Holley EFI V6 Software

Holley EFI V6 Feature Overview

The primary addition to V6 are updates to manage transmission shifting, converter lockup, and transmission bleeds and dumps. This area is designed specifically for drag racing applications. It is not intended for "street" or road racing, etc. There is a launch input (transbrake/clutch) that starts timers that are used to activate/deactivate functions.   Although the operation of these functions are straight forward these instructions MUST be thoroughly read and understood before use. These new functions are used to control the following:

Shift Outputs

- Controls up to 8 speeds
- Single Output or Multiple Output options
- Applications Supported:
    - Single Output (conventional 2-3 speed automatics)
    - Liberty Transmissions (Individual Outputs for each gear apply)
    - Lenco Transmissions ("stacked" individual outputs for each gear change)
    - Generic Multiple Outputs (individual outputs for each gear change, custom applications)
- Each gear change can be individually performed based on time and/or engine RPM
- Manual shift override input option
- Ability to perform ignition cut on gear change
- Ability to ramp timing during gear change
- The tuner can use the "Gear" in other tuning areas (replaces the need for RPM Drop Strategy)

Converter Lockup Outputs

- 4 individual outputs available
- Lockup can be performed off time and/or any sensor input (such as Engine or Driveshaft RPM)
- Ability to unlock/relock on gear change
- Ability to pulse/PWM on initial lockup
- Minimum RPM safety setting to not lug engine
- Ability to program minimum gear for lockup enable

Dump Valves

- 4 individual outputs available
- Can be programmed to activate on transbrake and/or down track
- Option to pulse/PWM output
- Can turn on/off based on several conditions

Spool Assist Valves

- 2 individual outputs available
- Active on transbrake, turn off based on boost

General Setup

These functions are used by adding the previously existing Transmission ICF. This is not a new ICF.   When adding the transmission ICF, make sure choose the base transmission ICF called RACING. If you do NOT choose this and choose one of the electronic transmission selections (4L60E, etc..), you will remove any inputs and outputs pin mapped to the J4 connector. If you choose the "RACING.transmission" ICF, you will not remove anything pin mapped to J4.

Once this is added, the Transmission area should look like this. If you selected an electronic transmission, change the "Transmission Type" to "Racing (below) (noting if you did you removed any pin mapped items on the J4 connector). Next select the number of gears/speeds your transmission has. (a powerglide would have 2, a 3 speed Turbo 400 would have 3, etc.)
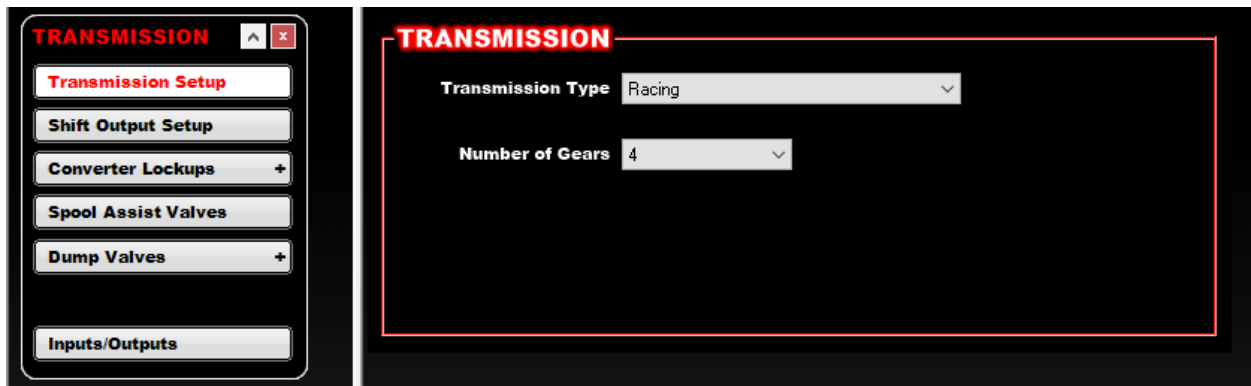
Inputs

Race Trans Launch (H,G) – This input will be automatically configured and is required. This should be connected to the transbrake or clutch switch input. As always, NEVER connect directly to the transbrake coil. Use a relay or connect with PN 554-128. This input is used to start timers and functions active on the transbrake. This input is used for EVERY function and must be wired properly. It is a required input for all functions.

Monitor Channels

Race Trans Launch – Status LED, will be active (green) when input is active, inactive (red) when input is not active.

Shift Output

Overview

This area is designed to provide single or multiple outputs to actuate solenoids to shift up to an 8 speed transmission for drag racing applications. The capabilities allow the user to program each shift based on a combination of engine RPM and/or time from launch (and manual input override).   There are a variety of commonly used transmissions that require different solenoid actuation strategies, which will be accounted for either by selecting this specific transmission type (Lenco and Liberty) or by having variables the user can program to accommodate differences. There are two basic shifting methods "Single" (a single shift output) and "Discrete" with Number of Outputs = Number of Shifts. There is a variety of enabling parameters (RPM and TPS) used to allow activation.
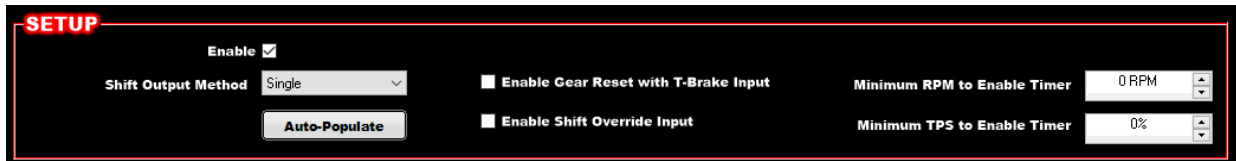
Shift Power Management is part of this area. There are two options the user has to reduce power during the shift, a reduction of timing and/or a complete cut in ignition event.

The significant item that comes out of the shift control is that the other areas in the Racing Transmission control (converter lockup, torque management and others) can all be precisely timed and tuned around the shift event, since the shift is being commanded by the ECU.

Note: ECU outputs can drive a solenoid up to 2.0 Amps. If a shift solenoid draws more current, have the ECU trigger a relay.

Parameters:

SETUP

- Enable – **Must** enable to active Shift Output area. (shown as "Shift Mster Enable in data monitor/logger channels)

  The "Shift Master Enable" input is **required** for all methods, it must be pin mapped and then turned on in a car for the shift events to occur. For conventional "single output" applications (powerglide, T400, etc), and where the transbrake/launch input is used to reset to gear 1 at launch, it is acceptable to wire the Shift Master input to switched 12v. For Lenco and Liberty and certain other applications this input should be set up on a toggle switch (see operation below for more info).

- Shift Output Method – See setup information further in this document. The selections are:
    o Single – Use for a single output typically driving a single air/electric solenoid on a conventional powerglide, Turbo 350/400, etc. transmission. This is used when a shift output is commanded, then the output is "relaxed" before the next shift is commanded.
    o Multiple – Use when multiple outputs are desired, where each output is actuated, then "relaxed" before the next output is commanded
    o Liberty – Use specifically for Liberty Transmissions. See information below.
    o Lenco – Use specifically for Lenco Transmissions. See information below.
- Auto-Populate – Pushing this button will auto-populate items for the "Shift Output Method" selected (select that first). This will program the MOST BASIC values needed for a 2 or 3 speed transmission to shift based on RPM. Only do this if you are starting out. The values must then be updated as required.
- Enable Gear Reset with T-Brake Input Checkbox – When checked/enabled, the gear will always reset to "1" when the race trans launch input is applied. There are times when you wouldn't want this checked, such as if you are leaving (or may decide to leave) in a gear higher than 1 for example. Most applications would want this checked.
- Enable Shift Override Input Checkbox– When checked/enabled the "Shift Override" input is created and must be configured and pin mapped as normal. When this input activated, it will perform the next shift in sequence. This is a "momentary" input. Each push performs one upshift. The "Output Active Time" and "Inactive Time After Shift" parameter will apply as they would for a normally commanded shift. Note that activating this input when a shift output is already occurring as well as if the Inactive Time After Shift state is occurring, the manual shift request will NOT occur (the "push" of the button has to occur when the shift/inactive state is not occurring). Also note that this input WILL cause a shift event when the Minimum RPM to Enable and Minimum TPS to enable conditions are NOT met. This allows for a gear change to occur while staging a car and allowing it to leave in a higher gear (note: unless the "Enable Gear Reset with T-Brake Input" is checked). It also would allow for testing the shift outputs without having to run the car down the track.
- Minimum RPM to Enable - Engine RPM must be above this value in order to start the shift timer (in addition to minimum TPS at release of transbrake). Once the timer has started, this value has no effect. So put this BELOW your launch RPM.
- Minimum TPS to Enable – TPS must be above this value in order to start the shift timer (in addition to minimum TPS at release of transbrake). Going below this value after launch also causes the "Pedaling Control" strategy to activate once the timer has started.

