User Manual

Table of Contents

1 Introduction

1.1 Introduction to the K-Series Programmable ECU

Congratulations on purchasing your Hondata K-Series Programmable ECU. With proper care and feeding it will provide hours of entertainment for the whole family. Note: Only feed the ECU as much as it can eat in a 3 minute period.

The Hondata K-Series Programmable ECU consists of three components:

- ECU - the Honda ECU.
- KPro - a electronic board which fits inside the Honda ECU which allows the ECU to be re-programmed plus adds datalogging functions.
- KManager - Windows software which interfaces with KPro.

Hondata, Inc.
386 Beech Ave
Unit B-2
Torrance, CA 90501
Tel: 310-782-8278
World Wide Web Site: http://www.hondata.com

1.2 Features

Hondata K-Series Programmable ECU features:

- Plug in replacement of factory ECU.
- High speed USB interface.
- Editable fuel, ignition and cam angle tables.
- Fuel trim, including individual cylinders.
- Expanded fuel, ignition and cam angle tables for forced induction.
- Alternate MAP sensor support.
- Rev limiter control.
- Engine protection from over boost and over temperature.
- Adjustment for different sized injectors, with overall fuel trim and individual cylinder fuel trim.
- VTEC set as a VTEC window.
- Nitrous control.
- Closed loop control.
- Idle speed adjustment.

Note: Not all features are available for all models.

1.3 What's new in this version

Change History

V1.1.3
- Fixed non-stock MAP sensor information not saving in calibration.
- Added TSX, Si JRSC and Si Greddy calibrations.

V1.1.2
- Fixed division by zero error when switching off the engine and datalogging.
- Removed target A/F atmospheric pressure compensation at full engine load.

V1.1.1
- Initialized high boost portion of calibrations.
- Fixed 16-28 lb boost portion of base and Civic calibrations not being displayed.

V1.1
- Added support for non-stock MAP sensors.
- Improved the upload algorithm which detects which parts of the ECU memory needs to be re-written during an upload.
- Fixed knock threshold not datalogging for PND ECUs

V1.0.18
- Fixed help->contents crashing application
- Change boost cut so that it is removed when engine speed drops below 2000 rpm or the throttle is released (previously rpm and MAP was used)
- Removed used options (some units, display size).
- Added engine overheating protection.
- Added the option to disable iVTEC
- Prevent the use of % symbols in the notes field.
- Validate air temperature compensation when loading calibration.
- Added two cybernation calibrations.

V1.0.17
- Make sure update file is created in the correct directory
- Force the use of a comma as the list separator and dot as the decimal point to prevent European language users from generating an error when loading calibrations.
- Fixed problem in display window where injector duration would not display
- Fixed missing help file problem
- Fixed idle speed glitch.

V1.0.16
- Update ECU type every upload

V1.0.15
- Remove fuel correction when switching to open loop under high load
- Added boost cut
- Added European Civic Type R support
- Added stock K24 Accord calibration (using PNF Civic Si ECU)

V1.0.14
- Improved datalogging speed
- Added an error message for errors while uploading

V1.0.13
- Added the option to disable the secondary intake runner control on base RSX (PND) ECUs
- Added support for the US Civic Si
- Fixed problem with highlight area on 2D ignition tables while datalogging
- Added the command the export datalog files.
- Fixed problem where current field in parameters window was not saved before upload.

V1.0.12
- Added support for the US base RSX
- Add Close command to the Datalog menu
- Fixed use of numeric keypad, negative and period keys in tables.
- Changed hot keys for datalog and record to F10 & F9 respectively.

V1.0.11
- Altered intake air temperature compensation
- Added nitrous status to datalog sensors

V1.0.10
- Fixed injector duration showing over 100% duty cycle
- Added new pressure unit to display inches vacuum and psi boost
- Added launch rev limiter

V1.0.9
- Added download calibration command.
- Changed nitrous control so that fuel may be removed and ignition advanced (for alcohol injection).
- Stop datalogging / recording when ignition switched off.
- Fixed index out of range error.
- Added calibration description.

V1.0.8
- Added more help.
- Added the option to disable the fuel over-run cutoff delay.

V1.0.7
- Fixed idle speed not saving in calibration
- Fixed disable P0134 not saving in calibration
- Added calibrations

V1.0.6
- Fixed datalog resolution problem

V1.0.5
- Added the option to disable error P0134
- Fixed problem where OBDII scan tools could not communicate

V1.0.4.13
- Updated JRSC 440 & 550 calibrations and Rev Hard calibration
- Corrected nitrous input & output descriptions

V1.0.3.12
- Added the option to switch to open loop above a certain MAP

V1.0.2.11
- Added the option to disable error P1167
- Added the option to flash the MIL when knock detected

V1.0.1.10
- Added undo.
- Added some calibrations.
- Added option for the table to follow VTEC and the cam angle.

V1.0.0.9
- Added context sensitive help
- Fixed internet update

V1.0.0.8
- Added drag & drop to open calibration files.
- Added association to open calibration and recordings from Windows Explorer.
- Added Create Forced Induction Tables form.
- Changed calibration extension from .kcd to .kal
- Enabled fuel system status

V1.0.0.6
- Added option to disable VTEC oil pressure

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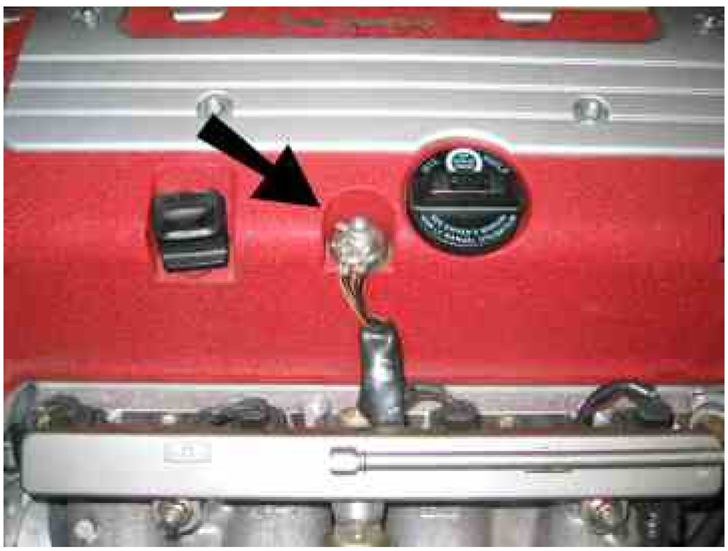
2 Installation

2.1 Installation overview

Important: Please install the KManager software before plugging in the ECU

Engine Ground

It is very important that the ground from the wiring harness to the engine (G101) makes good electrical contact with the cylinder head. Otherwise the return path for the sensors, ignition and VTEC may be through the ECU case to the vehicle body, which may damage the ECU and/or programmable board inside the ECU.



The recommended position for the engine ground is on the stud attached to the cylinder head. While the stock location on the intake manifold will usually work without problems, the stud on the cylinder head provides a better electrical connection.

Installation

Please follow the installation steps in the correct order.

1. Install the KManager software from the installation CD (see Installing KManager software).
2. Install the USB drivers.
3. Install the ECU (see Installing the ECU in the Vehicle).
4. Upload a base calibration into the ECU (see Uploading calibrations to the ECU).

If you have any problems refer to USB troubleshooting

2.2 Installing KManager software

To install the KManager software insert the CD into the CD drive. Installation should start automatically; if it does not, use Window Explorer to open the CD drive and double-click on the installation executable.

Once KManager is installed it is recommended that you check the Hondata website for updates using the Check for Updates command.

It is only recommended to have one copy of KManager on a PC at a time (i.e. do not keep multiple versions of KManager on a PC).

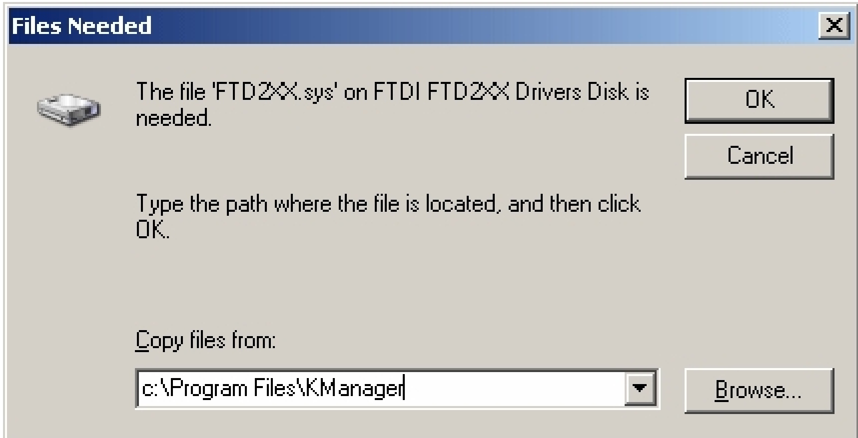
2.3 Installing USB drivers

Important: Please install the KManager software before plugging in the ECU

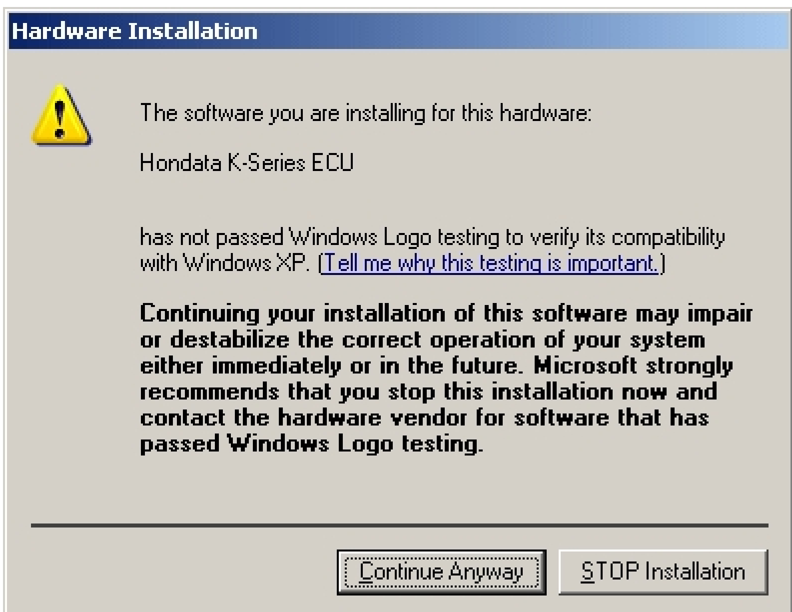
1. Plug the USB cable into the ECU and laptop. The ECU does not need to be in the vehicle at this point. When you plug in the USB cable the following message should be displayed on the *Windows Taskbar*.

2. *Windows* will automatically run the *Found New Hardware Wizard*. *Windows* will prompt for USB drivers. Click on *Install from a list of specific location*.

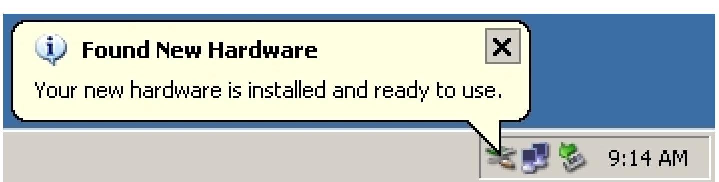
3. *Windows* will prompt for USB drivers. Enter the path to the KManager software (normally this is *C:\Program Files\KManager*.



4. *Windows* will warn that the USB drivers have not passed *Windows* Logo testing. Click on *Continue Anyway*.



5. *Windows* will copy drivers, and shortly the following message will be displayed on the Taskbar.



The USB drivers are now installed.

2.4 Installing the ECU in the Vehicle

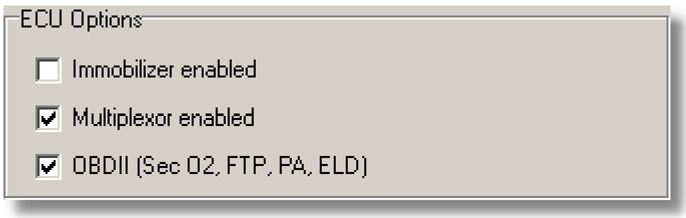
The ECU mounts in the stock location for the RSX/Integra and EP Civic.

It is easiest to plug the USB cable into the ECU before you install the ECU as the USB connector is hidden once the ECU is install into some vehicles. Take care not to place any strain on the USB connector and the circuit board inside the ECU.

Take care not to short the metal shield around the USB connector to the ECU case or chassis ground. It is not necessary to ground the case of the ECU.

Immobilizer

If the immobilizer light on the dash blinks (green key symbol) then you may to re-enable the immobilizer.



If the ECU does not match and vehicle (key and immobilizer transponder) then it is possible to disable the flashing immobilizer symbol simply by unplugging the immobilizer transponder (located on the ignition switch barrel).

3 Calibrations

3.1 Introduction to calibrations

A calibration is a set of parameters and settings to 'tune' an ECU to a particular engine combination. It contains all the information which you can edit from KManager, including fuel, ignition & cam angles tables plus the parameters. It is independent from the 'program' code used in the ECU.

Calibration files have the extension .kal. When KManager is installed, this file extension is associated with KManager so that you mat open a calibration by double-clicking on it. If the file extension association does not work then open the Settings dialog and check 'Associate calibration and datalog files with KManager'.

3.2 Uploading calibrations to the ECU

Uploading a calibration to the ECU will transfer the calibration from the laptop to the ECU. The vehicle ignition must be switched on while uploading. To upload a calibration use Online->Upload or Ctrl+U.

The first time a calibration is uploaded to the ECU it will take approximately 1 minute. Subsequent uploads are performed differentially and take from 3 seconds - 15 seconds to upload.

3.3 Upgrading calibration files

Because calibrations are stored independently from the program code for the ECU, program changes for the ECU are automatically applied whenever when you upload a calibration to an ECU.

To update a calibration in an ECU:
1. Load the calibration file into KManager
2. Upload the calibration into the ECU. Any ECU program changes are automatically applied.

