Recovery Rate	This is the rate at which the PCM recovers from KR (Knock Retard). The higher the value, the more quickly, you will return to normal timing advance.

Knock Retard Decel Recovery Rate	This is the rate at which the PCM recovers from KR (Knock Retard) on deceleration. The higher the value, the more quickly, you will return to normal timing advance.
Knock Retard IR Attack Rate	This is a knock retard multiplier based on current engine speed for the Integrate and Read Modes.
Maximum Allowed Spark Retard	This is the maximum amount of Spark Retard that is allowed when no Electronic Spark Control faults exist.
Spark Control Runtime Disable	If the engine has been running for less time than this value, Electronic Spark Control is not allowed.
Spark Control Coolant Disable	If the engine coolant is below this value, then spark control is not allowed.
Spark Control RPM Disable	If the engine speed is below this RPM, then Spark Control is not allowed.
Knock Retard Default Value	If a spark control fault exists, this is the default amount of retard to use.
Knock Retard Default max	The maximum amount of knock retard when a spark control fault exists.
Knock Present Time	If knock has been present continuously for more than this period of time, then start retarding spark.
Knock Ignore Time	Ignore short knock signals that are less than this.
Speed/Timing Limiter	
High RPM Threshold	When engine speed is greater than this, spark advance is set to High_RPM_Spark.
High RPM Spark	Spark_Advance, when engine speed is very high.
High MPH Limit	Vehicle speed must be greater than this before starting to enrichen the air fuel ratio and retard spark to limit vehicle speed.
Torque Mgmt	
ETC High PN RPM Limit	Enable ETC RPM governor if engine speed is greater than this while in park or neutral and below a vehicle speed.
ETC High RPM Limit	Enable ETC RPM governor if engine speed is greater than this while in park or neutral and below a vehicle speed.
ETC High Reverse RPM Limit	Engine speed above which ETC starts to close the throttle.

ETC Drivetrain Abuse Torque Reduction	Torque level to achieve using ETC and spark retard for Drivetrain Abuse.
Min RPM for MPH Shutoff	Engine speed below which high vehicle speed fuel shutoff is not allowed.
Use ETC for Abuse	Selects whether to use Throttle Control or fuel control for Drivetrain Abuse.
Use Tip In Bump ETC Algorithm	If TRUE, Tip In Bump algorithm is used. **
Use Raw Torque Calculation	If TRUE, use raw torque values for TIB calculations, otherwise use filtered values. **
Tip In Bump Minimum Coolant	Tip In Bump algorithm disabled if coolant temp is below this threshold.
Torque Management Engine Speed Limit	Engine speed must exceed this value to enable peak torque management.
Torque Engine Speed Limit RPM	Engine speed must exceed this value to enable peak torque management.
Torque Abuse Spark	Absolute spark when in drivetrain abuse.
Torque Differential Score Retard	Spark retard due to differential score protection mode.
Torque Abuse Speed Enable	This value specifies at which MPH (and below) drivetrain abuse mode can be activated by the computer.
Torque Abuse Throttle Enable	This table specifies the throttle % that enables drivetrain abuse mode.
Torque Abuse RPM Enable	This value specifies when drivetrain abuse mode can be enabled based on engine speed. If engine speed is above this value, then drivetrain abuse mode can be enabled.
Torque Abuse Time Enable	This table specifies the amount of time that drivetrain abuse mode will remain enabled.
Torque Abuse Spark Retard	This table specifies the amount of timing to retard due to torque management
Torque Abuse Differential Score MPH Enable	This table specifies the speed at which differential score protection mode will be enabled.

Supercharger

Boost Control	
Traction Mode Boost Control by Torque	If the torque ratio percentage calculated by the traction control system is less than this and traction control is not active, and then activates boost limiting.
Traction Mode Boost Control Enable	Boost calculated by traction control only if the traction control mode is above this value.
Decel Boost Control MPH	Boost is set to 0% if vehicle speed is greater than this value when Throttle_Position < KE_BST_Decel_Throttle.
Decel Boost Control By Throttle	Boost is set to 0% if Throttle_Position is less than this value when Vehicle_Speed > KE_BST_Decel_MPH.
Integral Gain	Integral gain used to calculate boost control duty cycle as a function of error in torque.
Proportional Gain	Proportional gain used to calculate boost control duty cycle as a function of error in torque.
Boost Ramp Rate	Rate at which boost is ramped in when it becomes enabled.
Excess MPH Boost Reduction Gain	Gain used to determine how much boost should be removed when speed limiting is active.
Excess MPH Torque Reduction Scalar	Reduction to the maximum torque limit when vehicle speed exceeds KE_BST_High_Torque_MPH_Thresh for KE_BST_High_MPH_Time while in **
Excess MPH Enable Timer	Amount of time that vehicle speed must exceed KE_BST_High_Torque_MPH_Thresh while in third gear before reducing the maximum torque
Excess MPH Enable by MPH	Vehicle speed that if exceeded for KE_BST_High_MPH_Time while in third gear will result in a reduction to the maximum torque limit
Catalyst Protection Boost Shutoff	If Catalyst temperature exceeds this value, then open Boost Solenoid to prevent catalytic converter overheating situation.

Transmission

Gear Ratio	
Calculated Pulses Per Revolution	Defines the number of input speed sensor pulses as Input_Speed_Pulses_Per_Rev / KE_Drive_Sproket_Ratio.
Pulses Per Mile	The pulses per mile variable is used to calculate the MPH of the car. Adjusting this variable allows you to adjust for tire size variations.
Drive Sprocket Ratio	Turbine shaft and Input shaft interconnect chain ratio.
Shift Point - Cruise	
2nd to 3rd Cruise Shift Line	2nd to 3rd gear upshift point. This parameter is used to determine shifting during cruise conditions.
3rd to 4th Cruise Shift Line	This shift point is used to determine the 3rd gear to 4th gear upshift point while cruising.
3rd to 2nd Cruise Shift Line	This shift point table is used for the 3rd to 2nd gear downshift while cruising.
4th to 4rd Cruise Shift Line	This shit point table is used to determine the 4th gear to 3rd gear downshift while cruising.
Shift Point - Hot	
1st to 2nd Hot Normal Line	Hot normal 1st to 2nd gear upshift shift line.
2nd to 3rd Hot Normal Line	Hot normal 2nd to 3rd gear upshift shift line.
3rd to 4th Hot Normal Line	Hot normal 3rd to 4th gear upshift shift line.
2nd to 1st Hot Normal Line	Hot normal 2nd to 1st gear downshift line.
3rd to 2nd Hot Normal Line	Hot normal 3rd to 2nd gear downshift shift line.
4th to 3rd Hot Normal Line	Hot normal 4th to 3rd gear downshift shift line.
1st to 2nd HOT WOT Shift	Hot detent 1st to 2nd gear upshift shift point.

2nd to 3rd HOT WOT Shift	Hot detent 2nd to 3rd gear upshift shift point.
3rd to 4th HOT WOT Shift	Hot detent 3rd to 4th gear upshift shift point.
2nd to 1st HOT WOT Shift	Hot detent 2nd to 1st gear downshift shift point.
3rd to 2nd HOT WOT Shift	Hot detent 3rd to 2nd gear downshift shift point.
4th to 3rd HOT WOT Shift	Hot detent 4th to 3rd gear downshift shift point.
1st to 2nd HOT RPM Shift	Engine speed threshold for a 1-2 hot detent upshift
2nd to 3rd HOT RPM Shift	Engine speed threshold for a 2-3 hot detent upshift
3rd to 4th HOT RPM Shift	Engine speed threshold for a 3-4 hot detent upshift
Shift Point - Normal	
1st to 2nd Normal Shift Line	Normal 1st to 2nd gear upshift shift line table
2nd to 3rd Normal Shift Line	Normal 2nd to 3rd gear upshift shift line table
3rd to 4th Normal Shift Line	Normal 3rd to 4th gear upshift shift line table
2nd to 1st Normal Line	Normal 2nd to 1st gear downshift shift line table
3rd to 2nd Normal Line	Normal 3rd to 2nd gear downshift shift line table
4th to 3rd Normal Line	Normal 4th to 3rd gear downshift shift line table
1st to 2nd Drive2 Normal Line	Drive-2 1st to 2nd gear upshift shift line
2nd to 3rd Drive2 Normal Line	Drive-2 2nd to 3rd gear upshift shift line
2nd to 1st Drive2 Normal Line	Drive-2 2nd to 1st gear downshift shift line
3rd to 2nd Drive2 Normal Line	Drive-2 3rd to 2nd gear downshift shift line
1st to 2nd DriveLow Normal Line	Drive-Low 1st to 2nd gear upshift shift line
2nd to 3rd DriveLow Normal Line	Drive-Low 2nd to 3rd gear upshift shift line
2nd to 1st DriveLow Normal Line	Drive-Low 2nd to 1st gear downshift shift line
3rd to 2nd DriveLow Normal Line	Drive-Low 3rd to 2nd gear downshift shift line
1st to 2nd WOT Shift	Detent 1st to 2nd gear upshift shift point.
2nd to 3rd WOT Shift	Detent 2nd to 3rd gear upshift shift

	point.
3rd to 4th WOT Shift	Detent 3rd to 4th gear upshift shift point.
2nd to 1st WOT Shift	Detent 2nd to 1st gear downshift shift point.
3rd to 2nd WOT Shift	Detent 3rd to 2nd gear downshift shift point.
4th to 3rd WOT Shift	Detent 4th to 3rd gear downshift shift point.
1st to 2nd Shift RPM	Engine speed threshold for a 1-2 detent upshift
2nd to 3rd Shift RPM	Engine speed threshold for a 2-3 detent upshift
3rd to 4th Shift RPM	Engine speed threshold for a 3-4 detent upshift
Shift Point - Performance	
1st to 2nd Performance Shift Line	Performance 1st to 2nd gear upshift shift line.
2nd to 3rd Performance Shift Line	Performance 2nd to 3rd gear upshift shift line.
3rd to 4th Performance Shift Line	Performance 3rd to 4th gear upshift shift line.
2nd to 1st Performance Shift Line	Performance 2nd to 1st gear downshift shift line.
3rd to 2nd Performance Shift Line	Performance 3rd to 2nd gear downshift shift line.
4th to 3rd Performance Shift Line	Performance 4th to 3rd gear downshift shift line.
1st to 2nd Performance WOT Shift	Performance detent 1st to 2nd gear upshift shift point.
2nd to 3rd Performance WOT Shift	Performance detent 2nd to 3rd gear upshift shift point.
3rd to 4th Performance WOT Shift	Performance detent 3rd to 4th gear upshift shift point.
2nd to 1st Performance WOT Shift	Performance detent 2nd to 1st gear downshift shift point.
3rd to 2nd Performance WOT Shift	Performance detent 3rd to 2nd gear downshift shift point.
4th to 3rd Performance WOT Shift	Performance detent 4th to 3rd gear downshift shift point.
1st to 2nd Performance Shift RPM	Engine speed threshold for a 1-2 perf. detent upshift.
2nd to 3rd Performance Shift RPM	Engine speed threshold for a 2-3 perf. detent upshift.
3rd to 4th Performance Shift RPM	Engine speed threshold for a 3-4 perf. detent upshift.

Shift Point - Urban	
1st to 2nd Drivelow Urban Line	Drive-Low urban 1st to 2nd gear upshift shift line table
2nd to 3rd Drivelow Urban Line	Drive-Low urban 2nd to 3rd gear upshift shift line table
2nd to 1st Drivelow Urban Line	Drive-Low urban 2nd to 1st gear downshift shift line table
3rd to 2nd Drivelow Urban Line	Drive-Low urban 3rd to 2nd gear downshift shift line table
Shift Pressure	
Shift Pressure 2nd Base	Base pressure for normal pressure pattern, 2nd Gear
Shift Pressure 3rd Base	Base pressure for normal pressure pattern, 3rd Gear
Shift Pressure 4th Base	Base pressure for normal pressure pattern, 4th Gear
Shift Pressure 2nd Performance	Base pressure for performance pressure pattern, 2nd Gear
Shift Pressure 3rd Performance	Base pressure for performance pressure pattern, 3rd Gear
Shift Pressure 4th Performance	Base pressure for performance pressure pattern, 4th Gear
Max Shift Pressure	Max allowable force motor pressure used for limiting calculations.
Shift Switch	
Shift Switch Type	This Value will toggle the Option for having performance shift in your vehicle. Enable = 1 Disable = 0
Discrete Switch Debounce Time	This indicates how long a discrete indicator switch should be debounced for.
Shift Time	
1st to 2nd Normal Shift Time	Desired shift time for a 1-2 shift in normal mode.
2nd to 3rd Normal Shift Time	Desired shift time for a 2-3 shift in normal mode.
3rd to 4th Normal Shift Time	Desired shift time for a 3-4 shift in normal mode.
1st to 2nd Performance Shift Time	Desired shift time for a 1-2 shift in performance mode.
2nd to 3rd Performance Shift Time	Desired shift time for a 2-3 shift in performance mode.
3rd to 4th Performance Shift Time	Desired shift time for a 3-4 shift in performance mode.

TCC	
TCC Apply 2nd Normal Line	Normal 2nd gear TCC Apply line table
TCC Apply 3rd Normal Line	Normal 3rd gear TCC Apply line table
TCC Apply 4th Normal Line	Normal 4th gear TCC Apply line table
TCC Release 2nd Normal Line	Normal 2nd gear TCC Release line table
TCC Release 3rd Normal Line	Normal 3rd gear TCC Release line table
TCC Release 4th Normal Line	Normal 4th gear TCC Release line table
TCC Apply 2nd HOT	Hot 2nd gear TCC Apply line table
TCC Apply 3rd HOT	Hot 3rd gear TCC Apply line table
TCC Apply 4th HOT	Hot 4th gear TCC Apply line table
TCC Release 2nd HOT	Hot 2nd gear TCC Release line table
TCC Release 3rd HOT	Hot 3rd gear TCC Release line table
TCC Release 4th HOT	Hot 4th gear TCC Release line table
TCC Apply 2nd Performance	Performance 2nd gear TCC Apply line table
TCC Apply 3rd Performance	Performance 3rd gear TCC Apply line table
TCC Apply 4th Performance	Performance 4th gear TCC Apply line table
TCC Release 2nd Performance	Performance 2nd gear TCC Release line table
TCC Release 3rd Performance	Performance 3rd gear TCC Release line table
TCC Release 4th Performance	Performance 4th gear TCC Release line table
Torque Mgmt	
Torque Reduction 2nd to 1st Downshift	Percentage of total torque reduction for 2-1 downshift
Torque Reduction 3rd to 2nd Downshift	Percentage of total torque reduction for 3-2 downshift
Torque Reduction 4th to 3rd Downshift	Percentage of total torque reduction for 4-3 downshift
Torque Reduction 1st to 2nd Upshift	Percentage of total torque reduction for 1-2 upshift using Normal pressure pattern
Torque Reduction 2nd to 3rd Upshift	Percentage of total torque reduction for 2-3 upshift using Normal pressure pattern
Torque Reduction 3rd to 4th Upshift	Percentage of total torque reduction for 3-4 upshift using Normal pressure pattern
Torque Reduction 1st to 2nd	Percentage of total torque reduction for

Performance Upshift	1-2 upshift using Performance pressure pattern
Torque Reduction 2nd to 3rd Performance Upshift	Percentage of total torque reduction for 2-3 upshift using Performance pressure pattern
Torque Reduction 3rd to 4th Performance Upshift	Percentage of total torque reduction for 3-4 upshift using Performance pressure pattern
Max Turbine Torque TCC Locked	This table sets the maximum desired turbine torque when the TCC is located.
Max Turbine Torque TCC Unlocked	This table sets the maximum turbine torque when the TCC is not locked.
Brake Torque Limit	This table determines how much turbine torque will trigger brake torque management.
Max Engine Torque For Upshift	This table specifies the maximum allowable engine torque on an upshift as a function of engine speed.

11 *OBD-II DTC Code List*

This section is about the GM OBD-II DTC Code List.

11.1 How to decipher a DTC code

Example P0300 - Engine Misfire Detected

X	B-Body C-Chassis P-Powetrain U-Network
X	0-SAE 1-MFG
X	1-Fuel & Air Metering 2-Fuel & Air Metering (Injector) 3-Ignition System or Misfire 4-Auxiliary Emission Controls 5-Vehicle Speed & Idle Control System 6-Computer Output Circuit 7-Transmission 8-Transmission 9-Reserved 0-Reserved
XX	Fault (00-99)

11.2 Powertrain Codes

P0016	Crankshaft Position Camshaft Position Correlation Bank 1 Sensor A
P0030	Heated Oxygen Sensor (H02S) Heater Control Circuit Bank 1 Sensor 1
P0031	Heated Oxygen Sensor (HO2S) Heater Circuit Low Voltage Bank 1 Sensor 1
P0032	Heated Oxygen Sensor (HO2S) Heater Circuit High Voltage Bank 1 Sensor 1
P0036	Heated Oxygen Sensor (HO2S) Heater Control Circuit Bank 1 Sensor 2
P0037	Heated Oxygen Sensor (HO2S) Heater Circuit Low Voltage Bank 1 Sensor 2
P0038	Heated Oxygen Sensor (HO2S) Heater Circuit High Voltage Bank 1 Sensor 2
P0050	Heated Oxygen Sensor (HO2S) Heater Circuit Bank 2 Sensor 1
P0051	Heated Oxygen Sensor (HO2S) Heater Circuit Low Voltage Bank 2 Sensor 1
P0052	Heated Oxygen Sensor (HO2S) Heater Circuit High Voltage Bank 2 Sensor 1
P0053	HO2S Heater Resistance Bank 1 Sensor 1 (PCM)
P0054	HO2S Heater Resistance Bank 1 Sensor 2 (PCM)
P0056	Heated Oxygen Sensor (HO2S) Heater Circuit Bank 2 Sensor 2
P0057	Heated Oxygen Sensor (HO2S) Heater Circuit Low Voltage Bank 2 Sensor 2
P0058	Heated Oxygen Sensor (HO2S) Heater Circuit High Voltage Bank 2 Sensor 2
P0068	Throttle Body Airflow Performance (PCM)
P0100	MAF Sensor Circuit Insufficient Activity
P0101	Mass Air Flow (MAF) Sensor Performance
P0102	Mass Air Flow (MAF) Sensor Circuit Low Frequency
P0103	Mass Air Flow (MAF) Sensor Circuit High Frequency
P0104	Mass Air Flow Circuit Intermittent
P0105	MAP Sensor Circuit Insufficient Activity
P0106	Manifold Absolute Pressure (MAP) System Performance
P0107	Manifold Absolute Pressure (MAP) Sensor Circuit Low Voltage
P0108	Manifold Absolute Pressure (MAP) Sensor Circuit High Voltage
P0109	Manifold Absolute Pressure Circuit Intermittent
P0110	Intake Air Temperature (IAT) Sensor Circuit
P0111	Intake Air Temperature (IAT) Sensor Performance
P0112	Intake Air Temperature (IAT) Sensor Circuit Low Voltage
P0113	Intake Air Temperature (IAT) Sensor Circuit High Voltage
P0114	Intake Air Temperature Circuit Intermittent
P0115	Engine Coolant Temperature (ECT) Sensor Circuit

P0116	Engine Coolant Temperature (ECT) Sensor Performance
P0117	Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage
P0118	Engine Coolant Temperature (ECT) Sensor Circuit High Voltage
P0119	Engine Coolant Temperature Circuit Intermittent
P0120	TP System Performance
P0121	TP Sensor Circuit Insufficient Activity
P0122	Throttle Position (TP) Sensor Circuit Low Voltage
P0123	Throttle Position (TP) Sensor Circuit High Voltage
P0124	Throttle Position Sensor 1 Circuit Intermittent
P0125	Engine Coolant Temperature (ECT) Insufficient for Closed Loop Fuel Control
P0126	Insufficient ECT for Stable Operation
P0128	Coolant Thermostat Below Thermostat Regulating Temperature
P0130	Heated Oxygen Sensor (HO2S) Circuit Closed Loop (CL) Performance Bank 1 Sensor 1
P0131	Heated Oxygen Sensor (HO2S) Circuit Low Voltage Bank 1 Sensor 1
P0132	Heated Oxygen Sensor (HO2S) Circuit High Voltage Bank 1 Sensor 1
P0133	Heated Oxygen Sensor (HO2S) Slow Response Bank 1 Sensor 1
P0134	Heated Oxygen Sensor (HO2S) Circuit Insufficient Activity Bank 1 Sensor 1
P0135	Heated Oxygen Sensor (HO2S) Heater Performance Bank 1 Sensor 1
P0136	Heated Oxygen Sensor (HO2S) Circuit Bank 1 Sensor 2
P0137	Heated Oxygen Sensor (HO2S) Circuit Low Voltage Bank 1 Sensor 2
P0138	Heated Oxygen Sensor (HO2S) Circuit High Voltage Bank 1 Sensor 2
P0139	Heated Oxygen Sensor (HO2S) Slow Response Bank 1 Sensor 2
P0140	Heated Oxygen Sensor (HO2S) Circuit Insufficient Activity Bank 1 Sensor 2
P0141	Heated Oxygen Sensor (HO2S) Heater Performance Bank 1 Sensor 2
P0142	Heated Oxygen Sensor (HO2S) Circuit Bank 1 Sensor 3
P0143	Heated Oxygen Sensor (HO2S) Circuit Low Voltage Bank 1 Sensor 3
P0144	Heated Oxygen Sensor (HO2S) Circuit High Voltage Bank 1 Sensor 3
P0145	Heated Oxygen Sensor (HO2S) Circuit Bank 1 Sensor 2 Slow Response
P0146	Heated Oxygen Sensor (HO2S) Circuit Insufficient Activity Bank 1 Sensor 3
P0147	Heated Oxygen Sensor (HO2S) Heater Performance Bank 1 Sensor 3

