



6L80/90E GM 6 Speed Transmission Control

558-499



Minimum Firmware and Software Versions	
Handheld Firmware	TermX.3.0.100.fwu
ECU Firmware	SNEFI_03001000.eep
Software	VERISON 3.0 BUILD: 100

General Overview:

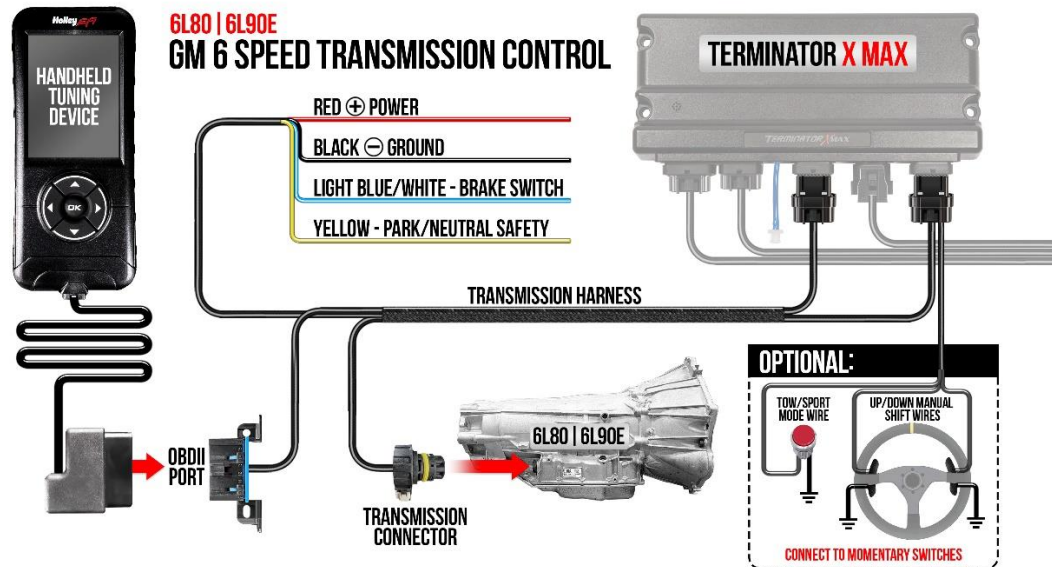
A departure from traditional Holley EFI transmission control, the Terminator X Max ECU allows the ability to use 2007+ GM 6L80e and 6L90E transmissions by communicating via CAN with the internal GM TCM (Transmission Control Module). Like in OE vehicle applications, the OBDII port located in the Holley 6L80/90E Transmission Harness is required for basic transmission tuning adjustments.

The supplied Holley EFI OBDII Transmission Tuning Handheld is used to adjust Shift Points, Tire Size, Gear Ratio, etc. The Terminator X V3 Software provides the ability to dial in Torque Management to optimize the desired shifting characteristics with your 6L80/90E Transmission. Terminator X V3 software also allows a user to control the Secondary Shift Mode within the Transmission TCM and allows use of Tap Up/Down Shifting.

The Terminator X Max ECU is required for GM 6L80/90E transmission control. If you currently have a Terminator X ECU, upgrading to a Terminator X Max ECU can be easily done by plugging your main harness into the Max ECU. When upgrading to a Terminator X Max ECU, remember to save your current calibration from your Terminator X ECU with the 3.5" TSLCD or with the PC software to re-upload into the Terminator X Max ECU.

Transmission Harness

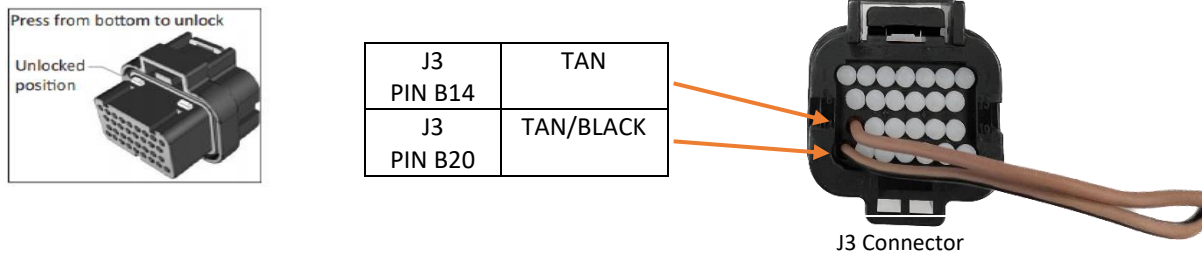
The Holley 6L80/90E Transmission harness consists of 4 main connectors.



Connectors

ECU Connector (J3) – Plugs into the Terminator X Max between the MAP Tube and Main Power connector.

NOTE: This J3 connector is also used for DBW (Drive-By-Wire) applications. If you are using a DBW throttle body, remove the two TCM CAN wires from the Transmission Harness J3 connector and install them in your existing DBW harness connector.



ECU Connector (J4) – Plugs into the last connector on the ECU, opposite the main engine harness.