4 Datalogging

4.1 Introduction to datalogging

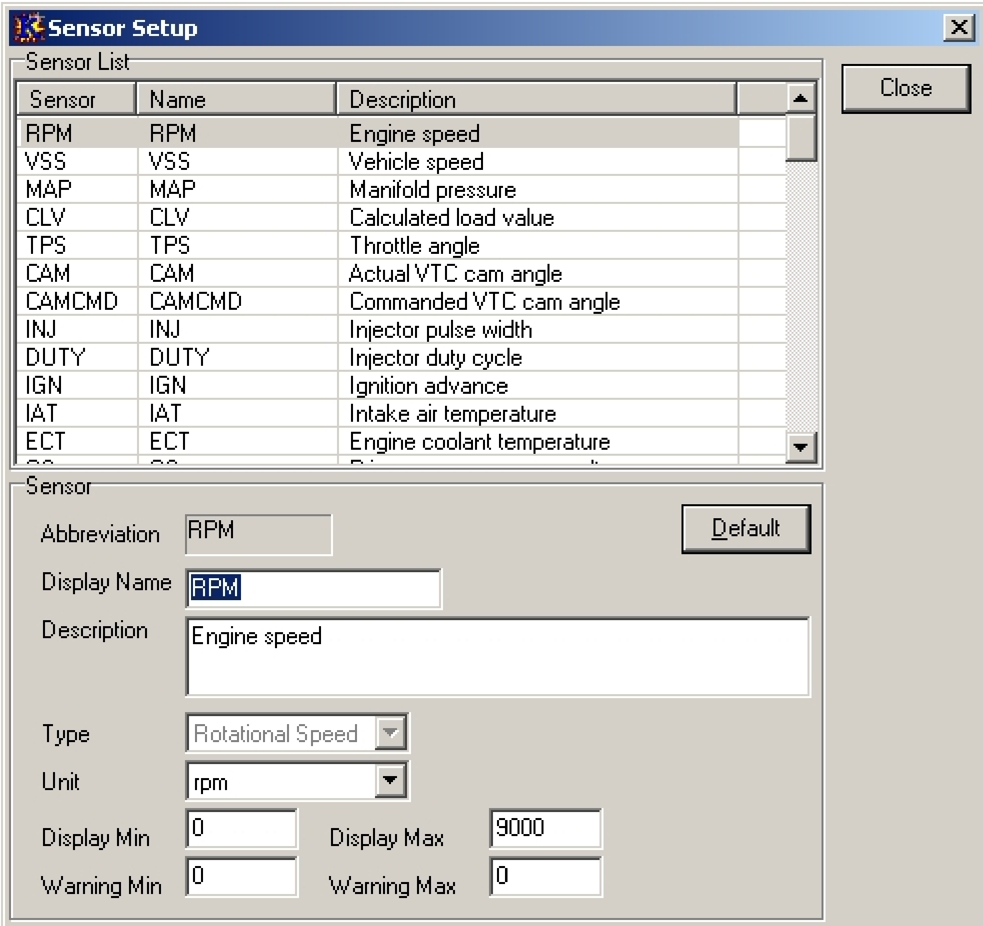
KManager can datalog from the ECU when connected to the ECU and the vehicle ignition is switched on. There is no internal storage inside the ECU so a laptop must be connected to the ECU in order to datalog. Note that some sensors are not datalogged if the engine is not running.

KManager uses frames to datalog. A frame is like a snapshot of all sensor values taken at one point in time. The number of datalog frames and datalog length is shown below the menu bar in the main window.

Datalog files have the extension .kdl, and normally are associated with KManager so that double-clicking on a datalog file will open the recording in KManager. If the file extension association does not work then open the Settings dialog and check 'Associate calibration and datalog files with KManager'.

4.2 Sensor Setup

This window allows you to customise sensor settings.



Abbreviation
This is the name shown in the sensors window.

Display Name
This name is shown in print-outs.

Description
Further explains the function of the sensor.

Unit
Shows the sensor data type.

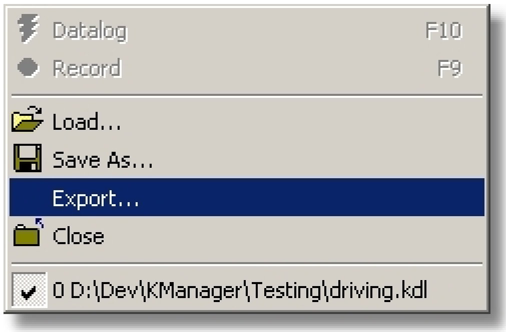
Unit
Allows you to specify the unit for the sensor.

Display Min & Display Max
The minimum and maximum values for graphing.

Warning Min & Warning Max
Sets a warning range for the display window. Sensor values will turn from green to red when the value goes outside the warning range.

4.3 Export Datalog

The command exports the current datalog file in a comma separated value format.



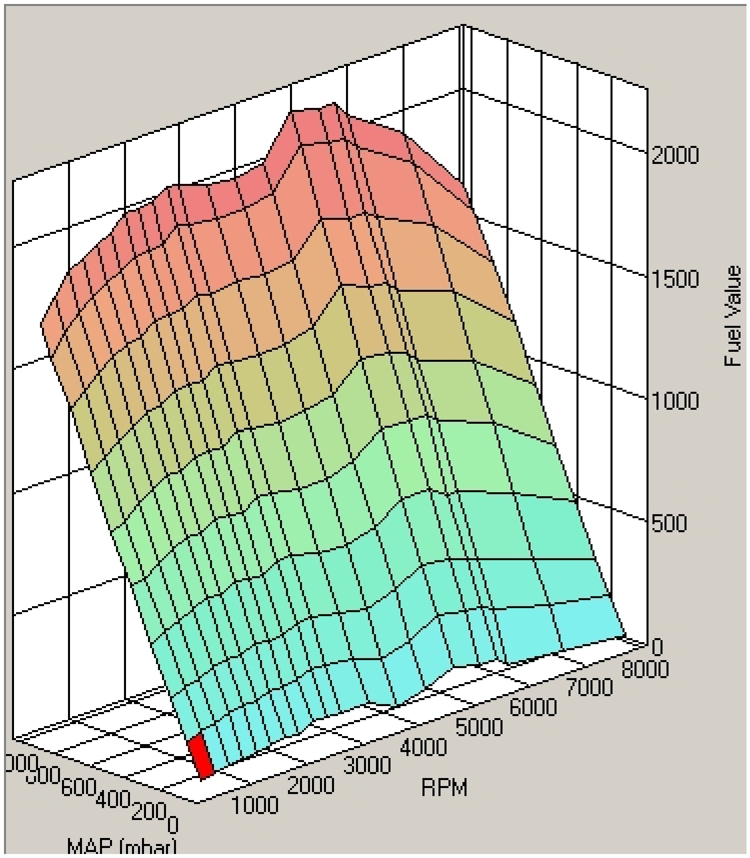
Fields and Units

- frame - frame number
- time - frame time (seconds)
- rpm - engine speed
- map - manifold pressure (bar)
- clv - calculated load value (%)
- tps - throttle position (%)
- camangle - cam angle (degrees)
- targetcamangle - cam angle (degrees)
- injector - injector duration (ms)
- ignition - ignition timing (degrees)
- ta - air temperature (degrees centigrade)
- tw - water temperature (degrees centigrade)
- lambda - air/fuel ratio (lambda)
- targetlambda -target air/fuel ratio (lambda)
- shorterm - short term fuel trim (%)
- longterm - long term fuel trim (%)
- knockcount - knock count
- voltage - battery voltage (volts)
- eld - electrical load (amps)

5 Tuning your vehicle

Basics

First it is important to understand how the Honda ECU determines the appropriate settings for the engine. The Honda ECU uses the speed/density method of calculating these values. The ECU uses the intake manifold pressure and engine speed to index lookup tables for ignition, fuel and cam angle (amongst other things). Other parameters such as coolant temperature, battery voltage and intake air temperature are used to compensate the table lookup values for the engine. To tune the engine we alter the main tables (fuel, ignition and cam angle) to suit the particular configuration of the engine.



A typical fuel table is shown above. The indices used are rpm (along the bottom) and intake manifold pressure (along the side). The ECU uses interpolation to calculate valves from the table which do not fall exactly on a row or column index. e.g. if an ignition table contains 20 degrees advance at 2000 rpm and 10 degrees advance at 3000 rpm, when the engine rpm is 2500 rpm the ignition advance will be 15 degrees. The interpolation actually occurs in two dimensions (engine speed and engine load) or three dimensions (engine speed, engine load and cam angle).

VTEC

VTEC is one mechanism Honda uses to achieve good emissions, fuel economy and engine power from a small displacement engine. The function of VTEC (variable valve timing and lift electronic control) is to provide two distinct camshaft profiles which are switched electro-hydraulically. The smaller camshaft profile is called the low-speed cam; the larger the high speed cam. The camshaft profiles are switched depending on engine rpm and load, usually from 2500 rpm to 6500 rpm. The main effect on tuning of VTEC is that there are usually two copies of every major table - one for the low speed camshaft, one for the high speed camshaft. Another tuning consideration is the point at which VTEC switches (see Tuning the VTEC point).

iVTEC

iVTEC ('intelligent' VTEC) is a combination of VTEC and VTC. VTC (variable timing control) is another mechanism used by Honda to increase engine output which decreasing emissions and fuel consumption. VTC controls the intake camshaft advance. Unlike VTEC VTC is not a simple on/off control, rather the ECU controls the intake camshaft advance over a range of 60 crank degrees in steps of 1/4 of a degree. The effect on tuning of VTC is that there are 6 copies of each major table - for cam advance 0, 10, 20, 30, 40 and 50 degrees. In effect this makes the major tables three dimensional.

The Tuning Process

Because of VTC, tuning the K-Series engine is a little different from tuning any other engine. The best process is:

- Tune the fuel then ignition for every cam angle for the low speed cam (see Tuning fuel tables and Tuning ignition tables).
- Tune the fuel then ignition for every cam angle for the high speed cam.
- Tune the cam angle tables (see Tuning cam angle tables).
- Set the VTEC point (see Tuning the VTEC point).

5.1 Tuning cam angle tables

Introduction

The cam angle is the intake cam advance measured in crank degrees. The allowable cam angle range is from 0 to 50 degrees.

The intake cam is positioned by an electro-hydraulic mechanism, which uses feedback from the intake cam position to alter the position of a solenoid which in turn rotates the intake cam inside the cam sprocket. Because of the design of the mechanism there is a delay between setting the cam position in the ECU, and the cam physically rotating to this position. This delay is around 0.1 seconds per 10 degrees of rotation.

Warning:
With Honda cams there is a physical stop limiting cam advance to prevent valve to valve contact and valve to piston contact. With after market cams it is up to the manufacturer to ensure that the cam lobes are positioned so that valve to valve and valve to piston contact is not possible. Because the cam control mechanism uses a closed-loop feedback system, limiting the cam position in the ECU will not guarantee that the cam position will not exceed what is set in the ECU. Because of this all **cams must have a physical stop to prevent valve contact**.

Tuning Guidelines

In short, the better the breathing of the engine; intake, cams and exhaust, the greater the cam advance needed. There is no situation in which best overall performance is achieved by fixing the cam angle to just one setting or using manual cam adjustment wheels for the intake cam. There may be benefits to fitting and adjusting the exhaust camshaft angle, which is not under computer control.

- With a naturally aspirated engine the cam advance should be set to maximum just after VTEC engagement until about 6500-7000 rpm. From 7000 rpm (where the cam advance should be near 50 degrees) to redline the cam is retarded back around 25 degrees. This procedure is correct for all commercially available after market cams at the date of release of this software, but camshafts which are substantially different from a Honda camshaft may require different settings.
- With a supercharged engine the cam advance needs to be set to maximum (50 degrees or more) throughout the rev range, with only a 10 degrees or so retard above 7000 rpm.
- With a turbocharger engine the cam advance needs to be less than stock. This is because a turbocharger generates much more exhaust back pressure than a naturally aspirated or supercharged configuration. The higher the back pressure the more cam retard is needed. With small turbos and stock catalytic converters you may need to retard the cam fully to 0 degrees at 8000 rpm

Procedure

- Set the VTEC point high (6500 or 7000) rpm. Only dyno the low speed cam.
- Set both the high speed and low speed cam angles to zero. Tune the fuel and ignition tables for this cam angle (this is necessary because the engines runs at 0 cam advance when cold and for the first 10 seconds of operation).
- Set both cam angle tables to 10 degrees, then 20 degrees and so on up to 50 degrees, and tune the ignition and fuel tables for this cam angle.
- Perform dyno runs at 0, 10, 20, 30, 40 and 50 degrees. This will give you with 6 dyno curves with different cam angles. Set the cam angles in the cam angle map to those which give you maximum

power then re-dyno. The power curve you get should be a maximum of all the 6 individual dyno runs you have just done.
- Now we need to "bracket" the composite cam angle map we have just created. Add 5 degrees to the cam angle map and re-dyno. Subtract 5 degrees and re-dyno. This will verify you have an optimum cam angle map. You will probably find a few RPM points, particularly where the cam is changing angle, that need a little modification to make more power. If you wish you can then bracket the resultant power curve by dynoing with plus or minus 2 degrees cam angle change. The power change at this degree of cam angle change is likely to be about 1 – 1.5 hp on a naturally aspirated engine.
- Now set the VTEC point low (3000 rpm) and repeat the above procedure for the high speed cam.

Cam Angle at VTEC

If the cam position tables require the camshaft to rotate a large amount at VTEC (e.g. from 20 degrees on the low speed cam angle table to 45 degrees on the high speed cam angle table) you may lose power for 500-700 rpm after VTEC activates, as the cam rotates into the correct position. The best method is to start advancing the intake cam in the low speed cam angle table before the VTEC point, so the cam has to rotate less once VTEC activates. This usually means sacrificing a few hp just before VTEC point to gain hp after the cams switch. When this is done right the characteristic VTEC change in sound is greatly reduced.

Part Throttle Cam Angle

This applies to the portions of the cam angle table below full naturally aspirates load (column 7 and less).
- At idle and low rpm (below 100 rpm) set the cam angle to 0 or 5 degrees.
- At cruising rpm and load (columns 2 - 7 and 1500 - 4500 rpm) set the cam angle to around 30 degrees. The EGR effect of the extra camshaft overlap will reduce emissions and improve fuel economy at cruise.
- Above normal cruise rpm set the cam angle to the same value as under full load. This will smooth out gearshifts as the cam shaft will not start to rotate back to zero during the gearshift.

Hints

- Remember that the cam cannot rotate instantaneously. It takes about 0.1 seconds to rotate 10 degrees. Cam angle changes should not be great over a small rpm interval.
- The intake cam is locked at 0 degrees for 10 seconds after a hot start. Let the engine run for at least 10 seconds after starting the engine before performing a dyno run.

5.2 Tuning fuel tables

Warning:

A lean air/fuel condition will damage the engine. Make sure that you monitor the air/fuel ratio at all times, and abort any dyno run if the air/fuel ratio becomes too lean.

Tuning Fuel at full load

It it necessary to use and lambda meter (air/fuel gauge) to tune to fuel tables. Certain K-Series engines utilise and wide-band oxygen sensor which is useful for tuning, otherwise most dynos are equipped with a lambda meter. It is best to tune so that the air/fuel plot are fairly flat.

Tuning Fuel at part throttle

To tune the fuel for part throttle the aim is to get the air/fuel ratio so that the engine will run correctly in closed loop. Normally the closed loop air/fuel ratio will center around the stoichiometric air/fuel ratio of 14.7:1, so it is best to tune the fuel tables up to column 7 to 14.7:1.

5.3 Tuning ignition tables

Warning:

Excessive ignition advance will damage the engine. The combustion pressure and load on the engine (especially bearing stress) increase dramatically if the engine is over-advanced. Do not believe the fallacy that 'more is better' for ignition advance. Too little ignition advance can also damage the engine by increasing the exhaust gas temperature, especially with turbo-charged engines. **Do not rely on the knock sensor to retard the ignition timing if the engine detonates.**

The Knock Sensor

One important tool in tuning ignition advance is the knock sensor. This is a sensitive microphone located on the engine block which the ECU uses to determine when the engine is knocking (or pinging). A useful datalog variable is the knock count, which in incremented every time the ECU hears knock. The knock count is reset every time the engine is started. When performing dyno runs monitor the knock count after every run (and preferably during the run). It is normally for the ECU to sense a small amount of knock at the VTEC point, usually 2 times. If the knock count is more than this then it is very likely that the engine is knocking, which should be fixed as soon as possible.

