



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:

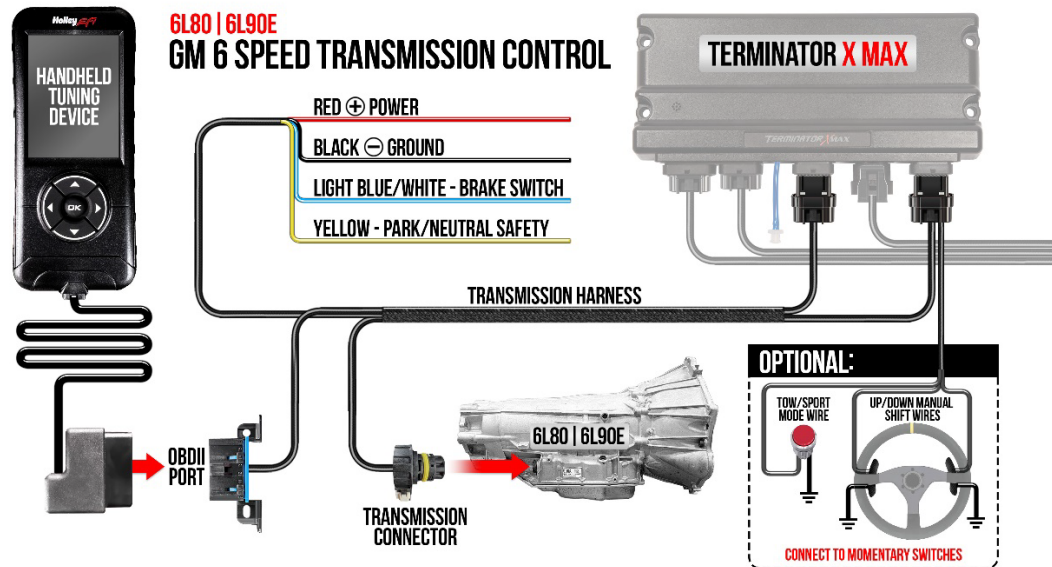
A departure from traditional Holley EFI transmission control, the Terminator X Max ECU allows the ability to use 2007+ GM 6L80e and 6L90E transmissions by communicating via CAN with the internal GM TCM (Transmission Control Module). Like in OE vehicle applications, the OBDII port located in the Holley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

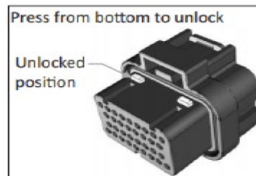
The Holley 6L80/90E Transmission harness consists of 4 main connectors.



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.



J3 PIN B14	ORANGE
J3 PIN B20	ORANGE/BLACK



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

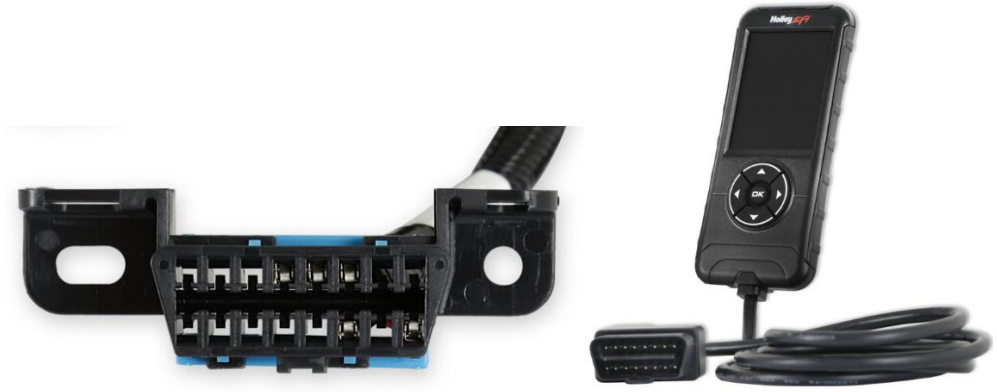
Main Transmission Connector – Located on the passenger's rear side of the transmission.