Main Transmission Connector – Located on the passenger’s rear side of the transmission.

1. Orient the alignment slot on the connector with the alignment tab on the electrical connector passage sleeve on the transmission.
2. Slide the connector into the transmission side connector.
3. Rotate the connector lever clockwise until the connector is fully seated.
4. Lock the slide lock on the connector.

NOTE: Limit twisting or wiggling the connector during removal. Bent pins can occur.



OBDII Port – Used by the Holley OBDII Transmission Tuning Handheld or other OBDII scanners/programmers to connect to the 6L80/90E internal TCM. We recommend installing the OBDII port in an easily accessible area.



Loose Wires

Power (Red) – Supplies power to the transmission solenoids. This should be connected directly to the battery or a constant battery source capable of supplying 5 amps

Ground (Black) – Connect to a good chassis/engine ground source

Brake Switch (Light Blue/White) – Wired to the brake light switch. This must be installed to a +12v source (as most brake light switches are).

Park/Neutral Safety (Yellow) – Circuit for starter solenoid. When the transmission is in Park or Neutral, this Yellow Wire will be Grounded (-). When the transmission is in gear, this circuit will be open.


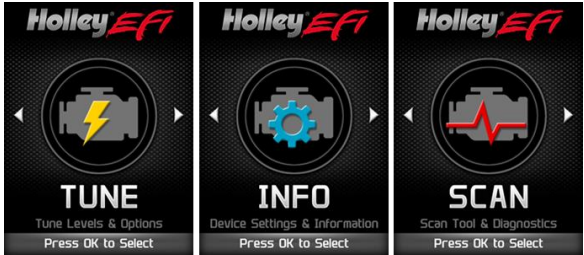

Setup of Transmission Control



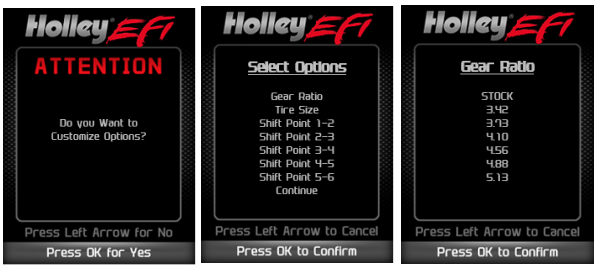



The TCM within the physical transmission will need to be programmed via the Holley EFI OBDII Transmission Tuning Handheld. This should be done after the Holley 6L80E/6L90E harness has been installed.

Holley EFI OBDII Transmission Tuning Handheld NAVIGATING TIPS:

- To move back to the previous menu, press the left arrow button.
- The Arrow buttons are used to select menu options, as well as adjust values for certain features.
- To move forward to the next menu, you can press either OK or follow the prompts given by the menu within the handheld.



STEP 1	Wire Transmission harness – making sure the Power and Ground connections are not interrupted at any time. Transmission TCM requires constant Battery Power.
STEP 2 	Plug in OBDII Tuning Device into the OBDII Port in the Holley 6L80E/6L90E Transmission Harness Splash Screen to the Left will Appear
STEP 3 	Three Options will Be Available: TUNE, INFO, SCAN - Select TUNE
STEP 4 	- Turn the Ignition On, - Press the OK button When Complete