Tuning Ignition Advance at full load

The best way to determine the correct ignition advance at full load is by using a dyno. Generally for naturally aspirated engines it is safe to set the advance near to maximum power, with the aim being to run the least amount of timing possible. A good procedure is to tune for maximum power then retard the timing until you just start to lose power (around 1 hp). At all times monitor engine knock to make sure there is no detonation (even for a naturally aspirated engine). If pinging it audible or the ECU shows that the engine is knocking (e.g. the knock count is increasing) then it is advisable to abort the dyno run, retard timing/add fuel, and restart the run.

With forced induction engines it is important not to over-advance the ignition, otherwise the engine will be damaged in only a few seconds. Use conservative ignition settings, monitor the knock sensor and abort any dyno run if the engine shows signs of knock, pinging or detonation.

Tuning Ignition Advance at part throttle

Tuning ignition advance at part throttle is more difficult than full throttle because it is difficult to accurately determine the correct settings. In general the default calibrations are suitable for part throttle, otherwise an EGT gauge can be used to determine the best ignition advance.

5.4 Tuning the VTEC point

Warning:

- Do not set the VTEC point too low as the engine will lose oil pressure and possibly damage the engine. It is not recommended to set the VTEC point below 2000 rpm.
- Do not set the VTEC point too high as the high speed cam rocker arm may float on the lost motion assembly, damaging the valve spring retainers. It is not recommended to set the VTEC point over 6500 rpm.

The determine the best VTEC point perform two dyno runs, one with VTEC set low (e.g. 3000 rpm) and the other run with VTEC set high (e.g. 6500 rpm). Set the VTEC point to the intersection of the high speed cam and the low speed cam. Generally if there is a sudden increase in engine output immediately after the cams switch then lower VTEC. Conversely if there is a sudden dip in engine output then raise the VTEC point. Since the VTEC point will be at the intersection of the low speed and high speed cam torque curves, it is normal for the torque to dip around the VTEC point.

6 Windows

6.1 Settings

The window allows you the alter general KManager parameters and settings.

General Settings

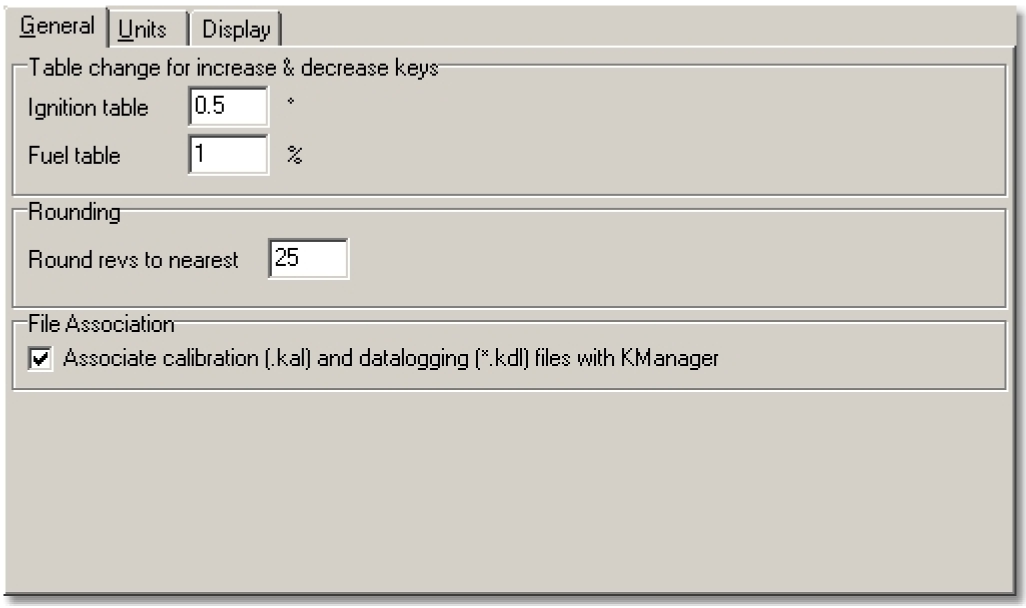
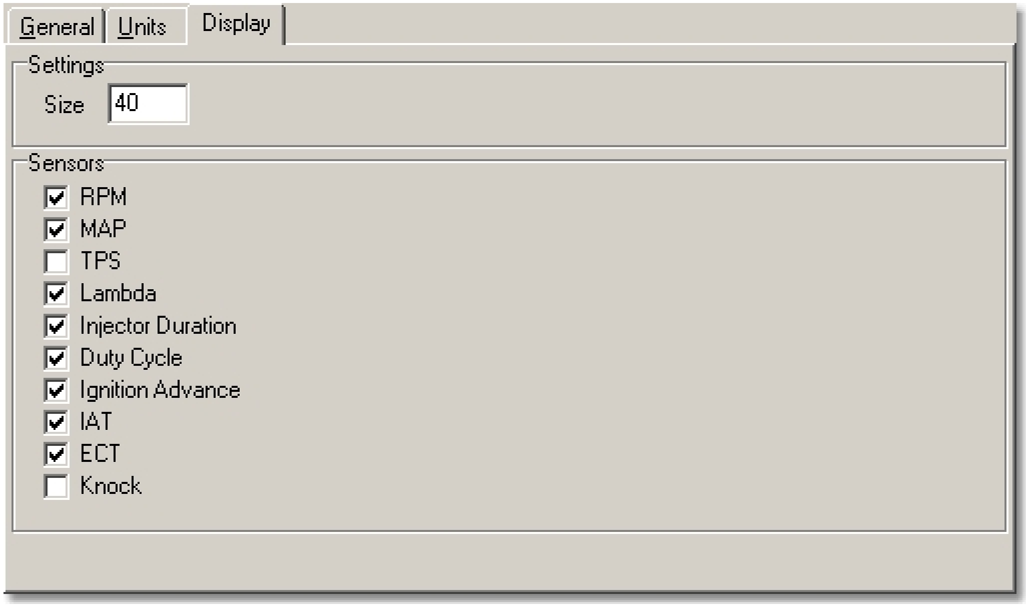


Table change for increase and decrease keys - this sets the amount by while the ignition and fuel tables are altered when the increase and decrease keys are used to alter a selection in the Table Window The Cam Angle is always altered by 1 degree.

Rounding - currently unused.

File association - check this to associate calibration and datalogging files with KManager. If you associate files with

Display Settings



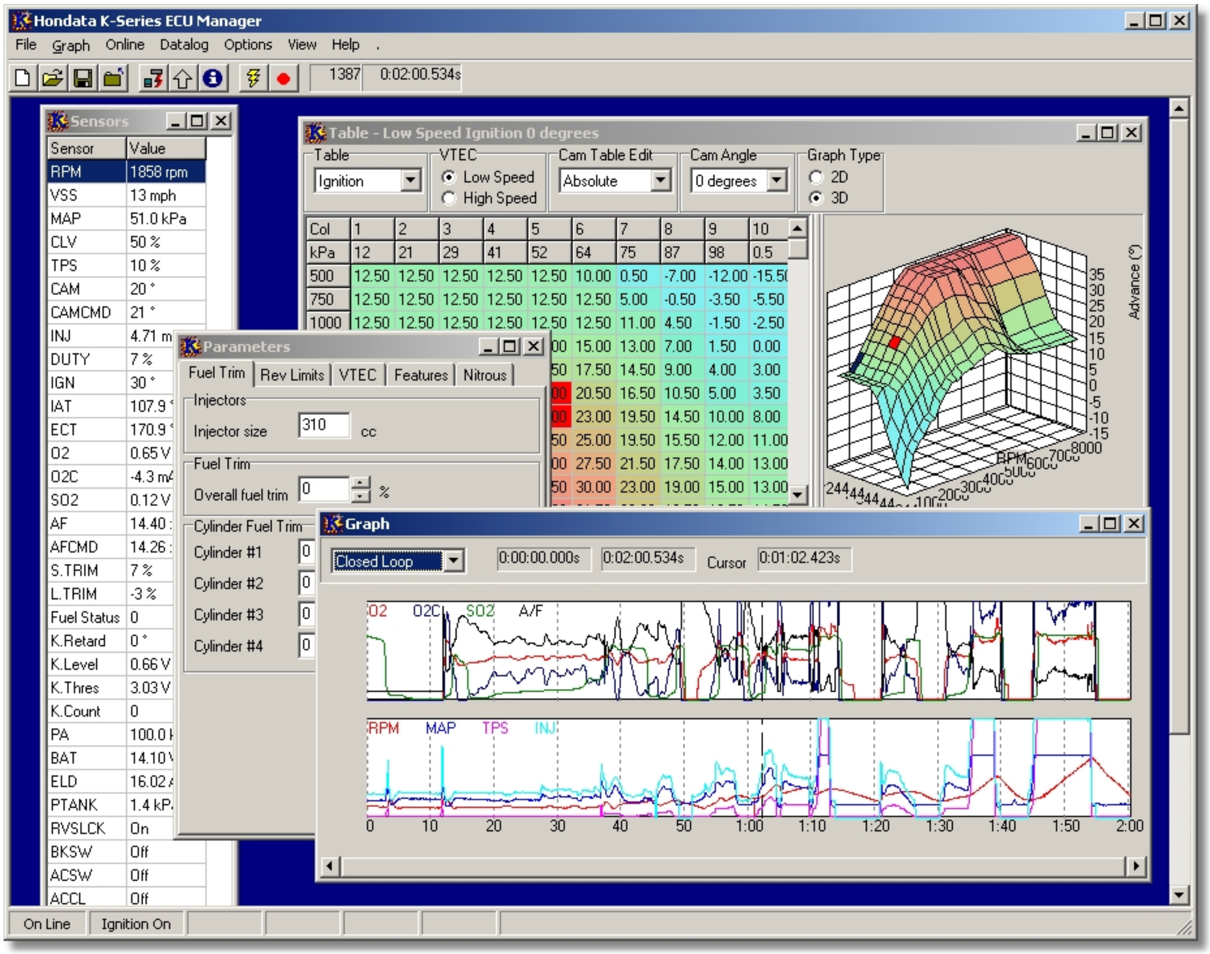
This tab contains settings for the display window.

Size - this is the height of the fields in the display window, measured in pixels.

Sensors - this selects which sensors are shown in the display window.

6.2 Main Window

The main window contains a number of child windows which allow you to edit the current ECU calibration and show and datalogging and graphing.

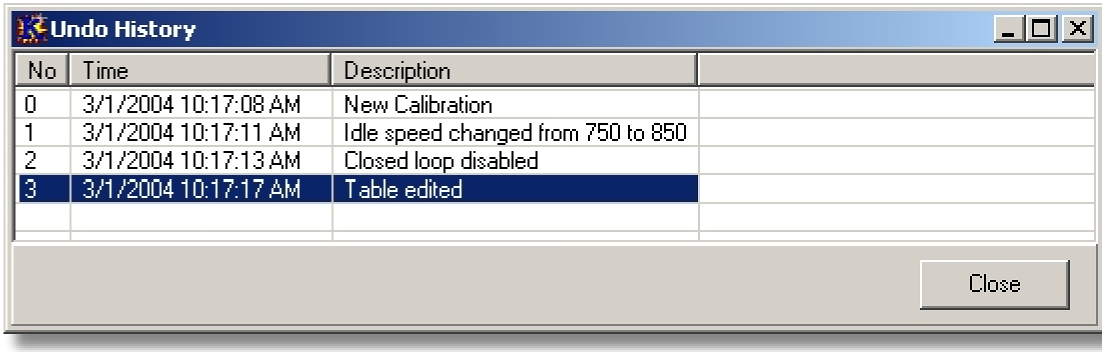


The Status Bar (at the bottom of the main window) contains:

On Line / Off Line - Shows if the laptop is connected to the ECU via the USB cable.
Ignition On / Ignition Off - Shows the state of the vehicle ignition.
Datalog - displays Datalog when the ECU is being datalogged.
Record - displays Record when the ECU is being recorded.
Modified flag - displays Modified when the calibration has been edited but not saved.

6.2.1 Undo History

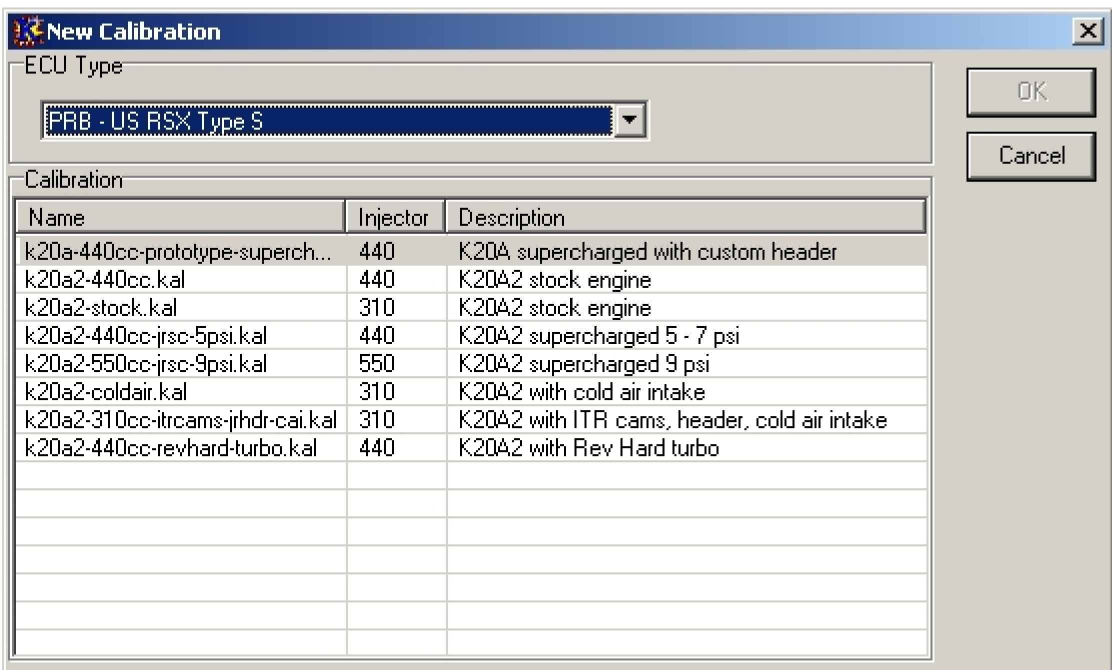
The Undo History window shows a list of editing activities performed on the current calibration.



This window is for informative purposes only.

6.2.2 New Calibration

The New Calibration window is a way of creating a new calibration from a pre-defined calibration.