PEDALING CONTROL

PEDALING CONTROL
Pedaling Strategy: Pause Enabled

- Pedaling Strategy – There are two selections, which occur after launch and if the TPS goes below the "Minimum TPS to enable:
  - Pause Enabled – Freezes the shift timer (this only applies if you are shifting by time, not RPM) when pedaling occurs. Note this does NOT freeze the timing offset function or shift output if it's in process.
  - Continue Timer – Does not affect the shift timer if pedaling occurs

SHIFT OUTPUT SETUP

SHIFT OUTPUT SETUP

	1-2	2-3	3-4
Shift RPM	☐ 0 RPM	☐ 0 RPM	☐ 0 RPM
And/Or	AND	AND	AND
Shift Time	☐ 0.00 sec	☐ 0.00 sec	☐ 0.00 sec
Output Active Time	0.00 sec	0.00 sec	0.00 sec
Inactive Time After Shift	0.00 sec	0.00 sec	0.00 sec

Shift Output Setup – Editable per gear

- Shift RPM per Gear – Check if using RPM condition for gear shift
- And/or Condition for shift RPM/Time – Will be an option if both the Shift RPM and Shift Time are selected. Selecting "And" will require BOTH the time AND RPM conditions to be met. Selecting OR will cause a shift event when either the RPM OR time condition is first met. The purpose of using both (instead of just RPM) is that you can put a time in so that you don't get a quick 1-2 shift due to tire spin.
- Shift Time per Gear – Check if using Time condition per gear. This timer for this shift starts at launch.
- Output Active Time – This value determines how long the shift output is active. This needs to be long enough so the shifter is mechanically moved (usually .2-.4 seconds).   This isn't needed with Liberty and Lenco types.
- Inactive Time After Shift – This time value occurs AFTER the "Output Active Time" expires. It is a "dead time" that occurs where the next shift is NOT allowed to occur. It will override both a time (if they are programmed to overlap, which they should not be) and RPM command for the next shift. Notes:
  - This is to make sure that the shift output/solenoid can disengage and all the shifter to "relax" so that it can properly detent and the next shift occur.
  - It can be used if a spin condition occurs after a shift, it will not allow for the next shift to quickly occur
  - Be aware that a manual shift can NOT occur during this time.
  - Proper understanding and programming of this value is essential.

SHIFT POWER MANAGEMENT SETUP

- Enable Ignition Cut Function checkbox – If an ignition cut during a gear shift is desired (can be programmed per gear), check this box.
- Enable Timing Offset Functions checkbox – If it is desired to retard (or add) after a shift event is commanded, (can be programmed per gear), check this box.
- Delay Time – Delay applied after shift commanded before either the ignition cut or timing offset starts (per gear change)
- Ignition Cut Time – Time where ignition outputs will be cut (per gear change)

Timing Offset

- Select Shift Table to Edit (changes with "select gear to edit")
- Timing Offset – 1x16 time based curve that can retard (or add) timing after the shift is commanded. Time starts after delay time and cut time applied if applicable

Shift Output Method Overview:

Single – A single output activates during each shift. The output is active for the "Output Active Time". This is used for a typical 2 or 3 speed (Powerglide, T400, etc) transmission.

Multiple – Individual Outputs are used (number of outputs = number of shift events). Each output is active for the "Output Active Time".

Liberty – The strategy for the Liberty is as follows:

> The "Shift Master" input is used to engage 1st gear.   Unlike all other types, when the Shift Master input is NOT active, the Gear shows as "0" (all others show 1), which is neutral/no gears applied.

When the Shift Master input is turned on, the system will activate the "Shift Single" output and the Gear position will be "1". This output should be wired to the 1st gear activation solenoid. The "Shift Single" out will stay applied (unless the Shift Master input is turned off). When the 1-2 shift is commanded, at the same time, the "Shift Single" output is deactivated and the "Shift 1-2" output is activated. When the 2-3 shift is commanded, the "Shift 1-2" is deactivated and the "Shift 2-3" output is active. And so on until the highest gear shift is present.

There is an optional (checkbox enabled) "High Gear Active Time" just for the Liberty. If enabled (can be enabled and edited only when the high gear shift is selected, otherwise it is greyed out) the high gear output will be deactivated and the transmission put into neutral after this time (time after high gear is applied). The "Shift Master" enable (or ignition cycle) must then be toggled to restart any future shift activity.

To deactivate outputs at any time with the Liberty strategy, either the ignition or "Shift Master" enable must be turned off (or High Gear Active Time occurs).

Cycling the "Shift Master" enable will re-engage 1st gear.

Note: There is no "output active time" with the Liberty Strategy. The "Inactive Time After Shift" operates as normal.

Lenco – The strategy for the Lenco is as follows:

The "Shift Master" is used to enable shift activity. When it turns on, there are no outputs commanded. When the 1-2 shift is commanded, the "Shift 1-2" output is commanded. This output will remain on for the rest of the shift sequence (as will any other shift outputs). When the 2-3 shift is commanded, the "Shift 2-3" output is commanded. And so on, with other gear changes.

All outputs will remain on until:
- The "Shift Master enable" is turned off
- Ignition Power is turned off

IMPORTANT NOTE ON LENCO: You should not turn the shift master enable off when the car is under power (for example going through the traps under power), this can cause the transmission to go into 1st gear at high speed. When shift master enable is turned off, the ignition power/engine should be shut off as well.

Shift Output Basic Operation:

Step by Step Setup:

The following overviews setting up the shift output area.

1) Make sure main "Enable" checkbox is checked
2) If desired, select a baseline "Application". This will auto-populate several of the settings with some baseline entries. They can be edited as needed in the following steps.
3) Select the appropriate "Shift Output Method"
4) Enable Gear Reset with T-Brake Input checkbox – decide if you want this to be selected. This would typically BE checked unless you intend to enable the shift override input and launch in a higher gear. (note this is not an option on a Liberty)
5) Enable Shift Override Input checkbox – select if you want to enable in ECU input that will allow for a manual shift input. This can cause a manual shift during the run or be used to bump up a gear before staging.
6) Select the "Minimum RPM to Enable". This should be below your launch RPM.
7) Select the "Minimum TPS to Enable". This should be below you're your launch TPS and at a value that you'd want to have the pedaling control state be enabled.

8) Select Pedaling Control method. Pause enabled will freeze timer if TPS goes below Minimum TPS to Enable during a run. Continue Timer will not freeze timer (will continue) if pedaling occurs.
9) Next, select when each shift occurs. For each gear change, select the "Shift RPM" and/or the "Shift Time" for each shift to occur. If both are selected you must properly select the AND/OR dropdown. If AND is selected, both the time and RPM entry must be me for the shift to occur. This is useful if you use RPM as the primary criteria and don't want to have an early 1-2 shift occur if there is tire spin. For example, if you want to shift at 8000 RPM, and that normally occurs at 2.0 seconds, you could use a shift RPM of 8000 AND a minimum time of 1.75 seconds. This would not allow for a shift due to tire spin before 1.75 seconds.   You can independently program each shift event to be based on Time and/or RPM.

