TERMINATOR™ X

TERMINATOR™ XMAX

MPFI FUEL INJECTION SYSTEM

PART NUMBERS
550-903 thru 905, 550-916 thru 918 & 550-926 thru 931

HANDHELD TUNING AND REFERENCE MANUAL – 199R11761

CONTENTS

TUNING

BASIC

The TERMINATOR X handheld allows the user to perform tuning changes to help optimize mileage, drivability, and performance. The tuning is split up into “Basic Tuning” and “Advanced Tuning” sections.

BASIC FUEL

Allows changes to the Target Air/Fuel ratio at idle, cruise, and wide open throttle. The following are typical values and tuning notes.

TARGET AFR

TARGET AFR AT IDLE

Typically between 13.5 and 15.0. Engines with larger cams may need a richer setting for smoothest idle.

TARGET AFR AT CRUISE

Typically between 13.5 and 15.5. Engines with larger cams may need a richer setting.

TARGET AFR AT WOT

Typically between 12.5 and 13.2 on Naturally Aspirated engines. Running richer may reduce power. Running leaner may reduce power or cause potential engine damage.

TARGET AFR BOOST OFFSET

Use the slider bar to input the desired target AFR Offset per 7 lbs of boost.

ACCELERATION ENRICHMENT

ACCELERATION ENRICHMENT

Changes the “accelerator pump” function of the fuel injection. Raising the number increases the amount of fuel added when the pedal is pushed. Lowering the number decreases the amount of fuel added when the pedal is pushed. It is highly recommended NOT to change this until the ECU is allowed to perform self-tuning.

FUEL PRIME

FUEL PRIME ENABLE

Fuel prime is an option that is enabled by default in all of the base calibrations. The fuel prime function injects a small shot of fuel into the intake runners when the ignition is turned on, allowing the engine to start much quicker. The amount of fuel is based on the engine temperature and how long it was since the engine previously ran. This amount of fuel can be increased or decreased by changing the “Percent” value. If the engine seems flooded reduce this value, if the engine seems to want more fuel, increase it. Experiment for best results. Typically this value will range from 75-150% with a maximum of 200% typically used

NOTE: THE ECU ONLY INJECTS FUEL ONCE AT KEY-ON, AND WILL NOT DO IT AGAIN UNTIL THE ENGINE HAS RUN. THIS FUEL PRIME OCCURS ½ OF A SECOND AFTER KEY-ON. IF YOU QUICKLY TURN THE IGNITION KEY WITHOUT WAITING FOR ½ A SECOND, THE PRIME WILL NOT OCCUR AND IT MAY TAKE LONGER FOR THE ENGINE TO START.

FUEL PRIME PERCENT

If the engine seems flooded reduce this value, if the engine seems to want more fuel, increase it. Experiment for best results. Typically this value will range from 75-150% with a maximum of 200%.

CLOSED LOOP / LEARN

CLOSED LOOP

CLOSED LOOP ENABLE/DISABLE

This menu enables or disables closed loop operation. There is typically no reason to turn off closed loop operation unless you suspect an oxygen sensor problem and want to disable the sensor.

NOTE: SELF-TUNING REQUIRES CLOSED LOOP OPERATION TO FUNCTION.

MIN CTS ENABLED

Enable or disable the minimum coolant temp for closed loop operation.

COOLANT TEMP

Once enabled, use this to set the minimum coolant temp for closed loop operation.

TRANSFER TABLE

This will transfer data from the Learn Map to the Base Fuel map.

FUEL LEARN

FUEL LEARN ENABLE/DISABLE

The LEARN Enable / Disable menu turns the Self Tuning “On” and “Off”. If enabled, self-tuning is performed. Learning should be enabled when an engine is first run with the Terminator X and the tuning process is occurring. After the vehicle is driven under various operating conditions, and is running well, it is advised to limit the amount of learning that can occur to 10% or less in the Advanced Learn menu.

BASIC IDLE

Selecting BASIC IDLE allows you to change the Target Hot Engine Idle Speed. This should be adjusted to your desired idle RPM. Values between 650-800 rpm are typical. Larger camshafts or aftermarket torque converters may require a slightly higher value to maintain proper idle quality while in gear.

HOT ENGINE IDLE SPEED

This will adjust the target HOT (above 160°F) idle speed.

SPARK

IGNITION TIMING AT IDLE

8-22 degrees is typically used at idle. The larger the camshaft, the more timing is usually used.

IGNITION TIMING AT CRUISE

32-44 degrees is typically used when cruising for optimal fuel economy.

IGNITION TIMING AT WOT

Varies by engine, but typically values range between 25 and 34 for Naturally Aspirated engines.

CRANKING IGNITION TIMING

This is the actual timing during cranking. It is set to 15 degrees at any RPM below 400 by default.

DRIVE-BY-WIRE

The Pedal vs. Throttle Position table is the primary method of “tuning” a Drive-By-Wire throttle body system. The “Pedal Position” represents the position of the accelerator pedal. The user can adjust the “Throttle Position” to change based on the pedal position. This allows the user to increase or decrease throttle body position (engine airflow) to tailor the “responsiveness” of the engine. It can allow for an overly-large throttle body to have good driving manners or a small throttle body to be very responsive.

On new installations, Idle Tuning must be performed on the “Pedal vs. Throttle” table. It is a similar adjustment to opening or closing the throttle plates with the idle set screw on a standard cable driven throttle body.

TAKE CARE WHEN TUNING THE “PEDAL VS. THROTTLE” TABLE. WHEN YOU INCREASE THE PEDAL POSITION VALUE AT A CERTAIN TPS VOLTAGE, THE THROTTLE WILL GO TO THAT POSITION AT THAT TPS VOLTAGE SETTING. IT IS EXTREMELY IMPORTANT THAT YOU PAY CLOSE ATTENTION AND ARE NOT DISTRACTED WHEN MAKING CHANGES TO THE “PEDAL VS. THROTTLE CABLE” CURVE WITH THE TOUCH SCREEN. ANY CHANGES TO THIS CURVE SHOULD BE MADE WITH THE SYSTEM OFFLINE AND NOT WHILE THE ENGINE IS RUNNING AND ONLINE. THE CURVE OF THIS GRAPH SHOULD ALWAYS BE LOW AT LOW (IDLE) PEDAL POSITION AND INCREASE TO FULLY OPEN AT HIGH PEDAL POSITIONS. IF YOU DO NOT FULLY UNDERSTAND THIS GRAPH, DO NOT ATTEMPT TO MAKE ANY CHANGES TO THE SYSTEM. LOCATE A KNOWLEDGEABLE INSTALLER/TUNER OR CONTACT HOLLEY PERFORMANCE TECHNICAL SERVICE FOR ASSISTANCE. THE FIRST DATA POINT IN THIS TABLE IS LIMITED TO A VALUE OF 20%, THE SECOND CELL 30%, AND THE FOURTH CELL 40%. ALL OTHER CELLS ALLOW FOR THE THROTTLE BODY TO BE COMMANDED TO 100% THROTTLE BODY OPENING.

PEDAL VS THROTTLE

Once the engine is warm and idling in neutral, refer to the “IAC Position” value in the data monitor. You want this value to read between 5-15%. If it reads higher, turn the engine off and increase the first cell value (Pedal Position = 0%) in 1% increments until the IAC is in the 5-15% range. If the IAC position is at 0%, follow the same procedure but lower the first cell value until the IAC reads 5-15%.

WARNING: ENGINE MUST BE TURNED OFF BEFORE MODIFYING THE PEDAL VS THROTTLE TABLE!

