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V5 Feature Overview

The following are the most significant updates in Holley V5 software:

- Multiple Injector Set Configuration and Tuning – V5 offers the tuner the ability to sequence and tune the fuel contribution of multiple injector sets in any fashion they want.
- Active Speed Management – Time based traction control based on engine speed and/or driveshaft speed.
- Individual Cylinder Timing Adjustment for all Ignition Types – The ability for any ignition output type to perform individual cylinder timing trims.
- Staging Assist – Output functions to help with staging a car.
- Updates to minimize data logging frame skips

There are several more updates and features outlined below as well.

Custom Injector Setup

The following is information specifically for the new Custom Injector Setup. This requires tuning in the System and Fuel ICF.

Custom Injector Setup - System ICF

Fuel System > Injection Type > "Custom"

A new "Injection Type" call "Custom" has been added. This can be used for 1, 2, or 3 injector sets.

NOTE: A Dominator ECU and an external injector driver module(s) is required when using more than one injector set on an 8 cylinder engine, and more than 2 on a 6 cylinder engine. Holley PN 554-142 (8 channel) is highly recommended. See below for more details.

The screenshot displays the Custom Injector Setup interface with the following sections and values:

- ENGINE:** Number of Cylinders: 8; Engine Displacement: 364 CI
- LOAD SENSING:** Speed Density
- WIDEBAND O2 SENSOR:** Sensor Type: NTK; Number of Sensors: 1
- FUEL TYPE:** Fuel: Gasoline
- STARTUP SETTINGS:** Clear Flood TPS: 35.0%; Enable Fuel Prime: ; Fuel Prime Percent: 200%
- FUEL SYSTEM:** Injection Type: Custom; Fuel Pump Prime: 5.0 sec; Configure Injector Sets button; Total System Fuel Flow: 1348.0 lb/hr
- FUEL INJECTOR INFORMATION:** Number of Injector Sets: 1; Enable Injector End Angle Table: ; Injector End Angle: 0.0°

For a single injector set, it offers the following additional functionality over the standard/previous injector setup:

- The driver output can be set in the software to saturated, 4:1A, 8:2A, or a custom setting
- The injector firing strategy is not forced to sequential if a cam sensor is used. All offerings are available.
- A low pulse width linearization table is available.

For 2 or 3 injector sets, it offers the following additional functionality over standard setups (including the additions mentioned for a single set):

- Each set can be chosen to be used or not used for:
 - Fuel Prime Shot
 - Cranking Fuel
 - Used for Individual Cylinder Fuel Correction
- In the Fuel ICF, each set has its own 16x16 or 31x31 table to indicate what percentage that set contributes to the fueling.

The following covers injector set setup.

Injector Set To Edit Set #1

INJECTOR SET #1

Number of Injectors: 8 Firing Strategy: Sequential

System Type: 160LB Holley 522-168 (43 PSI)

Rated Flow per Injector: 168.5 lb/hr Final Flow per Injector: 168.5 lb/hr

Rated Injector Pressure: 43.0 psi Final Injector Set Flow: 1348.0 lb/hr

Actual System Pressure: 43.0 psi

Minimum Injector Opening Time: 0.00 msec

DRIVER SETUP

Type: 4:1 Standard

USE FOR

Use for Prime Shot Prime Percentage: 100%

Use for Cranking Fuel Cranking Percentage: 100%

Use for Individual Cylinder Correction

INJECTOR OFF TIME

Off Time [msec] View Graph

1.39	1.22	1.07	0.94	0.84	0.76	0.69	0.62	0.56	0.51	0.46	0.42	0.39	0.35	0.32	0.28
8.0 V	8.8 V	9.6 V	10.4 V	11.2 V	12.0 V	12.8 V	13.6 V	14.4 V	15.2 V	16.0 V	16.8 V	17.6 V	18.4 V	19.2 V	20.0 V

LINEARIZATION TABLE

Pulsewidth Offset [msec] View Graph

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00

Base Pulsewidth [msec]

Custom Injector Setup Screen

Injector Set #1/#2/#3

Number of Injectors – Indicates number of injectors on that set. This will be equal to the number of cylinders. If a different number is used, the driver setup and injector flow can be adjusted to compensate.

Firing Strategy – Same as previous options, except any can be selected if a cam sensor is enabled. If “Sequential” is selected and there is no cam sensor used, it will operate the same as “Untimed Sequential”.

The following are the same as previous software versions:

System Type – Auto-fills injector information. Note that there are new selections.

Rated Flow per Injector – Actual injector flow at the Rated Injector Pressure

Rated Injector Pressure – Pressure that the Rated Flow per Injector is measured at.

Actual System Pressure – Actual fuel pressure that the engine is run at.

Minimum Injector Opening Time – Minimum pulse width that the injector will be commanded to.

Driver Setup

If this has a "Type" dropdown, this implies that the injector drivers for this set of injectors can come from the ECU (you can still use an external driver box). You will NOT see this choice if the set configured uses PWM outputs (which requires an external driver box where the driver will be configured). The choices are as follows:

Saturated – Will draw as much current as the injector can pull up to 3.75A.

4:1 Standard – Operates the same as previous V2-V4 setting. 4A peak and 1A hold.

8:2 Standard – Operates the same as previous V2-V4 setting. 8A peak and 2A hold.

Custom – Allows for the Peak and Hold currents to be set. The "Peak Timeout" is how long the driver will hold peak current IF the peak is NOT met.

Use For

These selections are typically used when using more than one injector set.

"Use for Prime Shot" – When checked, specific injector set will be used to contribute to the cranking prime shot.

"Prime Percentage" - indicates how much that set will contribute to the base value. It is possible to go over a combined value of 100% for multiple sets as well as less than 100%. This will increase the prime shot over the base value.

"Use for Cranking Fuel" – When checked, specific injector set will be used to contribute to the cranking fuel value.

"Cranking Percentage" - indicates how much that set will contribute to the base table. It is possible to go over a combined value of 100% for multiple sets as well as less than 100%. This will increase the cranking fuel over the base table.

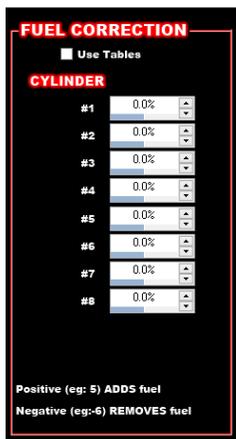
"Use for Individual Cylinder Correction" – When checked, specific injector set will be used to contribute to individual cylinder injector trims.

IMPORTANT! – When using the CUSTOM Injection Type, the Individual Cylinder Fuel Correction Table (shown below) is such that the percentage entered in the correction table will apply to the fuel flow from the *individual injector set*, NOT a function of total fuel flow.

Using an example of two sets of 500 lb/hr injectors. Assume both are set to contribute 50% of the fuel at all times, but only the second set is selected for individual cylinder trims. If all injectors are flowing a base of 100 lb/hr each for a total fuel flow of $100 \times 16 = 1600$ lbs of fuel, and a 10% fuel correction is entered for a cylinder, then 10 lb/hr extra will be added to that cylinder (110 lb/hr from the one injector).

Using the same example as above if BOTH injector sets are selected for individual trims, then 20 lb/hr of extra fuel will be added to that cylinder (110 lb/hr from both injectors).

This is important to keep in mind if you are staging a set of injectors in. If you are using a second set for trims, and they are ramping in, the cylinder fuel trims will ramp in accordingly as well.



The screenshot shows a "FUEL CORRECTION" screen with a "Use Tables" checkbox. Below it is a table with 8 rows, each representing a cylinder. Each row has a "CYLINDER" label (e.g., #1, #2, etc.) and a percentage value (0.0%) with up and down arrows. At the bottom, there are two lines of text: "Positive (eg: 5) ADDS fuel" and "Negative (eg: -6) REMOVES fuel".