<p>STEP 5</p>	 <p>The screen displays the Holley EFI logo at the top. Below it, the text reads 'Select Tuning' followed by two options: 'Performance' and 'Orig w/ Options'. At the bottom, it says 'Press Left Arrow to Cancel' and 'Press OK to Confirm'.</p>	<p>- Select Tuning</p> <p>'Performance' or 'Orig w/ Options'</p> <ul style="list-style-type: none"> • Performance: Modifies OEM tables within TCM and feels more crisp than OEM • Orig w/ Options: Utilizes OEM tables within TCM and drives like OEM <p>-Scroll to the desired option and press OK</p>
<p>STEP 6</p>	 <p>The screen displays the Holley EFI logo at the top. Below it, the text reads 'ATTENTION' in red. Underneath, it says 'Performance is Designed for Optimal Shifting.' At the bottom, it says 'Press Left Arrow to Cancel' and 'Press OK to Confirm'.</p>	<p>- Warning Screen:</p> <p>- Press OK to Continue</p>
<p>STEP 7</p>	 <p>Three screens are shown side-by-side. The first is an 'ATTENTION' screen asking 'Do you Want to Customize Options?' with 'Press Left Arrow for No' and 'Press OK for Yes' options. The second is a 'Select Options' screen listing 'Gear Ratio', 'Tire Size', 'Shift Point 1-2', 'Shift Point 2-3', 'Shift Point 3-4', 'Shift Point 4-5', 'Shift Point 5-6', and 'Continue', with 'Press Left Arrow to Cancel' and 'Press OK to Confirm' options. The third is a 'Gear Ratio' screen showing a list: 'STOCK 3.42', '3.43', '4.10', '4.56', '4.88', and '5.13', with 'Press Left Arrow to Cancel' and 'Press OK to Confirm' options.</p>	<p>Choose items to customize.</p> <ul style="list-style-type: none"> - Gear Ratio & Tire Size must be changed to match vehicle <p>- To continue, scroll down to 'Continue' and then press the OK button</p>
<p>STEP 8</p>	 <p>The screen displays the Holley EFI logo at the top. Below it, the text reads 'ATTENTION' in red. Underneath, it says 'Install the Performance File?'. At the bottom, it says 'Press Left Arrow for No' and 'Press OK for Yes'.</p>	<p>-Screen showing that tune for the TCM is being built will appear. Then the screen to the left will appear, confirming you want to load the file to the TCM.</p> <p>- Press OK to start the installation process.</p>
<p>STEP 9</p>	 <p>Two screens are shown side-by-side. The first is a 'TURN IGNITION OFF' screen with an image of a key and the text 'Press OK when Completed'. The second is an 'ATTENTION' screen that says 'Please Wait... This Could Take Up To One Minute'.</p>	<p>At this time, a series of screens will automatically flash the TCM with a calibration. Then, the handheld will ask for the Ignition to be turned off.</p> <ul style="list-style-type: none"> - Press OK <p>Do Not unplug the Handheld Device while the tune installation is finalizing within the TCM.</p> <p>Once tune Install is complete, the Handheld will notify you.</p>
<p>STEP 10</p>	 <p>The screen displays the Holley EFI logo at the top. Below it, the text reads 'Performance Tuning is Now Installed'. At the bottom, it says 'Press OK to Continue'.</p> <p>For New Installs: You are now ready to use the 3.5" TSLCD calibration wizard to create a tune for your engine and transmission combo. The wizard will set the Terminator X Max correctly to communicate with the TCM inside the 6L80E/6L90E Transmission.</p>	<p>The TCM Calibration has been installed.</p> <ul style="list-style-type: none"> - Press OK <p>For Existing installs: You are now ready to use the Terminator X V3 PC software to configure the Terminator X Max ECU to communicate with the TCM inside the 6L80E/6L90E Transmission.</p>

Holley OBDII Transmission Tuning Handheld Functions	Terminator X V3 Software Tuning Functions
<ul style="list-style-type: none"> Shift Point MPH/RPM <ul style="list-style-type: none"> 1-2 2-3 3-4 4-5 5-6 Axle Gear Ratio (<i>Must be updated in Transmission Tuning Handheld & V3 Software</i>) Tire Size (<i>Must be updated in Handheld & V3 Software</i>) Performance Optimized Transmission Tuning Read / Clear TCM Diagnostic Trouble Codes View TCM Operating System (OS) # Transmission Relearn 	<ul style="list-style-type: none"> Virtual Torque Virtual TPS% Torque Management Tap Shift Inputs Shift Mode Input Speedometer Output Axle Gear Ratio (<i>Must be updated in Handheld & V3 Software</i>) Tire Size (<i>Must be updated in Handheld & V3 Software</i>)

Terminator X V3 Software:

Transmission ICF



If the Transmission ICF icon is not shown in the tool bar:

- Go to "Toolbox" **Toolbox** ▾.
- Select "Add Individual Config".
- Select the "Transmission" folder.
- Double-click "Default Trans.transmission" to add the Transmission ICF to the tool bar.

Transmission Setup

Transmission Setup

Transmission Type (GM 6L80/90E) – After selecting GM 6L80/90E from the drop-down, CAN Bus 2 Type will automatically change to *GM 6L80*, allowing communication to the TCM. By default, the Terminator X fuel flow parameter from engine operation is used to calculate a real time *Virtual Torque* (ft/lb) value.

Speed Calculation

NOTE: Gear Ratio and Tire Size MUST ALSO be selected in the Holley EFI OBDII Transmission Tuning Handheld; otherwise shifting calculations will be incorrect or vehicle speed will not be properly calculated. Remember, these values should match between the Terminator X Software, and the TCM Handheld. The Terminator X Software tire size and gear ratio is only used for the Speed calculation, not transmission shifting.

TRANSMISSION

Transmission Type GM 6L80/90E ▾

Manual/Tap Shift Enable Secondary Shift Mode Enabled

The secondary shift mode's functionality is defined by the transmission's internal ECU. This input allows you to turn that predefined functionality on and off. Typical modes will either be "Tow/Haul" or "Sport Mode"

SPEED CALCULATION

Speedometer Output Enable 4000 ppmile ▾

Tire Diameter 27.7 inch ▾ **Tire Diameter and Rear Gear Ratio must be set the same as the Holley OBDII Transmission Tuning Handheld for speed calculation to be accurate.**

Rear Gear Ratio 4.10 ▾

Speedometer Output Enable - Provides a PWM- output to drive an electronic speedometer at the required pulses per mile.

Tire Diameter - Measure and enter the real tire diameter (inches).

