Syvecs LTD

V1.1

Technical Manual

This document is intended for use by a technical audience and describes a number of procedures that are potentially hazardous. Installations should be carried out by competent persons only.

Syvecs and the author accept no liability for any damage caused by the incorrect installation or configuration of the equipment.

Please Note that due to frequent firmware changes certain windows might not be the same as the manual illustrates. If so please contact the Syvecs Tech Team for Assistance.

Support@Syvecs.com

SSuite User Guide

Installing the software

In order to modify the calibration on your devices the SSuite package must be installed. This can be obtained from www.syvecs.com/forums under Software or from your local trader.

Install the SSuite package onto your computer and 6 Programs will appear:

- **SCal**   -Used to adjust the maps in the ECU (Calibrate it)
- **SCfg**   -Used to setup the data logging (Configure which channels/events to log)
- **SData**   -Used to read data logs from the ECU
- **SView**   -Used to view and interpret data logs
- **SMon**   -Used to monitor live ECU parameters
- **SMsg**   -Used to monitor ECU status and debug messages

Please note: New releases of software and firmware are often released to apply new features and upgrades, be sure to check the website or with the Tech team at Syvecs for these update changes.
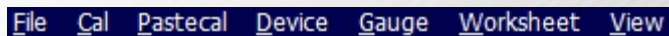

Connecting to Devices

Connecting to Syvecs Devices is done via the Ethernet cable which will either be supplied with your Plug and Play boards or part of a harness adaptor made for your car.

When the ECU is powered and the Ethernet cable is plugged into the car you should notice a private IP being created. To double check it is talking to the ECU check that the local area network is sending and receiving data.

The User Interface

All the Syvecs applications share a common graphical user interface (GUI). It broadly follows the Microsoft Windows GUI guidelines, but with some key differences.

Main MenuBar

File   Cal   Pastecal   Device   Gauge   Worksheet   View

The MenuBar operates in a very similar way to a Windows Menu. The main difference is that no <Alt> key is required to activate each popup. *Just press the relevant underlined Letter to open the menu desired (F for File, C for Cal, etc...).*

General information about the current calibration is displayed to the right of the last button on the MenuBar. The fact that no <ALT> key is required makes one handed operation easier which is important when the other hand is holding the laptop hosting the application. In general thought has been given to using the applications without a mouse for the same reason.

File / Directory Selection

The standard windows file selection dialog box has not been used (this may be available in future as a preference). File selection is via a simple menu which displays the contents of a single directory along with menu entries to navigate the directory structure, other drives and the windows desktop. This menu is intended to be quick to operate without a mouse.

Working Directory

The Syvecs suite of programs are designed to automatically manage calibrations, logged data and logging setups within a directory tree specific to the current activity. Options are provided to sort files based on vehicle and/or date. Once the working directory has been selected (from any of the applications), all applications will perform load and save operations to appropriate directories automatically.

 Working directory is the base directory where data for the Syvecs applications will be stored and accessed.

Working Directory Behaviour

This provides options to sort the data generated with the applications. It displays each device that has been accessed in the past, with options to edit and assign a name and or suffix. Name applies to the device directory and suffix normally applies to logs.

SCal

This application is used to configure a device. It does this by altering the devices calibration. This calibration can be edited live while connected to a device or edited offline then programmed into a device.

MenuBar

File

N	New
L	Load
S	Save
T	saveTo
F12	QuickSave
C	Close
U	User Update
B	Build calibration
I	Import
M	coMpare
W	Working Directory
E	Working Dir Behaviour
D	Dump Dashs/Msgs to Disk
G	Global Options
A	About
X	eXit

- Create New Calibration
- Load Calibration
- Save Calibration
- Select Directory to Save Calibration to
- Saves the calibration and Programs the Ecu at same time
- Closes the Calibration
- Area where users with limited access can update unrestricted maps
- Method for building calibrations from several partial Calibrations
- Option to Import Calibration Settings from another file to existing
- Compare Files (RECOMMEND TO USE PASTECAL, See Below
- Select the directory where calibrations and logs are saved on host pc
- Change the behaviour of how calibrations and logs are saved
- Dumps the Dash/Message area values to .txt file in Working Directory
- Change options on colours and layout
- About current software version
- Exit Software

Cal

O	Open Windows Explorer
P	PassPhrase
C	Comment
U	Usage
I	change Identity
W	Warnings Menu
S	edit Shortcuts
F	edit property Flags
V	change software Version
A	change user Access
L	reset all Learn maps

- Opens Windows Explorer tab
- Allows user to set password for Calibration and logging
- Ability to Set comments in the calibrations
- Shows usage of calibration
- Change Login identity for software
- Allows users to be able to remove warning flags set quickly
- Users here can set keyboard shortcuts to popular calibrations
- Can set Warning, Locked or Restricted flags to different calibrations
- Option to Change Firmware levels of existing open Calibration
- Ability to set different levels of user access for end users or tuners
- Resets all the learn maps

PasteCal

Function which allows comparison of Calibration files and importing of branches or specific maps

L	Load
C	Close
D	Description
I	Import branch
T	import branch and Tag

- Load the calibration you wish to compare against
- Close the compared
- Ability to Set comments in the calibrations
- Shows usage of calibration
- Change Login identity for software

Device

C	Connect
D	Disconnect
P	Program
Z	Program defaults (ERASE)
E	Errors
F11	Clear Errors
M	Clear Messages
F	Clear Fuel Consumption
L	Logbook
A	Clear Distance Accumulator
T	Set Real Time Clock
V	View Sync Log
S	Sensor Corrections
X	Playback

- Connects to Device (Ecu, Dash, PDU)
- Disconnects to Device (Ecu, Dash, PDU)
- Programs the Ecu (stores into Memory all the changes)
- Erases the calibration on the ecu completely
- Shows Error present on ecu
- Clears errors present on the ecu
- Clears messages on the ecu
- Clears Fuel consumption
- View Logbook(Shows peaks, Min and averages of parameters)
- Clears distance travelled counter
- Sets ECU Clock from Host computer clock
- View the Crank and Cam Waveforms during crank and errors
- Set the groups of sensors corrections
- Playback recorded calibration adjustments (engine dyno use)

Gauge

A	Add
R	Remove
X	Remove All
N	New Layout
O	Overwrite Layout
D	Set Default Layout
P	Preferences

- Add a gauge at bottom of the screen for monitoring
- Remove the highlighted gauge
- Removes all the gauges
- Save the gauge layout currently on the screen
- Overwrite a saved gauge layout
- Set a layout as the default so opens on starting software
- Preference to change gauge properties

Worksheet

Function which allows users to setup a custom worksheet so that certain calibrations can all be views at same time

N	New
S	Save
O	Overwrite
A	Add Cal
R	Remove Cal

- Open a new blank worksheet
- Saves the current worksheet layout
- Overwrites the current worksheet layout
- Add a calibration to the worksheet area
- Remove the selected calibration for the worksheet area

View

T	Menu Tooltips
N	* Normal
I	hide Invalid maps
L	hide Locked maps
U	hide Untagged maps

- Option to open a Quick view of the calibration when hovering over the map
- Shows the calibration branch in default view with all maps visible
- Option to hide invalid set maps
- Option to hide locked maps
- Option to hide untagged maps

The Calibration Tree

Once a calibration has been loaded or a connection to an ECU has been established the calibration tree will appear. Branches can be opened and closed by hitting the <Return> key or by double clicking with the left mouse button. Individual maps are selected in the same way. The keys affecting the menu are:

<Up>	Up one line
<Down>	Down one line
<Page Up>	Up one page
<Page Down>	Down one page
<Home>	Top of menu
<End>	Bottom of menu
<Plus>	Expand all branches in menu
<Minus>	Collapse all branches in menu
<Return>	Open/Close branch or select calibration for editing
<Shift> + <F2-F8>	Define shortcut
<F2-F8>	Shortcut – go to map and edit

The Map Editor

Calibrations can be viewed graphically, textually, or both together. This is selected via the options menu on the top right of the software.

The last setting used for each map is remembered. The mouse can be used to select cells in all of the editors. Pressing <ESC> or selecting the ESC button in the editor's menu bar closes the editor and returns to the calibration tree.

<Left>	Left one cell
<Right>	Right one cell
<Up>	Up one cell in 3D and 4D maps
<Down>	Down one cell in 3D and 4D maps
<Page Up>	Up one layer in 4D maps only
<Page Down>	Down one layer in 4D maps only
>	Rotate anti-clockwise in 3D and 4D maps only
<	Rotate clockwise in 3D and 4D maps only
<Return>	Bring up cell value editor dialog
A	Toggle area select mode

<Plus>	Increase cell value
<Minus>	Decrease cell value
<Shift>	Hold shift and use arrow keys for alternate area select
U	Undo previous edit
<Ctrl> + C	Copy selected cells
<Ctrl> + V	Paste selected cells
O then F/C	Switch between Fine and Course map adjustments

Miscellaneous Keystrokes

<F1>	Toggle HELP display
Z	Traverse backwards edited maps
X	Traverse forward in window history
<Space>	Freeze/Unfreeze

Basics Functions in Scal
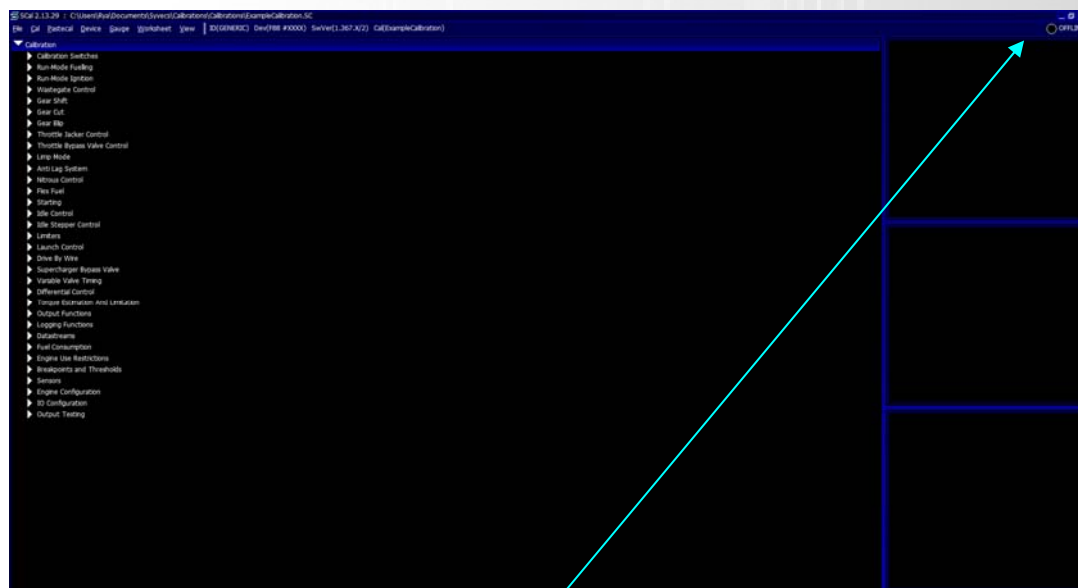
Making a connection to the ECU

In the sub menu for **Device** you find the option **Connect**. Select this and Scal should find your Device. Once this device is found it will ask you how you want to access this File. Select **OK.**

You should now see the Ecu status in the top right change to Connected and a Green light will be present.

If you are connected, the Calibration list should be presented as below
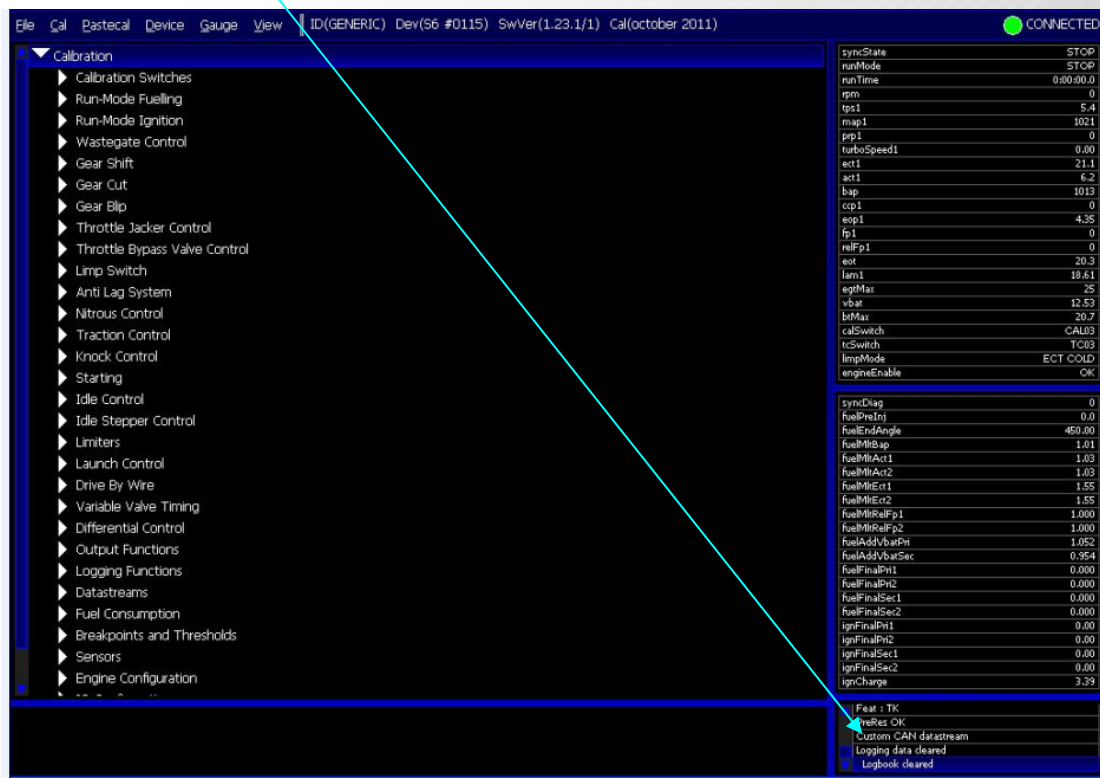
If you are having problems connecting to the Device contact the Syvecs tech team on Tech@Syvecs.co.uk

Loading a Calibration

Once connected to the unit you first need to click on the **F**ile button in the top menu and then select **L**oad. You will then be asked if you want to Program a Disk Calibration, select Yes at this option, from here find the map file you wish to load. If the map is greyed out it means that the calibration software level and the Ecu Firmware don't match. The software level can be found at the top of the map when opening offline, see below.

The Ecu Firmware level will be shown when you first connect to the Ecu before the calibration tree is present, see below
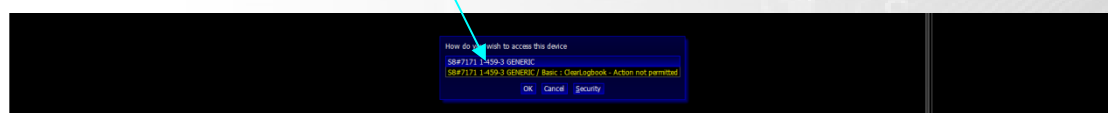
There are 2 Options here: First change the firmware level of the Ecu to Match the Map Software level (See Firmware Update below), Second Option is to Import a Calibration (See Importing a Calibration Below)

Once the Software Level and Firmware Level match it will state Calibration Flashed Pass OK after selecting the Map from Load.

Importing a Calibration

In some cases you may want to import a calibration instead of loading it.

If that is the case, just select "**F**ile" and "**I**mport", select the calibration you are willing to import and ALWAYS click Tag as it will flag all the maps you need to check as they didn't import fully. Make sure the values are correct as with newer firmware some of the tables may not be populated properly.

Also check the I/O Configuration (At the bottom of the tree) and make sure any new items added in Red and labelled Undefined are set to Not Connected by double clicking and selecting "NOT CONNECTED". Or assigned them to your configuration if needed.

IMPORTANT: If devices are not Assigned (Undefined) the ECU will connect but won't sync after you programmed it.

Saving a Calibration

Calibrations are saved in the "Working Directory" by default.

(This directory is created in "C:\{User Space}\Public\Documents\Syvecs".

To Save a Calibration select "**F**ile" and then "**S**ave". Create file name for the calibration. (It is a good practice to increment with version suffix so that you can reference any changes in the future.) This will save the calibration in the "Working Directory".

It is possible to change the default file location directory by accessing the "Working Directories" option. To do so select "**F**ile" and then "**W**orking directory". To access the working directories options Select **F**ile and then **W**orking directory

To save a calibration in an alternative location you can select "**F**ile" and then "**S**ave **T**o".

SSuite is capable of automatically creating directories based on device or date or user defined variables. To access these options select "**F**ile" - "Working Dir B**e**haviour". Keep in mind that session (date stamp) takes priority to device.

Programming the ECU (Store)

After changing vital setting in Scal like engine triggering setup, sensor setups, I/O changes and enabling of any controls you must always program the unit for the changes to be applied. These Vital Calibration are coloured Blue

Items which can be updated live at Green.

NOTE: Even items in Green needs to be programmed before you disconnect your laptop or it will not be saved!

To Program the Device, Select "**D**evice" and then "**P**rogram" (If the engine is running, you will be prompted to shut it off, this can be performed by selecting Yes when prompted)

After any tuning session it is important to program the unit and then check that everything has been stored correctly.

Firmware Update

Download the Latest firmware and open in without connecting the Ethernet from the Ecu. Click space bar to exit when no devices has been found and then close (this load the firmware template into Scal).
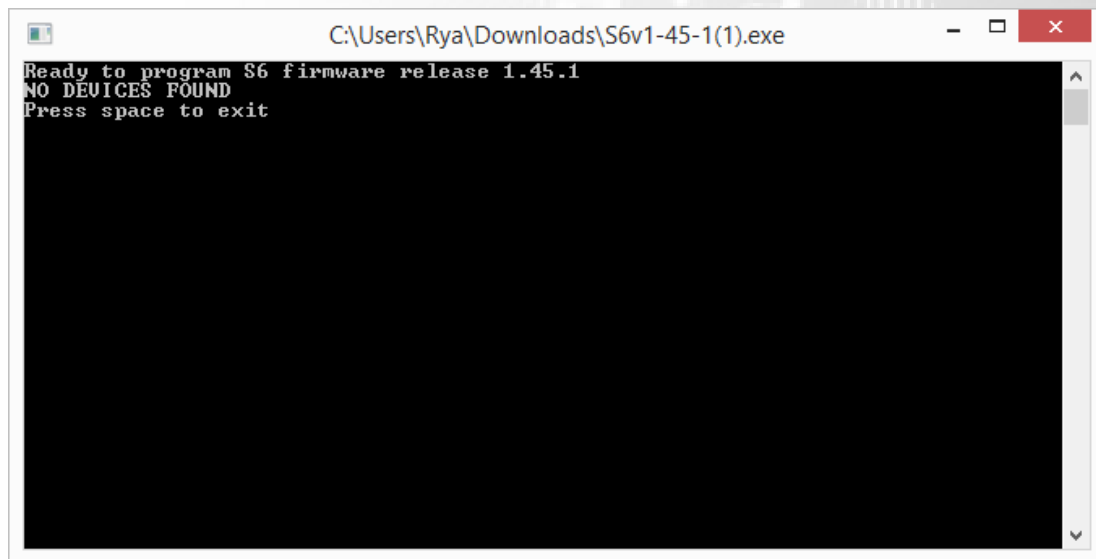

Now reconnect the Ethernet cable to the ECU and open SCfg – Click Device – Get Config Once loaded, click change software version. Select the Latest Firmware you have just ran the .exe for and then once changed click File/Save and rename so you can reload later.
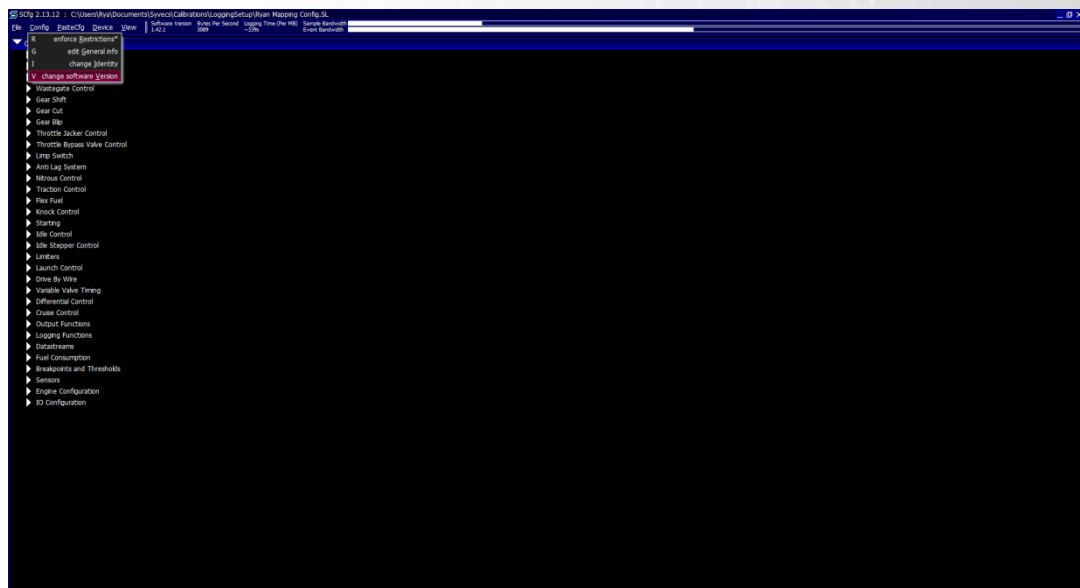
Next, Open Scal and click "**F**ile" – "**L**oad", choose your current map and let it open.

Then click Cal - Change Software version… select the latest firmware
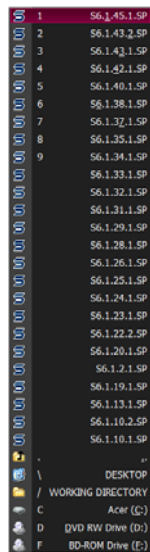
You will then be presented with this screen stating which calibrations copied over correctly and which didn't. ALWAYS click Tag as it will flag all the maps you need to check and make sure the values are correct.

They will be highlighted like below

Open up each section and check to ensure that the calibrations are correctly set.

Also check the I/O Configuration (At the bottom of the tree) and make sure any new items added in Red and labelled Undefined are set to Not Connected by double clicking and selecting "NOT CONNECTED".

Once done, Click File – Save

Close SCal

Now connect the Ethernet Cable, Reopen SCal and turn the Ecu power on.

Run the Firmware .exe file and follow the prompts. Before closing verify that the prompt is displaying "SUCCESSFULL" update. Close the update window.

Open SCal – and proceed with "**D**evice", "**C**onnect" … at the Prompt select LOAD

Choose the updated map and the Ecu will state Calibration Flash Passed. If it doesn't and says not connected, check the bottom right hand corner of screen to see what error is displayed.

After this, reopen SCfg, Select "**F**ile" and "**L**oad". Select the Config saved earlier and then Click "Device" and "Set Config".

It is recommended to set the time stamp at this point as well. That can be performed by selecting "**D**evice" and "Set real **T**ime clock". This will synchronize the log and log book time stamps with your computer.

Error Warning

Any Errors that have occurred on the Syvecs will be shown in SCal when first connecting and illustrated by the Device tag flashing as seen below.

Yellow = Intermittent Error which has occurred but is no longer present.

Red = Hard Fault Error which is current and needs to be resolved

To view the error log, select **Device** and **Error**. The following screen will appear.

This log states that the Throttle Position sensor was deemed out of its working voltage range set in the calibration. This can happen if a sensor is unplugged when the ECU is powered up.

Input and Output (IO) Setup

The **IO** of your calibration can be fully configured to match your Pin assignments used on your Connector. Certain restrictions will apply when configuring your IOs like trying to assign a PWM output for an Injector.

The **IO Configuration** table is found at the bottom of your calibration table depending on what firmware you are running. Firmware versions later than 1.10 have **Output Testing** below the **IO Configuration** table.
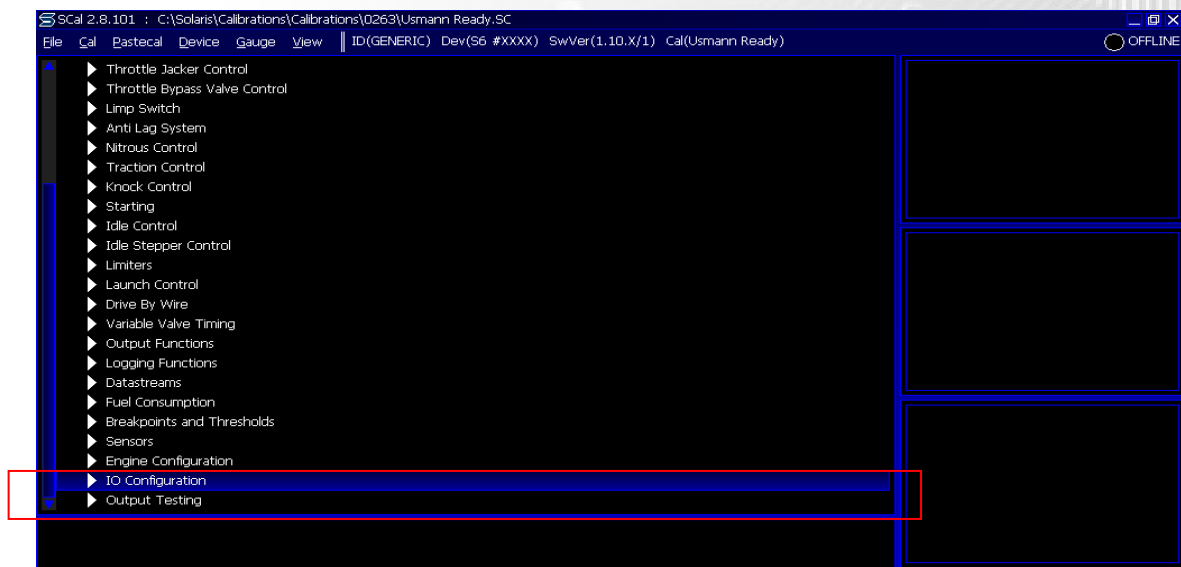
IO Configuration

After selecting **IO Configuration**, Select **Pin Assignments** the Full Input and output table will be displayed.
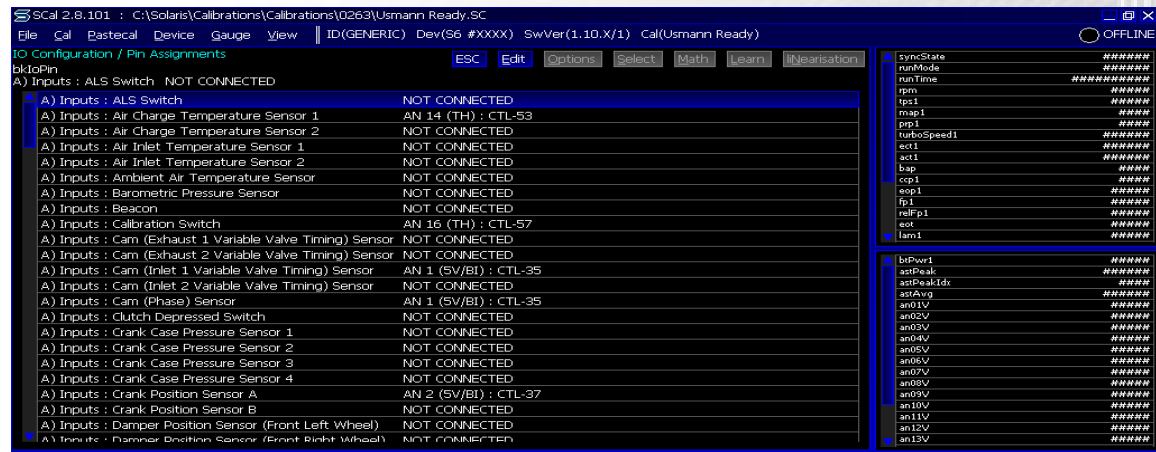
Pin Assignments

Assigning Items

The IO Configuration starts with all the potential input functions.

You need to select the appropriate item you want to use and then match to the Analogue (AN) input you used when populating your Device Connector. Some inputs can be assigned to more than one item on the Cam Options for example for the Phase Cam sensor and the VVT Cam Input.

The Output settings are found further down the list. They are set in the same manner but the assignments are PWM, Fuel and Ignition options.

Important Advice

PWM Outputs can drive 10A Peak / 5A Continuous

Fuel Outputs can drive 10A Peak / 5A Continuous

H Bridge Outputs can drive 10A Peak / 5A Continuous

Ignition TTL Ouputs can take 40mA of Current

Ignition IGBT Ouputs can take drive 10A Peak / 5A Continuous

PWM, IGN IGBT and Fuel pull to Ground on activation; IGN TTL Outputs apply 5v or 12v depending on jumper settings on board. (5v from Factory)

The CTL Number in the I/O Configuration don't relate to the pin on S6 connector!

To assign an Input or output choose the Assignment which matches the function you want to populate and double click or press enter on the item.

A window like below will be brought up

If the desired input or output pin is currently allocated, it will be displayed in RED. The WHITE items display unassigned (available) pins.

The Device needs to be programmed after any I/O Configuration change

Calibrating Sensors in SCAL

To configure the assigned sensors proceed to the "Sensor" tab in SCal.

Shown below.

This list shows all the available sensors and switches available on the device.

(Please Note: This list could get updated with new firmware releases)

Every Sensor's Function has a different list of options. For example, you can calibrate up to 4 oil pressure sensors but all of them have similar options listed which are explained below. Please note some sensor selections will have extra tabs for "Engine Trips" and "Limp". These are explained in section Calibration Engine Trips and Limps in SCal

Input Configuration

This configuration allows you to specify which type of input is required for the sensor required.