CYLINDER	Percentage
#1	0.0%
#2	0.0%
#3	0.0%
#4	0.0%
#5	0.0%
#6	0.0%
#7	0.0%
#8	0.0%

Positive (eg: 5) ADDS fuel
Negative (eg: -6) REMOVES fuel

Fuel Correction Screen

Injector Off-Time

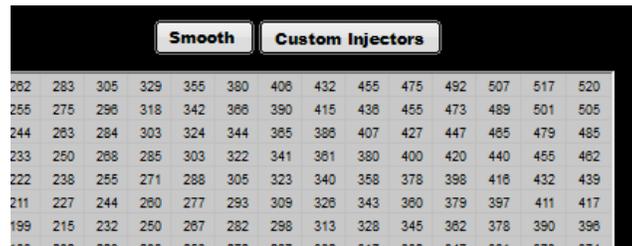
This table operates the same as previous software versions. It is used to maintain constant injector flow with changes in battery voltage.

Linearization Table

This table is new. This table is used to “linearize the flow” of an injector at low pulse widths, there the flow becomes non-linear. This requires specialized data specific to an injector at the pressure and voltage it’s running at (in other words leave this table to zero if you don’t have this data).

Custom Injector Setup - Fuel ICF

Base Fuel Table – The Base Fuel table has new functionality when an Injection Type of “Custom” is selected and multiple injector sets are used. When “Custom” is selected a new button called “Custom Injectors” will appear at the top of the Base Fuel Table.



Custom Injector Entry Tab													
Smooth							Custom Injectors						
262	283	305	329	355	380	406	432	455	475	492	507	517	520
255	275	296	318	342	366	390	415	438	455	473	489	501	505
244	263	284	303	324	344	365	386	407	427	447	465	479	485
233	250	268	285	303	322	341	361	380	400	420	440	455	462
222	238	255	271	288	305	323	340	358	378	398	416	432	439
211	227	244	260	277	293	309	326	343	360	379	397	411	417
199	215	232	250	267	282	298	313	328	345	362	378	390	396

Custom Injector Entry Tab

The Base Fuel table remains and is unchanged in purpose. It represents the total base fuel flow or VE for the engine. The new tables that are available are viewed by selecting the “Custom Injectors” button shown above. The first screen this bring up is shown below. There will be up to three radio buttons on the top left. There will be one if one injector set is being used, two for two injector sets, and three for three injector sets.

“Set 1” is a read only table and works as follows:

One injector set used – Set 1 will always display 100% due to it being the only injector set used.

Two injector sets used – Set 1 will display whatever value totals 100% after taking into account what the user programs for the second injector set. For example, if the user programs that the second set of injectors will supply 60% of the fuel, this table would read 40% for every value.

Three injector sets used – Set 1 will display whatever value totals 100% after taking into account what the user programs for both the second and third set of injectors. For example, if the user programs 25% for both the second and third sets, this table would read 50% for every value.

MAP (kPa)	496	700	800	900	1000	1100	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000	6250	6500	6800	7100	7500
238	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
218	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
196	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
188	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
178	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
169	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
159	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
149	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
139	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
129	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
119	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
109	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
94	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
89	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
84	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
79	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
74	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
69	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
64	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
59	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
56	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
53	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
49	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
46	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
42	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
39	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
31	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
11	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Injector Set 1 Table

Note that there is a “Display as Fuel Flow” checkbox at the top. If checked, this will convert the table to fuel flow dependent on the percentage of fuel it’s programmed for. If a static condition exists, the value will turn red.

Set 2 is a user programmable table and works as follow:

It will only be shown if two or three injector sets are used. The user can input what percentage of the fuel flow they want the second set of injectors to contribute. This is *fuel flow*, not the duty cycle of the injectors. For example, 50% means the second set would contribute 50% of the fuel flow. If the entire table was 100%, this would effectively turn the first set off. You can check the “Display as Fuel Flow” checkbox at the top, this converts the table into fuel flow. You can also edit the table in fuel flow. This table automatically re-calculates Set 1 as it’s changed. If a value turns red, it indicates the injector set is being driven over 100% duty cycle.

Set 3 is a user programmable table and works as follow:

It will only be shown if three injector sets are used. The user can input what percentage of the fuel flow they want the third set of injectors to contribute. This is *fuel flow*, not the duty cycle of the injectors. For example, 30% means the third set would contribute 30% of the fuel flow. If the entire table was 100%, this would effectively turn the first and second sets off. You can check the “Display as Fuel Flow” checkbox at the top, this converts the table into fuel flow. You can also edit the table in fuel flow. This table automatically re-calculates Set 1 as it’s changed. If a value turns red, it indicates the injector set is being driven over 100% duty cycle. Also, for tables two or three, you are not allowed to enter a value that drives the combined percentage for all three sets over 100%. It will automatically limit the values you enter.

Wiring – Holley Injector Driver Box PN 554-142

The following tables show how to wire a second and third injector set using the custom injector strategy and Holley PN 554-142 external injector driver box (an external driver box is required) on an eight cylinder engine. Refer to the instructions for PN 554-142 for other wiring as well as driver box to injector wiring. This tables below are for ECU to driver box wiring.

Injector Set 2			
ECU J2B - (PWM-)		Driver Box	
Cylinder	J2B Pin	Cylinder	Pin
Cylinder 1	B12	Cylinder 1	A27
Cylinder 2	B6	Cylinder 2	A28
Cylinder 3	B8	Cylinder 3	A29
Cylinder 4	B21	Cylinder 4	A31
Cylinder 5	B5	Cylinder 5	A33
Cylinder 6	B11	Cylinder 6	A4
Cylinder 7	B3	Cylinder 7	A5
Cylinder 8	B9	Cylinder 8	A6

Injector Set 3			
ECU J2B - (PWM+)		Driver Box	
Cylinder	J2B Pin	Cylinder	Pin
Cylinder 1	B24	Cylinder 1	A27
Cylinder 2	B25	Cylinder 2	A28
Cylinder 3	B2	Cylinder 3	A29
Cylinder 4	B1	Cylinder 4	A31
Cylinder 5	B4	Cylinder 5	A33
Cylinder 6	B10	Cylinder 6	A4
Cylinder 7	B22	Cylinder 7	A5
Cylinder 8	B23	Cylinder 8	A6

Sensor ICF

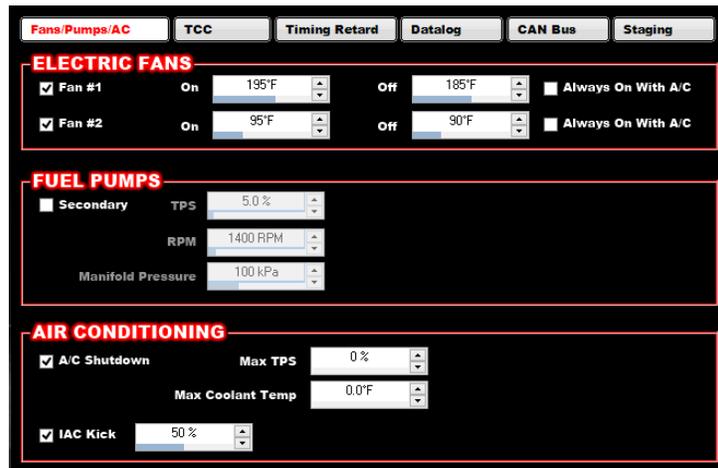
Several new sensor dropdowns are added for MAP, Oil and Fuel Pressure (200 PSI).

System ICF

Basic I/O

Fans/Pumps/AC

A checkbox is now available for Fan #1 and Fan #2. This ONLY appears if the "IAC Kick" input is selected and used. When the IAC kick input (an input triggered when Air Conditioning is active), the user has the option to have one or both of the fans automatically come on, independent of engine coolant temperature.



Staging

This is a new area. It is used such that a user can program an output that can be turned off based on time. When enabled, it creates two inputs and one output. It functions as follows:

Staging Input #1 – When this input is active, the Staging Output is always/fully active. When this input is NOT active, the output is never active.

Staging Input #2 – When this input is active, *as well as the Staging #1 input*, the Staging Output becomes inactive per the user programming described below.

Output Type – This can be selected as “Single Pulse” or “Duty Cycle”. If single pulse, when Staging Input #2 is pushed, the Staging Output will deactivate for a single event. The time of this single event is determined by the “Time” parameter. However, if the user removes Staging Input #2, the time parameter is overridden if it hasn’t timed out yet.

If “Duty Cycle” is selected, the Staging Output will be pulsed at the Duty Cycle and Frequency entered. The time of this pulsed event is determined by the “Time” parameter. However, if the user removes Staging Input #2, the time parameter is overridden if it hasn’t timed out yet.