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.



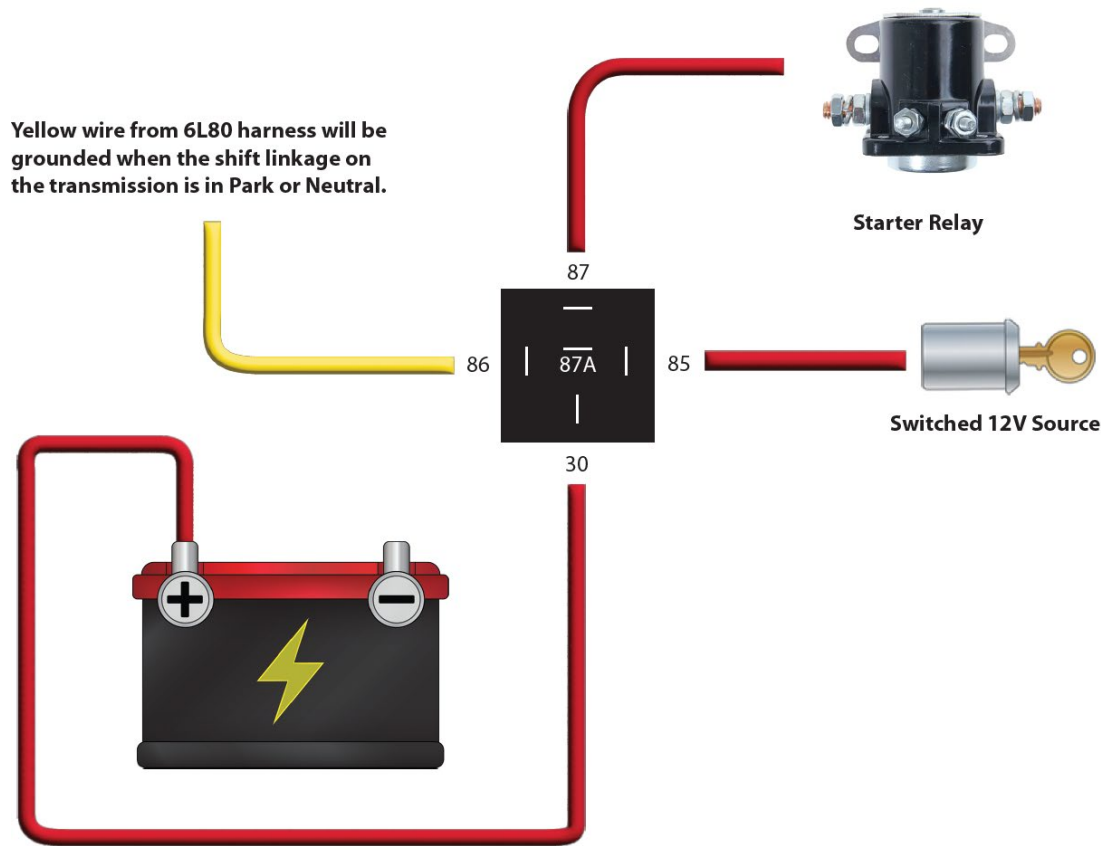
Loose Wires

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 (This wire must see +12V when brakes are applied).

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.




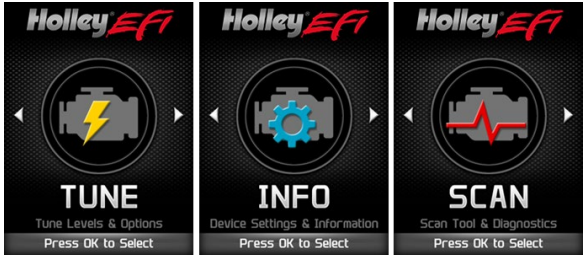

Setup of Transmission Control



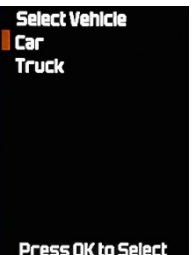


The TCM within the physical transmission will need to be programmed via the Holley EFI OBDII Transmission Tuning Handheld. This should be done after the Holley 6L80E/6L90E harness has been installed.