TRANSMISSION

CAUTION MUST BE USED WHEN MODIFYING TRANSMISSION PARAMETERS. LOWERING LINE PRESSURES TOO MUCH CAN CAUSE RAPID WEAR AND DAMAGE TO THE TRANSMISSION. THE BASE CALIBRATIONS PROVIDED SHOULD PROVIDE A SAFE BASE CALIBRATION. IF THE TRANSMISSION HAS VERY SOFT SHIFTS OR SEEMS TO SLIP, IMMEDIATELY STOP TO DIAGNOSE WHETHER THE PROBLEM IS DUE TO TUNING OR MECHANICAL ISSUES.

SHIFTS

Each Up-shift and Down-shift can be completely configured by selecting ‘Shifts’ from the transmission menu.

All Upshift points must occur at a higher speed than downshift. The touchscreen will give a warning and not allow this to occur if requested.

Although it can be programmed with the handheld, the ECU won’t allow a downshift to occur if it will over-rev the past the MAXIMUM RPM in the SYSTEM>TRANSMISSION>TRANS SETUP area.

SHIFT UP 1ST-2ND

Table used to modify 1-2 upshift based on throttle position (or MAP for boosted applications) and speed.

SHIFT DOWN 2ND-1ST

Table used to modify 1-2 downshift based on throttle position (or MAP for boosted applications) and speed.

SHIFT UP 2ND-3RD

Table used to modify 2-3 upshift based on throttle position (or MAP for boosted applications) and speed.

SHIFT DOWN 3RD-2ND

Table used to modify 3-2 downshift based on throttle position (or MAP for boosted applications) and speed.

SHIFT UP 3RD-4TH

Table used to modify 3-4 upshift based on throttle position (or MAP for boosted applications) and speed.

SHIFT DOWN 4TH-3RD

Table used to modify 4-3 downshift based on throttle position (or MAP for boosted applications) and speed.

WOT SHIFTS

Use this menu to choose the RPM at which the transmission will upshift at WOT. Each gear change may be adjusted independent of the others.

1-2 WOT UPSHIFT

This is the RPM at which the 1-2 upshift will occur.

2-3 WOT UPSHIFT

This is the RPM at which the 1-2 upshift will occur.

3-4 WOT UPSHIFT

This is the RPM at which the 1-2 upshift will occur.

TORQUE CONVERTER CLUTCH (TCC) PARAMS

Contains parameters that tune TCC activation and deactivation.

> *THE TCC WILL NOT APPLY UNTIL THE ENGINE IS ABOVE 122°F, AS WELL AS A TRANSMISSION FLUID TEMPERATURE ABOVE 46°F.*

MINIMUM RPM TO ENABLE TCC

This is the minimum RPM at which the Torque Converter Clutch will enable. This value can be adjusted so that engines with large camshafts do not hesitate surge if the TCC is applied at too low of an engine speed.

RPM TO DISABLE TCC

Used to unlock the TCC once it is locked. The Lock and Unlock values should not be too close together, or they will continuously lock and unlock. Applications with high stall torque converters will typically need 400-700 RPM or more between these values.

MAXIMUM TPS TCC

Throttle position value when the TCC will unlock. Most lockup torque converters do not have a clutch designed to lock up when higher power is being applied. It is best to unlock the converter under moderate to hard acceleration. Typically TPS values should be between 25-50%.

TCC DISABLE

This will disable TCC functionality in all conditions.

TCC (UN)LOCK

These parameters work in addition to the TCC Parameters by offering additional tuning based on vehicle speed. This keeps the TCC from locking up during 'around-town' driving if it is not desired. The Lock values should always be higher than the Unlock values. Adjustments to these can be done by using the graph.

TCC LOCK

This is a table to adjust when the TCC locks based upon throttle position and vehicle speed.

TCC UNLOCK

This is a table to adjust when the TCC unlocks based upon throttle position and vehicle speed.

LINE PRESSURE

Tune the line pressure vs. TPS or MAP for each gear. A lower duty cycle (moving towards 0%) increases line pressure with 0% providing maximum line pressure applied. Values above 40-50% typically result in a line pressure too low for any throttle position, which may result in transmission damage.

Naturally aspirated and nitrous calibrations created through the wizard use TPS for line pressure vs. load scaling, whereas turbo or supercharged cals use map sensor for line pressure vs load scaling.

LINE PRESSURE 1ST GEAR

Editable line pressure curve for 1st gear

LINE PRESSURE 2ND GEAR

Editable line pressure curve for 2nd gear

LINE PRESSURE 3RD GEAR

Editable line pressure curve for 3rd gear

LINE PRESSURE 4TH GEAR

Editable line pressure curve for 4th gear

NON-ELECTRONIC TRANS

Used for GM TH700R4 transmissions that have a lockup torque converter. Note that this should be used to drive a relay that is used in conjunction with a brake pedal switch disable. The brake pedal switch is not part of the EFI logic for this transmission type.

ENABLE TCC OUTPUT

Creates an output that can be used to trigger the relay used for the torque converter clutch solenoid activation.

TCC OUTPUT

Allows the user to select an available output pin.

NOTE: THIS OUTPUT IS USED TO TRIGGER A RELAY. THE ECU OUTPUT TRIGGER WIRE SHOULD NEVER BE DIRECTLY CONNECTED TO THE TCC SOLENOID.

See THE "INPUT & OUTPUS" SECTION for more information on the input and outputs.

MIN TPS FOR LOCKUP

TPS positions below this parameter will unlock the torque converter.

MIN RPM FOR LOCKUP

Converter will not lock unless engine speed is above this value.

MIN CTS FOR LOCUP

Converter will not lock unless Engine Coolant Temperature is above this value.

WOT UNLOCK TPS

If enabled, converter will unlock above this TPS.

SYSTEM

OUTPUTS

FAN #1 ON TEMPERATURE

The OUTPUT screen allows for the Fan #1 and Fan #2 ON and OFF temperatures to be adjusted. The ON temp needs to always be a higher value than the OFF temp. Use a difference of at least 5 degrees so they aren't cycling excessively. In Sniper Kits, these are ground outputs that should be wired to trigger a fan relay. NEVER wire them directly to the fans!

Preset to 195°F

FAN #1 OFF TEMPERATURE

Preset to 180°F.

FAN #2 ON TEMPERATURE

Preset to 205°F.

FAN #2 OFF TEMPERATURE

Preset to 190°F.

AC SHUTDOWN MAX TPS

The AC Disable value is a TPS value above which a ground output is sent out to deactivate the air conditioning compressor at wide open throttle Preset to 50%.

ENGINE SETUP

ENGINE DISPLACEMENT

This value should reflect your actual engine size. The base fuel table calculates proper fuel flow based upon this value.

FUEL SETUP

FUEL PUMP PRIME

This is how long the fuel pump will run for when the ignition if first turned on to pressurize the system and there is no rpm signal.

CLEAR FLOOD TPS

Above this value, no fuel will be injected when the engine is cranking/starting. Typically set to 65% or higher.

RATED FLOW PER INJECTOR

Fuel Injector flow in lb/hr

RATED INJECTOR FUEL PRESSURE

Pressure at which injectors flow was rated at (psi)

NOTE: DO NOT CONFUSE THIS VALUE WITH ACTUAL SYSTEM FUEL PRESSURE!

ACTUAL SYSTEM FUEL PRESSURE

This is the actual fuel system pressure of the vehicle. All Terminator X LS base calibrations are configured for 60 psi.

NOTE: INCORRECT ENTRY WILL CAUSE THE FUELING TO BE INACCURATE.