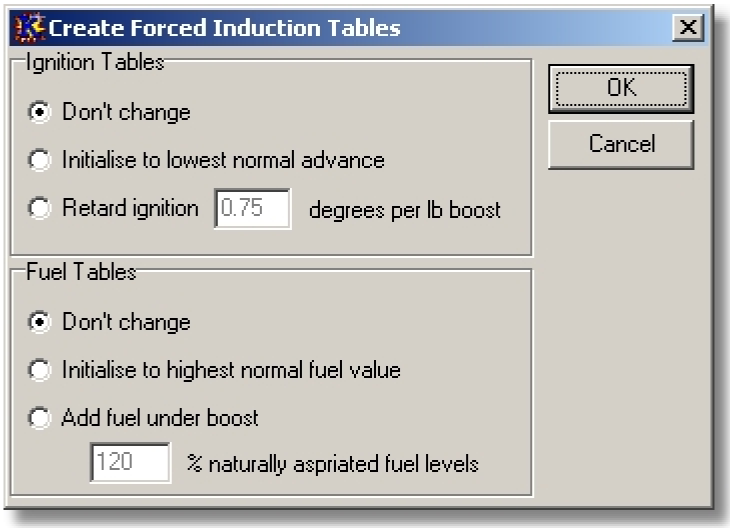


To load a calibration select a calibration from the list and select 'OK', or double-click on the calibration.

Note: All the calibrations were tuned and tested by Hondata on vehicle setups are shown in the description column. These calibrations make a good starting point but usually require further tuning to run perfectly.

6.2.3 Create Forced Induction Tables

This window allows you to initialize the forced induction parts of the fuel & ignition tables.



Only boost columns are altered (columns 11-13).

Ignition tables

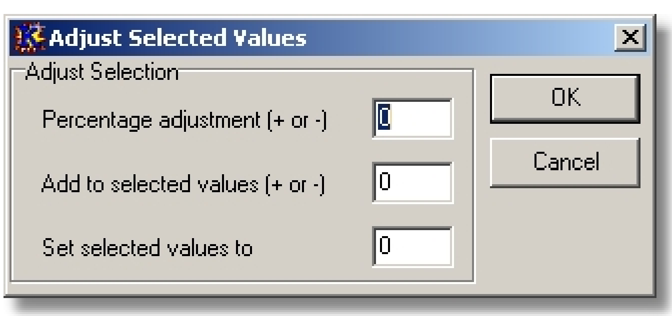
Don't change - doesn't alter the ignition table.
Initialise to lowest normal advance - copies the highest naturally aspirated ignition column into all the boost portion columns of the ignition tables.
Retard ignition - as above but retards the ignition based on specified retard value (degrees per pound boost).

Fuel tables

Don't change - doesn't alter the fuel table.
Initialise to highest normal fuel value - copies the highest naturally aspirated fuel column into all the boost portion columns of the fuel tables.
Add fuel under boost - as above but adds fuel in proportion to the increase in manifold pressure over atmospheric pressure. To allow for the lower BSFC for forced induction it is normal to add for fuel than the absolute increase in pressure would suggest.

6.2.4 Adjust Selected Values

This window allows you to adjust a selected group of cells in a table.



Enter a number into only **one** box in this dialog.

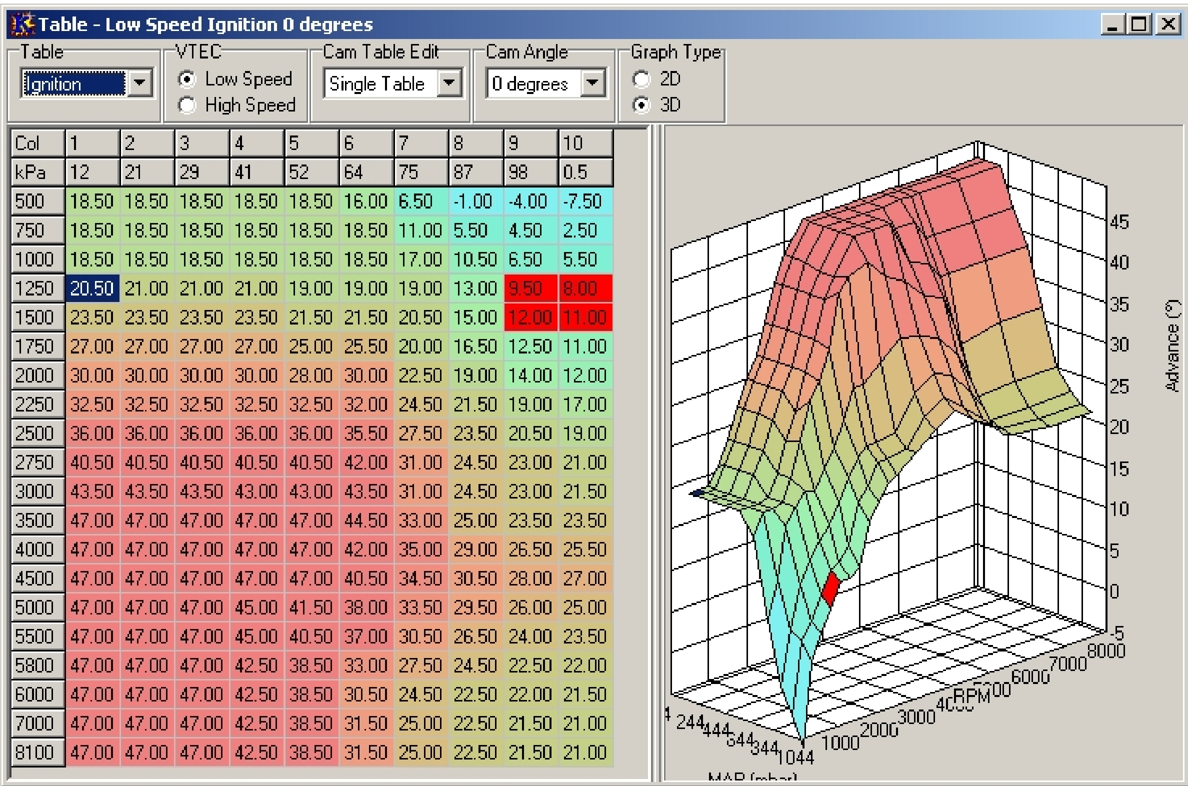
Percentage adjustment - this adjusts the selected cells by the specified percentage. A negative percentage may be used. e.g. -10 will decrease the specified cells by 10%.

Add to values - this increases or decreases the selected cells by the specified number. A negative number may be used.

Set values - this sets the selected cells to the specified number.

6.3 Table Window

The table window contains the main tables from the ECU - ignition, fuel and cam angle.



Col	1	2	3	4	5	6	7	8	9	10
kPa	12	21	29	41	52	64	75	87	98	0.5
500	18.50	18.50	18.50	18.50	18.50	16.00	6.50	-1.00	-4.00	-7.50
750	18.50	18.50	18.50	18.50	18.50	18.50	11.00	5.50	4.50	2.50
1000	18.50	18.50	18.50	18.50	18.50	18.50	17.00	10.50	6.50	5.50
1250	20.50	21.00	21.00	21.00	19.00	19.00	19.00	13.00	9.50	8.00
1500	23.50	23.50	23.50	23.50	21.50	21.50	20.50	15.00	12.00	11.00
1750	27.00	27.00	27.00	27.00	25.00	25.50	20.00	16.50	12.50	11.00
2000	30.00	30.00	30.00	30.00	28.00	30.00	22.50	19.00	14.00	12.00
2250	32.50	32.50	32.50	32.50	32.50	32.00	24.50	21.50	19.00	17.00
2500	36.00	36.00	36.00	36.00	36.00	35.50	27.50	23.50	20.50	19.00
2750	40.50	40.50	40.50	40.50	40.50	42.00	31.00	24.50	23.00	21.00
3000	43.50	43.50	43.50	43.00	43.00	43.50	31.00	24.50	23.00	21.50
3500	47.00	47.00	47.00	47.00	47.00	44.50	33.00	25.00	23.50	23.50
4000	47.00	47.00	47.00	47.00	47.00	42.00	35.00	29.00	26.50	25.50
4500	47.00	47.00	47.00	47.00	47.00	40.50	34.50	30.50	28.00	27.00
5000	47.00	47.00	47.00	45.00	41.50	38.00	33.50	29.50	26.00	25.00
5500	47.00	47.00	47.00	45.00	40.50	37.00	30.50	26.50	24.00	23.50
5800	47.00	47.00	47.00	42.50	38.50	33.00	27.50	24.50	22.50	22.00
6000	47.00	47.00	47.00	42.50	38.50	30.50	24.50	22.50	22.00	21.50
7000	47.00	47.00	47.00	42.50	38.50	31.50	25.00	22.50	21.50	21.00
8100	47.00	47.00	47.00	42.50	38.50	31.50	25.00	22.50	21.50	21.00

It is important to understand that for Ignition and Fuel tables the ECU stores multiple tables for various intake cam angles. Ignition and Fuel tables are broken into low-speed and high-speed tables, which are then broken down into 6 tables (for intake cam angles of 0, 10, 20, 30, 40 and 50 degrees). Thus there are a total of 12 Ignition tables (2 x 6), 12 Fuel tables (2 x 6) and 2 Cam Angle tables. Only one table may be viewed at a time.

Option Area

The area at the top of the table window selects which table is shown in the table window.

Table - selects Ignition, Fuel of Cam Angle table.

VTEC - selects either low or high speed cam.

Cam Table Edit - determines how the multiple tables for each cam angle are edited for Ignition & Fuel tables.

Single Table edits each table individually. Any change made to the current table will only effect that table.

All Tables edits all related cam angle tables together. For Ignition tables the change in value for the current table is applied to all other cam angle tables. e.g. adding 2 degrees timing to some cells in the 30 degree table will also add 2 degrees times to the 0, 10, 20, 40 and 50 degree tables (to the same cells in the table as the 30 degree table). For fuel tables the percentage change in value for the current value is applied to all other cam angle tables. e.g. adding 4% fuel to a potion on the 20 degree fuel table will add 4% fuel to the 0, 10, 30, 40 and 50 degree tables. Note that for fuel tables the other tables are always altered by a percentage change, even if the current fuel table is not changed by a percentage.

Cam Angle - selects the cam angle table

Graph Type - 2D or 3D graph.

Grid View

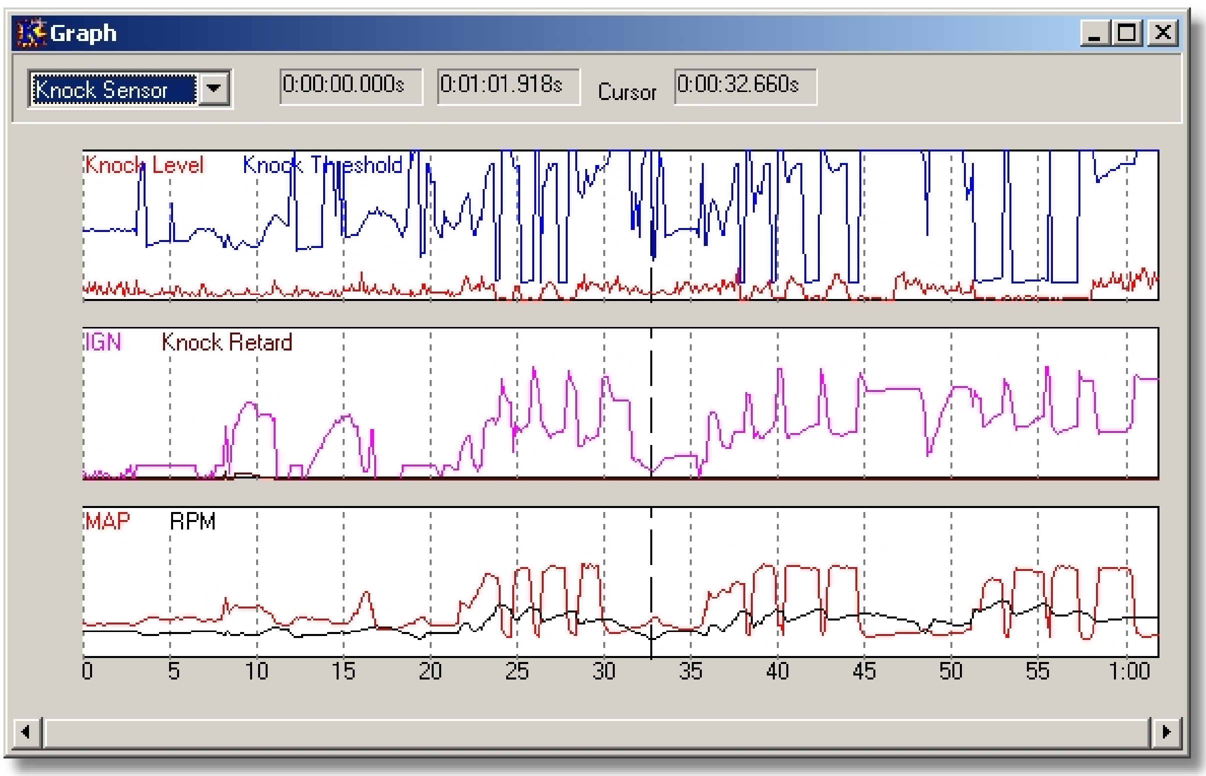
The area on the left of the table window shows a numerical representation of the current table. Cell values may be altered either by clicking on the cell and entering a value, or using the arrow keys to move the current selection (blue square) onto a cell, then entering a value. Cells may be selected by using the mouse to allow more than one cell to be altered at a time. All the cells in the table may be select by using Ctrl+A. If multiple cells are selected, the Adjust Selected Values window (Ctrl+J) may be used to alter the selected cells. Ctrl+I and Ctrl+D will increase and decrease the selected cells.

Graph View

The right side of the table window contains a 2D or 3D representation of the current table. Mapping points on the 2D graph may be altered by clicking on the rectangles and dragging up or down. On the 3D graph clicking will select an area on the Grid View.

6.4 Graph Window

The graph window displays sensor values either while recording, or while reviewing a datalogged recording.



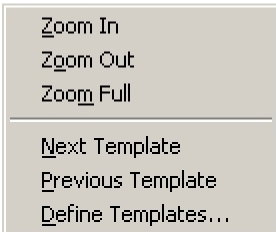
The graph may be scrolled using the scroll bar at the bottom of the window. A cursor may be positioned on the screen by left-clicking on the graph window. This will change the sensor values displayed in the Sensors Window.