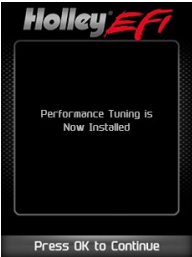
Holley EFI OBDII Transmission Tuning Handheld NAVIGATING TIPS:

- 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>-Press the OK Button</p>
<p>STEP 6</p>		<p>- Select Transmission Type</p> <p>6L80E or 6L90E</p> <p>NOTE: A 4 digit designation tag on the transmission can be used to help determine if you have a 6L80E or a 6L90E</p> <ul style="list-style-type: none"> • 6L80E: 2nd digit will be a “C” • 6L90E: 2nd digit will be a “D” <p>-Scroll to the desired option and press OK</p>
<p>STEP 7</p>		<p>- Select between a Car or Truck application</p> <p>NOTE: Optional Secondary Shift Mode will be dictated by this selection.</p> <ul style="list-style-type: none"> • Car: Sport Mode • Truck: Tow Haul Mode <p>-Scroll to the desired option and press OK</p>
<p>STEP 8</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 9</p>		<p>- Warning Screen:</p> <p>- Press OK to Continue</p>

<p>STEP 10</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 11</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 12</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 13</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 (Must be updated in Transmission Tuning Handheld & V3 Software) • Tire Size (Must be updated in Handheld & V3 Software) • 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 (Must be updated in Handheld & V3 Software) • Tire Size (Must be updated in Handheld & V3 Software)

Terminator X V3 Software:

Transmission ICF



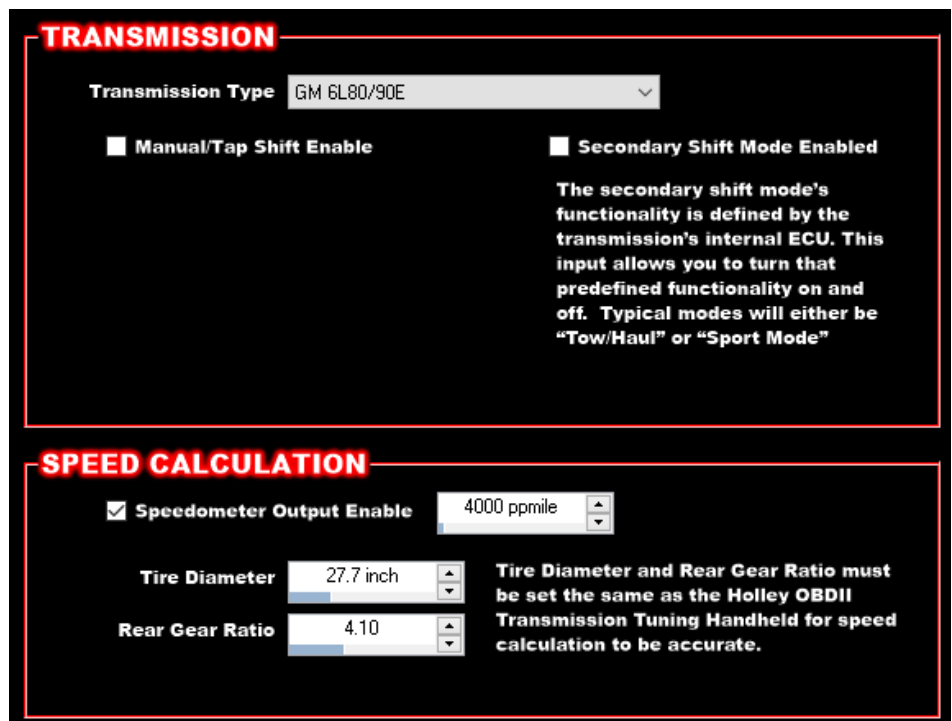
If the Transmission ICF icon is not shown in the tool bar:

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

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.