TERMINATOR X SETUP

INJECTION TYPE

Displays the current injection strategy

SYSTEM TYPE

Displays fuel injector information

IGNITION SETUP

IGNITION SETUP #1

IGNITION TYPE

Displays the ignition type information

IGNITION SETUP #2

FIRING ORDER

Displays the engines selected firing order

MAIN REV LIMITER TYPE

View and edit the main rev limiter type. There are five types to choose from:

- Fuel Only – performs a “hard cut” of fuel flow only when the main over-rev HIGH RPM is hit. “Hard cut” means that fuel flow is stopped to all cylinders until the main over-rev LOW RPM setting is met.
- Spark Only – performs a “hard cut” of ignition only when the main over-rev HIGH RPM is hit. “Hard cut” means that ignition is stopped to all cylinders until the main over-rev LOW RPM setting is met.
- Fuel and Spark – performs a “hard cut” of ignition AND fuel flow when the main over-rev high RPM is hit.
- Soft – begins a “soft cut” of ignition when the main over-rev LOW RPM is hit. “Soft cut” means that ignition will be removed from individual cylinders as needed to limit RPM. If the HIGH RPM limit is reached, a hard cut will be implemented.
- Spark, high only – This type has a single high side value. It is recommended to use this for a 2-step rev limiter and as a high side rev limiter.

IT IS USUALLY BEST TO HAVE A NARROW RANGE (20-50 RPM) BETWEEN THE LOW AND HIGH RPM SETTINGS TO REDUCE STRESS ON THE ENGINE.

MAIN REV LIMITER HIGH RPM

See rev limiter types above

MAIN REV LIMITER LOW RPM

See Rev limiter types above

NOT AVAILABLE FOR REV LIMITER TYPE "SPARK, HIGH ONLY"

STATIC TIMING

GET

This gets the commanded static timing value that has been set previously, if user navigated away from static timing check screen and the ignition has not been cycled.

SET

This sets the commanded timing to the chosen value.

CLEAR

This clears the static timing value.

CLOSE

This closes the Static Timing menu.

TRANSMISSION

TRANS SETUP

TRANSMISSION TYPE

Displays the calibration's transmission type

MAXIMUM RPM

If this RPM is exceeded when in manual shift mode, the transmission will upshift automatically. If a manual downshift is performed, and this RPM will be exceeded, the downshift will not be allowed.

SPEED CALC

TIRE DIAMETER

Measure and enter the real tire diameter (inches).

REAR GEAR RATIO

Enter the rear axle gear ratio.

ADVANCED

ADVANCED FUEL

STARTUP ENRICHMENT

CRANKING FUEL

This dictates how much fuel is injected when the engine is cranking and is dependent on coolant temperature. Changing this value offsets the entire curve at all temperatures. Adjustment values are in pounds of fuel per hour (PPH) and should initially be adjusted in increments of 2-4 PPH.

AFTER START HOLDOFF

The amount of time after engine starts to when the after start fuel is deployed.

AFTER START ENRICHMENT

The afterstart parameter is fuel that is added for a short time immediately after an engine starts. This value varies depending on engine temperature. Changing this value offsets the entire curve at all temperatures. Adjustments are made as a percentage of the base map from 75% to 200%, 100% would mean no additional fuel is being added, 110% would mean that an additional 10% of fuel is being added to the base fuel map, and 85% would mean that 15% of fuel is being taken away from the base map. All selections will decay back to 100% over a predetermined amount of time.

AFTER START DECAY RATE

The amount of time it takes for the After Start Enrichment to decay to zero.

ACCELERATION ENRICHMENT

AE VS. TPS RATE OF CHANGE

Ads additional, momentary fuel based on the rate of change of the TPS. Same function as an accelerator pump on a carburetor.

AE VS. MAP RATE OF CHANGE

This parameter provides another way of adding fuel when the accelerator is depressed. It adds fuel depending on how fast the MAP sensor reading changes (detects a change in engine load). There is typically no need to adjust this parameter except possibly under some extreme conditions of vehicles that are heavy or under-powered. Adjustment values are in pounds of fuel per hour (PPH) and should initially be adjusted in increments of 5-10 PPH.

AE TPS VS COOLANT TEMP

This curve adjusts the acceleration enrichment as a function of coolant temperature and TPS rate of change. This should not need to be adjusted.

MAP AE TIME VS COOLANT

The length of time it takes for the AE vs. MAP fuel to decay from peak value to 0.

MAP AE VS COOLANT

Modifies the AE vs. MAP Rate of Change Graph based on engine coolant temperature.

TEMPERATURE ENRICHMENT

COOLANT TEMP ENRICHMENT

Coolant enrichment is similar to the choke on a carburetor. Adjustments are made as a percentage of the base map from 100% to 150%. 100% would mean no additional fuel is being added by the Coolant Enrichment, 110% would mean that an additional 10% of fuel is being added to the base fuel map which will decay back to 100% in relation to actual engine coolant temperature.

A/F RATIO OFFSET

A positive value LEANS the target A/F ratio and a negative value RICHENS the target A/F ratio.

AIR TEMP ENRICHMENT

The Air Temperature Enrichment % table is used to add additional fuel based on air temperature. As air gets colder it typically becomes denser, requiring more fuel. This table is beneficial to minimize closed loop correction values.

IDLE FUEL

IDLE FUEL TRIM

This modifies the VE fuel table values in the idle area of the fuel map. It is only available when the “Minimum RPM to enter closed loop” feature has been enabled and configured.

NOTE: BASE CALIBRATIONS MADE THROUGH THE WIZARD THAT USE CAMSHAFT TYPE 3 HAVE CLOSED LOOP DISABLED BELOW 2500 RPM BY DEFAULT.

CLOSED LOOP

CLOSED LOOP #1

CLOSED LOOP ENABLE / DISABLE

This menu enables or disables closed loop operation. There is typically no reason to turn off closed loop operation unless you suspect an oxygen sensor problem and want to disable the sensor.

NOTE: SELF-TUNING REQUIRES CLOSED LOOP OPERATION TO FUNCTION.

CLOSED LOOP + LIMIT

The maximum percentage the ECU is allowed to add to the base fuel calibration in order to maintain the commanded target air fuel ratio. This is set to 50% by default and under most circumstances should not need to be changed.

CLOSED LOOP – LIMIT

The maximum percentage the ECU is allowed to remove from the base fuel calibration in order to maintain the commanded target air fuel ratio. This is set to 50% by default and under most circumstances should not need to be changed.

CLOSED LOOP SPEED

This is the “speed” (gain) at which closed loop operation occurs. This can be set to five levels, 1, 2, 3, 4, or 5. 3 is the base setting and should be good for most applications. 4 or 5 is typically not used as the closed loop speed may be too excessive for certain applications. If the oxygen sensor is installed far back in the exhaust (more than 1 foot back from the collector in long tube headers), a value of 1 or 2 may be needed.

CLOSED LOOP #2

ENABLE RPM TO ENTER CL

Enable or Disable minimum RPM required to enter closed loop operation.

RPM TO ENTER CL

Below the Engine Speed value entered, the engine will not operate closed loop – it will operate open loop.

ENABLE MIN CTS TO ENTER CL

Enable or Disable minimum coolant temperature required to enter closed loop operation.

CTS TO ENTER CL

Below the Engine Coolant Temperature value entered, the engine will not operate closed loop – it will operate open loop.

ENABLE TPS TO ENTER CL

Enable or Disable minimum throttle position required to enter closed loop operation.

TPS TO ENTER CL

Below the Throttle Position value entered, the engine will not operate closed loop – it will operate open loop.

ADV. LEARN

LEARN + LIMIT

This value is set to 100% by default, and should remain there until ample driving time and tuning has occurred. The LEARN COMPENSATION LIMIT is a parameter that ECU is allowed to work within when making changes to the fuel map based upon CLOSED LOOP operation. Unlike the CLOSED LOOP LIMIT which is a set parameter for commanded changes to actual fuel flow based upon the O2 sensor reading, LEARN COMPENSATION LIMITS are the percentage of change that is allowed to actually be saved as a modifier to the fuel map.