P0150	Heated Oxygen Sensor (HO2S) Circuit Closed Loop (CL) Performance Bank 2 Sensor 1
P0151	Heated Oxygen Sensor (HO2S) Circuit Low Voltage Bank 2 Sensor 1
P0152	Heated Oxygen Sensor (HO2S) Circuit High Voltage Bank 2 Sensor 1
P0153	Heated Oxygen Sensor (HO2S) Slow Response Bank 2 Sensor 1
P0154	Heated Oxygen Sensor (HO2S) Circuit Insufficient Activity Bank 2 Sensor 1
P0155	Heated Oxygen Sensor (HO2S) Heater Performance Bank 2 Sensor 1
P0156	Heated Oxygen Sensor (HO2S) Circuit Bank 2 Sensor 2
P0157	Heated Oxygen Sensor (HO2S) Circuit Low Voltage Bank 2 Sensor 2
P0158	Heated Oxygen Sensor (HO2S) Circuit High Voltage Bank 2 Sensor 2
P0159	Heated Oxygen Sensor (HO2S) Slow Response Bank 2 Sensor 2
P0160	Heated Oxygen Sensor (HO2S) Circuit Insufficient Activity Bank 2 Sensor 2
P0161	Heated Oxygen Sensor (HO2S) Heater Performance Bank 2 Sensor 2
P0162	Heated Oxygen Sensor (HO2S) Circuit Bank 2 Sensor 3
P0163	Heated Oxygen Sensor (HO2S) Circuit Bank 2 Sensor 3 Low Voltage
P0164	Heated Oxygen Sensor (HO2S) Circuit Bank 2 Sensor 3 High Voltage
P0165	Heated Oxygen Sensor (HO2S) Circuit Bank 2 Sensor 3 Slow Response
P0166	Heated Oxygen Sensor (HO2S) Circuit Bank 2 Sensor 3 No Activity Detected
P0167	Heated Oxygen Sensor (HO2S) Heater Circuit Bank 2 Sensor 3
P0169	Fuel Composition Sensor
P0170	Fuel Trim Bank 1
P0171	Fuel Trim System Lean Bank 1
P0172	Fuel Trim System Rich Bank 1
P0173	Fuel Trim Bank 2
P0174	Fuel Trim System Lean Bank 2
P0175	Fuel Trim System Rich Bank 2
P0176	Fuel Composition Sensor Circuit
P0177	Fuel Composition Sensor Circuit Performance
P0178	Fuel Composition Sensor Circuit Low Voltage
P0179	Fuel Composition Sensor Circuit High Voltage
P0180	Fuel Temperature Sensor 1 Circuit
P0181	Fuel Temp. Sensor 1 Circuit Performance
P0182	Fuel Temperature Sensor Circuit Low Voltage

P0183	Fuel Temperature Sensor Circuit High Voltage
P0184	Fuel Temperature Sensor 1 Circuit Intermittent
P0185	Fuel Temperature Sensor 2 Circuit
P0186	Fuel Temp. Sensor 2 Circuit Performance
P0187	Fuel Temperature Sensor 2 Circuit Low Voltage
P0188	Fuel Temperature Sensor 2 Circuit High Voltage
P0189	Fuel Temperature Sensor 2 Circuit Intermittent
P0190	Fuel Rail Pressure Sensor Circuit
P0191	Fuel Rail Pressure Sensor Circuit Performance
P0192	Fuel Rail Pressure Sensor Circuit Low Voltage
P0193	Fuel Rail Pressure Sensor Circuit High Voltage
P0194	Fuel Rail Pressure Sensor Circuit Intermittent
P0195	Engine Oil Temperature Sensor
P0196	Engine Oil Temperature Sensor Performance
P0197	Engine Oil Temperature Sensor Low Voltage
P0198	Engine Oil Temperature Sensor High Voltage
P0199	Engine Oil Temperature Sensor Intermittent
P0200	Injector Control Circuit
P0201	Injector 1 Control Circuit
P0202	Injector 2 Control Circuit
P0203	Injector 3 Control Circuit
P0204	Injector 4 Control Circuit
P0205	Injector 5 Control Circuit
P0206	Injector 6 Control Circuit
P0207	Injector 7 Control Circuit
P0208	Injector 8 Control Circuit
P0209	Injector 9 Control Circuit
P0210	Injector 10 Control Circuit
P0211	Injector 11 Control Circuit
P0212	Injector 12 Control Circuit
P0213	Cold Start Injector 1
P0214	Cold Start Injector 2
P0215	Engine Shutoff Control Circuit
P0216	Injection Timing Control Circuit
P0217	Engine Overtemp Condition
P0218	Transmission Fluid Over temperature
P0219	Engine Over speed Condition
P0220	APP Sensor 2 Circuit
P0221	APP (Throttle Position) Sensor 2 Circuit Performance
P0222	APP (Throttle Position) Sensor 2 Circuit Low Voltage
P0223	APP (Throttle Position) Sensor 2 Circuit High Voltage
P0224	Throttle Position Sensor 2 Intermittent
P0225	APP Sensor 3 Circuit
P0226	APP Sensor 3 Circuit Performance
P0227	APP Sensor 3 Circuit Low Voltage

P0228	APP Sensor 3 Circuit High Voltage
P0229	Throttle Position Sensor 3 Intermittent
P0230	Fuel Pump Relay Control Circuit
P0231	Fuel Pump Feedback Circuit Low Voltage
P0232	Fuel Pump Feedback Circuit High Voltage
P0233	Fuel Pump Secondary Circuit Intermittent
P0234	Turbocharger Engine Over boost Condition
P0235	Turbocharger Boost Sensor 1 Circuit
P0236	Turbocharger Boost System
P0237	Turbocharger Boost Sensor Circuit Low Voltage
P0238	Turbocharger Boost Sensor Circuit High Voltage
P0239	Turbocharger Boost Sensor 2 Circuit
P0240	Turbocharger Boost Sensor 2 Performance
P0241	Turbocharger Boost Sensor 2 Circuit Low Voltage
P0242	Turbocharger Boost Sensor 2 Circuit High Voltage
P0243	Turbocharger Waste gate Solenoid 1
P0244	Turbocharger Waste gate Solenoid 1 Performance
P0245	Turbocharger Waste gate Solenoid 1 Low Voltage
P0246	Turbocharger Waste gate Solenoid 1 High Voltage
P0247	Turbocharger Waste gate Solenoid 2
P0248	Turbocharger Waste gate Solenoid 2 Performance
P0249	Turbocharger Waste gate Solenoid 2 Low Voltage
P0250	Turbocharger Waste gate Solenoid 2 High Voltage
P0251	Injection Pump Fuel Metering Control "A" Malfunction (Cam/Rotor/Injector)
P0252	Injection Pump Fuel Metering Control "A" Range/Performance (Cam/Rotor/Injector)
P0253	Injection Pump Fuel Metering Control "A" Low (Cam/Rotor/Injector)
P0254	Injection Pump Fuel Metering Control "A" High (Cam/Rotor/Injector)
P0255	Injection Pump Fuel Metering Control "A" Intermittent (Cam/Rotor/Injector)
P0256	Injection Pump Fuel Metering Control "B" Malfunction (Cam/Rotor/Injector)
P0257	Injection Pump Fuel Metering Control "B" Range/Performance (Cam/Rotor/Injector)
P0258	Injection Pump Fuel Metering Control "B" Low (Cam/Rotor/Injector)
P0259	Injection Pump Fuel Metering Control "B" High (Cam/Rotor/Injector)
P0260	Injection Pump Fuel Metering Control "B" Intermittent (Cam/Rotor/Injector)
P0261	Cylinder 1 Injector Circuit Low
P0262	Cylinder 1 Injector Circuit High

P0263	Cylinder 1 Contribution/Balance Fault
P0264	Cylinder 2 Injector Circuit Low
P0265	Cylinder 2 Injector Circuit High
P0266	Cylinder 2 Contribution/Balance Fault
P0267	Cylinder 3 Injector Circuit Low
P0268	Cylinder 3 Injector Circuit High
P0269	Cylinder 3 Contribution/Balance Fault
P0270	Cylinder 4 Injector Circuit Low
P0271	Cylinder 4 Injector Circuit High
P0272	Cylinder 4 Contribution/Balance Fault
P0273	Cylinder 5 Injector Circuit Low
P0274	Cylinder 5 Injector Circuit High
P0275	Cylinder 5 Contribution/Balance Fault
P0276	Cylinder 6 Injector Circuit Low
P0277	Cylinder 6 Injector Circuit High
P0278	Cylinder 6 Contribution/Balance Fault
P0279	Cylinder 7 Injector Circuit Low
P0280	Cylinder 7 Injector Circuit High
P0281	Cylinder 7 Contribution/Balance Fault
P0282	Cylinder 8 Injector Circuit Low
P0283	Cylinder 8 Injector Circuit High
P0284	Cylinder 8 Contribution/Balance Fault
P0285	Cylinder 9 Injector Circuit Low
P0286	Cylinder 9 Injector Circuit High
P0287	Cylinder 9 Contribution/Balance Fault
P0288	Cylinder 10 Injector Circuit Low
P0289	Cylinder 10 Injector Circuit High
P0290	Cylinder 10 Contribution/Balance Fault
P0291	Cylinder 11 Injector Circuit Low
P0292	Cylinder 11 Injector Circuit High
P0293	Cylinder 11 Contribution/Balance Fault
P0294	Cylinder 12 Injector Circuit Low
P0295	Cylinder 12 Injector Circuit High
P0296	Cylinder 12 Contribution/Range Fault
P0300	Engine Misfire Detected
P0301	Cylinder 1 Misfire Detected
P0302	Cylinder 2 Misfire Detected
P0303	Cylinder 3 Misfire Detected
P0304	Cylinder 4 Misfire Detected
P0305	Cylinder 5 Misfire Detected
P0306	Cylinder 6 Misfire Detected
P0307	Cylinder 7 Misfire Detected
P0308	Cylinder 8 Misfire Detected
P0309	Cylinder 9 Misfire Detected
P0310	Cylinder 10 Misfire Detected

P0311	Cylinder 11 Misfire Detected
P0312	Cylinder 12 Misfire Detected
P0313	Misfire Detected With Low Fuel Level
P0315	Crankshaft position (CKP) system variation values are not stored in the PCM memory
P0318	Rough Road Sensor Circuit
P0320	Ignition/Distributor Engine Speed Input Circuit Malfunction
P0321	Ignition/Distributor Engine Speed Input Circuit Range/Performance
P0322	IC Module 4X Reference Circuit No Frequency
P0323	Ignition/Distributor Engine Speed Input Circuit Intermittent
P0324	Knock Sensor (KS) Module Performance
P0325	PCM Knock Sensor Circuit
P0326	Knock Sensor Circuit Excessive Spark Retard
P0327	Knock Sensor Circuit Low Voltage
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)
P0329	Knock Sensor 1 Circuit Intermittent (Bank 1 or Single Sensor)
P0330	Knock Sensor (KS) Circuit Bank 2
P0331	Knock Sensor 2 Circuit Range/Performance (Bank 2)
P0332	Knock Sensor 2 Circuit Low Input (Bank 2)
P0333	Knock Sensor 2 Circuit High Input (Bank 2)
P0334	Knock Sensor 2 Circuit Intermittent (Bank 2)
P0335	CKP Sensor A Circuit Performance
P0336	Crankshaft Position (CKP) Sensor A Performance
P0337	Crankshaft Position (CKP) Sensor Circuit Low Duty Cycle
P0338	Crankshaft Position (CKP) Sensor Circuit High Duty Cycle
P0339	Crankshaft Position (CKP) Sensor Circuit Intermittent
P0340	Camshaft Position (CMP) Sensor Circuit
P0341	Camshaft Position (CMP) Sensor Performance
P0342	Camshaft Position Sensor Circuit Low Input
P0343	Camshaft Position Sensor Circuit High Input
P0344	Camshaft Position Sensor Circuit Intermittent
P0350	Ignition Coil Primary/Secondary Circuit Malfunction
P0351	Ignition Coil 1 Control Circuit
P0352	Ignition Coil 2 Control Circuit
P0353	Ignition Coil 3 Control Circuit
P0354	Ignition Coil 4 Control Circuit
P0355	Ignition Coil 5 Control Circuit
P0356	Ignition Coil 6 Control Circuit
P0357	Ignition Coil 7 Control Circuit
P0358	Ignition Coil 8 Control Circuit
P0359	Ignition Coil I Primary/Secondary Circuit Malfunction
P0360	Ignition Coil J Primary/Secondary Circuit Malfunction
P0361	Ignition Coil K Primary/Secondary Circuit Malfunction
P0362	Ignition Coil L Primary/Secondary Circuit Malfunction
P0370	Timing Reference High Resolution Signal A Malfunction

P0371	IC 24X Reference Circuit Too Many Pulses
P0372	IC 24X Reference Circuit Missing Pulses
P0373	Timing Reference High Resolution Signal A Intermittent/Erratic Pulses
P0374	Timing Reference High Resolution Signal A No Pulses
P0375	Timing Reference High Resolution Signal B Malfunction
P0376	Timing Reference High Resolution Signal B Too Many Pulses
P0377	Timing Reference High Resolution Signal B Too Few Pulses
P0378	Timing Reference High Resolution Signal B Intermittent/Erratic Pulses
P0379	Timing Reference High Resolution Signal B No Pulses
P0380	Glow Plug/Heater Circuit "A" Malfunction
P0381	Glow Plug/Heater Indicator Circuit Malfunction
P0382	Exhaust Gas Recirculation Flow Malfunction
P0385	Crankshaft Position (CKP) Sensor B Circuit
P0386	Crankshaft Position (CKP) Sensor B Performance
P0387	Crankshaft Position Sensor B Circuit Low Input
P0388	Crankshaft Position Sensor B Circuit High Input
P0389	Crankshaft Position Sensor B Circuit Intermittent
P0400	Exhaust Gas Recirculation Flow Malfunction
P0401	Exhaust Gas Recirculation (EGR) Flow Insufficient
P0402	Exhaust Gas Recirculation Flow Excessive Detected
P0403	Exhaust Gas Recirculation (EGR) Solenoid Control Circuit
P0404	Exhaust Gas Recirculation (EGR) Open Position Performance
P0405	Exhaust Gas Recirculation (EGR) Position Sensor Circuit Low Voltage
P0406	Exhaust Gas Recirculation Sensor A Circuit High
P0407	Exhaust Gas Recirculation Sensor B Circuit Low
P0408	Exhaust Gas Recirculation Sensor B Circuit High
P0410	Secondary Air Injection (AIR) System
P0411	Secondary Air Injection (AIR) System
P0412	Secondary Air Injection (AIR) Solenoid Relay Control Circuit Bank 1
P0413	Secondary Air Injection System Switching Valve A Circuit Open
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted
P0415	Secondary Air Injection System Switching Valve B Circuit Malfunction
P0416	Secondary Air Injection System Switching Valve B Circuit Open
P0417	Secondary Air Injection System Switching Valve B Circuit Shorted
P0418	Secondary Air Injection (AIR) Pump Relay Control Circuit Bank 1
P0419	Secondary Air Injection (AIR) Pump Relay Control Circuit Bank 2
P0420	Catalyst System Low Efficiency
P0421	Warm Up Catalyst Efficiency Below Threshold (Bank 1)
P0422	Catalyst System Low Efficiency Bank 1
P0423	Heated Catalyst Efficiency Below Threshold (Bank 1)

P0424	Heated Catalyst Temperature Below Threshold (Bank 1)
P0430	Catalyst System Low Efficiency Bank 2
P0431	Warm Up Catalyst Efficiency Below Threshold (Bank 2)
P0432	Catalyst System Low Efficiency Bank 2
P0433	Heated Catalyst Efficiency Below Threshold (Bank 2)
P0434	Heated Catalyst Temperature Below Threshold (Bank 2)
P0440	Evaporative Emission (EVAP) System
P0441	Evaporative Emission Control System Incorrect Purge Flow
P0442	Evaporative Emission (EVAP) System Small Leak Detected
P0443	EVAP Purge Solenoid Valve 1 Control Circuit
P0444	Evaporative Emission Control System Purge Control Valve Circuit Open
P0445	Evaporative Emission Control System Purge Control Valve Circuit Shorted
P0446	EVAP Vent Solenoid Valve Control System
P0447	Evaporative Emission Control System Vent Control Circuit Open
P0448	Evaporative Emission Control System Vent Control Circuit Shorted
P0449	Evaporative Emission (EVAP) Vent Solenoid Control Circuit
P0450	Fuel Tank Pressure Sensor Circuit
P0451	Evaporative Emission Control System Pressure Sensor Range/Performance
P0452	Fuel Tank Pressure Sensor Circuit Low Voltage
P0453	Fuel Tank Pressure Sensor Circuit High Voltage
P0454	Evaporative Emission Control System Pressure Sensor Intermittent
P0455	Evaporative Emission (EVAP) System Leak Detected
P0460	Fuel Level Sensor Circuit
P0461	Fuel Level Sensor Performance
P0462	Fuel Level Sensor Circuit Low Voltage
P0463	Fuel Level Sensor Circuit High Voltage
P0464	Fuel Level Sensor Circuit Intermittent
P0465	Purge Flow Sensor Circuit Malfunction
P0466	Purge Flow Sensor Circuit Range/Performance
P0467	Purge Flow Sensor Circuit Low Input
P0468	Purge Flow Sensor Circuit High Input
P0469	Purge Flow Sensor Circuit Intermittent
P0470	Exhaust Pressure Sensor Malfunction
P0471	Exhaust Pressure Sensor Range/Performance
P0472	Exhaust Pressure Sensor Low
P0473	Exhaust Pressure Sensor High
P0474	Exhaust Pressure Sensor Intermittent
P0475	Exhaust Pressure Control Valve Malfunction
P0476	Exhaust Pressure Control Valve Range/Performance
P0477	Exhaust Pressure Control Valve Low
P0478	Exhaust Pressure Control Valve High

P0479	Exhaust Pressure Control Valve Intermittent
P0480	Cooling Fan Relay 1 Control Circuit
P0481	Cooling Fan Relay 2 Control Circuit
P0482	Cooling Fan 3 Control Circuit Malfunction
P0483	Cooling Fan Rationality Check Malfunction
P0484	Cooling Fan Circuit Over Current
P0485	Cooling Fan Power/Ground Circuit Malfunction
P0496	Evaporative Emission (EVAP) System Flow During Non-Purge
P0500	Vehicle Speed Sensor (VSS) Circuit
P0501	Vehicle Speed Sensor Range/Performance
P0502	Vehicle Speed Sensor (VSS) Circuit Low Input
P0503	Vehicle Speed Sensor (VSS) Circuit Intermittent
P0505	Idle Control System Malfunction
P0506	Idle Speed Low
P0507	Idle Speed High
P0510	Closed Throttle Position Switch Malfunction
P0512	Start Switch Circuit
P0520	Engine Oil Pressure Sensor/Switch Circuit Malfunction
P0521	Engine Oil Pressure Sensor/Switch Circuit Range/Performance
P0522	Engine Oil Pressure Sensor/Switch Circuit Low Voltage
P0523	Engine Oil Pressure Sensor/Switch Circuit High Voltage
P0526	Cooling Fan Speed Sensor Circuit
P0530	A/C Refrigerant Pressure Sensor Circuit Malfunction
P0531	A/C Refrigerant Pressure Sensor Circuit Range/Performance
P0532	Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit Low Voltage
P0533	Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit High Voltage
P0534	Air Conditioner Refrigerant Charge Loss
P0550	Power Steering Pressure (PSP) Switch Circuit
P0551	Power Steering Pressure Sensor Circuit Range/Performance
P0552	Power Steering Pressure Sensor Circuit Low Input
P0553	Power Steering Pressure Sensor Circuit High Input
P0554	Power Steering Pressure Sensor Circuit Intermittent
P0560	System Voltage
P0561	System Voltage Unstable
P0562	System Voltage Low (TCM)
P0563	System Voltage High (TCM)
P0564	Cruise Control Multi-Function Switch Circuit (PCM)
P0565	Cruise Control On Signal Malfunction
P0566	Cruise Control Off Signal Malfunction
P0567	Cruise Control Resume Signal Malfunction
P0568	Cruise Control Set Signal Malfunction
P0569	Cruise Control Coast Signal Malfunction
P0570	Cruise Control Accel Signal Malfunction

P0571	Cruise Control Brake Switch Circuit
P0573	Cruise Control/Brake Switch A Circuit High
P0574	Vehicle Speed Too High
P0575	Cruise Control Related Malfunction
P0576	Cruise Control Related Malfunction
P0576	Cruise Control Related Malfunction
P0578	Cruise Control Related Malfunction
P0579	Cruise Control Related Malfunction
P0580	Cruise Control Related Malfunction
P0600	Serial Communication Link Malfunction
P0601	Control Module Read Only Memory (ROM)
P0602	Control Module Not Programmed
P0603	Control Module Long Term Memory Reset
P0604	Control Module Random Access Memory (RAM)
P0605	Control Module Programming Read Only Memory (ROM)
P0606	Control Module Internal Performance
P0607	ECU Malfunction
P0608	Control Module VSS Output "A" Malfunction
P0609	Control Module VSS Output "B" Malfunction
P0610	Control Module Vehicle Options Incorrect
P0615	Starter Relay Control Circuit
P0616	Starter Relay Control Circuit Low Voltage
P0617	Starter Relay Control Circuit High Voltage
P0620	Generator Control Circuit Malfunction
P0621	Generator L-Terminal Circuit
P0622	Generator F-Terminal Circuit
P0625	Generator F-Terminal Circuit Low Voltage
P0626	Generator F-Terminal Circuit High Voltage
P0628	Fuel Pump Relay Control Circuit Low Voltage
P0629	Fuel Pump Relay Control Circuit High Voltage
P0638	Throttle Actuator Control (TAC) Command Performance
P0641	PCM voltage out of tolerance condition on the 5-volt reference circuit
P0645	Air Conditioning (A/C) Clutch Relay Control Circuit
P0646	Air Conditioning (A/C) Clutch Relay Control Circuit
P0647	Air Conditioning (A/C) Clutch Relay Control Circuit
P0650	Malfunction Indicator Lamp (MIL) Control Circuit
P0651	PCM voltage out of tolerance condition on the 5-volt reference circuit
P0654	Engine RPM Output Circuit Malfunction
P0655	Engine Hot Lamp Output Control Circuit Malfunction
P0656	Fuel Level Output Circuit Malfunction
P0660	Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit
P0661	Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit Low Voltage