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.

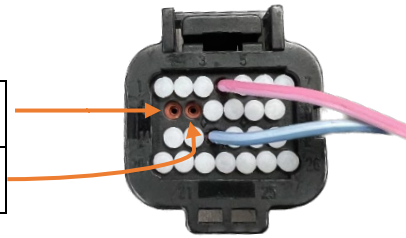
Gear Ratio - Enter the rear axle gear ratio :1.

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 page of the Transmission ICF. The Tap up/down switches are being used to request an increase or decrease in the transmission gear.

J4-B8	Manual/Tap Upshift	Momentary Input (+12v, Ground)
J4-B9	Manual/Tap Downshift	Momentary Input (+12v, Ground)



J4 Connector

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 selection of Car or Truck in the Holley OBDII Transmission Tuning Handheld and the TCM Operating System Installed within the TCM the exact functionality may slightly differ from transmission to transmission, for example:

In 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. 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 Car applications in D6 range, the TU/TD buttons act similar to the truck TU/TD. Below the D6 range in Cars applications, 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 requested.

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.

J4-B22	2nd Shift Mode	Momentary Input (+12v, Ground)
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J4 Connector

"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.

NOTE: Depending on the selection of Car or Truck in the Holley OBDII Transmission Tuning Handheld and the TCM Operating System Installed within the TCM the exact functionality may slightly differ from transmission to transmission.

Car Selection will provide "Sport Mode" & Truck Selection will provide "Tow/Haul Mode"

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.

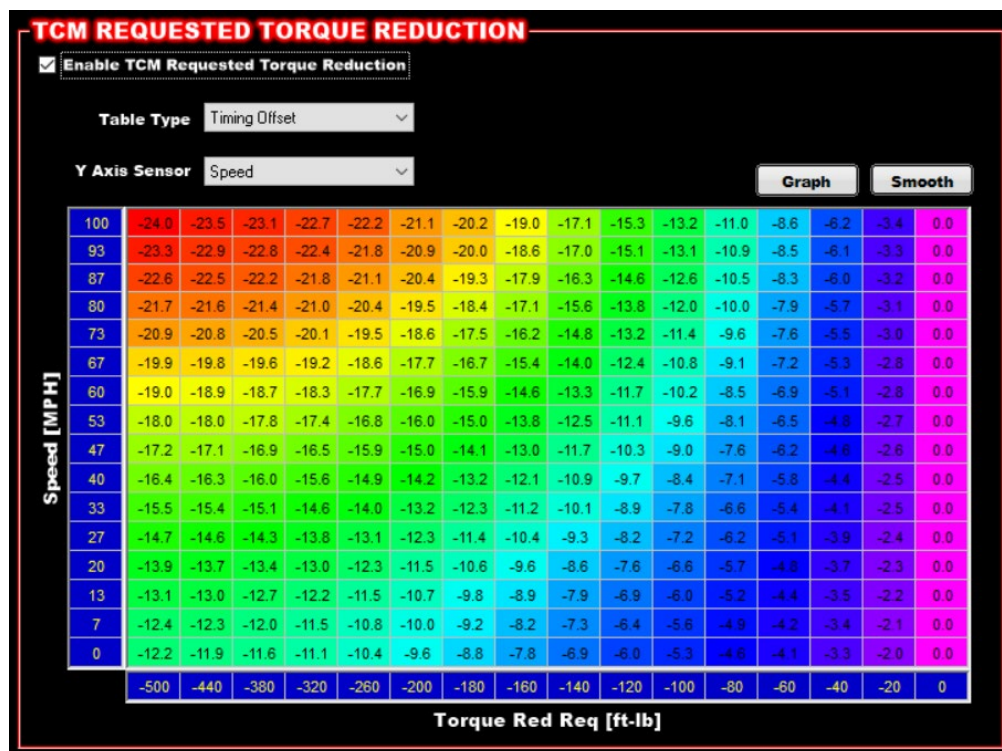
Torque Reduction Request – The delta between the TCM requested torque value and the ECU Virtual Torque value.