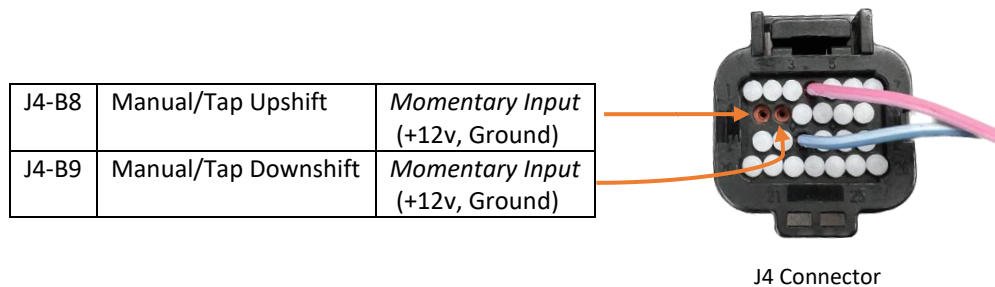
Holley EFI OBDII Transmission Tuning Handheld must also be updated whenever Tire Diameter is changed.

Gear Ratio - Enter the rear axle gear ratio :1.

Holley EFI OBDII Transmission Tuning Handheld must also be updated whenever rear axle Gear Ratio is changed.

Once the Transmission TCM has been tuned via the Holley OBDII Transmission Tuning Handheld & the Terminator X has been programmed in the Trans ICF to GM 6L80/90E and the gear ratio & tire diameters are correct. The vehicle is ready to be driven. **The following information is optional and not required for most applications. Before enabling or tuning the below options or tables, ensure you have an in-depth understanding of how each system operates.**

Manual/Tap Shift Enable (check box) This will enable two specified pins in the J4 connector for momentary button inputs. +12v or Ground input type can be selected in the Inputs/Outputs Inputs/Outputs page of the Transmission ICF. The Tap up/down switches are being used to request an increase or decrease in the transmission gear.



Overview: When a momentary input signal (usually a button) is received by the Terminator X Max ECU, a CAN message is sent to the TCM requesting a Gear Increment or Decrement. This provides the ability to "manually shift" the transmission over CAN in a similar manner as an OE vehicle application.

NOTE: Depending on the TCM Operating System (i.e., the model of vehicle the transmission originated from) the exact functionality may slightly differ from transmission to transmission, for example:

In most truck applications in the D6 shifter range position mode, the transmission will ignore the Tap Up/Tap Down buttons, until the shifter is moved below the D6 range. Many truck TCM OS (Operating Systems) the TU/TD buttons are to select the highest gear the transmission is allowed to shift up to and the transmission will still auto upshift and downshift. In many car applications in D6 range, the TU/TD buttons act similar to the truck TU/TD. Below the D6 range in many cars, the TU/TD buttons act similar to a more traditional manual paddle shifters where the transmission will attempt to stay in the gear the driver has requesting.

Secondary Shift Mode Enable (check box) This enables a specified pin in the J4 connector for momentary button input. +12v or Ground input type can be selected in the Inputs/Outputs of the Transmission ICF within the Terminator X V3 Software.



"Secondary Shift Mode" is used to cover multiple OE terms such as Sport Mode, Tow/Haul Mode, etc.

Overview: Provides the ability for the transmission to enter a "Secondary Shift Mode" via a (+12v or Ground) input to the Terminator X Max ECU. This "Secondary Shift Mode" will be dependent on the calibration within the TCM. This could be Sport Mode or Tow/Haul mode depending on what the transmission originally came out of.

There are 20+ different T43 TCM OS versions varying over many years and OE vehicle models, many of which require different CAN messages to enable this Second Shift Mode commonly know as Sport Mode or Tow/Haul Mode.

Because of the large number of TCM OS's variations, not all transmission OS's have been tested for functionality. User discretion is advised if using a Second Shift Mode. The TCM may not respond to the input or may cause a 'limp mode' that will require the TCM Codes to be cleared via the Holley EFI OBDII Transmission Tuning Handheld.

Torque Management

Torque Management

Torque Management – Allows Torque Reduction via Timing Offset or DBW Offsets Based on TCM Requested Torque vs. ECU Virtual Torque. 16x16 Table.

Enable TCM Requested Torque Reduction – Master enable for Torque Management.