P0662	Intake Manifold Tuning (IMT) Valve Solenoid Control Circuit High Voltage
P0685	Engine Controls Ignition Relay Control Circuit (PCM)
P0691	Cooling Fan Relay Control Circuit Low Voltage
P0693	Cooling Fan Relay Control Circuit Low Voltage
P0692	Cooling Fan Relay Control Circuit High Voltage
P0694	Cooling Fan Relay Control Circuit High Voltage
P0700	Transmission Control System Malfunction
P0701	Transmission Control System Range/Performance
P0702	Transmission Control System Electrical
P0703	Brake Switch Circuit Malfunction
P0704	Clutch Switch Input Circuit Malfunction
P0705	Trans Range Switch Circuit
P0706	Trans Range Switch Performance
P0707	Transmission Range Sensor Circuit Low Input
P0708	Transmission Range Sensor Circuit High Input
P0709	Transmission Range Sensor Circuit Intermittent
P0710	Transmission Fluid Temperature Sensor Circuit Malfunction
P0711	TFT Sensor Circuit Range/Performance
P0712	Transmission Fluid Temperature (TFT) Sensor Circuit Low Input
P0713	Transmission Fluid Temperature (TFT) Sensor Circuit High Input
P0714	Transmission Fluid Temperature Sensor Circuit Intermittent
P0715	Input/Turbine Speed Sensor Circuit Malfunction
P0716	Input Speed Sensor Circuit Intermittent
P0717	Input Speed Sensor Circuit Low Input
P0718	Input/Turbine Speed Sensor Circuit Intermittent
P0719	Brake Switch Circuit Low Input
P0720	Output Speed Sensor Circuit Malfunction
P0721	Output Speed Sensor Range/Performance
P0722	Output Speed Sensor Circuit Low Input
P0723	Output Speed Sensor Intermittent
P0724	Brake Switch Circuit High Input
P0725	Engine Speed Input Circuit
P0726	Engine Speed Input Circuit Range/Performance
P0727	Engine Speed Circuit No Signal
P0728	Engine Speed Input Circuit Intermittent
P0730	Incorrect Gear Ratio
P0731	Incorrect 1st Gear Ratio
P0732	Incorrect 2nd Gear Ratio
P0733	Incorrect 3rd Gear Ratio
P0734	Incorrect 4th Gear Ratio
P0735	Gear 5 Incorrect ratio
P0736	Reverse incorrect gear ratio
P0740	TCC Enable Solenoid Circuit Electrical
P0741	TCC System Stuck Off

P0742	TCC System Stuck On
P0743	TCC Enable Solenoid Circuit Electrical
P0744	Torque Converter Clutch Circuit Intermittent
P0745	Pressure Control Solenoid Malfunction
P0746	Pressure Control Solenoid Performance or Stuck Off
P0747	Pressure Control Solenoid Stuck On
P0748	Pressure Control Solenoid Circuit Electrical
P0749	Pressure Control Solenoid Intermittent
P0750	Shift Solenoid A Malfunction
P0751	1-2 Shift Solenoid Valve Performance
P0752	1-2 Shift Solenoid Valve Performance
P0753	1-2 Shift Solenoid Circuit Electrical
P0754	Shift Solenoid A Intermittent
P0755	Shift Solenoid B Malfunction
P0756	2-3 Shift Solenoid Valve Performance
P0757	2-3 Shift Solenoid Valve Performance
P0758	2-3 Shift Solenoid Circuit Electrical
P0759	Shift Solenoid B Intermittent
P0760	Shift Solenoid C Malfunction
P0761	Shift Solenoid C Performance or Stuck Off
P0762	Shift Solenoid C Stuck On
P0763	Shift Solenoid C Electrical
P0764	Shift Solenoid C Intermittent
P0765	Shift Solenoid D Malfunction
P0766	Shift Solenoid D Performance or Stuck Off
P0767	Shift Solenoid D Stuck On
P0768	Shift Solenoid D Electrical
P0769	Shift Solenoid D Intermittent
P0770	Shift Solenoid E Malfunction
P0771	Shift Solenoid E Performance or Stuck Off
P0772	Shift Solenoid E Stuck On
P0773	Shift Solenoid E Electrical
P0774	Shift Solenoid E Intermittent
P0780	Shift Malfunction
P0781	1-2 Shift Malfunction
P0782	2-3 Shift Malfunction
P0783	3-4 Shift Malfunction
P0784	4-5 Shift Malfunction
P0785	3-2 Shift Solenoid Circuit Electrical
P0786	Shift/Timing Solenoid Range/Performance
P0787	Shift/Timing Solenoid Low
P0788	Shift/Timing Solenoid High
P0789	Shift/Timing Solenoid Intermittent
P0790	Normal/Performance Switch Circuit Malfunction
P0801	Reverse Inhibit Control Circuit Malfunction

P0803	1-4 Upshift (Skip Shift) Solenoid Control Circuit Malfunction
P0804	1-4 Upshift (Skip Shift) Lamp Control Circuit Malfunction
P0850	Park/Neutral Position (PNP) Switch Circuit
P0856	Powertrain Indicated Traction Control Malfunction
P0894	Transmission Component Slipping
P0897	PCM detects a calculated transmission fluid life of 10 percent or less
P0962	Line Pressure Control (PC) Solenoid Control Circuit Low Voltage (TCM)
P0963	Line Pressure Control (PC) Solenoid Control Circuit High Voltage (TCM)
P0966	Clutch Pressure Control (PC) Solenoid Control Circuit Low Voltage (TCM)
P0967	Clutch Pressure Control (PC) Solenoid Control Circuit High Voltage (TCM)
P0970	Shift Pressure control (PC) Solenoid Control Circuit Low Voltage (TCM)
P0971	Shift Pressure Control (PC) Solenoid Control High Voltage (TCM)
P0973	PCM detects an open or short to ground in the 1-2 SS valve circuit
P0974	PCM detects a continuous short to voltage in the 1-2 SS valve circuit
P0976	PCM detects a continuous open or short to ground in the 2-3 SS valve circuit
P0977	PCM detects a continuous short to voltage in the 2-3 SS valve circuit
P0979	Shift Solenoid (SS) 3 Control Circuit Low Voltage (TCM)
P0980	Shift Solenoid (SS) 3 Control Circuit High Voltage (TCM)
P0982	Shift Solenoid (SS) 4 Control Circuit High Voltage (TCM)
P0983	Shift Solenoid (SS) 4 Control Circuit High Voltage (TCM)
P0985	Shift Solenoid (SS) 5 Control Circuit Low Voltage (TCM)
P0986	Shift Solenoid (SS) 5 Control Circuit High Voltage (TCM)
P1031	Heated Oxygen Sensor (HO2S) Heater Current Monitor Control Circuit Banks 1 and 2 Sensor 1
P1032	Heated Oxygen Sensor (HO2S) Heater Warm Up Control Circuit Banks 1 and 2 Sensor 1
P1101	Actual measured airflow from MAF
P1105	Secondary Vacuum Sensor Circuit
P1106	Manifold Absolute Pressure (MAP) Sensor Circuit Intermittent High Voltage
P1107	Manifold Absolute Pressure (MAP) Sensor Circuit Intermittent Low Voltage
P1108	BARO to MAP Sensor Comparison Too High
P1109	Secondary Port Throttle System
P1111	Intake Air Temperature (IAT) Sensor Circuit Intermittent High Voltage

P1112	Intake Air Temperature (IAT) Sensor Circuit Intermittent Low Voltage
P1113	Intake Resonance Switchover Solenoid Control Circuit
P1114	Engine Coolant Temperature (ECT) Sensor Circuit Intermittent Low Voltage
P1115	Engine Coolant Temperature (ECT) Sensor Circuit Intermittent High Voltage
P1116	ECT Signal Unstable or Intermittent
P1117	Engine Coolant Temp. Signal Out-Of-Range Low
P1118	Engine Coolant Temp. Signal Out-Of-Range High
P1119	ECT Signal Out-Of-Range With TFT Sensor
P1120	Throttle Position (TP) Sensor 1 Circuit
P1121	Throttle Position (TP) Sensor Circuit Intermittent High Voltage
P1122	Throttle Position (TP) Sensor Circuit Intermittent Low Voltage
P1125	Accelerator Pedal Position (APP) System
P1130	Heated Oxygen Sensor (HO2S) Circuit Low Variance Bank 1 Sensor 1
P1131	Heated Oxygen Sensor (HO2S) Circuit Low Variance Bank 1 Sensor 2
P1132	Heated Oxygen Sensor (HO2S) Circuit Low Variance Bank 2 Sensor 1
P1133	Heated Oxygen Sensor (HO2S) Insufficient Switching Bank 1 Sensor 1
P1134	Heated Oxygen Sensor (HO2S) Transition Time Ratio Bank 1 Sensor 1
P1135	Heated Oxygen Sensor (HO2S) Lean Mean Bank 1 Sensor 1
P1136	Heated Oxygen Sensor (HO2S) Rich Mean Bank 1 Sensor 1
P1137	Heated Oxygen Sensor (HO2S) Bank 1 Sensor 2 Lean System or Low Voltage
P1138	Heated Oxygen Sensor (HO2S) Bank 1 Sensor 2 Rich or High Voltage
P1139	Heated Oxygen Sensor (HO2S) Insuff. Switching Bank 1 Sensor 2
P1140	Heated Oxygen Sensor (HO2S) Transition Time Ratio Bank 1 Sensor 2
P1141	Heated Oxygen Sensor (HO2S) Heater Control Circuit Bank 1 Sensor 2
P1143	Heated Oxygen Sensor (HO2S) Bank 1 Sensor 3 Lean System or Low Voltage
P1144	Heated Oxygen Sensor (HO2S) Bank 1 Sensor 3 Rich or High Voltage
P1145	Heated Oxygen Sensor (HO2S) Cross Counts Bank 1 Sensor 3
P1153	Heated Oxygen Sensor (HO2S) Insufficient Switching Bank 2 Sensor 1
P1154	Heated Oxygen Sensor (HO2S) Transition Time Ratio Bank 2 Sensor 1

P1155	Heated Oxygen Sensor (HO2S) Lean Mean Bank 2 Sensor 1
P1156	Heated Oxygen Sensor (HO2S) Rich Mean Bank 2 Sensor 1
P1157	Heated Oxygen Sensor (HO2S) Bank 2 Sensor 2 Lean System or Low Voltage
P1158	Heated Oxygen Sensor (HO2S) Bank 2 Sensor 2 Rich or High Voltage
P1159	Heated Oxygen Sensor (HO2S) Cross Counts Bank 2 Sensor 2
P1161	Heated Oxygen Sensor (HO2S) Heater Control Circuit Bank 2 Sensor 2
P1163	Heated Oxygen Sensor (HO2S) Bank 2 Sensor 3 Lean System or Low Voltage
P1164	Heated Oxygen Sensor (HO2S) Bank 2 Sensor 3 Rich or High Voltage
P1165	Heated Oxygen Sensor (HO2S) Cross Counts Bank 2 Sensor 3
P1170	Bank to Bank Fuel Trim Offset
P1171	Fuel System Lean During Acceleration
P1172	Fuel Transfer Pump Flow Insufficient
P1185	Engine Oil Temperature Circuit
P1186	EOT Circuit Performance
P1187	EOT Sensor Circuit Low Voltage
P1188	EOT Sensor Circuit High Voltage
P1189	Engine Oil Pressure (EOP) Switch Circuit
P1190	Engine Vacuum Leak
P1191	Intake Air Duct Air Leak
P1200	Injector Control Circuit
P1201	(Alt. Fuel) Gas Mass Sensor Circuit Range/Performance
P1202	(Alt. Fuel) Gas Mass Sensor Circuit Low Frequency
P1203	(Alt. Fuel) Gas Mass Sensor Circuit High Frequency
P1211	Mass Air Flow Circuit Intermittent High
P1212	Mass Air Flow Circuit Intermittent Low
P1214	Injection Pump Timing Offset
P1215	Ground Fault Detection Indicated
P1216	Fuel Solenoid Response Time Too Short
P1217	Fuel Solenoid Response Time Too Long
P1218	Injection Pump Calibration Circuit
P1219	Throttle Position Sensor Reference Voltage
P1220	Throttle Position (TP) Sensor 2 Circuit
P1221	Fuel Pump Secondary Circuit Low
P1222	Injector Control Circuit Intermittent
P1225	Injector Circuit Cylinder 2 Intermittent
P1228	Injector Circuit Cylinder 3 Intermittent
P1231	Injector Circuit Cylinder 4 Intermittent
P1234	Injector Circuit Cylinder 5 Intermittent
P1237	Injector Circuit Cylinder 6 Intermittent
P1240	Injector Circuit Cylinder 7 Intermittent

P1243	Injector Circuit Cylinder 8 Intermittent
P1245	Intake Plenum Switchover Valve
P1250	Early Fuel Evaporation Heater Circuit
P1257	Supercharger System Over boost
P1258	Engine Coolant Over temperature
P1260	Last Test Failed SCC
P1270	Accelerator Pedal Position Sensor A/D Converter Error
P1271	Accelerator Pedal Position (APP) Sensor 1-2 Correlation
P1272	Accelerator Pedal Position Sensor 2
P1273	Accelerator Pedal Position Sensor 1
P1274	Injectors Wired Incorrectly
P1275	Accelerator Pedal Position (APP) Sensor 1 Circuit
P1276	Accelerator Pedal Position Sensor 1 Circuit Performance
P1277	Accelerator Pedal Position Sensor 1 Circuit Low Voltage
P1278	Accelerator Pedal Position Sensor 1 Circuit High Voltage
P1280	Accelerator Pedal Position (APP) Sensor 2 Circuit
P1281	Accelerator Pedal Position Sensor 2 Circuit Performance
P1282	Accelerator Pedal Position Sensor 2 Circuit Low Voltage
P1283	Accelerator Pedal Position Sensor 2 Circuit High Voltage
P1285	Accelerator Pedal Position Sensor 3 Circuit
P1286	Accelerator Pedal Position Sensor 3 Circuit Performance
P1287	Accelerator Pedal Position Sensor 3 Circuit Low Voltage
P1288	Accelerator Pedal Position Sensor 3 Circuit High Voltage
P1300	Igniter Circuit
P1305	Ignition Coil 2 Primary Feedback Circuit
P1310	Ignition Coil 3 Primary Feedback Circuit
P1315	Ignition Coil 4 Primary Feedback Circuit
P1320	IC 4X Reference Circuit Intermittent
P1321	Electronic Ignition System Fault Line
P1322	EI System or Ignition Control Extra or Missing
P1323	IC 24X Reference Circuit Low Frequency
P1324	Crank RPM Too Low
P1335	CKP Circuit
P1336	Crankshaft Position (CKP) System Variation Not Learned
P1345	Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation
P1346	Intake Camshaft Position [CMP] Sensor System Performance
P1350	Ignition Control System
P1351	Ignition Coil Control Circuit High Voltage
P1352	IC Output High/Pulse Detected when GND_Cyl. 2
P1353	IC Output High/Pulse Detected when GND_Cyl. 3
P1354	IC Output High/Pulse Detected when GND_Cyl. 4
P1355	IC Output High/Pulse Detected when GND_Cyl. 5
P1356	IC Output High/Pulse Detected when GND_Cyl. 6
P1357	IC Output High/Pulse Detected when GND_Cyl. 7
P1358	IC Output High/Pulse Detected when GND_Cyl. 8

P1359	Ignition Coil Group 1 Control Circuit
P1360	Ignition Coil Group 2 Control Circuit
P1361	Ignition Coil Control Circuit Low Voltage
P1362	IC Cylinder 2 Not Toggling After Enable
P1363	IC Cylinder 3 Not Toggling After Enable
P1364	IC Cylinder 4 Not Toggling After Enable
P1365	IC Cylinder 5 Not Toggling After Enable
P1366	IC Cylinder 6 Not Toggling After Enable
P1367	IC Cylinder 7 Not Toggling After Enable
P1368	IC Cylinder 8 Not Toggling After Enable
P1370	IC 4X Reference Circuit Too Many Pulses
P1371	IC 4X Reference Circuit Too Few Pulses
P1372	Crankshaft Position (CKP) Sensor A-B Correlation
P1374	3X Reference Circuit
P1375	IC 24X Reference Circuit High Voltage
P1376	Ignition Ground Circuit
P1377	IC Cam Pulse To 4X Reference Pulse
P1380	Misfire Detected
P1381	Misfire Detected
P1390	Wheel Speed Sensor 1
P1391	Wheel Speed Sensor 1
P1392	Wheel Speed Sensor 1
P1393	Wheel Speed Sensor 1
P1394	Wheel Speed Sensor 1
P1395	Wheel Speed Sensor 2
P1396	Wheel Speed Sensor 2
P1397	Wheel Speed Sensor 2
P1398	Wheel Speed Sensor 2
P1399	Wheel Speed Sensor 2
P1403	Exhaust Gas Recirculation System Valve 1
P1404	Exhaust Gas Recirculation (EGR) Closed Position Performance
P1405	Exhaust Gas Recirculation System Valve 3
P1406	EGR Valve Pintle Position Circuit
P1407	EGR Air Intrusion in Exhaust Supply to EGR Valve
P1408	Intake Manifold Pressure Sensor Circuit
P1409	EGR Vacuum System Leak
P1410	Fuel Tank Pressure System
P1415	Secondary Air Injection (AIR) System Bank 1
P1416	Secondary Air Injection (AIR) System Bank 2
P1418	Secondary Air Injection System Relay A Control Circuit High
P1420	Intake Air Low Pressure Switch Circuit Low Voltage
P1421	Intake Air Low Pressure Switch Circuit High Voltage
P1423	Intake Air High Pressure Switch Circuit High Voltage
P1431	Fuel Level Sensor 2 Circuit Performance
P1432	Fuel Level Sensor 2 Circuit Low Voltage

P1433	Fuel Level Sensor 2 Circuit High Voltage
P1441	Evaporative Emission (EVAP) System Flow During Non-Purge
P1442	EVAP Vacuum Sw. High Voltage During Ign. On
P1450	Barometric Pressure Sensor Circuit
P1451	Barometric Press. Sensor Performance
P1460	Cooling Fan Control System
P1480	Cooling Fan 1 Control Circuit High
P1481	Cooling Fan Speed Sensor Circuit
P1482	Cooling Fan Speed Output Circuit
P1483	Engine Cooling System Performance
P1484	Cooling Fan System Performance
P1500	Starter Signal Circuit
P1501	Theft Deterrent System
P1501	Vehicle Speed Sensor Circuit Intermittent
P1502	Theft Deterrent Fuel Enable Signal Not Received
P1503	Theft Deterrent Fuel Enable Signal Not Correct
P1504	Vehicle Speed Output Circuit
P1508	Idle Speed Low
P1509	Idle Speed High
P1510	Throttle Control System Performance
P1511	Throttle Control System
P1514	Airflow to TP Sensor Correlation High
P1515	Electronic Throttle System Throttle Position
P1516	Throttle Actuator Control (TAC) Module Throttle Actuator Position Performance
P1517	Electronic Throttle Module
P1518	Electronic Throttle Module to PCM Communication
P1519	Throttle Actuator Control (TAC) Module Internal Circuit
P1520	Transmission Range Switch Circuit
P1521	Transmission Engaged at High Throttle Angle
P1522	Park/Neutral to Drive/Reverse at High RPM
P1523	Throttle Closed Position Performance
P1524	Throttle Closed Position Performance
P1525	Throttle Body Service Required
P1526	Minimum Throttle Position Not Learned
P1527	Transmission Range to Pressure Switch Correlation
P1528	Governor
P1529	Heated Windshield Request Problem
P1530	Throttle Actuator Control (TAC) Module Internal Circuit
P1531	A/C Low Side Temperature Sensor Fault
P1532	A/C Evaporator Temp. Sens. Circuit Low Voltage
P1533	A/C Evaporator Temp. Sens. Circuit High Voltage
P1534	A/C High Side Temp. Sensor Low Voltage
P1535	A/C High Side Temperature Sensor Circuit
P1536	Engine Coolant Over temperature