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

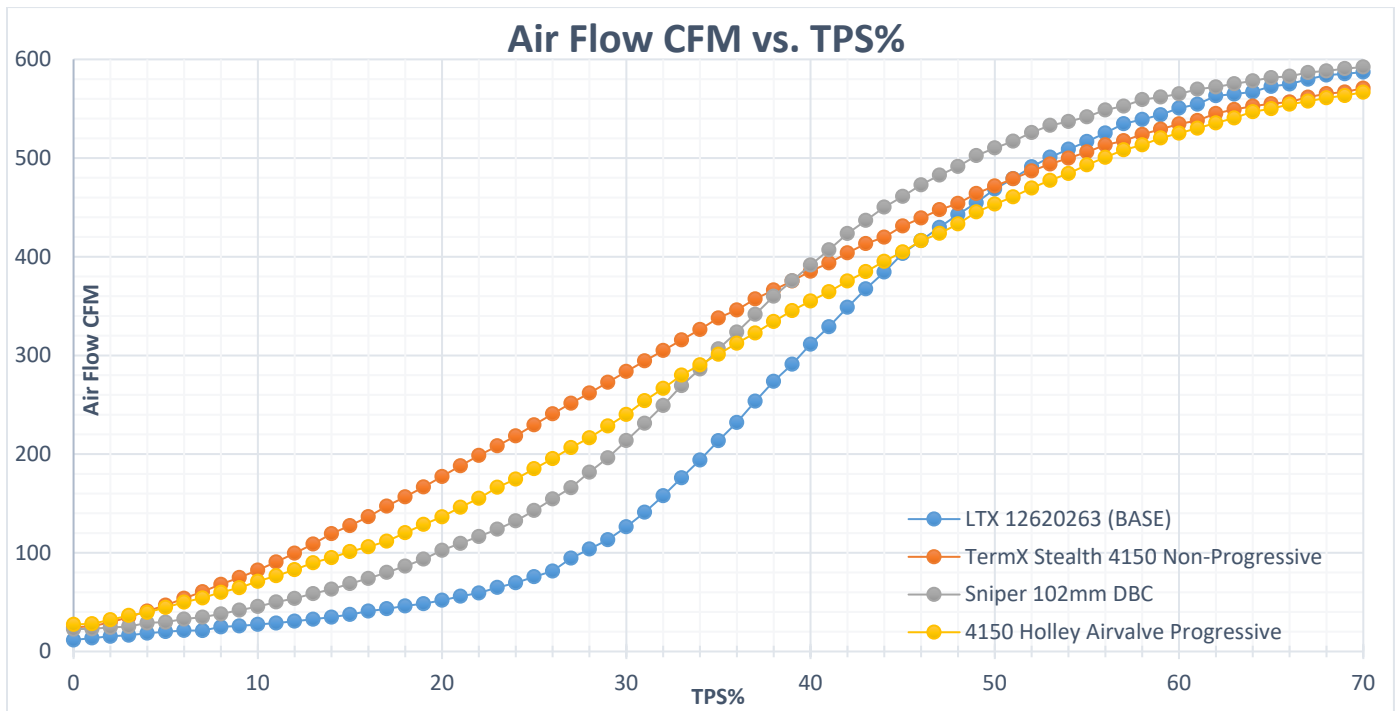
Virtual TPS

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.