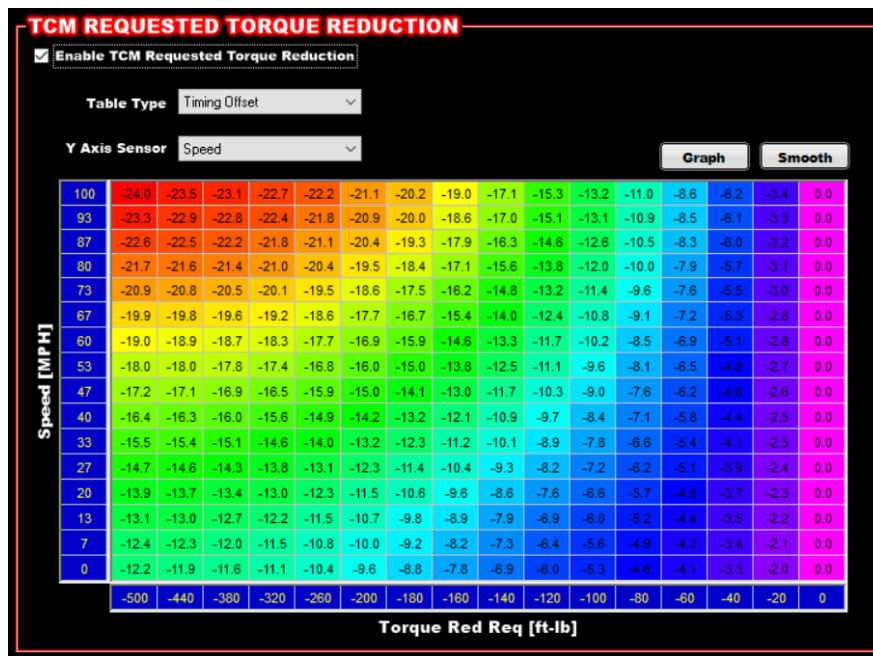
Torque Reduction Request – The delta between the TCM requested torque value and the ECU Virtual Torque value.

Functionality Overview: The 6 speed transmission in OE applications rely heavily on torque reduction to control shift feel. Generalizing much of the OE functionality, the TCM sends a 'requested torque' value to the ECU. The ECU attempts to reduce engine power via timing control or throttle control. These Torque requests are used for Upshifts, Downshifts, TCC events, etc.

X-Axis Torque Red Req (ft-lb) – TCM Torque Reduction Request. This axis is re-scalable if desired, range (-999.0 to 0.0 ft-lb)

Y-Axis Sensor – By default, Speed is selected from 0 to 100mph as it satisfies the widest range of vehicles and shifting conditions. If desired, the Y-axis sensor can be changed to fit your needs. For example, in many applications with DBW, using Pedal Position % in the Y-axis works well.

Advanced Tuning – Tuning of the Torque management is subjective. If the shifts feel overly aggressive or RPM flairs then drops on power down shifts, numerically decreasing the Timing/DBW Offset will lower the engines output during Torque Management events. If it feels like the vehicle is hesitating or momentarily decelerating during a shift, numerically increasing the offsets will increase the engine's output during these events.



NOTE: If using Timing Offset Table Type, it is recommended that you check the **Minimum Timing Limit** in the System Parameters ICF, Ignition Parameters tab is set to a reasonable value. While late model engines (Coil on Plug) typically tolerate a minimum of -10.0 degrees, engines equipped with a distributor will need a value that prevents spark jumping to the wrong terminal in the cap.

Torque Red Req (Advanced IFC Axis Type) – If desired, the Torque Reduction Request (ft-lb) value can be used as an Advanced Table X or Y Axis type. This allows the ability to create your own strategies for Torque Management or use multiple strategies, like in the case of many OE vehicle applications where both a Timing Offset and DBW offset are used.