   The "Output Active Time" is how long the ECU output will be active. This should be enough time for the shift lever to move (with plenty of margin).

   The "Inactive Time After Shift" is a time AFTER the "Output Active Time" that does not allow for a shift output to be active. It overrides any other command (such as a manual shift input or a commander shift based on time or RPM).   If you have more than a 2 speed transmission you should always enter SOME time for this value. The purpose of this is:

   - Use to "relax" a shift solenoid so that the shift lever is free to properly find a detent in the shifter before the next shift.
   - Is used to stop an upcoming shift from occurring if there was tire spin on a shift. For example, if you program both the 1-2 and 2-3 to occur at 8000 RPM, and there is tire spin on the 1-2 that holds the RPM over 8000 for a ¾ of a second, if you had a .5 second output time and a .5 second inactive time (.5 + .5 = 1.0 seconds), then the next shift couldn't occur until at least 1.0 seconds.

10) Enable Ignition Cut Function checkbox – select if you want an ignition cut during a shift. This is typically only used on motorcycles
11) Enable Timing Offset Function checkbox – select if you want to retard (or add) timing after the shift is commanded.
12) Next, program the Power Management Setup, if either are enabled. Note that these are programmable by gear. The delay time will delay both the Ignition Cut and Timing Offset. If all three are present, the Timing Offset will occur after the sum of the delay and ignition cut. The Timing Offset has a X time axis programmable up to 9.999 seconds

Inputs

Shift Override In (H, G)

Shift Mstr Enable (H,G)

Outputs

Shift Out Single (H, G)

Shift Output 1-2 (H, G)

Shift Output 2-3 (H, G)

Shift Output 3-4 (H, G)

Shift Output 4-5 (H, G)

Shift Output 5-6 (H, G)

Shift Output 6-7 (H, G)

Shift Output 7-8 (H, G)

Monitor/Logger Channels

Shift Discrete Out – Status

Shift Output 1-2 - Status

Shift Output 2-3 - Status

Shift Output 3-4 - Status

Shift Output 4-5 - Status

Shift Output 5-6 - Status

Shift Output 6-7 - Status

Shift Output 7-8 – Status

Shift Over-Ride – Status

Shift Launch Input – Status

Gear – 1-8

Shift Master Enable - Status

Ignition Cut – Status

Shift Timing Modifier - -60 to +60

Shift Timer – Timer that starts off release of brake

Converter Lockup Operation

Overview:

The Converter Lockups is an area specific to locking up a lockup torque converter. There are four individual outputs that can be used for applications that have multiple applies. These can be used to activate items other than a torque converter if the strategy applies as well. The apply has a PWM (pulsed) option.   Lockup can be determined by time or RPM. A minimum gear for activation is an option. There is the ability to unlock and relock the converter on a shift. There are multiple pedaling strategies and an option for a switched disable input.

There will be FOUR of these, completely duplicated.

"Name" – User can retype name (same as Advanced ICF).   Base name is "Converter Lockup 1 (through 4)"

Parameters:

Lockup Activation

- Enable Checkbox – Must be selected to enable function and output (must be pin mapped)
- Name – Allows for the channel name (in the data monitor and data logger) to be whatever the user wants. Does not impact function.
- Lockup Start Time – If checked, converter lockup will occur at this time (timer starts at launch)
- And/Or Function for Lockup Time and RPM – Will be an option if both the Lockup RPM and Lockup Time are selected. Selecting "And" will require BOTH the time AND RPM conditions to be met. Selecting OR will cause a lockup event when either the RPM OR time condition is first met
- Trigger Sensor – Option to pick any sensor (Engine RPM or Driveshaft RPM is typically used) to trigger converter lockup. Note that this is a "latching" condition. Once it is hit, the converter will stay locked, even if the value does below it. This is the case UNLESS the "Minimum Engine RPM" is triggered, in which case the converter won't relock until the trigger sensor value is re-met. For example, if the Trigger sensor value is 8000 Engine RPM, and the Minimum Engine RPM is 6500, if the engine hits 6500, the converter will unlock and not re-lock until the engine RPM gets to 8000 again (same would hold true for driveshaft speed or any other sensor..).
- Trigger Sensor Value –If checked, converter lockup will not occur until this engine RPM is met. Note this is a "one time" value. Once it is met, the converter will remain locked (unless other unlock criteria occurs)

LOCKUP PARAMETERS

- Minimum TPS for Activation – Serves three purposes:
  - Minimum TPS needed when launch input is released to start timer.
  - Once the timer starts, going below this value will unlock the converter
  - Once the timer starts, going below this value will cause the "Pedaling Strategy" to occur
- Minimum Gear for Activation – Converter will not lock (over-rides time or RPM parameters) until this gear is reached.
- Minimum Engine RPM – Below this RPM the converter will ALWAYS unlock/be unlocked. The purpose of this value to ensure is to ensure that the engine is not "lugged" when the converter is locked. Note: This RPM does NOT have to be met at launch for the lockup timer to start. There is a 100 RPM hysteresis on this value. For example, if the value is 6000, the converter will unlock once RPM falls to

6000, the converter will re-lock once the engine gets back to 6100 (and the trigger sensor condition is re-met if it is being utilized).

- Manual Disable Input – This is an option. Enabling creates an input that must be configured and pin mapped. When this input is active, converter lockup will not occur and will unlock the converter if activated during a run. There is a single input, but the option is configurable by stage.

PEDALING CONTROL

- Pedaling Strategy – Note that when the TPS goes below the minimum TPS value, the convert will ALWAYS unlock, what it does when the TPS goes above is as follows:
  - Deactivate Output – When pedaling occurs, the converter will NOT relock for the rest of the run.
  - Pause Enabled – When pedaling occurs, the lockup timer will freeze and restart when the TPS goes back above the minimum value. If the lockup is in a PWM condition when pedaling occurs, the PWM timer will be frozen.
  - Continue Timer – Does not affect/freeze the lockup timer if pedaling occurs
  - Programmable Restart Time – When TPS goes back above the minimum TPS, this time value is applied before the converter is re-locked. If .50 is used for example, the converter lockup will be delays for .50 once conditions for lockup are re-met after pedaling.
- Converter Re-lock Delay - Only shown if Pedaling Strategy = Programmable Restart. Enter desired time.

SHIFT

- Unlock During Shift Checkbox – If it is desired to unlock the converter on the shift, select this checkbox. It will unlock it on EVERY shift.
  - Unlock Delay Time – Delay time after a shift is commanded before unlock off time occurs
  - Unlocked Time – Time that the converter is unlocked