P1537	A/C Request Circuit Low Voltage
P1538	A/C Request Circuit High Voltage
P1539	A/C Clutch Status Circuit High Voltage
P1540	Air Conditioning (A/C) Refrigerant Overpressure
P1541	A/C High Side Over Temperature
P1542	A/C System High Pressure High Temperature
P1543	A/C System Performance
P1544	A/C Refrigerant Condition Very Low
P1545	Air Conditioning (A/C) Clutch Relay Control Circuit
P1546	A/C Clutch Status Circuit Low Voltage
P1547	A/C System Performance Degraded
P1548	A/C Recirculation Circuit
P1551	Throttle Valve Rest Position Not Reached During Learn
P1554	Cruise Control Feedback Circuit
P1555	Electronic Variable Orifice Output
P1558	Cruise Control Servo Indicates Low
P1559	Cruise Control Power Management Mode
P1560	Transaxle Not in Drive
P1561	Cruise Vent Solenoid
P1562	Cruise Vacuum Solenoid
P1563	Cruise Vehicle Speed/Set Speed Difference Too High
P1564	Vehicle Acceleration Too High
P1565	Cruise Servo Position Sensor
P1566	Engine RPM Too High
P1567	Active Banking Control Active
P1568	Cruise Servo Stroke Greater than Commanded in Cruise
P1569	Cruise Servo Stroke High While not in Cruise
P1570	Traction Control Active
P1571	Traction Control Torque Request Circuit
P1572	ASR Active Circuit Low Too Long
P1573	PCM/EBTCM Serial Data Circuit
P1574	Stop lamp Switch Circuit
P1575	Extended Travel Brake Switch Circuit
P1576	BBV Sensor Circuit High Voltage
P1577	BBV Sensor Circuit Low Voltage
P1578	BBV Sensor Circuit Low Vacuum
P1579	P/N to D/R at High Throttle Angle
P1580	Cruise Move Circuit Low Voltage
P1581	Cruise Move Circuit High Voltage
P1582	Cruise Direction Circuit Low Voltage
P1583	Cruise Direction Circuit High Voltage
P1584	Cruise Control Disabled
P1585	Cruise Control Inhibit Output Circuit
P1586	Cruise Control Brake Switch 2 Circuit
P1587	Cruise Control Clutch Control Circuit Low

P1588	Cruise Control Clutch Control Circuit High
P1599	Engine Stall or Near Stall Detected
P1600	TCM Internal Watchdog Operation
P1601	Serial Comm. Problem With Device 1
P1602	Knock Sensor (KS) Module Performance
P1603	Loss of SDM Serial Data
P1604	Loss of IPC Serial Data
P1605	Loss of HVAC Serial Data
P1606	Serial Communication Problem With Device 6
P1607	Serial Communication Problem With Device 7
P1608	Serial Communication Problem With Device 8
P1609	Loss Of TCS Serial Data
P1610	Loss of PZM Serial Data
P1611	Loss of CVRTD Serial Data
P1612	Loss of IPM Serial Data
P1613	Loss of DIM Serial Data
P1614	Loss of RIM Serial Data
P1615	Loss of VTD Serial Data
P1617	Engine Oil Level Switch Circuit
P1619	Engine Oil Life Monitor Reset Circuit
P1620	Low Coolant Circuit
P1621	Control Module Long Term Memory Performance
P1622	Cylinder Select
P1623	Transmission Temp Pull-Up Resistor
P1624	Customer Snapshot Requested
P1625	TCM System Reset
P1626	Theft Deterrent Fuel Enable Signal Not Received
P1627	A/D Performance
P1628	ECT Pull-Up Resistor
P1629	Theft Deterrent System
P1630	Theft Deterrent Learn Mode Active
P1631	Theft Deterrent Start Enable Signal Not Correct
P1632	Theft Deterrent Fuel Disable Signal Received
P1633	Ignition 0 Switch Circuit
P1634	Ignition 1 Switch Circuit
P1635	5 Volt Reference Circuit
P1636	PCM Stack Overrun
P1637	Generator L-Terminal Circuit
P1638	Generator F-Terminal Circuit
P1639	5 Volt Reference 2 Circuit
P1640	Driver-1-Input High Voltage
P1641	Malfunction Indicator Lamp (MIL) Control Circuit
P1642	Vehicle Speed Output Circuit
P1643	Engine Speed Output Circuit
P1644	Traction Control Delivered Torque Output Circuit

P1645	Evaporative Emission (EVAP) Vent Solenoid Control Circuit
P1646	Evaporative Emission (EVAP) Vent Solenoid Control Circuit
P1647	Driver 1 Line 7
P1650	Control Module Output B Circuit
P1651	Fan 1 Relay Control Circuit
P1652	Powertrain Induced Chassis Pitch Output Circuit
P1653	Oil Level Lamp Control Circuit
P1654	Cruise Control Inhibit Output Circuit
P1655	EVAP Purge Solenoid Control Circuit
P1656	Driver 2 Line 6
P1657	1-4 Upshift Solenoid Control Circuit
P1658	Starter Enable Relay Control Circuit
P1660	Cooling Fan Control Circuits
P1661	MIL Control Circuit
P1662	Cruise Lamp Control Circuit
P1663	Oil Life Lamp Control Circuit
P1664	1-4 Upshift Lamp Control Circuit
P1665	Driver 3 Line 5
P1666	Driver 3 Line 6
P1667	Reverse Inhibit Solenoid Control Circuit
P1669	ABS Unit Expected
P1670	Driver 4
P1671	Driver 4 Line 1
P1672	Low Engine Oil Level Lamp Control Circuit
P1673	Engine Hot Lamp Control Circuit
P1674	Tachometer Control Circuit
P1675	EVAP Vent Solenoid Control Circuit
P1676	Driver 4 Line 6
P1677	Driver 4 Line 7
P1680	Driver 5 (ECU Malfunction)
P1681	Driver 5 Line 1
P1682	Driver 5 Line 2
P1683	Driver 5 Line 3
P1684	Driver 5 Line 4
P1685	Driver 5 Line 5
P1686	Driver 5 Line 6
P1687	Driver 5 Line 7
P1689	Delivered Torque Circuit Fault
P1690	ECM Loop Overrun
P1691	Coolant Gage Circuit Low Voltage
P1692	Coolant Gage Circuit High Voltage
P1693	Tachometer Circuit Low Voltage
P1694	Tachometer Circuit High Voltage
P1695	Remote Keyless Entry Circuit Low
P1696	Remote Keyless Entry Voltage High

P1700	Transmission Control Module (TCM) Requested MIL Illumination
P1701	Trans. MIL Request Circuit
P1705	P/N Signal Output Circuit
P1719	Incorrect Shifting Detected (TCM)
P1740	Torque Reduction Signal Circuit
P1743	TP Signal from ECM
P1760	TCM Supply Voltage Interrupted
P1779	Engine Torque Delivered to TCM Signal
P1780	Park/Neutral Position [PNP] Switch Circuit
P1781	Engine Torque Signal Circuit
P1790	Transmission Control Module Checksum
P1791	Transmission Control Module Loop
P1791	Throttle/Pedal Position Signal (2000+)
P1792	Transmission Control Module Reprogrammable Memory
P1792	ECM to TCM Engine Coolant Signal
P1793	Transmission Control Module Stack Overrun
P1793	Wheel Speed Signal (2000+)
P1795	CAN Bus
P1800	TCM Power Relay Control Circuit
P1801	Performance Selector Switch Failure
P1804	Ground Control Relay
P1810	TFP Valve Position Switch Circuit
P1811	Maximum Adapt and Long Shift
P1812	Transmission Over Temperature Condition
P1813	Torque Control
P1814	Torque Converter Overstressed
P1815	Transmission Range Switch
P1816	TFP Valve Position Sw.
P1817	TFP Valve Position Sw.
P1818	TFP Valve Position Sw.
P1819	Internal Mode Switch
P1820	Internal Mode Switch Circuit A Low
P1822	Internal Mode Switch Circuit B High
P1823	Internal Mode Switch Circuit P Low
P1825	Internal Mode Switch
P1826	Internal Mode Switch Circuit C
P1831	Pressure Control (PC) Solenoid Power Circuit
P1832	Pressure Control (PC)/Shift Lock Solenoid Control Circuit High Voltage
P1833	A/T Solenoids Power Circuit
P1834	Torque Converter Clutch (TCC)/Shift Solenoid (SS) Control Circuit High Voltage
P1835	Kick-Down Switch Circuit
P1836	Kick-Down Switch Failed Open
P1837	Kick-Down Switch Failed Short

P1842	1-2 Shift Solenoid Circuit Low Voltage
P1843	1-2 Shift Solenoid Circuit High Voltage
P1844	Torque Reduction Signal Circuit Desired By TCM
P1845	2-3 Shift Solenoid Circuit Low Voltage
P1847	2-3 Shift Solenoid Circuit High Voltage
P1850	Brake Band Apply Solenoid Circuit
P1851	Brake Band Apply Solenoid Performance
P1852	Brake Band Apply Solenoid Low Voltage
P1853	Brake Band Apply Solenoid High Voltage
P1860	TCC PWM Solenoid Circuit Electrical
P1864	Torque Converter Clutch Circuit
P1865	4-5 Shift Solenoid (SS) Valve Control Circuit High Voltage
P1866	Torque Converter Clutch (TCC) Pulse Width Modulation (PWM) Solenoid Control Circuit Low Voltage
P1867	Torque Converter Clutch (TCC) Pulse Width Modulation (PWM) Solenoid Control Circuit High Voltage
P1868	Transmission Fluid Life
P1870	Transmission Component Slipping
P1871	Undefined Gear Ratio
P1873	TCC Stator Temp. Switch Circuit Low
P1874	TCC Stator Temp. Switch Circuit High
P1875	4WD Low Switch Circuit Electrical
P1884	TCC Enable/Shift Light Circuit
P1886	Shift Timing Solenoid
P1887	TCC Release Switch Circuit
P1890	ECM Data Input Circuit
P1890	Throttle Position Signal Input
P1891	Throttle Position Sensor PWM Signal Low
P1892	Throttle Position Sensor PWM Signal High
P1893	Engine Torque Signal Low Voltage
P1894	Engine Torque Signal High Voltage
P1895	TCM to ECM Torque Reduction Circuit
P2008	Intake Manifold Runner Control (IMRC) Solenoid Control Circuit
P2009	Intake Manifold Runner Control (IMRC) Solenoid Control Circuit Low Voltage
P2010	Intake Manifold Runner Control (IMRC) Solenoid Control Circuit High Voltage
P2066	Fuel Level Sensor 2 Performance
P2067	Fuel Level Sensor 2 Circuit Low Voltage
P2068	Fuel Level Sensor 2 Circuit High Voltage
P2096	Post Catalyst Fuel Trim System Low Limit
P2097	Post Catalyst Fuel Trim System High Limit
P2098	Post Catalyst Fuel Trim System Low Limit
P2099	Post Catalyst Fuel Trim System High Limit
P2100	Throttle Actuator Control (TAC) Motor Control Circuit

P2101	Control Module Throttle Actuator Position Performance
P2105	Throttle Actuator Control (TAC) System
P2107	Throttle Actuator Control (TAC) Module Internal Circuit
P2108	Throttle Actuator Control (TAC) Module Performance
P2119	Throttle Closed Position Performance
P2120	Accelerator Pedal Position (APP) Sensor 1 Circuit
P2121	Accelerator Pedal Position (APP) Sensor 1 Performance
P2122	Accelerator Pedal Position (APP) Sensor 1 Circuit Low Voltage
P2123	Accelerator Pedal Position (APP) Sensor 1 Circuit High Voltage
P2125	Accelerator Pedal Position (APP) Sensor 2 Circuit
P2127	Accelerator Pedal Position (APP) Sensor 2 Circuit Low Voltage
P2128	Accelerator Pedal Position (APP) Sensor 2 Circuit High Voltage
P2135	Throttle Position (TP) Sensor 1-2 Correlation
P2138	Accelerator Pedal Position (APP) Sensor 1-2 Correlation
P2176	Minimum Throttle Position Not Learned
P2500	Generator L-Terminal Circuit Low Voltage
P2501	Generator L-Terminal Circuit High Voltage
P2535	Ignition 1 Switch Circuit High Voltage (PCM)
P2610	ECU Malfunction
P2763	Short to voltage in the TCC Solenoid
P2764	Open or Short to ground in the TCC PWM solenoid valve circuit
P2A00	HO2S Circuit Closed Loop (CL) Performance Bank 1 Sensor 1 (PCM)
P2A01	HO2S Circuit Closed Loop (CL) Performance Bank 1 Sensor 2 (PCM)
P3000	Hacking AWH Data
C0000	Vehicle Speed Information Circuit Malfunction
C0035	Left Front Wheel Speed Circuit Malfunction
C0040	Right Front Wheel Speed Circuit Malfunction
C0041	Right Front Wheel Speed Sensor Circuit Range/Performance (EBCM)
C0045	Left Rear Wheel Speed Circuit Malfunction
C0046	Left Rear Wheel Speed Sensor Circuit Range/Performance (EBCM)
C0050	Right Rear Wheel Speed Circuit Malfunction
C0051	LF Wheel Speed Sensor Circuit Range/Performance (EBCM)
C0060	Left Front ABS Solenoid #1 Circuit Malfunction
C0065	Left Front ABS Solenoid #2 Circuit Malfunction
C0070	Right Front ABS Solenoid #1 Circuit Malfunction
C0075	Right Front ABS Solenoid #2 Circuit Malfunction
C0080	Left Rear ABS Solenoid #1 Circuit Malfunction
C0085	Left Rear ABS Solenoid #2 Circuit Malfunction
C0090	Right Rear ABS Solenoid #1 Circuit Malfunction

C0095	Right Rear ABS Solenoid #2 Circuit Malfunction
C0110	Pump Motor Circuit Malfunction
C0121	Valve Relay Circuit Malfunction
C0128	Low Brake Fluid Circuit Low
C0141	Left TCS Solenoid #1 Circuit Malfunction
C0146	Left TCS Solenoid #2 Circuit Malfunction
C0151	Right TCS Solenoid #1 Circuit Malfunction
C0156	Right TCS Solenoid #2 Circuit Malfunction
C0161	ABS/TCS Brake Switch Circuit Malfunction
C0221	Right Front Wheel Speed Sensor Circuit Open
C0222	Right Front Wheel Speed Signal Missing
C0223	Right Front Wheel Speed Signal Erratic
C0225	Left Front Wheel Speed Sensor Circuit Open
C0226	Left Front Wheel Speed Signal Missing
C0227	Left Front Wheel Speed Signal Erratic
C0229	Drop Out of Front Wheel Speed Signals
C0235	Rear Wheel Speed Signal Circuit Open
C0236	Rear Wheel Speed Signal Circuit Missing
C0237	Rear Wheel Speed Signal Erratic
C0238	Wheel Speed Mismatch
C0241	EBCM Control Valve Circuit
C0245	Wheel Speed Sensor Frequency Error
C0254	EBCM Control Valve Circuit
C0265	EBCM Relay Circuit
C0266	EBCM Relay Circuit
C0267	Pump Motor Circuit Open/Shorted
C0268	Pump Motor Circuit Open/Shorted
C0269	Excessive Dump/Isolation Time
C0271	EBCM Malfunction
C0272	EBCM Malfunction
C0273	EBCM Malfunction
C0274	Excessive Dump/Isolation Time
C0279	Powertrain Configuration Not Valid
C0281	Brake Switch Circuit
C0283	Traction Switch Shorted to Ground
C0284	EBCM Malfunction
C0286	ABS Indicator Lamp Circuit Shorted to B+
C0287	Delivered Torque Circuit
C0288	Brake Warning Lamp Circuit Shorted to B+
C0290	Lost Communications With PCM
C0292	Lost Communications With PCM
C0291	Lost Communications With BCM
C0297	Powertrain Configuration Data Not Received
C0298	Powertrain Indicated Traction Control Malfunction
C0300	Rear Speed Sensor Malfunction

C0305	Front Speed Sensor Malfunction
C0306	Motor A or B Circuit
C0308	Motor A/B Circuit Low
C0309	Motor A/B Circuit High
C0310	Motor A/B Circuit Open
C0315	Motor Ground Circuit Open
C0321	Transfer Case Lock Circuit
C0323	T-Case Lock Circuit Low
C0324	T-Case Lock Circuit High
C0327	Encoder Circuit Malfunction
C0357	Park Switch Circuit High
C0359	Four Wheel Drive Low Range (4LO) Discrete Output Circuit
C0362	4LO Discrete Output Circuit High
C0367	Front Axle Control Circuit High
C0374	General System Malfunction
C0376	Front/Rear Shaft Speed Mismatch
C0379	Front Axle System
C0387	Unable to Perform Shift
C0472	Steering Hand wheel Speed Sensor Signal V Low
C0473	Steering Hand wheel Speed Sensor Signal V High
C0495	EVO Tracking Error
C0498	Steering Assist Control Actuator Feed Circuit Low
C0499	Steering Assist Control Solenoid Feed Circuit High
C0503	Steering Assist Control Solenoid Return Circuit Low
C0504	Steering Assist Control Solenoid Return Circuit High
C0550	ECU Malfunction
C0559	EEPROM Checksum Error
C0563	Calibration ROM Checksum Error
C0577	Left Front Solenoid Circuit Low
C0578	Left Front Solenoid Circuit High
C0579	Left Front Solenoid Circuit Open
C0582	Right Front Solenoid Circuit Low
C0583	Right Front Solenoid Circuit High
C0584	Right Front Solenoid Circuit Open
C0587	Left Rear Solenoid Circuit Low
C0588	Left Rear Solenoid Circuit High
C0589	Left Rear Solenoid Circuit Open
C0592	Right Rear Solenoid Circuit Low
C0593	Right Rear Solenoid Circuit High
C0594	Right Rear Solenoid Circuit Open
C0611	VIN Information Error
C0615	Left Front Position Sensor Malfunction
C0620	Right Front Position Sensor Malfunction
C0625	Left Rear Position Sensor Malfunction
C0628	Level Control Position Sensor Circuit High

C0630	Right Rear Position Sensor Malfunction
C0635	Left Front Normal Force Circuit Malfunction
C0638	Left Front Normal Force Circuit High
C0640	Right Front Normal Force Circuit Malfunction
C0643	Right Front Normal Force Circuit High
C0655	Level Control Compressor Relay Malfunction
C0657	Level Control Compressor Circuit Low
C0658	Level Control Compressor Circuit High
C0660	Level Control Exhaust Valve Circuit Malfunction
C0662	Level Control Exhaust Valve Circuit Low
C0663	Level Control Exhaust Valve Circuit High
C0665	Chassis Pitch Signal Circuit
C0690	Damper Control Relay Circuit Malfunction
C0691	Damper Control Relay Circuit Range
C0693	Damper Control Relay Circuit High
C0695	Position Sensor Over current (8 volt supply)
C0696	Position Sensor Over current (5 volt supply)
C0710	Steering Position Signal Malfunction
C0750	Tire Pressure Monitor (TPM) system sensor not transmitting
C0755	Tire Pressure Monitor (TPM) system sensor not transmitting
C0760	Tire Pressure Monitor (TPM) system sensor not transmitting
C0765	Tire Pressure Monitor (TPM) system sensor not transmitting
C0800	Device Power #1 Circuit Malfunction
C0896	Electronic Suspension Control (ESC) voltage is outside the normal range of 9 to 15.5 volts
C1211	ABS Indicator Lamp Circuit Malfunction
C1214	System Relay Contact or Coil Circuit Open
C1217	Pump Motor Shorted to Ground
C1218	Pump Motor Circuit Shorted to Voltage or Motor Ground Open
C1221	Left Front Wheel Speed Sensor Input Signal is 0
C1222	Right Front Wheel Speed Sensor Input Signal is 0
C1223	Left Rear Wheel Speed Sensor Input Signal is 0
C1224	Right Rear Wheel Speed Sensor Input Signal is 0
C1225	Left Front Excessive Wheel Speed Variation
C1226	Right Front Excessive Wheel Speed Variation
C1227	Left Rear Excessive Wheel Speed Variation
C1228	Right Rear Excessive Wheel Speed Variation
C1232	Left Front Wheel Speed Circuit Open or Shorted
C1233	Right Front Wheel Speed Circuit Open or Shorted
C1234	Left Rear Wheel Speed Circuit Open or Shorted
C1235	Right Rear Wheel Speed Circuit Open or Shorted
C1236	Low System Supply Voltage
C1237	High System Supply Voltage
C1238	Brake Thermal Model Exceeded
C1241	Variable Effort Steering Circuit Malfunction

C1242	Pump Motor Circuit Open
C1243	BPMV Pump Motor Stalled
C1244	Powertrain Indicated Engine Drag Control Malfunction
C1246	Brake Lining Wear Circuit Open
C1248	EBCM Turned the Red Brake Warning Indicator On
C1251	RSS Indicated Malfunction
C1252	Left Front Normal Force Malfunction
C1253	Right Front Normal Force Malfunction
C1254	Abnormal Shutdown Detected
C1255	EBCM Internal Malfunction
C1256	EBCM Internal Malfunction
C1261	Left Front Inlet Valve Solenoid Malfunction
C1262	Left Front Outlet Valve Solenoid Malfunction
C1263	Right Front Inlet Valve Solenoid Malfunction
C1264	Right Front Outlet Valve Solenoid Malfunction
C1265	Left Rear Inlet Valve Solenoid Malfunction
C1266	Left Rear Outlet Valve Solenoid Malfunction
C1267	Right Rear Inlet Valve Solenoid Malfunction
C1268	Right Rear Outlet Valve Solenoid Malfunction
C1271	Left Front TCS Master Cylinder Isolation Valve Malfunction
C1272	Left Front TCS Prime Valve Malfunction
C1273	Right Front TCS Master Cylinder Isolation Valve Malfunction
C1274	Right Front TCS Prime Valve Malfunction
C1276	Delivered Torque Signal Circuit Malfunction
C1277	Requested Torque Signal Circuit Malfunction
C1278	TCS Temporarily Inhibited By PCM
C1281	VSES Sensors Uncorrelated
C1282	Yaw Rate Sensor Bias Circuit Malfunction
C1283	Excessive Time to Center Steering
C1284	Lateral Accelerometer Sensor Bias Malfunction
C1285	Lateral Accelerometer Sensor Circuit Malfunction
C1286	Steering Sensor Bias Malfunction
C1287	Steering Sensor Rate Malfunction
C1288	Steering Sensor Circuit Malfunction
C1291	Open Brake Lamp Switch Contacts During Deceleration
C1292	Brake Fluid Pressure Sensor Circuit
C1293	Code C1291 Set in Previous Ignition Cycle
C1294	Brake Lamp Switch Circuit Always Active
C1295	Brake Lamp Switch Circuit Open
C1296	Brake Fluid Pressure Sensor Circuit
C1297	PCM Indicated Brake Extended Travel Switch Failure
C1298	PCM Class 2 Serial Data Link Malfunction
C1326	Battery Out of Range
C1650	RSS Control Module Fault
C1658	RSS Control Module Calibration Fault