The configurations are listed below but please ensure the sensor is pinned into the right input type on the Ecu. See ASSIGNING SENSOR INPUTS

- *UEGO Lambda* – Select this option for controlling a lambda sensor which is driven direct from the ECU (NTK). If using a S6/S7 Plus ,the Denso and LSU4.9 is driven via a External circuit so set input as 5v.

- *K-Type thermocouple* – Select this option if the sensors you are setting up is a K- Type thermocouple.

- *5V* – Select this option if your sensor outputs 0-5v and does NOT require an input pull-up.

    - *Thermistor* – Select this option if the sensor you have outputs a 0-5v output but requires a pull-up.

- *5V Bipolar* – Select this option if the sensor you are installing creates a waveform which goes above and below the reference ground.

Default Voltage High

This configuration allows you to set a high voltage level above which the sensor is considered faulty and will set an Error in the ECU.

Default Voltage Low

This configuration allows you to set a low voltage level below which the sensor is considered faulty and will set an Error in the ECU.

Default Sensor Reading

This configuration is the default sensor reading that will be assigned to the parameters of the ecu if the sensor is considered faulty and will set an error in the ECU.

Filter Constant

This Option allows you to add a filtering level to the sensor 0% is no filtering 100% is full filtering. The Filtering is Serviced a 1khz

Failure Rate

This option allows users to set a failure rate percentage. When a sensors reading has gone out of the set voltage ranges the ecu default the sensor level to the select parameter but does not consider the sensor to be completely faulty until the failure rate percentage/seconds has hits the value set under this configuration.

Recovery Rate

This options sets level in which the failure rate percentage has to pass until the sensors is considered not faulty again. When this occurs the values on the input are used again instead of the default sensor reading value.

Linearization

A table is presented in this configuration which allows the user to select a sensors reading based on what voltage level is provide to the input. An Example is shown below showing how to set up for example an external lambda gauge output.

The external gauge states that at 0volt the wideband air/fuel ratio is 10:1 and at 5volts it is 20:1. The output is linear between this.

So at 0v it is set to 10:1 and at 5v it is set to 20:1, then these 2 points in the table and everything between these values are selected. Now to create a linear table between these points I have selected **M**ath and then **I**nterpolate.
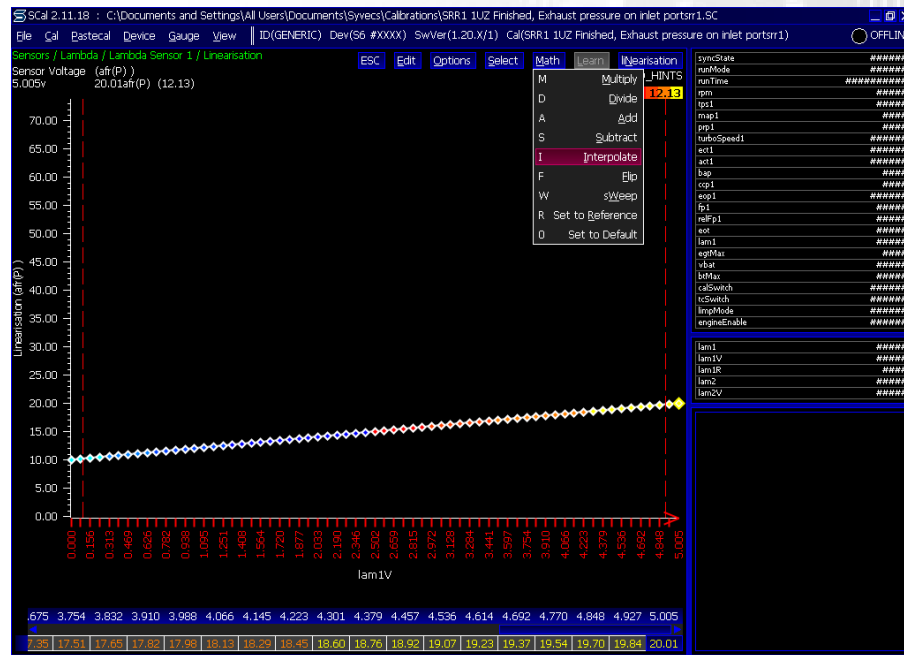
Sensor Database

The sensor database is a useful tool for saving known sensor Linearisations, this makes building a calibration easier in the future. The Syvecs Support team have already loaded a select of sensors into the database to also make calibrators life easier.

Install the Latest Software from our website to update the sensor database.

Loading a Sensor Linearization

Head to the Sensor area of the calibration tree and select a sensor you wish to setup.
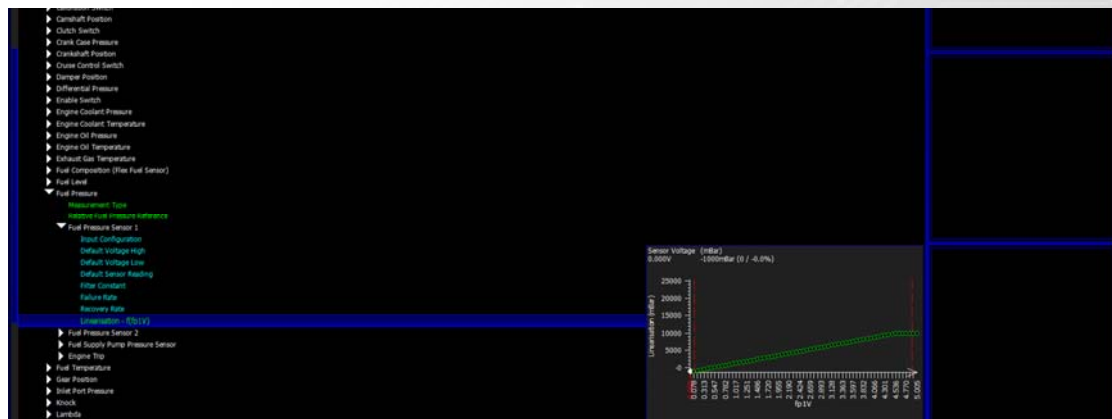
Select the Linearisation area of the Sensor setup and then again select the linearisation option in the top right hand corner of the screen. As Shown below

Select the SensorDB option at the bottom of the list – After select the Load Sensor option

The following window will then be presented

If the sensor you wish to use is present in this list then select the click Ok. After doing so you will notice the Linearisation of the sensor will have changed. Device – Program will then update the ecu to use these values for the sensor parameter.

The sensor you are using may not be present in the list so enter the values as specified by the sensor manufacture. After this it would be wise to save the Sensor in the SensorDB. Follow the steps below

Saving a Sensor Linearisation

Once the correct linearisation has been entered head up to the Linearisation section and select SensorDB again – Click Save Sensor, Enter the name and then click Ok

Calibrating Switches

Some functions of the S6 can be switched via the Cal switch but other functions like Air-Con request are switched signals that are needed to turn on certain outputs or functions on the ECU. All the Switched inputs can be found in the I/O Configuration but only a few are found in the sensor list. The others are found in the function area which it relates to. Example being Launch control switch input settings are found under **Launch Control** in SCal.

Switches found under **Sensors** have the following options.
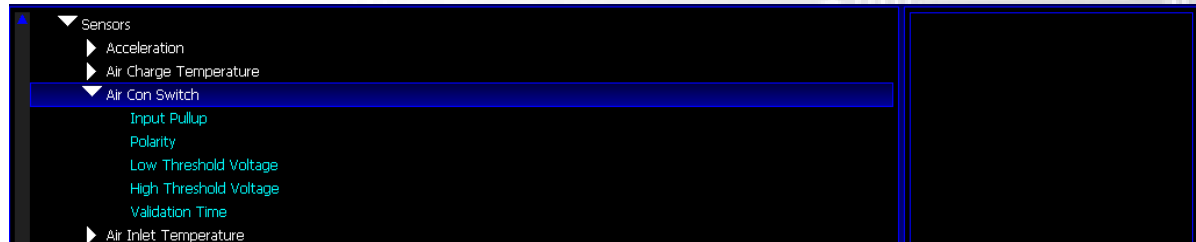
Input Pullup

This option allows you to provide a 5v pull-up on the input.

Polarity

Use this option to set which polarity is used by the ECU to recognise in what state the switch is considered ON. (See below to set the state thresholds)

Low Threshold

This value allows users to set the voltage level below which the input is considered in its low state.

High Threshold

This value allows users to set the voltage level above which the input is considered in its high state.

Validation Time

This option allows the user to set a validation time for which the voltage change must be stable to validate its position.

Calibration Switches Setup

Rotary/Calibration switches can be assigned to make changes to the calibration settings to the ecu when it is live and can also linked to the traction control and launch control strategies for additional adjustments.

Syvecs has developed Calibration switches which are designed to work specifically with the Syvecs range of ECUs, please contact your nearest trader for details.

After the Calibration Switch is installed (see wiring area) you need to assign the calibration switch in the I/O Configuration. It is required to calibrate the switch options before it is operational. That is performed under the "Sensors" menu.
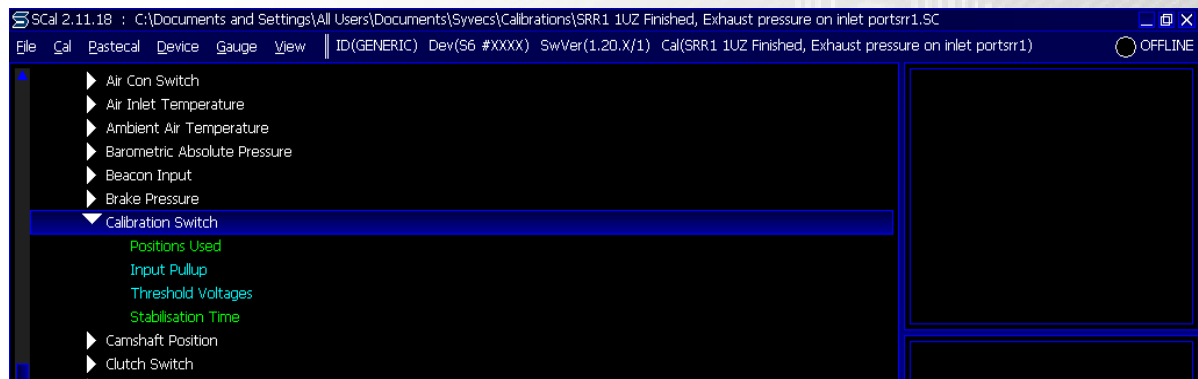
Positions Used

Sets the maximum number of positions on the rotary switch to be used. (Syvecs' switches can have a Max of 12).

Input Pull-up

Syvecs switches utilize diode chain and require a pull up. Resistive switches, if not externally powered, would require a pull up as well.

Threshold Voltages

The Syvecs Calibration switch uses the settings below, otherwise the voltage thresholds should be set slightly above the actual switch voltage for each position. (0.2V is usually a good starting point)
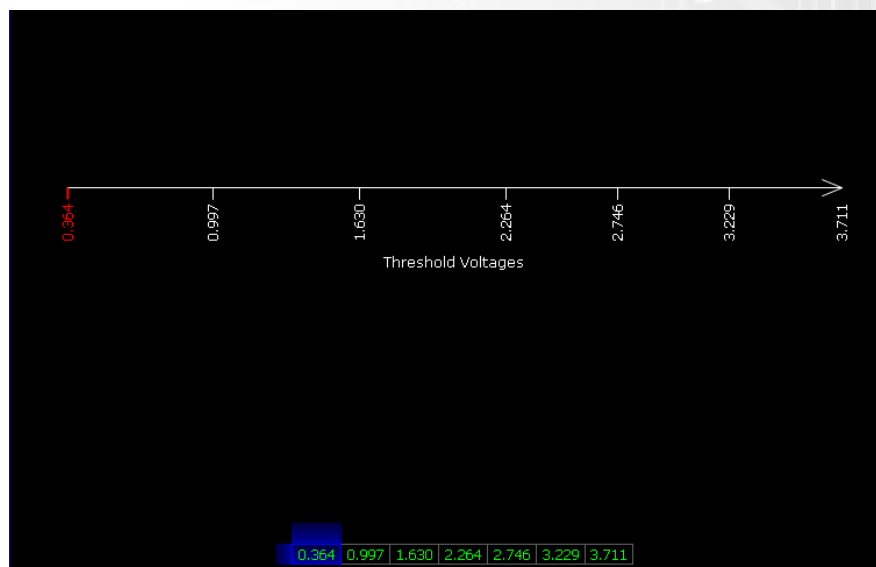
Stabilisation time

When a voltage change has occurred on the CalSwitchV input it has to wait this amount of time before the new position is adopted.

Calibrating Engine Trips/ Limps

One of the best features on the Syvecs is the engine protection strategies via the Engine trips and limps on certain sensors.

The following Sensors allow you to set trips and limps:

- Crank Case Pressure

- Engine Coolant Temp

- Coolant Pressure

- Engine Oil Pressure

- Engine Oil Temp

- Fuel Pressure

- Lambda Sensor

To manage these trips and limps, refer to the sensor you wish to configure for protection under **Sensors** in SCal. You will then be able to choose what trips you want for a specific sensor.

Warm up Limps

Warmup limps can be used to limit the engine Load and RPM until operating temperature has been reached. Currently the following sensors are capable of WarmUp limp:

- Engine Coolant Temp

- Engine Oil Temp
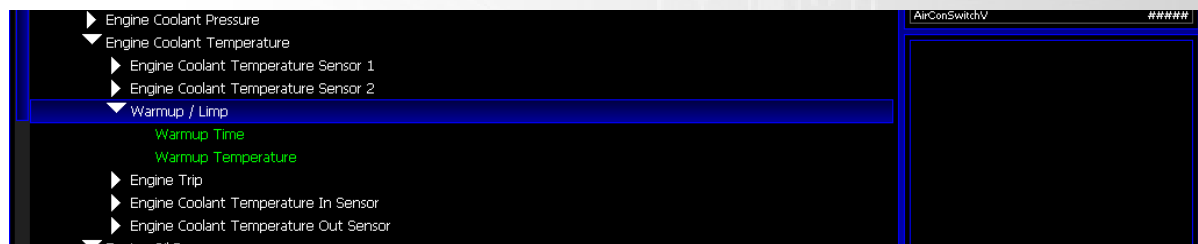
Warm-up Time

This configures the minimum amount of run time that needs to pass before the engine can operate normally. If this time is exceeded the limp will turn off regardless of the temperature threshold.

Warm-up Temperature

This configures the minimum temperature that needs to be reached before the engine operates normally. Warm-up time will supersede this option and enable normal operation even if this threshold has not been reached.

Engine Trips

Select the Sensor from the list above which you wish to provide an engine trip to and then scroll down to the **Engine Trip** Option as shown below.
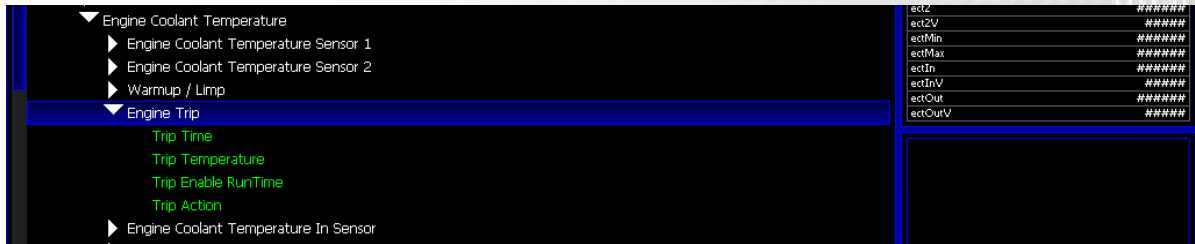
Trip time

The time it takes for the trip action to take action once the trip enable threshold has been exceeded

Trip Temperature/Pressure

Specifies the parameter level in which the trip will occur.

Trip Enable RunTime

The trip will be inactive for this amount of RunTime since start.

Trip Action

Allows the user to set what action will occur if the trip become active.

Please Note that the Trips can be overridden through the Cal Switches Options on engine trips as Shown below:
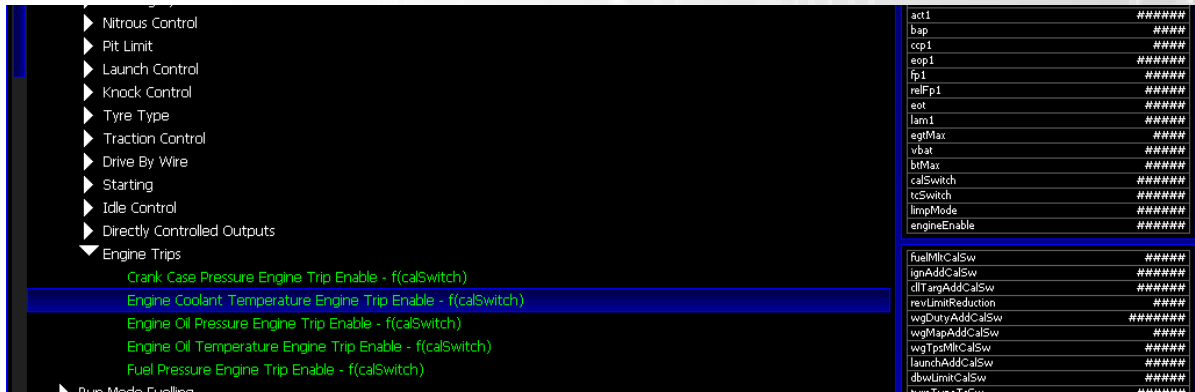
Configuring Output Functions

Configuring external outputs can automate certain function that may otherwise require additional equipment or user interaction. For example triggering electric fans On or Off.

The output function list is a selection of popular functions but these functions do not have to be used for the Description they are currently given in the list. For example you could use the Water Injection Out to trigger an IC Spray relay.

IMPORTANT: Fuel and PWM Outputs from the Syvecs Ecu Range pull to Ground (Active Low) and that the current limits for the Fuel and PWM output pins on the Ecu are 10A. If the external item you want to drive draws more than 10A please trigger the item through a Normal relay or, a Solid State relay if you are providing a PWM to the item.

S6 IGN TTL Outputs are <u>LOW CURRENT and ACTIVE HIGH</u>

Do not connect them directly to anything that is either

a) inductive

b) likely to draw more than 40mA.

This means no ignition coils [unless they have built in igniters], no relays, no bulbs etc. They are designed to drive the inputs of igniters or other buffers. Things like OEM fuel pump controllers, the Syvecs DBW H-Bridge driver, LEDs are all fine. If you must drive a load that is either inductive or requires a lot of current then you need to use a buffer. A single channel igniter module would work fine. Solid State Relays are probably fine. CDI Amplifiers are probably fine [depending on type, see below].

In addition to this the outputs are Active High Push Pull; that means when they are On the pin is driven to +5 or +12 (selectable by solder bridge on the board) and when Off they drive the pin to 0V. This is different when compared to the INJ and AUX outputs which connect the relevant pin to PWRGND when On and open (do not drive the pin) when Off. Any CDI ignition amplifier must be able to fire on the *FALLING* edge; if the amplifier is supposed to connect where the OEM coil would have been then it will expect rising edge and will not work if connected directly [use the car's igniter between the ECU and CDI to invert the signal]. Some CDI modules allow the edge to be configured, it may be possible to connect them directly to the ECU by setting them to falling edge trigger.

To Configure an Output after it has been assigned in the I/O Configuration you need to connect to the ECU and Navigate down to *Output Functions*

The Selection of functions will be presented in front of you and will match up to the Output you assigned in the I/O Configuration. All of the functions have different options to suit the required task they are set for and include threshold triggers for certain parameters. Set these to as needed.

External Devices which demand more current than the S6 Outputs can handle like Fuel Pumps, Electric Fans etc need to be switch via a Relay or a Sold State relay if you wish to control the speed of them as shown below.

Relay
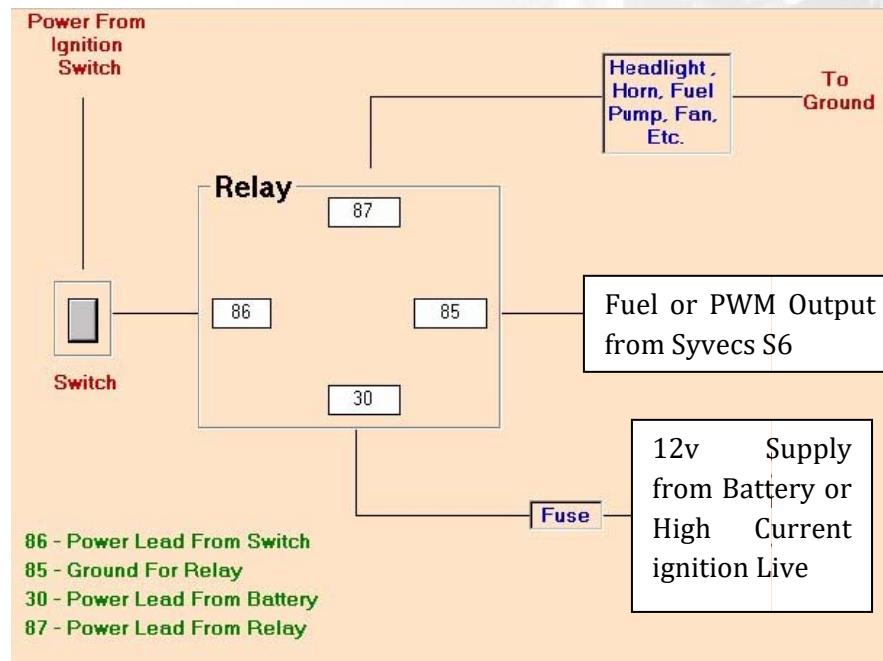
Solid State Relay
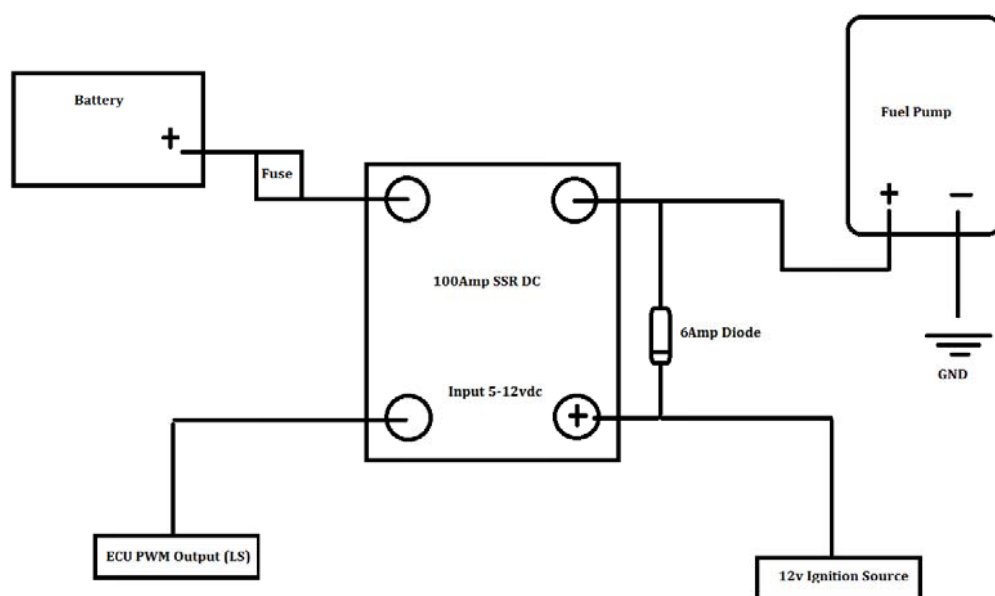
Output Testing

The Output testing on the Syvecs is an excellent feature for fault finding and testing the wiring is correct.

You can test the outputs of all the Fuel, Ignition and Pulse Width Modulated outputs to ensure that allocated I/O configuration is correct.

First you need to ensure the ECU is powered up and that you are connected live to the ECU in SCal. Once this is done refer to the *Output Testing* menu.
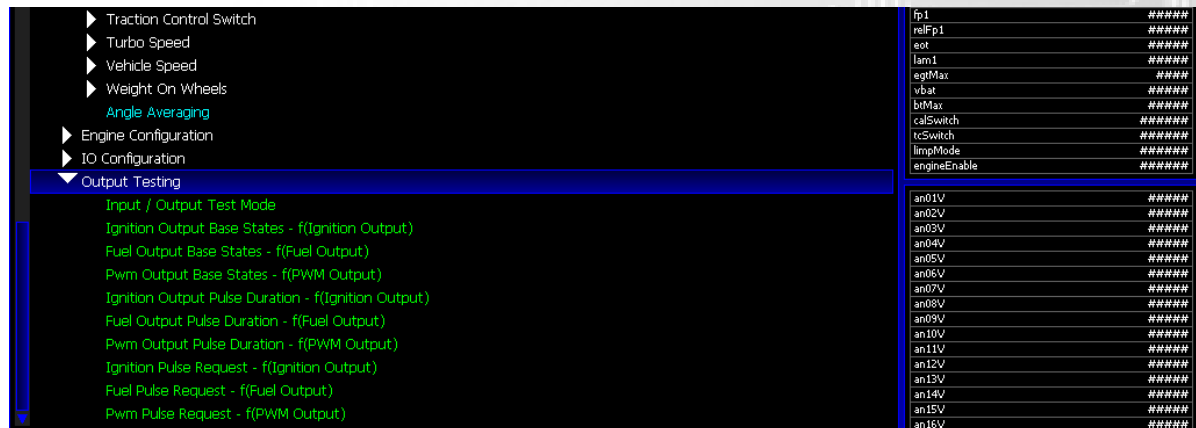
Please Note: If you are running a firmware version earlier than 1.19.1 you need to upgrade the firmware to have the Output Testing option available

Before enabling the Output test mode please read the below to ensure you understand how to use the output testing feature and that none of the output base states are enabled.

Input/Output Test Mode
Enable/Disable the output test mode.

Ignition Output Base State
This area allows you to set a continuous state to the Ignition outputs I.E The output is turned on 100% until the base state is turned off again.

> **WARNING: A Coil will fail if turned on constantly!!! Use Ignition Pulse Request to test for spark!!!**

Fuel Output Base State
This area allows you to set a continuous state to the Fuel outputs I.E The output is turned on 100% until the base state is turned off again

PWM Output Base State
This area allows you to set a continuous state to the PWM outputs I.E The output is turned on 100% until the base state is turned off again

Ignition Output Pulse Duration
Sets the time the Ignition output pulse request is active for. It is usually around 3ms for testing a spark.

Fuel Output Pulse Duration

Sets the time the Fuel outputs pulse request is active for. Usually around 5ms for testing an injector spray.

PWM Output Pulse Duration

Sets the time the PWM outputs pulse request is active for.

Ignition Pulse Request

Allows users to request a Pulse on Ignition outputs based on the Pulse duration set by pressing either + or -

Fuel Pulse Request

Allows users to request a Pulse on Fuel outputs based on the Pulse duration set by pressing either + or -

PWM Pulse Request

Allows users to request a Pulse on PWM outputs based on the Pulse duration set by pressing either + or –

Setting up Monitoring Gauges

Monitoring gauges are useful in the SCal software to keep an eye on important parameters when calibrating. You can also set warning on these gauges to prompt you when unusual parameter values occur.

To Add Gauges to your SCal worksheet, select **G**auges and then **A**dd. A list will be brought up of all the parameters that are viewable.

The easiest way to find a parameter is to start typing the gauge item. For example to find Lambda type **lam**.

Once you have found the item you want to view select it and press OK.

Now you will be asked how you want the Gauge to be displayed. Select how you would like to view it and then select the frequency to want to monitor that parameter at.

The Gauge will then be shown similar to the picture below and you can add as many as your screen can feasibly fit.
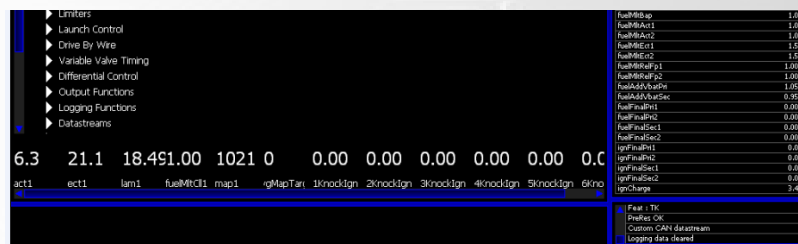
You can save the layout. To do this, select **G**auges and then **N**ew Layout. You will be prompted to enter a name for the layout and then select Ok. To recall it later, select **G**auges and navigate to the desired layout. The default layout will be displayed every time SCal restarts.

WorkSheets (Custom Layout)

Many calibrators prefer unique layouts when tuning and the worksheet option in Scal is a perfect tool for allowing user configurability.
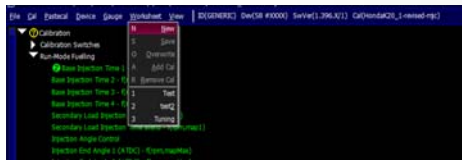
As default no worksheets are setup but to get started is very simple, Click the worksheet tab from the Main Menu Structure and select New.