When using this function with a trans brake, the proper settings will be dependent on many variables. The following are some basic steps to obtain some initial numbers.

1. Place the car in the air safely (do this in a very safe manner away from people or property).
2. Select a frequency and duty cycle to start with. (guess high on DC, too high won’t move the tire, too low will be violent)
3. Start the engine and while idling activate the trans brake
4. Raise the engine just above idle, 1500-2000rpm is plenty
5. Activate the stage assist button
6. Tire should slowly move, if it does not move lower DC 5% and try again. If it moves fast go up 10%.
7. Once tire is moves slowly at low rpm/light throttle you are ready to take it to the track and try under full power
8. It will likely require fine tuning at the track, these steps are only to get you in the ball park before using it at the track.

Individual Cylinder Timing Trims

Previously Individual Cylinder Timing (ICT) trims were only available for coil on plug application. The following Ignition Outputs now have ICT trims available. A cam sensor must be used. Make sure you have the cam sensor timed in the proper position or the wrong cylinder will be trimmed. It’s a good idea to check this function with a timing light at idle.

Points Output

EST Output (5V)

EST Output (5V active low)

EST Output (12V)

EST Output (12V active low)

Injector Auto-Phasing Table

The Auto-Phasing portion was updated so the user can either put in the individual valve events, or type in any duration values and the lobe separation angle.

Input/Output ICF

Inputs – The following are the updates to the input area

Input Types:

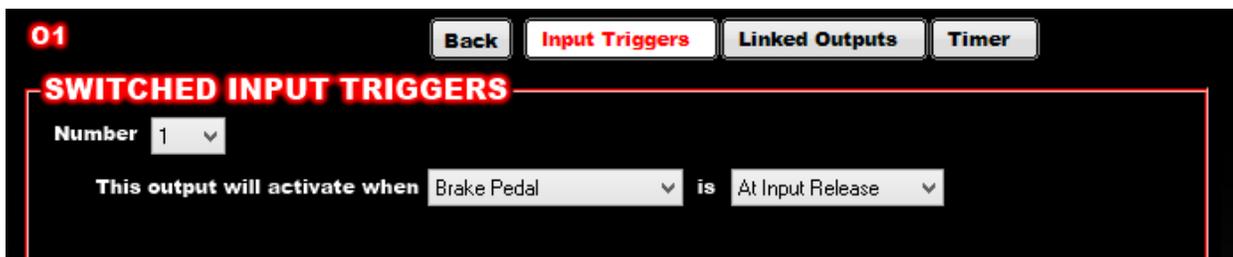
5 Volt Inputs – Added pre-defined inputs for new and future products (list?)

- Holley EFI G Meter
- 1, 7 Bar Holley MAP transducers
- 500 and 3000 PSI pressure transducers
- Racepak shock travel sensors
- Racepak 200C IR temp sensor
- Holley current transducers
- Holley pressure/temp combo sensor

Internal Parameters – There are new internal parameters for the “Active Speed Management” traction control.

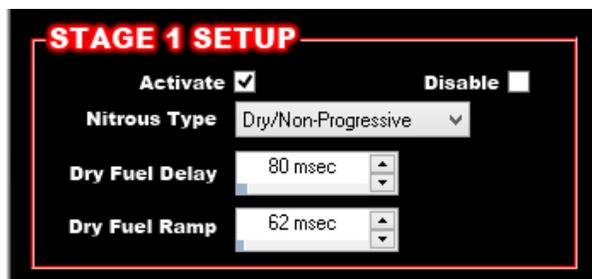
Where Used Button – Selecting the “Where Used” button will bring up the different areas in a calibration that that Input or Output is being used.

New Switched Input trigger condition – There is a new activation condition called “**At Input Release**”. This condition will start an output when that input is released (such as the release of a transbrake). All other activation conditions still must be met as normal as well as the other conditions will “turn off” the output.



Nitrous ICF

The only update to the nitrous ICF is the addition of a “Dry Fuel Ramp” to each stage. This value linearly ramps in the dry fuel from a value of zero to the full value at that time. To further clarify, the existing “Dry Fuel Delay” is a time after activation that ZERO dry fuel is added. The “Dry Fuel Ramp” begins after the “Dry Fuel Delay” is done. This is done to further help the engine to not “choke” on excess fuel at the hit of a stage.



READ THE FOLLOWING IF USING THE NITROUS ICF:

Below is a copy of the nitrous stage timing retard rules, as well as additional clarification. Also there was a bug in the V4 version described below that has been resolved in V5.

1. If every stage has “fixed” timing, the highest stage activated will drive the timing (stage 1, 2, 3, 4, etc...) So it is highly likely it is best to activate the stages in numerical order, and reduce the timing accordingly as each extra stage is activated. The base timing table is ignored. Also, any timing modifiers from the Advanced ICF as well as the System ICF timing retards will be ignored.

2. If every stage is a “retard”, the retard is based/removed from whatever the timing is commanded by the base timing table. The retards are additive. Also, any timing modifiers from the Advanced ICF as well as the System ICF timing retards will be added to these values.
3. If a “fixed” timing is commanded first, then a “retard” follows, the retard is based off the “fixed” timing, not the timing table. Also, any timing modifiers from the Advanced ICF as well as the System ICF timing retards will be ignored, if the first stage activated is fixed.
4. If the first stage is a “retard”, the retard is based/removed from whatever timing is commanded by the base timing table. If the next stage is “fixed”, the timing will be whatever the fixed timing is. The base timing table and previous retard are ignored. Timing modifiers from the Advanced ICF as well as the System ICF timing retards will be active UNTIL a fixed timing stage is activated, at which they will be ignored after that.

Note when Using Traction Control: Traction Control initiated timing retards will ALWAYS be active for all “Rules” shown above.

V4 Bug – V4 had a bug for rule #4 whereas timing retards before a fixed stage are added to the fixed timing. This is resolved in V5 and rule #4 is enforced. Make sure you are aware of this and any changes this might require to your V4 tune!

Best practice advice: If using any timing modifiers outside the nitrous ICF such as the Advanced ICF and System ICF timing retards, make all of your nitrous retards non-fixed which makes all retards additive at all times.

Transmission ICF

Several new dropdowns have been added to the Transmission ICF. They are:

GM 4L60E/5E (2009+) – This will require a harness different than Holley 558-405. The harness will be released at a later date.

Ford AODE – This will require a harness different than Holley 558-470. The harness will be released at a later date.

Ford 4R70W (98-03) – Uses Holley harness 558-470.

Ford 4R70W (2003+) – Uses Holley harness 558-470. This has a different VSS tooth count compared to a 98-03.

Drive By Wire ICF

Added 15-17 Coyote dropdown.

Advanced ICF

Added the following new Table Types:

- Injector Set #1 Fuel Multiplier
- Injector Set #2 Fuel Multiplier
- Injector Set #3 Fuel Multiplier

NOTE: The three Table Types above are only active if “Injection Type” is set to “Custom”

Traction Control ICF

One of the first updates is that for the “Profiler with Smart Drop”, the Smart Drop now functions.

Another change is the re-naming of the “TC Enable” checkbox to “TC Switched Enable Input”. To clarify, if this box is checked, one must wire up a toggle switch or some type of switched input to the ECU. When this switch is active, the traction control will be active. When the switch is off, the traction control will be disabled. If this box is NOT checked, traction control will be active all the time.

Active Speed Management

The next update is the addition of integrated traction control. Activation of this features requires the purchase of PN 555-100. This feature can be fully viewed and tuned without purchase, but for it to function internally to the ECU, an Activation Key must be entered. This key comes with the purchase and can be used for a single ECU ID/Serial number.

“Active Speed Management” should be chose for the system type. This method uses ignition timing and the option to use an ignition rev limiter as well.

General Overview

This traction control is intended primarily for drag racing or racing that starts from a stop. Traction management is based on the time from launch vs engine and driveshaft speed (one or both can be used). A reference curve can be imported from either a Holley log file, or from a Racepak .csv file in order to create the engine speed or driveshaft curves. Once a reference curve is imported, an editable "Base" curve can be copied from it. Once the "Base" is established a "Retard A", "Retard B", and "Rev Limit" curve can be created. The Retard A curve is the curve that starts a timing retard event with a full retard value occurring at the Retard B curve. The retard value is interpolated between the two curves. Engine rev limiting occurs when the Retard B curve is exceeded (one cylinder dropped at this point), and is under maximum cylinder drop (four cylinders on an eight cylinder engine) when the Rev Limit curve is hit and maintains this above that curve.