C1710	Left Front Damper Actuator Short Circuit to Battery
C1711	Left Front Damper Actuator Short Circuit to Ground
C1712	Left Front Damper Actuator Open Circuit
C1715	Right Front Damper Actuator Short Circuit to Battery
C1716	Right Front Damper Actuator Short Circuit to Ground
C1717	Right Front Damper Actuator Open Circuit
C1720	Left Rear Damper Actuator Short Circuit to Battery
C1721	Left Rear Damper Actuator Short Circuit to Ground
C1722	Left Rear Damper Actuator Open Circuit
C1725	Right Rear Damper Actuator Short Circuit to Battery
C1726	Right Rear Damper Actuator Short Circuit to Ground
C1727	Right Rear Damper Actuator Open Circuit
C1735	Compressor Relay Short to Battery
C1736	Compressor Relay Short to GND/Open Circuit
C1737	Exhaust Solenoid Valve Short to Battery
C1738	Exhaust Solenoid Valve Short to GND
C1743	Speed Signal Fault
C1744	Lift/Dive Signal Discrete Fault
C1760	Left Front Position Sensor Input Fault
C1761	Right Front Position Sensor Input Fault
C1762	Left Rear Position Sensor Input Fault
C1763	Right Rear Position Sensor Input Fault
C1768	Position Sensor Supply Fault
C1780	Loss of Steering Position Signal
C1782	ICCS2 DL Left Output Short Circuit to Bat
C1783	ICCS2 DL Left Output Short Circuit to GND
C1784	ICCS2 DL Right Output Short Circuit to Bat
C1785	ICCS2 DL Right Output Short Circuit to GND
C1786	Damper Control Relay Fault
C1787	Damper Control Relay Short to GND
C1788	Damper Control Relay Short to Bat
B0001	PCM Discrete Input Speed Signal Error
B0004	PCM Discrete Input Speed Signal Not Present
B0005	In Park Switch Circuit Malfunction
B0012	Right Front/Passenger Frontal Deployment Loop Circuit
B0013	Right Front/Passenger Frontal Deployment Loop Circuit
B0014	Right Front/Passenger Frontal Deployment Loop Circuit
B0016	Right Front/Passenger Frontal Deployment Loop (Single Stage or Stage 1) Resistance Low
B0017	Right Front/Passenger Frontal Deployment Loop (Single Stage or Stage 1) Open
B0018	Right Front/Passenger Frontal Deployment Loop (Single Stage or Stage 1) Short to Ground/Voltage Out of Range

B0022	Left Front/Driver Frontal Deployment Loop (Single Stage or Stage 1) Resistance Low
B0024	Left Front/Driver Frontal Deployment Loop (Single Stage or Stage 1) Short to Ground/Voltage Out of Range
B0026	Left Front/Driver Frontal Deployment Loop (Single Stage or Stage 1) Open
B0028	Right Front/Passenger Side Deployment Loop Resistance Low
B0029	Right Front/Passenger Side Deployment Loop Open
B0030	Right Front/Passenger Side Deployment Loop Short to Ground/Voltage Out of Range
B0035	ADS Closed/Shorted to Ground
B0036	ADS Open/Missing/Shorted to Battery
B0037	AUX switch closed/shorted to ground
B0038	AUX switch open/shorted to battery
B0040	Left Front/Driver Side Deployment Loop Resistance Low
B0041	Left Front/Driver Side Deployment Loop Open
B0042	Left Front/Driver Frontal Deployment Loop Circuit
B0043	Left Front/Driver Frontal Deployment Loop Circuit
B0044	Left Front/Driver Frontal Deployment Loop Circuit
B0045	Left Front Side Deploy Loop Short to Ground/Voltage Out of Range
B0051	Deployment Commanded
B0053	Deployment Commanded with Loop Malfunctions Present
B0057	Right Front/Passenger Pretensioner Deployment Loop Resistance Low
B0058	Right Front/Passenger Pretensioner Deployment Loop Open
B0059	Right Front/Passenger Pretensioner Deployment Loop Short to Ground/Voltage Out of Range
B0061	Roof Rail Module-Left Deployment Loop Circuit
B0062	Roof Rail Module-Left Deployment Loop Circuit
B0064	Left Front/Driver Pretensioner Deployment Loop Resistance Low
B0065	Left Front/Driver Pretensioner Deployment Loop Open
B0066	Left Front/Driver Pretensioner Deployment Loop Short to Ground/Voltage Out of Range
B0068	Roof Rail Module-Left Deployment Loop Circuit
B0069	Roof Rail Module-Right Deployment Loop Circuit
B0070	Roof Rail Module-Right Deployment Loop Circuit
B0071	Roof Rail Module-Right Deployment Loop Circuit
B0073	Supplemental Deployment Loop #1 Resistance Low
B0074	Supplemental Deployment Loop #1 Open
B0075	Supplemental Deployment Loop #1 Short to Ground/Voltage Out of Range
B0077	Left Front/Driver Side Impact Sensor (SIS) Malfunction
B0078	Right Front/Passenger SIS Malfunction
B0079	Incorrect Left Front/Driver SIS Installed

B0080	Discard Left Front/Driver SIS
B0081	Incorrect Right Front/Passenger SIS Installed
B0082	Discard Right Front/Passenger SIS
B0086	Supplemental Deployment Loop #2 Resistance Low
B0087	Supplemental Deployment Loop #2 Open
B0088	Supplemental Deployment Loop #2 Short to Ground/Voltage Out of Range
B0090	Active switch voltage out of range
B0091	Active switch: wrong state
B0092	PPS passenger detection error
B0093	PPS/CPS self-test malfunction
B0094	CPS child seat detection error
B0095	SDM-PPS/CPS mismatch malfunction
B0100	Electronic Front End Sensor 1 Performance
B0101	Electronic Front End Sensor 1 Performance
B0102	Electronic Front End Sensor 1 Performance
B0103	Electronic Frontal Sensor Circuit
B0104	Electronic Frontal Sensor Circuit
B0105	Electronic Frontal Sensor Circuit
B0109	Side impact module-Left Rear deployment loop resistance is less than 1.3 ohms
B0110	Side impact module-Left Rear high circuit is less than 2.4 volts
B0111	Side impact module-Left Rear high and/or low circuits is short to ground or short to voltage
B0112	Side impact module-Right Rear deployment loop resistance is less than 1.3 ohms
B0113	Side impact module-Right Rear high circuit is less than 2.4 volts
B0114	Side impact module-Right Rear high and/or low circuits is short to ground or short to voltage
B0126	Right Panel Discharge Temperature Fault
B0130	Air Temperature/Mode Door Actuator Malfunction
B0131	Right Heater Discharge Temperature Fault
B0145	Auxiliary HAVC Actuator Circuit
B0159	Outside Air Temperature Sensor Circuit Range/Performance
B0160	Ambient Air Temperature Sensor Circuit
B0162	Ambient Air Temperature Sensor Circuit
B0164	Passenger Compartment Temperature Sensor #1 (Single Sensor or LH) Circuit Range/Performance
B0169	In-car Temp Sensor Failure (passenger -not used)
B0174	Output Air Temperature Sensor #1 (Upper; Single or LH) Circuit Range/Performance
B0179	Output Air Temperature Sensor #2 (Lower; Single or LH) Circuit Range/Performance
B0183	Sunload Sensor Circuit
B0184	Solar Load Sensor #1 Circuit Range (sunload)

B0188	Sunload Sensor Circuit
B0189	Solar Load Sensor #2 Circuit Range (sunload)
B0229	HVAC Actuator Circuit
B0248	Mode Door Inoperative Error
B0249	Heater/Defrost/AC Door Range Error
B0263	HVAC Actuator Circuit
B0268	A/I Door Inoperative Error
B0269	Air Inlet Door Range Error
B0283	Electric Rear Defrost Circuit
B0285	Electric Rear Defrost Circuit Low (BCM)
B0286	Electric Rear Defrost Circuit High (BCM)
B0408	Temperature Control #1 (Main/Front) Circuit Malfunction
B0409	Air Mix Door #1 Range Error
B0414	Air Temperature/Mode Door Actuator Malfunction
B0418	HVAC Actuator Circuit
B0419	Air Mix Door #2 Range Error
B0423	Air Mix Door #2 Inoperative Error
B0424	Air Temperature/Mode Door Actuator Malfunction
B0428	Air Mix Door #3 Inoperative Error
B0429	Temperature Control #3 Rear Circuit Range/Performance
B0510	RH Panel Discharge Temp Sensor Failure
B0515	RH Heater Discharge Temp Sensor Failure
B0520	Rear Discharge Temp Sensor Failure
B0530	Fuel Level Sensor Stuck
B0532	Fuel Sensor Shorted To Ground
B0533	Fuel Sensor Open/Shorted To B+
B0540	Speedometer Circuit
B0560	Tachometer Circuit
B0688	Security System Indicator Circuit High
B0689	Security System Indicator Circuit Open (BCM)
B0728	P (park) Indicator Circuit High (BCM)
B0729	P (park) Indicator Circuit Open (BCM)
B0733	R (reverse) Indicator Circuit High (BCM)
B0734	R (reverse) Indicator Circuit Open (BCM)
B0738	N (neutral) Indicator Circuit High (BCM)
B0739	N (neutral) Indicator Circuit Open (BCM)
B0748	D (drive) Indicator Circuit High (BCM)
B0749	D (drive) Indicator Circuit Open (BCM)
B0768	Service Indicator Circuit High
B0770	All Wheel Drive (AWD) Indicator Circuit
B0775	Four Wheel Drive High Range (4HI) Indicator Circuit
B0780	Four Wheel Drive Low Range (4LO) Indicator Circuit
B0785	Two Wheel Drive High Range (2HI) Indicator Circuit
B0790	Transfer Case Neutral Indicator Circuit
B0846	+5 Volt Reference Out of Range

B0856	Battery 2 Out of Range
B0951	Dimming Circuit
B1000	ECU Malfunction
B1001	Option Configuration Error
B1004	Keep Alive Memory (KAM)
B1008	Calibration Data Not Programmed (BCM)
B1007	EEPROM Write Error
B1009	EEPROM Checksum Error
B1013	ROM Checksum Error
B1014	Program ROM Checksum Error
B1015	Passenger Deploy. Loop Resistance High
B1016	Passenger Deployment Loop Resistance Low
B1017	Passenger Deployment Loop Open
B1018	Passenger Deployment Loop Short to GND
B1019	Passenger Deploy. Loop Short to Voltage
B1021	Driver Deployment Loop Resistance High
B1022	Driver Deployment Loop Resistance Low
B1023	Integral Switch Performance
B1024	Driver Deployment Loop Short to Ground
B1025	Driver Deployment Loop Short to Voltage
B1026	Driver Deployment Loop Open
B1035	Discr. Sensor Closed or Short to GND
B1036	Discr. Sensor Open or Short to Voltage
B1045	Audio Output 3 Circuit (Radio)
B1051	Frontal Air Bag and Preten Deployment
B1053	Deployment Commanded w/Loop Malfunction
B1054	Infl Rst IP Module Switch Circuit Failure
B1055	Audio Output 4 Circuit (Radio)
B1061	Lamp Circuit Failure
B1071	Internal SDM Failure
B1115	Passenger Deploy. Loop Resistance High
B1116	Passenger Deploy. Loop Resistance Low
B1117	Passenger Deployment Loop Open
B1121	Driver Deployment Loop Resistance High
B1122	Driver Deployment Loop Resistance Low
B1124	Driver/Passenger Deploy. Loop Short to GND
B1125	Driver/Pass Deploy Loop Short to Voltage
B1126	Driver Deployment Loop Open
B1131	Passenger Pretensioner Loop Resistance High
B1132	Passenger Pretensioner Loop Resistance Low
B1134	Passenger Pretensioner Loop Open
B1135	Discr. Sensor Closed or Short to GND
B1136	Discr. Sensor Open or Short to Voltage
B1141	Driver Pretensioner Loop Resistance High
B1142	Driver Pretens. Deploy. Loop Res. Low

B1144	Driver/Pass Pretens. Loop Short to GND
B1145	Driver/Pass Pretens. Loop Short to Volt
B1146	Driver Pretensioner Loop Open
B1147	Driver Side Air Bag System Malfunction
B1148	Passenger Side Air Bag System Malfunction
B1151	Deployment Commanded
B1152	Data Area Full
B1153	Deployment Commanded w/Loop Malfunction
B1155	SDM Calibration Mismatch
B1159	Loss of Serial Data-Key Not Received
B1160	Loss of Serial Data
B1161	Lamp Circuit Failure
B1163	Loss of Serial Data-No Lamp Response
B1171	Internal SDM Failure
B1245	CD Changer Not Responding
B1259	The digital radio receiver detects an antenna fault
B1271	Theft Lock Enabled
B1310	Ambient Air Temperature Sensor Failure
B1311	Outside Air Temp Sensor Short Circuit
B1312	High Side Temp Sensor Open Circuit
B1313	High Side Temp Sensor Short Circuit
B1314	Evaporator Inlet Temp Sensor Open Circuit
B1315	Evaporator Inlet Temp Sensor Short Circuit
B1316	In Car Temperature Sensor Open Circuit
B1317	In Car Air Temperature Sensor
B1318	LH Sun Load Sensor Fault
B1319	Sunload Sensor Short Circuit
B1321	A/C Low Side Temperature Sensor Fault
B1324	A/C Refrigerant Overpressure
B1327	Vehicle system voltage below 9.0 volts
B1328	Vehicle system voltage is greater than 15.9 volts
B1328	RH Sun Load Sensor Fault
B1330	Left A/C Discharge Sensor Fault
B1331	Right A/C Discharge Sensor Fault
B1332	Left Heater Discharge Sensor Fault
B1333	Right Heater Discharge Sensor Fault
B1336	Memory seat module (MSM) current exceeds 81 amps
B1340	Air Mix Door One Movement Fault
B1341	Air Mix Door Two Movement Fault
B1343	Air Inlet Door Movement Fault
B1344	Heater Defrost/AC Door Movement Fault
B1347	Very Low A/C Refrigerant Warning
B1348	Very Low A/C Refrigerant Pressure
B1350	Engine Coolant Over-Temperature
B1372	Device Ignition 1 Circuit Low

B1375	Device Ignition 3 (ON) Circuit
B1377	Device Ignition 3 (ON) Circuit Low (BCM)
B1378	Device Ignition 3 (ON) Circuit High (BCM)
B1382	Device Ignition ACCESSORY Circuit Low
B1390	Device Voltage Reference Input Circuit Malfunction
B1396	Device Voltage Reference Output 1 Circuit Range Performance
B1399	Loss of KDD Communications
B1420	Seat Switch Input Status
B1422	Device Power Moding Malfunction
B1438	IPC High Voltage Output Over current to IPM
B1440	Power Mode Master Input Circuits Mismatch
B1480	Battery Rundown Protection Circuit Malfunction
B1482	Battery Rundown Protection Circuit Low (BCM)
B1513	Voltage falls below 10.5 volts with the engine is running
B1514	Voltage is greater than 16.2 volts with the engine running
B1550	Mirror Left Front or Right Front Select Switch Circuit
B1552	Keep Alive Memory (KAM) Error
B1556	IPC EEPROM Odo/Configuration Error
B1557	EEPROM Calibration Error
B1558	BCM EPROM Checksum Error
B1586	Mirror Horiz. Pos Sensor-Out of Range/Open
B1591	Mirror Vert. Pos Sensor-Out of Range/Open
B1652	Loss of Keep Alive Memory (KAM)
B1656	EEPROM Write Error
B1658	EEPROM Checksum Error
B1697	Mirror Switch L Input Shorted to Ground
B1698	Mirror Switch L Up Input Stuck High
B1702	Mirror Switch L Input Shorted to Ground
B1703	Mirror Switch L Down Input Stuck High
B1707	Mirror Switch R Input Shorted to Ground
B1708	Mirror Switch R Up Input Stuck High
B1710	Switched Antenna Error
B1712	Mirror Switch R Input Shorted to Ground
B1713	Mirror Switch R Down Input Stuck High
B1717	Mirror Power Fold Control Switch Shorted Low
B1718	Power Folding Mirror Switch Input Circuit High
B1720	Mirror Up and Down Control Switch Circuit
B1721	Mirror Left and Right Control Switch Circuit
B1723	Mirror Motor Control Circuit 1 Performance
B1724	Mirror Motor Control Circuit 2 Performance
B1735	Driver Seat Front Up Switch Circuit Malfunction (Power Seat Switch Circuit)
B1740	Driver Seat Front Down Switch Circuit Malfunction
B1745	Driver Seat Rear Up Switch Circuit Malfunction
B1750	Driver Seat Rear Down Switch Circuit Malfunction

B1755	Driver Seat Asm Forward Switch Circuit Malfunction
B1760	Driver Seat Asm Rearward Switch Circuit Malfunction
B1760	CD Changer Not Responding
B1761	CD changer tracking fault
B1762	CD changer focus error
B1763	CD player load/unload fault
B1770	Cassette not responding
B1771	Cassette tape slow
B1772	Cassette head cleaning required
B1780	Theft Lock Enabled
B1802	Inadv. Pwr Short to Ground
B1805	Ignition Switch Problem
B1815	Driver Recline Forward Switch Circuit Malfunction
B1820	Driver Recline Rearward Switch Circuit Malfunction
B1825	Driver Recline Sensor Circuit Malfunction
B1830	Driver Lumbar Forward Switch Circuit Malfunction
B1835	Driver Lumbar Rearward Switch Circuit Malfunction
B1840	Driver Lumbar Up Switch Circuit Malfunction
B1845	Driver Lumbar Down Switch Circuit Malfunction
B1850	Driver Lumbar Horiz Sensor Circuit Malfunction
B1860	Driver Lumbar Vert Sensor Circuit Malfunction
B1870	Driver Belt Tower Up Switch Circuit Malfunction
B1875	Driver Belt Tower Down Switch Circuit Malfunction
B1900	Driver Belt Tower Vert Sensor Circuit Malfunction
B1910	Generator L-Terminal Open Circuit
B1911	Generator L-Terminal Problem
B1913	Heated Seat Switch
B1918	Heated Seat Switch
B1970	Exterior Lamp Power
B1971	Inadvertent Power
B1972	Low Power Driver Fault
B1973	High Power Control Fault
B1981	Battery Voltage Low
B1982	Device Power Circuit High
B1983	Device Power Circuit Low
B2075	Lumbar Switch Control Circuit
B2080	Lumbar Switch Control Circuit
B2085	Lumbar Switch Control Circuit
B2090	Lumbar Switch Control Circuit
B2101	Recline Aft Switch Failed
B2102	Recline Forward Switch Failed
B2103	Rear Vertical Down Switch Failed
B2104	Rear Vertical Up Switch Failed
B2105	Horizontal Aft Switch Failed
B2106	Horizontal Forward Switch Failed

B2107	Front Vertical Down Switch Failed
B2108	Front Vertical Up Switch Failed
B2109	Lumbar Aft Switch Failed
B2110	Lumbar Forward Switch Failed
B2111	Lumbar Down Switch Failed
B2112	Lumbar Up Switch Failed
B2115	Recline Sensor Failed
B2116	Rear Vertical Sensor Failed
B2117	Horizontal Sensor Failed
B2118	Front Vertical Sensor Failed
B2119	Lumbar Forward/Aft Sensor Failed
B2120	Lumbar Up/Down Sensor Failed
B2130	Driver Memory 1 Select Switch Circuit Malfunction
B2131	Driver Memory 2 Select Switch Circuit Malfunction
B2132	Driver Memory Exit Exit/Off Switch Circuit Malfunction
B2133	Driver Memory Set Switch Circuit Malfunction
B2140	Mirror Up Control Switch Circuit Malfunction
B2141	Mirror Down Control Switch Circuit Malfunction
B2142	Mirror Left Control Switch Circuit Malfunction
B2143	Mirror Right Control Switch Circuit Malfunction
B2144	Left Front Mirror Vertical Position Sensor Circuit Low
B2145	Left Front Mirror Vertical Position Sensor Circuit High
B2146	Left Front Mirror Horizontal Position Sensor Circuit Low
B2147	Left Front Mirror Horizontal Position Sensor Circuit High
B2148	Right Front Mirror Vertical Position Sensor Circuit Low
B2149	Right Front Mirror Vertical Position Sensor Circuit High
B2150	Right Front Mirror Horizontal Position Sensor Circuit Low
B2151	Right Front Mirror Horizontal Position Sensor Circuit High
B2175	Tilt/Telescope Module Manual Switch Fail
B2200	Left Front Window Switch Stuck in Up Position
B2201	Left Front Window Switch Stuck in Down Position
B2202	Right Front Window Switch Stuck in Up Position
B2203	Right Front Window Switch Stuck in Down Position
B2204	Left Rear Window Switch Stuck in Up Position
B2205	Left Rear Window Switch Stuck in Down Position
B2206	Right Rear Window Switch Stuck in Up Position
B2207	Right Rear Window Switch Stuck in Down Position
B2212	Right Front Switch on Left Front Door Stuck Up Position
B2213	Right Front Switch on Left Front Door Stuck Down Position
B2214	Left Rear Switch on Left Front Door Stuck Up Position
B2215	Left Rear Switch on Left Front Door Stuck Down Position
B2216	Right Rear Switch on Left Front Door Stuck Up Position
B2217	Right Rear Switch on Left Front Door Stuck Down Position
B2220	Left Front Door Lock/Unlock Switch Stuck in Lock
B2221	Left Front Door Lock/Unlock Switch Stuck UnLock