You will then be presented with a blank worksheet, to start adding calibrations click worksheet – add Cal
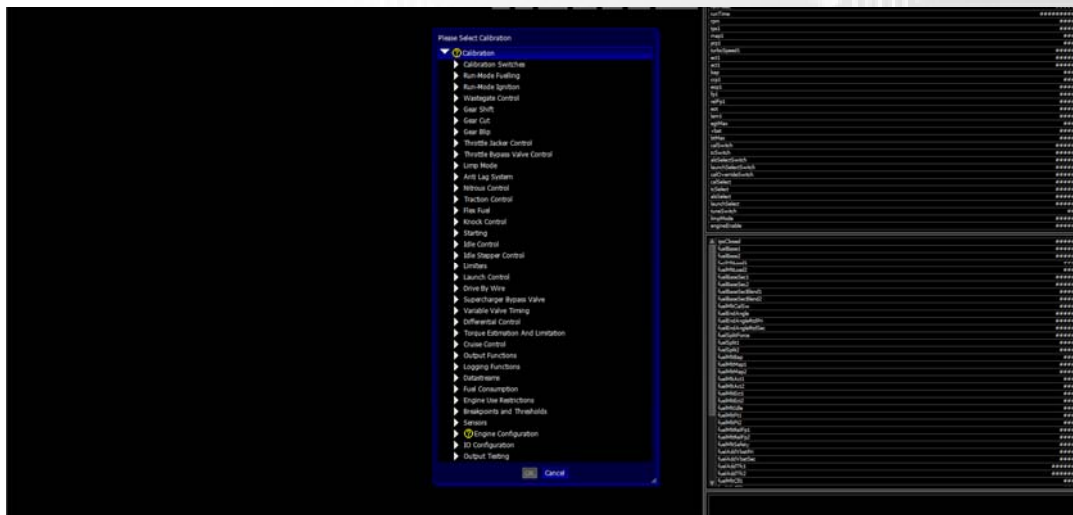
Once you have select a Calibration, it will then be presented in your worksheet as shown in the picture below.
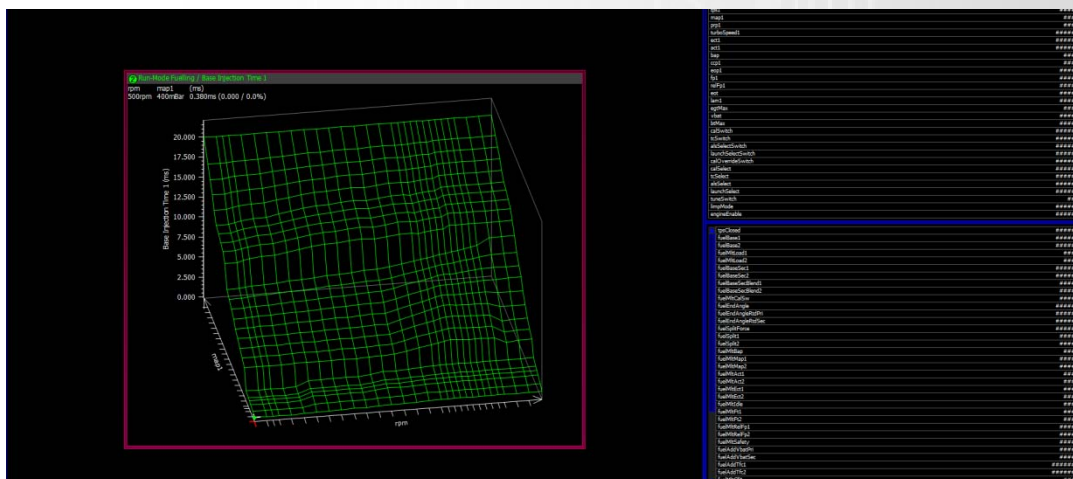
Users can now move the Calibration window to any section of the worksheet by click at the top of the box and dragging it. You can also resize the table by selecting a corner of the box and dragging it to a size you wish.
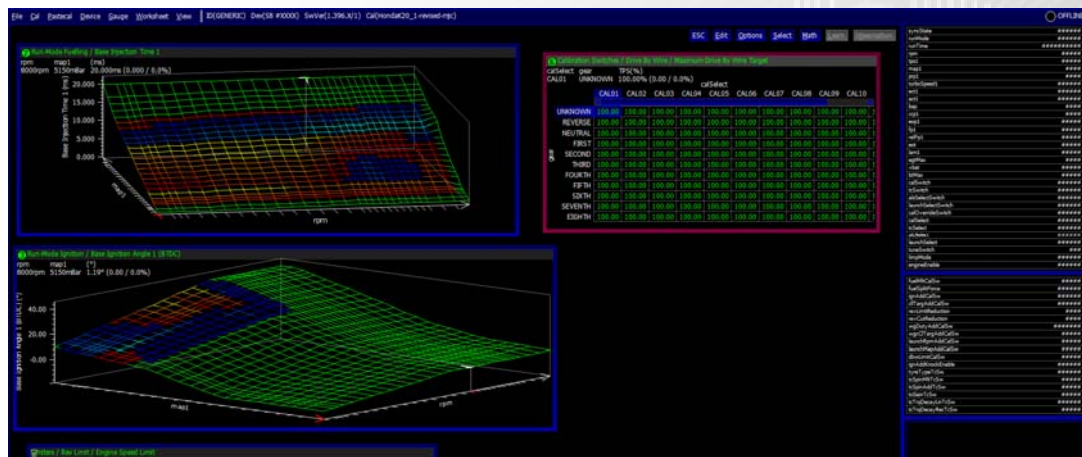
Once a worksheet customization is complete you can save the layout by clicking Worksheet – Save.

There is no limitation on the amount of worksheets that you can save.

Basic ID Calibrations Access

When using the Syvecs product range for the first time it can be overwhelming finding the basic strategies or calibrations. An alternative basic option is present when connecting to the ecu, it removes a lot of the calibrations not needed for basic tuning needs.

Below is an Example of the Generic Layout and an Example Basic Layout

<u>Generic</u>

Basic Example

It is good practice to setup a basic view layout for base adjustments on calibrations that have been refined in all other areas. This process is not difficult and is explained below.

First you need to open a calibration in generic access
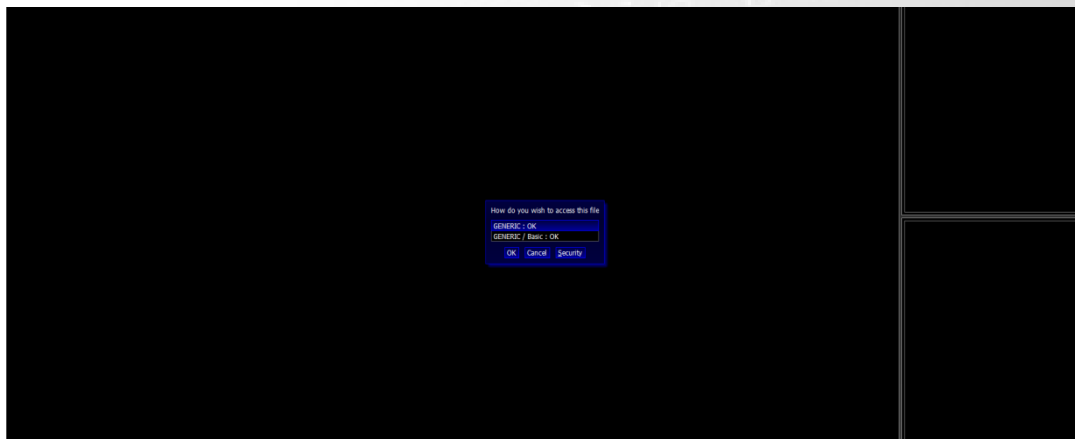
Select **C**al – Change User **A**ccess – Change Cal**M**ap Access

The following window will be presented

Select which Calibrations you wish to have access to in Basic View by highlighting a calibration and then pressing 1 or selecting Group1 after double clicking the item.

You can now save the settings so you can load them into other maps easily by using the Save and Load options. Once the selected calibrations are all activated in Group1 hit the Ok (F10). If you are online with the Ecu at this point it will have to program the ecu and a message to do this will be presented.

Now load the map into the ecu again and you can then select the Basic ID option to view your layout.
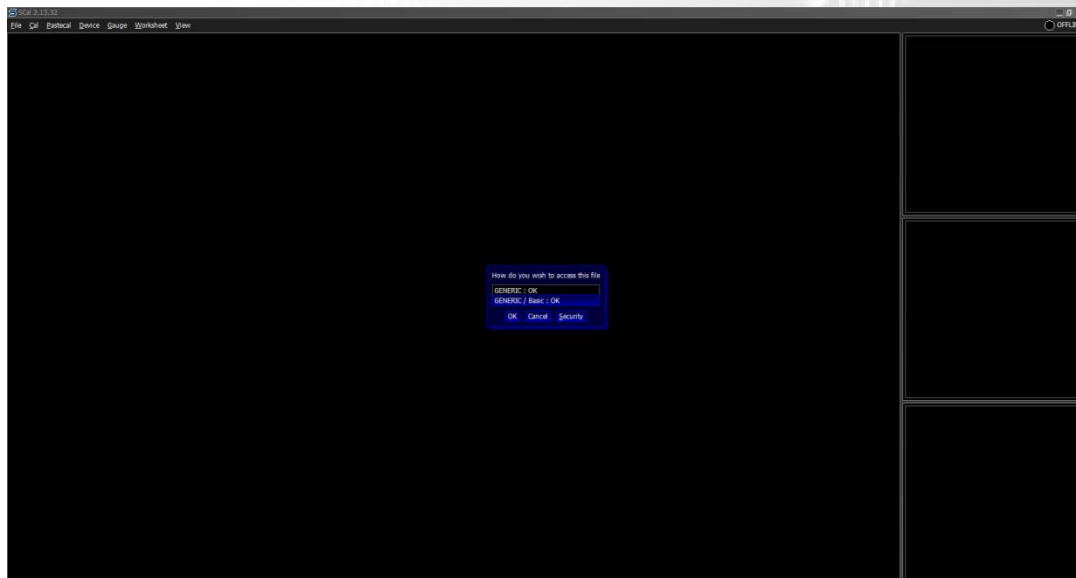
SCfg

The Main MenuBar

This application is used to configure the logging configuration of a device. The current configuration can be extracted from a device altered and put back or edited offline. There are two types of logging items; event items and sampled items. Event items occur only occasionally and only use logging memory when they occur, a common example of one of these is gear position. Sampled items use logging memory at a constant rate. As the rate and the amount of the logged items increases the duration of the logs will decrease, the ECU will overwrite the oldest data once the memory buffer is full.

With firmware"xxxxx" Syvecs has introduced burst logging capabilities which greatly maximise the use of the internal logging memory. With this strategy it is possible to switch between preset logging configurations that are defined in the main logging template. For example under high load certain idle parameters can be dropped from the log and other parameters added, it is also possible to speed up and slow down the rates of other logged parameters as need. To trigger the different states please refer to SCal Logging Options Menus.

The Logging Item Tree

Once a logging setup has been loaded or acquired from an ECU the logging item tree will appear. Branches can be opened and closed by hitting the <Return> key or by double clicking with the left mouse button. Individual items can be selected in the same way, in which case a sample rate dialog will appear (event logged items can only be turned On and Off). Hitting the <Tab> key toggles between 3 different views of the logging items; a tree view, a list of all items and a list of only those items that are logged.

<Tab>	Toggle between menu/list mode
<Up>	Up one line
<Down>	Down one line
<Page Up>	Up one page
<Page Down>	Down one page
<Home>	Top of menu
<End>	Bottom of menu
<Plus>	Expand all branches in menu
<Minus>	Collapse all branches in menu
<Left>	Decrease logging sample rate or turn off event item
<Right>	Increase logging sample rate or turn on event item
<Return>	Open Dialog to enter sample rate

SData

The Main MenuBar

This application is used to download the logged data and logbooks from a device. It has no special keys to remember. All activities are controlled from the MenuBar.

SMon

The Main MenuBar

This application is used to show the value of monitoring items associated with a device. User configurable dashboards of these items can be setup. To add an item to the dashboard simply double click an item on the menu or hit <Return>. Once it has been added to the dashboard it can be further configured by right clicking on it and selecting the desired attributes from the popup menu. All other activities are controlled from the MenuBar. One of the benefits to this application is that math channel values can be monitored live.

SMsg

The Main MenuBar

Syvecs devices send state messages when started and after certain events. These messages can be useful in determining the state of the device. For example the ECU will not run an engine if the crank and cam inputs are not setup. If a Syvecs device does not appear to be working properly these state messages will indicate the cause in most instances. It should be noted that SCal also collects these messages. It is not a good idea to have both SCal and SMsg connected to the same device as either application could lose the messages.

SMsg has no special keys to remember. All activities are controlled from the MenuBar.

SView

SView is used to display the logged data from a device.

The Graphical Display

The graphical display in its simplest form is a single graph. A graph is an area of the display with a single y-axis and traces of channels. Other graphs can be added via the graph menu but all graphs share the same time period or distance.

<Left>	Move accelerating cursor to left
<Right>	Move accelerating cursor to right
[	Move cursor left to previous different value
]	Move cursor right to next different value
<	Move cursor to previous alarm position
>	Move cursor to next alarm position
F6	Move cursor to minimum value
F7	Move cursor to maximum value
<Ctrl> + <Left>	Move cursor to left by 10% of screen
<Ctrl> + <Right>	Move cursor to right by 10% of screen
<Shift> + <Left>	Accelerating scroll to left
<Shift> + <Right>	Accelerating scroll to right
<Plus>	Zoom in
<Minus>	Zoom out
<Tab>	Toggle graph focus

The Key

The key is displayed to the right of the graphical display. It has 2 modes of operation selectable in the options menu. The normal mode shows all the channels in a data file. It gives the value of each channel at the current cursor position. Channels that are shown in one of the graphs also have a colour tab to show their respective trace colours. The alternative mode only shows those channels displayed in the graphical display area.

<Up>	Up one channel
<Down>	Down one channel
<Page Up>	Up page of channels

<Page Down>   Down page of channels

<Return>   Add/Remove channel on focus graph

<Right Shift>   Toggle between data files when more than one loaded

<Delete>   Remove math channel

Miscellaneous Keystrokes

F1   Toggle HELP display

<Space>   Drop Marker

<Backspace>   Remove marker

Data-logging

Data-logging on the Syvecs ECU's is one of its most powerful features with the ability to log parameters up to 1000 Hz. This really helps with fault finding and getting the best calibration for your car.

Before going over how to pull logs from the ecu you need to setup a Data-logging config file to choose which parameters you wish log. A basic config file setup will be loaded into the ecu but it is recommend to setup your own logging template or save the current log file so that during future firmware updates it can be re loaded. Refer to SCfg section for more details on how to perform these operations.

Data-logging Configuration

To setup the Data-logging configuration you need to use the application SCFG which will have been installed part of your SSuite install and which has been quickly described on page ...

Open up SCFG by double clicking the Executable or shortcut on your desktop.

The following window will open.

As the Ecu will have a Basic Configuration file loaded even after a firmware update it can be easier to first grab this Config file from the ecu and then edit it to suite your needs. If you already have a Config file from your tuner then skip the next section.

Extracting the Current Configuration

First Power up the Syvecs

Select *Device* and then *Get config*.

You will be prompted that the device has be found and do you wish to access the device - as shown below
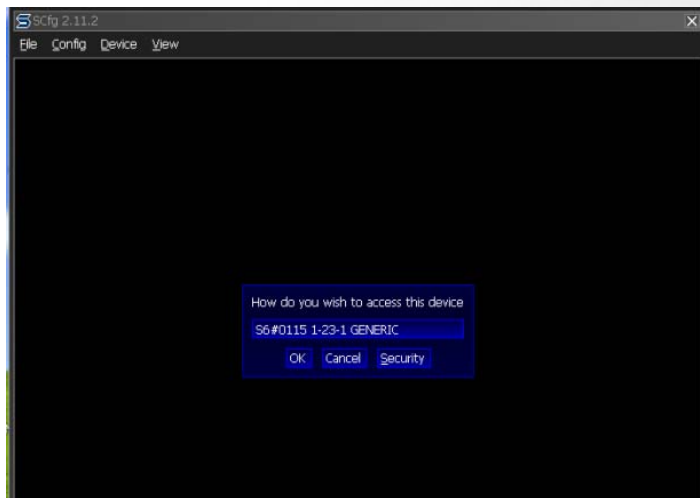
Select **Ok**, the current config tree will then be displayed as shown below.

Editing the Configuration File

To load a saved Config file select *File* and *Load*

If you have just extracted the Configuration file as explained above you should have a list of the available logging parameters which will now be shown in sub groups based on Strategies on the ecu.

Any parameters which are currently being logged are parameters which have a sampling rate number next to them as shown below. To view which items are currently logged click *View* and then *List Logged*.
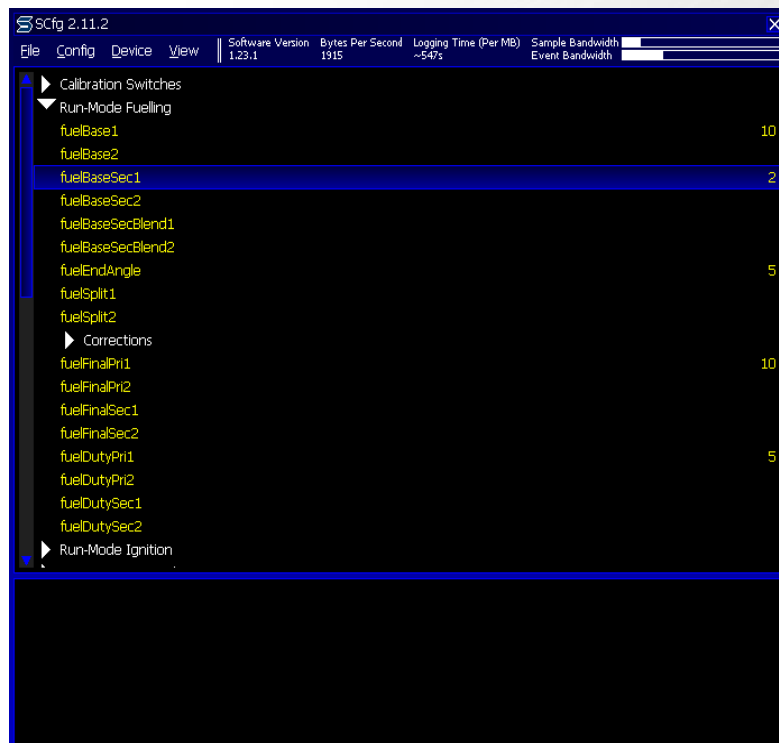
To remove the current parameter from logging, double click on the item and then leave the value empty or enter 0 in the Sampling rate command box.

To add a parameter for logging, double click the parameter and enter the sampling rate you wish to log at.

The higher the sampling rate the faster it logs that parameter but remember it takes up more memory when logging faster so keep an eye on the bandwidth and logging time shown at the top of the SCFG window.

Flashing the Configuration file on the Syvecs

Now that your Configuration file is set as you wish, you need to flash the config to the ecu.

To do this have the configuration file you wish to flash to the ecu loaded up in SCFG and then select *Device* and *Set Config*.

You will then be prompted that existing Data stored on the ecu will be lost do you want to continue select Yes and then the Config flash is Complete.

If you are prompted with the window below when trying to flash the configuration file to the ecu then you need to internal config file name to suite the version of Firmware you currently running on the Syvecs.
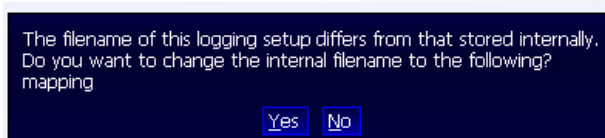
Select Yes on the prompt and then the following window will be brought up
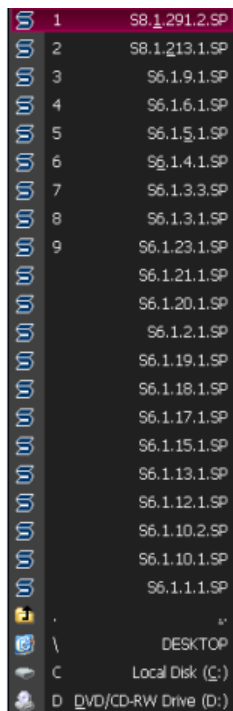
Select the S6 Firmware you are currently running. You can check this by connecting to the Syvecs through SCAL and viewing the SWVersion at the top of the screen.

Once selected a window will be shown with any differences between the Firmware versions. Make a note of these changes and update any items in the configuration file to suite.
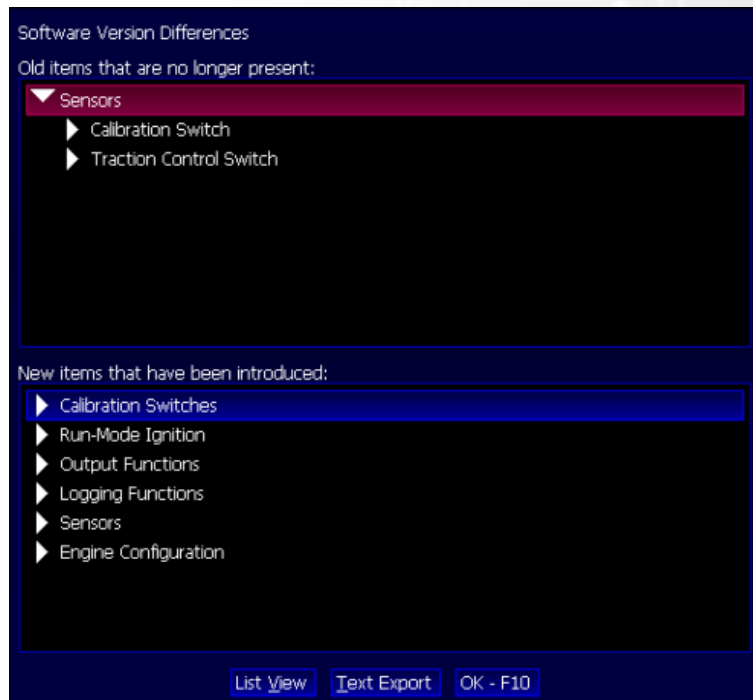
Now flash the configuration again to the Syvecs as explained above and you are ready to extract some logs from the ecu.

Data-logging triggering

Many users do not want the data-logging to be running constantly to ensure that only the required information is logged. To change the Data-logging trigger points or setup a Logging switch the application SCAL is required.

Connect to SCAL as explain in Page 23 then scroll down to the *Logging Functions*.

In here you can setup the triggering points when the Data-logging, Logbook and SyncScope become active and de-activate.

A Data logging Switch is also found in the *Calibration switches* section.

An external switch can also be added which can be populated in the *I/O Configuration* to override any triggering parameters set and turn on the data-logging at any moment. See page 29 for more info

Extracting a Datalog from the Syvecs

To extract a datalog from the Syvecs the application SDATA is required which will have been installed part of the Ssuite installation. The first step with SData is to setup the working directories of where you want the Downloaded Data from the Syvecs to be saved and how. To set this up select *File* and then *Working directories* and *Working directories bEhaviour*

Open up SDATA and the following window will be shown

Next power up the Syvecs

Once powered up select *Device* and then *Read Data*

The following prompt will appear
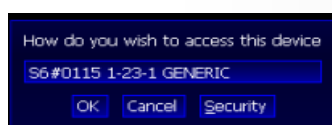
Select Ok

You will then be given the option to enter a download commend and add a suffix for the logs extracted. Press **OK-F10**

2 Prompts will now appear asking you if you wish to delete the data on the Syvecs now it has been extracted. (At this Point the data has been extracted and saved to the working directory)
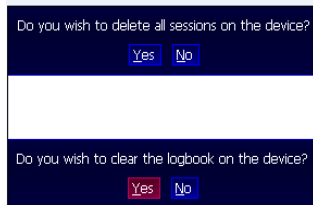
To constantly keep as much space as possible on the Syvecs select **Yes** twice or if you want to keep the logs stored on the ecu select **No**.

All the Datalogs are now downloaded to the working directory set in SData

To Open the latest Log in Sview, Select *File* and then *Load latest Data in Sview*

*(*Please note that if you already have a Log open in Sview and you have select *Load latest data in SView* it will add both the logs to one window. In order to properly view the data close the old log down by selecting *File* and *Close)*

Viewing Datalogs

To View datalogs from the Syvecs you need to use the Application SView which will have been installed part of the SSuite executable.

Open up SView and load up the log you wish to view to do this select *File* and then *Load.* As standard the log files are saved based on Date Stamp and Time based on the serial number of the ecu you are using.

The Log file will then be loaded into Sview with all the Parameter you have chosen to log in Scfg on the right hand side.
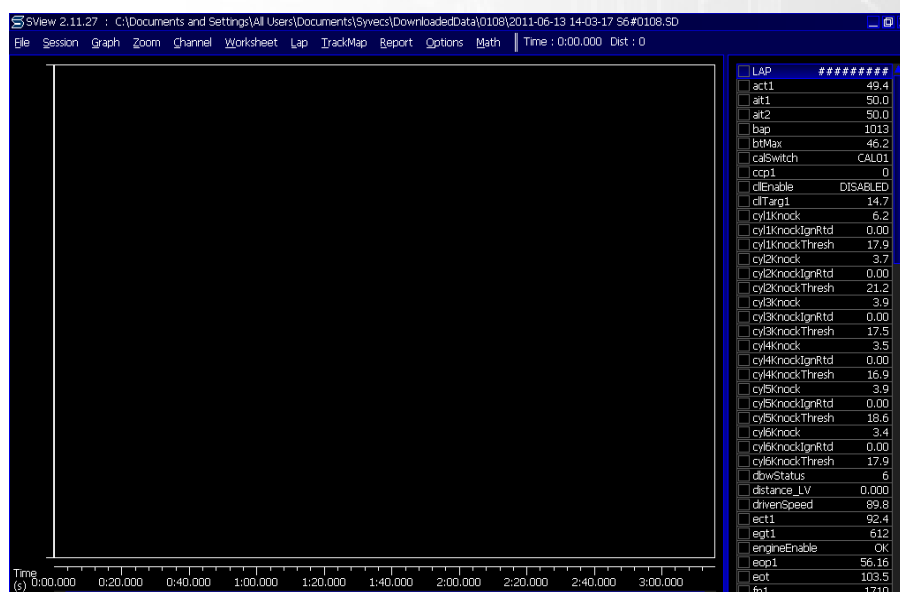
You now have the ability to choose which parameters you wish to view by clicking on the tickboxes next the parameter. Doing this will automatically assign a colour to the

parameter you selected but this can be change by right clicking the item again and selecting *Colour.*
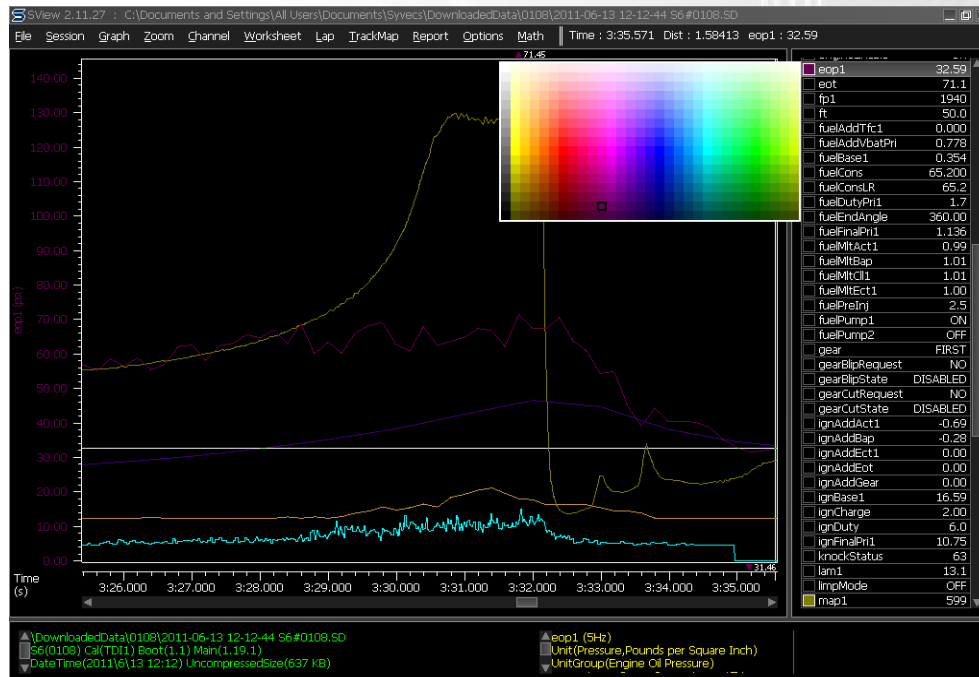

Setting up a Worksheet in SView

A worksheet in SView enables users to quickly access pre-populated templates.

Setting up a worksheet is very easy. First select all the parameters you wish to view. Then select Worksheet and New. Enter a name for the worksheet and click OK.

That Worksheet will now also be stored in Sview for any other logs you open. To enable the worksheet all you then need to do Select **W**orksheet and then choose your desired sheet you saved. Like shown below
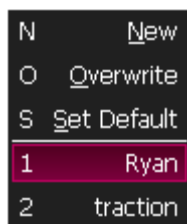
Useful features in SView

You can choose to view as many parameters as you wish in Sview but If the screen starts to become very crowded you can choose to switch the data into a couple of windows to help separate certain parameters.