LEARN – LIMIT

This value is set to 100% by default, and should remain there until ample driving time and tuning has occurred. The LEARN COMPENSATION LIMIT is a parameter that ECU is allowed to work within when making changes to the fuel map based upon CLOSED LOOP operation. Unlike the CLOSED LOOP LIMIT which is a set parameter for commanded changes to actual fuel flow based upon the O2 sensor reading, LEARN COMPENSATION LIMITS are the percentage of change that is allowed to actually be saved as a modifier to the fuel map.

ENABLE RPM TO ENTER LEARN

Enable or Disable minimum RPM required to enter learn.

RPM TO ENTER LEARN

Below the Engine Speed value entered, the ECU will not populate the learn table.

ENABLE TPS TO ENTER LEARN

Enable or Disable minimum throttle position required to enter learn.

TPS TO ENTER LEARN

Below the Throttle Position value entered, the ECU will not populate the learn table.

ADV. IDLE

Cable Throttle Bodies

The Idle Air Control (IAC) motor is a stepper motor located in the throttle body that controls the idle speed of the engine by metering air. It also operates during engine cranking and when the engine returns back to idle. The IAC moves from a position of 0% (fully closed, no air added) to 100% (fully open, maximum air flow).

Drive-By-Wire Throttle Bodies

Unlike a cable throttle body with separate IAC stepper motor, a DBW throttle body modulates the actual blade position to maintain commanded idle settings.

IAC RAMPDOWN

IAC HOLD POSITION

This is the position the IAC motor will “hold” or “freeze” at when the TPS moves above idle (when TPS becomes greater than 0%). If it is too high, the engine RPM will “hang” and not return to idle.

IAC RAMP DECAY

This is the time (in seconds) it takes for the IAC to return to the target idle range of movement.

IAC RAMP START (RPM ABOVE IDLE)

This value is the RPM added to the target idle speed that the IAC will automatically start to ramp back down to idle. If this is too low, the engine RPM will “hang” and not return to idle.

IAC KICK

The IAC Kick provides a temporary increase in IAC position to keep engine the RPM from dropping. Typically, this is used in conjunction with an A/C system to keep the engine speed from ‘dipping’ as the compressor cycles on and off.

IAC CONTROL

IAC CONTROL

This menu is used to select the type of IAC motor application that is being used. This selection drives the background parameters that control the IAC motor. These parameters have been fine tuned for each of these applications, eliminating the need for the user to perform further modifications.

IAC STARTUP

IAC PARKED POSITION (CRANKING)

This is the position the IAC motor will be at during cranking and immediately after the engine starts. If it is too high, the engine will be at too high of an RPM once it starts – too low and poor starting will result. Note that this is a temperature based table. The percentage value changed in the handheld offsets this entire curve.

IAC STARTUP HOLD TIME

This is the amount of time that the IAC will remain at the “IAC Parked Position”. Lower this if the engine 'hangs' at a higher RPM for too long after startup.

IAC STARTUP DECAY TIME

This is the amount of time for the IAC to decay from the “IAC Parked Position” back to its “Target Idle” position. It is a linear decay.

IDLE SPARK

IDLE SPARK ENABLE / DISABLE

Idle spark is a feature active only when the ECU is controlling timing. When enabled, the ECU modifies commanded timing at idle to help maintain the target idle speed.

> ***NOTE:*** *THIS FEATURE SHOULD BE DISABLED WHEN CHECKING BASE TIMING WITH A TIMING LIGHT AND NOT USING THE STATIC TIMING OPTION.*

P TERM

Raising or lowering the “P Term” will change the speed at which the timing is allowed to change. Experiment to see what the engine likes best.

D TERM

The “D Term” is used to help minimize overshoot. If you are unsure, just make the D term the same value as the P term to start.

IDLE SPEED

IDLE SPEED CURVE

Unlike the Idle speed slider bar found in the Basic Tuning menu, this allows for full customization of target idle speed at all coolant temperatures

MONITOR

The Terminator X handheld display has a variety of pre-configured gauge screens. Three fully customizable screens are also included. Most channels allow for user-programmable caution and warning limits to provide visual indicators of parameters that are deemed to be out of range.

MONITORS

IDLE

Engine RPM / TPS / IAC Position / Air/Fuel Ratio / Ignition Timing

LEARN

Fuel Learn Status / Current Learn / Closed Loop Compensation / Target Air/Fuel Ratio / Air/Fuel Ratio

CLOSED LOOP

Closed Loop Status / Closed Loop Compensation / Target Air/Fuel Ratio / Air/Fuel Ratio / Fuel Learn Status

SENSORS

MAP / TPS / MAT / CTS / Battery

FUEL

Engine RPM / Air/Fuel Ratio / Injection Pulse Width / Closed Loop Compensation / Fuel Duty Cycle

INITIAL STARTUP

Engine RPM / TPS / MAP / CTS / IAC position / Battery

MULTI-GAUGE

SENSORS

MAP / CTS / TPS / AFR / RPM / Battery / Ignition Timing / MAT / IAC Position / Injector Duty Cycle

VITALS

Fan #1 / Fan #2 / AC Shutdown / CTS / RPM / IAC Position / AFR / Battery / Closed Loop Status / Learn Status

AIR/FUEL RATIO

AFR / Target AFR / Coolant Enrichment / Closed Loop Compensation / RPM / Current Learn / Closed Loop Status / Learn Status / Injector Pulse Width / Fuel Flow

DASH #1

This layout is transmission focused.

Gear / RPM / Line Pressure / TCC Duty Cycle / TCC Lockup Status / Line Temp / Input Shaft Speed / TPS / Speed / Fuel Economy

DASH #2

This layout is drive-by-wire focused.

TPS / Pedal Position / Throttle Body Position / TB TPS #1 Voltage / Pedal TPS #1 Voltage / TB TPS #2 Voltage / Pedal TPS #2 Voltage / Brake Pedal Status / RPM / MAP

DASH #3

Fan #1 / Fan #2 / AC Shutdown / CTS / IAC Position / AFR / Battery / Fuel Pressure / RPM / Oil Pressure

CUSTOM DASH #1-3

Up to three (3) Custom gauge layouts can be created on the 3.5 Touch Screen. Follow these steps to configure:

Step 1: Choose ‘Dash Setup’ from the Multi-Gauge screen.

Step 2: Choose the Dash number to be configured.

Step 3: Choose the desired layout.

Step 4: Select channels and choose gauge display types.

CHANNELS SCALING

Each channel displayed by the 3.5 Touch Screen can be configured to have caution and warning indicators.

To do this, choose ‘Channel Scaling’ from the MONITOR menu. Cautions will display as Yellow and Warnings will display as RED when using the Multi-Gauge screens.

ADVANCED FEATURES

NITROUS

STAGE 1 ACTIVATION

NITROUS DISABLE

If using Terminator X for Nitrous Control, this will Enable or Disable the Stage.

MIN RPM

Minimum RPM required for Nitrous activation

MAX RPM

Maximum RPM allowed for Nitrous activation. Any RPM above this will turn off the stage.

ACTIVATION DELAY

This will delay the activation by the amount selected. The delay starts from the time the stage is triggered. A value of zero means the nitrous will turn on as soon as all activation conditions are met.

STAGE DURATION

This will set the duration of the nitrous stage, allowing a stage to be turned off at a precise time for bracket racing, or for another layer of safety. This parameter is enabled by default.

STAGE 1 TUNING

FIXED TIMING VALUE

If you are using Terminator X for timing control, this is the actual timing value the engine will operate with when the Nitrous is activated.

PROGRESSIVE CONTROL

Enable/Disable progressive timing retard curve. This parameter requires Terminator X laptop software to configure.

TIMING RETARD

1x16 editable timing curve – only available when not using a fixed timing value. This parameter requires Terminator X laptop software to configure.

TARGET AFR

Closed Loop compensation will override the target AFR table and use this value as its new target only when the nitrous is on.