B2222	Right Front Door Lock/Unlock Switch Stuck in Lock
B2223	Right Front Door Lock/Unlock Switch Stuck UnLock
B2224	Left Rear Door Lock/Unlock Switch Stuck in Lock
B2226	Right Rear Door Lock/Unlock Switch Stuck in Lock
B2240	Memory 1 Switch Failed
B2241	Memory 2 Switch Failed
B2242	Memory Exit Switch Failed
B2243	Memory Set Switch Failed
B2310	Hand Set Failure
B2311	TRU Failure
B2312	Software Failure
B2355	Driver Front Vertical Sensor Malfunction
B2365	Driver Rear Vertical Sensor Malfunction
B2375	Driver Seat Asm Horiz Sensor Circuit Malfunction
B2419	Twilight Photocell Circuit Problem
B2420	Twilight Delay Pot Failure
B2422	Interior Lamp Rheostat Failure
B2425	Seat Heater Circuit
B2430	Seat Heater Circuit
B2435	Seat Back Heater Sensor
B2440	Seat Back Heater Sensor
B2455	Open or short in Cellular Phone Microphone Circuit
B2460	Navigation Antenna Selector Circuit High Current
B2461	Navigation ECU Synchronous Signal Error
B2462	GPS Signal Error
B2463	Navigation CD Player
B2464	Navigation CD Player
B2465	Navigation CD Player
B2466	Navigation VICS Memory Error
B2468	Navigation Display Head (NDH) Malfunction
B2470	Daytime Running Lamps Fault
B2470	Cellular Phone Antenna Circuit (2000+)
B2471	Interior Lamp Fault
B2472	Low Beam Fault
B2473	High Beam Fault
B2474	Navigation Display Head (NDH) Back Lighting Malfunction
B2475	Navigation Display Head (NDH) Auxiliary Input Malfunction
B2476	Cellular Phone Select Service Switch Malfunction (keypad signal circuit)
B2477	Reverse Lamp Relay Shorted to Ground
B2478	Reverse Lamp Shorted to Battery
B2482	Cellular Phone Select Service Switch Range/Performance
B2483	Global Positioning System (GPS) Antenna Circuit
B2484	Global Positioning System (GPS) Antenna Circuit
B2502	Auto Trans Shift Lock Control Shorted to Ground

B2503	Park Gear (Auto Trans Shift Lock Control) Relay Shorted to Batt
B2507	Voltage from climate control seat module (CCSM) is less than 2.0 volts or greater than 10 volts
B2510	Steering Wheel Controls HVAC Key Stuck
B2511	Steering Wheel Controls Conv Key Stuck
B2512	Steering Wheel Controls Illegal A/D Values
B2515	Steering Wheel Cont Illegal Resistance Value
B2527	Front Fog Lamp Circuit Low
B2530	Front Fog lamps Control Circuit
B2532	Front Fog Lamps Control Circuit Low (BCM)
B2533	Front Fog Lamps Control Circuit High (BCM)
B2540	Rear Fog lamps Control Circuit
B2550	Storage Mode Entered (Backup Lamps Control Circuit)
B2556	Interior Lamp Rheostat Circuit Range
B2560	RKE Message Validation Error
B2575	Headlamp Control Circuit
B2577	Headlamp Relay Output Circuit Low (BCM)
B2578	Headlamp Relay Output Circuit High (BCM)
B2580	Headlamp High Beam Control Circuit
B2585	Park lamp Control Circuit Malfunction
B2587	Park Lamp Relay Output Circuit Low (BCM)
B2588	Park Lamp Relay Output Circuit High (BCM)
B2600	Daytime Running Lamp Control Circuit (BCM)
B2602	Daytime Running Lamp Circuit Low (BCM)
B2603	Daytime Running Lamp Circuit High (BCM)
B2610	Passenger Compartment Dimming 1 Circuit
B2615	Passenger Compartment Dimming 2 Circuit
B2620	Display Dimming Input Circuit
B2622	Display Dimming Pulse Width Modulation (PWM) Input Circuit Low (BCM)
B2623	Display Dimming Pulse Width Modulation (PWM) Input Circuit High (BCM)
B2625	Display Dimming Pulse Width Modulation (PWM) Output Circuit
B2627	Display Dimming Pulse Width Modulation (PWM) Output Circuit Low (BCM)
B2628	Display Dimming Pulse Width Modulation (PWM) Output Circuit High (BCM)
B2641	Delayed Exterior Lighting Ctrl Circuit Range
B2645	Ambient Light Sensor Circuit
B2646	Ambient Light Sensor Circuit Range
B2647	Ambient Light Sensor Circuit Low (BCM)
B2662	Park Lamp Relay Output Circuit Low (BCM)
B2697	Headlamp Washer Request Circuit
B2700	Ignition Shift Interlock Circuit (base number)
B2701	Ignition Shift Interlock Circuit Range/Performance

B2702	Ignition Shift Interlock Circuit Low
B2703	Ignition Shift Interlock Circuit High
B2704	Ignition Shift Interlock Circuit Open
B2707	Gearshift Unlock Circuit Low (BCM)
B2708	Gearshift Unlock Circuit High (BCM)
B2710	PASSKey Open/Shorted Pellet
B2711	PASSKey Open/Shorted Pellet After Good Key
B2719	CTD-Trunk Tamper Switch Fault
B2725	ATC Mode Switch Circuit Malfunction
B2732	Trunk Release Switch Circuit Low
B2734	Coded Key Controller Memory Failure
B2743	Fog Lamp Switch Circuit High (BCM)
B2750	PASSKey Data Communication Failure
B2752	Horn Relay Coil Circuit Low (BCM)
B2753	Horn Relay Coil Circuit High (BCM)
B2757	Driver Memory 1 Select Switch Circuit Low
B2762	Driver Memory 2 Select Switch Circuit Low
B2767	Memory Set Switch Failed Low
B2772	Driver Memory Exit Switch Circuit Low
B2780	Wrong Resistor Before Good
B2781	Wrong Resistor After Good
B2782	PASSKey Pellet Resistance Not Programmed
B2783	Key Code/Password Corrupted in Memory
B2805	Steering Wheel Controls HVAC Switch Circuit Malfunction
B2810	Steering wheel controls Entertainment Circuit Malfunction
B2815	Steering Wheel Controls Illegal Resistance Value
B2853	Telescope Forward Switch Circuit Malfunction
B2858	Telescope Rearward Switch Circuit Malfunction
B2860	Telescope Position Sensor Range
B2862	Telescope Position Sensor Low
B2873	Tilt Up Switch Circuit Malfunction
B2878	Tilt Down Switch Circuit Malfunction
B2880	Tilt Position Sensor Range
B2882	Tilt Position Sensor Low
B2891	Tilt/Telescope Motor Over Current
B2904	Tilt/Telescope 4-way Position Switch Circuit Malfunction
B2947	Security System Sensor Power Circuit Low
B2948	Security System Sensor Power Circuit High
B2955	Security System Sensor Data Circuit Malfunction
B2957	Security System Sensor Data Circuit Low
B2958	Security System Sensor Data Circuit High
B2960	Security System Sensor Data Incorrect but Valid
B2961	Key In Ignition Circuit Malfunction
B2965	Key in Ignition Circuit Open (IPC)
B3028	Starter Relay Interface Short to Ground

B3029	Starter Relay Interface Open/Short to B+
B3031	Key Decoder Device in Assembly Learn Mode
B3033	Security System Indicates Tamper
B3055	Key Not Present
B3060	Security System Sensor Data Incorrect but Valid
B3064	Driver Door Key Cylinder Circuit
B3069	Right Front/Left Front Door Key Unlock Circuit Low
B3108	Transmitter Synchronization Failure
B3109	3 consecutive low battery signals from the same programmed transmitter
B3127	LF Door Only
B3128	LF Door Only
B3132	All Door Unlock Circuit Low (BCM)
B3133	All Door Unlock Circuit High (BCM)
B3137	All Door Lock Circuit Low (BCM)
B3138	All Door Lock Circuit High (BCM)
B3142	Left Front Unlock Switch Circuit Low
B3147	Passenger Unlock Switch Circuit Low
B3152	Left Front Lock Switch Circuit Low
B3157	Passenger Lock Switch Circuit Low
B3172	Window Up Switch Circuit Low
B3177	Window Down Switch Circuit Low
B3182	Window Switch Circuit
B3187	Window Switch Circuit
B3192	Window Switch Circuit
B3197	Window Switch Circuit
B3203	Rear Window Lockout Switch Input Circuit High
B3282	Window Switch-Express Input Shorted to Ground
B3287	Left Rear Window Switch Express Down Circuit Low
B3292	Right Rear Window Switch Express Down Circuit Low
B3282	Window Switch-Express Input Shorted to Ground
B3287	Window Switch Circuit
B3292	Window Switch Circuit
B3377	Left Front Window Up Switch Circuit Low
B3382	Left Front Window Down Switch Circuit Low
B3387	Right Front Window Up Switch Circuit Low
B3392	Right Front Window Down Switch Circuit Low
B3397	Left Rear Window Up Switch Circuit Low
B3410	AHLD Front Axle Sensor Signal Circuit
B3420	AHLD Rear Axle Sensor Signal Circuit
B3452	Left Rear Window Down Switch Circuit Low
B3457	Right Rear Window Up Switch Circuit Low
B3462	Right Rear Window Down Switch Circuit Low
B3467	Left Front Window Express Down Circuit Low
B3472	Right Front Window Express Down Circuit Low

B3477	Left Rear Window Express Down Circuit Low
B3482	Malfunction Window Express Down Circuit Low
B3517	Left Rear Door Switch Express Up/Down Window Contact Shorted to GND
B3522	Right Rear Door Switch Express Up/Down Window Contact Shorted to GND
B3527	Window Lockout Switch Circuit Low
B3531	Auxiliary HAVC Actuator Circuit
B3642	Seat cool temperature switch shorted
B3702	Intermittent Wiper Delay Input Circuit Low (BCM)
B3703	Intermittent Wiper Delay Input Circuit High/Open (BCM)
B3708	Front Washer Motor Input High (BCM)
B3713	Rear Washer Motor Input Circuit High (BCM)
B3717	Front Wiper Relay Drive Circuit Low (BCM)
B3718	Front Wiper Relay Drive Circuit High (BCM)
B3722	Rear Wiper Relay Drive Circuit Low (BCM)
B3723	Rear Wiper Relay Drive Circuit High (BCM)
B3761	HVAC Actuator Circuit
B3770	HVAC Actuator Circuit
B3793	Memory Seat Module Over Current
B3801	Passenger Compartment Lamp Request Circuit
B3802	Park lamps Request Circuit
B3808	Rear Door Lock Relay Circuit
B3809	Rear Door Unlock Relay Circuit
B3810	Washer Relay Circuit
B3811	Washer Relay Circuit
B3819	Left Rear Power Window Up Relay Circuit
B3820	Left Rear Power Window Down Relay Circuit
B3821	Window Lockout Circuit Low
B3822	Right Rear Power Window Up Relay Circuit
B3823	Right Rear Power Window Down Relay Circuit
B3824	Window Lockout Circuit Low
B3832	Window Position Sensor Circuit
B3833	Window Position Sensor Circuit
B3905	Lumbar Switch Control Circuit
B3935	Transponder Authentication Error
U0001	Controller Area Network (CAN) Bus Communication (ECM)
U1000	Class 2 Communication Malfunction
U1001~U1254	Loss of XXX Communications
U1002~U1015	Loss of serial communications for class 2 devices
U1016	Loss of Class 2 Communication with VCM
U1016	Loss of Communications with PCM
U1017~U1025	Loss of serial communications for class 2 devices

U1026	Loss of ATC Class 2 Communication
U1027~U1039	Loss of Serial Communications for Class 2 Devices
U1040	Loss of Class 2 Communications with ABS
U1041	Loss of EBCM Communication
U1042	Lost Communications with Brake/Traction Control System
U1043~U1055	Loss of Serial Communications for Class 2 Devices
U1056	Loss of Communications with RSS
U1057~U1060	Loss of Serial Communications for Class 2 Devices
U1161	Loss of PDM Serial Data
U1062	Loss of Serial Communications for Class 2 Devices
U1163	Loss of RRDM Serial Data
U1064	Loss of Communications with DIM
U1065	Loss of Communications with IPM
U1066	Loss of Communications with RIM
U1067~U1069	Loss of Serial Communications for Class 2 Devices
U1170	Loss of Driver Door Switch Asm Serial Data
U1071~U1087	Loss of Serial Communications for Class 2 Devices
U1088	Loss of Communications with SDM
U1089~U1095	Loss of Serial Communications for Class 2 Devices
U1096	Loss of Communications with IPC
U1097~U1127	Loss of serial communications for class 2 devices
U1128	Loss of Communications with IRC
U1129	Loss of Communications with AMP
U1130~U1143	Loss of serial communications for class 2 devices
U1144	Loss of Communications with PHN
U1145	Loss Of NAV Communications
U1146	Loss Of Onstar Communication
U1147~U1151	Loss of serial communications for class 2 devices
U1152	Loss Of ACM Serial Data Communication
U1152	Loss of Data HCM
U1153	Loss of Communications with CCP
U1154~U1159	Loss of serial communications for class 2 devices
U1160	Loss of Communications with DDM
U1161	Loss of PASS Door Module SBI
U1162	Loss of Rear Driver Door Module SBI
U1163	Loss of Rear PASS Door Module SBI
U1164	Loss Of DIM Serial Data Communication
U1165	Loss of serial communications for class 2 devices
U1166	Loss of Communications with SCM
U1167	Loss of serial communications for class 2 devices
U1168	Loss Of TTM Communications
U1169	Loss of Communications with MMM
U1170	Loss of Driver Door Switch SBI
U1171~U1175	Loss of serial communications for class 2 devices
U1176	Loss Of RFA Communications

U1177~U1191	Loss of serial communications for class 2 devices
U1192	Loss of VTD Class 2 Serial Data Com
U1193	Loss of VIM Class 2 Communication
U1194~U1254	Loss of serial communications for class 2 devices
U1255	Class 2 Communication Malfunction (Serial Data Line Malfunction)
U1300	Class 2 Short to Ground
U1301	Class 2 Short to Battery
U1304	Loss Of UART Communications
U1305	Class 2 Data Link Low or High
U1500	Inter-Device Dedicated Bus Malfunction
U1713	Loss of Front Door Module to Window Motor High Speed Comm.
U1715	Loss of Front Door Module to Window Motor High Speed Comm.
U1714	Loss of Front Door Module to Window Motor Normal Speed Comm.
U1716	Loss of Front Door Module to Window Motor Normal Speed Comm.
U1800	Controller Area Network (CAN) Bus Communication
U2000	Invalid BFC Transmitted SPI Data
U2001	Invalid IPC Transmitted SPI Data
U2002	SPI Data-In Low
U2003	SPI Data-In High
U2004	SPI Data-Out Low
U2005	SPI Data-Out High
U2006	SPI Clock-Out Low
U2007	SPI Clock-Out High
U2050	SIR PPS/CPS Communications Link malfunction
U2100	Controller Area Network (CAN) Bus OFF
U2100	CAN-BUS Communication Malfunction
U2102	More Controllers on Bus than Programmed
U2103	Fewer Controllers On Bus Than Programmed
U2104	CAN Bus Reset Counter Overrun
U2105	CAN Bus Error ECM
U2105	Lost Comm with Engine Control System
U2106	Lost Comm with Trans Control System
U2107	Lost Communications with Body Control System
U2108	CAN Bus Error ABS
U2108	Lost Comm with ABS Control System
U2150	Navigation ECU Gateway Communication Error
U2151	Navigation ECU Communication Malfunction
U2153	VICS ECU Communication Error

12 **Terminology**

This section will go over some of the basic terms used in the tuning world. Some of these will be brief and some more in depth. If you are unsure of something when dealing with tuning a PCM always ask questions no matter what. A lot of these you will never need to know but when dealing with tuning and talking to others, and getting ideas and tips from others, some may use some terms you may or may not know. This list contains a very wide range, and some outside of the GM world.

A/C	Air conditioning
A/F	Air Fuel
A/T	automatic transmission
AAV	anti-afterburn valve (Mazda)
ABS	antilock brake system
ABSV	air bypass solenoid valve (Mazda)
AC	alternating current
ACTS	air charge temperature sensor (Ford)
AE	Acceleration Enrichment
AERA	Automotive Engine Rebuilders Assn.
AFM	air flow meter
AFS	air flow sensor (Mitsubishi)
AIR	Air Injection Reaction (GM)
AIS	Air Injection System (Chrysler)
AIS	automatic idle speed motor (Chrysler)
ALCL	assembly line communications link (GM)
ALDL	assembly line data link (GM)
ALT	Alternator
AP	Air Pump
API	American Petroleum Institute
APS	absolute pressure sensor (GM)
APS	atmospheric pressure sensor (Mazda)
ASD	automatic shutdown relay (Chrysler)

ASDM	airbag system diagnostic module (Chrysler)
ASE	Automotive Service Excellence
ATC	after top center
ATDC	after top dead center
ATF	automatic transmission fluid
ATMC	Automotive Training Managers Council
ATS	air temperature sensor (Chrysler)
AWD	all-wheel drive
B+	battery positive voltage
BARO	barometric pressure
BAT	battery
BCM	body control module (GM)
BHP	brake horsepower
BID	Breaker less Inductive Discharge (AMC)
BIT	Uses 1Æs and 0Æs for set and not set and sometimes a 3 to disable
BMAP	barometric/manifold absolute pressure sensor (Ford)
BP	backpressure sensor (Ford)
BPS	barometric pressure sensor (Ford & Nissan)
BPT	back-pressure transducer
BTC	before top center
BTDC	before top dead center
BTU	British thermal units
C	Celsius
C3	Computer Command Control system (GM)
C3I	Computer Controlled Coil Ignition (GM)
C4	Computer Controlled Catalytic Converter system (GM)
CAAT	Council of Advanced Automotive Trainers
CAC	charge air cooler
CAFE	corporate average fuel economy
CALPAK	calibration pack
CANP	canister purge solenoid valve (Ford)
CARB	California Air Resources Board
CAS	Clean Air System (Chrysler)
CAS	crank angle sensor
CC	catalytic converter
CC	cubic centimeters
CCC	Computer Command Control system (GM)
CCD	computer controlled dwell (Ford)
CCEI	Coolant Controlled Idle Enrichment (Chrysler)
CCEV	Coolant Controlled Engine Vacuum Switch (Chrysler)
CCOT	clutch cycling orifice tube
CCP	controlled canister purge (GM)
CCV	canister control valve
CDI	Capacitor Discharge Ignition (AMC)

CEAB	cold engine air bleed
CEC	Crankcase Emission Control System (Honda)
CECU	central electronic control unit (Nissan)
CER	cold enrichment rod (Ford)
CESS	cold engine sensor switch
CFC	Chlorofluorocarbons
CFI	continuous fuel injection
CFI	Cross Fire Injection (Chevrolet)
CFM	cubic feet per minute
CID	cylinder identification sensor (Ford)
CID	cubic inch displacement
CIS	Continuous Injection System (Bosch)
CKP	Crankshaft Position Sensor
CKP REF	crankshaft reference
CL	closed loop
CMP	camshaft position sensor
CMP REF	camshaft reference
CO	carbon monoxide
CO2	carbon dioxide
COP	Coil On Plug ignition
CP	canister purge (GM)
CP	crankshaft position sensor (Ford)
CPI	Central Port Injection (GM)
CPP	clutch pedal position
CPS	Cycles Per Second (Cycles per second are taken of the crankshaft position sensor)
CPU	central processing unit
CSC	Coolant Spark Control (Ford)
CSSA	Cold Start Spark Advance (Ford)
CSSH	Cold Start Spark Hold (Ford)
CTAV	Cold Temperature Actuated Vacuum (Ford)
CTO	Coolant Temperature Override Switch (AMC)
CTOX	continuous trap oxidizer
CTP	closed throttle position
CTS	charge temperature switch (Chrysler)
CTS	coolant temperature sensor (GM)
CTVS	choke thermal vacuum switch
CVCC	Compound Vortex Controlled Combustion system (Honda)
CVR	control vacuum regulator (Ford)
dB	decibels
DC	direct current
DEFI	Digital Electronic Fuel Injection (Cadillac)
DEG	Degrees Celsius or Fahrenheit
DEPS	digital engine position sensor
DERM	diagnostic energy reserve module (GM)