Virtual TPS

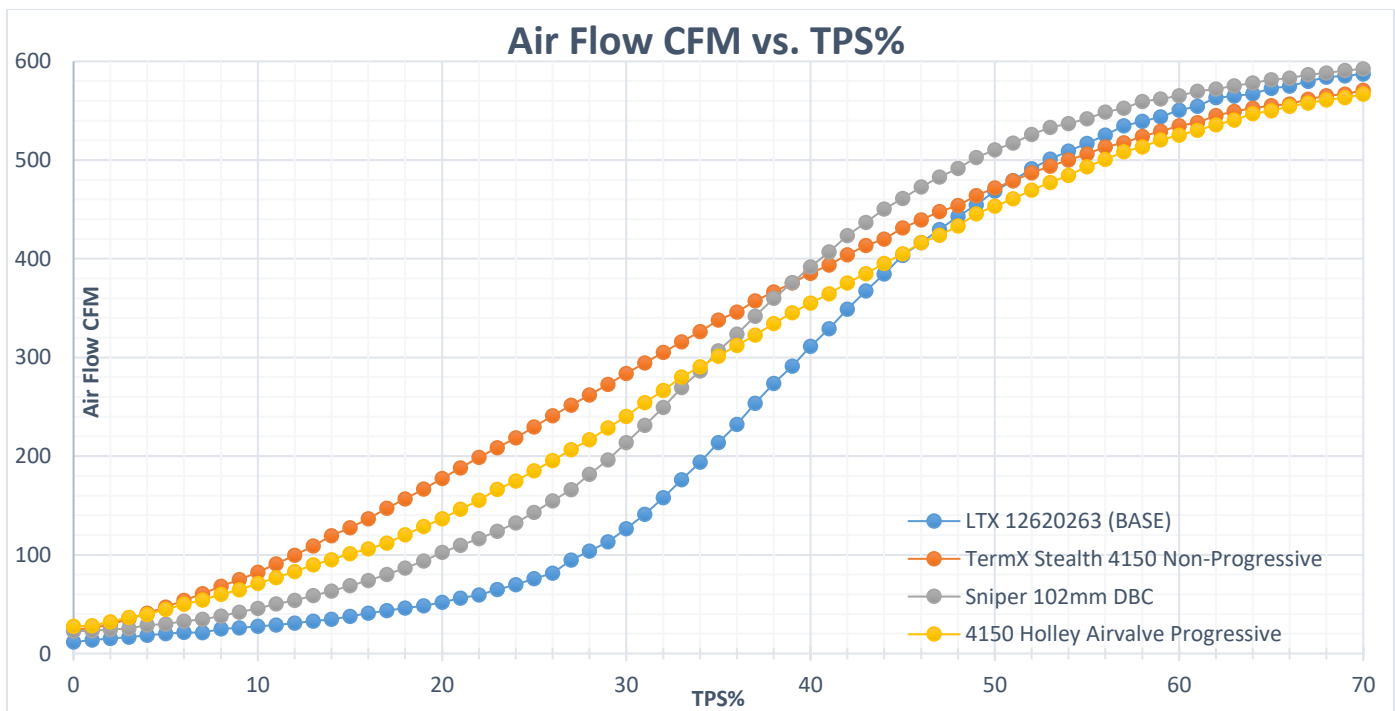
Virtual TPS

Virtual TPS – Virtual TPS(%) is the Throttle Position parameter the TCM uses in its shifting calculations. This Virtual TPS parameter is a 'correction' for the differences in TPS% vs. Air Flow from OE vehicle Throttle Bodies and Aftermarket Throttle Bodies.

Throttle Body Type – Select the Throttle Body Type that most closely describes the one installed on your engine. The table will auto-populate based on your selection.

Functionality Overview: While shift feel (pressure & time) is largely based on the Virtual Torque, partial throttle Shift Speed (mph) is based primarily around TPS%.

Different throttle bodies have differing airflows at the same TPS%. The issue we run into is the TCM shift point calibrations are programmed around OE DBW (Drive-By-Wire) engines that generally have a higher TPS% to Airflow ratio. In vehicles with large DBC (Drive-By-Cable)/4150 TBs, this causes the shift points to happen much sooner than desired due to the greater airflow and acceleration of the engine at the same TPS% compared to OE applications.



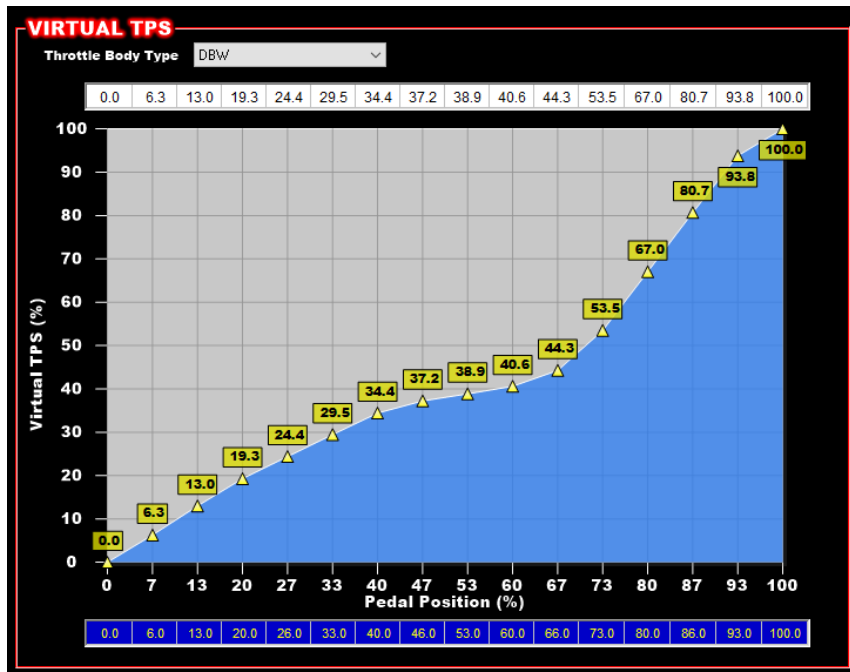
For example, given the same vehicle acceleration rate (or mass airflow) with a typical DBW TB the TPS% will be 30-40%; while a 4150 TB will be 5-15%. Large aftermarket DBW/DBC mono-blades may respond similar to 4150 throttle bodies. This difference can cause a major change in the shift points. In the example above, this can be as much as 10-20mph at low throttle positions.

X-Axis TPS(%) – The actual TPS% from the Terminator X Max ECU.

Y-Axis Virtual TPS(%) – Virtual TPS% is the value the TCM uses for shifting calculations. It is recommended the 0% and 100% TPS table cells remain at 0% and 100% respectively.

Advanced Tuning – The Holley OBDII Transmission Tuning Handheld should be used for your main shift point adjustments. However, Partial Throttle Shift Points can be tweaked by adjusting this table. While each case may vary, in general, raising the Virtual TPS% will increase Shift MPH and lowering will decrease. These adjustments are most useful in light acceleration conditions below 50% TPS. Shift points and feel are subjective and may vary based on personal preference.

Setting a Virtual TPS to a linear line from 0-100% as a starting point and logging acceleration at certain TPS%, then changing the Virtual TPS% and logging at the same TPS% as before can help you understand the role this table plays and how you can use it to dial in your Partial Throttle Shifting.