To do this load up a Log and then select *Graph, Add*

You will notice the screen splits in half and adds another graph sections. There is no defined limitation on the amount of graphs that can be present on one screen. The size of the screen and its resolution are ultimately the limitation.
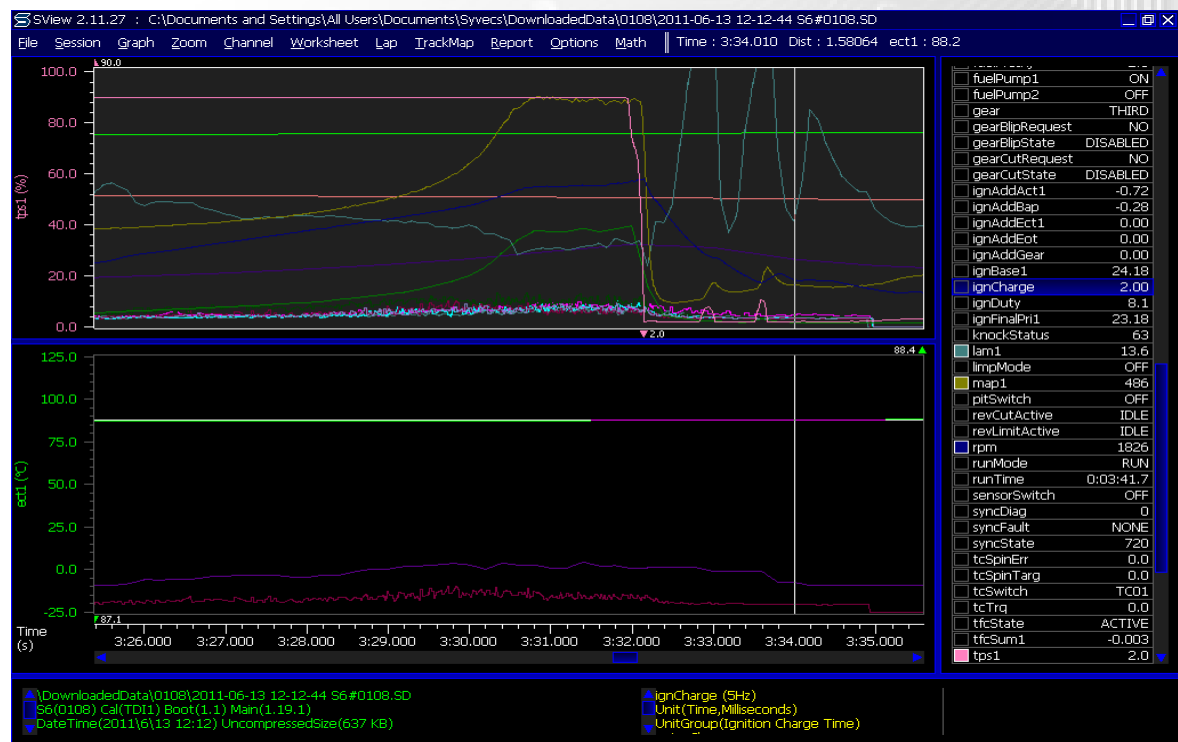
Comparing logs

Comparing Logs is another useful feature. To compare two logs against each other you need to load up the first log by selecting "**F**ile" and "**L**oad".

Then either using your set worksheet or by selecting the parameters listed on the right, populate the graph with data you wish to view.

Add another graph by Selecting.. **G**raph - **A**dd

Now select **F**ile – Load An**O**ther, choose the next log you wish to compare against. You will now see two sets of parameters loaded like shown below.

The List on the far right is for the bottom blank graph area of Sview. You now need to again select the data you wish to view in the second graph area by selecting the bottom graph and then enabling the parameters from the list. To save this setup for future session save the worksheet as explained in the pages above.
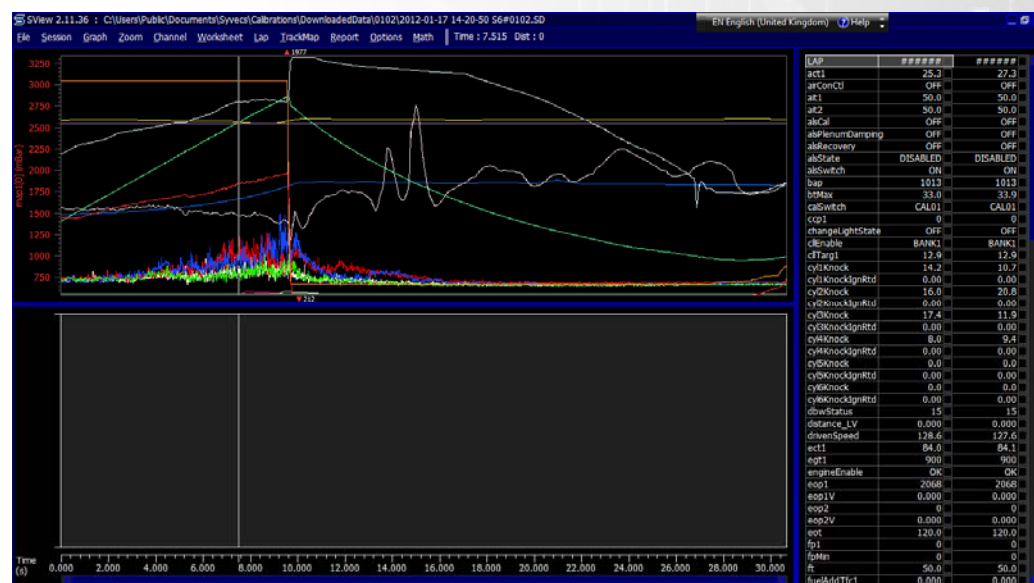
To move the bottom graph so it is possible to compare relative to the time bar, Click on the bottom Graph and hold down the **Shift button**, then while holding down the shift key left mouse click the graph and drag it to match the above log like shown below

Comment on the log - You can add comments in certain places in the log by double clicking the area you wish to add a comment
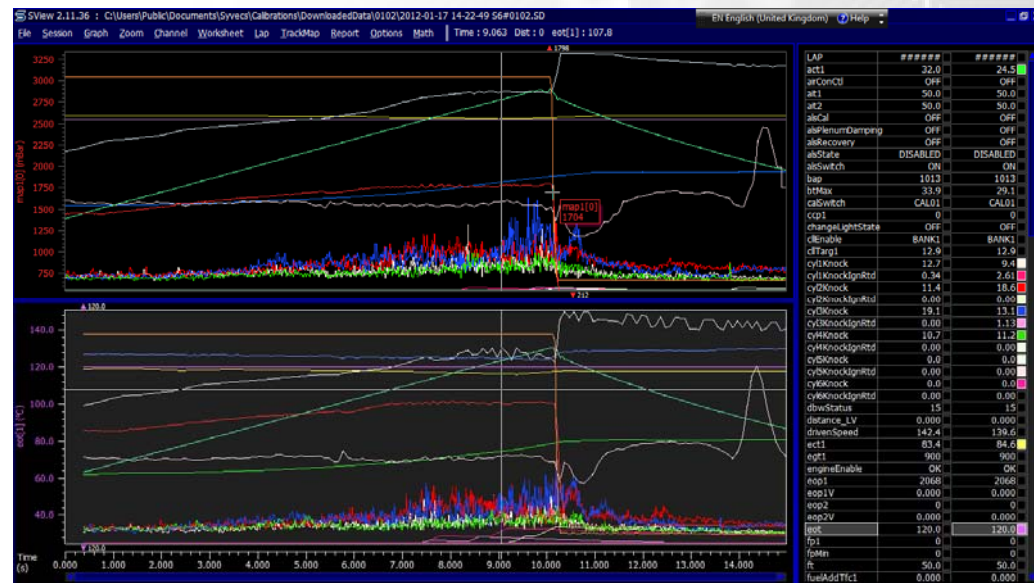
It should be noted that it is possible to overlay the parameters in the same graphs and perform direct comparison.
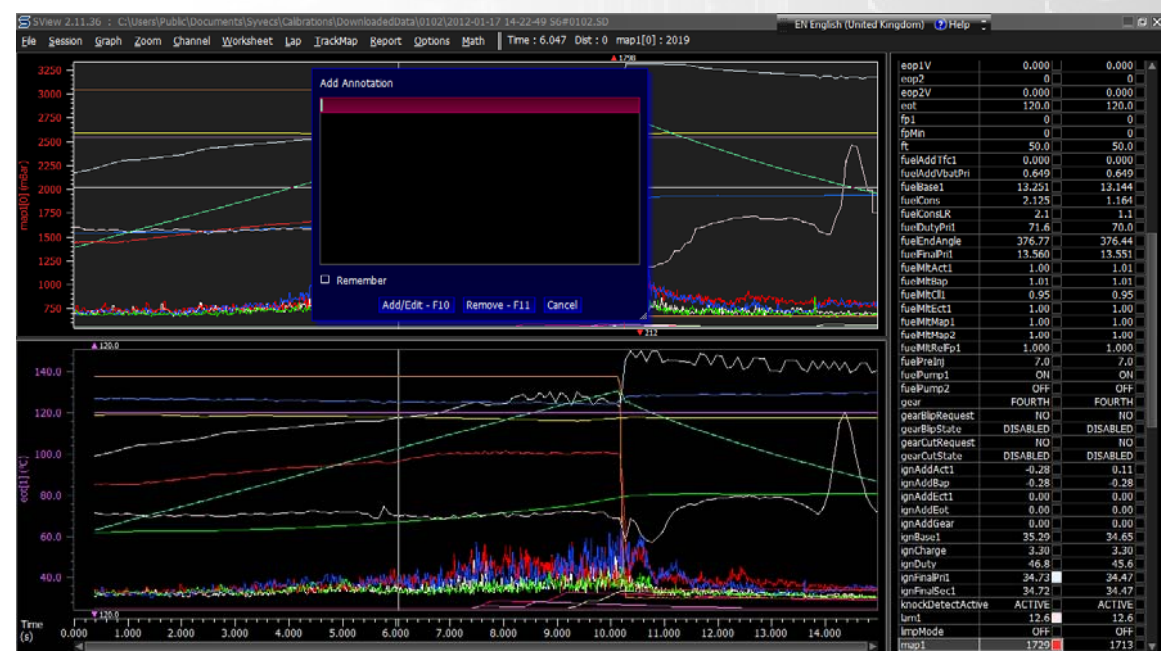
View Max, average and Min Values of parameters – To do this select **R**eport, **L**ap Report
then when prompted yes to view all parameters or No to view just the selected.

Creating Custom Logging Parameters via Math Channels

Start off with opening Scfg and Log the Appropriate input channels which you used for
each custom input. Click Device/Get Config Go down to the bottom and click I/O
configuration

Select the An Inputs you have wired the sensors into by click while holding down the
Ctrl button on the keyboard

Press Enter on the keyboard and then enter a value for the logging of these items to be
sampled per second.

Finish by clicking Device – Set Config... this flashes the logging config into the ecu

The next stage requires you to download a log from the ecu with the new saved config. Once done and open in Sview go to the math section at top and click New.

The below window will appear, here you can enter expressions and create custom logging parameters, see examples next page.

When finished hit F10 to save into Sview Registry
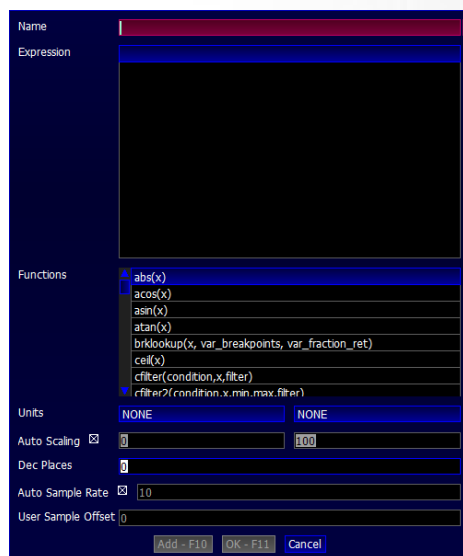
Some Examples:
Adding a custom 0-5v linear sensor for multiple EGTS
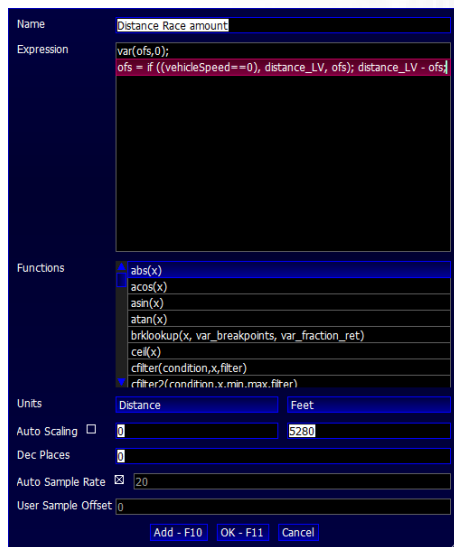
Interpolate (an14V, 0, 0, 5, 1250)

Input No, Value at 0v, Value at 5v

Adding a Custom parameter for measuring Distance travelled – Very useful for ¼ racing
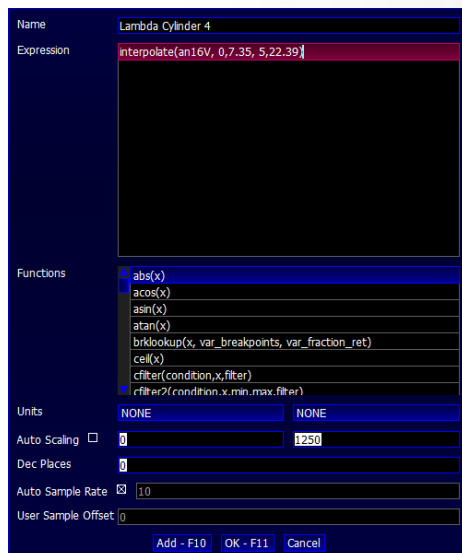
var(ofs,0);

ofs = if ((vehicleSpeed==0), distance_LV, ofs); distance_LV - ofs;

Adding a custom 0-5v linear sensor for multiple Lambda sensors measuring in AFR from an Innovate LC1

Interpolate (an16V, 0,7.35, 5,22.39)

Syvecs Parameters – Abbreviations

If the Units are not what you are used to, right click on the Parameter and Select Change Units.

ACT – Air Charge Temp

AIT – Air Intake Temp

ALS – AntiLag Calibration selected

Bap – Barometric Pressure

CalSwitch – Calibration switch position

CCP – Crank Case Pressure

CllEnable – Closed Loop Lambda Enable

CllTarget – Closed Loop Lambda Target Air/Fuel Ratio

Cyl1knock – Raw Knock Value on Cylinder 1

Cyl1knockthresh – Cylinder 1 Knock threshold limit before timing adjustment occurs

Cyl1knockIgnRtd – Cylinder 1 Knock Control retard amount

DrivenSpeed – Driven wheel speed

ECT – Engine Coolant Temp

EGT – Exhaust Gas Temp

Engine Enable – States if any Trips or Limps are present

EOP – Engine Oil Pressure

EOT – Engine Oil Temp

FP – Fuel Pressure

FT – Fuel Temp

Fuelbase – Fuel Amount set from Base fuel table in m/s (not final amount)

Fueldutypri – Injector duty %

Fuelfinalpri – Final fuel amount which goes to injectors after corrections in m/s

FuelMltCll – Correction amount applied to FuelFinal based on Closed loop lambda, 1 is no correction. Lower than 1 is removing fuel…. Higher is adding

Gear – Gear Position

IgnAddACT – Ignition timing correction applied to final ignition timing value based on Air Charge temp

IgnBase – Ignition timing amount set from Base Ignition timing table in degrees (not final amount)

IgnCharge – Coil Dwell time

IgnfinalPri - Final Ignition timing after corrections in degrees

Lam – Lambda Value

LaunchState – Shows states on launch control strategy

LimpMode – Limp Mode that is present

Map – Manifold Pressure

MapLimitBase – Manifold pressure limit set

N20 Final – Nitrous Final amount applied to solenoid

N20 Switch – Nitrous Switch position

RevCutActive – Shows state on Rev Cut

RevlimitActive – Shows state on Rev limit

RPM – Revs per Minute of engine

SyncFault – States if problem with Crank or Cam sensor on engine

TcSpintarg – Target value of slip allowed on Traction control

TcSwitch – Position of Traction Control Switch

TcTrq – Level of torque reduction being applied to engine from traction control strategy

Tfcsum1 – Amount of Fuel being added from transient fuel strategy

Tps – Throttle Position %

TpsClosed – Throttle State (open/closed)

Vbat – Battery Voltage

VvtIn – Variable Valve timing on Intake

VvtEx – Variable Valve timing on Exhaust

Vehicle Speed - Vehicle Speed (Traction control system uses this against the Driven Speed to work out wheelspin

WgBaseDuty – Wastegate duty amount from wastegate duty table

WgFinalDuty – Wastegate duty final amount after all corrections

WgMapLimit – Maximum desired Manifold pressure from wastegate strategy

WgTargetLimit – Desired Manifold Pressure from wastegate strategy

WheelSpin – Amount of WheelSpin detected by Traction control

SyncLog

The Synclog is a powerful tool part of Scal which allows the engine triggers to be monitored after cranking, live when the engine is running or after a SyncError has occurred. Having this ability makes setting up Crank and Cam Pattern in Engine Configuration easier as well as finding Sync Errors.

The SyncLog is found under the tab Device – View SyncLog,

If opening when Offline the SyncLog will appear blank but allows users to load previously saved logs.

To view a Saved SyncError Log, Click on the SyncError button or to view Live waveforms click Live.
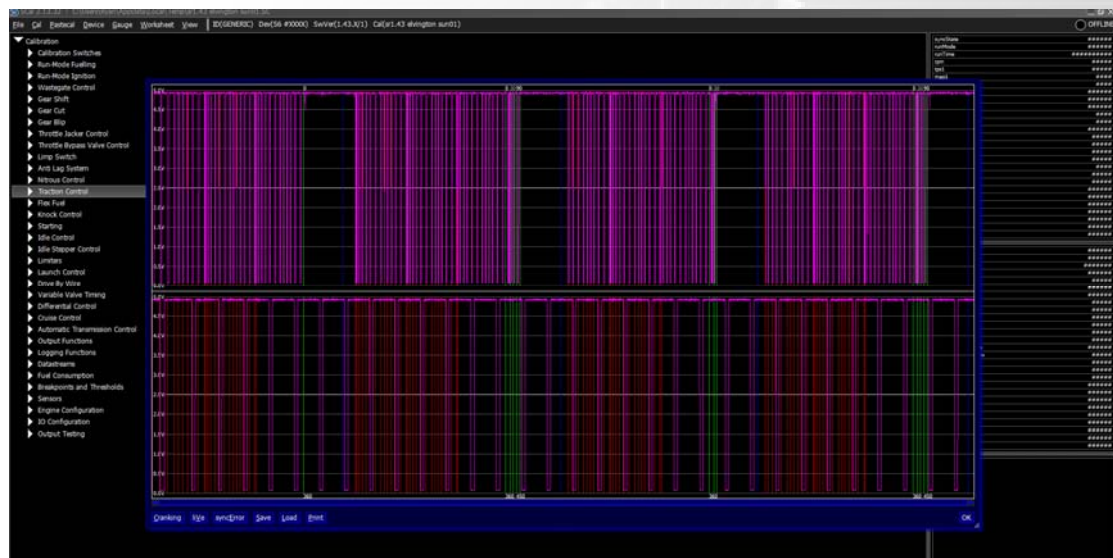
If opening the SyncLog Online it will display the last saved cranking log.

Red Lines – Indicates where the tooth edge was detected while the SyncState was not in sync.

Green Lines – Indicates Sync has been Achieved. First green line appears at the known TDC after the Reference Angle, Each Line after appears at every 30Degs of Crank rotation.

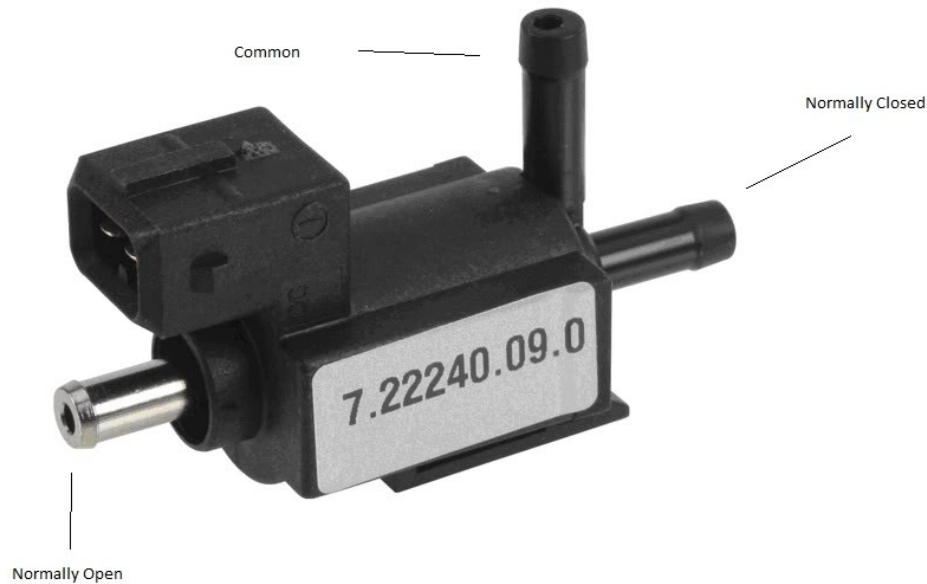Blue Lines – Indicates where the SyncState was lost.

Users are able to change the frequency of the Sync Error captures and Live Captures under Logging Functions – Sync Scope.

Ecu Strategies

Wastegate Control

Wastegate Solenoid Fitting

EXTERNAL Wastegate Setup

Metal nipple
Pressure source

Side nipple
Wastegate top port

Wastegate side port still needs to be supplied with pressure

INTERNAL Wastegate setup

Metal nipple
Pressure source

Side nipple
Wastegate top can

PLEASE NOTE THAT DIFFERENT SOLENOID SETUPS REQUIRE THE OUTPUT LIZEARIZATION TO BE CHANGED CHECK BELOW IN OUTPUT LIZEARIZATION

Wastegate Control Setup

In order for Wastegate control to work it needs to be assigned to an output in the I/O Configuration Table.

Next you need to make sure that the parameters under *Enable* are set to allow the Wastegate control to activate.
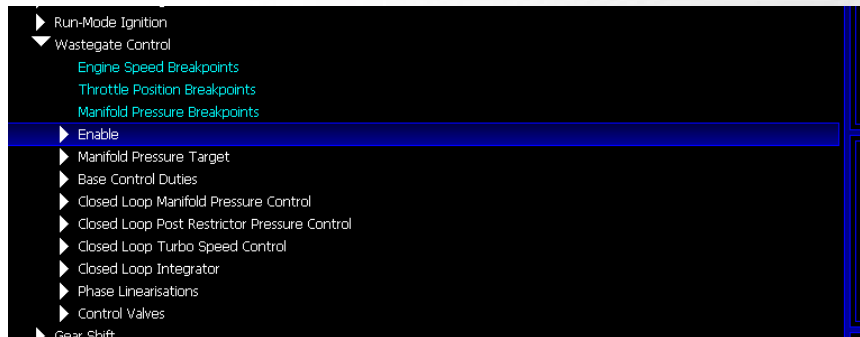
Wastegate Control Enable

Example settings would be:

Enable Throttle Position	50%
Enable Engine speed	**2000rpm**

The *Control Valves* and *Phase Linearization* sections then need to be completed. Under the *Control Valves* Section you need to enter the Pulse Width Modulation frequency for your chosen Wastegate Valve under *PWM Frequency*.

The Syvecs Valves work best around 35Hz.

If you know the battery adder values for your Valve then enter them under *Battery Adder*, If not then leave them all as 0.

The Phase Linearization sections can be setup to work with both Single Valve Wastegate setups and Dual Valve Setups but for dual valve setups then the anti-phase needs to be assigned also in the **I/O** Configuration.

The *Phase Output Linearization* table should be adjusted to suit your valve setup. The goal is to make the calculated WGD reflect the Solenoid duty correctly. Eg. if your solenoid provides minimum boost when it is at rest then the table should start at 0 and interpolate to 100%, and if your solenoid provides max boost when it is at rest the table should start at 100% and interpolate to 0%. (starting and ending points are referenced left to right.)

If you are using the Syvecs Valve for an internal wastegate setup then it should be plumbed as shown in *Wastegate Solenoid Fitting* and the Output linearization should be set as the picture below:
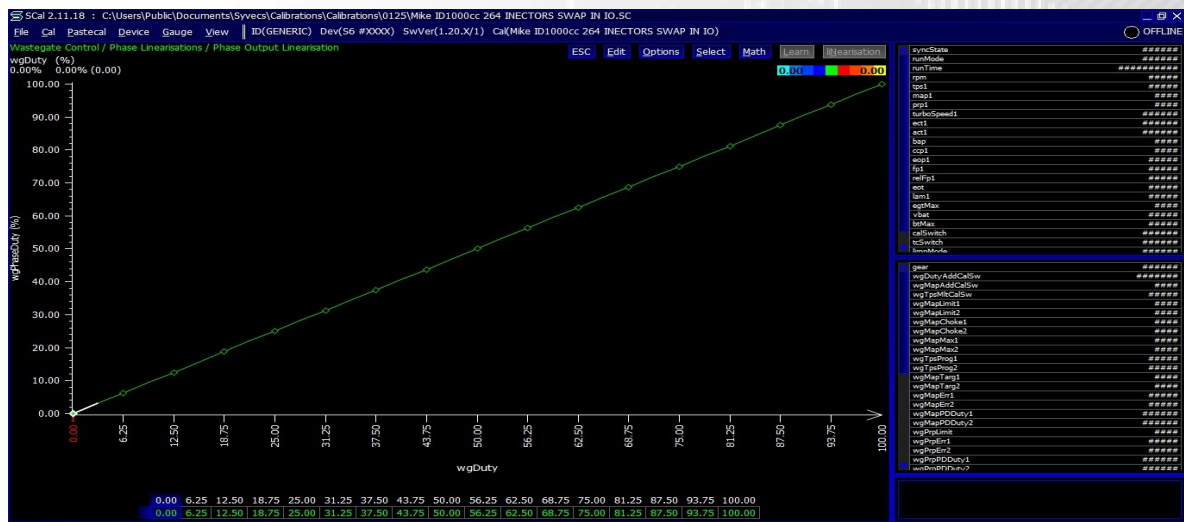
For External wastegate the Linearization should be set as below when using the Syvecs valve plumbed in as shown in *Wastegate Solenoid Fitting*.

The *Phase and Anti-Phase Output Absolute Pressure Compensation* section allows users to set the condition of each Phase output to either Bleed On or Off Wastegate duty to aid in stability especially when using the Anti-phase dual valve setup. It also can be used in Single Phase setups allowing the Wastegate strategy to fully Bleed Off or Bleed On under the Minimum Wastegate target to aid with faster spool. The bleed state should be set based on the Wastegate setup you have installed.

## Basic Wastegate Control – "Open Loop"

Basic Wastegate control consists of controlling the Wastegate in an open loop strategy meaning that when you set a duty and a manifold pressure target no automatic correction is applied by the ECU to maintain the pressure target you require.

When the valve is setup correctly and it can maintain the wastegate's spring pressure correctly without any duty set you need to open up the *Manifold Pressure Target* section of Wastegate control. In here you need to set the maximum desired boost

pressure you want to run based on Rpm and then use the Calibration switch – Wastegate area to reduce the manifold pressure target using the **Wastegate control map target adder**.

If you are not using a Calibration switch input a lower manifold pressure target first for what boost pressure you want to run.

Once this is set you need to setup the **Manifold Pressure Target Progression** table. This table allows you to set different boost levels for different gears and throttle positions. For more information on this press F1 when viewing this table.
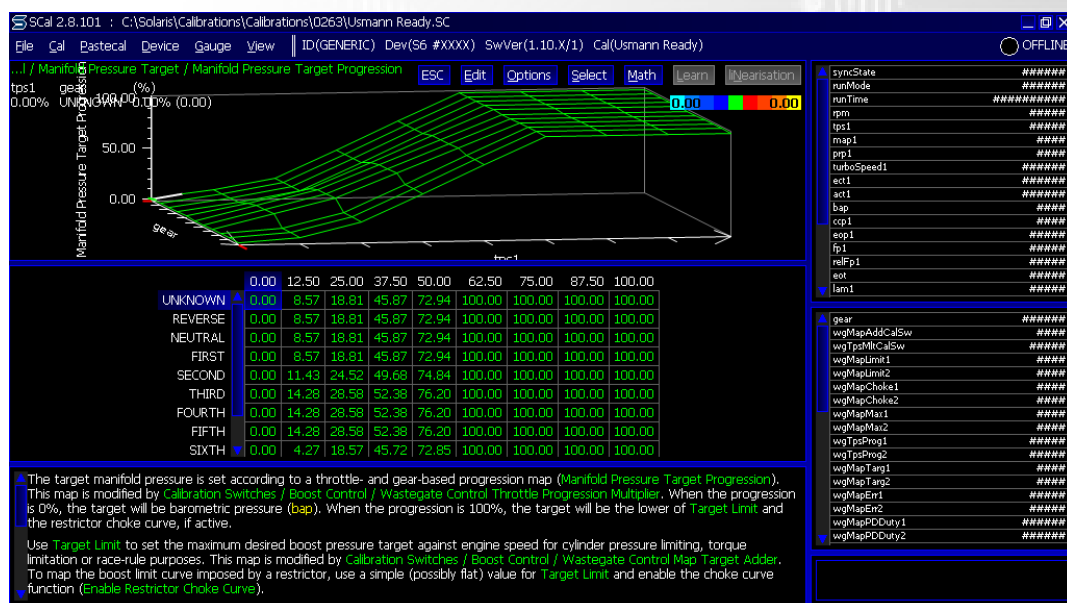

After a target is set you need to setup the amount of duty required to reach that target in the **Base Control Duties** section of Wastegate control. To set this, open up **Base Wastegate Duty 1** and for the Manifold pressure target you have chosen change the duty in that section of the table until you hit the desired boost pressure required. You can monitor the Manifold pressure target and duty being applied by opening a Gauge for **wgmaptarget1** and **wgfinalduty1.** (For setting up Gauges see Basic Manual under software section on forum)   .