Graph Templates

The graph window displays sensors based on pre-defined graph templates. These templates specify the number of sub-graphs on the graph window, and the sensors in each sub-graph. For more information see the Graph Templates Window

Graph Menu

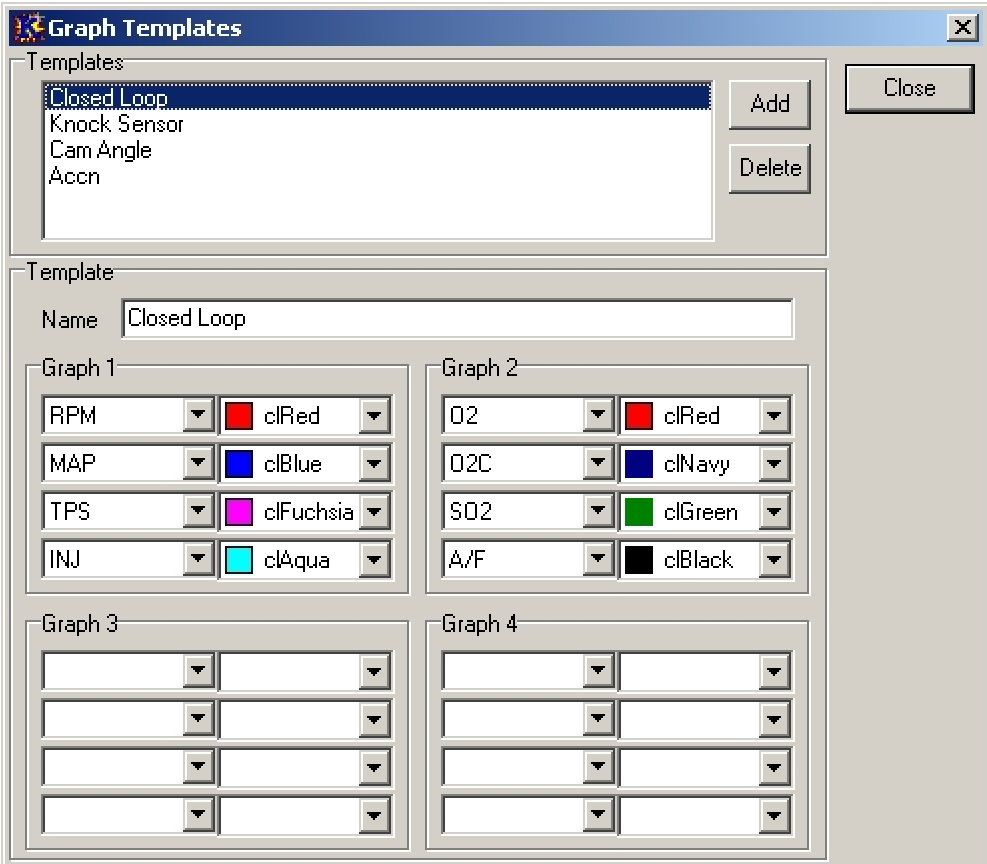
Additional graph functions may be accessed either from the Graph menu, or by right clicking on the graph window.



Zoom In - zooms the graph in centered on the cursor.
Zoom Out - zooms the graph out centered on the cursor.
Zoom Full - shows the full recording on the graph window.
Next Template - selects the next graph template.
Previous Template - selects the previous graph template.
Define Templates - opens the Graph Templates Window

6.5 Graph Templates

This window allows you to define and edit graph templates, which are used in the Graph Window This allows you to switch between many different display configurations for the graph window quickly.



The graph window is broken down into 1 to 4 sub-graphs. Each sub-graph can contain 1 - 4 sensors.

6.6 Parameters Window

The Parameters Window allows you to edit the following ECU parameters:

Fuel Trim Parameters
Rev Limit Parameters
MAP Parameters
VTEC Parameters
Misc Parameters
Nitrous Parameters
Protection Parameters
Compensation Table Parameters
Notes Parameters
Closed Loop Parameters
Idle Parameters
Knock Sensor Parameters

Also see:
Adding a MAP Sensor

6.6.1 Fuel Trim Parameters

Injectors

This tab contains settings for injector size and fuel trim.

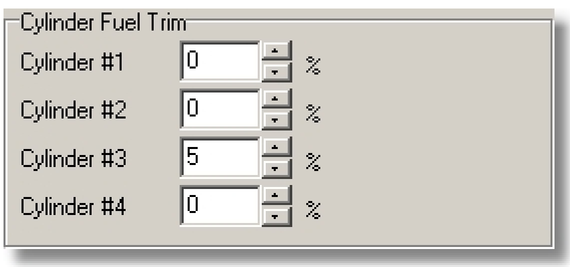
Changing the injector size will automatically compensate the fuel tables for the rating of the injector (but not for the specific characteristics of the injector). Also the cranking fuel is compensated based on the injector size.

Fuel Trim

The overall fuel trim is an additional compensation applied evenly to the main fuel tables. The cranking fuel trim is applied when starting the engine.

Note that the injector size will automatically reduce the overall fuel and cranking fuel even if the trims are set to zero.

Cylinder Fuel Trim



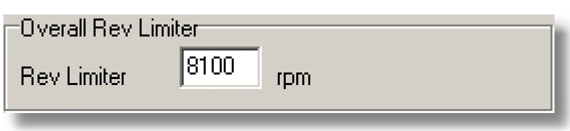
By changing the cylinder fuel trim it is possible to add or remove fuel for individual cylinders. Note that the injector duration as datalogged is the duration for injector #1. Changing the fuel trim for cylinder #1 will result in the datalogging showing the duration for cylinder #1, not the rest of the cylinders.
Warning: Do not set the cylinder fuel trim from reading the spark plugs. The only reliable way to set the fuelling for individual cylinders is using EGTs.

6.6.2 Rev Limit Parameters

Note: All rev limiters operate via fuel cut.

Overall Rev Limiter

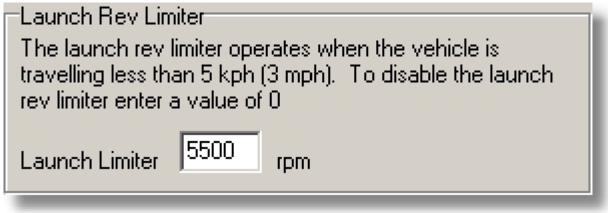
This is the main engine speed limiter value.



Do not increase the rev limiter unless you are sure all the components of the engine will withstand the greater stress.

Launch Rev Limiter

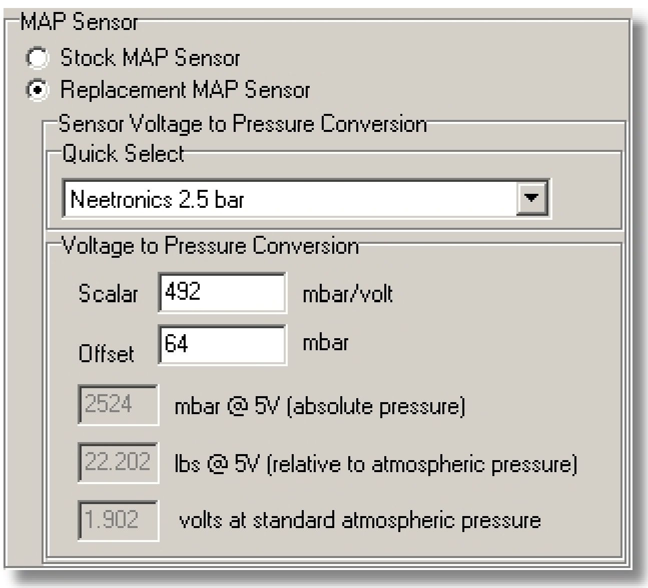
The launch rev limiter operates when the car is stationary. When the clutch is released and the car starts to move the launch rev limit is removed.



6.6.3 MAP Parameters

This tab contains MAP Sensor parameters. Also see MAP Sensor Installation

Warning : Exceeding the MAP sensor upper pressure limit will result in the engine running lean.
Warning : Setting the boost limit beyond the MAP sensor upper pressure limit will result in the boost limiter not functioning.



The MAP (manifold absolute pressure) sensor reads air pressure in the intake manifold to determine engine load. It is the primary sensor in determining fuel, ignition and other requirements of the engine. The stock MAP sensor can read pressure to approximately 1.8 bar (11.4 lbs boost pressure). Beyond this value a replacement MAP sensor is necessary. Any sized linear 5V MAP sensor can used - which is virtually any MAP sensor.

Tab Parameters

MAP Sensor Selection
Either the stock MAP sensor or an alternate sensor can be used. If the stock MAP sensor is selected then the stock voltage to pressure conversion is used - you do not need to enter anything in the Voltage to Pressure conversion section of the tab.

Quick Select
Selects from a number of pre-set voltage to pressure conversion parameters. If the MAP sensor you are using is not listed then you will need to enter a custom conversion.

Scalar
The scalar (multiplication value) for the MAP sensor voltage to pressure conversion. For more information see *scalar & offset*.

Offset
The offset for the MAP sensor voltage to pressure conversion. For more information see *scalar & offset*.

Full Scale Values
This calculates the full scale pressure readings at in mbar and lbs boost. Note that these values are calculated at 5V and may not be achievable due to differences in supply voltage from the ECU. See *Boost Limit* for more information.

Atmospheric Pressure Values
This calculates the expected voltage at standard atmospheric pressure (1013.2 mbar). Note that not all MAP sensors will report atmospheric pressure under key-on-engine-off conditions.

Scalar & Offset

A MAP sensor converts a pressure reading into a voltage output. There is a relationship between output voltage and pressure which determines the pressure range of the MAP sensor. This relationship should be linear (otherwise the MAP sensor is poor quality) and therefore can be described using a linear equation.

The scalar and offset describe the pressure / voltage equation. These values may be determined by measuring the voltage output from the MAP sensor and plotting on a graph, or from the specifications of the MAP sensor.

If you do not know the scalar of offset for a MAP sensor then please do not guess.

Boost Limit

The boost limit operates when the manifold pressure exceeds a pre-set value. The value must be within the range of pressure that the MAP sensor can read, with a margin for production tolerances on the ECU sensor output voltage and MAP sensor. You must not assume that a 5V MAP sensor will reach 5V output at maximum pressure. e.g. the boost limit is set to 11.3 lbs for a stock MAP sensor, which equates to an output voltage of 4.96 V from the MAP sensor. This is too close to the maximum output of the MAP sensor for reliable triggering of the boost cut (the MAP sensor might never exceed 4.9 V for instance). It is recommended that a 1 lb or 0.2V margin is left between the boost cut and MAP sensor maximum pressure reading.

5 Bar MAP Sensors

While any linear MAP sensor is supported, the fuel,ignition and cam angle tables are only currently mapped to 28 lbs. For MAP sensors greater than 3 Bar absolute a future software release will allow the column pressure index to be altered to allow higher values. The number of columns will not change.

6.6.3.1 Adding a MAP Sensor

Wiring in a replacement MAP Sensor

If wiring in a replacement MAP sensor *take great care to ensure that the wiring is correct before* *applying power*. Most MAP sensors will not tolerate reversed polarity and will burn out very quickly.

To save cutting the wiring harness it is recommended to use a replacement MAP sensor with a Honda type connector. Failing that, use a MAP sensor with wiring pigtail and wire the MAP sensor in parallel with the stock MAP connector (only plug in one MAP sensor at a time!). This allows easy diagnostics of any problems by allowing the stock MAP sensor to be hooked up at any time. It is not recommended to cut the stock MAP sensor connector off.

Stock MAP Wiring

Wire Color	*Function*	*MAP Marking*
yel/red	VCC	V
grn/red	MAP Signal	O
grn/wht	GND	G

Determine the replacement MAP sensor wiring and splice the wiring into the factor harness. Double check all connectors before switching the ignition on as most MAP sensors will burn out if you make a wiring mistake.

Plumbing in the MAP sensor

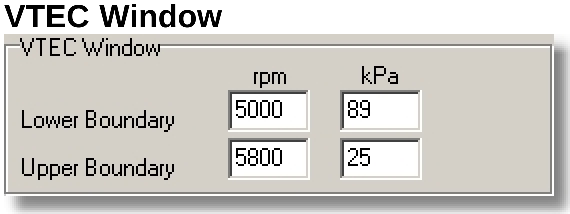
Run a vacuum line from the intake manifold for the MAP sensor. The MAP sensor must read the intake manifold pressure accurately.

- For supercharged vehicles make sure that the MAP sensor is connected to the intake manifold after the supercharger, otherwise it will not see boost.
- Do not be tempted to use the cold air bypass fitting close to the cylinder head between number 2 and 3 cylinders. This supplies air to the injector tips while cold for better emissions and is a poor place to read manifold vacuum.
- Run a single vacuum line from the manifold to the MAP sensor with no 'Ts' or branches to other devices, such as blow of valves, boost gauges and boost controllers.

6.6.4 VTEC Parameters

This tab contains parameters for setting the VTEC point & window.

VTEC Window

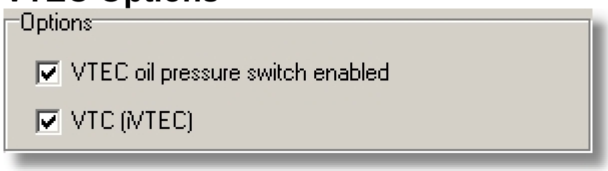


The VTEC window is a variable VTEC switch point based on engine speed and engine load. Usually you want the VTEC point to move higher with lighter engine load. The above screen shot shows VTEC switching at 5000 rpm when the manifold pressure is 89 kPa or above (which is close to full throttle), reducing in a linear fashion to 5800 rpm at 25 kPa manifold pressure.

Do not set the VTEC switch point too low as there will be insufficient oil pressure for the rest of the engine. As a guide do not go below 2000 rpm.

Do not set the VTEC switch point too high as the high speed rocker arm will float on the lost motion spring and damage the valve train. As a guide do not set the VTEC point higher than 6500 rpm.

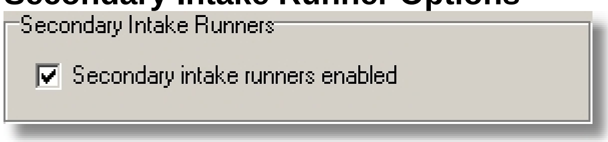
VTEC Options



For JDM engines and JDM ECUs disable the VTEC oil pressure sensor.

Disable VTC for engines with locked camshafts.

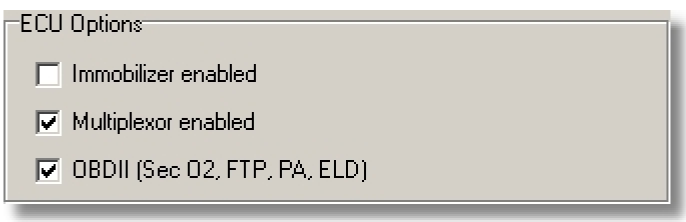
Secondary Intake Runner Options



The option is only available for engines with secondary intake runners. Disable the secondary intake runners if the intake manifold is replaced with a single path manifold (e.g. a supercharger manifold).

6.6.5 Misc Parameters

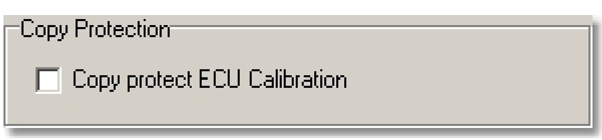
Additional miscellaneous parameters.



Immobilizer enabled - Sets whether the immobilizer is enabled or disabled. Keep the immobilizer enabled except for engine-swaps where the vehicle has no immobilizer key and transponder.

Multiplexor enabled - Enables/disables the multiplexor, which communicates with the rest of the vehicle. Only disable this for engine-swaps where the vehicle does not have the multiplexor unit in the fuse box.