PULSED OUTPUT
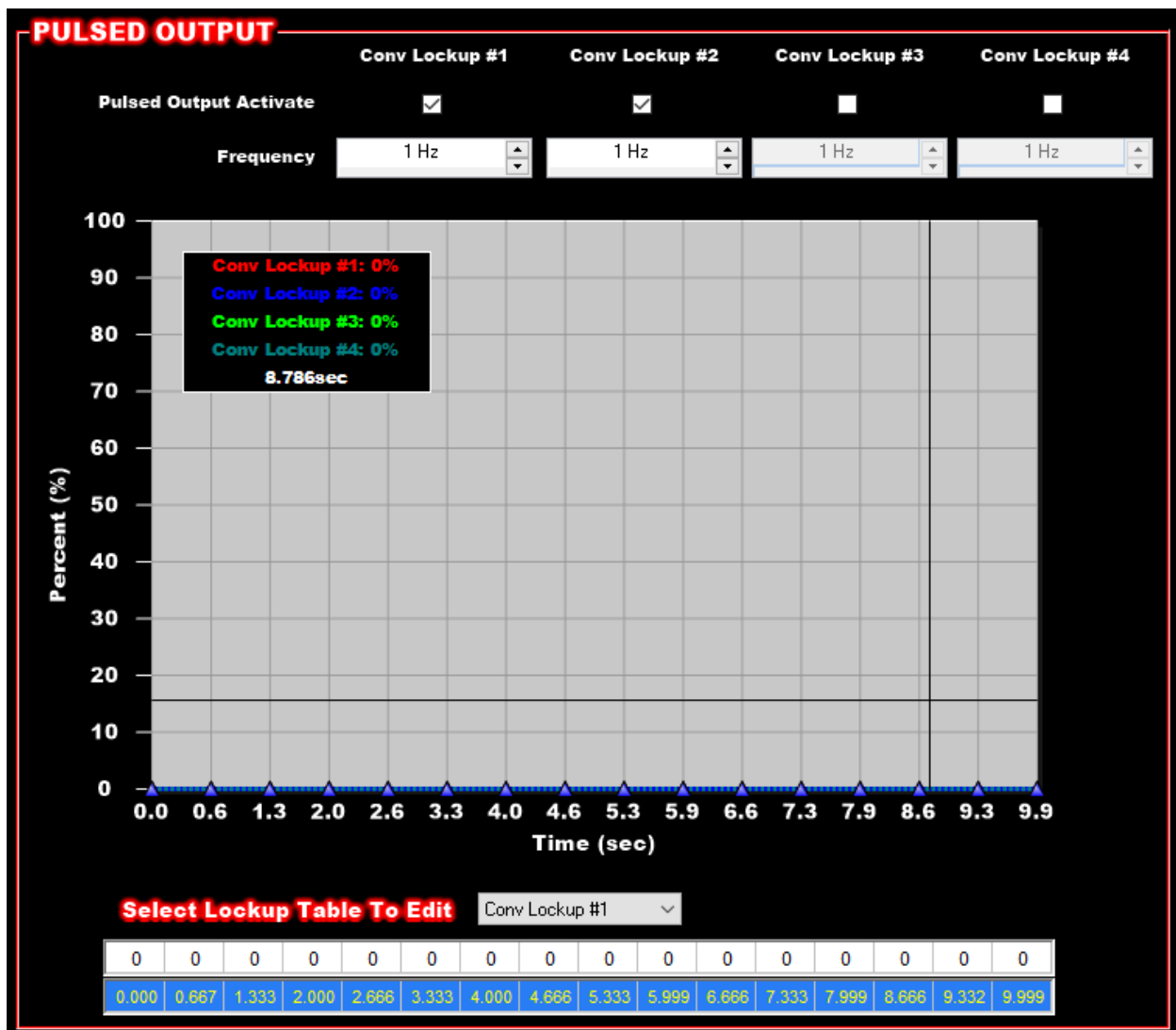
- Pulsed Output – Checkbox must be selected to enable PWM/Pulsed Output. The output is pulsed ONLY during the initial lockup. If unlocked due to pedaling, unlock on shift, etc, it will not be PWM'd on re-apply.   The X axis is user-programmable from 0 to 9.999 seconds.
    - Pulse Frequency – PWM Frequency
- PWM Lockup Table – Each Converter Lockup has its own lockup table and its own X axis time scale. They are all graphed together.

Lockup Operation

Converter Lockup Timer Operation

Timer Reset – Timer zeros at apply of Race Launch input (always) and key-on.

Timer Start – Timer ONLY starts if TPS is above "Minimum TPS for Activation" AND at release of Race Launch input.

Timer Pause - The only thing that will pause the timer is if the "Pedaling Strategy" is set to "Pause Enabled" and the TPS goes below the "Minimum TPS for Activation".

What is the "Timer" – The timer is used for the "activation time", if a "pulsed output" is used, and for deactivation on the shift. If the timer pauses, it pauses the timer that affects these.

The following must ALL be true for lockup:

- Minimum TPS for Activation
- Minimum Gear for Activation
- Lockup Start Time
- Min RPM

Parameters Will Turn off Lockup Output for rest of run

- Manual Disable Input – Optional Switched input. When active it will disable any stage that has it enabled (there is a single disable input, but enablable by stage). This is a single input used for all four Converter Lockup outputs. If applied during a run, will not allow restart until transbrake resets system. So if it is this input occurs even momentarily, it shuts off the converter outputs permanently for the rest of the run.

- Pedaling occurs and pedaling strategy set to Deactivate Output

Parameters Will Turn off Lockup Output temporarily for run

Minimum Engine RPM – Does NOT inhibit start of Activation Time. Going below will disable lockup, but not pause the timer. There is a 100 RPM hysteresis for it to go back on. For example if 8000 RPM is selected, the converter will unlock at 8000 when RPM FALLS, and turn back on when RPM CLIMBS to 8100. Note that the "Trigger Sensor" condition must also be re-met again (no matter what the sensor chosen is). If this is Engine RPM, the trigger sensor value will need to be re-met (over-rides the Minimum Engine RPM value).

Minimum TPS for Activation – If the TPS goes below this value, the lockup output will turn off. Whether or not the timer pauses or continues to run during this time is dependent on the "Pedaling Control".

Pedaling Control

Pedaling Strategy – There are four options available. "Pedaling" is defined such that if the TPS goes below the "Minimum TPS for Activation", pedaling occurs. No other parameters (such as RPM) constitutes pedaling). Going below the Minimum TPS value will ALWAYS turn the converter lockup OFF.

Deactivate Output – Disables converter lockup for rest of the pass. Transbrake/key cycle to reactivate.

Pause Enable – The activation timer is frozen, when TPS value goes back above activation value the timer will continue. Converter will TURN OFF below this value and TURN on (at previous frozen timer value).

Continue Timer – Once the transbrake is pushed/released, the timer will continue until it "times out" or transbrake is pushed. Converter will TURN OFF below this value and TURN on at current timer value.

Programmable Restart - If converter was locked, it unlocks, when TPS is re-met, this time is applied before re-locking. If converter was not yet locked, this time is added to the activation time when it restarts.

Unlock During Shift

Allows for the converter to be unlocked during a shift.

Delay – Keeps the converter locked (is previously in a locked condition) for this amount of time when a shift is commanded.

Unlocked Time – Amount of time converter is unlocked during shift

Pulsed Output – Optional. PWM's the output for this value only when the lockup is first applied.

Inputs

Conv Lock Disable (one input that is used for all four..)

Outputs

Converter Lock 1 – H, G, P-/P+

Converter Lock 2 – H, G, P-/P+

Converter Lock 3 – H, G, P-/P+

Converter Lock 4 – H, G, P-/P+

Monitor/Logger Channels

Converter Lock 1- 0-100%

Converter Lock 2- 0-100%

Converter Lock 3- 0-100%

Converter Lock 4- 0-100%

Manual Disable Input - Status

Spool Assist Valve

Overview

There are two Spool Assist outputs. They perform identical operations (operate only when on the transbrake). The Spool Assist outputs are intended to activate when the Race Trans Launch input (transbrake) is active and when the TPS is over the Minimum TPS for Activation.   The output will turn off when the "Boost Deactivation" value is met. It will also deactivate when the Race Launch input turns off or the TPS goes below the Minimum TPS for Activation.

There is a 1 PSI hysteresis on the Boost Deactivation. If a value of 10 PSI is entered, the output will turn off at 10 PSI, but not turn back on until 9 PSI.

Inputs:

None

Outputs:

Spool Asst Out 1 (H, G)

Spool Asst Out 2 (H, G)

Monitor Channels:

Spool Assist Out 1 – Status

Spool Assist Out 2 - Status

Transmission Dump Valve Outputs

Overview

This area is used to activate outputs (usually used for transmission dump/bleed valves) which can be active both on the transbrake (Race Trans Launch input) and then operate off a timer after launch. They have the option to be pulsed/PWM'd. The area is intended to optionally operate other items that are time/RPM dependent during a run. There are four of these outputs available (Trans Dump 1-4).

There are several options for turning off the output including time and a user selectable sensor condition.