Virtual TPS Offset (Advanced IFC Table Type) – If desired, a 1D advanced table can be used to create an offset of the Virtual TPS based on an input to the ECU.

Virtual Torque

Virtual Torque

Virtual Torque – Virtual Torque is the Torque value from the Terminator X Max ECU to the TCM. The TCM uses this Virtual Torque value to determine shift characteristics.

By default, the Terminator X fuel flow parameter from engine operation is used to calculate a real time *Virtual Torque* (ft/lb) value. The single parameters listed below can be adjusted to change the characteristics of the shifts easily. For more advanced control, use the tables named the “Custom Virtual Torque Modifier” & “Virtual Torque Table”.

Virtual Torque Offset – The value in this box will offset the Virtual Torque to the TCM by said amount (+/-).
Default: (0.0 ft/lb).

Tuning Tip: If shifts are felt to be too soft or slipping under low partial throttle positions, start by adding 5 ft/lb until shift firmness is to your liking. To soften firm shifts, input a negative value, starting at -5 ft/lb.

Virtual Torque Multiplier – The % input by the user in this box will multiply the Virtual Torque to the TCM by said amount (+/-). 0%, the neutral value does not modify Virtual Torque. A positive value increases Virtual Torque, and negative decreases Virtual Torque.
Default: (0.0 %)

Closed Throttle Braking Virtual Torque Offset – When TPS is below 10% (*Pedal Position for DBW*) and the Brake Pedal is applied, this value will be added to VT. This purpose of this offset is to lower the Virtual Torque to near 0 ft/lb, in turn reducing harshness when transitioning between forward/reverse and allow proper downshifting under braking.
Default: (-65.0 ft/lb)

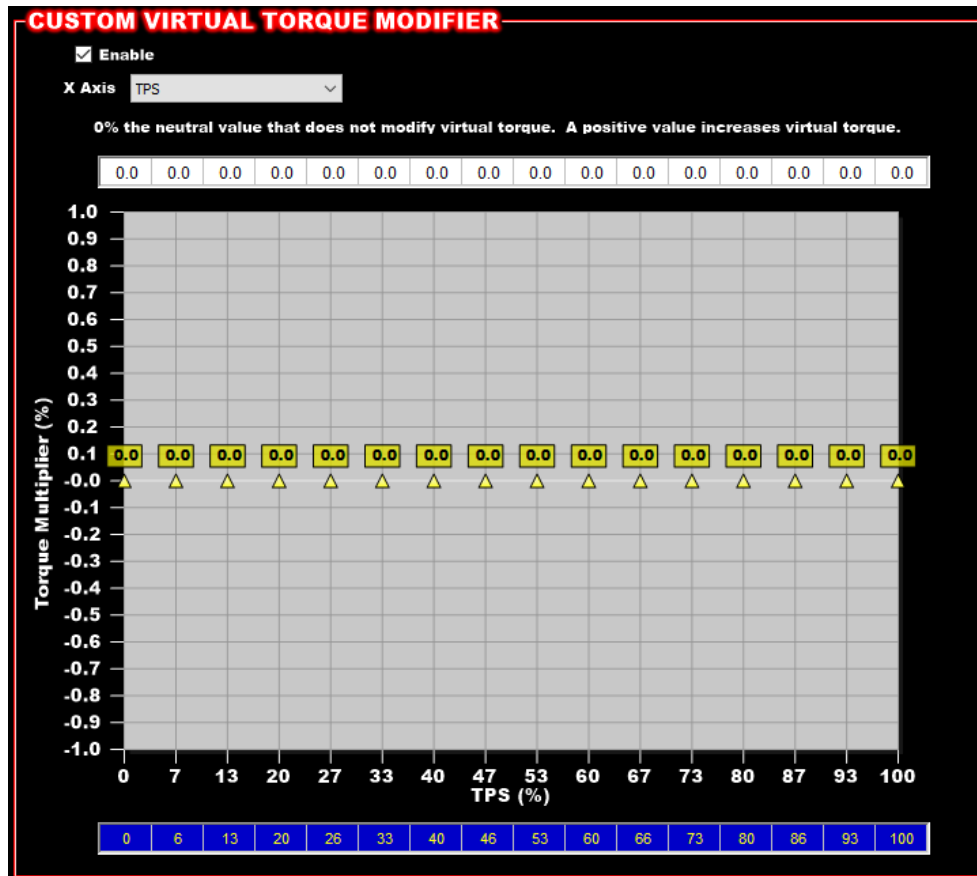
Tuning Tip: With the vehicle at operating temperature, idling in Drive with the Brake Pedal depressed, adjust this value until The Virtual Torque in the data monitor reads 0 to 20 ft/lb.