Important Notes!

Make sure you read and understand the following important items. They are explained in more detail later:

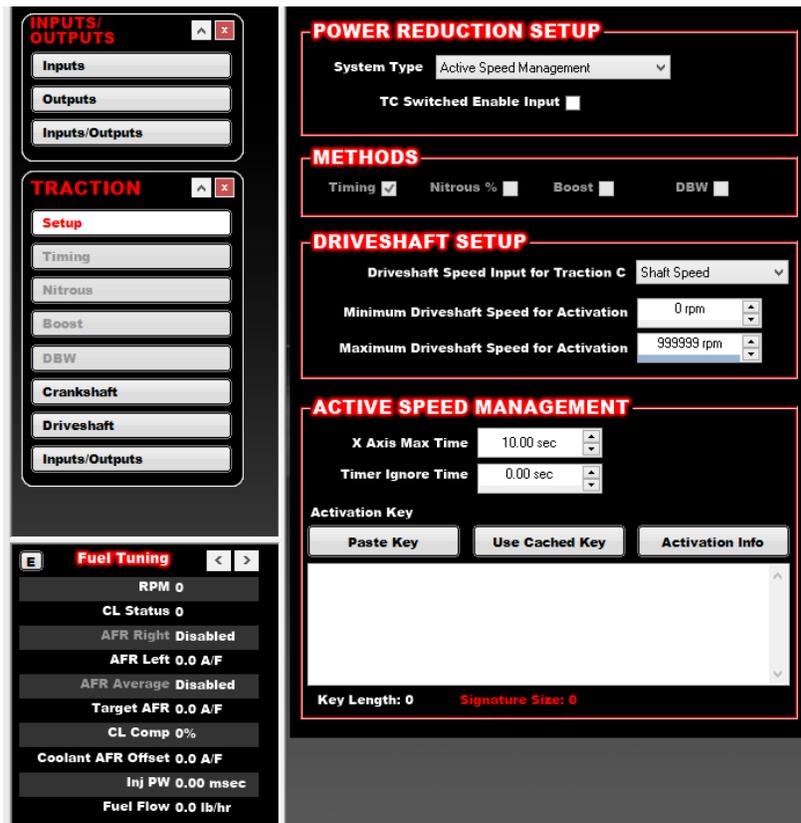
- When the rev limiter traction control curve becomes activate at any time, the system will revert to OPEN LOOP fueling. If you are using the rev limiter traction control feature (NOT recommended on nitrous cars), make certain your tune is sound and can be run in an open loop condition!
- Thoroughly understand the fact that the final value on the right of either the engine or driveshaft curves will be remain in effect when the final time on that particular curve is met. If you want to "end" the curve at a specific time, put the final engine or driveshaft value at a very high amount such that the traction control is effectively not active after that time.
- Understand how the rev limit curve functions, regarding how many and when cylinders are dropped as well as how to disable the traction control based rev limiting (as you will likely want to do with nitrous engines).

Driveshaft Setup

Driveshaft Speed Input for Traction Control – Some type of driveline speed must be available to use Driveshaft based control. The ones that are available are shown in the dropdown. This can come from the transmission ICF or one can be created in the I/O ICF.

Minimum Driveshaft Speed for Activation – Below this speed, the drive shaft curve will not be active.

Maximum Driveshaft Speed for Activation – Above this speed, the drive shaft curve will not be active.



Active Speed Management

X Axis Max Time – This sets the length and scaling on the Crankshaft and Driveshaft curves. Set this the maximum time you want to have traction control active or to roughly the length of your ET. Keeping this to the minimum needed helps with viewing resolution.

Timer Ignore Time – Traction control will be non-active until this time has been reached after launch.

Activation:

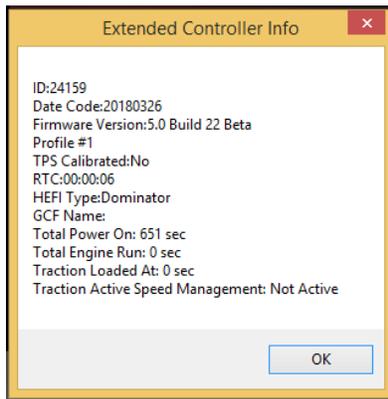
For the traction control to function, an activation key (PN 555-100) must be pasted in the Activation Key area. This key must correspond properly with the ECU serial number. To acquire the key once PN 555-100 is purchased, one must enter the ECU serial number on the Holley Website activation area. This number is the ID number on the back of the ECU. One can retrieve it while connected online with the ECU by hitting the “Activation Info” button. The serial number can then be copied to the clipboard and pasted onto the Holley website (or manually typed). Once the ID is entered the activation key will be generated and can be copied from the webpage and pasted into the activation key area of the software. Also, an email will be sent with the unlock key for your records. The key length is significant and you will want to use “copy and paste” functions to copy and enter it. Once it is “copied”, use the “Paste Key” in the software to enter it in the software. There is a copy feature on the website. The “Key Length” and “Signature Size” are tech support items if needed.

NOTE: Only one ECU ID can be entered per 555-100 purchased. BE 100% SURE YOU ENTER THE CORRECT ID NUMBER.

Once entered into an ECU with a single calibration, the traction control will then ALWAYS be active in that ECU in any calibration, UNTIL a firmware upgrade is performed, at which time the key will have to be re-entered after the firmware update.

To verify that the traction control has been activated properly, select the down arrow on the “Sync with ECU” icon and select “Get Extended ECU Info”. At the bottom, the “Traction Active Speed Management” is “Active” or “Not Active”.





Setup and Operation

NOTE: The values needed for these tables will vary based on tire type, suspension, track conditions, etc. Knowledge, experience, and testing are critical to optimizing the operation of this system.

The following gives a more detailed set of steps to set up and utilize this feature.

Checkboxes:

“View Deltas” checkbox – When checked, the table will show the difference in engine or driveshaft speed between the “Base” curve and whatever curve is selected. Note that the Delta value is editable..

“Synchronize Axes” checkbox – When this is checked, a couple things will happen. First, when initially checked, all of the time axes (for EITHER the crankshaft or driveshaft tables) will be copied to whatever the axis is being edited. Secondly, if it is left checked, the axes will constantly be updated as a change is made to any axis.

“Edit Rev Limit/Retard A/Retard B/Base” checkboxes – These four checkboxes indicate what curves can be edited at the same time on the graph or which ones will have modified by the “offset editable curves” button

The following steps are now the same for both “Crankshaft” and “Driveshaft” curves.

Import a reference curve. This is pretty much a mandatory requirement. This curve once imported is NOT editable. The following are the two options:

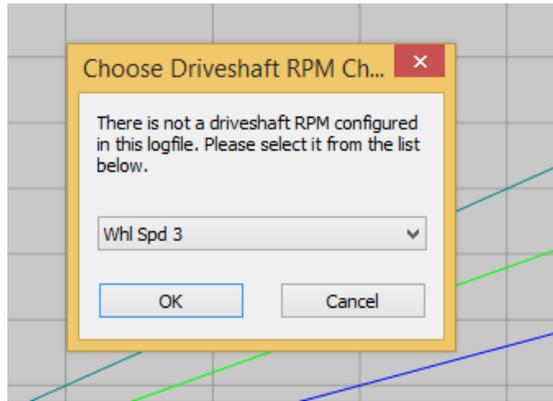
1. “Import Logfile” – This function allows for an engine or driveshaft curve to be imported from a Holley EFI datalog. This file can be a V5 file that had the driveshaft input set up, or a V5 or earlier version that did not have the Driveshaft Speed Input configured. There are subtle differences described below.

To import a Crankshaft curve

- Open the log in Holley V5 software. If it is a non-V5 log it will be automatically converted.
- Set the zero time to where you want to start the engine or driveshaft curve (must do..)
- Select “Import Logfile”
- The curve should appear in the table.