DFCO	decel fuel cut-off mode
DFI	direct fuel injection
DFS	deceleration fuel shutoff (Ford)
DIS	Distributorless Ignition System (Ford)
DIS	Direct Ignition System (GM)
DLC	data link connector
DLC	data link connector (GM)
DOHC	dual overhead cams
DOT	Department of Transportation
DRBII	Diagnostic Readout Box (Chrysler)
DRCV	distributor retard control valve
DSSA	Dual Signal Spark Advance (Ford)
DTC	Diagnostic Trouble Codes
DTM	diagnostic test mode
DVDSV	differential vacuum delay and separator valve
DVDV	distributor vacuum delay valve
DVOM	digital volt ohm meter
EACV	electronic air control valve (Honda)
EBCM	electronic brake control module
EBCM	electronic brake control module (GM)
EBM	electronic body module (GM)
EBTCM	electronic brake traction control module
EC	engine control
ECA	electronic control assembly
ECCS	Electronic Concentrated Control System (Nissan)
ECL	engine coolant level
ECM	engine control module
ECM	electronic control module (GM)
ECS	Evaporation Control System (Chrysler)
ECT	Engine Cooling Temperature
ECT	engine coolant temperature (Ford & GM)
ECU	electronic control unit (Ford
EDIS	Electronic Distributorless Ignition System (Ford)
EEC	Evaporative Emission Controls (Ford)
EEC	Electronic Engine Control (Ford)
EECS	Evaporative Emissions Control system (GM)
EEPROM	electrically erasable programmable read only memory
EFC	electronic fuel control
EFC	electronic feedback carburetor (Chrysler)
EFCA	electronic fuel control assembly (Ford)
EFE	early fuel evaporation
EFE	Early Fuel Evaporation system (GM)
EFI	electronic fuel injection
EGO	exhaust gas oxygen sensor (Ford)
EGR	Exhaust Gas Recirculation

EGRPS	EGR valve position sensor (Mazda)
EGR-SV	EGR solenoid valve (Mazda)
EGRT	EGR temperature
EGRTV	EGR thermo valve (Chrysler)
EGT	Exhaust Gas Temperature
EI	electronic ignition
EI	electronic ignition (GM)
ELB	Electronic Lean Burn (Chrysler)
EM	engine modification
EMI	electromagnetic interference
EOS	exhaust oxygen sensor
EPA	Environmental Protection Agency
EPOS	EGR valve position sensor (Ford)
EPROM	erasable programmable read only memory
ESA	Electronic Spark Advance (Chrysler)
ESC	Electronic Spark Control (GM)
ESS	Electronic Spark Selection (Cadillac)
EST	Electronic Spark Timing (GM)
EVAP	evaporative emission system
EVP	EGR valve position sensor (Ford)
EVRV	electronic vacuum regulator valve for EGR (GM)
F	Fahrenheit
FBC	feedback carburetor system (Ford & Mitsubishi)
FBCA	feedback carburetor actuator (Ford)
FC	fan control
FCA	fuel control assembly (Chrysler)
FCS	fuel control solenoid (Ford)
FDC	fuel deceleration valve (Ford)
FEEPROM	flash electrically erasable programmable read only memory
FF	flexible fuel
FI	fuel injection
FLS	fluid level sensor (GM)
FMVSS	Federal Motor Vehicle Safety Standards
FP	fuel pump
FPROM	flash erasable programmable read only memory
FT	Foot
ft.lb.	foot pound
FTP	federal test procedure
FWD	front-wheel drive
gal	gallon
GCM	governor control module
GEN	generator
GND	ground
GPM	grams per mile
H20	water

HAIS	Heated Air Intake System (Chrysler)
HC	Hydro carbon
HEGO	heated exhaust gas oxygen sensor
HEI	High Energy Ignition (GM)
Hg	mercury
HO2S	heated oxygen sensor
HO2S1	upstream heated oxygen sensor
HO2S2	up or downstream heated oxygen sensor
HO2S3	downstream heated oxygen sensor
hp	horsepower
HVAC	heating ventilation and air conditioning system
HVS	high voltage switch
HZ	Hertz (Frequency)
I/M	inspection/maintenance
I/P	instrument panel
IA	intake air
IAC	Idle Air Control
IAC	idle air control (GM)
IAT	Idle Air Temperature
IATS	intake air temperature sensor (Mazda)
IC	ignition control circuit
IC	integrated circuit
ICM	ignition control module
ICS	idle control solenoid (GM)
ID	inside diameter
IFI	indirect fuel injection
IFR	Injector Flow Rate
IFS	inertia fuel shutoff
IGN	ignition
IPC	instrument panel cluster
ISC	idle speed control
ISO	International Standards Organization
ITCS	Ignition Timing Control System (Honda)
ITS	idle tracking switch (Ford)
JAS	Jet Air System (Mitsubishi)
kHz	kilohertz
Km	kilometers
KOEC	key on engine cranking
KOEO	key on engine off
KOER	key on engine running
KPA	kilopascal
KR	Knock Retard
KS	knock sensor
KSM	knock sensor module
KV	kilovolts

L	liters
lb. ft.	pound feet
LBS	Pounds
LCD	liquid crystal display
LED	light emitting diode
LT	long term fuel trim
LTFT	Long Term Fuel Trim
MACS	Mobile Air Conditioning Society
MAF	Mass Air Flow
MAMA	Midwest Automotive Media Assn.
MAP	Manifold Absolute Pressure
MAP	Motorist Assurance Program
MAT	manifold air temperature
MC	mixture control
MCS	mixture control solenoid (GM)
MCT	manifold charge temperature (Ford)
MCU	Microprocessor Controlled Unit (Ford)
MDP	manifold differential pressure
MFI	multiport fuel injection
Mg	Milligram
MIL	malfunction indicator lamp
MISAR	Micro processed Sensing and Automatic Regulation (GM)
mm	millimeters
MPFI	multi point fuel injection
MPG	miles per gallon
MPH	Miles Per Hour
MPI	multi port injection
Ms	Milliseconds
MSDS	material safety data sheet
MST	manifold surface temperature
mV	millivolts
MVZ	manifold vacuum zone
NACAT	National Assn. of College Automotive Teachers
NATEF	National Automotive Technician's Education Foundation
NHTSA	National Highway Traffic Safety Administration
Nm	Newton meters
NOX	oxides of nitrogen
NVRAM	nonvolatile random access memory
O2S	oxygen sensor
OBD	onboard diagnostics
OBD	onboard diagnostics
OBD I	onboard diagnostics generation one
OBD II	onboard diagnostics second generation
OC	oxidation catalyst
OC	oxidation converter (GM)

OD	outside diameter
ODM	output device monitor
OE	original equipment
OEM	original equipment manufacture
OHC	overhead cam
OL	open loop
ORC	oxidation reduction catalyst (GM)
OS	oxygen sensor
OSAC	orifice Spark Advance Control (Chrysler)
OSC	oxygen sensor storage
P/B	power brakes
P/N	part number
PA	pressure air (Honda)
PAFS	Pulse Air Feeder System (Chrysler)
PAIR	Pulsed Secondary Air Injection system (GM)
PCM	Powertrain control module (supersedes ECM)
PCV	positive crankcase ventilation
PE	Power Enrichment
PECV	power enrichment control valve
PERA	Production Engine Rebuilders Assn.
PFI	port fuel injection (GM)
PGM-FI	Programmed Gas Management Fuel Injection (Honda)
PIP	profile ignition pickup (Ford)
PNP	park/neutral switch
PPM	parts per million
PROM	program read only memory
PS	power steering
PSA	pressure switch assembly
PSI	pounds Per Square Inch
PSP	power steering pressure
pt.	pint
PTOX	periodic trap oxidizer
PVA	ported vacuum advance
PVS	ported vacuum switch
PVS	ported vacuum switch
QS9000	Quality assurance standard for OEM part suppliers
Qt.	quart
RABS	Rear wheel Antilock Brake System (Ford)
RAM	random access memory
RFI	radio frequency interference
RM	relay module
ROM	read only memory
RPM	Revolutions Per Minute
RPO	regular production option
RWAL	Rear Wheel Antilock brake system (GM)

RWD	rear-wheel drive
SAE	Society of Automotive Engineers
SAP	accelerator pedal
SAVM	spark advance vacuum modulator
SC	supercharger
SCB	supercharger bypass
SCC	Spark Control Computer (Chrysler)
SDI	Saab Direct Ignition
SDM	sensing diagnostic mode
SEC	Seconds
SES	service engine soon indicator (GM)
SFI	sequential fuel injection
SFI	Sequential Fuel Injection (GM)
SIR	Supplemental Inflatable Restraint (air bag)
SMPI	Sequential Multiport Fuel Injection (Chrysler)
SOHC	single overhead cam
SPOUT	Spark Output signal (Ford)
SRDV	spark retard delay valve
SRI	service reminder indicator
SRS	Supplemental Restraint System (air bag)
SRT	system readiness test
SS	speed sensor (Honda)
SSI	Solid State Ignition (Ford)
ST	short term fuel trim
STFT	Short Term Fuel Trim
TA	temperature air (Honda)
TABPV	throttle air bypass valve (Ford)
TAC	thermostatic air cleaner (GM)
TACH	tachometer
TAV	temperature actuated vacuum
TB	throttle body
TBI	throttle body injection
TC	turbocharger
TCC	Torque Converter Clutch
TCCS	Toyota Computer Controlled System
TCM	transmission or transaxle control module
TCS	Torque Control System
TCS	Transmission Controlled Spark (GM)
TDC	top dead center
TFP	throttle fluid pressure
TIC	thermal ignition control (Chrysler)
TIV	Thermactor idle vacuum valve (Ford)
TKS	throttle kicker solenoid (Ford)
TP	throttle position sensor (Ford)
TPI	Tuned Port Injection (Chevrolet)

TPP	throttle position potentiometer
TPS	Throttle Position Sensor
TPT	throttle position transducer (Chrysler)
TRS	Transmission Regulated Spark (Ford)
TSP	throttle solenoid positioner (Ford)
TV	throttle valve
TVS	thermal vacuum switch
TVV	thermal vacuum valve
TWC	three way catalyst
TWC+OC	three way + oxidation catalytic converter
V	Volts
VAC	volts alternating current
VAF	volume airflow
VAF	vane airflow sensor
VCC	viscous converter clutch (GM)
VCM	vehicle control module
VDC	volts direct current
VDV	vacuum delay valve
VIN	vehicle identification number
VR	voltage regulator
VS	vehicle sensor
VSS	vehicle speed sensor
WOT	Wide Open Throttle
WSS	wheel speed sensor
WU-TWC	warm up three way catalytic converter

13 DHP Logcolor
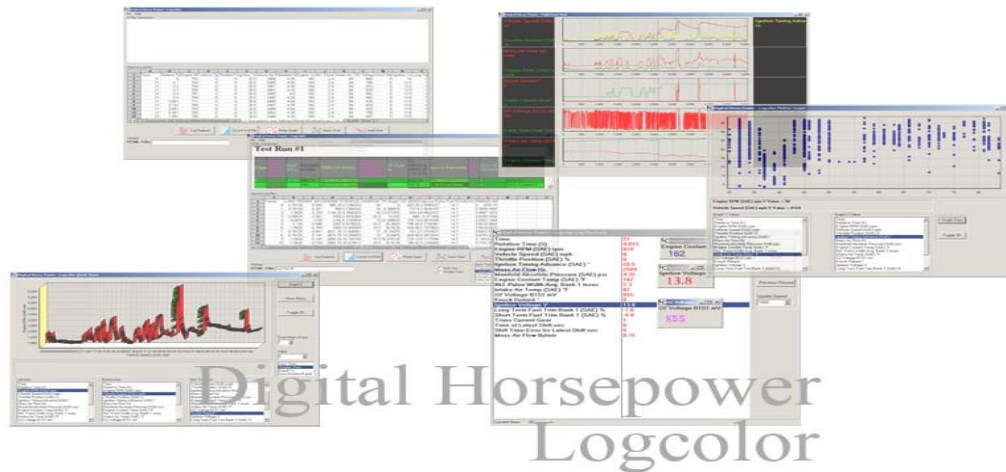
DHP Logcolor is a freeware program that is a free download and also packaged with Powrtuner.

Logcolor is a simple interface that you can load CSV for graphing out, viewing, log play back, HTML conversion, ect.

To load your log file, click on Scantool then Logs, then Playback. You will then get a new window showing all log files that you have currently saved (Figure 13-1). Choose one and click the View Log button.
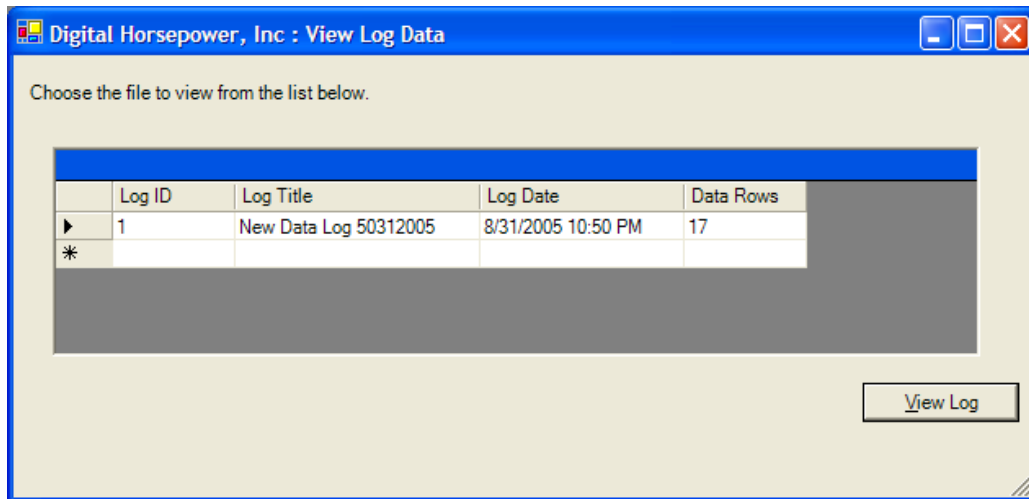
Figure 13-1. View Log Data

Once you have your log file loaded, it will execute Logcolor and load up your choosen logfile. (Figure 13-2)
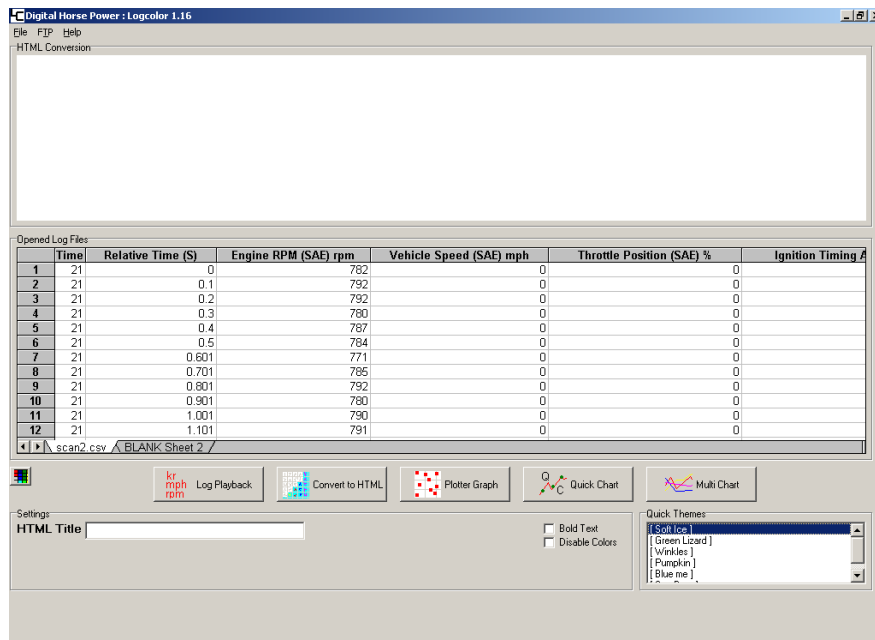
Figure 13-2. Log File Loaded

From here you can scroll around the file, looking at the data that was recorded. You also have a few options to look at this data differently. There are FIVE buttons under the data grid of data. Clicking on these will bring up a new window.

13.1 Log Playback

This feature will bring up a new window (Figure 13-3) that shows all your logged items on the left, and their corresponding data on the right. If you right click on any of the Items on the left list box, you will get an option to add a Visual Gauge (Figure 13-4). If you have a visual gauge, then you can right click on that and toggle a needle gauge (Figure 13-5). If you are to click on any of the gauges a window will come up allowing you to make changes to the font. You can change font style, color, size, ect. (Figure 13-6) Once you make the changes the gauge window will update. (13-7)
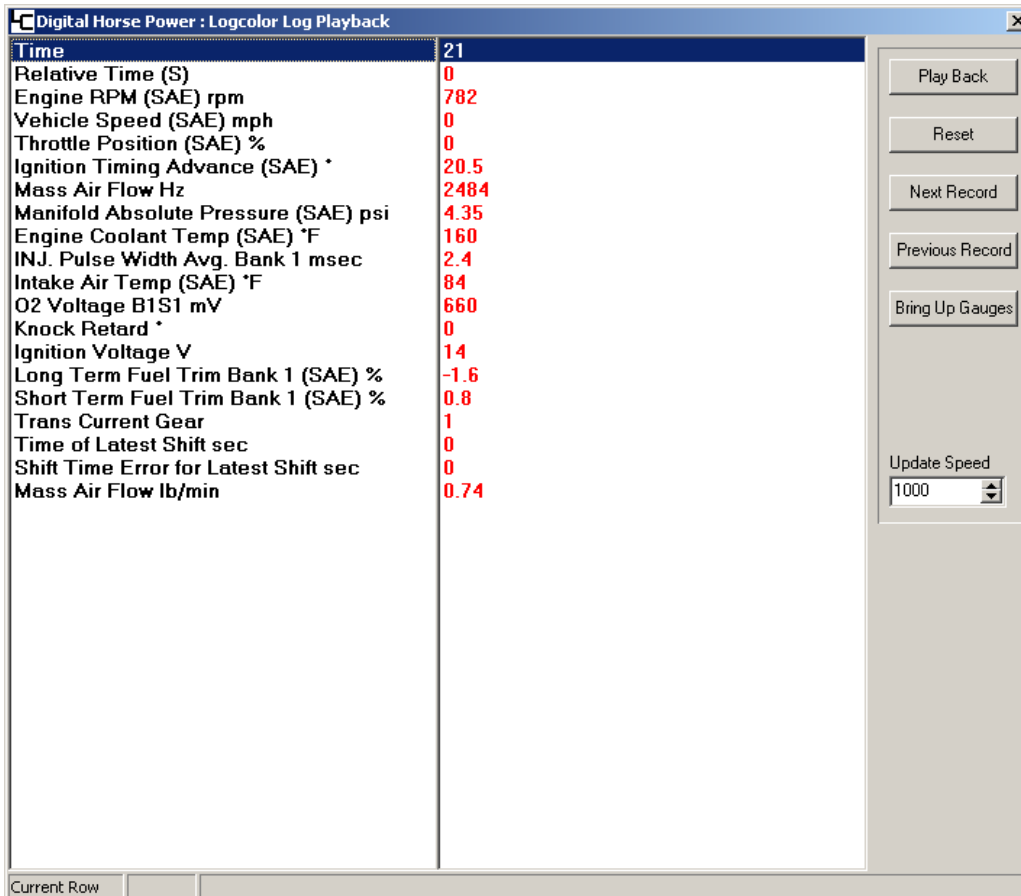
Figure 13-3. Log Playback Screen

From here you can watch the values change as it goes down the list. There are also 6 options on this Screen.

- **Play Back / Pause**
  This will start the playing or pausing of the playback

- **Reset**
  This will reset back the very start of the log.

- **Next Record**

  If you have the playback paused, you can advance to the next record.

- **Previous Record**

  If you have the playback paused, you can advance to the previous record.

- **Bring up Gauges**

  If you have the visual Gauges up, and they are behind any windows, this will bring them all back to the foreground.

- **Update Speed**

  This will slow or speed up the playback of the log

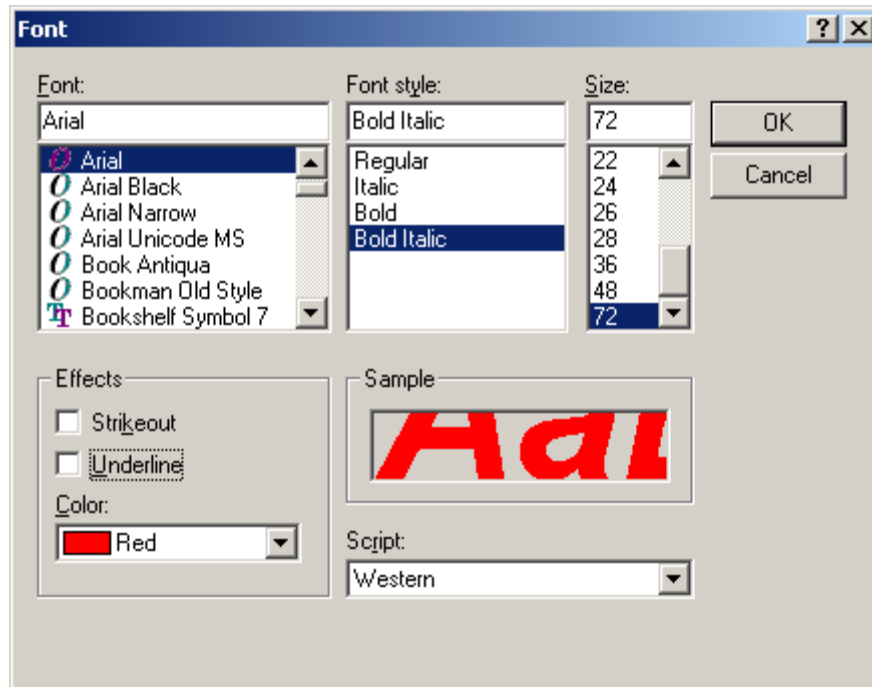**Figure 13-4. Visual Gauge**
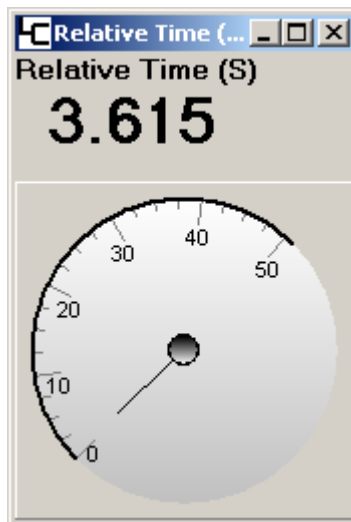
Figure 13-5. Visual Gauge with Needle Gauge

Figure 13-6. Font Editor

Figure 13-7. Gauge font changed.