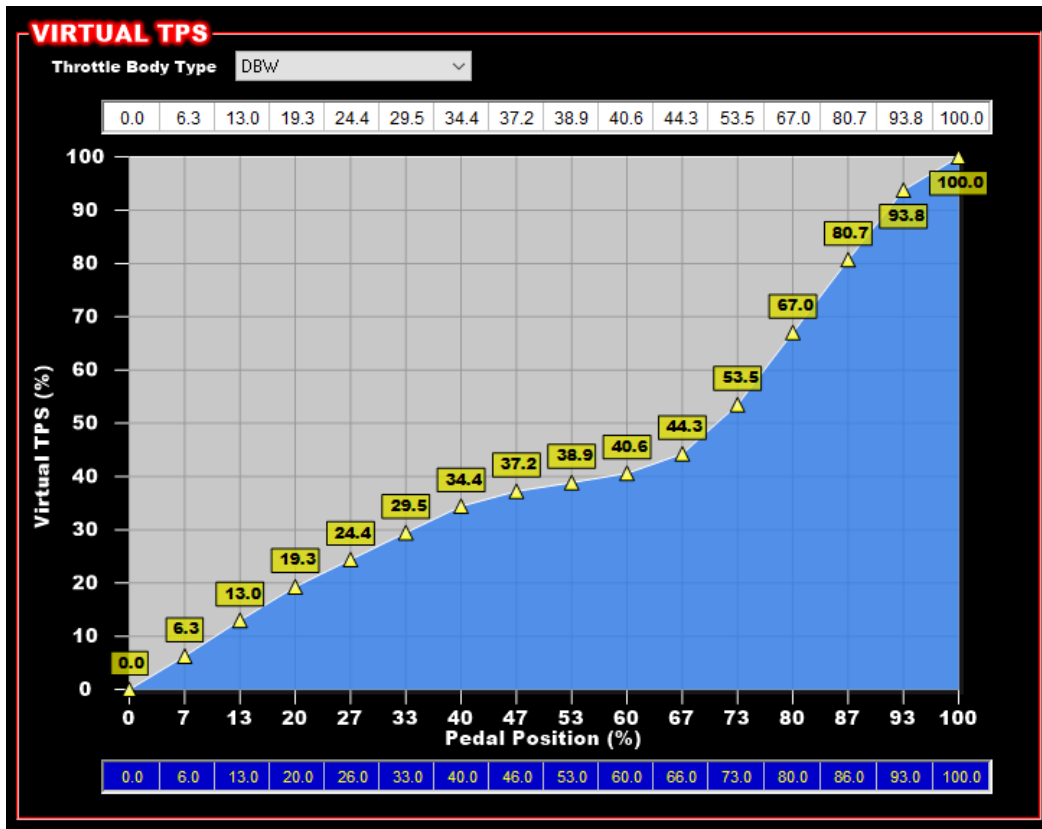
For example, given the same vehicle acceleration rate (or mass airflow) with a typical DBW TB the TPS% will be 30-40%; while a 4150 TB will be 5-15%. Large aftermarket DBW/DBC mono-blades may respond similar to 4150 throttle bodies. This difference can cause a major change in the shift points. In the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

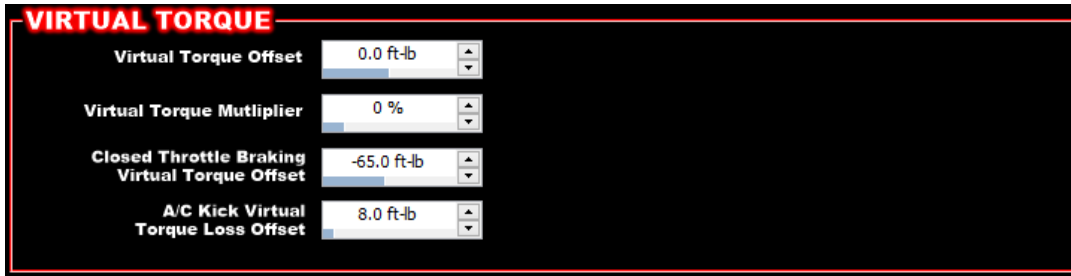
Closed Throttle Braking Virtual Torque Offset – When TPS is below 10% (*Pedal Position for DBW*) and the Brake Pedal is applied, this value will be added to VT. This purpose of this offset is to lower the Virtual Torque to near 0 ft/lb, in turn reducing harshness when transitioning between forward/reverse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