To import a Driveshaft curve

- Open the log in Holley V5 software. If it is a non-V5 log it will be automatically converted.
- Set the zero time to where you want to start the engine or driveshaft curve (must do..)
- Select “Import Logfile”
- If the log was taken with the driveshaft input already configured in the Traction Control ICF, the curve should appear in the table.
- If the log was a V4 log, or a V5 that hadn’t had the Driveshaft configured in the Traction Control ICF, you should receive a message below that allows you to choose speed inputs that are active in the log. Select the channel you want to use.

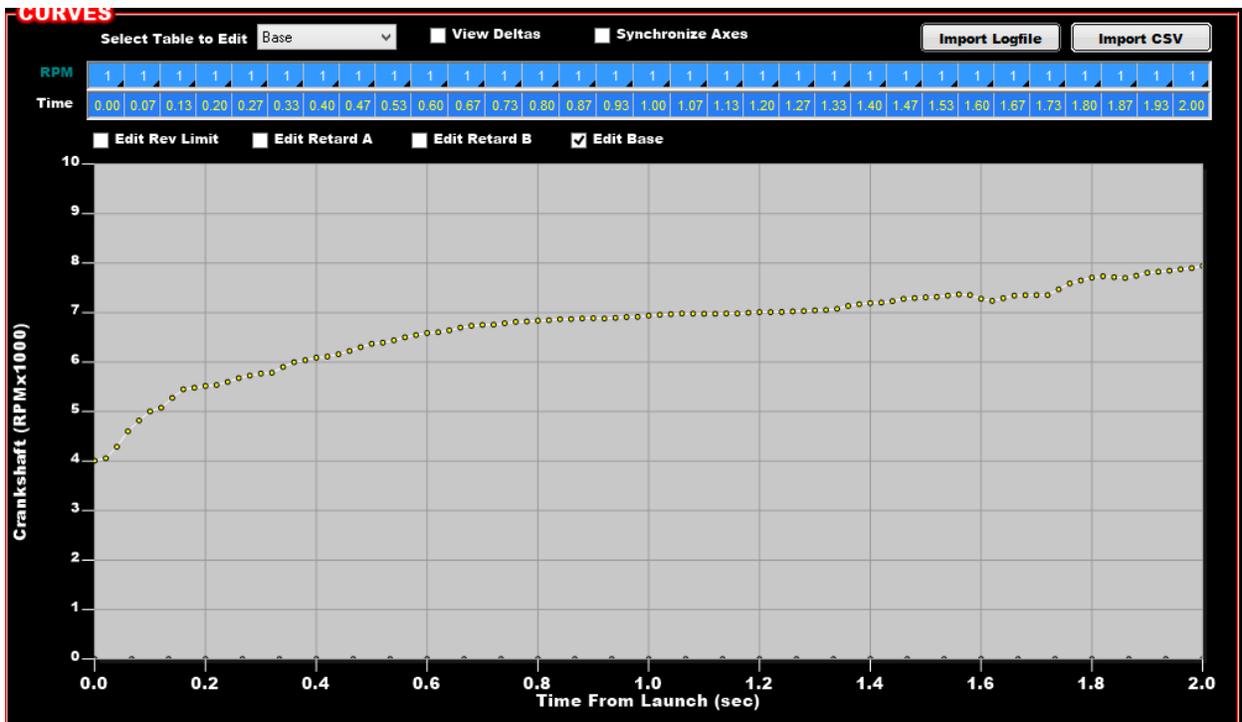


2. The second method is to import a Racepak .CSV file. Export a Racepak log to a .CSV file. Select the “Import CSV” tab. Next, find and select the .CSV file. This will import the RPM or driveshaft curve (each must be done independently).

To import a Racepak file perform the following in the Racepak software:

- Open the file
- Set the zero time to where you want to start the engine or driveshaft trace
- Show only the traces you want imported to the Holley software on the Racepak screen (DS and/or Engine RPM)
- Select “Print/Save Ascii data” (under File)
- Make sure “Comma” is selected, hit “OK”
- Save it as the name you want and make sure it is saved with a .csv extension
- Open/select it in the Holley software under “Import CSV”
- It should automatically select the driveshaft or engine RPM curve. If it can’t find it properly, it will give the user a dropdown to select the channel if it had an odd nomenclature.

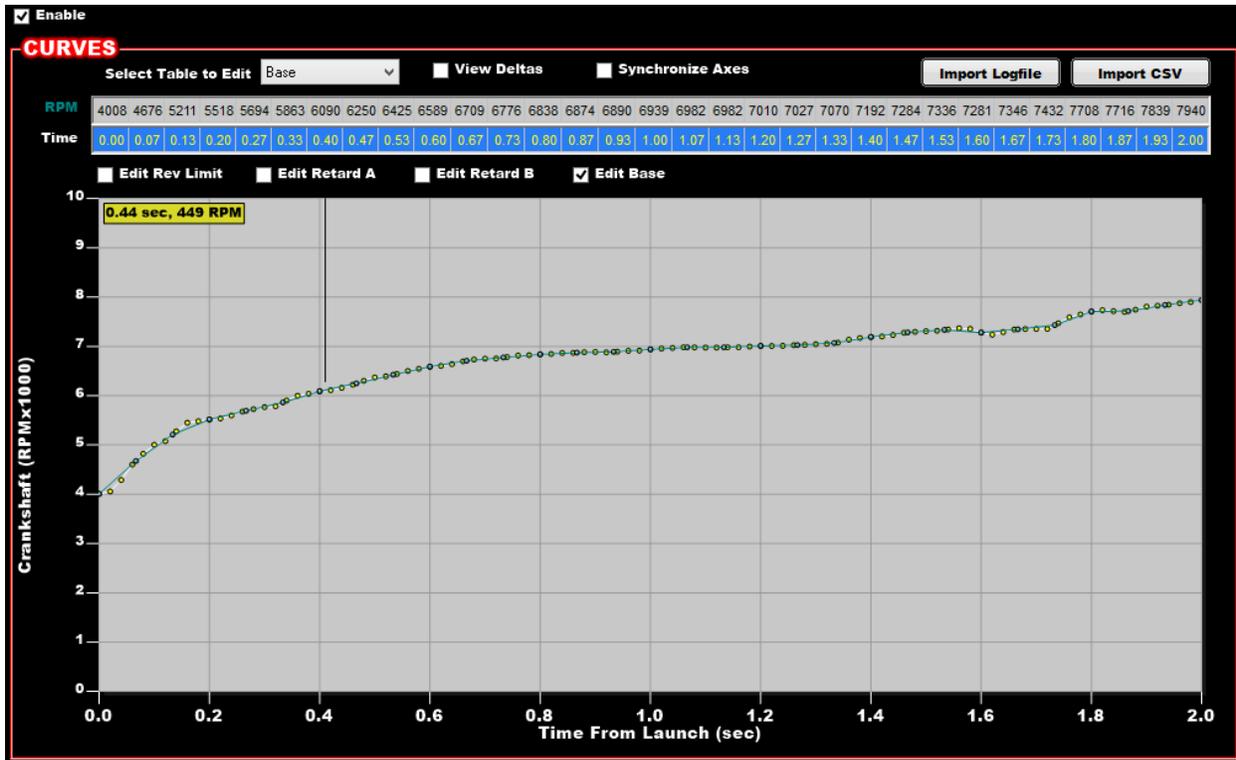
NOTE: You can import more than one log file curve for either method!



Imported Engine Speed Curve

Once you import a reference curve, you want to create all the other curves starting with the “Base” curve. Right or Left mouse click ON the reference curve. You will have the option to Copy or Offset the curves from the reference curve. Copying will produce the new curve on top of the reference curve. Offsetting allows you to create a curve offset from the reference curve. For the “Base” curve you likely want to “Copy” the curve on top of the reference curve. Select Copy > “Copy to Base”. This will put an editable Base curve on top of the reference curve. At this point you can keep or delete

(right or left click and select "Remove Trace" the reference curve. Once you move away from the screen the reference curve will be removed. It can be added back in again if needed. You can perform an "Offset all Lines" which will copy all lines on top of the imported curve (Offset = 0) or offset them off of the imported curve.