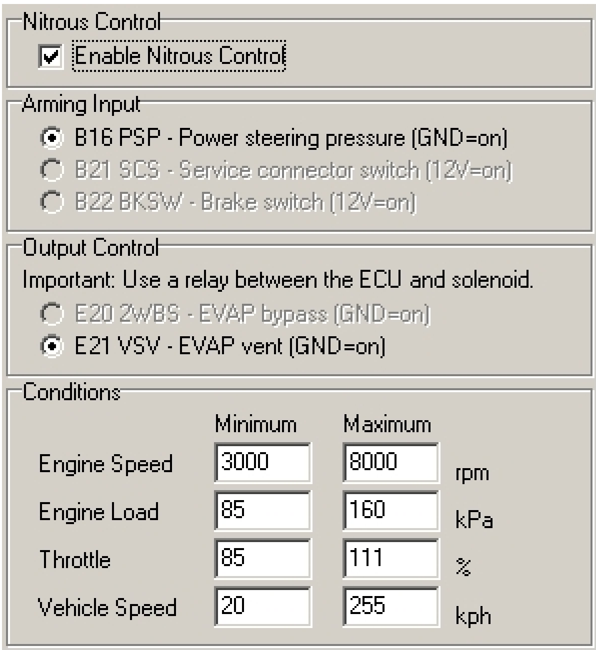
OBDII - Enables/disables most OBDII functions. To remove the secondary o2 sensor error (from using a race header with no catalytic converter or secondary o2 sensor) clear the check mark from the OBDII box. **Note**: Only disable OBDII for race vehicles, as doing so will prevent many OBDII tests and error checking from being performed.



Copy Protect ECU Calibration - checking this will prevent the calibration from being downloaded from the ECU. **Warning**: If you check this, be sure to save the calibration to disk, as there is no way of reading the calibration from the ECU once copy protected. This feature is currently disabled.

6.6.6 Nitrous Parameters

These parameters allow the ECU to control the use of nitrous oxide or water/alcohol injection.



Enable Nitrous Control - enables the control on nitrous.

Arming Input - specifies which ECU pin is used to arm nitrous.

Output Control - specifies which ECU pin controls the nitrous solenoid. Important: the ECU cannot sink enough current directly to control a solenoid. A relay must be used between the ECU and solenoid to prevent damage to the ECU.

Conditions - specifies the conditions which must be met before the output is switched on.

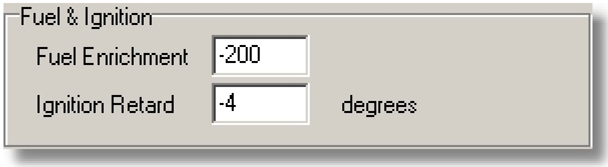
Fuel & Ignition - specifies changes to fuel and ignition when nitrous is activated.

The maximum retard is 40 degrees, and the ignition timing can be retard to a maximum of 10 degrees BTDC.

Do not make nitrous changes without using a wideband lambda meter to determine the correct air/fuel ratio. As a general guide, the following extra fuel is necessary:

Nitrous Jet	Fuel Value
0.24	200
0.32	350
0.47	850

With nitrous control it is possible to remove fuel and/or advance ignition timing by using negative values. This is useful when using water/alcohol injection.



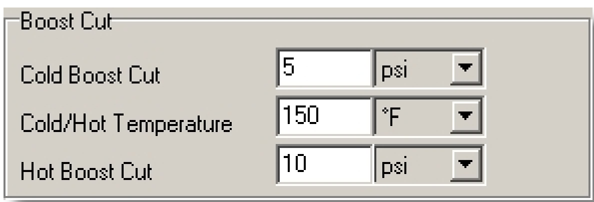
The above example will remove fuel and advance the ignition timing by 4 degrees when activated.

6.6.7 Protection Parameters

Engine protection parameters.

Boost Cut

The boost cut is designed to prevent engine damage from over-boosting. It has two settings - a cold boost limit and a hot boost limit.



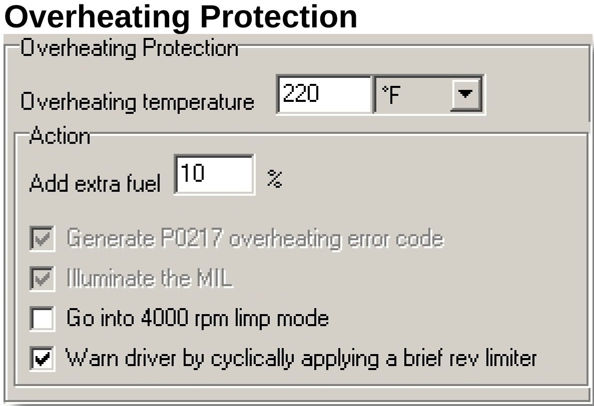
The cold boost cut operates below the cold/hot transition temperature; the hot boost cut operates above the transition temperature. In this way the engine can be protected from boost when not fully warmed up.

When the boost cut is triggered fuel is immediately cut to the engine, as per the main rev limiter. When either engine speed falls below 2000 rpm or the throttle is released, the rev limiter is removed.

With a stock MAP sensor the maximum level for a boost cut is 10.5 lbs. This must be less than the maximum range of the MAP sensor (~11.3 lbs) so that the MAP sensor is capable of sensing when the manifold pressure exceeds the boost cut limit.

To disable the boost cut set the units to kPa and enter a value of 0 for both hot and cold boost cuts.

Overheating Protection



Overheating protection attempts to protect your engine from damage via overheating. Note that it will not prevent the cause of the overheating in the first place!

Overheating temperature is the temperature above which the engine is deemed to be overheating. Set this above the normal operating temperature of the engine.

If the engine temperature exceeds the overheating temperature, then one or more of the following actions are taken:

Add extra fuel - this enrichens the mixture in an attempt to cool the engine. Note that this will not usually cure the overheating condition.

Generate P0217 error code (engine overheating) - will generate an error code which can be read with KManager or an OBDII scan tool.

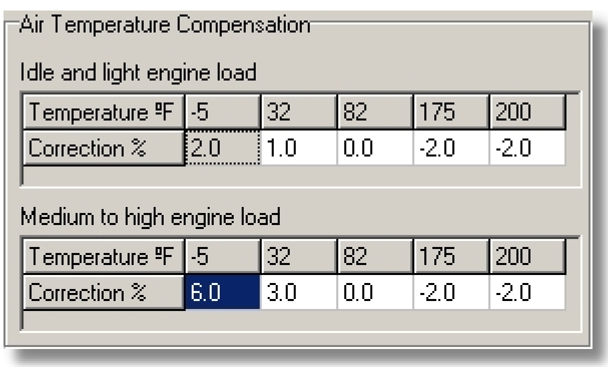
Illuminate the MIL - switches on the MIL (check engine light) when the engine over-heats.

Go into 4000 rpm limp mode (optional) - this will rev limit the engine to 4000 rpm. This is not recommended for race applications.

Warn driver by cyclically applying a brief rev limiter (optional) - this will briefly rev limit at around a 1 second interval. The rev limiter is very brief and the driver will feel this as a slight hesitation, especially under full power. Idle and low load running is not affected.

6.6.8 Compensation Table Parameters

Air Temperature Compensation



Air Temperature Compensation

Idle and light engine load

Temperature ºF	-5	32	82	175	200
Correction %	2.0	1.0	0.0	-2.0	-2.0

Medium to high engine load

Temperature ºF	-5	32	82	175	200
Correction %	6.0	3.0	0.0	-2.0	-2.0

The air temperature compensation tables determine how the ECU alters the amount of fuel delivered based on the intake air temperature. There are two air intake temperature compensation tables; one for low load and idling conditions and another for medium to high load. As a guide the low load table is used below 3500 rpm at light manifold pressure, 2000 rpm at medium manifold pressure and 1000 rpm at high manifold pressure.

The compensation tables have two rows - temperature and correction factor. The temperature is measured in degrees Fahrenheit. A higher correction factor will increase the amount of fuel delivered, a lower correction factor will decrease the amount of fuel delivered.

Theory of Air Temperature Compensation

Air density decreases with increasing temperature, so the corresponding amount of fuel needs to be less with hotter intake air temperatures. The calculation for the change in density (and theoretical change in fuel) is :

```
Density ratio = Temp 1
```

```
Temp 2
```

Both temperatures are measured in degrees Rankin (= degrees F + 459.67) or degrees Kelvin (= degrees C + 273)

e.g. if the air intake temperature changes from 80 degrees to 100 degrees, the air density change is 80 + 460 / 100 + 460 = 0.964 = -3.6 %

However in practice the fuel requirements of the engine are different from that calculated from the above air density calculation. In practice the decrease in engine fuel requirements is less than what the change in air density would suggest. What happens is that the speed of sound increases as the air temperature increases, and the engine will flow slightly better. Generally the air temperature compensation needs to be slightly less than half that calculated from the change in air density.

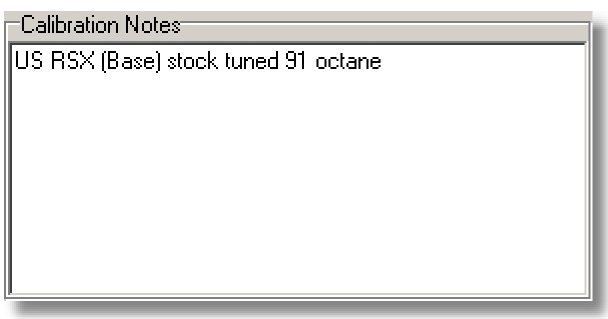
Tuning the Air Temperature Compensation Tables

The engine behaves differently at light load than high load, which is why there are two tables to tune the air temperature compensation. Generally at idle and light load the engine requires almost no reduction of fuel at higher air intake temperatures.

For the medium/high load table a rough guide of 1 % reduction in fuel for every 10 degrees F increase in air intake temperature. At high air intake temperatures it is usually best to not reduce the fuel as much, in order to cool the engine with a richer mixture.

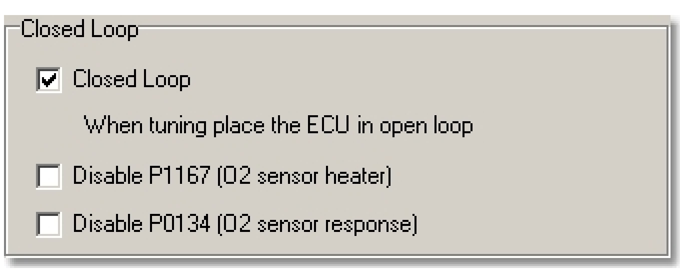
6.6.9 Notes Parameters

This allows you to enter notes about the calibration.



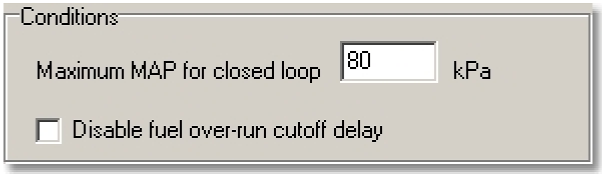
6.6.10 Closed Loop Parameters

These parameters control closed loop operation.



Disable closed loop while tuning. Otherwise the ECU will adjust the air/fuel ratio resulting in an inconsistent air/fuel ratio.

Disable P1167 and P0134 DTCs for race vehicles without a primary oxygen sensor.



Maximum Map for closed loop - this determines the maximum engine load for closed loop.

Disable fuel over-run cutoff delay - this disables the 0.5 second delay between closing the throttle and the fuel injectors being shut down under over-run conditions. Disable this if you experience a hesitating while shifting with large injectors or see the short term fuel trim go sharply negative while shifting.

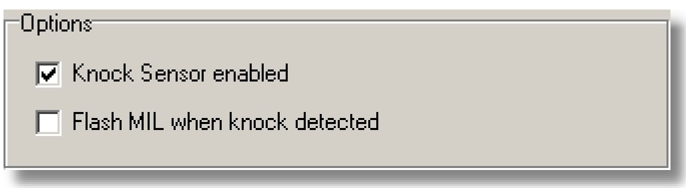
6.6.11 Idle Parameters

Idle speed parameters.

Sets the hot idle speed.

6.6.12 Knock Sensor Parameters

Knock sensor parameters.

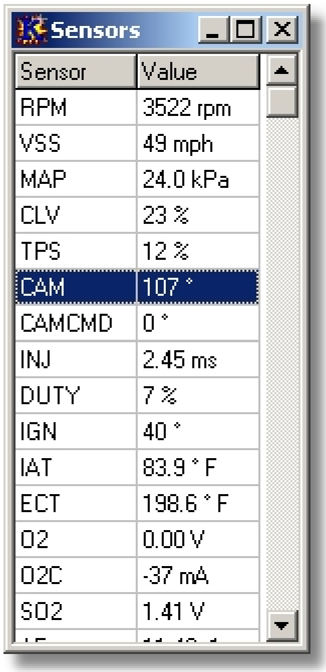


Always enable the knock sensor.

Flashing the MIL (check engine light) when the ECU detects knock will help alert you if the engine is knocking.

6.7 Sensor Window

The sensors window displays a list of sensors, which are updating when datalogging or while displaying a recording.



Sensor units can be changed from the Sensor Setup window.

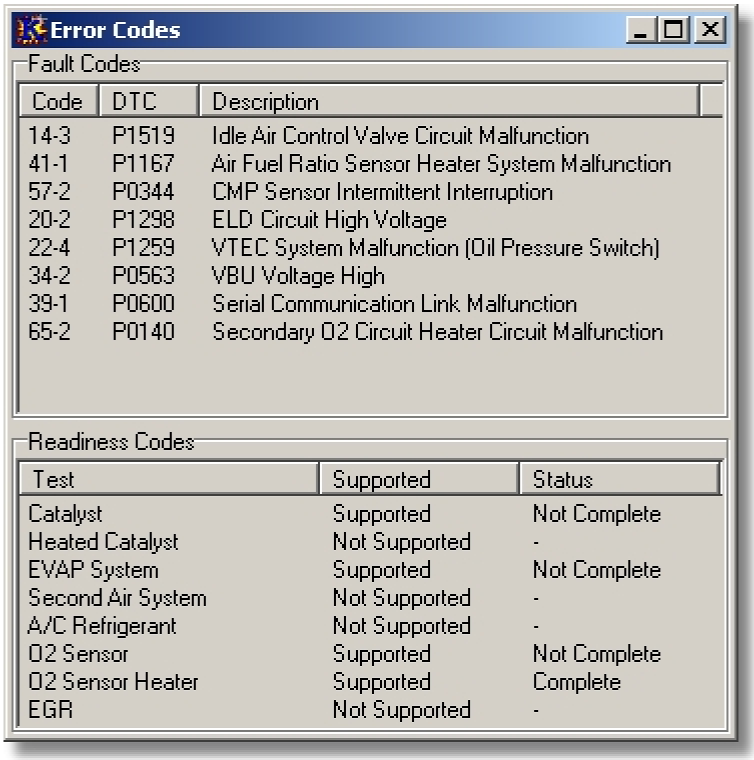
6.8 Display Window

The display window shows some sensor values in a large font. It is useful while dynoing to monitor the engine parameters.

To alter what is shown in the display window see Settings Window

6.9 Error Codes Window

The error codes window lists fault codes (error codes or DTCs) and readiness codes from the ECU.