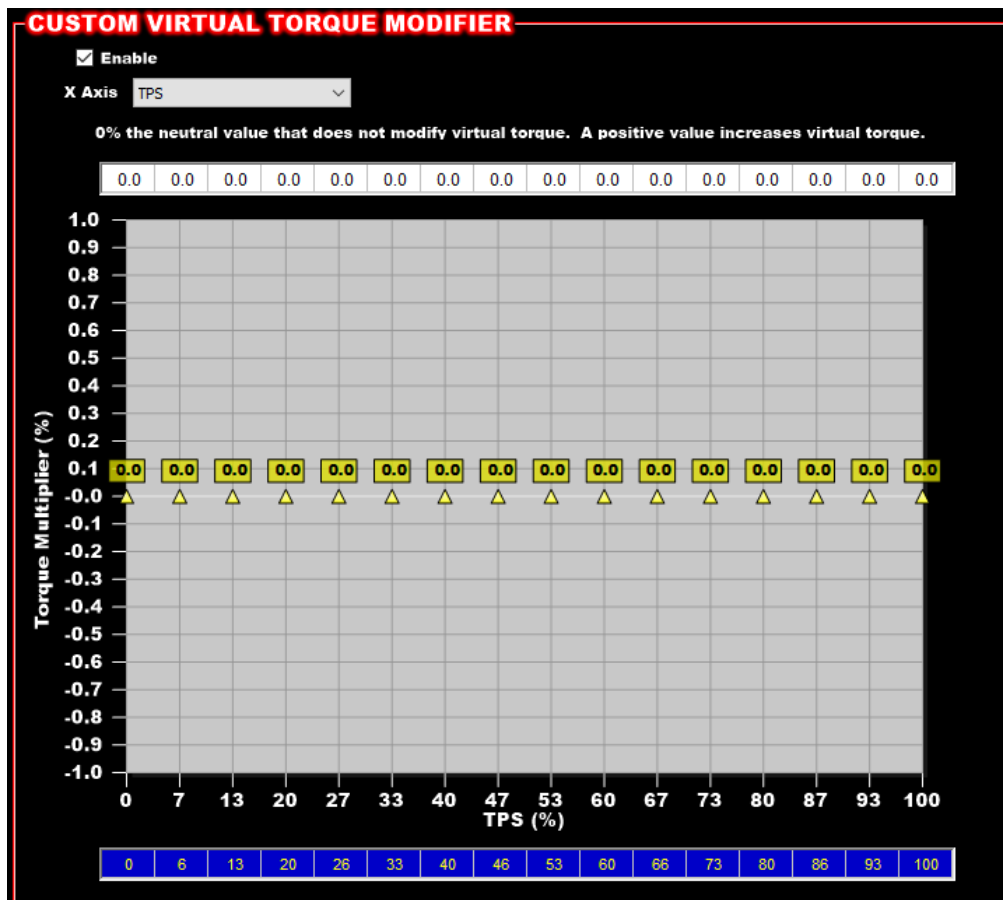
A/C Kick Virtual Torque Loss Offset – When A/C Kick Input is active, this value will be added to the Virtual Torque to offset the torque absorbed by the A/C Compressor.