Parameters

BASIC USE

- Enable Checkbox - Must be selected to enable function and output (must be pin mapped)
- User definable name - Allows for the channel name (in the data monitor and data logger) to be whatever the user wants. Does not impact function.
- Min TPS for Activation - Serves two purposes:
  - Minimum TPS required to be met when launch input is released to start timer.
  - Once the timer starts, going below this value will cause the "Pedaling Strategy" to occur
  NOTE: Going below this value will NOT turn off the output once the timer has started.
- Output Duration and Checkbox – Optional time where output will turn off after launch. Note the timer will freeze if the pedaling strategy is set to "pause enable", delaying the output duration during the freeze.

- Transbrake Operation Enable and Setting – When the "Active When Transbrake On" checkbox is enabled, the output will activate as soon as the transbrake (Race Trans Launch) input is active. If the "Pulsed Output" is enabled, you are given the option to select a fixed duty cycle that the output will be set to on the transbrake. Note that if this is enabled, the "Activation Delay" setting is not available.
- Pedaling - Pedaling Strategy – There are three options available. "Pedaling" is defined such that if the TPS goes below the "Minimum TPS for Activation", pedaling occurs. No other parameters (such as the sensor input condition) constitutes pedaling. Going below the Minimum TPS value will NOT turn off the dump output UNLESS the pedaling strategy is set to "Deactivate Output".
  - Deactivate Output – Disables output for the rest of the pass. Transbrake/key cycle needed to allow reactivation.
  - Pause Enable – The activation timer is frozen, when TPS value goes back above activation value the timer will continue. The dump OUTPUT will NOT TURN OFF below this value, only the timer will freeze and start again when the TPS goes above this value.
  - Continue Timer – Once the transbrake is pushed/released, the timer will continue until it "times out" or transbrake is pushed. The dump OUTPUT will NOT TURN OFF below this value and the timer will continue to run.
- Activation Delay and Checkbox – Optional time delay from launch that output will be delay. Note that if the "Active When Transbrake On" is enabled, this will not be an option.
- Manual Disable Checkbox – Enabling creates an input that will disable the output. Note that there is a single disable that impacts all four Trans Dump Valves. Each can individually be chosen whether the Disable input will affect each one.

SENSOR ACTIVATION SETUP

- Sensor Enable and Setup – Each output has an optional sensor trigger condition that can be used to turn the output on or off. Note that this condition does not affect the timer, just the output state (whether it is physically on or off).

PULSED OUTPUT
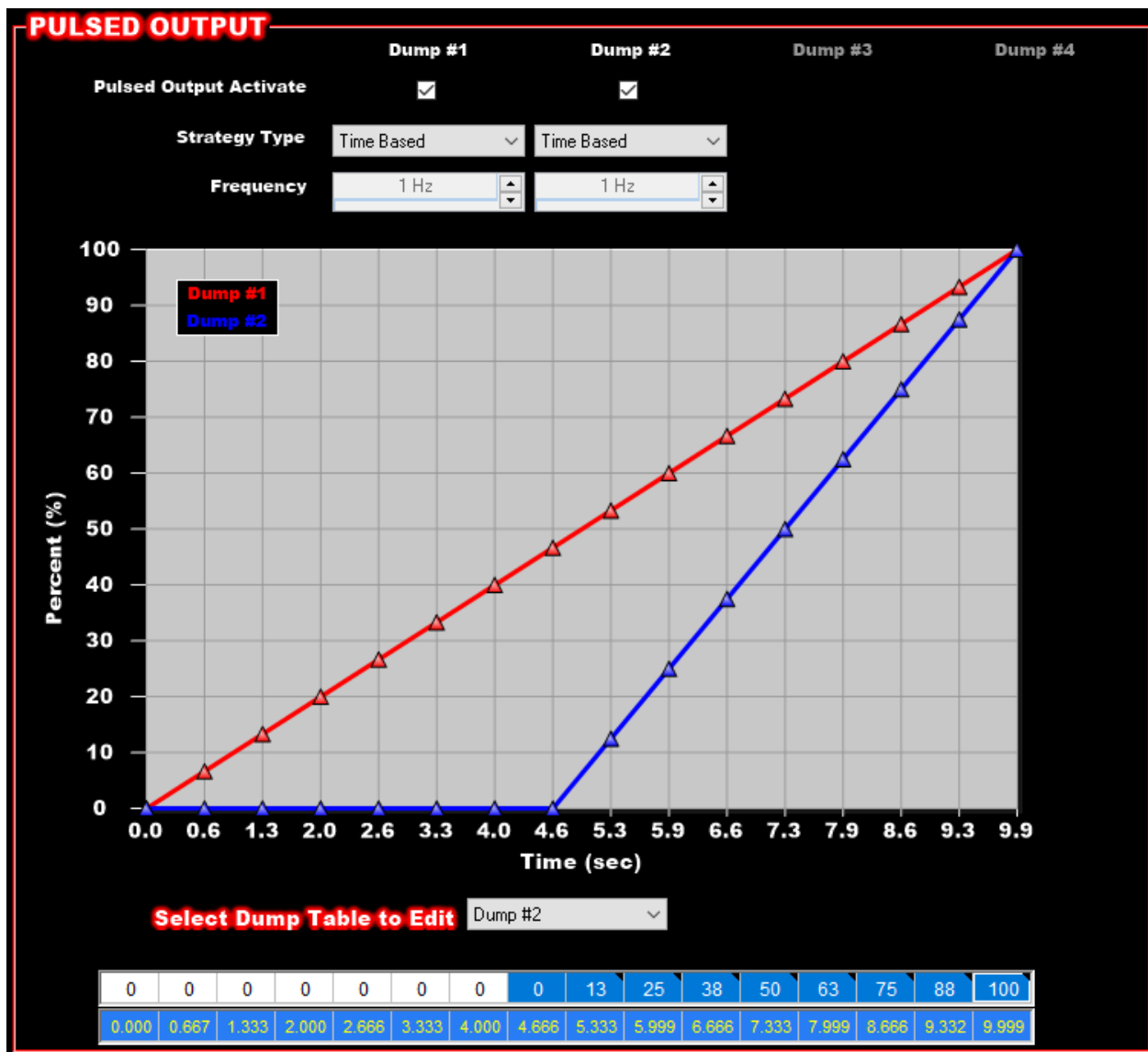
- Pulsed Output and Checkbox – If enabled, the output is pulsed based on the Strategy Type of RPM or Time. The Frequency must be set. The 1x16 time/RPM axis is user editable individually for each output.

Dump Timer Operation

Timer Reset – Timer only zeros at apply of transbrake (always) and key-on.

Timer Start – Timer ONLY starts if TPS is above "Minimum TPS for Activation" AND at release of transbrake.

Timer Pause - The only thing that will pause the timer is if the "Pedaling Strategy" is set to "Pause Enabled" and the TPS goes below the "Minimum TPS for Activation". There are other parameters that can turn off the output (mentioned below) but not cause the timer to pause/freeze.

What is the "Timer" – The timer is used for the "activation delay", "output duration", and if a "pulsed output" (with a time based X axis) is used. If the timer pauses, it pauses the timer that affects these.

<u>Parameters that Will Turn off Dump Output for rest of run</u>

Output Duration – If this is enabled, and this time met, the output turns off for the rest of the run and can only start back up after the transbrake is active.

Manual Disable Input – Optional Switched input. When active it will disable any stage that has it enabled. This is a single input used for all four dump outputs. If applied during a run, will not allow restart until transbrake resets system. So if it is this input occurs even momentarily, it shuts off the converter outputs permanently for the rest of the run.

<u>Parameters Will Turn off Dump Output temporarily during run</u>

Optional Sensor Trigger Input – Does NOT inhibit start of Activation Time. Going outside of this setting will turn off the dump output, but not pause the timer. When the condition is remet, the output will turn back on (vs staying off the rest of the run).

Operation Examples:

The user selects whether the output is Fixed or PWM (+ and -). There user can select (has to be enabled) if the output is active when the transbrake is active.