Example:
If desired boost is 1bar of boost then a manifold pressure target of 2000milli-bar should be set and then for that row in table base Wastegate duty 1 this particular engine needed 20% of duty. The table for which is shown below.
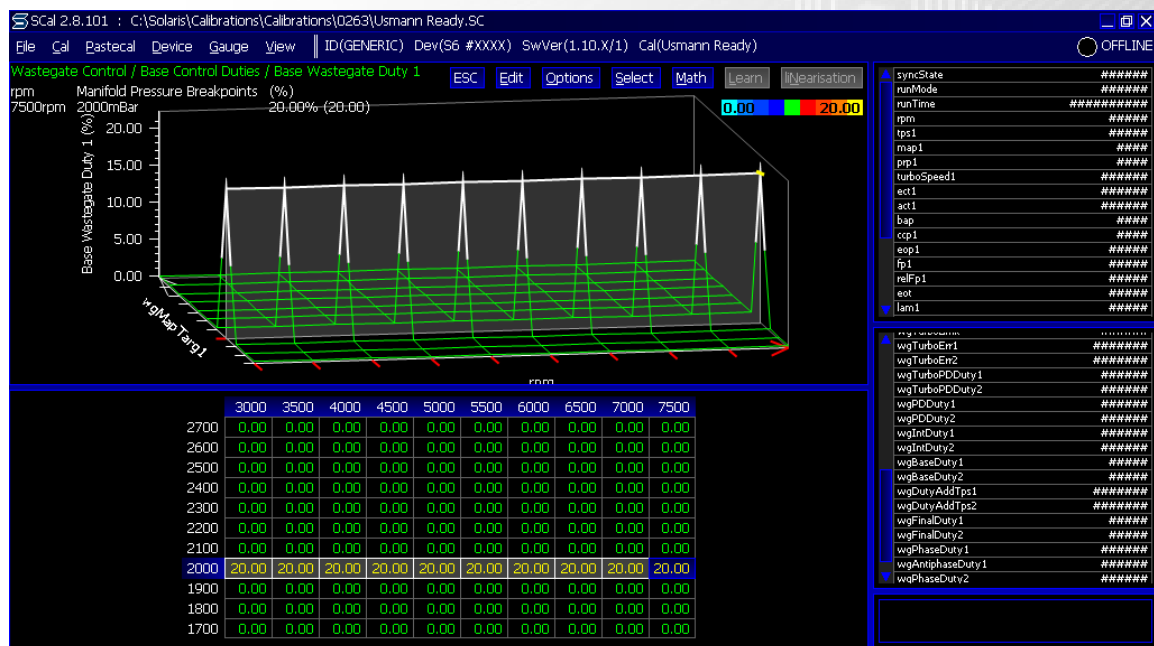
A good rule is starting at the lowest desired boost and working up and then setting everything above the maximum manifold pressure required to the same duty as that row, as shown below.
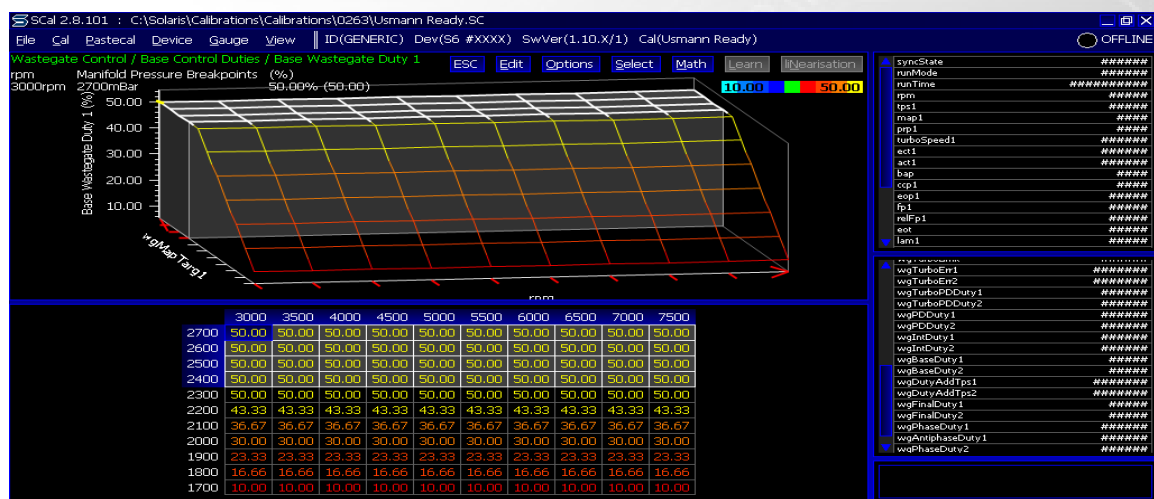
Advanced Wastegate Control – "Closed Loop"

"Closed loop" Wastegate control is the best way of setting up the wastegate control on any engine. It applies an automatic correction on the wastegate duty to ensure that the boost pressure is always at the manifold pressure target set or as close as possible. Reasons why this is important to have set is due to how much environmental changes effect manifold pressure as well differences in engine loading and throttle applied.

In order for the advanced wastegate control to work as best as possible Syvecs advise that you setup the basic wastegate control area of wastegate control first for a good base line of the duty needed for desired boost and then let the PID Strategy in closed loop then take care of the rest .

Once a base line duty is set head to the **Closed Loop Manifold Pressure** section of wastegate control and select **Enable Control Loop Control.** Now hit the enter key and select Enabled. After this is enabled like all major changes of the Syvecs you need to

Program the Unit. As described in the first section of Scal just Press **D** and **P** (if the engine is running select Yes also when prompted).

Now perform a power run to ensure that the closed loop is working as should and also test by lowering the base duty levels to see if the closed loop control correct for it.. The PD Table should be set to work for most engines in your base map but if you find you want to build boost faster or slower then modification to the *Manifold Pressure PD Control Duty* table or the *Closed Loop Integrator* section can be done. Before doing this make sure you have a good understanding of how a PID systems work.
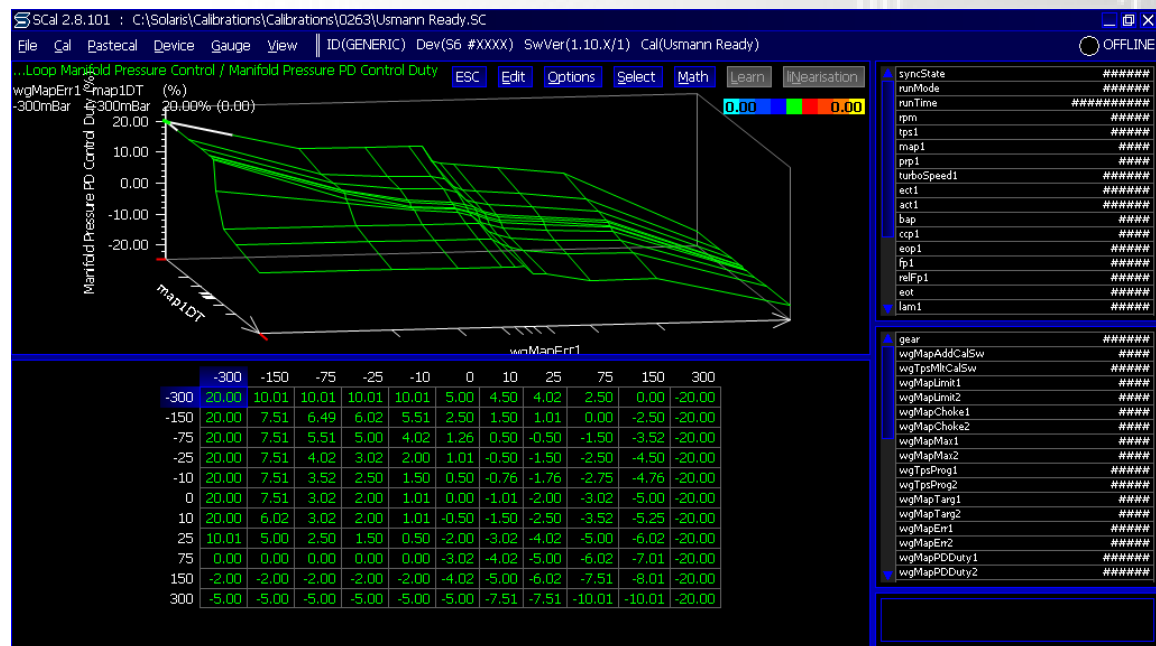
The wastegate Target and Duty can be also adjusted via the Cal Switch so be sure to populate the wastegate control Cal switch settings as you see fit. See Figure 0-10a.
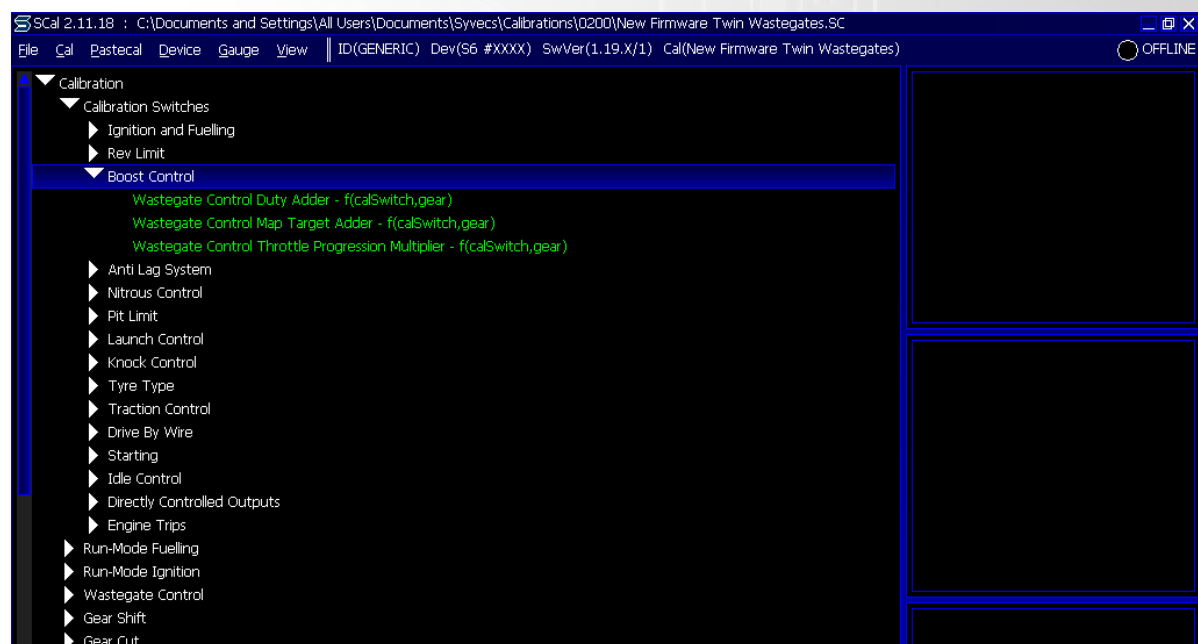
Tuning Tips for Boost control:

The PID control is compromised of three terms that monitor the state of the system and adjust the control signal to reach and maintain target levels.

The proportional term is applied to the difference between target and set point. It is just a number that this difference is being multiplied by.

The Integral term is the area under the error curve, but it is signed in a sense positive above the target and negative below.

If you look at a log with boost and boost target parameters scaled equally the longer those line are apart the larger the integral term would be. It can be useful to adjust the Integral term thresholds and reduce its effect on the system until the system has stabilized (reached a steady state level close to target.) Keep in mind that correcting with too much I term will generate unsteady ripple because once the error is accumulated it will take some time for it to regress. The derivative term is the rate of change at witch pressure is climbing. This is normally calculated over some discrete time interval and the difference between the initial and final state is referenced. On "spool" the goal is to use the proportional and derivative control to drive the system to its target. Proportional is the bulk adjustment that is needed to reach the target level. It is best to keep the proportional term at a level that will undershot the target slightly. The derivative term is used to soften or increase the response of the system based on the rate of change. During "spool" it is likely to see very high rate of change as the turbo approaches its operating range. It is best at that time to use the derivative term and remove WDG so that the rate of change is dampened as we approach the set point.

When tuning Boost Control PID it is advisable to keep the WGD at minimal 20-30% duty across the entire table. Then target a level that is few points higher (Set base at 20% = 200kpa, target 225kpa). Adjust the P term until the boost is barely undershooting the target. Then add the derivative gain (rate of change) so that it takes WGD out when close to target and the derivative is high and adds WGD when far from target and the derivative is low. You should see better response in the lower boost portions of your curve but worst performance towards the set point. At this point increase your P term to compensate for the difference. Once you feel that the desired response has been achieved, fine tune the integral term.

Anti-Lag Strategy

A Strategy designed to keep turbine drive energy present at areas where lower torque is required. Used in Rally cars generally but also applied to Race cars with large turbochargers

Overall Enable
Calibration to be able to turn off or on the Antilag Strategy, as a blue item requires a device – program to take effect

ALS Enable Switch Pull-up
Applies a Pull Up to the ALS Switch Input

ALS Enable Switch Polarity
Sets the polarity for which the switch is considered active

Driver Demand Select
Sets the Demand axis for the ALS Tables, Either Pedal Position or Throttle

Bypass Duty Effect
Selection of enabling Air Bypass for the ALS System via either Idle Stepper, DBW, Throttle Jacker Actuator or Throttle Bypass Valve

High Throttle Bypass Disable Threshold
Above this Driver Demand Threshold Bypass duty wont be applied

Use Exhaust Gas Temperature for Recovery
Option to enable Exhaust gas temp entry and exits for Safety Recovery of Antilag, Very useful for when EGTS are going above a safe limit from ignition modifications

Exhaust Gas Temperature Failure Disables ALS
Option to turn off Antilag if the Exhaust gas temp sensors fails

Ignition Modification Function
Option to allow maximum Advance or Retard for Ignition modifications, generally set on retard

Breakpoints

Engine Speed Breakpoints
Ability to change breakpoint for RPM on ALS Tables

Throttle Position Breakpoints
Ability to change breakpoint for Throttle Position or Pedal on ALS Tables

Off Calibration

When the Antilag switch is on but Antilag selection under Calibration Switches/Antilag/Antilag Calibration Select is set to OFF you can apply a fuel cut to maintain a lower idle when a throttle is manually jacked open. Used on older designed ALS Systems

Fuel Cut
Set Severity of Fuel cut to maintain a Idle with throttle manually jacked open

Shutdown Delay
A delay option for the Shutdown from an Antilag Calibration to OFF

Start Calibration

Allows a different level of Antilag for when the car is stationary at the start of a stage

Bypass Vehicle Speed
Above this speed the Start Calibration is ignored

Exit Throttle Angle
Above this Throttle Angle the Start Calibration for ALS is ignored

Fuel Cut
Calibration to set Fuel Cut Severities based on Driver Demand and Rpm for Start Calibration

Ignition Retard
Calibration to set Ignition timing modifications based on Driver Demand and Rpm for Start Calibration

Fuel Multiplier
Calibration to apply a fuel multiplier based on Driver Demand and Rpm for Start Calibration

Bypass Duty
Calibration to apply Bypass duty level based on Driver Demand and Rpm for the Start Calibration

Note: A Bypass Duty amount must be set in order for the Start Calibration to become active

Recovery Fuel Cut
When the Recovery parameters are met the Strategy applies this fuel cut amount based on Driver demand and Rpm. Normally a larger duty in order to cool the temperatures of the engine

Calibrations

8 Different Calibration which can be selected via Calibration Switches or Antilag Select Switch

Fuel Cut

Calibration to set Fuel Cut Severities based on Driver Demand and Rpm for ALS Cal 1-12

Ignition Modification

Calibration to set Ignition timing modifications based on Driver Demand and Rpm for ALS Cal 1-12

Fuel Multiplier

Calibration to apply a fuel multiplier based on Driver Demand and Rpm for ALS Cal 1-12

Bypass Duty

Calibration to apply Bypass duty level based on Driver Demand and Rpm for ALS Cal 1-12

Note: A Bypass Duty amount must be set in order for the Start Calibration to become active

Recovery Fuel Cut

When the Recovery parameters are met the Strategy applies this fuel cut amount based on Driver demand and Rpm. Normally a larger duty in order to cool the temperatures of the engine

Throttle Timeout

Allows calibrator to turn off ALS if below the set Throttle Angle for too Long

Throttle Angle

If Throttle is below this angle for time which is longer than set In Timeout ALS is Disabled

Timeout

Set the time for the above

High Temperature Recovery

Recover Entry Air Charge Temperature

Air Charge (ACT) temps greater than this amount cause the Antilag strategy to enter Recovery Mode

Recover Entry Air Charge Temperature Guard Time

Air Charge Temps have to be greater than the Recover Entry Air Charge Temp for Longer than this calibration time to enter recovery mode

Recovery Exit Air Charge Temperature

When the Air Charge Temp is less than this amount the Recovery mode is turned off and the previous ALS Calibration is re-enabled

Recovery Air Charge Temperature Override on Starting

A time amount after starting can be set here for disabling the Air Charge Temp Recovery Entry threshold

Recover Entry Exhaust Gas Temperature

Exhaust Gas Temp (EGT) temps greater than this amount cause the Antilag strategy to enter Recovery Mode

Recover Entry Exhaust Gas Temperature Guard Time

Exhaust gas temps have to be greater than the Recover Entry Exhaust Gas Temp for Longer than this calibration time to enter recovery mode

Recovery Exit Exhaust Gas Temperature

When the Exhaust Gas temp is less than this amount the Recovery mode is turned off and the previous ALS Calibration is re-enabled

Plenum Damping

ALS plenum damping is used to restrict spike readings of MAP if ALS is mapped aggressively enough to cause plenum explosions. It is only expected to matter when ALS is most active IE at low throttle so enables on below.

Entry Throttle Angle

Throttle below this value activates

Exit Throttle Angle

Throttle above this value turns off strategy

Rate of Increase clip for Manifold Pressure Measurement

Ability to limit the Map1 and Map2 values rate of change over cylinder cycles

Fixed injection End Angle

User can set a Fixed Injection end angle value during Plenum Dampening

Pit Limit Calibration Selection Override

While a Pit Limiter is Active users can set the ALS to a different Calibration

Override Calibration Select during Pit Limit

Option to enable this

Calibration Select during Pit Limit

Set the Calibration which will be used for the ALS during Pit Limiter

Tuning Tips:

The Antilag strategy can be used in many ways to reduce turbocharger lag when energy through the drivetrain is not required by the driver, the most common time for using this is when under braking or at low throttle openings when torque demand is not high.

Antilag works by moving the combustion process to later in the engine cycle and allows the combustion to happen while the exhaust valves are still open to move the energy into the Turbine of the turbocharger.

Different applications require different amounts of antilag levels to be used. In order for the strategy to be effective, oxygen is required and during low throttle openings where torque is not demanded the oxygen levels into the engine are low. To make the strategy work effective extra oxygen is required. The easiest but not practical for general road use way to achieve this is via opening the throttle more on the stop and then controlling

the engine torque in order to maintain a low torque in areas required like idle, is by introducing fuel cuts. This is found under the **Off Calibration** of the antilag area.
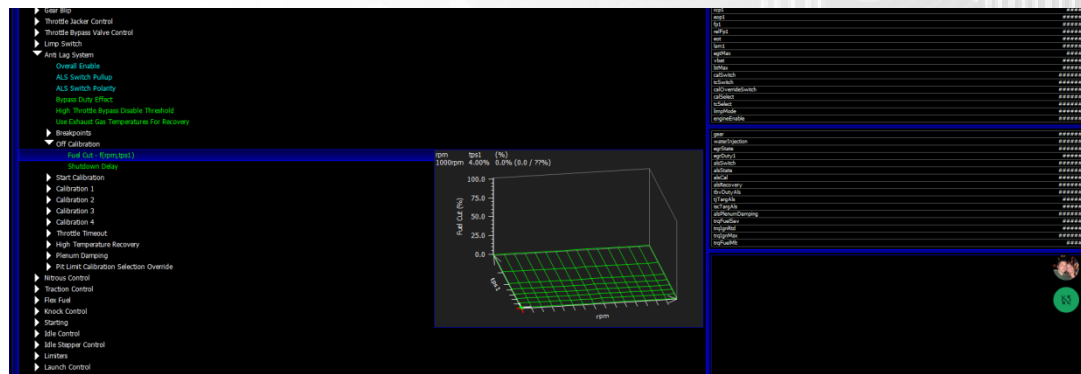

Adjust the fuel cuts amount to achieve the torque required at low throttle openings
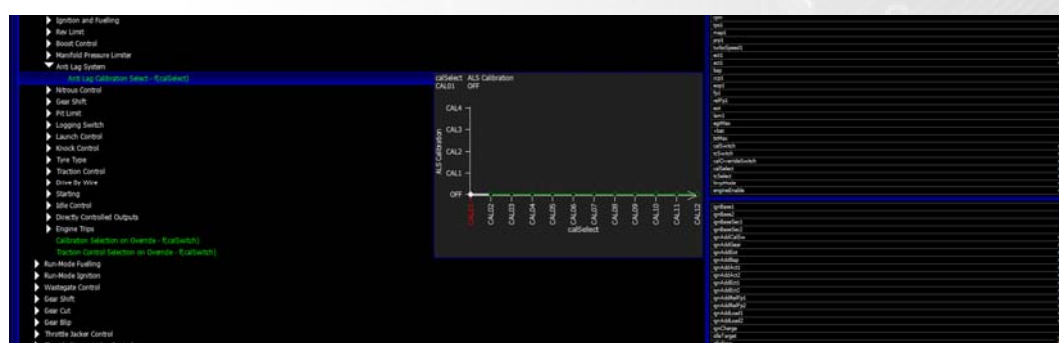
Most practical ways of achieving more air is via the use of electric throttle bodies or throttle bypass valves. Select the method you wish to use in the **Bypass Duty Effect** Calibration. Under each calibration then you will see a **Bypass Duty** table where users can set the duty or throttle target required based on gear and rpm.

After more air is introduced its time to move the combustion to later in the cycle by retarding the ignition events. Positive numbers in the Ignition Retard Table apply a ignition adjustment to the Ignition Final value IgnFinalPri1. Start with levels of 30degrees and fuel cuts of 30% while monitoring the Exhaust Gas Temp and Air Charge temp if available. If the EGTS or ACT start to get high, users can set a Recovery Fuel Cut entry level which activates the Recovery Fuel Cut table under each calibration level to cool the EGTs or ACT's by increasing the fuel cuts.

Adjust the entry points for Recovery under **High Temperature Recovery**
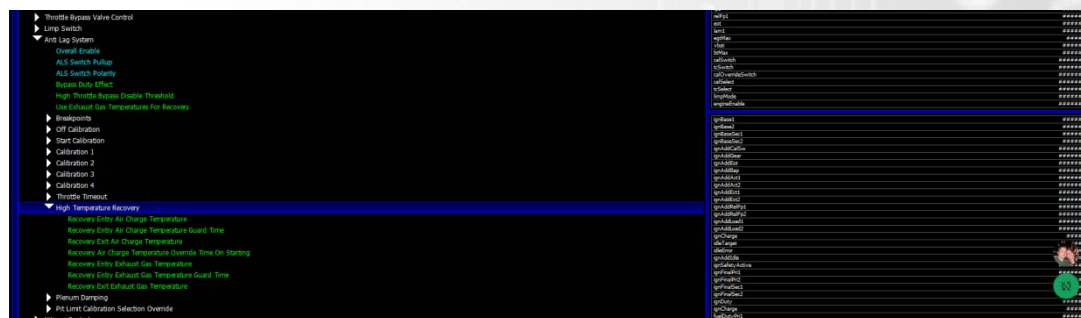
Users can set different levels of Antilag level under each Calibration and then switch between them using the calibration switch area found at the top of the calibration area tree.

Nitrous Control

The Nitrous control system can be run as a Wet or Dry System. Syvecs recommend the use of a dry system so that the Fueling is done via the Injectors.

Activation of System can be done via the Use of a Nitrous Switch, which can be populated in the I/O config or it can be turned on via a Calibration switch and then made to select desired Nitrous map on the position chosen like shown below.

Wet System Setup

In the I/O Config of the Syvecs you will find 2 outputs available Nitrous Control A and B, these outputs are mirrored so the same PWM Freq and Duty that is applied as a final value of N20Final is applied on both outputs if they are selected in the I/O config. Use these outputs to drive the solenoids for the Nitrous and Fuel ensuring the correct Jet sizes are used!!!

The Following Maps are not used in a Wet Nitrous Setup:

Fuel Added Base engine speed

Base Fuel Adder – Leave values at 0

Maximum base fuel adder decay rate – Place at 0%

Fuel adder tuning – Leave values at 1.00

Dry Nitrous Setup

When setting up a Dry System you need to ensure the Injectors and Fuel system on the car can carry the extra fuel required to match the Nitrous Jet size installed.

In the I/O Configuration there are 2 nitrous outputs. Populate the outputs to Suite your setup.

If you are wanting to drive 2 nitrous solenoids please note that Nitrous Control A and B outputs are mirrored so the same PWM Freq and Duty that is applied as a final value of N20Final is applied on both outputs.

PWM Frequency

This is the frequency that the manufacture of the Solenoid will want set to drive them at. Input this Frequency (normally between 20 to 40hz).

Engine, Throttle and Manifold Pressure Breakpoints

These options allow you to define the breakpoint of the Nitrous map to suit your application and apply the best resolution available when the nitrous is used.

Base Demand Select

This option allows your to select what demand/load is to be populated in the Nitrous maps. You can choose between Throttle Position and Manifold Pressure.

Base Duty Tables

The Base duty tables are 3D tables which allow you to select the Nitrous levels based on the Demand/Load vs RPM.

This Table has multipliers available which are listed below

Nitrous Control- Duty Multiplier(TPSORMAP)

This is a multiplier table which has an axis of the opposing Base Demand which was not selected.

Nitrous Control - Duty Multiplier(Bap)

This is a multiplier based on Barometric pressure

Calibration Switch – Nitrous Control – Nitrous Base Duty Multiplier

This 3D table allows you to provide a Multiplier of the Final Nitrous Duty Based on Cal Switch and Gearing. The Gearing is setup under Sensor – Gear Position

Enable Throttle Position
Set the TPS position in which the nitrous base duty tables become active

Enable Engine Speed
Set the RPM Speed in which the nitrous base duty tables become active

Maximum Rate of Duty Increase
For Safety Reason the rate in which duty is applied per second can be changed to ensure the fuel mixture is perfect. This calibration is required when Injector position and Nitrous solenoid placement is in different locations.

PWM Battery adder
This feature allows the tuner to set a Duty in which the Solenoid starts to open based on Battery Voltage. If unknown leave at 0.

PLEASE NOTE THAT THE BELOW AREA IS ONLY TO BE SETUP BY EXPERIENCE TUNERS

Fuel Adder Base Engine Speed
Set a Base engine speed where the Base Fuel Adder is calculated to provide the correct mixture. The additional fuel then required is automatically compensated as rpm varies.

Base Fuel Adder
This table specifies the addition fuelling required based on the nitrous solenoid duty when the rpm is at the desired *Fuel Adder Base Engine Speed.*

Example of how to Setup values for Base fuel adder and Fuel Adder Base Engine Speed:

Work out total fuel requirement @ 5.5cc / BHP

75HP shot requires 75 * 5.5 = 412cc/min total flow

Divide by number of cylinders to find flow per cylinder… (In this Example 6)

412 / 6 = 69cc per cylinder

Calculate pulse width available at Fuel Adder Base Engine Speed (typically 5000 RPM),

120000 / 5000 = 24ms period at 5000 RPM, so 24ms gives 100% flow at 5000 RPM

The 120000 equates to a 1ms cycle time (1000 RPS * 60 sec/min * 2 turns / cycle)

Divide the cylinder flow per cylinder (This Example 69cc) by the injector size (this example 1000cc) to get percentage of injector flow

69 / 1000 = 0.06.9%, so 6.9% injector flow for 75HP

Multiply pulse width by injector flow percentage to get pulse width required

24ms * 0.069% = 1.65ms per injector (6 of) for 75 HP.

Maximum Base fuel adder decay rate
Sets the rate of decay of which the N20fuelFinal is removed after the N20FinalDuty is removed to ensure that if any nitrous that is flowing through the intake system after the duty is removed is supplied fuelling to obtain a correct mixture.

Fuel Adder Tuning (RPM)

Allows the N20FuelFinal value to be tuned slightly based on rpm to obtain the perfect mixture

Fuel Adder Tuning (MAP or TPS)

Allows the N20FuelFinal value to be tuned slightly to obtain the perfect mixture based on the Demand which is not select under Base Demand.

Ignition Adder

A 3D table which allows ignition to be advanced or retard based on Nitrous Base Duty.

Maximum Rate of Ignition adder increase

Allows the tuner to set a limit to the amount of advance based per second after the nitrous system is activated.

TRACTION CONTROL

The Syvecs Traction control strategy is derived to provide a solution for variety of motorsports racing series, as well as road or track use. It is a multidimensional approach to dealing with varying conditions of adhesion.

Traction control is active when **Overall Enable** is ENABLED and **vehicleSpeed** exceeds **Minimum Vehicle Speed (Minimum Vehicle Speed In Launch)** when **launchState** is ON. **wheelSpin** is calculated as (**drivenSpeed-vehicleSpeed**) / **vehicleSpeed** in %.

The wheel spin target, **tcSpinTarg** is calculated by modifying the base values (**Spin Target** 1/2/3/4) by a calibration switch, lap distance and tune switch settings **(Calibration Switches / Traction Control / Traction Control Spin Target Adder, Calibration Switches / Traction Control / Traction Spin Target Multiplier, Lap Distance Spin Target Adder, Tune Switch Spin Target Adder)** and limiting the result **(Minimum Spin Target, Maximum Spin Target)**.

tcSpinErr is then calculated as **wheelSpin-tcSpin Targ**.

The overall torque reduction demand (**tcTrq**) is then calculated as **tcSpinErr** multiplied by **Base Gain** and **Calibration Swtiches / Traction Control / Traction Control Gain Tuning** and clamped by **Torque Reduction Clamp**.