BOOST

LAUNCH

LAUNCH TARGET

Allows for a specific boost level to be maintained while this input is active, as well as creates a starting point for time based boost control (when launch input is de-activated).

SAFETY SETUP

INSTANTANEOUS BOOST PRESSURE SAFETY

Boost pressure above which ignition will be instantly cut

TIME DELAY BOOST PRESSURE SAFETY

Boost pressure above which ignition will be cut (with time delay)

TIME DELAY

Amount of time actual boost must be above “time delay Boost Pressure” to activate ignition cut

BOOST VS. SPEED

BOOST CURVE

The units in this table are dome pressure, not boost pressure in the manifold.

BOOST VS. RPM

The units in these tables are dome pressure, not boost pressure in the manifold.

GEAR 1

Boost vs. RPM curve for 1st Gear

GEAR 2

Boost vs. RPM curve for 2nd Gear

GEAR 3

Boost vs. RPM curve for 3rd Gear

GEAR 4

Boost vs. RPM curve for 4th Gear

BOOST VS. GEAR

The units in these tables are dome pressure, not boost pressure in the manifold.

GEAR 1

Boost vs RPM curve for 1st Gear

GEAR 2

Boost vs. RPM curve for 2nd Gear

GEAR 3

Boost vs. RPM curve for 3rd Gear

GEAR 4

Boost vs. RPM curve for 4th Gear

BOOST VS. TIME

BOOST CURVE

This operating mode only has one curve. The units in the table are dome pressure, not boost pressure in the manifold.

LAUNCH

2-STEP

REV LIMITER #1 ENABLE

Enable or Disable Rev Limiter #1.

REV LIMITER #1 INPUT

Allows the user to select an available ECU input pin. See THE “INPUT & OUTPUTS” SECTION for more information on the input and outputs.

REV LIMITER #1 TYPE

View and edit rev limiter #1 type. There are five types to choose from:

- Fuel Only – performs a “hard cut” of fuel flow only when the main over-rev HIGH RPM is hit. “Hard cut” means that fuel flow is stopped to all cylinders until the main over-rev LOW RPM setting is met.
- Spark Only – performs a “hard cut” of ignition only when the main over-rev HIGH RPM is hit. “Hard cut” means that ignition is stopped to all cylinders until the main over-rev LOW RPM setting is met.
- Fuel and Spark – performs a “hard cut” of ignition AND fuel flow when the main over-rev high RPM is hit.
- Soft – begins a “soft cut” of ignition when the main over-rev LOW RPM is hit. “Soft cut” means that ignition will be removed from individual cylinders as needed to limit RPM. If the HIGH RPM limit is reached, a hard cut will be implemented.
- Spark, high only – this type has a single high side value. It is recommended to use this for a 2-step rev limiter and as a high side rev limiter.

IT IS USUALLY BEST TO HAVE A NARROW RANGE (20-50 RPM) BETWEEN THE LOW AND HIGH RPM SETTINGS TO REDUCE STRESS ON THE ENGINE.

REV LIMITER #1 ON RPM

See Rev limiter types above.

REV LIMITER #1 OFF RPM

See Rev limiter types above.

NOT AVAILABLE FOR REV LIMITER TYPE “SPARK, HIGH ONLY”

LAUNCH RETARD

SETUP

LAUNCH RETARD ENABLE

Enable or Disable Launch Retard.

TYPE

Select the launch retard table units (Time or RPM).

LAUNCH RETARD ACTIVATION

Select whether the launch retard activates with an input, or at the release of an input (i.e. transbrake button).

LAUNCH RETARD INPUT

Allows the user to select an available ECU input pin. See THE “INPUT & OUTPUTS” SECTION for more information on the input and outputs.

TUNING

LAUNCH RETARD

The table values are in degrees of retard, so a value of 5 would equate to a 5 degree retard in total timing.

MIN RPM

If RPM was selected as the table unit type, this is the first RPM point in the retard table.

MAX RPM

If RPM was selected as the table unit type, this is the last RPM point in the retard table.

MIN TIME

If time was selected as the table unit type, this is the first time point in the retard table.

MAX TIME

If time was selected as the table unit type, this is the last time point in the retard table.

THE LAUNCH RETARD OPERATES OFF A 1X16 TABLE. THE BREAK-POINTS OF THE TABLE ARE FILLED IN A LINEAR FASHION BETWEEN THE MIN AND MAX (TIME OR RPM) INPUT VALUES. FINE TUNING OF THESE POINTS CAN BE DONE BY SELECTING TABLE ICON IN THE GRAPH EDITOR.

ADVANCED ICF

The configurations in the advanced tables must be setup using Terminator X Software. Once those are configured, a limited number of parameters may be adjusted in the handheld. Please read the Terminator X Software instructions to learn about and properly setup Advanced Tables.

1D TABLES

TABLE #1

ENABLE

Enables or disables the advanced table

TABLE TYPE

Displays the table type

TIME DELAY ENABLE

Enables or disables the table’s activation time delay

TIME DELAY TO START

Edits the activation time delay

EDIT CURVE

Allows editing of the 1x16 table

TABLE #2

See table #1 above

TABLE #3

See table #1 above

TABLE #4

See table #1 above

2D TABLES

TABLE #1

ENABLE

Enables or disables the advanced table

TABLE TYPE

Displays the table type

TIME DELAY ENABLE

Enables or disables the table’s activation time delay

TIME DELAY TO START

Edits the activation time delay

EDIT TABLE

Allows editing of the 16x16 table

TABLE #2

See table #1 above

TABLE #3

See table #1 above

TABLE #4

See table #1 above

LOGGING

Terminator X MPFI systems come standard with powerful data logging capabilities. Logging can be stopped and started via the 3.5” Handheld, and the data logs will save automatically to the SD card.

Choosing ‘Files’ in the DATA LOGGING menu will display all logs contained on the SD card

Automatic log triggering can be configured by choosing the setup icon.

Data logs are timestamped and named using the following format:

TermX_*YYMMDD-hhmmss*-XX.dlz

Terminator X data logs can be viewed through the free Terminator X PC software.

FILE

ECU OVERVIEW

PAGE 1

CURRENT GLOBAL FOLDER/FILE

Displays the name of the current ECU calibration

TRANSMISSION TYPE

Displays the Calibration’s configured transmission type

IGNITION INPUT TYPE

Displays the current Ignition Type

WIDE BAND O2 SENSOR TYPE

Displays the current O2 sensor type

INJECTION TYPE

Displays the current injection strategy

SYSTEM TYPE

Displays injector information

PAGE 2

ECU FIRMWARE VERSION

Displays ECU firmware version

ECU TIME

Displays the ECU time. This time can be synced with actual time using Terminator X Software.

TPS AUTOSET

Indicates whether a TPS autoset has been performed

LOCAL SETUP

TOUCH CALIBRATE

The touch screen can be recalibrated by following the on-screen instructions.

LOCAL INFO

Displays detailed handheld touchscreen firmware information

LOCAL OPTIONS

RESTORE SCREENS ON STARTUP

SELECTING THIS OPTION WILL RESTORE THE HANDHELD TO THE LAST SCREEN IT WAS ON BEFORE IT WAS POWERED OFF.

DO NOT SHOW ADVANCED FEATURES WARNING

THIS WILL DISABLE THE WARNING THAT IS SHOWN WHENEVER THE ADVANCED FEATURES ICON IS SELECTED.

SHOW TEMPERATURES IN °C

THIS WILL CONVERT TEMPERATURES SHOWN ON THE HANDHELD TO CELSIUS.

THIS HAS NO EFFECT ON ECU FIRMWARE OR SOFTWARE TUNING – IT IS A HANDHELD DISPLAY CONVERSION ONLY.