13.2 Convert to HTML

Converting to HTML will convert the whole file to HTML table file. In the bottom right corner is a list of available color schemes. Once you click the conversion button, it will then prompt you to save the file (Figure 13-8) and after you give a file name to save as, it will convert the file and display it in the top half of the screen (Figure 13-9).

The color codes for all the values will change. It compares to the previous value and will change depending if it's same, less or greater then.
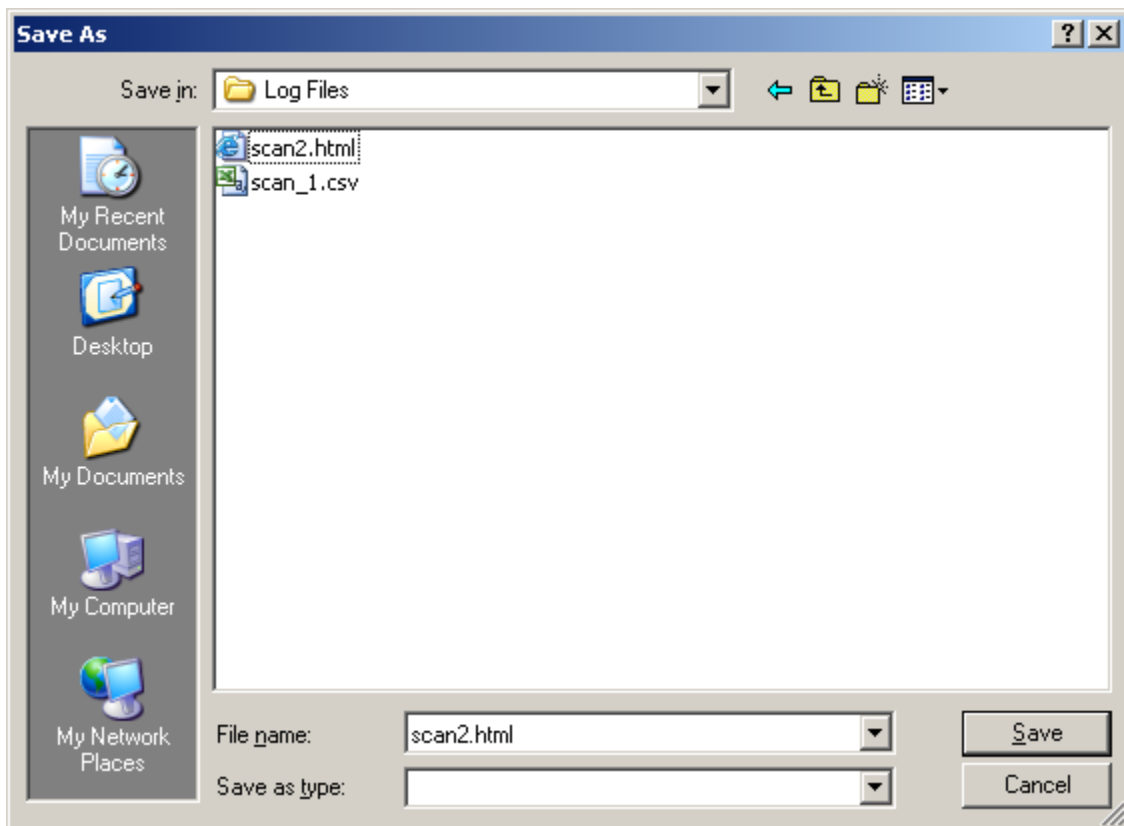
Figure 13-8. File loading screen
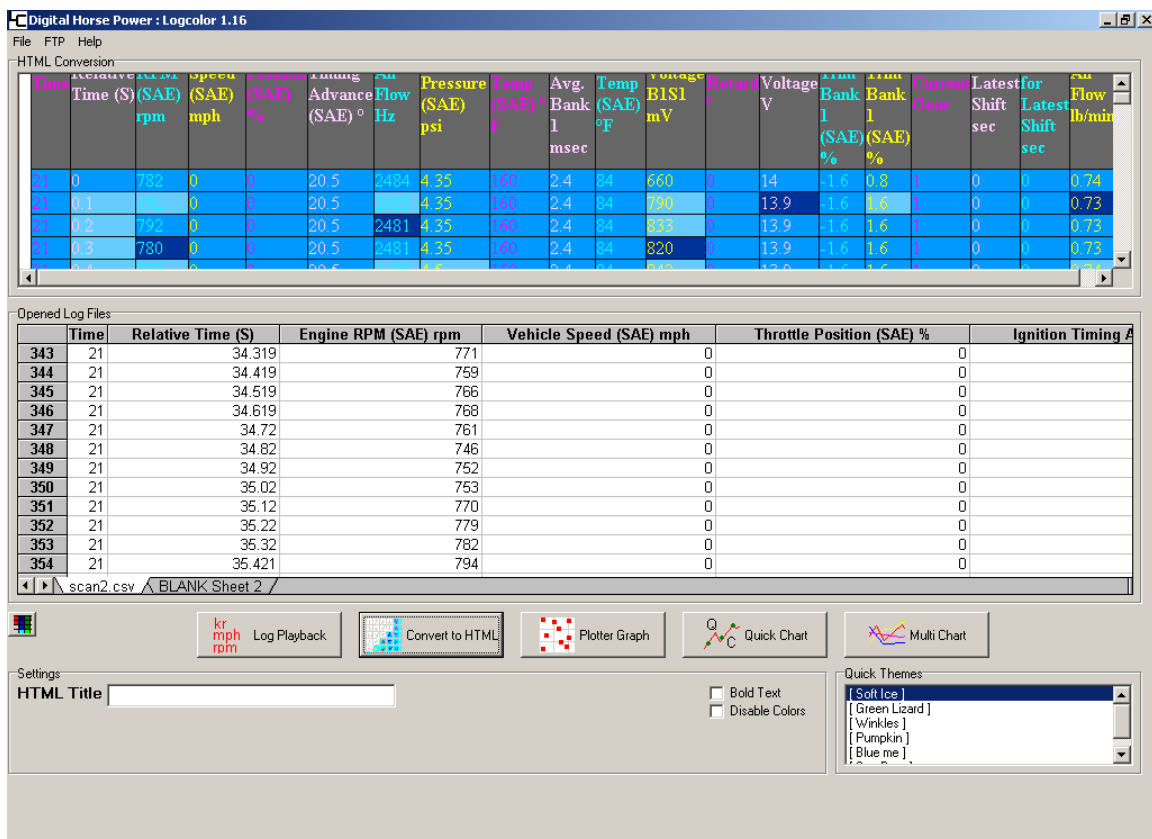
Figure 13-9. HTML Conversion screen

The button located to the very Left Below the data grid, a multi color button, is a quick button to load the current converted HTML file into a new window using your default browser.

13.3 Plotter Graph

The Plotter Graph is a simple chart tool that will allow you to graph out plotted points on an X / Y Graph (Figure 13-10).
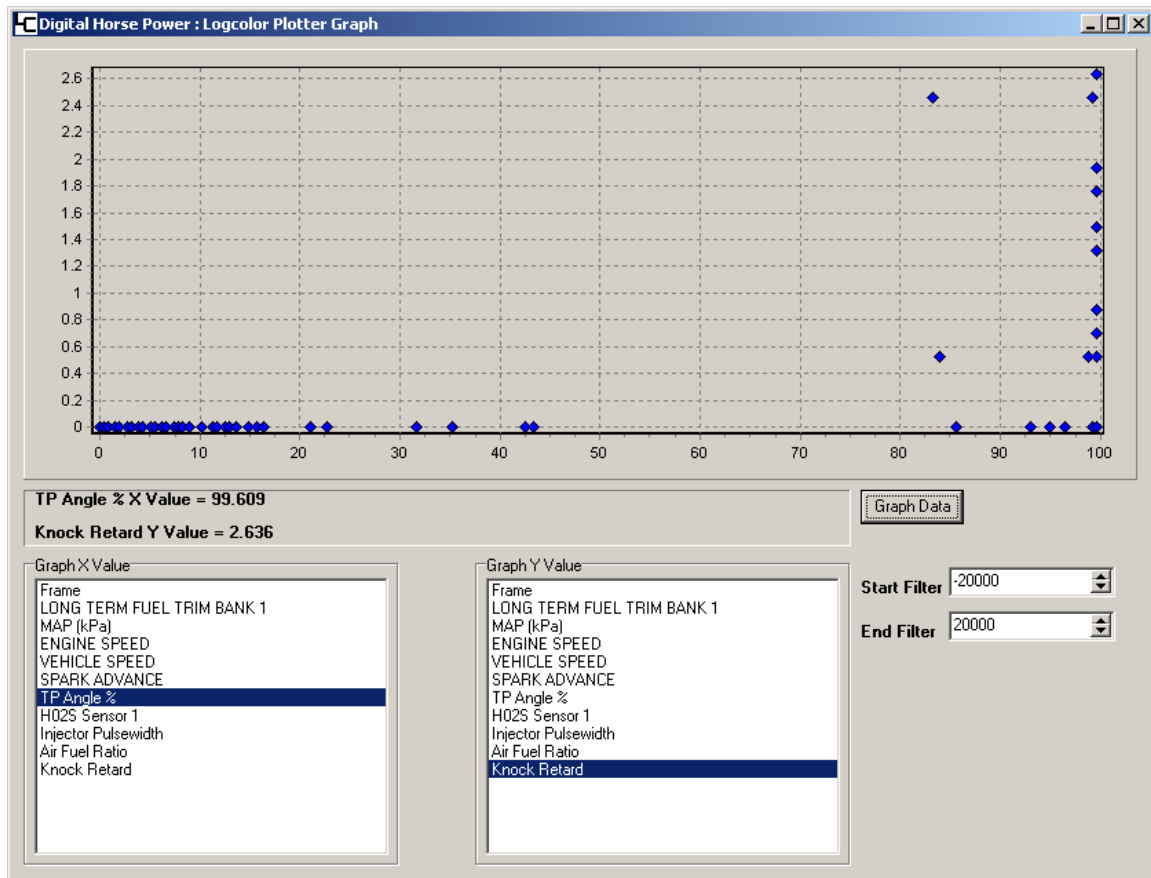

Figure 13-10. Plotter Graph

On this graph, you will have an X value and Y value to select. Here we used a Throttle Position (X) vs. Knock Retard (Y) . After you select your desired values, click the GRAPH Data button.

As you can see the points that are higher in the graph represent where there was KR at. It shows that there was 2.63* of KR at 99% Throttle, by going over the point with your mouse. Hovering over any plotted point will show plots value names and value. If you change your selection for either the X or Y values, just click the GRAPH DATA button again.

Also there is a simple filter option also. On the right hand there will be a Start and End filter boxes. This is where you can filter out values based on the X value. If you want to filter from 0 – 15 and values that are before 0 and after 15 they will not be plotted at all.

13.4 Quick Chart

The Quick Chart menu will allow you to create a line graph of data and also plot points of data. Here you will be able to do another X / Y Graph and you can select how you want the plots to be done. (Figure 13-11)
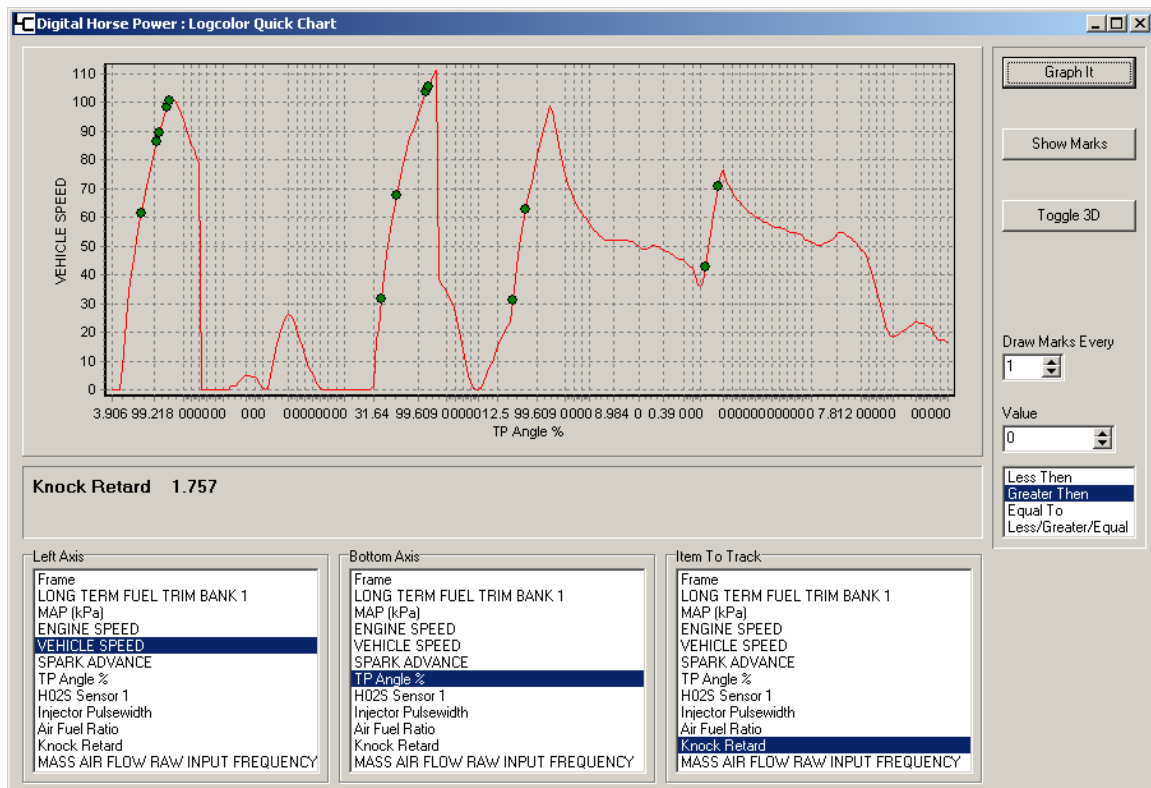

Figure 13-11. Quick Chart Graph * needs updated *

In this example we chart the data out by the Vehicle Speed (MPH) , Throttle Position and plot points of Knock Retard (KR). From here we leave the VALUE setting set to 0 since the values are always 0 or greater for the selected item to plot. We also select the "Greater Then" from the list box on the far right. This will then make it so only values GREATER then 0 will be plotted, other wise, every single value would be plotted on the line graph.   By hovering over each plotted point will then show the values in the box in the middle of the form.

You can also Click the Show Marks button on the top right, giving you a flag over each point with its value. (Figure 13-12)
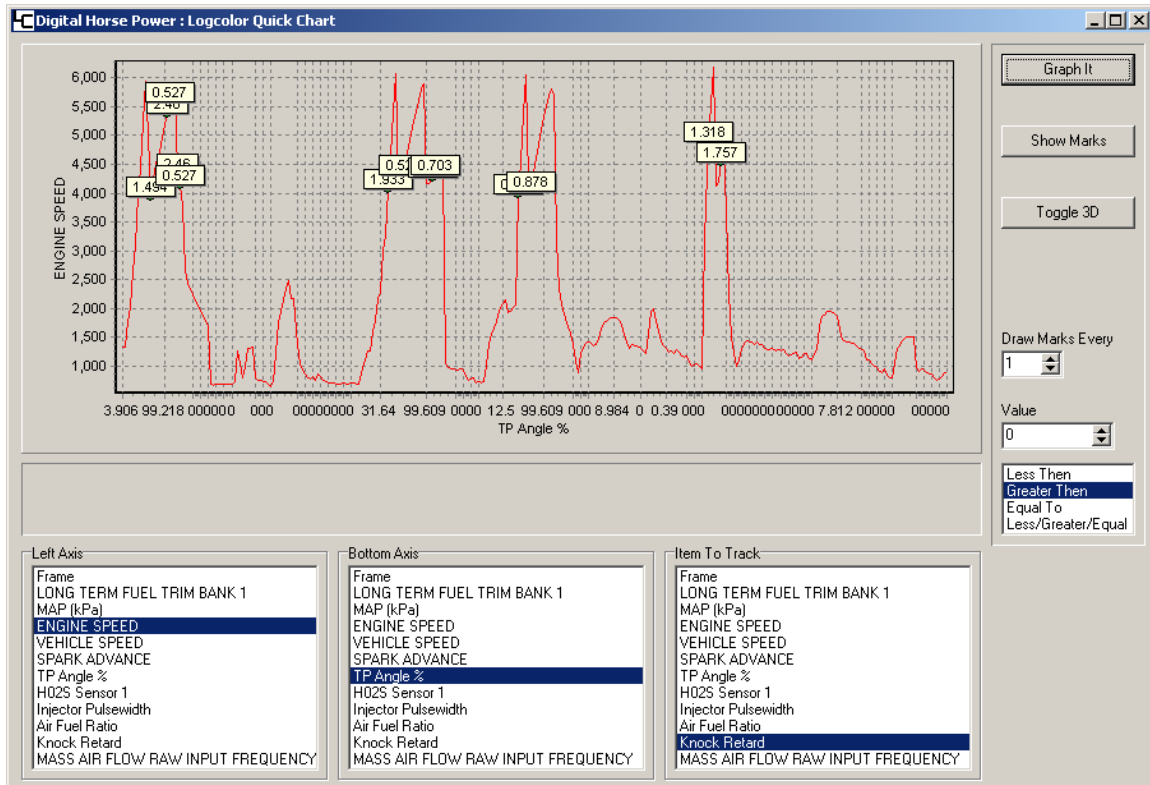
Figure 13-12. Flagged Points.

If you have a lot plotted points and flag them, it may get to cluttered, and you can change this by change the value in the "Draw Marks Every" selection box. Default is set to 1, which will tag every point. If you were to change to 2 this will do every other, change to 3 and every 3rd and so on.

13.5 Multi Chart

The Multi Chart maybe the most helpful tool. This feature will allow you to graph up to 20 items at a time. My moving your mouse cursor to any points, it will then update all values that are located in the black boxes with the corresponding data for that currently selected section. The blue line represents where you're currently at (Figure 13-13).

Here you can see how all the data looks like in a line graph environment. This will help give you a visual representation of your values.
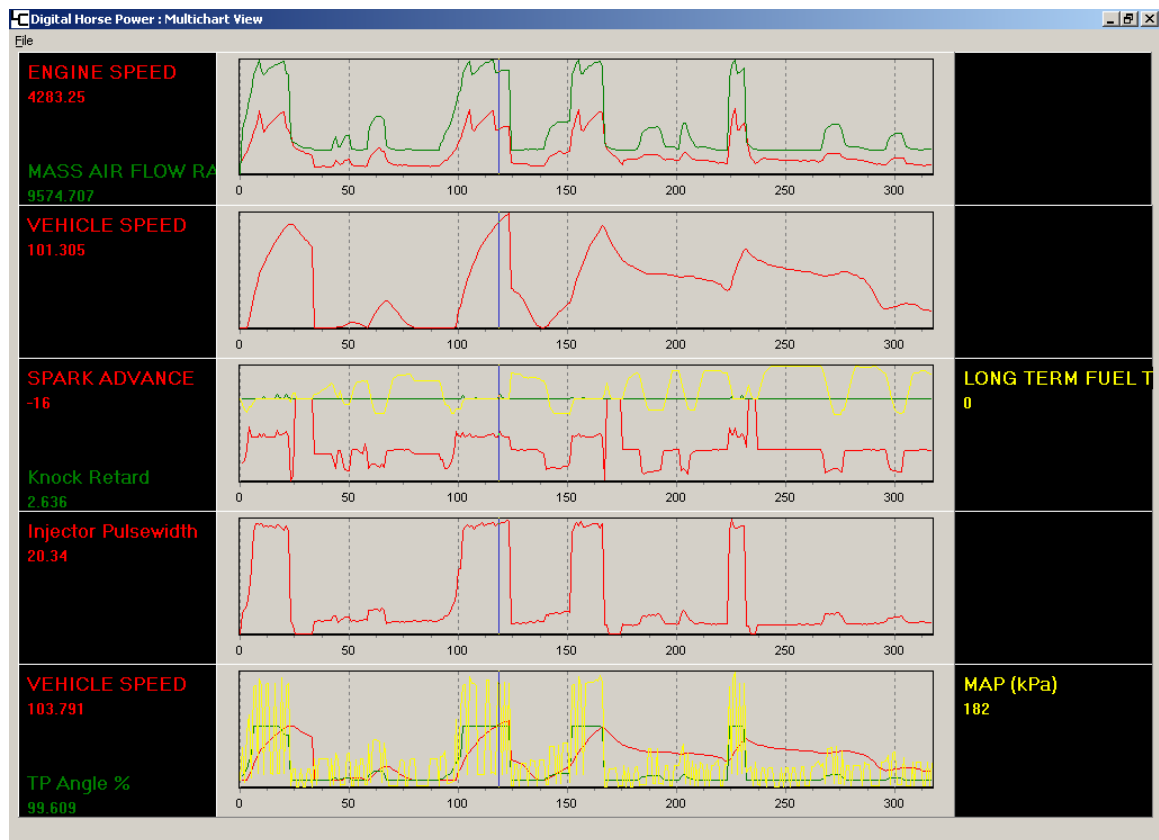

Figure 13-13. Multi Graph View

13.6 Where to get updates and news.

For any updates, downloads, or news on Logcolor please visit
http://www.digitalhorsepowerinc.com/logcolor