Fault Codes

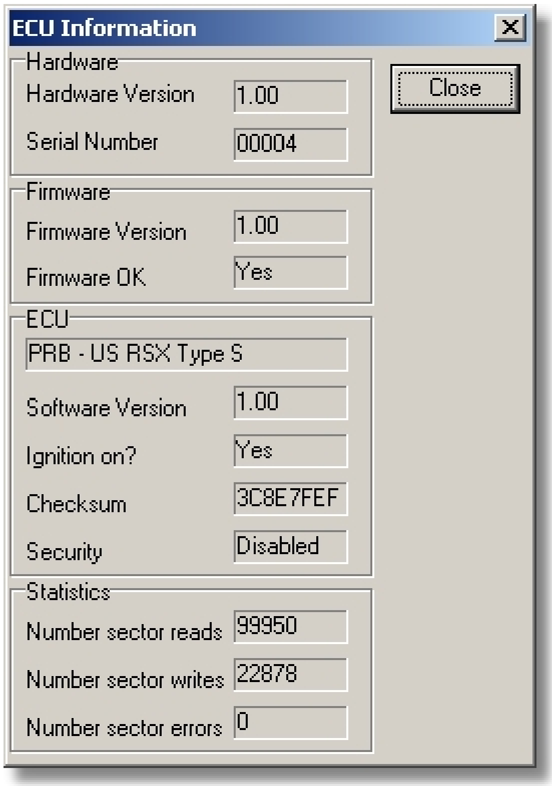
Fault codes are error codes from the Honda ECU, and usually indicate a problem with a sensor or wiring in the vehicle. The Honda ECU does not store temporary DTCs so only stored DTCs are shown. Fault codes are stored once the ignition is switched off. Fault codes may be cleared using the Clear DTCs command.

Readiness Codes

Readiness codes indicate which OBDII tests the ECU supports and the status of those tests. The Honda ECU does not support all tests. Readiness codes are reset to 'Not Complete' when the Clear DTCs command is used. Readiness codes may be marked as 'Complete' using the Set Readiness command.

6.10 ECU Information Window

The ECU information windows shows information from the ECU.



Hardware
The hardware version and serial number from the Hondata programmer inside the ECU.

Firmware
The firmware version and status from the Hondata programmer inside the ECU.

ECU
The ECU type, software version and information on the security status.

Statistics
Information on the number of reads, writes and errors from the Hondata programmer inside the ECU.

7 Commands

7.1 Download

The download command will download the current calibration from the ECU.

7.2 Clear DTCs

The Clear DTCs command clears any fault codes from the ECU. Also see Error Codes Window.

7.3 Set Readiness

The Set Readiness command sets all readiness codes to 'Complete'. Also see Error Codes Window.

7.4 Updating KPro firmware

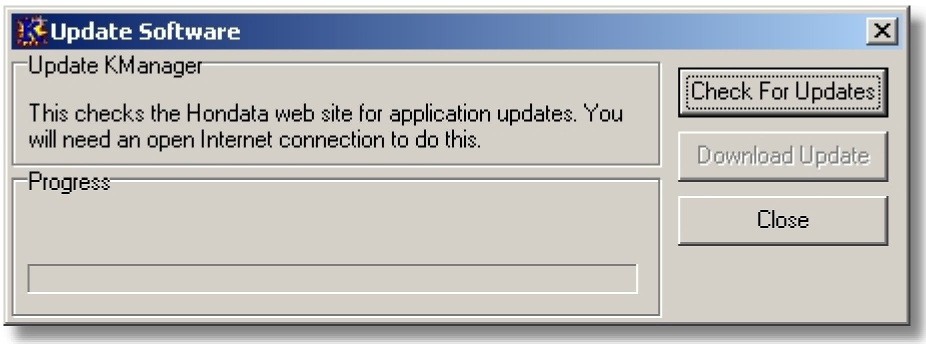
Only do this if instructed to do so by Hondata.

This updates the firmware in the programming board located inside the ECU. The process takes about 2 minutes. The vehicle ignition does not need to be switched on. **Please do not interrupt the update process**, otherwise the programming board will need to be sent back to Hondata for re-programming.

7.5 Check for Updates

This command checks for updates on the Hondata website.

Important: When installing updates make sure that the ECU is not plugged into the PC.



Updating KManager will update the KManager application, ECU software and the base calibration files.

If you do not have Internet access on the tuning PC, then you will need to download updates from the Hondata website, transfer the update files to the tuning PC, then run the update on the tuning PC.

8 Reference

8.1 Sensors

List of sensors used in KManager:

RPM - Engine speed
VSS - Vehicle speed sensor
MAP - Manifold absolute pressure
CLV - Calculated load value
TPS - Throttle position sensor
CAM - Intake cam advance
CAMCMD - Target intake cam advance
INJ - Injector duration
DUTY - Injector duty cycle
IGN - Ignition advance
IAT - Intake air temperature
ECT - Engine coolant temperature
AF - Air/fuel ratio
AFCMD - Target air/fuel ratio
S.TRIM - Short term fuel trim
L.TRIM - Long term fuel trim
Fuel Status - Fuel system status

K Retard - Knock retard
K Level - Knock level
K Thres - Knock threshold
K Count - Knock count
PA - Atmospheric pressure
BAT - Battery voltage
ELD - Electrical load
PTANK - Fuel tank pressure
RVSLCK - Reverse lock solenoid
BKSW - Brake switch
ACSW - Air conditioning switch
ACCL - Air conditioning clutch
SCS - Service connector switch
EPS - Electric power steering
FLR - Fuel pump relay
VTP - VTEC pressure switch
VTS - VTEC spool valve
FANC - Radiator fan clutch
MIL - Malfunction indicator light

8.1.1 RPM

RPM is a measure of the engine speed in revolutions per minute calculated from the crank position sensor.

Note that the RPM as displayed in KManager may be different from that shown on the tachometer. The rpm calculated from the ECU is extremely accurate whereas most tachometers read 5-10 % over.

8.1.2 VSS

Vehicle **S**peed **S**ensor

VSS is a measure of the vehicle ground speed, calculated from the VSS sensor, which is located on the transmission. Because the speed of the driven wheels is measured, wheel slip and wheel spin are not compensated for.

8.1.3 MAP

Manifold **A**bsolute **P**ressure

The MAP sensor measures the air pressure inside the intake manifold, after the throttle plate. On supercharged vehicles it is important for the MAP sensor to read manifold pressure after the supercharger.

8.1.4 CLV

Calculated **L**oad **V**alue

CLV is a measurement of engine load expressed as a percentage of maximum load. The sensor is mainly for OBDII compatibility.

8.1.5 TPS

Throttle **P**osition **S**ensor

The TPS measures the angle of the throttle plate. Is is mainly used for detecting idle and fail-safe functions. The ECU mainly uses the MAP sensor when calculating engine load and fuel/ignition settings.

8.1.6 CAM

Intake Camshaft Position

This is the intake camshaft position, measured in degrees of crankshaft rotation from a base position. For the first 10 seconds after startup the intake will be locked in the zero (fully retarded) position.

8.1.7 CAMCMD

Intake camshaft command

This is the desired position for the intake camshaft, based on the cam advance table and engine running conditions. Because the VTC mechanism is a closed loop feedback system, the actual intake camshaft advance make lag the CAMCMD by 0.1 - 0.5 seconds.

8.1.8 INJ

Injector Duration

This is the injector duration for an injector, usually measured in milliseconds. The injector duration is for #1 injector.

8.1.9 DUTY

This is the injector duty cycle. 100% means the injector is fully open (it never closed) and cannot deliver any more fuel. The injector duration usually reaches it's maximum near peak power. Normally it best to upgrade the injectors and/or the fuel system once the duty cycle reaches 80-85%

Remember that different driving conditions may place further demands on the fuel system from when the engine was tested. e.g. colder weather will require more fuel from the injectors.

8.1.10 IGN

This is the ignition timing in degrees before top dead center.

8.1.11 IAT

Intake **A**ir **T**emperature

This is the temperature of the air measured in the intake pipe. For forced induction it is recommended to move the IAT so that it reads the temperature of the air after the supercharger or turbocharger. An OBDI IAT is compatible with the K-Series ECU.

8.1.12 ECT

Engine Coolant Temperature

This is the engine coolant temperature as measured in the cylinder head.

8.1.13 AF

Air/Fuel Ratio

The air/fuel ratio is calculated from the stock lambda sensor. Note that JDM, USA and some other vehicles have a semi-wide band sensor, with a range of approx 11.5:1 to 30:1 European spec vehicles utilize a narrow band sensor, with a range of 14.5 - 14.9:1.

8.1.14 AFCMD

Air/Fuel ratio command

The air/fuel ratio command is the target air/fuel ratio as determined by the ECU. Note: The A/F CMD is ignored when the ECU is operating in open loop.

8.1.15 S TRIM

Short term fuel trim

The short term fuel trim is used only in closed loop in modify the fuel delivery to the engine in order to keep the air/fuel ratio close to stoichiometric, which is the optimum air/fuel ratio for catalytic converter operation. Normally short term fuel trim should be within the range of -10% to +10%, otherwise the fuel maps need to be tuned at part throttle.

8.1.16 L TRIM

Long term fuel trim

The long term fuel trim is the fuel adjustment based on the trend of the short term fuel trim. Normally the long term fuel trim should range from -5% to +5%.

8.1.17 Fuel Status

The fuel system status shows the status of the closed loop operation of the ECU.

Common values are:

- Open - Cold
  The ECU is operating in open loop because the engine is cold or has just been started.
- Open - Error
  The ECU is operating in open loop due to an error code.
- Open - Driving Conditions
  The ECU is operating in open loop due to driving conditions. Usually this is based on rpm, TPS or MAP.
- Closed Loop
  The ECU is operating normally in closed loop.

8.1.18 K Retard

This is the amount of ignition retard in degrees resulting from knock detected from the knock sensor or a calculated retard based on expected driving conditions.

8.1.19 K Level

This is the processed noise from the knock sensor expressed in volts. Note that this is not the actual voltage of the knock sensor, rather it is a relative voltage from 0 - 5V.

8.1.20 K Thres

This is the knock level voltage threshold where the ECU will consider the engine is knocking.

8.1.21 K Count

Knock **Count**

This knock count is a counter of any knock event which the ECU detects. The counter is reset each time the ECU is reset, either by switching the ignition off or when a calibration is uploaded.

8.1.22 PA

Atmospheric **P**ressure

This shows the atmospheric pressure. The atmospheric pressure sensor is located inside the ECU.

8.1.23 BAT

Battery Voltage

This shows the battery voltage.

8.1.24 ELD

Electrical **L**oad **D**etector

This shows the current draw on the battery/alternator from the vehicle.

8.1.25 PTANK

Fuel **Tank P**ressure

The fuel tank pressure for OBDII diagnostics.

8.1.26 RVSLCK

Re**v**er**s**e **L**o**ck**up Solenoid

The reverse lockup output controls the reverse lock solenoid, located on the transmission. This solenoid is switched above approximately 25 mph to prevent the shift mechanism from travelling to the reverse gear plane. Only 6 speed transmissions have reverse lockout.

8.1.27 BKSW

Bra**k**e **Sw**itch

This shows the status of the brake switch.

8.1.28 ACSW

Air **C**onditioning **Sw**itch

This shows the status of the A/C switch. Note that the A/C switch is read via the multiplexor.

8.1.29 ACCL

Air **C**onditioning **Cl**utch

This shows the status of the A/C clutch output. Normally the A/C clutch is switched from the A/C switch, with a slight time delay to allow the engine to idle up before the A/C compressor is engaged.

8.1.30 SCS

Service **C**onnector **S**witch

This shows the status of the service connector switch, which is activated by shorting two terminals on the scan tool plug.

8.1.31 EPS

Electric **P**ower **S**teering Switch

This shows the status of the electric power steering input.

8.1.32 FLR

Fue**l** Pump **R**elay

This shows the status of the fuel pump relay. Normally this is active for the first 2 seconds after the ignition is switched on, or when the engine is running.

8.1.33 VTP

VTEC **P**ressure Switch

This shows the status of the VTEC pressure switch. Normally this will activate shortly after the VTEC spool is switched on. Some JDM engines do not have the VTEC pressure switch.

8.1.34 VTS

VTEC **S**pool Valve

This shows the status of the VTEC spool valve. If switched on, oil is directed to the lock pins between rocker arms to engage the high speed cam lobe.

8.1.35 FANC

Radiator **Fan C**lutch

This shows the status of the radiator fan clutch.

8.1.36 MIL

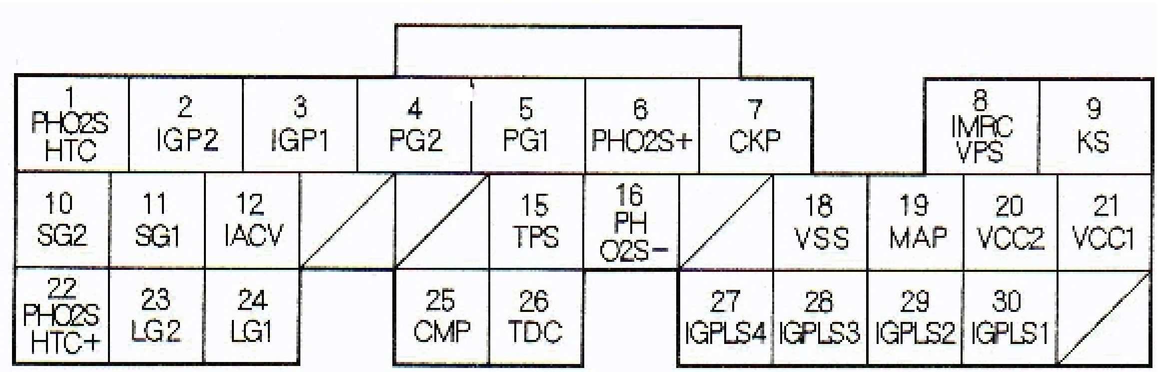
Malfunction **I**ndicator **L**ight or check engine light.

The MIL is located in the instrument cluster, and indicates that there is a problem with the engine, ECU or wiring. It is normal for the MIL to illuminate for 2 seconds when the ignition is first switched on. By shorting out a diagnostic connector it is possible to retrieve error codes from the ECU by counting flashes from the MIL. With the programmable ECU it is easier to plug in a laptop and datalog the ECU to retrieve the error codes.

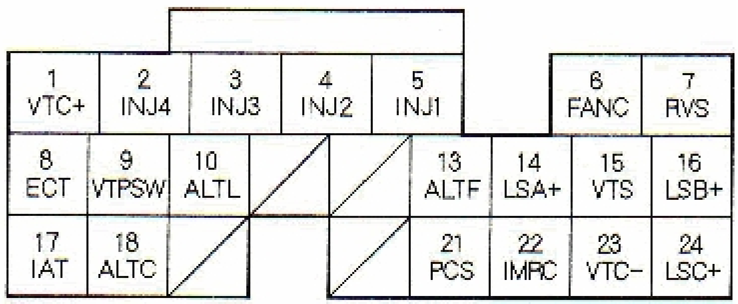
8.2 ECU Connectors

All connectors are shown from the wire side of the female connector (i.e. looking at the ECU).