RESTORE CHANNEL DEFAULTS

THIS WILL RESTORE ANY USER CUSTOMIZED CHANNEL WARNING INDICATORS TO THE FACTORY DEFAULT VALUES.

SCREEN BRIGHTNESS

SCREEN BRIGHTNESS CAN BE MANUALLY ADJUSTED HERE. 0% IS THE LOWEST BRIGHTNESS SETTING, AND 100% IS THE BRIGHTEST.

ECU HW/FW

This screen displays more detailed Terminator X ECU information, and is also where you go to upgrade ECU firmware.

GLOBAL CONFIGS

List view of all saved Sniper calibrations on the SD card. This is where you can save, rename, and upload saved ECU calibrations (i.e. pump gas tune, race gas tune).

LAPTOP SUPPORT

Your Terminator X system supports advanced tuning and data log review through use of the free software, which can be downloaded. Live tuning requires a 558-443 CAN to USB cable.

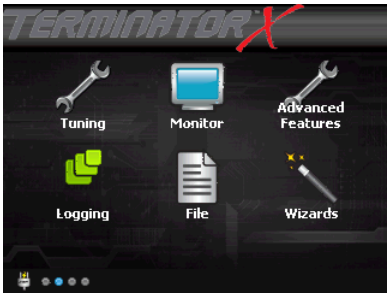
To view instructional videos on how to use Terminator X software – visit the Holley YouTube channel

Calibrations and data logs can also loaded to Terminator X software by using the handheld's SD card.

DOWNLOADING & LOADING CALIBRATIONS FROM THE TERMINATOR X TO AN SD CARD:

Downloading Calibration from ECU

1. Press "File" icon from the Main Menu



2. Press the "Global Configs" Icon

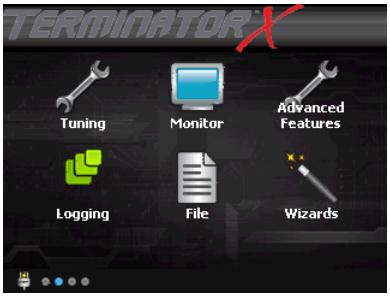
3. Press "Download From ECU"

Press "OK", if you would like to name it with a unique name, user can press "Save GCF as", type the name for the calibration, and press save.

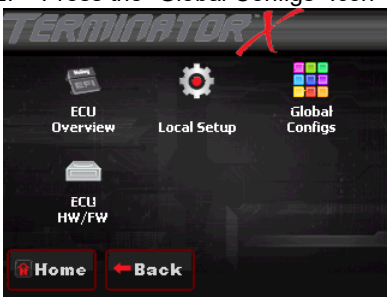
4. SD card now has the Global Configuration that is in the ECU unit, this can be opened up with the Terminator X software on a PC.

Loading Calibration into Terminator X ECU

1. Press "File" icon from the Main Menu



2. Press the "Global Configs" Icon



3. Highlight the Configuration you would like to load into the Terminator X (making it highlight in Blue).

4. Press Upload to ECU and follow the Onscreen Prompts:
   a. Press okay when it asks, "Upload GCF to ECU"
   b. Turn the ignition off for at least 4 seconds when it asks you to. If you press OK, the upload of the calibration will not take place until the ignition is cycled.
5. New Configuration has been uploaded to the Terminator X ECU.

INPUTS & OUTPUTS

The Terminator X ECU contains 4 configurable inputs and 4 configurable outputs:

Base calibrations are pre-configured with 3 outputs and one input to be used for the following features:

- Electric Fan #1 output
- Electric Fan #2 output
- Air Conditioning Shutdown at Wide Open Throttle
- IAC Kick Input

Additional features such as a launch retard or 2-step rev limiting can be configured through the handheld without the use of software.

The following chart lists the connector and wire color information for all of the inputs and outputs to aid in wiring and setup:

Name	ECU PIN	Harness Connector	Wire Color	Function	Type
Input 1	A12	A	White/Blue	IAC Kick	Ground
Input 2	A3	B	White/Red	Unassigned	Ground
Input 3	A13	C	White/Black	Unassigned	Ground
Input 4	A4	D	White/Green	Unassigned	Ground
Output 1	B12	E	Grey/Yellow	Electric Fan 1	Ground
Output 2	B11	F	Grey/Red	Electric Fan 2	Ground
Output 3	B10	G	Grey/Black	AC Shutdown	Ground
Output 4	B3	H	Grey/Green	Unassigned	Ground

Further customization of the inputs and outputs, including changing their signal type can be performed via Terminator X software.

APPENDIX 1.0 – ECU PINOUT

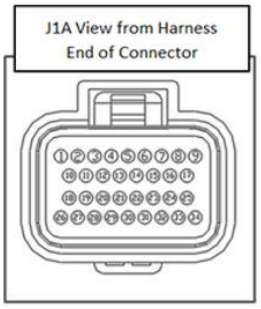
The following shows pins that are used on TERMINATOR X™ systems. Pins that are not populated on TERMINATOR™ systems are denoted with an asterisk (*).

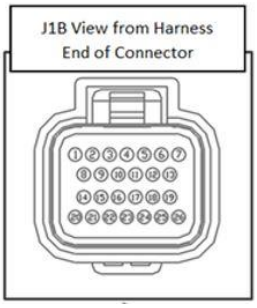
J1A Connector

Pin	Function
A1	Coil – Input
A2	Fuel Pump Relay Out (+12v) (10A Max)
A3	Input #2 (F,5,2,T,H,G)
A4	Input #4 (F,G,5)
A5	TPS Input
A6	Points Output
A7	WB1 COMPR2
A8	WB1 Shield
A9	WB HTR -
A10	Switched +12v Input
A11	Manifold Air Temp Input
A12	Input #1 (F,5,2,T,H,G)
A13	Input #3 (F,G,5)
A14	Cam/Crank Ground
A15	Gauge Output
A16	WB1 COMPR1
A17	WB1 VS-/IP+
A18	Sensor Ground
A19	Engine Coolant Temp Input
A20	Oil Pressure Input
A21	Knock Sensor #2 Input
A22	Cam Input / Bypass Out
A23	Map Sensor Input
A24	CAN Lo
A25	WB1 VS+
A26	Sensor +5v
A27	Bypass Out
A28	EST/Spout Output
A29	Knock Sensor #1 Input
A30	Crank Speed Input
A31	Fuel Pressure Input
A32	CAN Hi
A33	WB1 IP+
A34	WB HTR +

J1B Connector

Pin	Function
B1	IAC A Lo
B2	IAC A Hi
B3	PWM #4 Output (HG)
B4	Injector F (Cylinder 6)
B5	Injector G (Cylinder 7)
B6	Injector H (Cylinder 8)
B7	Injector E (Cylinder 5)
B8	IAC B Lo
B9	IAC B Hi
B10	PWM #3 Output (HG)
B11	PWM #2 Output (HG)
B12	PWM #1 Output (HG)
B13	Injector D (Cylinder 4)
B14	Ground
B15	EST B (Cylinder 2)
B16	EST D (Cylinder 4)
B17	EST F (Cylinder 6)
B18	EST H (Cylinder 8)
B19	Injector A (Cylinder 1)
B20	EST 12V Output
B21	EST A (Cylinder 1)
B22	EST C (Cylinder 3)
B23	EST E (Cylinder 5)
B24	EST G (Cylinder 7)
B25	Injector C (Cylinder 3)
B26	Injector B (Cylinder 2)