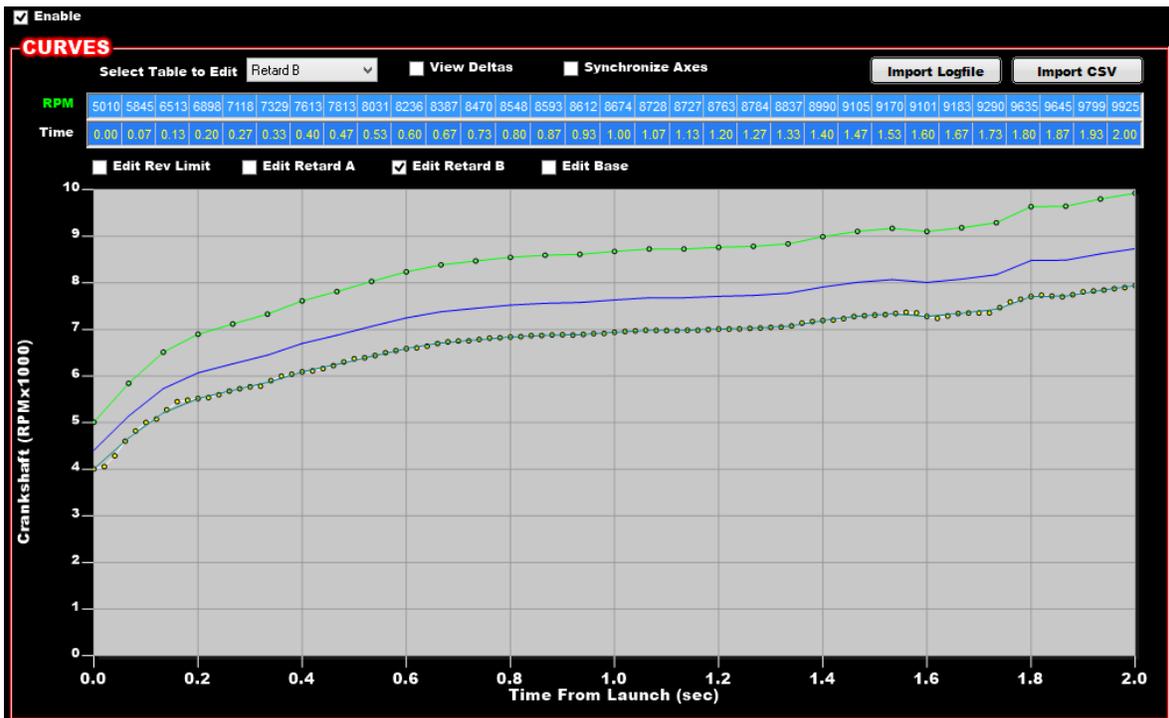
Base Curve copied over Reference Curve (Blue Curve)

After creating the Base Curve, create the "Retard A" curve. These next curves can be created in three basic ways:

1. Copied/Offset from the reference curve the same way the base curve is created.
2. Use the "View Deltas" as editing method. For example, you can type in value of 100 for a curve and it will be offset
3. Copy the values from the base curve to the other curves, and then perform a mathematical offset to them.

For this example, we'll perform an Offset > Offset to Retard A (Left or Right mouse click on the reference line to bring this up). We'll enter *1.1 for the offset. This will move the Retard A line such that it is 10% over the Base and Reference line in this example as a starting point.

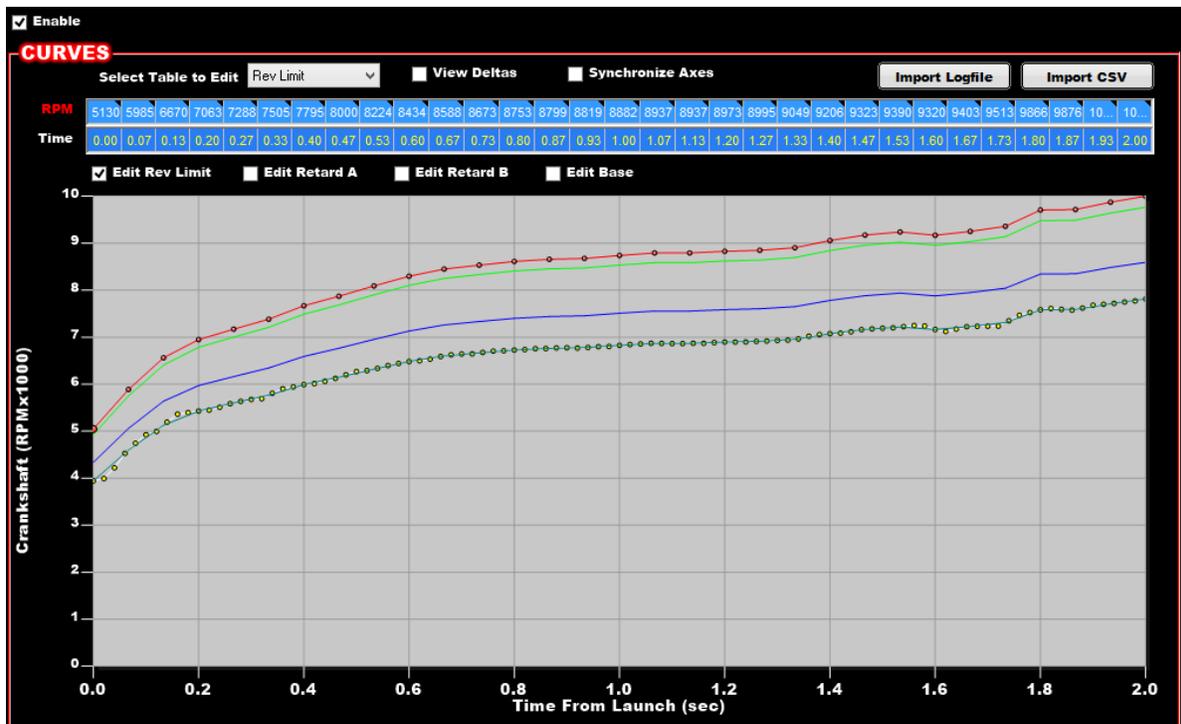
Next, we'll create a "Retard B" curve. The setup is the same as above. We'll use an offset value of *1.25. This will create a curve 25% higher than the base curve and 15% higher than Retard A.



Retard B Curve (Green Line)

Next, we'll create a "Rev Limit" curve. The setup again is the same as above. We'll use an offset value of *1.28. This will create the rev limit curve 3% higher than the Retard B curve. It is important to understand how the rev limit function works. As soon as the RETARD B curve is exceeded, the rev limiter function is enabled. Once you hit the red rev limiter curve, the rev limiter function is FULLY active. When it is initially is active, only one cylinder is dropped. When it hits the red curve, four cylinders will be dropped. The number of cylinders dropped is interpolated between the green Retard B curve and the red Rev Limit curves. For example, if the green Retard B curve is at 8000 RPM and the red Rev Limit curve is set at 8400, the following occurs:

- 8000-8100 RPM – one cylinder is dropped
- 8100-8200 RPM – two cylinders are dropped
- 8200-8300 RPM – three cylinders are dropped
- 8300-and upwards – four cylinders are dropped



Rev Limit Curve (Red Line)

NOTE:

It may be desirable to DISABLE the traction control rev limiter function, and retain the timing retard function only. An example of this could be a nitrous car, where it is likely you don't want any rev limiter activity. On some applications you may want to disable the rev limiter down-track. To disable the rev limiter, you need to put a rev limiter value of ZERO (0) in the cells (based on time) that you want it disabled. The following are some examples:

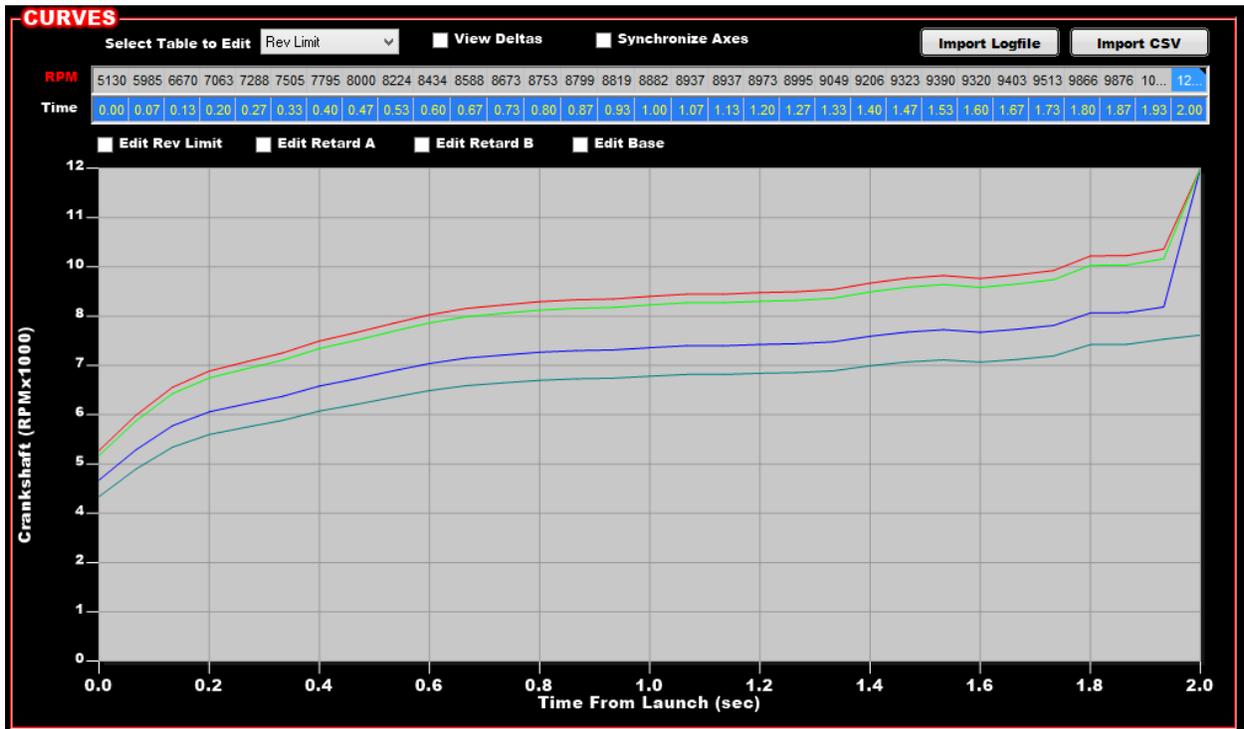
Example 1: Rev Limiter will be disabled at all times



Example 2: Rev limiter will be disabled from 0.00 to .88 seconds. Rev limiter will be disabled from 3.52 seconds and remain off after that.



After you get the curves set, you need to decide if you need/want to have the traction control end after a specific time. To do this with the driveshaft curve, it can easily be done on the setup screen by entering a value for the "Maximum Driveshaft Speed for Activation". If you need to end the Engine speed base curve, it's best to raise the end of the curve to a "very high point" that is never reached. The example below end the engine retard between 1.93 and 2.00 seconds by entering an RPM value of 12,000 RPM. It's also a good idea to zero out the timing retard as a backup which can be seen a few screen shots below.



Example showing how to "end" a curve

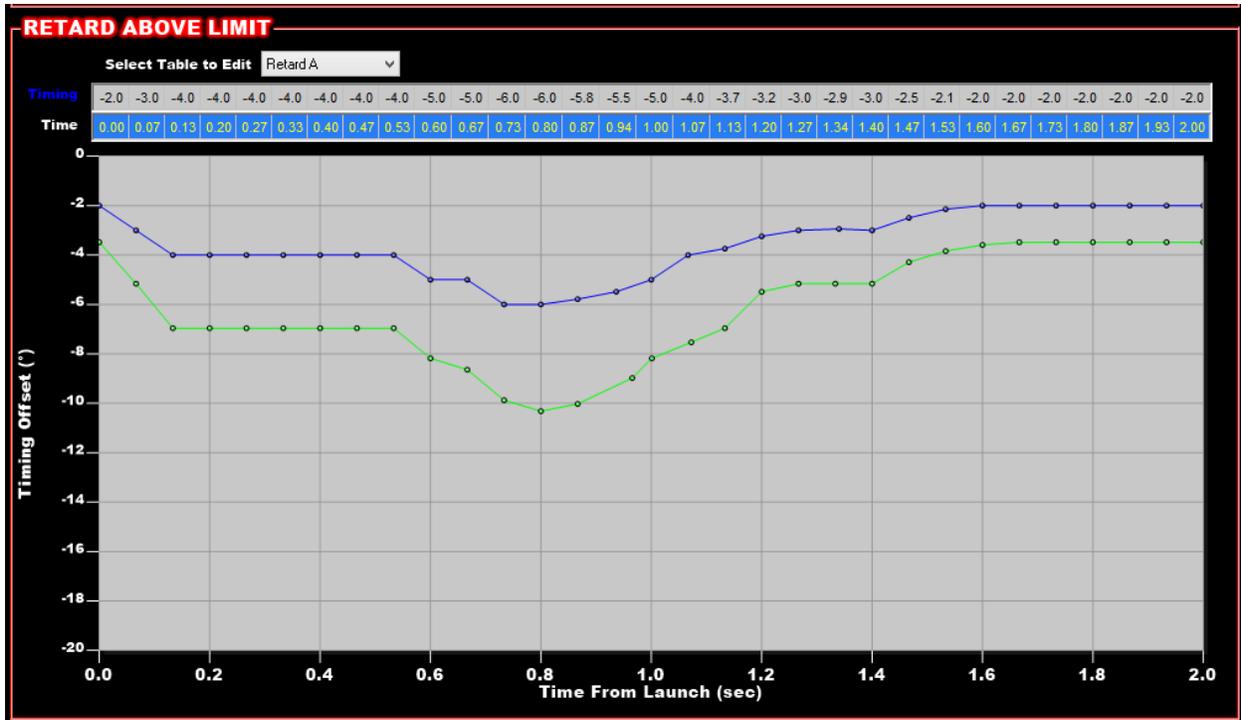
At this point you have created the boundaries for which the timing retard and rev limit curves will occur. Next we have to set up the amount of timing that will be pulled at each point.

Next, the "Retard Above Limit" table must be set.

Retard A – The “Retard A” curve is the amount of timing that is removed when the engine or driveshaft speed reaches the “Retard A Curve” at that specific time. You will need to be more or less aggressive with this value depending on many variables.

Retard B – The “Retard B” curve is the amount of timing that is removed when the engine or driveshaft speed reaches the “Retard B Curve”. It is varied based on time. See the example below.

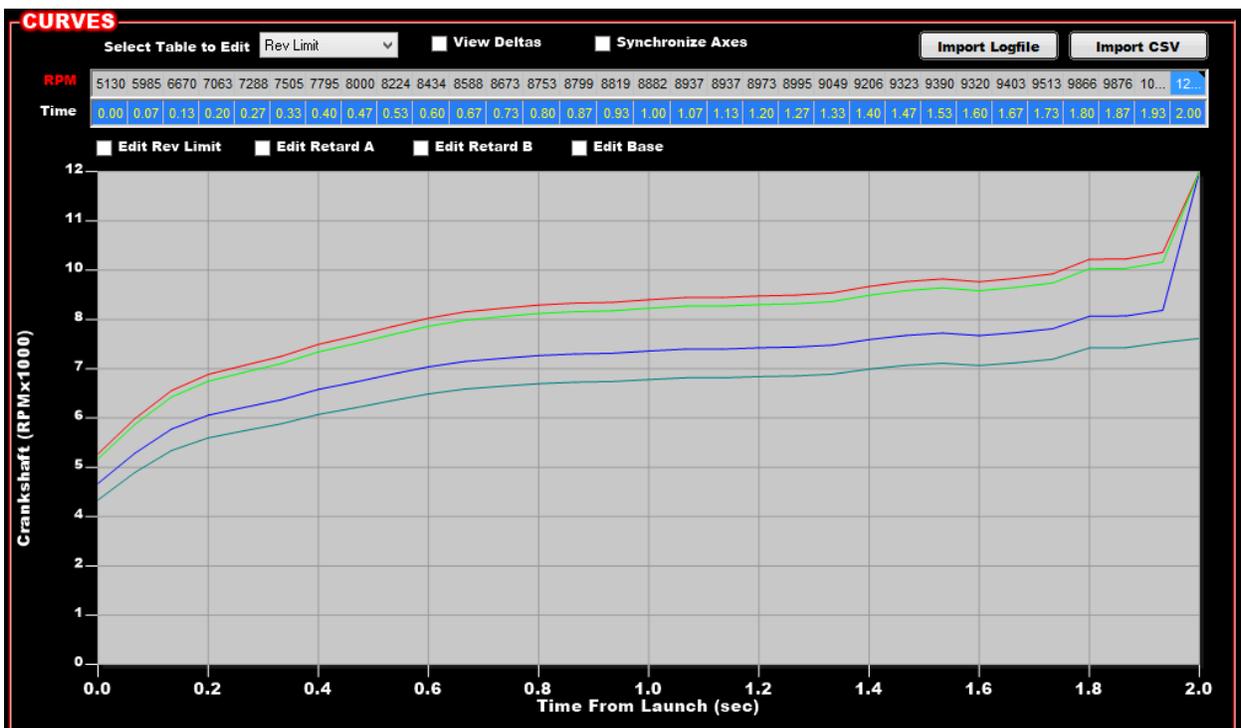
Timing retards between the A and B curve are an interpolated value.