A/C Kick Virtual Torque Loss Offset – When A/C Kick Input is active, this value will be added to the Virtual Torque to offset the torque absorbed by the A/C Compressor.
Default: (8.0 ft/lb)

VIRTUAL TORQUE	
Virtual Torque Offset	0.0 ft-lb
Virtual Torque Multiplier	0 %
Closed Throttle Braking Virtual Torque Offset	-65.0 ft-lb
A/C Kick Virtual Torque Loss Offset	8.0 ft-lb

Custom Virtual Torque Modifier – 1x16 Table; The % input by the user in this box will multiply the VT to the TCM by said amount (+/-). 0%, the neutral value does not modify Virtual Torque. A positive value increases Virtual Torque, negative decreases Virtual Torque.

Tuning Tip: 1x16 Table X Axis can be configured to modify the Virtual Torque value, similar to Virtual Torque Multiplier above, but varying over the X Axis. For example, this can be used to adjust shift characteristics under specific TPS%, or BoostPSIG to avoid slippage under boost conditions.



Virtual Torque Table – When the **Virtual Torque Table** is Enabled, the ft/lb value in the table will be used as the Virtual Torque value, instead of being calculated in real-time based on current fuel flow. Using this table removes variables, such as fuel correction or temperature enrichment from the Virtual Torque.

Range: (-999, 999) ft/lb

Calculate From Base Fuel Table – Pressing the Calculate From Base Fuel Table button above the Virtual Torque Table will auto populate the axis's and table based off of your Base Fuel table from the FUEL ICF. This works as a great starting point for the Virtual Torque Table. **NOTE: Fuel Learn Table Values are not referenced in this auto populate calculation.**

X Axis – Matches Base Fuel Axis, MAP, by default. User configurable for other axis types such as Grams/Cyl.

Y Axis – Matches Base Fuel Axis, RPM, by default. User configurable.

Advanced Tuning – Shifting characteristics at differing engine loads and speeds can be adjusted in the corresponding areas of the table. For example, if greater engine braking is desired under deceleration, inputting negative values in said areas generally will cause the transmission to downshift more-aggressively. Or in forced induction application, values in positive Manifold Pressure areas can be increased for firmer shifts or to avoid slipping.

If your transmission has been previously tuned and you have a graph of Trans Engine Torque, the axis and values in the table can be directly input into this table.

VIRTUAL TORQUE TABLE																
<input checked="" type="checkbox"/> Enable	X Axis RPM							Y Axis MAP								
Graph	Calculate From Base Fuel Table													Smooth		
240	895.4	901.9	910.3	927.5	970.7	999.0	999.0	999.0	999.0	999.0	999.0	998.0	954.5	920.5	908.8	
208	761.0	766.0	772.9	788.7	823.5	856.0	876.0	884.2	892.8	896.5	890.6	872.3	844.5	807.5	779.4	769.9
184	660.3	664.5	670.6	684.2	713.5	741.2	762.6	772.6	781.2	785.4	779.4	761.4	735.0	701.9	677.9	670.2
160	569.4	573.2	578.6	590.6	615.4	638.8	656.7	665.8	673.4	676.6	671.5	655.5	632.5	604.2	583.6	576.9
136	478.2	481.5	486.1	496.3	517.1	536.0	550.4	557.6	563.4	567.1	563.4	550.4	532.0	509.2	492.0	486.1
112	373.5	375.7	379.0	386.5	400.8	413.4	422.1	430.1	438.4	442.3	440.0	430.7	417.0	400.4	387.7	383.2
95	281.8	283.1	285.1	290.4	298.7	306.5	313.7	326.5	339.6	343.7	342.7	335.5	325.2	313.5	304.4	301.0
85	232.7	233.6	235.1	239.0	244.6	250.3	256.9	269.2	281.5	285.8	285.8	279.9	271.3	262.0	254.8	252.1
75	196.8	197.4	198.5	201.6	205.9	210.4	216.1	223.5	231.0	235.2	235.4	230.3	223.1	215.7	210.1	207.9
65	165.1	165.5	166.6	169.3	172.7	175.9	179.9	184.8	190.2	194.3	194.8	190.7	184.8	178.8	174.2	172.4
55	128.3	129.4	132.0	136.0	140.3	144.3	147.0	150.0	154.2	157.8	158.7	155.6	151.0	146.2	142.4	141.0
45	91.8	94.2	98.2	103.5	109.6	113.6	115.1	116.6	119.3	121.9	122.8	120.9	117.7	114.2	111.4	110.3
35	60.3	63.1	67.1	71.9	78.0	82.0	83.5	84.0	85.2	86.4	87.0	86.0	84.1	82.1	80.1	79.2
25	37.8	39.6	42.4	45.5	49.8	52.8	53.8	53.6	53.8	54.3	54.5	53.9	53.0	51.9	50.7	50.1
15	-24.4	-23.4	-22.1	-20.5	-18.6	-17.2	-16.8	-16.7	-16.5	-16.3	-16.2	-16.6	-17.1	-17.6	-18.1	-18.3
5	-38.3	-38.1	-37.7	-37.3	-36.7	-36.4	-36.2	-36.1	-36.0	-35.9	-35.9	-36.1	-36.2	-36.4	-36.5	-36.5
	500	700	900	1200	1600	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000

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