Default: (8.0 ft/lb)



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

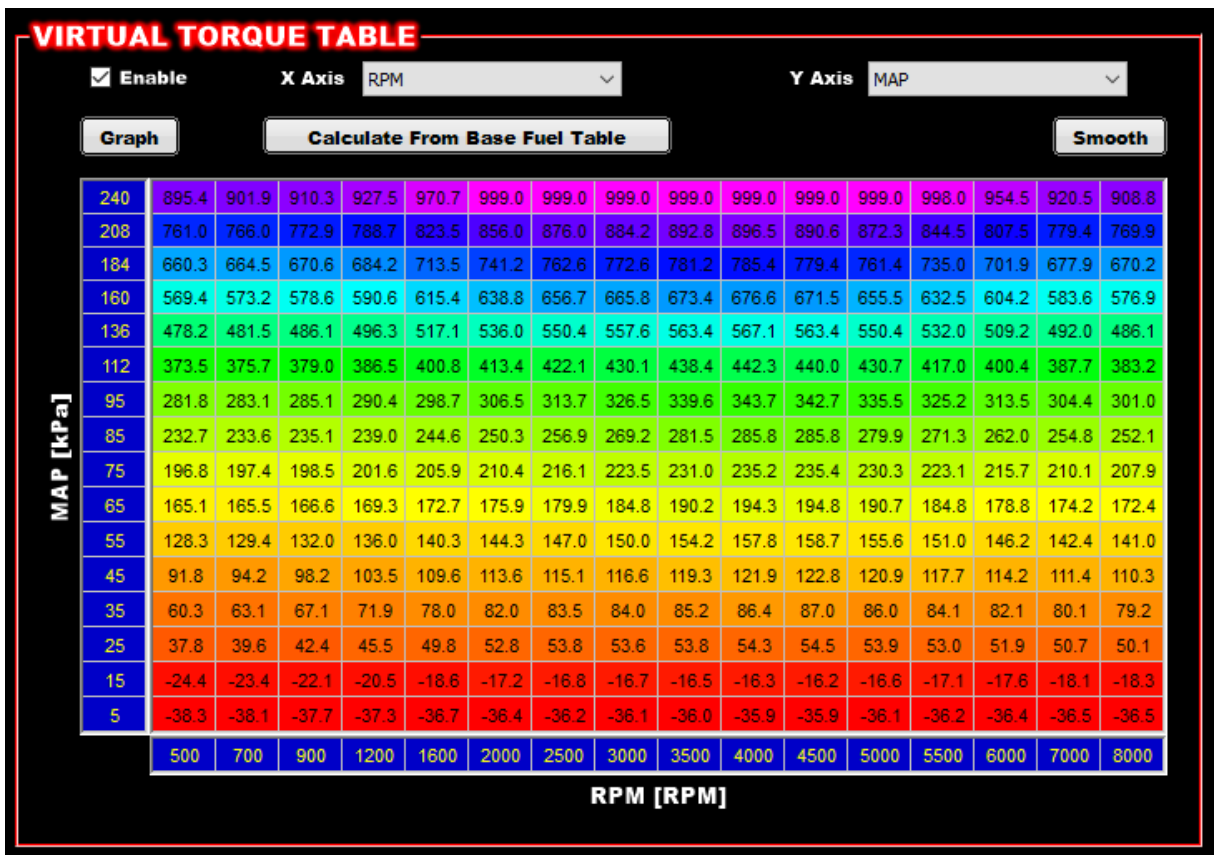
Calculate From Base Fuel Table – Pressing the Calculate From Base Fuel Table button above the Virtual Torque Table will auto populate the axis's and table based off of your Base Fuel table from the FUEL ICF. This works as a great starting point for the Virtual Torque Table. **NOTE: Fuel Learn Table Values 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.



Holley EFI OBDII Transmission Tuning Handheld TCM OS Matrix

The selection of Transmission type and Application type (Steps 6 & 7 in the Holley EFI OBDII Transmission Tuning Handheld) will determine which OS is installed into the TCM. The TCM will automatically be detected if it is an early or late TCM by the handheld. Matrix Below lists the OS that are installed in the TCM depending on the Selections.

	Pre 2010		Post 2010	
	6L80E	6L90E	6L80E	6L90E
Car	24249179	24249179	24264923	24261871
Truck	24249179	24253414	24270599	24270599

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