- If fixed and transbrake active is not enabled:
  - Starts at release of transbrake, but delays for "activation delay" if present.
  - Completely stops when:
    - Optional "duration" parameter is met
    - Pedaling strategy is set to "shut off" and pedaling occurs
    - Transbrake is pressed (resets timer)
- If fixed and transbrake active is enabled:
  - When transbrake is active and TPS condition is met. Ignores sensor condition
  - Continues at release of transbrake.   "activation delay" is NOT available, TPS and sensor conditions must be met.
  - Completely stops when:
    - Optional "duration" parameter is met
    - Pedaling strategy is set to "shut off" and pedaling occurs
    - Transbrake is pressed (resets timer)
- If PWM and transbrake active is not enabled
  - Starts at release of transbrake, but delays for "activation delay" if present.
  - Uses 2x16 table. X axis is selectable/configurable by Time or RPM. Table values are duty cycle.
  - Completely stops when:
    - Optional "duration" parameter is met
    - Pedaling strategy is set to "shut off" and pedaling occurs
    - Transbrake is pressed (resets timer)
    - Table duty cycle = 0% (timer still runs but output is not activated)
- If PWM and transbrake active is enabled:
  - When transbrake is active and TPS condition is met. Ignores sensor condition. Output is a single/fixed duty cycle value.
  - Continues at release of transbrake.   "activation delay" is NOT available, TPS and sensor conditions must be met.
  - Completely stops when:
    - Optional "duration" parameter is met
    - Pedaling strategy is set to "shut off" and pedaling occurs
    - Transbrake is pressed (resets timer)

Some example scenarios:

- Transbrake applied, TPS goes over 80%, RPM goes over 2500, activate output at a fixed 60% DC at 20Hz. Transbrake released (launch), DC goes from 60% to 0% in 1.50 seconds
- Transbrake applied, output not active. Transbrake released. Programmable delay time of .05 seconds occurs, output is applied 100% for 1 second until the output duration is met.

Inputs

Tran Dump Disable – H, G (one is used for all four..)

Outputs

Trans Dump #1 – PWM-/PWM+

Trans Dump #2 – PWM-/PWM+

Trans Dump #3 – PWM-/PWM+

Trans Dump #4 – PWM-/PWM+

Monitor/Logger Channels

Dump #1 – 0-100%

Dump #2 – 0-100%

Dump #3 – 0-100%

Dump #4 – 0-100%

Tran Dump Disable - Status

Monitor/Logger Channel Summary:

Race Trans Launch - Status

Shift Single Out – Status

Shift Output 1-2 - Status

Shift Output 2-3 - Status

Shift Output 3-4 - Status

Shift Output 4-5 - Status

Shift Output 5-6 - Status

Shift Output 6-7 - Status

Shift Output 7-8 – Status

Shift Over-Ride – Status

Gear – 1-8

Shift Master Enable - Status

Ignition Cut – Status

Shift Timing Modifier - -60 to +60

Shift Timer – Timer that starts off release of brake (discuss with Fred)

Conv Lockup #1- 0-100%

Conv Lockup #2- 0-100%

Conv Lockup #3- 0-100%

Conv Lockup #4- 0-100%

Conv Lock Disable - Status

Spool Asst Out - Status

Dump #1 – 0-100%

Dump #2 – 0-100%

Dump #3 – 0-100%

Dump #4 – 0-100%

Tran Dump Disable - Status

Advanced ICF/Other Items

The gear, as indicated using the "Racing" type in the transmission type is shown and can be used in the following areas:

- "Sensor Input" in all sensor input drop downs. IO, Advanced ICF, etc.
- "Shift Recognition" type (Advanced ICF) = TCU Input in (see image below, "TCU Input" is using the gear position from the transmission ICF"
- "Shift Recognition" type (Boost ICF, Gear Based Boost Control) = TCU Input in
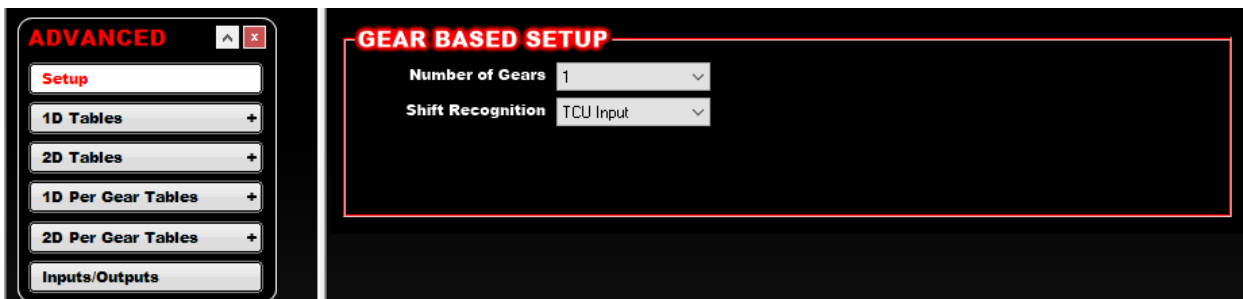
The following are available in the Advanced ICF as "Table Type" dropdowns. They can be manipulated in an Advanced ICF table. These can be used for "Custom and Advanced" uses that the base functionality doesn't allow.

Converter Lockup #1 Offset - (-100% to +100%)

Converter Lockup #2 Offset - (-100% to +100%)

Converter Lockup #3 Offset - (-100% to +100%)

Converter Lockup #4 Offset - (-100% to +100%)

Trans Dump Valve #1 Offset - (-100% to +100%)

Trans Dump Valve #2 Offset - (-100% to +100%)

Trans Dump Valve #3 Offset - (-100% to +100%)

Trans Dump Valve #4 Offset - (-100% to +100%)

Nitrous Software Updates

The nitrous area has a new "Stage Summary" that combines all the nitrous stages into one screen. All stages can be viewed and edited in this new area as well as the individual stages (a change on either is reflected in both).

There is a "Tuning Summary" at the top:

Next is an "Added Fuel" area, mostly for dry nitrous applications. There are two new fields "Nitrous Jet Size" and "Fuel Jet Size". These are to for the tuner to record nitrous and fuel jets (for wet) for the tune. *These do nothing to alter the tune or calculate any values.*