Finally ignition retard and fuel cuts are calculated from **tcTrq** according to **Ignition Retard** and **Fuel Cut Severity**, respectively.
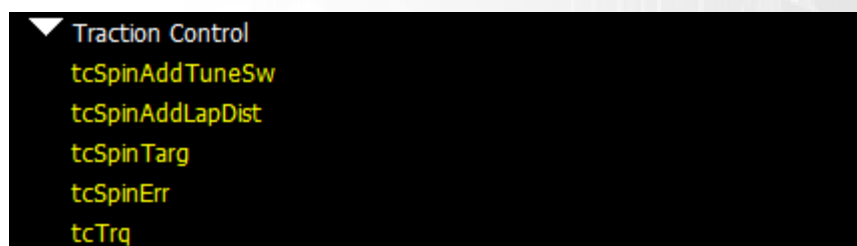
This calibration affects the following:

> **Spin Target 1**
>
> **Spin Target 2**
>
> **Spin Target 3**
>
> **Spin Target 4**

Helpful items to log at a minimum of 20Hz:

```
▼ Traction Control
    tcSpinAddTuneSw
    tcSpinAddLapDist
    tcSpinTarg
    tcSpinErr
    tcTrq
```

If **Overall Enable** is set to other than DISABLED is selected, then ensure that **Vehicle Speed Breakpoints**, **Steering Wheel Angle Breakpoints**, **Lateral G Breakpoints**, and **Yaw Breakpoints** are set accordingly. If the data highlighted in blue has been changed, remember to "program" the calibration into the ECU before moving on.

With Traction Control **ENABLED**, maximum wheel spin can be precisely controlled. There are three strategies to choose from.

YAW BASED

Use when the rotational rate of the car around its centre of mass can be monitored. This is the best control strategy for road racing, as it compensates for rotational instability.

LATERAL G BASED

Utilizes lateral acceleration sensor to limit the front to rear tire slip as the lateral G increases. It could sometimes be insufficient in Road Race scenario because the lateral G could decrease as tire slip increases and cause the targets to allow additional available torque from the engine thereby increasing slip further and causing the car to become unstable. This strategy is preferred for Drag Racing applications where the car is not pushed to its traction limits laterally.

TABLE DESCRIPTIONS:

Minimum Vehicle Speed
The minimum speed for Traction control to be active when not in launch mode

Minimum Vehicle Speed In Launch
This is the minimum speed for Traction control to be active in launch mode. It is used to prevent overlap of Launch Control torque reduction and Traction Control torque reduction. When this table is different from **Minimum Vehicle Speed**, ensure you are setting Launch control **Exit Vehicle Speed** accordingly so that the car can properly transition from torque control based on launch, to torque control based on traction.

Disable Time After Gear Cut
This works with the gear cut strategy to prevent unnecessary traction intervention on gear changes.

Spin Targets 1,2,3,4 – f(vehicleSpeed, latGAbs)
3D Wheel speed targets with axis based on Traction Control **Overall Enable** strategy and vehicle speed.

If the traction control is used instead of the launch control strategy, special care has to be taken at low wheel speeds and high engine RPM. The ratio of RPM to wheel speed in that zone needs to be addressed through clutch slip, torque converter slip or tire slip. The goal is to maintain RPM all the while allowing minimal tire slip.

Tune Switch Spin Target Adder – f(tuneSwitch)
This can serve as additional adjustment of spin targets based on external input.

Lap Distance Spin Target Adder – f(lapDistance)
This adjusts the amount of allowed wheel speed based on distance/lap calculation. Ensure the **Number of Lap Distance Breakpoints** and **Lap Distance Breakpoints** are set appropriately.

Minimum Spin Target
This prevents strategy activation if the slip is lower than the absolute minimum desired. In theory, the drive wheels will always have a slight amount of slip over the Un-Driven wheels. It is up to the user to determine the realistic and allowable minimum amount.

Maximum Spin Target
This is the absolute maximum allowed slip regardless of the calibration and multipliers.

Base Gain – f(vehicleSpeed)
The overall torque reduction demand **tcTrq** is calculated as **tcSpinErr** multiplied by **Base Gain.** This table is used for overall sensitivity by **vehicleSpeed**, when **tcTrq** is active. Higher numbers produce a larger TcTrq value.

Torque Reduction Clamp – f(rpm)
This sets the maximum allowed **tcTrq**.

Fuel Cut Severity
3D table of fuel cut torque reduction for traction control in % of fuel, with axis based on EGT and calculated torque reduction.

Ignition Retard
3D table of ignition timing reduction in degrees, with axis based on EGT and calculated torque reduction.

Tuning Tips:

The Traction control area of the Syvecs can be extremely effective when setup correctly, the first thing to remember is that the Target Slip tables are based on a % and the Torque reduction is only applied when the WheelSpin parameter (which is wise to log fast) is greater than the TcSpinTarg. **WheelSpin** is calculated as (**drivenSpeed-vehicleSpeed**) / **vehicleSpeed** in % so its important to remember that at slow speeds the difference in Speed between driven and Vehicle although small has a much larger % value and the slip target table needs to be set a lot higher to ensure the traction control does not apply TcTrq adjustments when difference is small.
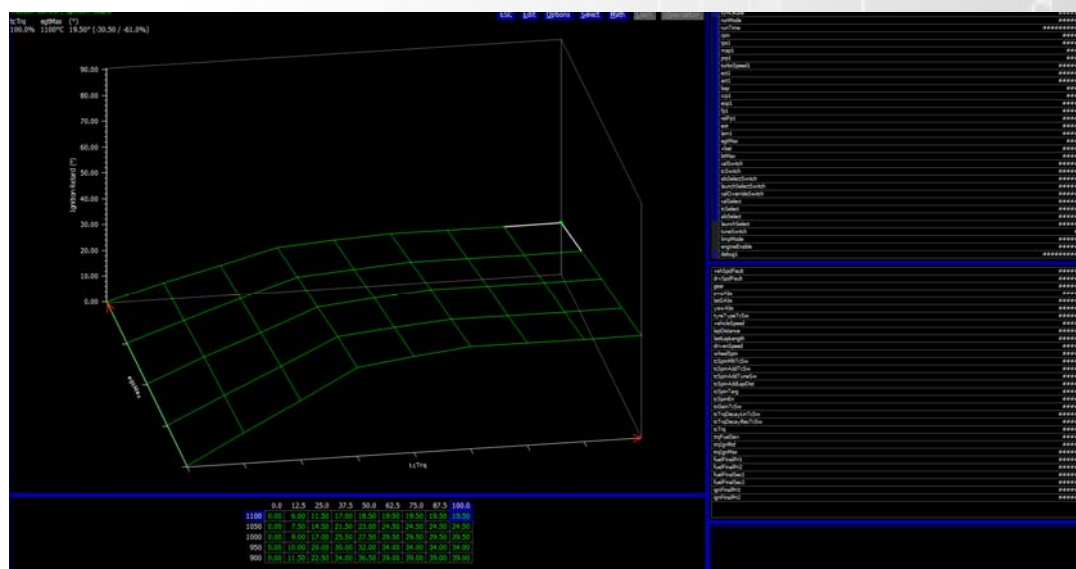
Example of above

VSS	*MPH*	4.0	6.0	8.0	12.0	16.0	20.0	25.0	30	40	50
Driven	*MPH*	24	24	24	24	24	24	26	24	40	50
% Difference	*%*	509	306	205	103	52	22	4	0	0	0

Example Traction slip table
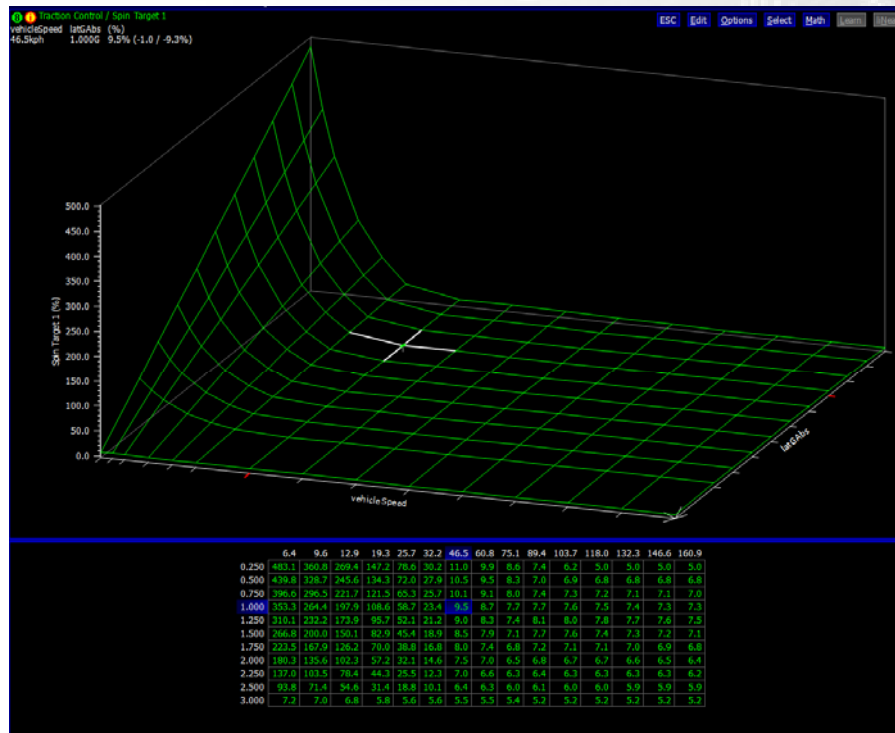
After setting the allowed slip users need to setup the torque limiting area of the strategy, fuel cuts is the easiest to understand as a 50% fuel cut results in a 50% reduction in torque in most applications but fuel cuts in a forced induction car can reduce turbine energy hugely and have a much larger effect of torque after the reduction request disappears compared to ignition retard reductions.

Using Ignition retard torque reductions up to a 20-30% TcTrq is recommended to start with as less of a transient effect happens with Ignition adjustments and above this apply fuel cuts or if the EGTs get too high. Below is a good model of Ignition retard based on torque reduction amounts to start with.


Then bring in the Fuel cuts above this amount of reductions or if the egts start to creep up.

Once Torque is under control you can tweak the gain to adjust the levels of TcTrq calculated based on vehicle speed to make the system more or less sensitive. Generally its set more sensitive at high speeds where lose of traction can carry a lot more energy in the movement of the car.

A valuable parameter when setting up traction control is Longitudal G, you can use this to monitor how the vehicle is accelerating to maximise accel. On certain tyres, allowing the tyre to slip 5% gains more accel where friction energy from slip is added to the tyres compound to add adhesion.

Launch Control

Overall Enable

Map to enable to Launch control strategy and Select the method of enabling, either by the Launch Control switch via the Pin Assignment or via the Pit Limit Switch. You can also enable under calibration switches if no Pin is assigned in the I/O Configuration.
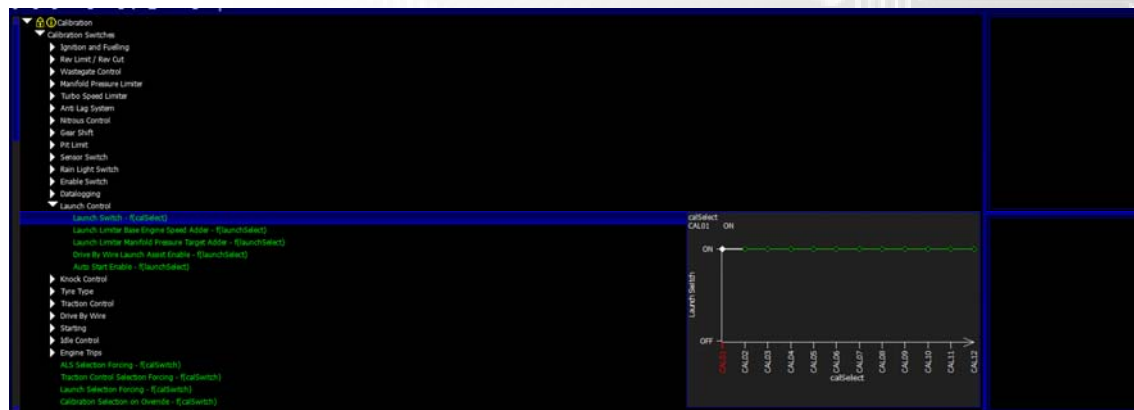
In the same area you can trim the Target Engine speed and Manifold Pressure Target on Launch.

Launch Switch Pullup

After assigning a pin in the I/O Configuration for Launch Switch you can select here to make the ecu pull the input up to 5v.

Launch Switch Polarity

Instruct here the strategy to enable on the Polarity of the Launch switch input to be High at 5v or Low at 0v

Launch Hold Time

The Launch Limiter will remain active for this period of time after the launch strategy has been disabled via either the Switch or a threshold is reached for example of Vehicle speed. ***Only becomes active is Launch Ramp Mode is set at Hold Time***.

Minimum Pedal Position for Activation

Launch control will not be considered active until this Pedal position is met

Disable Knock Control During Launch

Knock control is disabled when launch is active if enabled

Maximum Vehicle Speed for Activation

Ability to set a Vehicle speed which when higher than stops launch from becoming active again.

Vehicle Speed Breakpoints

Vehicle speed adjustable breakpoints for when using Launch Ramp Mode as Vehicle speed

Launch Hold Time Breakpoints
Launch hold time adjustable breakpoints for when using Launch Ramp Mode as Launch Hold time.

Launch Ramp Mode
User can select which method of ramp mode is used in the strategy

Base Engine Speed
Engine speed which the launch control targets, is adjustable based on either vehicle speed or Time depending on the Launch Ramp Mode selected. Can also be trimmed under Calibration switches – Launch Control

Vehicle Speed Breakpoints
Vehicle speed adjustable breakpoints for when using Launch Ramp Mode as Vehicle speed

Base Engine Speed Adder (TpsMax)
Engine speed adder based on Throttle position, useful for Targeting a higher Launch RPM when Torque is reduced by a lower Throttle Angle

Manifold Pressure Target
Manifold pressure which is targeted when Launch is Active, is based on either vehicle speed or Time depending on the Launch Ramp Mode selected. Can also be trimmed under Calibration switches – Launch Control

Fuel Cut Severity
3D Table which is based on Engine Speed target Error and Manifold Pressure Target error, extremely useful for allowing the Ecu to adjust the Fuel Cut Severity to maintain a targeted Engine speed but allows Manifold pressure to build when the vehicle is not moving.

Ignition Cut Severity
3D Table which is based on Engine Speed target Error and Manifold Pressure Target error, extremely useful for allowing the Ecu to adjust the Ignition Cut Severity to maintain a targeted Engine speed but allows Manifold pressure to build when the vehicle is not moving.

Ignition Retard
3D Table which is based on Engine Speed target Error and Manifold Pressure Target error, extremely useful for allowing the Ecu to adjust the Ignition Retard to maintain a targeted Engine speed but allows Manifold pressure to build when the vehicle is not moving.

Ignition Control Timeout
Ignition Cuts and High levels of retard put the engine components under different levels of stress, to ensure that it is not maintained for long periods users can set a period of time when the ignition adjustments end.

Ignition Control Disable Exhaust Temperature
Ignition adjustment ends when this EGT is Reached

Safety Fuel Cut Severity
If a Ignition control disable has become active the safety fuel cut severity table is used to maintain a sensible engine speed.

Exit Vehicle Speed
Vehicle Speed which the Launch control disables

Exit Pedal Position (*TPS)
Pedal Position in which Launch is disabled... *If no Pedal Position is assigned in the I/O Configuration it will track TPS

Fuel Cut Ramp in Rate
After Fuel Cuts (TrqFuelSev) has been disabled the Fuel cuts will ramp away to this rate.

Ignition Cut Ramp in Rate
After Ignition Cuts (TrqIgnSev) has been disabled the Ignition cuts will ramp away to this rate.

Ignition Retatd Ramp in Rate
After Ignition Retard (TrqIgnRtd) has been disabled the Ignition Retard will ramp away to this rate.

Automatic Re-Enable Vehicle Speed
When the Vehicle speed drops below this Value the Launch Control State will Clear back to Off ready to be Enabled again.

Turn Off Secondary Injectors During Launch
Secondary Injector will turn off during Launch is enabled.

Drive By Wire – Launch Limit – Launch Throttle Position Limit
Set the DBWTarget to limit based on Engine speed

Drive By Wire – Launch Assist
See Auto Start Below - When the Weight on Wheels is present again after the vehicle has been lowered i.e Car is back on the ground this strategy can be used to Target a set engine speed so the car has another torque to leave the pits immediately.

Auto Start
Strategy used for Race Car Pit Applications where the engine is required to be off during a PitStop. When the Weight on Wheels is present again after the vehicle has been lowered i.e Car is back on the ground this strategy can be used to enable a Starter motor and link into the Launch Assist Strategy

Launch Exit Time
Users can set here a time which is counted up after the Launch Control strategy has disabled to allow for adjustment to Wastegate Control Pressure Target and Nitrous Duty Multiplier.

Wastegate Control Manifold Pressure Target Limit Adder
Using the Launch Exit time users can set a adjustment to the Wastegate Manifold pressure Target against launch Exit time.

Nitrous Duty Multiplier

Using the Launch Exit time users can set a adjustment to the Nitrous Duty Multiplier against launch Exit time.

Tuning Tips:

Controlling the Torque on the Line during Launch is a key aspect to gain consistent and great launches, with the 3d adjustment tables for Fuel Cuts, Ignition Cut and Ignition retard this becomes very possible. With a Normally aspirated or 1:1 Supercharged engines the use of fuel cut and DBW limiting is the most effect way of controlling the torque, its when adding in the other variable of Manifold Pressure Target that a 3d error table is required.

With Turbo Charged engines the best way to start with the strategy is to get the engine speed under control first via the adjustment of Fuel cuts or Ignition Cut only based on the Rpm Error of the tables as shown below (Ignition cuts is far more effective method in building turbine energy but generates a lot of heat in the process so if using this method keep an eye on the EGTS)
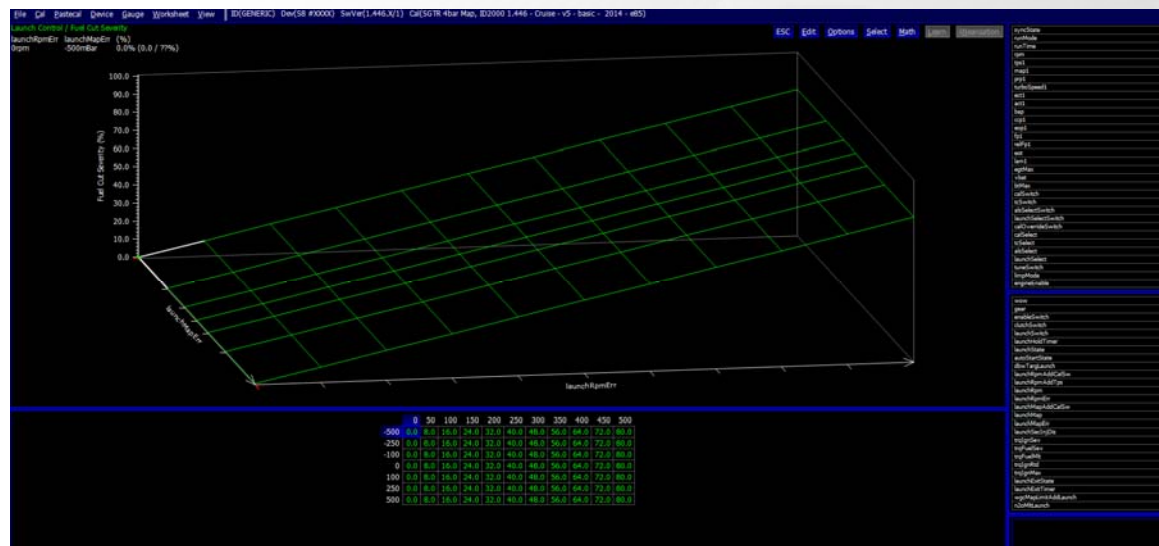
Once you have the Engine speed under control, set a Manifold Pressure Target and introduce some Ignition adjustments via the Ignition Retard table or Ignition Cut table in order to gain energy in the Turbine of the Turbo. As you see the Manifold pressure come up to the Target you will find that it overshoots if you have just set a Flat ramp of ignition adjustment based on engine speed error. Now use the Manifold Pressure Error axis of the table to adjust the Ignition adjustments as the Manifold pressure reaches its
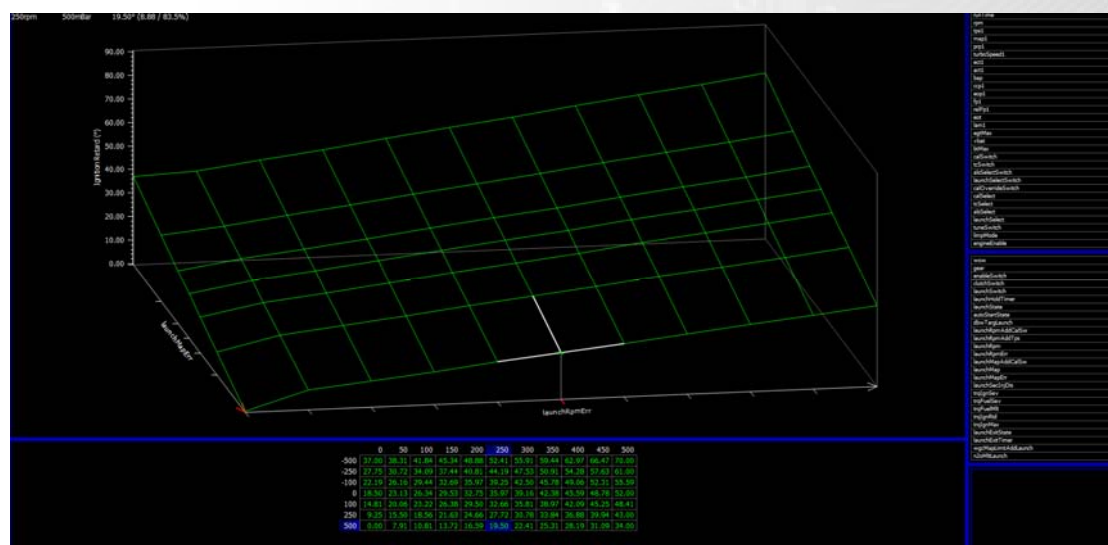
target. The table will start to look like below.

As Ignition adjustment is added you will find the engine speed might not reached the target now so adjustments to the Fuel cut table will be required in the lower Rpm Error breakpoints, this will also help the manifold pressure build faster as taking away fuel from the combustion via fuel cuts will reduce the energy in the turbine. Adjust the tables until you are able to maintain a stable RPM and Manifold Pressure.

A good tip to help with control is to set the Engine speed target slightly under the actual desired Engine speed and allow the error to be slighty positive to achieve the desired so that the error never goes negative causing the Ignition adjustment to stop.

Once setup you can then adjust all the Launch engine speed and Manifold pressure Targets from either a Rotary position - Launch Select Switch or via the Calibration Switch

Adjustments to torque after the Vehicle is moving can be done also if reliable Wheel Speed signals are not present for Traction control to work. This can be done based on Vehicle Speed or Time if no speed signals are present.

Select the Launch Ramp Mode required
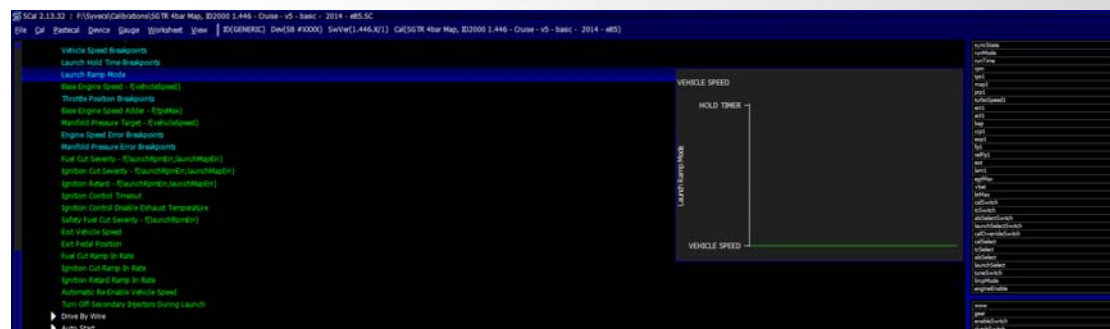
If based on Time then set a Launch Hold time Amount

After adjust the Base Engine Speed and Manifold pressure Target maps based on Vehicle speed or time to control torque after the vehicle has started moving.

Flex Fuel

When FlexFuel is set to ENABLED, various base map selection options function differently.

For example the four base fuel maps are considered to be two pairs of (0% Ethanol, 100% Ethanol) maps that are blended according to the measured fuel composition.

Enable Flex Fuel Operation

Turn on or off the Flex Fuel Control, as a blue item requires a Device – Program to take effect

Base Fuel Transition

Ability to Set a Fuel blend between the Run mode Fuel maps

Base Ignition Transition

Ability to Set an Ignition timing blend between the Run mode Ignition maps

Preliminary Fuel Transition

Ability to Set a Preliminary Starting Fuel blend between the Preliminary Fuel Injection maps under Starting (this is not a linear transition... below 20C /~68F a large amount of extra gasoline is needed to initiate combustion.)

Cranking Fuel Transition

Ability to Set a Cranking Starting Fuel blend between the Base Fuel Injection maps under Starting (this is not a linear transition... below 20C /~68F a large amount of extra gasoline is needed to initiate combustion.)

Cranking Ignition Transition

Ability to Set a Cranking Starting Ignition blend between the Ignition angle maps under Starting

Wastegate Manifold Pressure Target Transition

Ability to Set a Wastegate target blend between the wastegate target limit maps, also sets the blend between Map Limit1 and Map Limit2 under limiters.

Affected maps:

Starting

Starting / Preliminary Fuel Injection 1/2 are no longer independent maps, but are used for 0% Ethanol and 100% Ethanol, respectively. Calibration Switches / Starting / Starting Maps Select is ignored. The blend is set according to Preliminary Fuel Transition.

Starting / Base Fuel Injection 1/2 are no longer independent maps, but are used for 0% Ethanol and 100% Ethanol, respectively. Calibration Switches / Starting / Starting Maps Select is ignored. The blend is set according to Cranking Fuel Transition.

Starting / Ignition Angle 1 (BTDC)/2 are no longer independent maps, but are used for 0% Ethanol and 100% Ethanol, respectively. Calibration Switches / Starting / Starting Maps Select is ignored. The blend is set according to Cranking Ignition Transition.

Run Mode Fueling

Run-Mode Fuelling / Base Injection Time 1/2/3/4 are no longer four independent maps. If Calibration Switches / Ignition and Fuelling / Base Fuel Map Select is 1 or 2, Run-Mode Fuelling / Base Injection Time 1/2 are used for 0% Ethanol and 100% Ethanol, respectively. If Calibration Switches / Ignition and Fuelling / Base Fuel Map Select is 3 or 4, Run-Mode Fuelling / Base Injection Time 3/4 are used for 0% Ethanol and 100% Ethanol, respectively. The blend is set according to Base Fuel Transition.

Run-Mode Fuelling / Corrections / Closed Loop Lambda / Wideband Lambda Sensors / Base Target 1/2/3/4 are no longer four independent maps. If Calibration Switches / Ignition and Fuelling / Base Closed Loop Lambda Target Map Select is 1 or 2, Run-Mode Fuelling / Corrections / Closed Loop Lambda / Wideband Lambda Sensors / Base Target 1/2 are used for 0% Ethanol and 100% Ethanol, respectively. If Calibration Switches / Ignition and Fuelling / Base Closed Loop Lambda Target Map Select is 3 or 4, Run-Mode Fuelling / Corrections / Closed Loop Lambda / Wideband Lambda Sensors / Base Target 3/4 are used for 0% Ethanol and 100% Ethanol, respectively. The blend is set according to Base Fuel Transition. IN THIS MODE Run-Mode Fuelling / Corrections / Closed Loop Lambda / Wideband Lambda Sensors / Base Target 2/4 MUST NOT CONTAIN ANY ZEROES.

Wastegate Control

Wastegate Control / Standard Strategy / MAP Control / Maximum Manifold Pressure Target 1/2/3/4 are no longer four independent maps for wastegate target. If Calibration Switches / Wastegate Control / Wastegate Strategy Manifold Pressure Maximum Map Select is 1 or 2, Wastegate Control / Standard Strategy / MAP Control / Maximum Manifold Pressure Target 1/2 are used for 0% Ethanol and 100% Ethanol, respectively. If Calibration Switches / Wastegate Control / Wastegate Strategy Manifold Pressure Maximum Map Select is 3 or 4, Wastegate Control / Standard Strategy / MAP Control / Maximum Manifold Pressure Target 3/4 are used for 0% Ethanol and 100% Ethanol, respectively. The blend is set according to Wastegate Manifold Pressure Target Transition. The same is true for Inaccessible Map/2/3/4.

Limiters / Manifold Pressure Limiter / Pressure Limit Base 1/2 are no longer two independent maps for manifold pressure limitation. Limiters / Manifold Pressure Limiter / Pressure Limit Base 1/2 are used for 0% Ethanol and 100% Ethanol, respectively. The blend is set according to Wastegate Manifold Pressure Target Transition.

Tuning Tips:

Flex fuel control is a valuable strategy when using fuels with alcohol present like Ethanol and Methanol. The Syvecs Fuel Composition sensor measures the percentage of the alcohol present inside the sensor rail and allows users to blend between different maps.