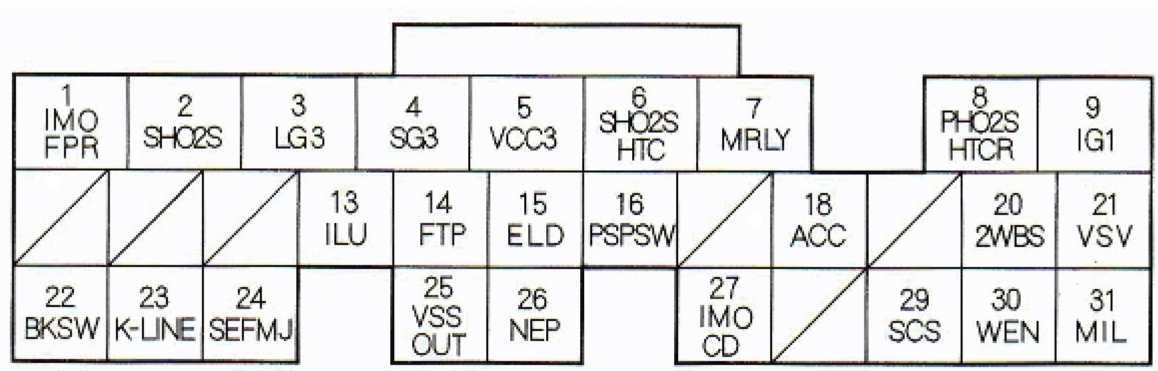
A Connector



B Connector



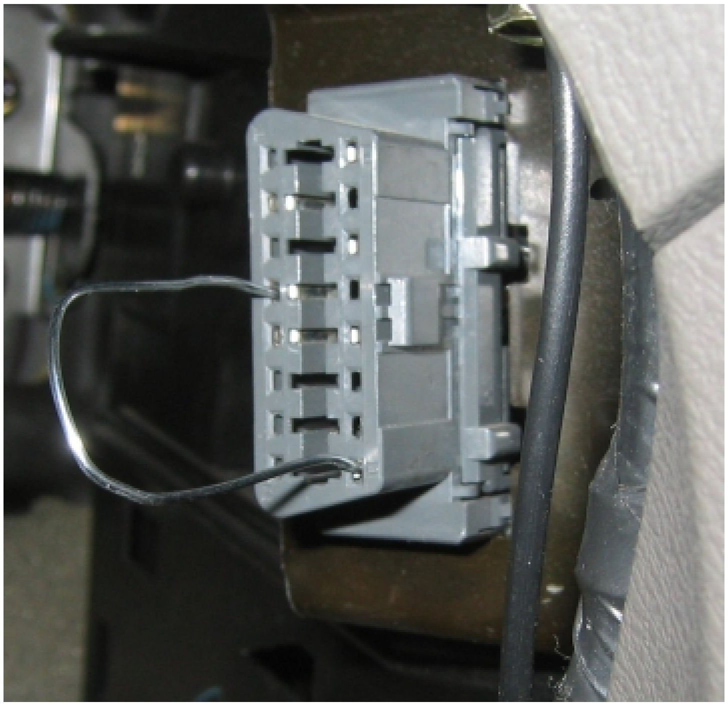
E Connector



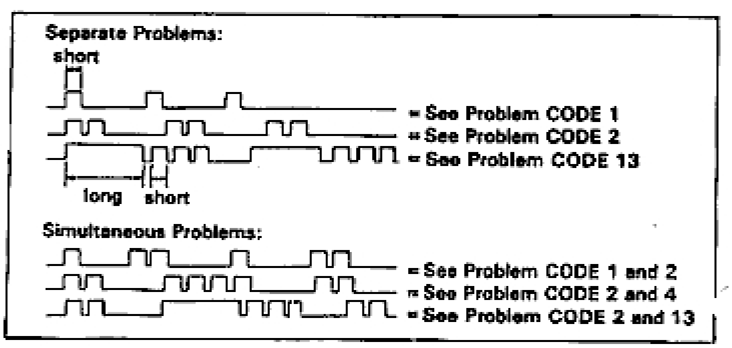
8.3 Retrieving DTCs

To manually retrieve DTCs (trouble codes or error codes), you will need to jumper the OBDII connector.

The OBDII connector is located in front of the centre console near the drivers foot well. Jumper pins 4 and 9 together with a small piece of wire or paper clip.



The MIL should start to flash out error codes. To interpret the MIL flashes, count the number of long flashes and multiply by 10, then add the number of short flashes. The resulting DTC code can be referenced in the Honda service manual.



9 Troubleshooting

9.1 USB troubleshooting

Background

When the ECU is connected to your PC for the first time, Windows detects the ECU and will ask for a device driver. If Windows cannot find a driver for the device and you click the default "Finish" button or click on "Disable the device," then Windows lists the ECU as a "USB Device" under "Other devices" and Windows will never prompt you again to install the driver. If this happens then KManager will not be able to communicate with the ECU.

When installing in Windows XP, Microsoft issues a warning that the software "has not passed Windows Logo Testing to verify its compatibility with Windows XP." If you choose to stop installation here, then Windows lists the ECU as a "USB Device" under "Universal Serial Bus Controllers."

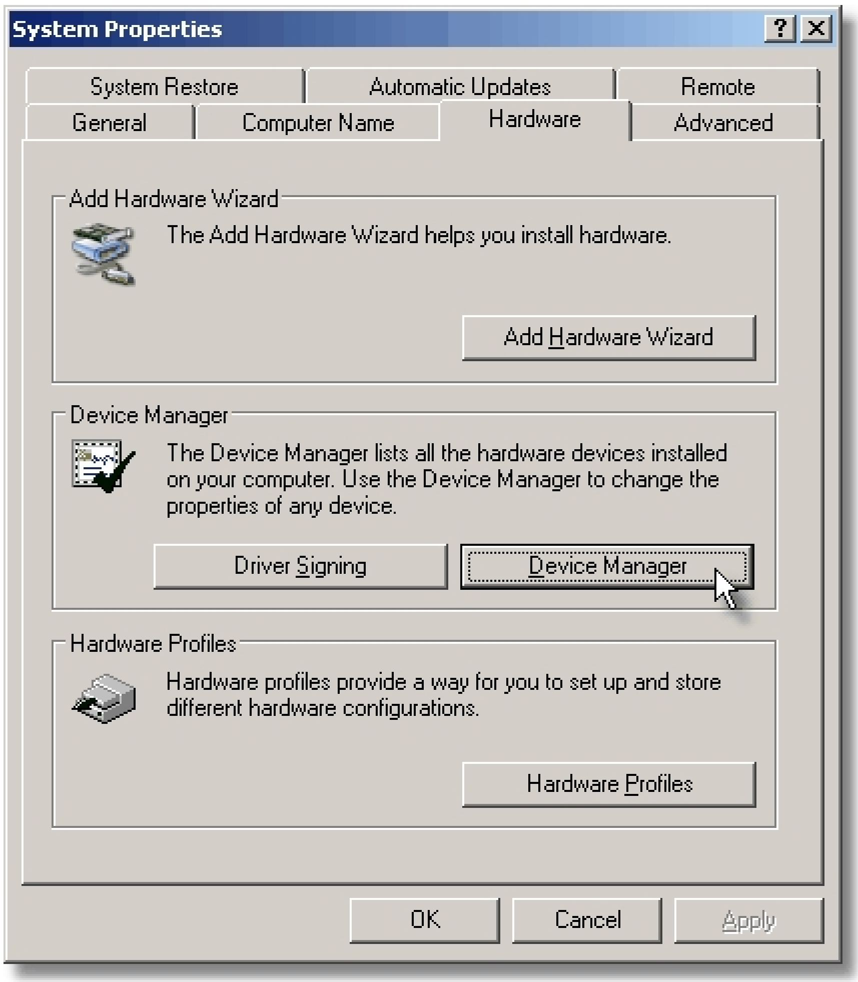
Hints

- Most problems are caused by plugging in the ECU before installing the software. Unplug the ECU, install the software, then follow the instructions below to update the drivers.
- Plug the ECU directly into the laptop/computer, not via a USB hub. Some USB hubs cannot supply enough power for the ECU.
- Under Windows 2000, you must be logged in as Administrator or have sufficient privileges to install device drivers.

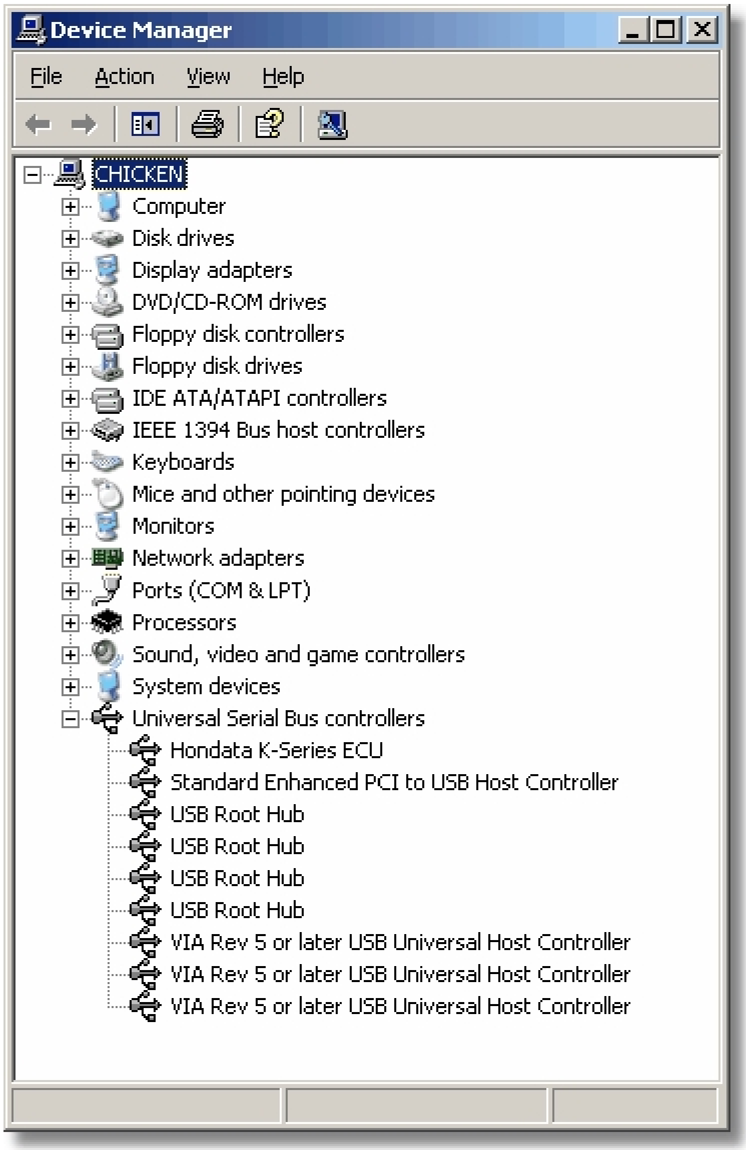
Trouble Shooting Procedure

1. Open the System Properties. To do this right click on My Computer and select Properties, or press <Windows Key> and <Pause/Break>.

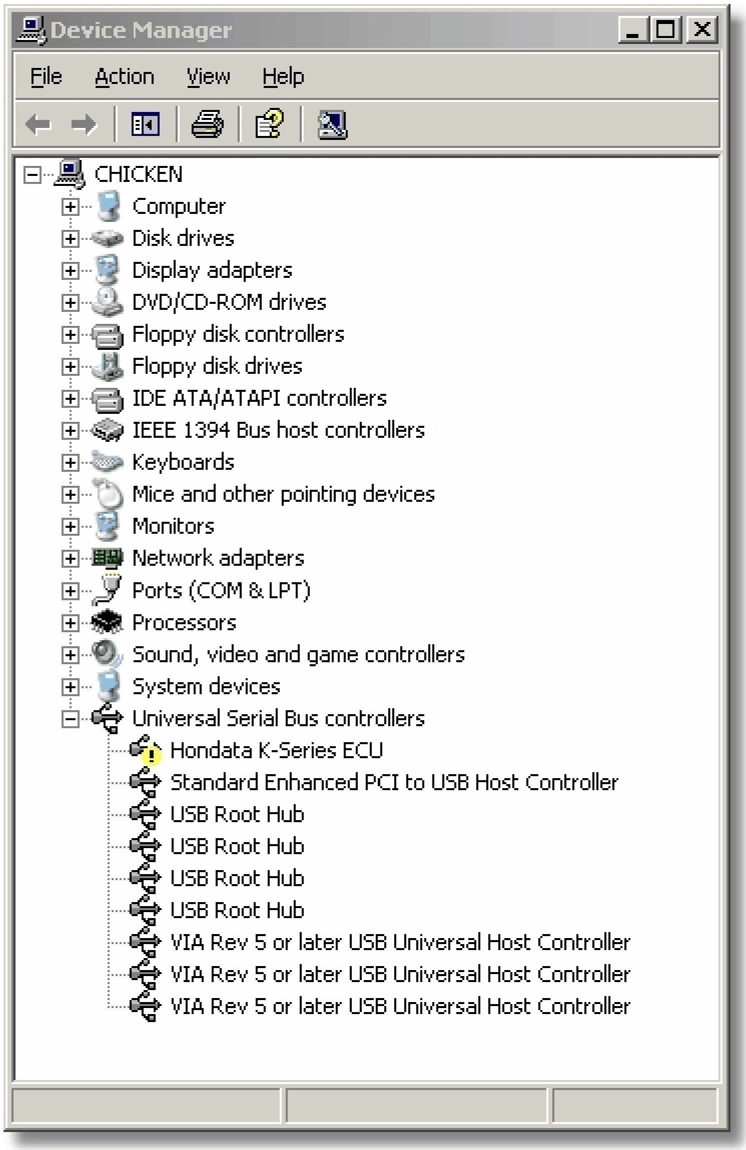
2. Open the Device Manager.



3. Click on the + to the left of Universal Serial Bus controllers to show the USB devices connected to the computer. There should be an entry *Hondata K-Series ECU*.



4. If there is a yellow icon next to the entry for *Hondata K-Series ECU*, then the USB drivers are not properly installed. Right click in *Hondata K-Series ECU* and select *Update Driver...*. Follow the instructions as per installing the USB drivers.



5. After the drivers are updated, the yellow exclamation mark should disappear from next to 'Hondata K-Series ECU'.

If you still have problems with the USB driver, reboot into safe mode, open the device manager and remove all copies of 'Hondata K-Series ECU' and any other unknown devices.

9.2 Programmer troubleshooting

There are red and green LEDs next to the USB connector on the top of the programmer board. To view the programmer status LEDs remove the ECU case.

Green LED	Red LED	Meaning
On	Off	Normal operation when not connected to KManager.
On	Flashing	KManager communicating with the ECU normally.
On	Flashing/Solid	KManager programming the ECU or datalogging.
Flashing	On	Fault with programmer board - see Updating KPro firmware
Off	Off	If the ignition is on then there is a fault with the programmer board or ECU socketing.

Index

- A -

- B -

- C -

- D -

- E -

- F -

- G -

- I -

- K -

- L -

- M -

- N -

- P -

- R -

- S -

- T -

- U -

- V -

- W -