You will notice a few calculations that total up the amount of fuel from all stages. In the top left corner there is a sum of fuel from all progressive (doesn't include non-progressive) at 100% solenoid duty cycle (see first picture). If all stages are non-progressive, there will be a new "Cumulative" line that sums all the stages at a specific RPM (see second picture). If there is a mix of progressive and non-progressive dry there will be a mix of both values.
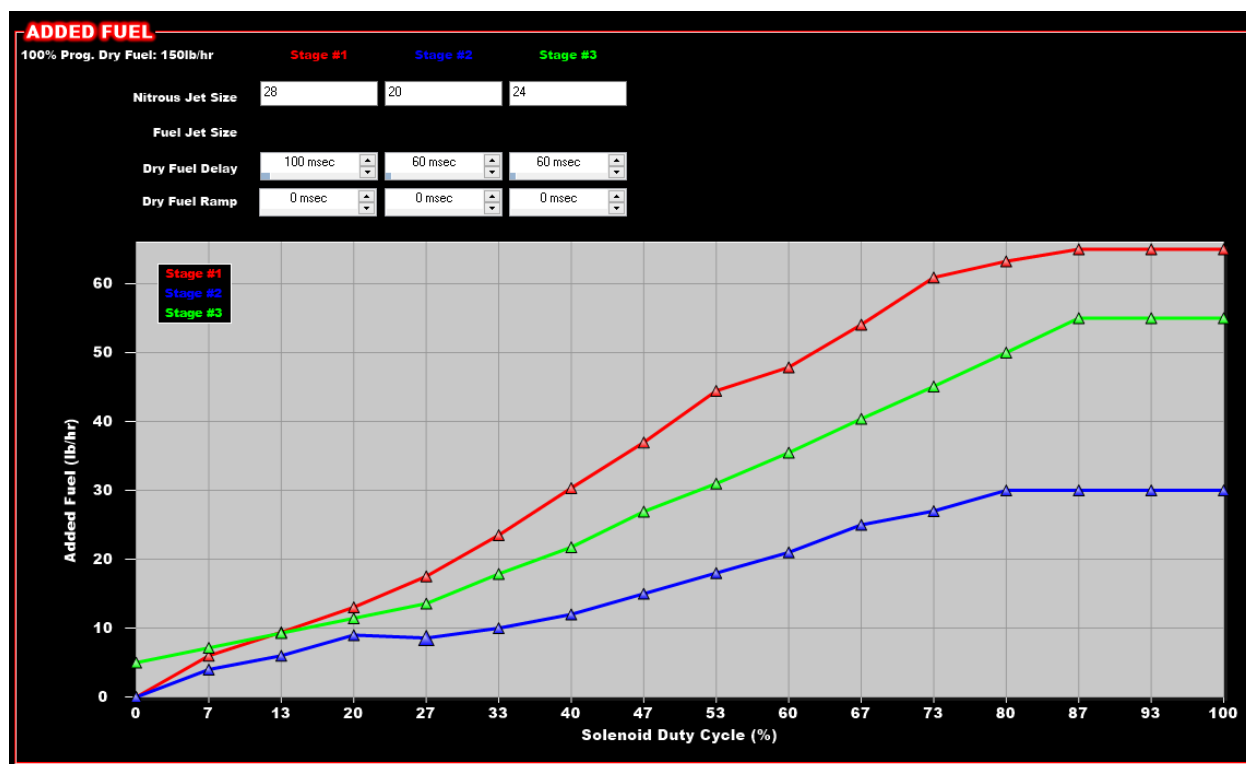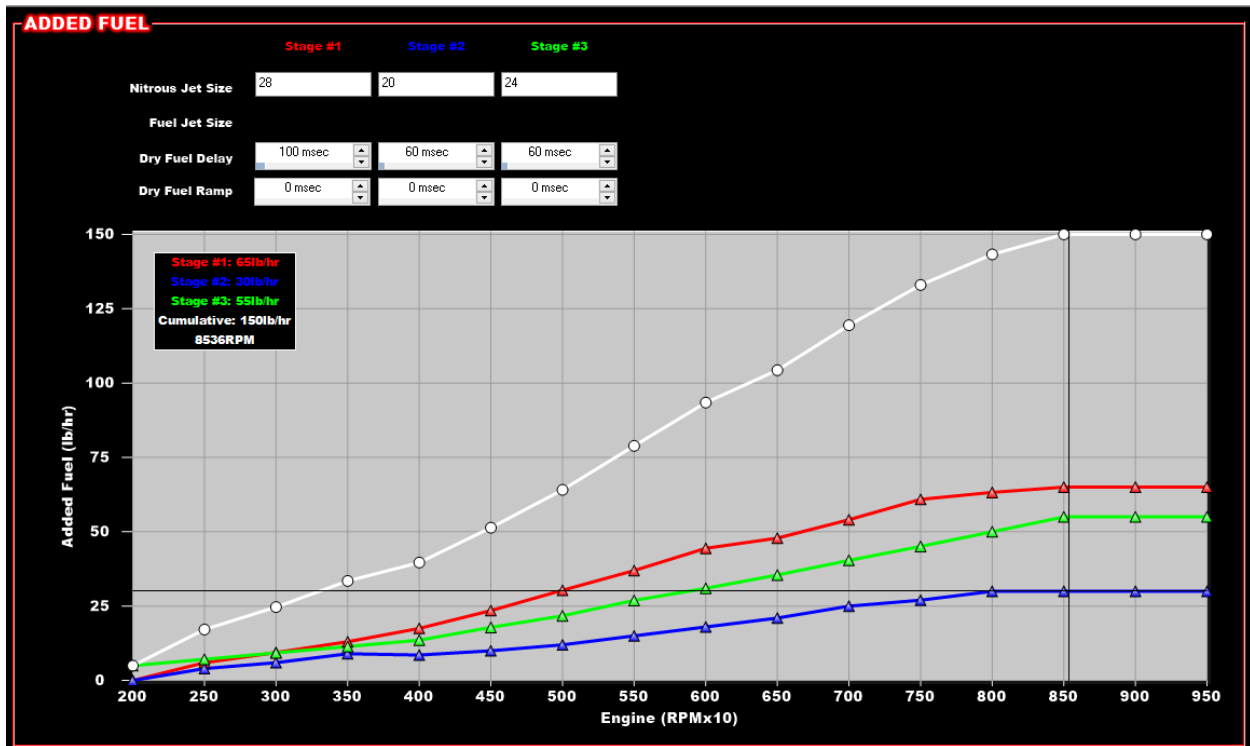
There is a summary screen for the timing retards (assuming they are time based and not fixed). The total timing retard is shown as a cumulative timing line. The retards for each stage can be edited on this graph. The retard "starts" at the stages "stage activation delay", the retard itself can't be move to a value before this.
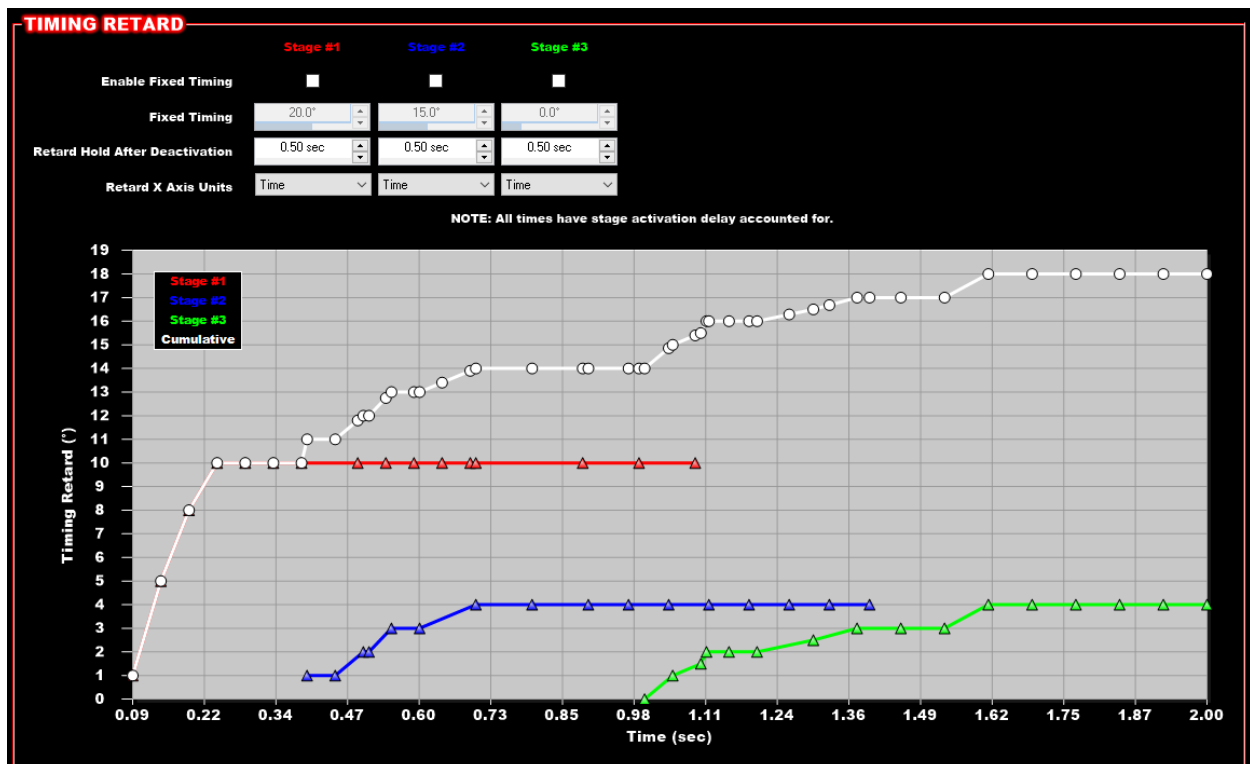
In the same manner progressive stages are shown on a summary screen. The start begins at the stages "stage activation delay", which can't be move to a value before this (modify the Stage Activation Delay).
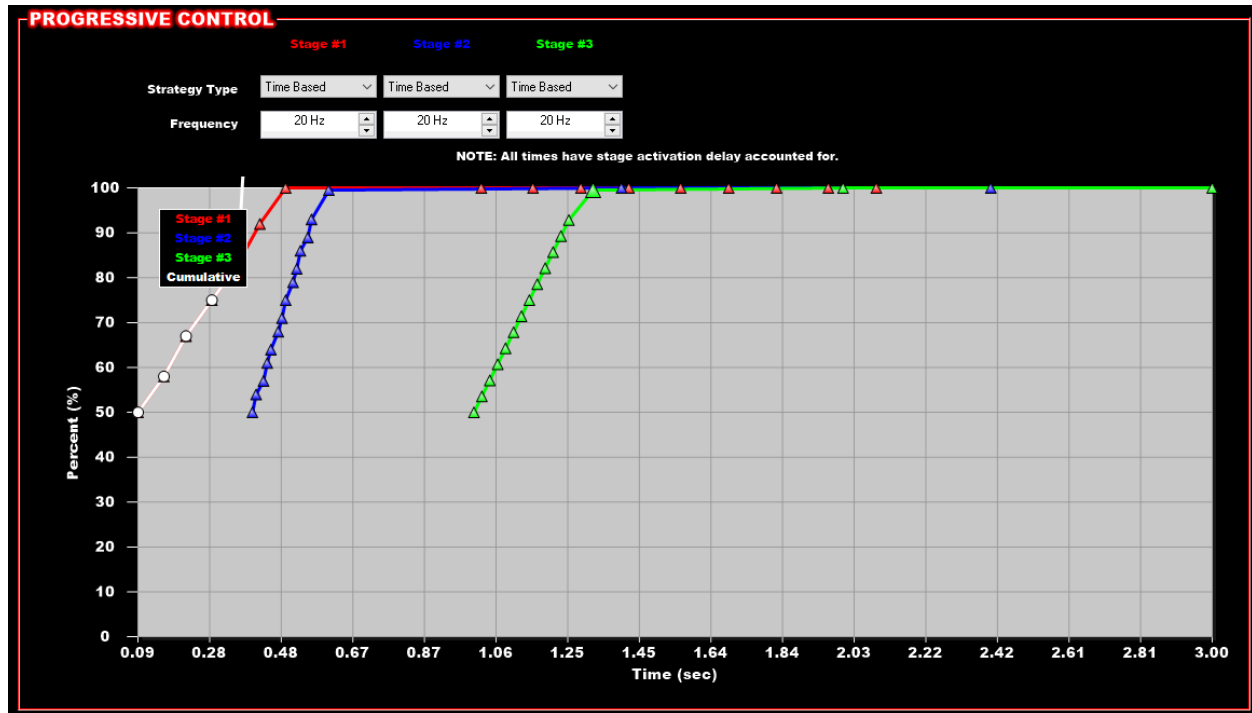
Advanced ICF Updates