A good starting point is to first calibrate the engine with convention fuel using the Base Fuel map1, Base Ignition map1 and Closed Loop Lambda Target1 and Starting maps 1, if the engine is turbocharged then setup the Wastegate Control via the Target Limit1 and set the Manifold Pressure Limit (boost cut) on base1. Highlighted Below
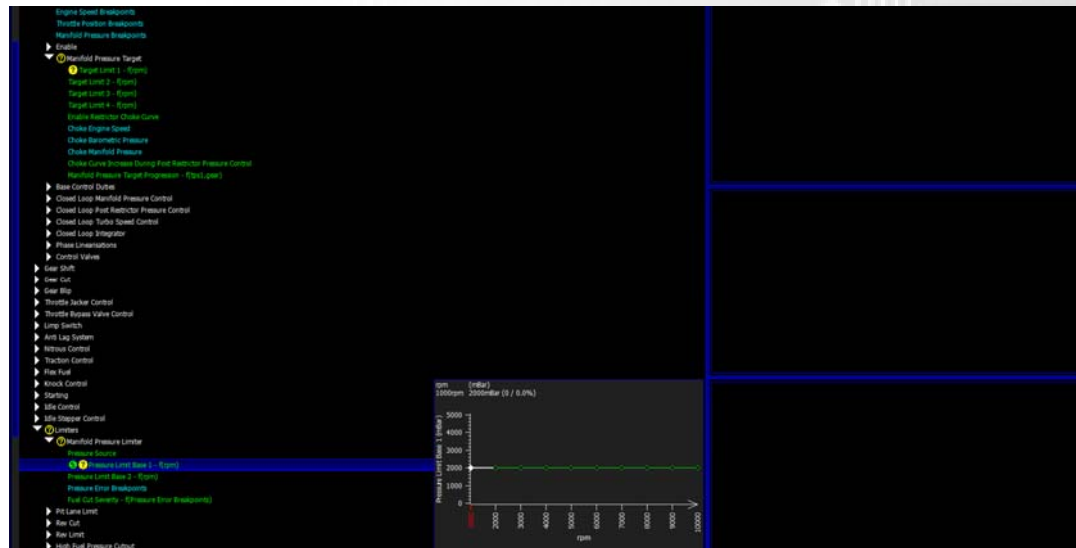
After finishing the calibrating on the conventional fuel swap the fuel to the alcohol based fuel at the maximum strength you are going to want to run.

Now turn on the Flex fuel control and set the blend tables all to 100% which will now make all the Base and Target tables use the 2nd option like Base Fuel 2, Base Ign 2, Wastegate Target 2, Closed loop lambda target 2, Starting 2 and Wastegate Limiter 2 etc
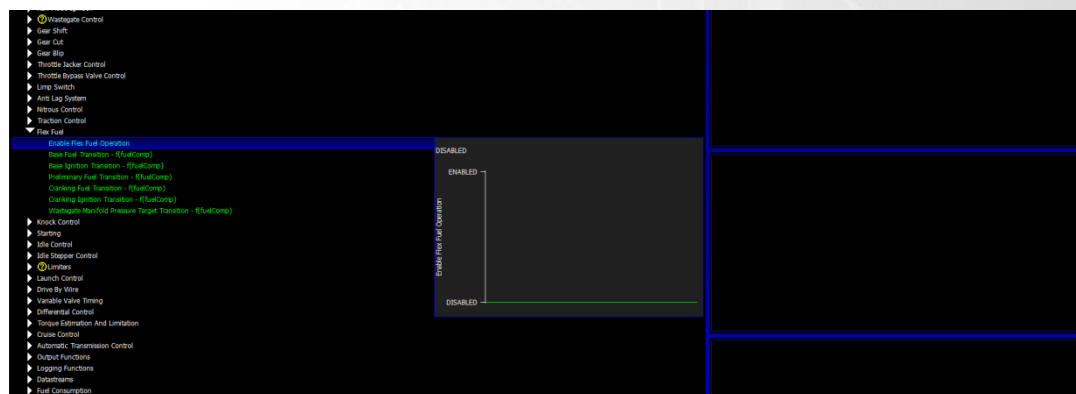
Finish calibrating the engine on the alcohol fuel and after then set the blend tables to as required.

Knock Control

A Strategy designed to maintain engine reliability as well as allow calibrations to run an engine near its Knock limit, which in some engines is where peak torque is found.

Knock Control Enable and Disable options are found under **Calibration Switches/Knock Control.**

Knock Sensing Setup

Found Under **Sensors/Knock**

Window Start
Engine Angle in which knock detection starts per cylinder

Window End
Engine Angle in which knock detection ends per cylinder

Band Pass Filter Frequency
Frequency which is monitored when Engine Angle is between Window Start and Window End

Gain Control
Overall gain of the knock sensing

Tip: While engine is at a idling state aim for the CylKnock* Values to be at ~ 3

Integrator Time Constant
Knock Integrator Time Constant controls sensitivity to knock noise in terms of the duration of the noise.

If a noise event lasts 100us (for example) a value of 100us or more will capture it fully. It will result in the highest possible knock output for that event. So if the ITC was set to 200us the output value for this event would not change but if the ITC was set to 50us the output value would be halved. If you suspect spurious brief noise spikes running a longer ITC can help eliminate them.

Gain Tuning

Calibration to be able to adjust the knock sensing gains per cylinder to average out all cylKnock values when the knock sensor is closer from one cylinder to another. Aim is to get all levels the same as shown below.
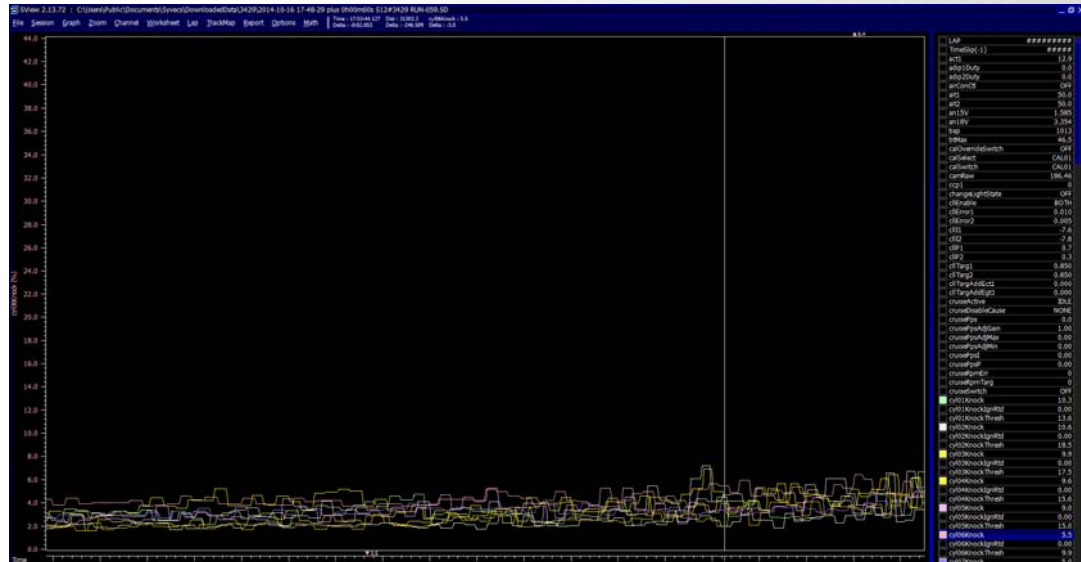
Knock Detection Enable Engine Speed

Engine RPM in which Knock Sensing begins

Base Level Clip

Knock Base Level Clip is used to prevent the internally tracked knock noise base level from rising so high that no knock can be detected above it. If this is set lower than the saturation error detection level, you will never get the saturation error.

Base Level Breakpoints

Ability to be able to change the Base level breakpoints of the event detection tables

Event Detection Level

Voltage values from the Knock sensors are converted to a Percentage and monitored continuously via a rolling average system. The Event Detection Level Calibration allows users to set a percentage value above a user adjustable Base level to define a Knock event per cylinder. The key to setting a Event detection level per engine comes from first establishing a CylKnock trace which does not have any real knock present. This allows the calibrator to set a Event level above the base in which an Knock event is set. You can monitor the Event Detection level via the Cyl*KnockThresh parameter as shown below where the Cyl*Knock value actually passes the Cyl*KnockThreshold (event detection level) and causes the Knock control system to activate.
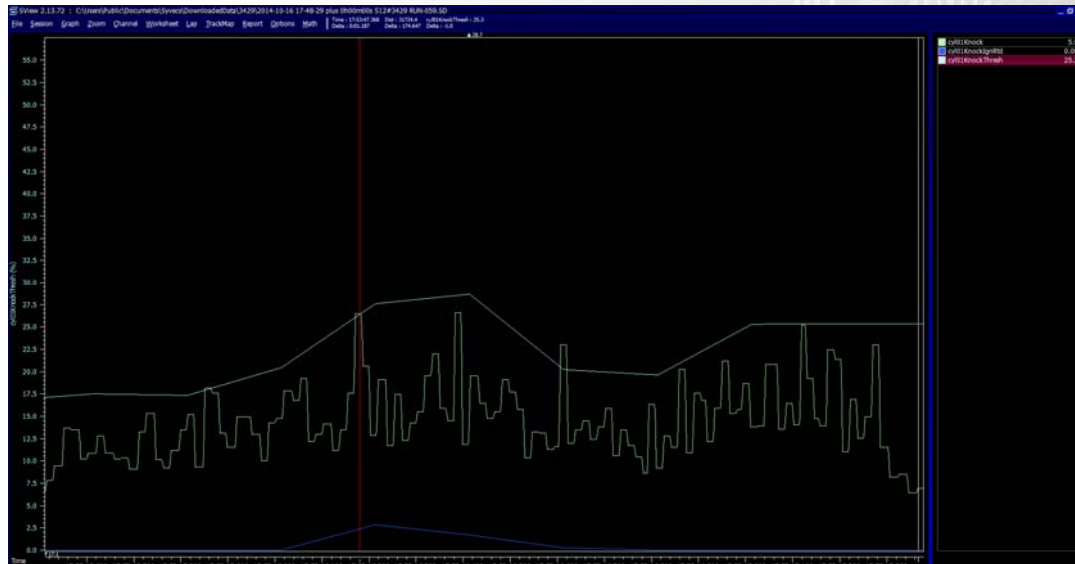
Severe Event Detection Level

This calibration works the same as the Event Detection level but if the Cyl*Knock value passes the Severe Knock event level is triggers a different manner of control under knock control

Pre- Ignition Event Detection Level

When the Cyl*Knock values pass this level it is considered a Pre-Ignition event and the Knock Control strategy acts accordingly.

Knock Control

Knock Control Enable Throttle Position

Throttle Position in which Knock Control becomes active

Knock Control Enable Manifold Pressure

Manifold Pressure in which Knock Control becomes active

Ignition Advance When Knock Control Active

Allows an adjustable Ignition advance to be added when the knock control is active

Disable Time After Gear Cut

After a Gear Cut Event the knock control remain in-active until this time has passed

Reset Ignition Retard on Gear Cut

During a Gear Cut Event the Cyl*KnockIgnRetard values are reset back to zero

First Event Ignition Retard Step

This Calibration is based per Cylinder. If no Knock events are present and a Knock Event gets triggered the knock control will adjust the ignition timing on the specific cylinder to be retarded by this calibration amount first.

Tip: Set quite aggressive around 2-3Degrees to get hold of the knock events quickly

Ignition Retard Step

Sets the ignition retard amount for each event after the first event is triggered

Severe Event Ignition Retard Step

Sets the ignition retard amount for each Severe event after the first event is triggered

Maximum Ignition Retard
Sets the maximum amount of ignition retard that can be set

Non–Knocking Cycles Per Reinstate step
Sets the rate in which Ignition timing is reapplied after a knock event is not present per 5 cycles of the engine.

Ignition Reinstate Step
Sets the amount in which Ignition timing is reapplied after a knock event is not present.

Ignition Retard Threshold for Full Fuel Cut
If Cyl*KnockIgnRetard reaches this amount a full fuel cut is applied to the cylinder to attempt to bring the cylinder back under control

Ignition Retard When Knock Sensing Failed
Sets a ignition timing adjustment amount when the knock sensing has failed

Events At Maximum Retard For Cylinder Shutdown
Sets a amount of Events at Maximum ignition retard before the cylinder is completely shut down

Consecutive Pre-Ignition Events For Cylinder Shutdown
Sets a amount of Pre-Ignition event before a cylinder is completely shutdown

Cylinder Trim Learning
Learning: USE means apply the values learned so far but do not do learn any further changes to those values; LEARN means use them and keep adjusting them according to the learning strategy.

Calibration Switches and Overide's

Calibrations Switches (CalSelect, TcSelect, LaunchSelectSwitch)

The Calibration switches at the top of the calibration tree is a very powerful tool for allowing users to control many aspects of the power train control via Rotary Switches or via Car integrated switches like on the Cruise Control Switches with the R35GTR and 911 kits.

The Syvecs Calibrations Switches look like below and can be used for Launch Select Switches, Traction Select switches or most popularly as Calibration Switches.

(if Launch or Traction Select Switches are not present then they follow the Calibration switch position)

Once wired in as instructed in the Connections and wiring sections of this manual you can then see the current Calibration, Launch or Traction Switch position via the Parameters CalSelect, TcSelect or LaunchSelectSwitch found on the right hand side of the Calibration tree. See below
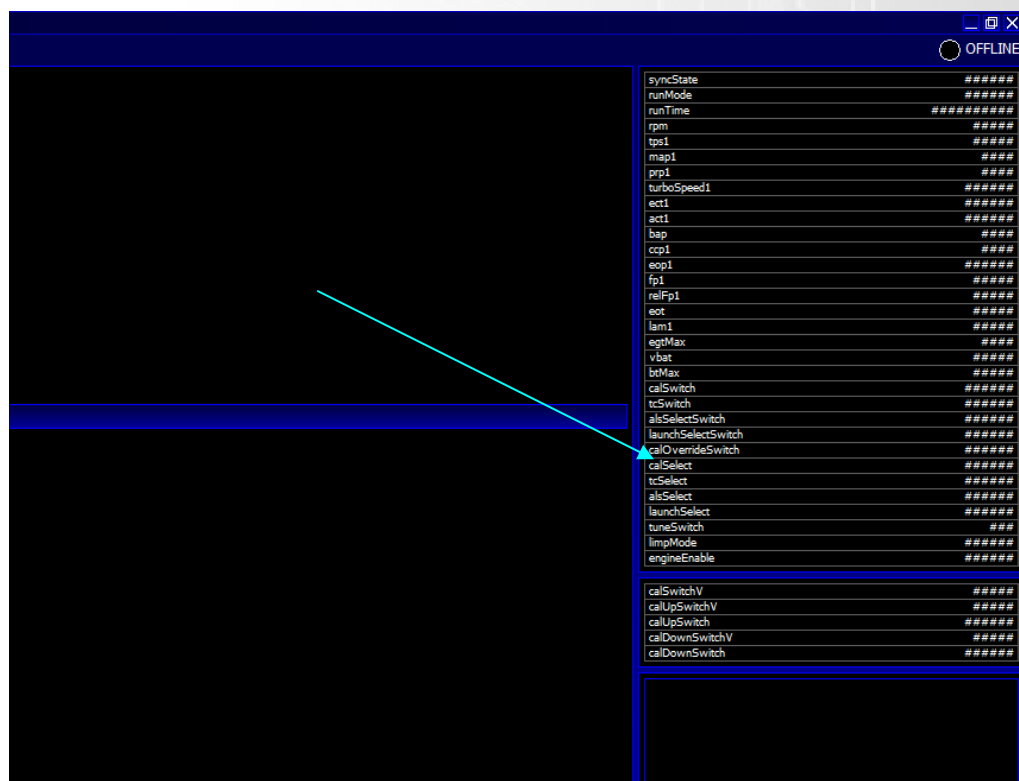
If using an R35GTR kit you can adjust the CalSelect via the Cruise Control Up and Down buttons. You will also see the CalSelect value on the Oil Temp Gauge.

If using an S911 Kit with a 997 you can adjust via turning on the cruise control until you see the Cruise Light flashing and then holding the Up and Down Stalks for 2 seconds to switch between CalSelect. You will also see the Current CalSelect on the Boost Gauge on the Clocks when viewing in units of Bar.

The Calibrations Switches section then allows for adjustment to maps in realtime via the appropriate switch. A Horizontal line will be present in each section to display the current Calibration position also.
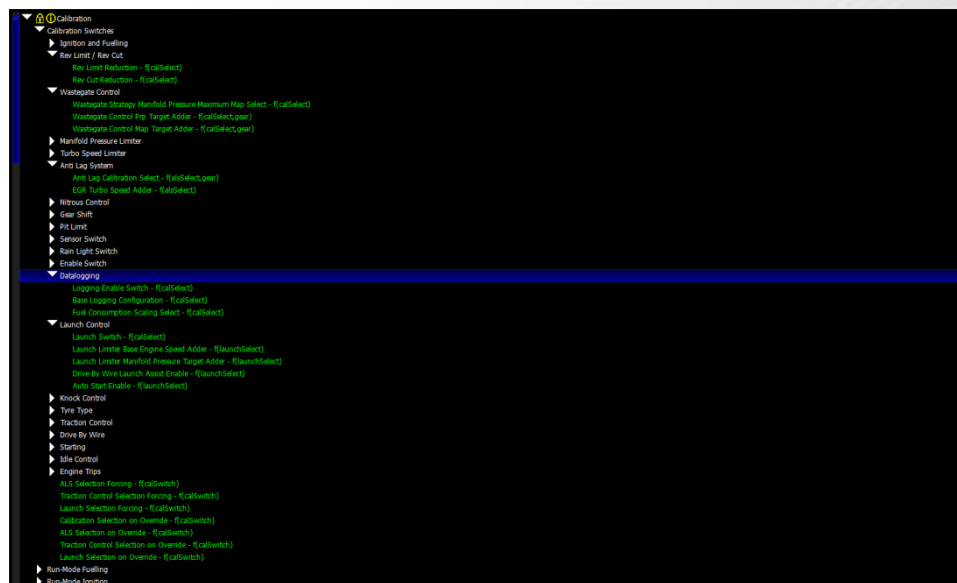
Calibration Override Switch

The Calibration override switch is extremely useful for overriding alot of Calibration settings at once and allows users to jump to an addition number of calibrations at a touch of a button. This is used in many applications for the strategy Syvecs brought to the industry known as Rolling Antilag. When the Calibration Override switch is pressed it jumped to a dedicated CalSelect and ALS map for controlling the Vehicles speed and Achieving Manifold Pressure while full throttle so at the release of the button lag was not present in a roll race and then car had manifold pressure present.

Others use it for Staging in Drag racing where they use the Clutch Switch set as the Calibration override switch and make a limited position switch like 8 that our own Cal Switches have be able to have 4 more positions while on the line to control different amounts of torque.
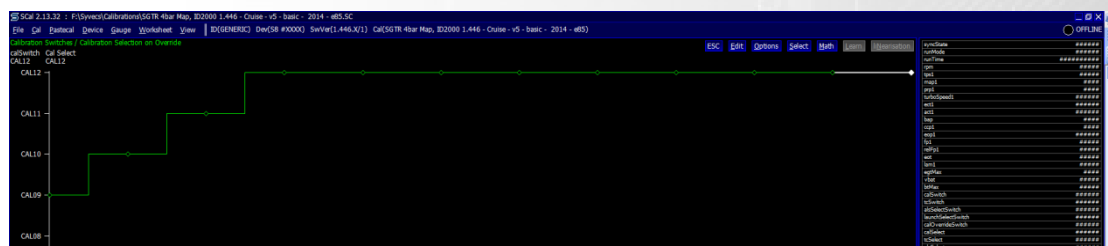
On the R35 SGTR kit this was done via the Cruise Control cancel Switch and on the S911 997 kit it was done via pulling back the Cruise control Stalk.

TORQUE ESTIMATION AND LIMITATION

Engine torque estimation and control is most often used when the need for proper engine torque data needs to be transmitted from the Syvecs, as well as for any external torque request into the Syvecs to be managed properly. This feature is most often used when integrating with any external systems and their torque control requirements; (For example, a dual clutch gearbox controller).

In such systems Driver Demand Torque and engTrqEstOutput are normally sent to the gearbox controller; the former being used to determine the most efficient use of the engine torque available based on driver demand, and the latter being used to determine the required clutch clamping force to maintain an even driveRatio. The gearbox controller will return engTrqLim and torque limitation will be applied when engTrqEst output exceeds this value.

Once true MBT is found, this format then allows the possibility to then impose a slightly different torque curve via the driver demand calibration by setting Enable Torque Limitation By Driver Demand (engTrqDmdPos).

Careful chassis or engine dyno testing is usually required to populate the torque estimation maps. Note that if the friction torque is not calibrated correctly (ie: if output torque is not negative on overrun), torque limitation will be incorrect and external gearbox controllers may not behave as expected.

If engTrqLim is below External Torque Limitation/Shift Event Detection Torque Threshold (engTrqLim<this) for External Torque Limitation / Tmeout, the torque limitation will be removed at External Torque Limitation/Torque Release (Per 10ms).

A new torque limitation request will only be permitted when engTrqLim returns above External Torque Limitation / Shift Event Detection Torque Threshold (engTrqLim<this) for External Torque Limitation / Reset Time.

If engTrqLim is below External Torque Limitation / Shift Event Detection Torque Threshold (engTrqLim<this) for External Torque Limitation / Limp Mode Trip Time, a trip into overall engine limp mode will occur, which will not clear until the ECU is reset.

If **Enable Torque Estimation** is set to Enabled, then ensure that **Engine Speed Breakpoints**, **Manifold Pressure Breakpoints**, and **Throttle Position Breakpoints** are set accordingly. If the data highlighted in blue has been changed, remember to "program" the calibration into the ECU before moving on.

TABLE DESCRIPTIONS

MBT Torque Estimate – (rpm,mapMax)

The axes on the MBT Torque Estimate table are Primary Load and RPM. The "units" in the MBT Torque Estimate table will need to be set to units that are familiar for you, or that match the data that the external gearbox controller is using. This can be done under the table legend at the upper right hand corner; <u>O</u>ptions>change <u>U</u>nits. The values in this table will very nearly follow actual engine torque being produced. The function and feature of this table is the ability to fine tune an external controller that does not have the capability to understand other modifications that have been done or the increase in maximum torque available at the engine.

MBT Torque Estimate Multiplier - (tpsMax)

If there is a need for finite adjustment of the torque output due to not enough engine vacuum at low rpm, IE with an aggressive camshaft, this table can aide in acquiring a very accurate output acting as an overall gain based on throttle position.

MBT Torque Estimate Multiplier – f(act1)

This table is used for a gain multiplier of MBT Torque Estimate based on the theoretical torque loss from increased air charge temperature.

ALTERNATE TORQUE ESTIMATION

Use Fuel Flow to Estimate MBT Torque

This option allows the Ecu to do some advanced calculations to estimate the torque the engine is producing, it is vital that for this strategy to work well that the correct Injector consumption scaling values are entered as shown below. Injector Manufactures will be able to give you this infomation based on your base fuel pressure.

Thermal Efficency Estimate

This calibration has an effect on the calculated torque value when using the fuel flow option and is important to adjust espically in the idle areas where the thermal efficiency drops on most engines.

Friction Torque Estimate Multiplier – f(rpm)

The values need to represent actual torque values from the engine theoretical friction losses. It is then subtracted from the final MBT Torque value. During overrun the values in this table can be adjusted to ensure that the gearbox controller sees a negative torque value. This value can be found for example on a Mustang Chassis dynamometer during deceleration and the load cell will report the negative torque value directly to the dyno.

Maximum Value For engTrqEstOutputPotClamp

The value entered in this table is an actual clamp for the MBT Torque Estimate output in the circumstance that the engine is creating more torque than the gearbox controller was programmed to handle.

EXTERNAL TORQUE LIMITATION

Enable Torque Limitation By External Request - (engTrqLim)

This toggle is extremely important. If set to ENABLED, it allows the Syvecs to respond to the signal from the gearbox controller's torque reduction request. This is required in order to reduce torque from the engine for example; during shifts, warm up, pre-launch, or in the case of a fault in the gearbox.

Pedal Position Limit – f(ppsDriver, engTrqLim)

This feature was designed to give some flexibility to the Calibrator to aid in reducing available torque at the engine by means of reducing airflow through the throttles via a drive by wire throttle. This can be used to further enhance the smooth feel of a shift, or if needed to help reduce the shock of engagement of the clutch at full power. The values in the table have no effect unless lower than the **ppsDriver** axis in use?

Pedal Position Limit ROI Max (Per10ms) – f(ppsDriver)

Once the **engTrqLim** is returned to the maximum value, the Rate of Return of the throttle from the Pedal Position Limit setting is limited to this value, per 10ms.

Minimum Cut Severity – f(tpsMax,engTrqLim)

This table is used to set an **IMPLEMENTED** engine torque reduction, ignoring the calculated torque reduction request input from **engTrqLim**. Understand that if the values are ZERO this function is turned off. This table can be used for example; when the external gearbox controller cannot handle the actual torque available at the engine properly, and when more torque reduction is needed for proper clutch/gear engagement.

Shift event Detection Torque Threshold – (engTrqLim<this)

Cut/Retard Defer Time – f(ppsDriver)

The actual torque reduction event may be delayed by the values in this table for example; if the transmission response times are slower than the engine's ability to reduce torque. Understand that if the values are ZERO this function is turned off.

Timeout Pedal Position Threshold

There is a time limit on **engTrqLim** above the value set in this table

Timeout f(gear)

This is a time limit that may be set in order to return to full engine torque regardless of the external torque request by **engTrqLim**. It is active when the **ppsDriver** is above the value in the Timeout Pedal Position Threshold definable per gear. This can be helpful for example; as the external gearbox controller may not know that the clutch has been upgraded and will allow for a faster return to full engine torque available.

Torque Release (Per 10ms) – f(gear)

The rate of return of the total **CUT/RETARD** from **engTrqLim** release is defined by the values in this table per gear. This can allow for slower or faster return to full torque available at the engine.

Limp Mode Trip Time – f(tpsMax)

When **engTrqLim** is active for more than this time, the Syvecs will enter a Limp. This is used to prevent damage to the gearbox, and to greatly reduce engine torque available in the case of an actual fault in the gearbox.

Reset Time

Another **engTrqLim** under the time limit in this table will be ignored. This hysteresis is needed to prevent going into Torque reduction request twice in one gear change. It will vary based on the gearbox controller being used.

Driver Demand Torque – f(rpm,ppsFinal)

An external gearbox controller will use the data in this table to best determine the USE of the engine torque available, for example; the decision for current gear and or clutch pressures. To best accommodate many different external gearbox controllers, **ppsDriver** is considered the torque requested by the driver. The values in this table will closely follow actual engine torque available and can be determined on a load cell bearing chassis dyno. From there, they can be adjusted to allow more or less driver demand at various pedal positions and RPM.

Enable Torque Limitation By Driver Demand – (engTrqDmdPps)

Enabling this option applies a torque limit based on what is set in the Driver Demand Torque table. Very useful for controlling torque on pull away and also in launch.

Minimum Torque Multiplier Via Ignition Retard

Below the value **engTrqLimitMlt**, the fuel/ign cut will be applied based on the settings in **Maximum Cut Severity** and **Cut Type**. The amount of Ignition Retard is defined in **Torque Estimate Multiplier.** The values in **Torque Estimate Multiplier** need to be best determined on an engine or chassis dyno to achieve the desired reduction in torque based on ignition timing. A value of 1.0 returns no reduction whereas a value of .9 results in roughly a 10% reduction in torque, and so on. Assign an ignition value reasonable to not increase exhaust energy beyond control of the turbocharger system.

At that limit a fuel cut would need to be implemented, hence the means to control torque as precisely as desired. To further aide in the precision, the axis is definable and recommended to adjust per each engine configuration.

Maximum Cut Severity

This value is the maximum defined cut, acting as a final clamp over all calculated and preset fuel/ign cut values. **Maximum Cut Severity** does not clamp the **Minimum Torque Multiplier Via Ignition Retard** as this table is defined by the user.

Cut Type

Defines the type of cut desired, IGN or FUEL. It is recommended to set to fuel as this reduces overall energy in and out of the engine. There are certain applications that need the IGN function, and if you feel this achieves the desired goals running an IGN cut over a FUEL cut, you can make this selection from this table.

Automatic Transmission Control

Overall Auto Trans Control Enable
Calibration to turn on the Auto Trans Control. As a blue item requires a Device Program to take effect

Throttle Position Breakpoints
Ability to adjust the Breakpoints for the Throttle Position tables

Setup of Selector Input
Assign in the I/O Config the Auto Trans Select 1-4 options for the Selector Position signals.

Park/Neutral

Drive

Sport

Reverse
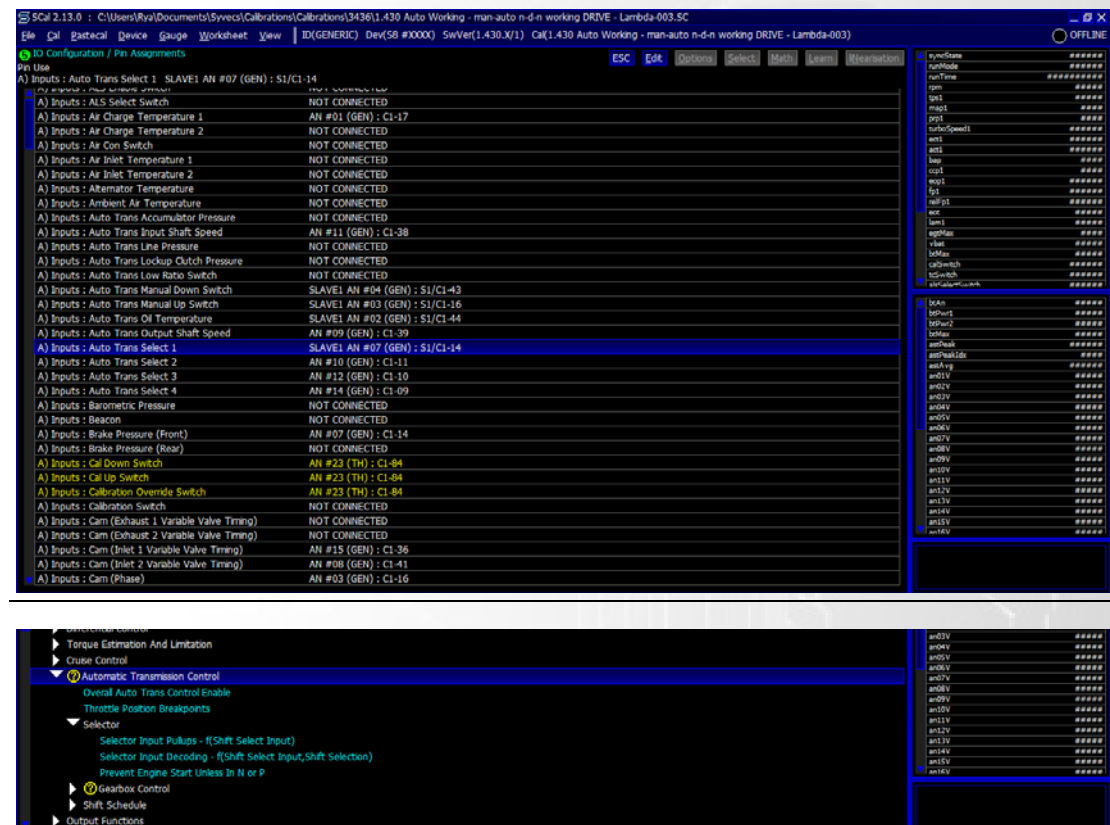
Select Inputs Pullup
Users can enable a 4.7k pull-up if the Selector shafts pulls to ground for selection. 90% of Selector shafts go to 12v for position.