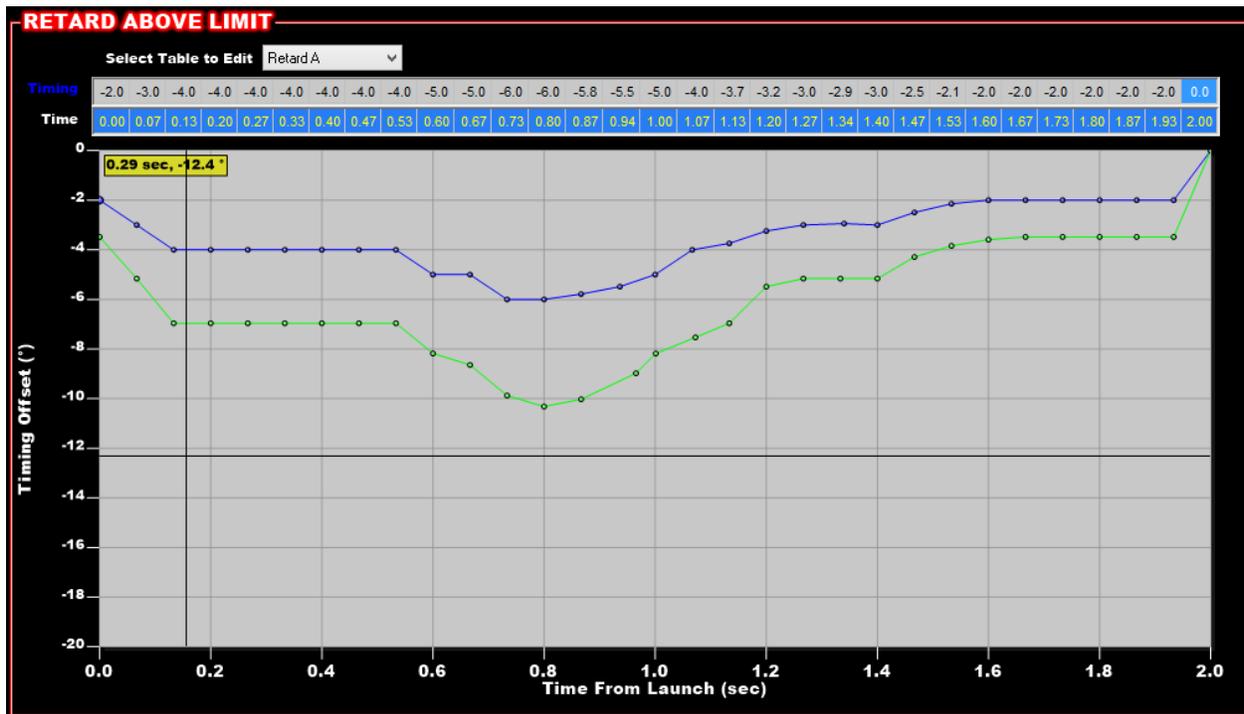


Retard Above Limit example

Operation:

The following gives an illustration of how the system works. It will use the two tables below. Note that the values used are “spread out” a lot to make the example clearer. Typically a curve will be tighter to the base curve than shown.





Let's say we are 1.0 seconds into the run. The following would occur at the following Engine speeds:

6940 RPM – Engine speed is on the Base curve. So timing is not affected.

7633 RPM – Engine speed is on the Retard A (Blue) line. This means that the first retard step takes effect, so we reference the Retard Above Limit graph at 1.0 seconds for the Retard A value. We see that it's -5.0 degrees. So at this point timing will be offset -5.0 degrees.

8675 RPM – Engine speed is on the Retard B (Green) line. This means that the max retard step occurs, so we reference the Retard Above Limit graph at 1.0 seconds for the Retard B value. We see that it's -8.2 degrees. So at this point timing will be offset -8.2 degrees.

If the RPM was in the middle of the A and B curves, at 8154, the timing offset would be $(-5) + (-8.2) / 2 = -6.2$ timing offset. When in-between A and B curves, interpolation always occurs.

Zooming

You can zoom into an area on the graphs by:

- Using the scroll bar (if equipped) on the mouse
- If no mouse scrollbar and you have a laptop, “spread” your fingers on the touchpad. Some touchpads do not respond to this however.
- Double-click with the left mouse button on a spot to zoom in.

You can hold the left mouse button and “drag” the screen in any direction after zooming.

New Monitor/Logger parameters for Active Speed Management

The following are the new Monitor/Logger channels for Active Speed Management:

DS Timing Offset – This value shows how much timing is being removed due to the Driveshaft retard curve. It will show as a negative value and is removing timing.

CS Timing Offset - This value shows how much timing is being removed due to the Crankshaft retard curve. It will show as a negative value and is removing timing.

DS Rev Limit – This value indicates if the Driveshaft based rev limiter is active. A value of zero means it is in-active. A value of 1 through 4 means it is active. The value indicates how many cylinders are being dropped. 1 = one cylinder being dropped. 4 = four cylinders being dropped (maximum possible).

CS Rev Limit – This value indicates if the Crankshaft based rev limiter is active. A value of zero means it is in-active. A value of 1 through 4 means it is active. The value indicates how many cylinders are being dropped. 1 = one cylinder being dropped. 4 = four cylinders being dropped (maximum possible).

TC Time – This value represents the traction control timer. Before the traction control is active/starts, it will read 0.00 seconds. When the timer starts, it will count up and will correspond to the traction control X axis value.

TC Launch Input – This is a status value (On/Off) and indicates if the TC Launch Input is on or off. When it is on, the traction control is disabled. When it goes off it will start the TC Timer.

New Internal Parameters for Active Speed Management

These should be added if they are being used. They all for the programmed curves to be plotted in the datalog. This allows you to compare actual RPM or DS speed vs what the tables.

TC_ASM_DS_RevLimitCurve
TC_ASM_DS_RetardACurve
TC_ASM_DS_RetardBCurve
TC_ASM_CS_RevLimitCurve
TC_ASM_CS_RetardACurve
TC_ASM_CS_RetardBCurve

Pin Map Updates

You can now put up to 10 inputs on a single input.

Data Monitor Updates

Add “X” on each view in setup to clear an individual view.

Data Logger Updates

Add “X” on each view in setup to clear an individual view.

New Logger/Monitor Channels

Target Idle Speed
Transmission Range Switch
Traction Control Channels
Injector Driver #13 through #28 PPH
Injector Driver #13 PW through #28 PW
Fuel Table 1%
Fuel Table 2%
Fuel Table 3%
Staging Input #1
Staging Input #2
Staging Output

Software Updates

- Added “tracing bubble” to all tables. (PWM, Advanced ICF, etc.)
- Created new “tracing bubble” that is active on all graphs. Selecting the “X” key will move the tuning cursor to current active point. (Tuning cursor must have been set on a point first).
- Gauge Panel saves which monitor views were present
- Strip chart accessible off-line

Scatterplot:

- Saves axis/color channels
- New color setup
- Saves filters
- Additional filter options

Data Logger:

- Fix double cross-hairs
- CAN Sensors and trans range switch added to Advanced and I/O ICF dropdowns

Firmware Updates

- Updates made to resolve data logger time skipping