There are three new additions to the "Table Type" dropdowns. These are:

- o Rev Limiter Main Offset
- o Rev Limiter #1 Offset
- o Rev Limiter #2 Offset

All three rev limiters can be adjusted using Advanced ICF tables. They can be increased or lowered. Their value affects the different types as follows using these examples:

Spark High Only:

Main Entry > 4000

Advanced Table Value > -1000

This would result in the main rev limiter being changed to 3000 RPM

All other types with two entry values. The single value entered in the Advanced ICF will affect and change BOTH values equally. Whatever the spread is of the two values will move as a pair. For example the following "Soft" settings:

Main Entry High RPM > 8000

Main Entry Low RPM > 7800

Advanced Table Value > -500

Results in the values of 7500 and 7300 for the High and Low Values.

There are many uses for this. It can be used to move the rev limiter to build boost quicker (both on the transbrake or from a roll). Can be used as a safety setup to activate if oil pressure is low for example. The use of a 1D or 2D table makes "rolling" rev limiter changes based on sensor/axis values in the table.

Rev Limiter Updates

There are firmware updates to the rev limiters to increase smoothness and decrease oscillation. This will primarily be seen on the "Spark, High Only". Other types may have small improvements. The higher the crank trigger tooth count, the smoother the rev limiter performance should be.

Drive-By-Wire Updates

Limits used to invoke an error for the pedal sensors were opened up from previous versions.

Traction Control Updates

There is a small nomenclature change. The "System Type" Dropdowns that previously read "Profiler" have been edited to "Profiler/TC3" to reflect proper use with Davis TC3 product.

Datalogging Updates

Downloading an internal datalog has two new options to download and open the last log file taken. The first comes up on the opening screen (see circled below). The second is a new dropdown in the "Datalog" tab called "Download and Open Most Recent Logfile". Both of these will download the last internal log taken and open it with one click.
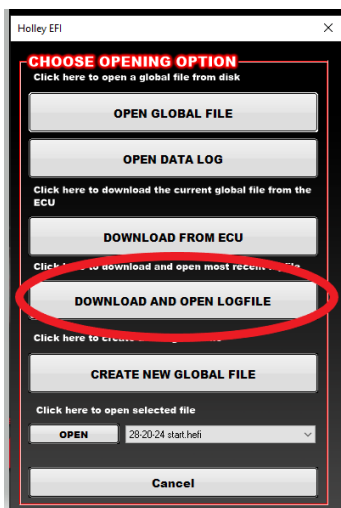
General Software

Issue resolved where "parts of the screen would turn black/blankM" and need to be redrawn.

In the System ICF "Staging" area a new calculation called "Individual Pulse Time" was added. This takes into account the Duty Cycle and Frequency/Pulses per Second.   This calculates individual bump pulse time when PWM'ing the output.
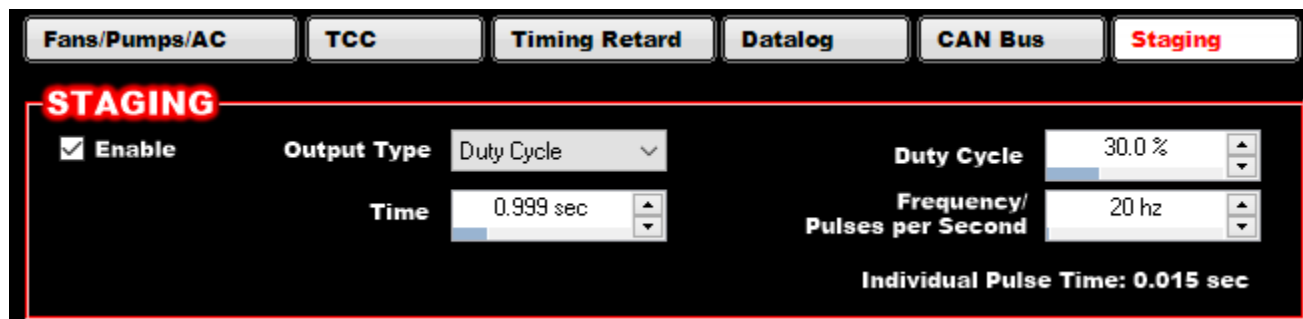
General Software/Firmware

Added capability to use "Single Pulse-Ignore Cam After Start" cam signal selection with the following crank types:

- LSx 58 Tooth
- LSx 24 Tooth
- 60-2
- Chrysler NGC 36-2+2
- 24-1

The following shows the latest allowable crank/cam combinations:

Crank	Single Pulse	Single Pulse Ignore	GM LSx 4x	Chrysler V8 NGC	Coyote Cam Locked	Coyote VVT	Not Used
	N = not allowed			Cam			
LSx 58 Tooth				N	N	N	
LSx 24 Tooth				N	N	N	
60-2					N	N	
1 pulse/fire						N	
36-1				N			
Chrysler NGC 36-2+2			N		N	N	
12-1				N	N	N	
24-1			N	N	N	N	
12 Tooth			N	N	N	N	
24 Tooth			N	N	N	N	
24-2			N	N	N	N	

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