Selector Input Decoding
Set the Polarity of the Signals from Each Auto Trans Select input to tell the ecu which signal, equals which position.

Requires Device/Program after changes

Gauge ATSelect to ensure the position decoding is setup correctly
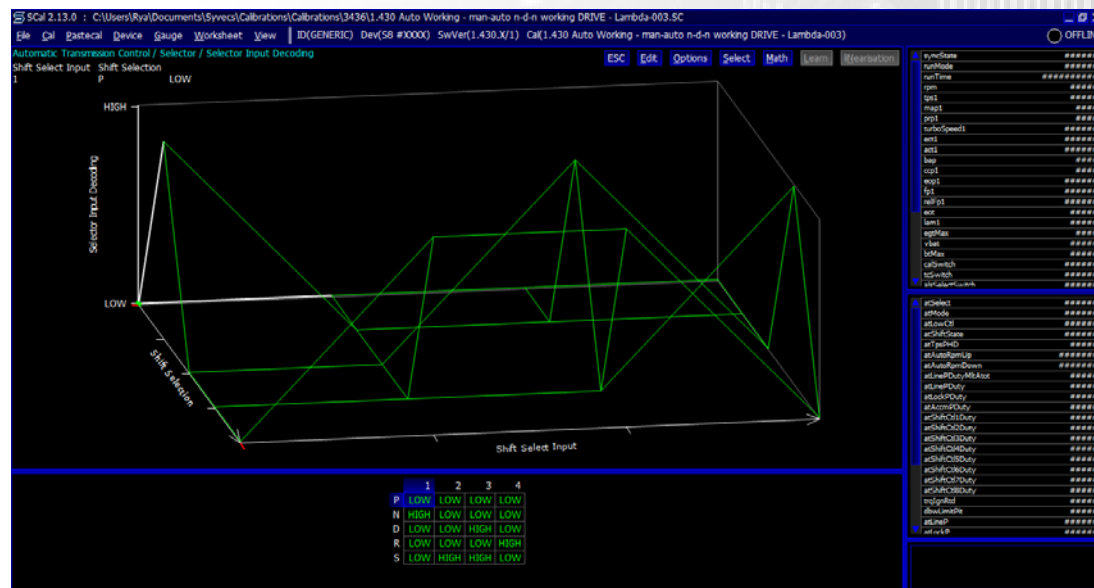
Prevent Engine Start unless in N or P

Option to stop the engine start until Park or Neutral selection is seen in ATSelect

Gearbox Control – Outputs

This area of the calibration should only be adjusted by experienced calibrators!

NOTES:

Half Bridge assigning when using X10 Expander

- Slave1 Fuel11 is H Bridge1 (Pin4 on X10)

- Slave1 Fuel12 is H Bridge2 (Pin30 on X10)

- Slave1 Fuel13 is H Bridge3 (Pin21 on X10)

- Slave1 Fuel14 is H Bridge4 (Pin22 on X10)

Half Bridge outputs should not be driven at more than 95% and when active provide a 12v supply from the output, generally used for gear control solenoids which are earth inside the transmission. These drivers can handle a Maximum of 10Amps!

Set PWM Frequency of the Solenoids used and the Output type to whether the Output pulls to Ground or up to 12v via H-Bridge.

Accumulator Pressure control override

Some gearboxes use the accumulator solenoid to do other tasks like when energised with a certain gear control pattern engages an overdrive.

Accumulator Pressure control duty override by shift output

Mode minimum means lowest of accumulator and shift output duties win; mode maximum means highest of them win

Accumulator Pressure control duty override by shift output number

Set the output you wish to set duties for in shift output matrix entry for which no pin is assigned

Shift Duty Ramp maps allow users to set a ramp in and out on some of the outputs. For Gear Solenoids this is not normally required but for overdrive solenoids and SL1 and SL2 signals on the Toyota/Lexus variant of gearboxes a ramp on of the duty and ramp off of duty is required

ALL RAMP RATES IN THE AUTO TRANS STRATEGY ARE SERVICED AT 10MS

Gear Control Matrix

Set the sequencing of the outputs to select the gear required, this info is present in most workshop manuals of the vehicle

Top Gear

Set the highest gear in the Gearbox

Gearbox Control – TakeUp

Users can set in the TakeUp area the following options:

Maximum Vehicle speed to exit Neutral

Maximum engine speed to exit Neutral

Maximum Throttle Position to exit Neutral

Exit Neutral via Higher gear to Reduce Squat below speed

Exit Neutral via Higher gear takeup Gear

Exit Neutral via Higher gear takeup Time

To help with Reducing Squat some transmission have the trans sat in a higher gear in neutral and park so that when exiting from neutral it does not take a while for the pressure to engaged the higher gear to reduce the squat - This can be set in the Gear control matrix

Gearbox Control – Lockup Clutch

The Lockup Clutch is activated generally in the higher gears of the transmission in Cruising areas. Some Vehicles apply it also on Full load

90% of the calibrations in this section are obvious to their task – Minimum and Maximum transfer ratio option applies to the atTRFadj parameter.
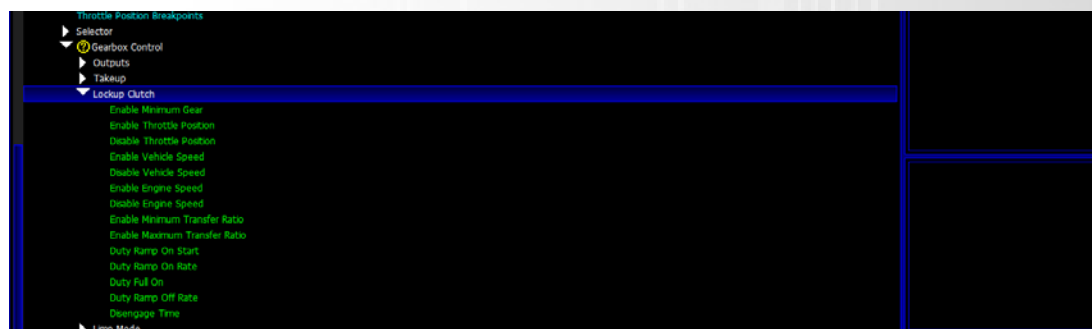
Gearbox Control – Limp Mode

Ability to set Limps for Clutch Slip Detection, High Transmission temp

Gearbox Control – Low Ratio Control

Control for Relay output for the 4LO output on Toyota/Lexus Trans. When Auto Trans Low Ratio Switch is Yes in I/O Config the Output Auto Trans Low Ration Control becomes active.

Setup the Input settings here for the 4Lo Switch

Gearbox Control

Line pressure control duty in neutral
When ATSelect is in Neutral the following line pressure duty is applied

Accumulator pressure control duty in neutral
When ATSelect is in Neutral the following Accumulator pressure duty is applied

Line pressure control duty
When ATSelect is in Drive or Reverse the following line pressure duty is applied against throttle position

Line pressure control duty in sport
When ATSelect is in Sport the following line pressure duty is applied against throttle position

Accumulator pressure control duty
When ATSelect is in Drive or Reverse the following accumulator pressure duty is applied against throttle position

Line pressure control duty during shift
During a Gear change the line pressure is able to be modified to a set duty based on TPS and is modified until the delay time has been reached after the shift outputs change.

Accumaltor pressure control duty during shift
During a Gear change the accumulator pressure is able to be modified to a set duty based on TPS and is modified until the delay time has been reached after the shift outputs change and line pressure harden.

Line pressure control duty multiplier
This table allows the calibrator to alter the line pressure duty based on Auto Transmission Oil Temperature : ATOT

Ignition Retard During Shift
Ability to be able to reduce the torque of engine via ignition timing adjustment based on throttle position.

Ignition Cut During Shift
Ability to be able to reduce the torque of engine via ignition cut severity adjustment based on throttle position.

Drive by Wire Target Limit during Shift
Ability to be able to reduce the DBW target of the engine based on current throttle position

Delay From Torque/Line/Accumulator Soften to Shift Output Change

Ability to set a delay in the activation of the next Shift Output to aid shift firmness by allowing the Torque/Line/Accumulator changes to reach desired effect

Delay From Shift Output Change to Line Harden

Ability to set a delay in the Line pressure modification after the Shift output has been activated. Some Hydraulic based gearboxes don't engage the next gear instantly due to delay in the fluid reaching the actuator

Line Pressure Duty Ramp in Rate

Users can set a ramp in rate of Line pressure changes (Duty based over 10ms)

Delay from Line Harden to Accumulator Harden

Allows users to be able to set a delay in the accumulator harden.

Accumulator Pressure Duty Ramp in Rate

Users can set a ramp in rate of Accumulator pressure changes (Duty based over 10ms)

Delay From Accumulator Harden to Torque Harden (minimum)

The torque reduction reinstate is in a closed loop system explained below. This calibration allows users to set a Minimum delay time for the torque to be reapplied after the Accumulator harden has been set.

Delay From Accumulator Harden to Torque Harden (Maximum)

The torque reduction reinstate is in a closed loop system explained below. This calibration allows users to set a Maximum delay time for the torque to be reapplied after the Accumulator harden has been set.

Delay From Accumulator Harden to Torque Harden (atTfrAdj Change)

The Torque is reinstated back into the engine when the **atTfrAdj** paramerer is within the value range set in this calibration from the activation of the shift in the strategy. Designed to only reinstate the torque when no slip is present

Ignition Retard Ramp out Rate

Based over 10ms cycles users can set the ignition retard ramp out rate in which the Ignition timing is return to the base ignition values

Ignition Cut Ramp out Rate

Based over 10ms cycle users can set the ignition cut ramp out rate in which it is returned to 0

Drive by Wire Target Limit Ramp out Rate

Based over 10ms cycles users can set the Drive by Wire target adjustment rate in which it returns to the original target based on pedal

Post Shift Disable Time

Ability to be able to set a wait time for a new shift after a previous shift completion

Gearbox Control – Shift Schedule

The automatic control of the scheduled shift point is setup in this area of the gearbox control strategy.

Throttle position is this area of the gearbox control is altered to have a peak hold function so that on sudden transient changes of throttle angle the strategy does not alter the current desired gear. *TpsPHD* is this parameter

Users can calibrate the peak hold time of this item and the decay rate using the following calibrations:

- tpsPHD Hold Time
- tpsPHD Decay rate
-

Gearchange Engine Speed Schedule

Here users can set a desired gear up change rpm and gear down change rpm based on *tpsPHD*. It is suggested to open 2 gauges showing *atAutoRpmUp* and *atAutoRpmDown* that state the desired rpm for next shift.
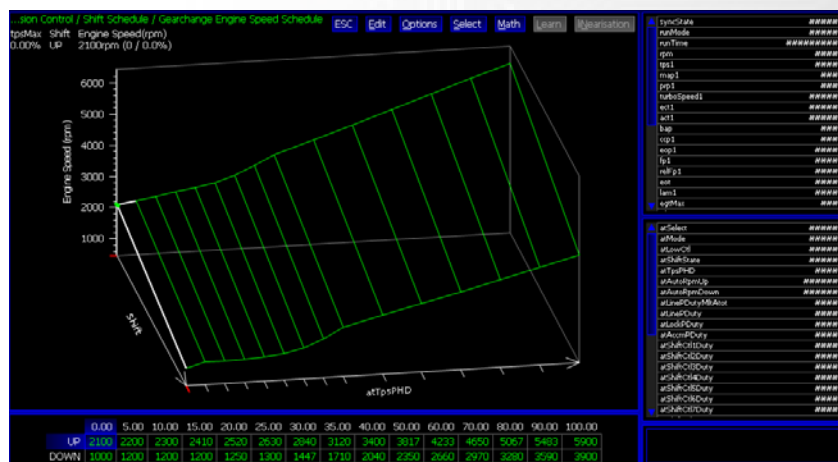
If users find that the Rpm Delta is large on some gear up exchanges that it causes the *atAutorpm down* value to be reach and request a down shift then setting a value around 500ms in the **Post-Shift Disable time** calibration found under the main gearbox control section to stop shift request until the RPM has stabilised

UpShift Limit

takes priority over the **Gearchange Engine Speed Schedule** and allows users to set a upshift rpm for each gear.

Sport Mode Engine Speed Schedule Adder

Effects the **Gearchange Engine Speed Schedule** values so that users can have a higher shift point in sport mode.

Downshifts can be calibrated to allow more than one gear step down on the Gear matrix to put the engine rpm in the optimal point. Users can set a limit on the amount gears it drops in the cal **Maximum Number of Gears to downchange in one step**. The decision for how many gears it downchanges is done based on the rpm difference of actual rpm and *atAutoRpmDown*. Values that are more than double that of *atAutoRpmDown* cause a double request of gear selection. A **Downshift decision delay time** is programmable as well so that quick blips of throttle movement do not cause a down shift.

At slow speed driving it can be set so that the box does not shift down to first gear below a configurable speed via **Do Not Change into First Above** calibration even if the atAutoRpmDown has been reached to improve slow speed driving. This can be

overridden in sport mode over a configurable throttle angle via the calibration **Overide First Gear Lockout in Sport above**

Manual Mode Operation

The use of manual mode requires up and down switches to be wired into the ecu and assigned in the **I/O Configuration– Pin Assignments** Items:

Input – Auto Trans Manual Down Switch

Input – Auto Trans Manual Up Switch

When assigned these inputs will be applied with a 5v internal pull-up. Only when pulled to Ground via the switch they will be considered active.

Manual mode can then be selected in Sport mode only and Activated by operation of either manual switch. Going back to Automatic operation is done via removal of Sport mode

Sport Mode can also be activate under **Calibration Switches – Gear Shift - Select Automation transmission Sport Mode (when in drive)**

Shaft Speed Signal Frequency Ratio (out/in)

This section is found under Sensors – Automatic Transmission Speed

Get Gear ratios from manual to set up shaft speed signal frequency ratio

- assuming here that input and output shaft frequencies match when the shaft speeds match (ie same number of teeth and same division setting in sensor setup)

- enter ratio for each gear directly in the map (use 1 for unknown, neutral, non-existent high gears)

- select entire map and then Math/Expression "1/cv" to invert each entry individually

- Example 1st is 3.3 in manual; either enter 0.303 (which is 1/3.3) or enter 3.3 then do math/exp "1/cv" to get 0.303

Monitoring Items:

atTRFraw - Raw ratio between in and output shaft

atTRFadj - if completely locked with no slip this should be 1 if greater than one then output shaft is faster than the predefined ration, if lower than 1 then trans in slipping

AtTRFSlip - always between 0-1 if 0 no slip... if 0.9 its 10 faster on output shaft over input

Frequently Asked Support Questions

Q)   For wastegate control I need boost by gear and rear vehicle speed and I can`t find it in the software.

A) You would assign the rear speeds under sensors to the vehicle speed and fronts to driven speed. Then you can set the gear detection to learn by ratios. After this go to Calibration Switches – Boost control and here you have change the boost per gear for each map position you are in using our 8 Position switch. You can also alter the Nitrous and boost delivery after the launch based on time or speeded if you look at the bottom on Launch control settings

Q)   During burnout i need a lower rev-limit and lower boost target

A) This is not a problem you would assign one of the 8 Position switches to have a lower limiters and boost target under calibration switches

Q)   What is Spin Target and Wheelspin parameters? Is it a percentage difference between driven wheels and non-driven wheels?

A) WheelSpin is calculated as (drivenspeed-vehiclespeed)/vehicle in %, the wheelspin target (tcSpinTarg) is then calculated by modifying the base values in the Steering angle and Lateral G spin target tables. Multipliers and adders are also applied based on settings on Traction control and Calibration Switches also..... Then the strategy kicks in when a tcSpinErr is produced. tcSpinErr is calculated as WheelSpin-tcSpinTarget

The Overal torque reduction demand (tcTrq) is then calculated as tcSpinErr multiplied by Base Gain and the gain multipliers under Calibration switches... This can be clamped then by Torque Reduction Clamp.

Finally Ignition retard and fuel cuts are applied based on the TcTrq amount vs the Ignition retard and Fuel cut severity calibrations.

Q)   During launch control can i have a set boost target along with RPM

A) Yes and this is where our product really stands out from the crowd. As we can control perfectly the rpm and boost on the line using precise closed loop control of ignition cuts, ignition retard and fuel cuts.

Q) Do you have some "manual" available for explanation for the ALS settings?

If not, the things I don't know exactly how they work:

    High Throttle Bypass Disable Threshold

A) This is the throttle angle in which Bypass duty for allowing more air into the engine via either DBW or Idle control etc is ignored

Q) Difference between Start Calibration and Calibration 1 (or 2,3,4)

A) The Start Calibration is purely a calibration area for setting up the ALS at the start of the Rally Stage. Ie if you wanted lots of boost available on the Start line you could set this map more aggressive then others.

Q) From the function "Start Calibration" what does mean "Bypass Vehicle Speed", "Exit Throttle Angle"?

A) As stated above, think of the Start calibration as the Race start line calibration and these options allow you to set when the start calibration becomes ignored and the cal1-4 calibration are used based on the settings under Calibration Switches. When Vehicle Speed is above the value set and the Throttle is greater than the value set it will go to the ALS Cal Maps.

Q) How does the High Temperature Recovery work? It's clear to me what the Recovery Entry and Exit Temperature settings mean. What does the Guard Time mean? What is happening when the Recovery Entry Temperature is exceeded? Does it activate the Recovery Fuel Cut or does it switch off ALS completely?

A) In the event that the EGT or Air temp values go greater than the Recovery Entry settings the ALS System will purely run on the Recovery fuel cut tables found under each ALS Calibration. When the temps drop below the Exit values it will go back to the Fuel Cut tables. The Guard time allows for spikes in temperature to be ignored.... So the temp would have to rise above the Entry temp for more than the Guard time.

Q) What does throttle timeout do exactly?

A) It allows the calibrator to set an ALS shut down if the throttle is held open for below the Throttle timeout angle for the time set under throttle timeout.

Q) How does the Plenum Damping function work?

A) In aggressive ALS setups the Manifold pressure sensor (Map1) will see large pulses or spikes in pressure. The Plenum Damping allows users to set a fix rate of change on the Map to filter out these pulses in the manifold and avoid any unwanted control issues.

Q) "Off Calibration", "Shutdown Delay" if I understand correctly, this is the actual time the ALS is active after throttle is closed and ALS is enabled.

A) After the ALS switch has been turned off or an Off calibration is selcted the ALS Strategy will remain active until the shutdown delay time have been reached.

Q) In the datalogging what's the (exact) meaning of:

    alsState: "TPS_SHUTDOWN"

    alsState: "TPS_TIMEOUT"

A) This is the current state of the ALS and displaying that it is not active due to the TPS_Shutdown being active or other reasons.

Q) Do you support the Bosch LSU Sensors

A) Yes we can support them but as there are many variables we can only supply a base calibration curve. We recommend tweaking to suit a known lambda external source on the dyno

Q) Does the software have a 3 step rev limiter vs vehicle speed per gear

A) Yes as above and the rpm target and map target can be plotted against Speed or Time for Launch

Q) Can i change ignition timing by Gear or vehicle speed.

A) Yes See RUN- Mode Ignition – Corrections – Gear Adder

Q) Can the internal datalogging be activated by an external switch and not by rpm

Q) Is there anywhere that explains better the operation of wideband control?

A) There is F1 help notes for it but in principle.

Select target map from cal switches

Then setup bank allocation down in engine config if on an Impreza all cylinders should be set to bank 1.

Then setup you target table and also the allowable trims for min max and at full throttle.

After this setup lambda trims for ect and egt and disable thresholds for transient fueling.

Best way to setup the lambda control is by service interval based Integral gain under gain control.

This then allows you to service the Intergral gain based on time at different loads and rpm. Reason this is wise is due to exhaust gas speeds varying in the time it take gas to hit sensor from port.

To best set this up, log lam1 and fuelfinal1. Then at idle, cruise and full throttle around 3k and 5k make a step change on the fueling to richer mixture and see how long it takes the lambda to see change after fuel final has adjusted. Then populate the service interval calibration.

After this it is a case of logging lambda error and setting up the P and I of the control.

Q) Does the lambda simply operate in the background only? With any active trims only available via logging?

That's correct, fuelmltcll1 is the trim correction. You can view this live in software by gauge - add and then view how you want and speed you like.

Or log it.

I generally view live when not doing full throttle runs and then load cell hold on Dyno and just multiply the cell by lambda correction to get fuel table right.

Q) For flat shift operation on a dog box via clutch switch (non sequential) I assume this would be wired and configured on I/O as a clutch switch ?

A) Would need to wire in signal which can be high or low signal but ensure you use correct input.

This needs to be assigned as gearcutrequest in pin assignments.

Q) Would this be implemented via a "gear cut" and if so what would be the preferred way? I see a time based table....obviously there is no guarantee of shift time with a manual shift.

A) You need to set gear shift strategy to manual mode. Setup the gearcut request settings with ignition on and check with a gauge that gearcut request changes state when pressing the clutch.

Now go to gearcut area and setup as open loop, closed loop requires gear position sensor.

Set cut time long around 1000ms and ensure end of request ends cut is set.

Now setup the ramp in, ramp out and cut settings. Ie fuel cut, ignition cut or retard amounts.

A) Yes See Calibration Switch Position or Look in I/O Config and see Datalogging enable switch

Q) Regarding the standard Crank/Cam triggers can we use stock sensors and triggers.

A) Yes the Stock Crank and Cam triggers can be defined under Engine Configuration, Some engines are fully configured and setup already – See Crank and Cam Types... if your engine is not present then we can work with you to develop a firmware to work

Q) The traction control section is very limited it only shows "Overall enable" as I need to read all the four wheels and employ a suitable strategy that will work from example 2nd gear and above and adjust target slips by gear or vehicle speed.

A) In the calibration you have been sent Traction was not enabled. Please contact a technician at Syvecs to enable this Free of Charge

Q) I have a Race Technology Dash 4PRO and DL1 mk3 GPS Data logger of which I need to combine them to work together with the Syvecs.

A) Yes you can select some streams from live in scal or define custom can streams to suit but all the hard work has already been done for this and see this thread on our forum http://www.syvecs.com/forum/viewtopic.php?f=14&t=174

Q) I have also an AEM 4 channel Wideband with turbo backpressure compensation of which I will be using and would like to have the output feed in the ECU so I have a reading on all cylinders and monitoring.

A) Not a problem you can assign an of the above items to any 0-5V input

Q) Also I have an AEM four channel EGT with amplifiers and need to feed them in the ECU so I have a reading on all 4 cylinders.

A) Again see above

Q) Can i program an Engine Trip for the following, Engine coolant pressure, Fuel pressure, Lambda and EGT on all 4 cylinders and crankcase pressure.

A) Yes this can be done under any sensor option and also we give the ability to turn of different trips in certain calibration switch position. All of the above trips can be set to lateral g guards so a car will not trip in mid corner.

Q) I see that for the crank position sensor, sensor type is set to thermistor. Does this mean that Syvecs can utilize magnetic type sensors on all of the configurable AV inputs not just as a crank position? IE drive shaft speed, etc.

A) You are correct... On the S8c AN1 – AN16 are all fully software configurable to work with any sensor. When setting up threshold and linearization's under sensors you can set the type of sensor aswell to suit. On the S6 Ecu the Input types are not all the same and best to see the following link http://www.syvecs.com/forum/viewtopic.php?f=6&t=401&p=1933#p1933 to understand them more

Q)I cannot recall where I saw but I think the Lambda sensors supplied are NTK L2H2. Are there any linearization/characteristic differences with L1H1 sensor? I am just curious about future sensor replacement especially because of all the leaded fuel being used.

A) The Sensors are L2H2 NTK Sensors which are off the shelf available. You can use the L1H1 no problem but might find the linearization needs a tweak. Best to stick with the L2H2 which are cheaper anyway. NTK sensors are very good with leaded fuels compared to the Bosch range and another reason why we use them

Q) Please explain the VVT Angle Latch Points and VVT Angle Latch Offsets

A) With all new builds I would recommend checking the vvti1 and 2 In values are indeed correct. To do this turn off the vvti by setting enable engine speed to say 5000rpm. The Latch angle are the points where the strategy looks for a cam pulse in relation to crank. This is normally set around 90 before the pulse to take into account the cam movement and then we set and offset to ensure the VVT1In is correct. So what you need to do is Open up a GAUGE for vvt1inraw and a slow speed like 1hz. Then make note of the values…. Do the same for Vvt2inraw…. Now go to the Angle Latch offsets tables and here punch in the values at the point where it is latched. This is obvious in base map as there will be values already present. You should then find the vvt1in is 0 when no duty is being applied to solenoids (this is done again by raising vvt enable engine speed) See the following video for more help on VVT http://youtu.be/nUMNPQ_xydU

Q) Is it possible to have Throttle based nitrous control? (I didn't see this in the video)

A) The Nitrous Control Load can be fully configured to either TPS or MAP with multiple multiplier to existing with control.

Q) How are the Ignition Cut and Fuel Cut severities implemented, does it just take this percentage of fuel away on every cylinder?

A) No, the cut omits fuel injection pulses to an average number of cylinders, that is to say that if you have a 33% cut severity (ie one in three) on a n*3 pot engine then it won't always be the same cylinders that aren't fuelled, but over a number of revolutions you'll achieve the given average.

Q) Closed Throttle position detection. How does it work?

A) Closed throttle detection is based on how close the current throttle position is to tpsLow. That is initially set to the Initial Minimum, and can decrease if a tps position is detected which is lower than the Initial Minimim, but tpsLow cannot fall below the Minimum Limit, even if the tps reads lower than the Minimim Limit; this prevents a temporary open circuit from re-setting the minimum to an un-achievable minimum. When the tps drops below the sum of tpsLow and the Window the throttle is considered closed. It must then rise up to tpsLow plus the Window plus the Hysteresis to be considered open again.

Allowing tpsLow to drop below the Initial Minimum means that the closed throttle detection is less dependant on getting the TPS linearisation perfect, and allows some drift during operation. If the throttle starts reading lower in operation, tpsLow can drop and move the closed throttle detection down (up to a limit, being the Minimum Limit). If it starts not reading as low then it still has to creep up by the window size before closed condition can no longer be detected.

Q) How does the Absolute Pressure Compensation work in Wastegate Control under Output Linearization

The Absolute Pressure Compensation is switchable to Bleed on or Bleed off the pressure from the Wastegate to basically to help with turbo spool. The way it works is simple (maptarget-baro) / (map-baro) * Baseduty for target.

Q)Can I see fuel and timimg map at the same time or any short cut key to change map quickly?

A) Yes you can make a worksheet in scal and add the items you wish to view on the screen, Go to Worksheets - New - then Worksheet again and ADD CALL...You can then save this template and view it again easily by selecting the saved worksheet again under the worksheets tab..

You can add shortcut keys no problem by going to CAL in Scal and then EDIT SHORTCUTS... here you can add shortcuts for any map in Scal

Q) Can I adjust map + and - numbers for fuel and ignition? For example, as for fuel 0.1ms to 0.05ms, as for ignition 0.25 to 0.5 deg?

Are these function available on this ecu as well?

1. map trace function (record tracing)

2. push any button to go to target point (space button for typical ecu)

3. where to see short term fuel correction for lambda?

A) Yes you can indeed by toggling between the FINE and COURSE option In an map.You can have the live trace via OPTIONS - TRAILING LIVE POSITION

We do not offer find position button but if pressing the space bar you can freeze the screen and see where you were based on the parameters

Short term fuel trim is Displayed as FUEMLTCLL1 for bank1 and FUELMLTCLL2 for bank2. You can log these or view in a gauge on the screen by pressing Gauge - ADD

Q) I am running the Rotary control on a Syvecs S6 and the primary and secondary ignition is not responding as it should. I can change the base table 2 to any value and the secondary timing does not follow what I program it to. I tried ignition timing relative on and off and there just doesn't seem to be any real control of the secondary timing. I can set the table to zero and get zero split. But any value up or down doesn't necessarily produce what is programmed and all values are greater than the advance on the primary ignition. So if primary is 10* BTDC, secondary is 10+* BTDC

A) The reason the secondary sparks are not placed as desired is a setting under Calibration Switches:

The timing for the primary spark comes from Run-Mode Ignition / Base Ignition Angle 1/2/3/4 as chosen by Calibration Switches / Ignition and Fuelling / Base Ignition Map Select.

The timing for the secondary spark comes from Run-Mode Ignition / Base Ignition Angle 1/2/3/4 as chosen by Calibration Switches / Ignition and Fuelling

Base Secondary Ignition Map Select (this map is taken to be absolute or relative to the primary choice depending on the Secondary Ignition Timing Maps Are Relative calibration).

Current these choices are set to the same value (1). So if Secondary Ignition Timing Maps Are Relative is NO, the primary and secondary spark will occur simultaneously, and if it is YES, the secondary spark angle will be double the primary spark angle.

Therefore the choices should be set to 1 and 2 typically.