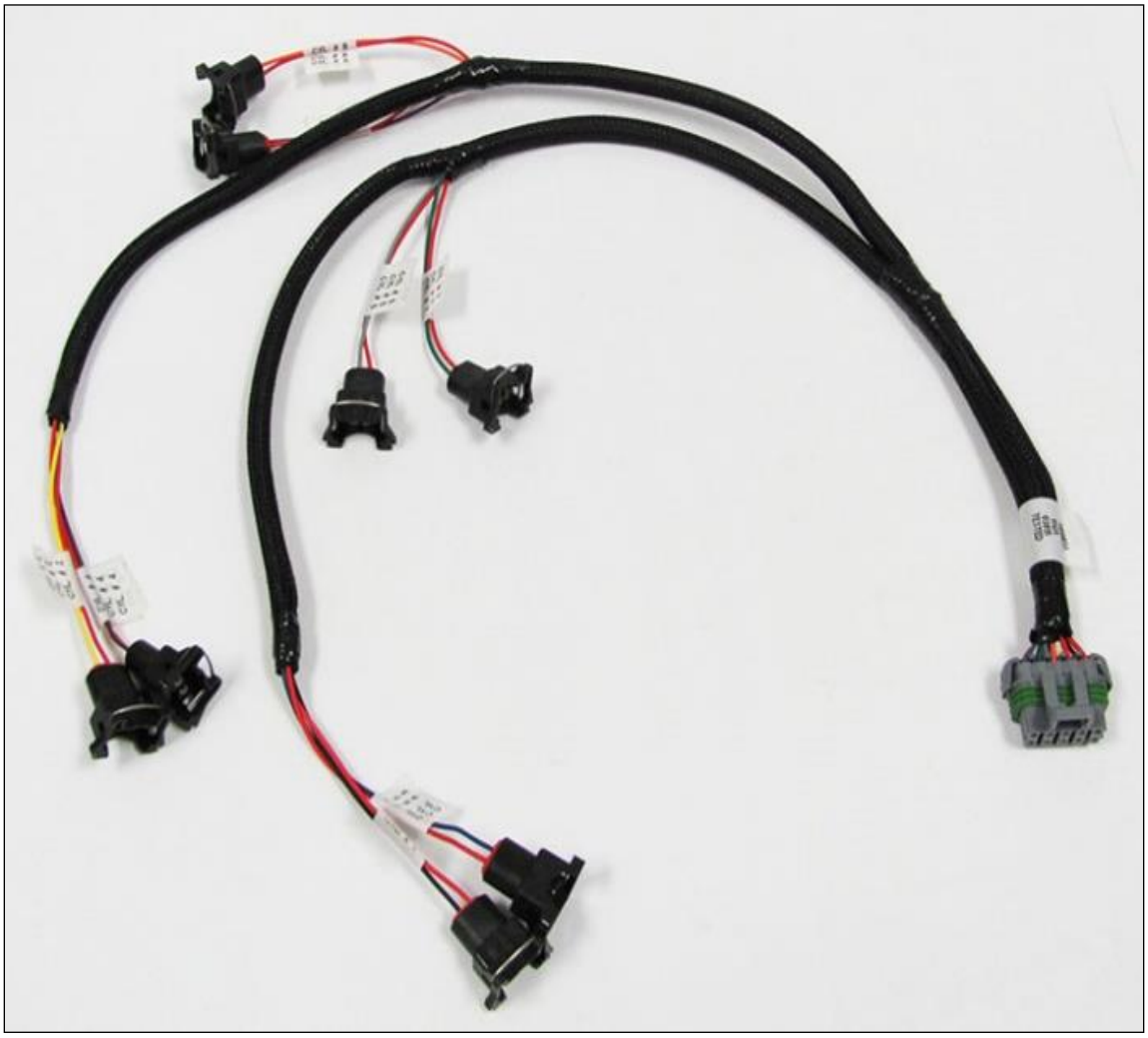


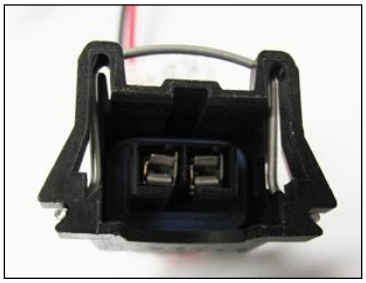
APPENDIX 2.0 – ENGINE CONNECTOR AND INJECTOR INFORMATION

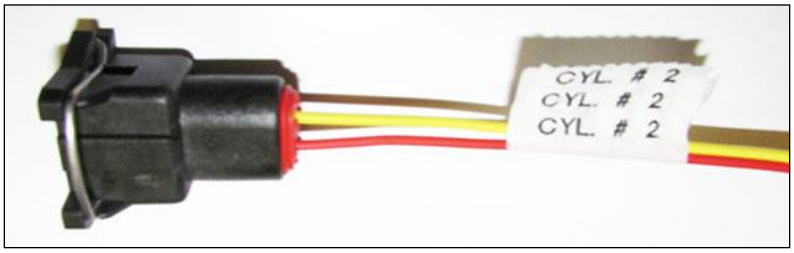
THERE ARE THREE VARIATIONS OF LS INJECTOR CONNECTORS:

EV1

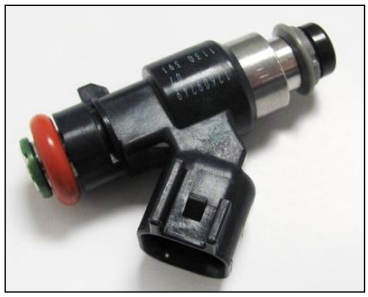
INJECTOR HARNESS PART NUMBER 558-200

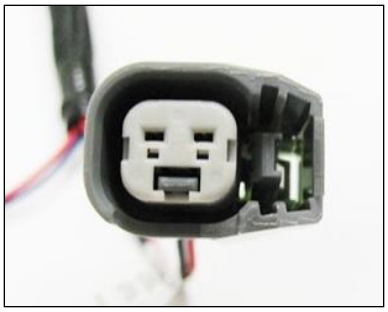


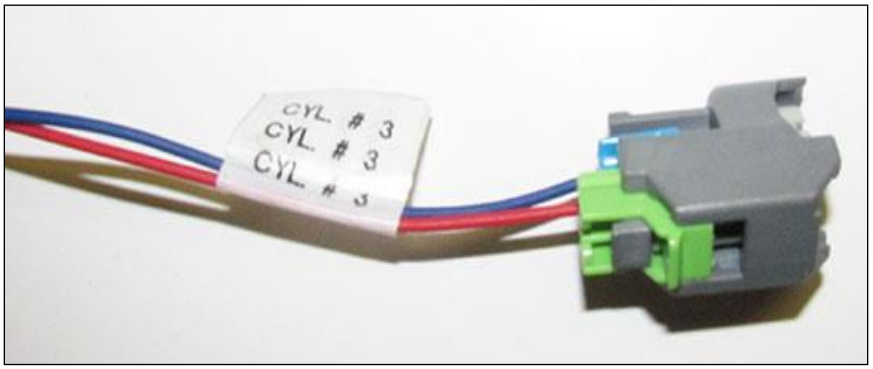




INJECTOR HARNESS PART NUMBER 558-201

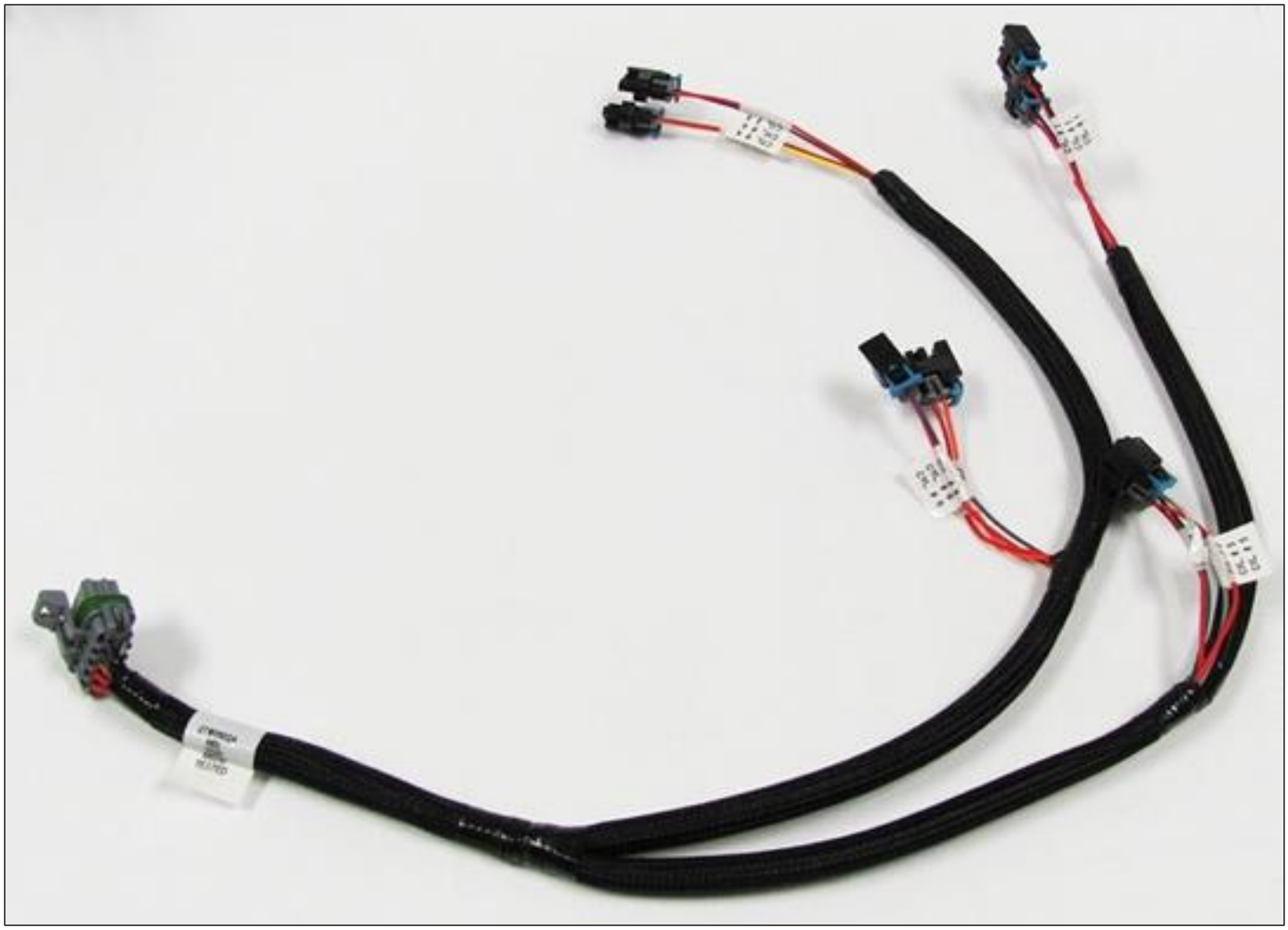


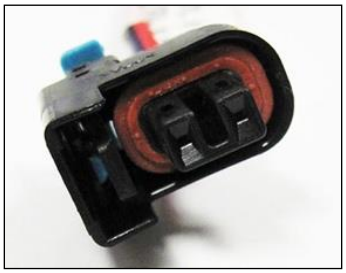


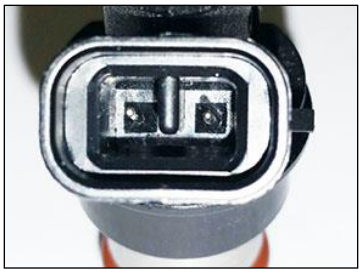


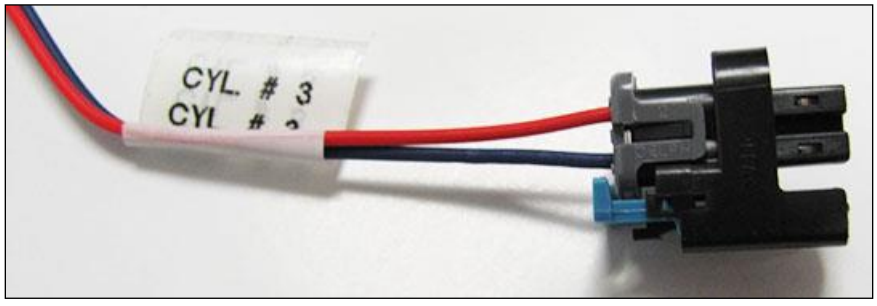
MULTEC2

INJECTOR HARNESS PART NUMBER 558-214









SUPPORTED FUEL INJECTORS

TERMINATOR X ECUS ONLY SUPPORT HIGH IMPEDANCE INJECTORS. THE USE OF LOW IMPEDANCE INJECTORS WILL DAMAGE THE ECU AND VOID THE WARRANTY.

The list below outlines injectors that are preconfigured selectable through the wizard. If your injectors are not on this list, Terminator X software will be required to configure before starting your engine.

GM	Holley	Sniper	Other
LS3 12576341	19LB Holley 522-198	Sniper 42 lb/hr (522-428S)	60LB Siemens Deka IV
GM 12580426 5.3 Flex Fuel	24LB Holley 522-248		FIC 525H
GM 12580681	30LB Holley 522-308		FIC 650H
GM 17113698	36LB Holley 522-368		FIC 775H
GM 25317628	42LB Holley 522-428		FIC 850H
GM 17113553	48LB Holley 522-488		FIC 1000H
GM 25323974			FIC 1100H
GM 25320288			FIC 1650H
GM 89017586			FIC 2150H
GM 12594512			
GM 12609749			
GM 12613411			
GM 12587269			
GM 12613412			

APPENDIX 3.0 – THROTTLE BODIES AND PEDALS

There are two styles of DBW throttle body connectors. The following part numbers are supported by Holley Terminator MPFI kits:

6 PIN CONNECTOR (LATE)

DRIVE BY WIRE HARNESS PART NUMBER 558-406

- 12570790
  - 2005-2008 Corvette, CTS-V and GTO
  - VIN Codes: E, U, W, Y
  - Engine Codes: L76, LQ4 (car), LS2, LS3, LS7
- 12580760
  - 2005-2008 Truck
  - VIN Codes: 0, 3, 4, 5, 8, C, H, J, K, L, M, Y
  - Engine Codes: L76, L92, LC9, LFA, LH6, LMF, LMG, LS2, LY2, LY5, LY6
- 12605109
  - 2009-2013 Corvette, Camaro, G8
  - VIN Codes: E, J, W, Y
  - Engine Codes: L76, L99, LS3, LS7
- 12629992
  - 2009+ Truck
  - VIN Codes: 0, 2, 3, 4, 5, 7, 8, A, B, C, F, G, H, J, K, L, M, P, Y
  - Engine Codes: L20, L76, L92, L94, L96, L9H, LC8, LC9, LFA, LH6, LH8, LH9, LMF, LMG, LS2, LY2, LY5, LY6, LZ1
- 17113669
  - 2001 thru 2005 Corvette & CTS-V
  - VIN Codes: G,S
  - Engine Codes: LS1, LS6

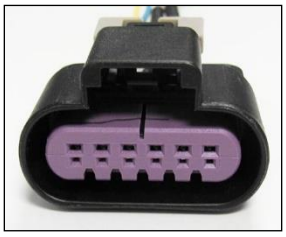
8 PIN CONNECTOR (EARLY TRUCK)

DRIVE BY WIRE HARNESS PART NUMBER 558-429

- 12570800
  - 2002-2007 Truck
  - VIN Codes: B, N, P, T, U, V, Z
  - Engine Codes: L33, L59, LM4, LM7, LQ4 (truck), LQ9, LR4

THROTTLE PEDAL

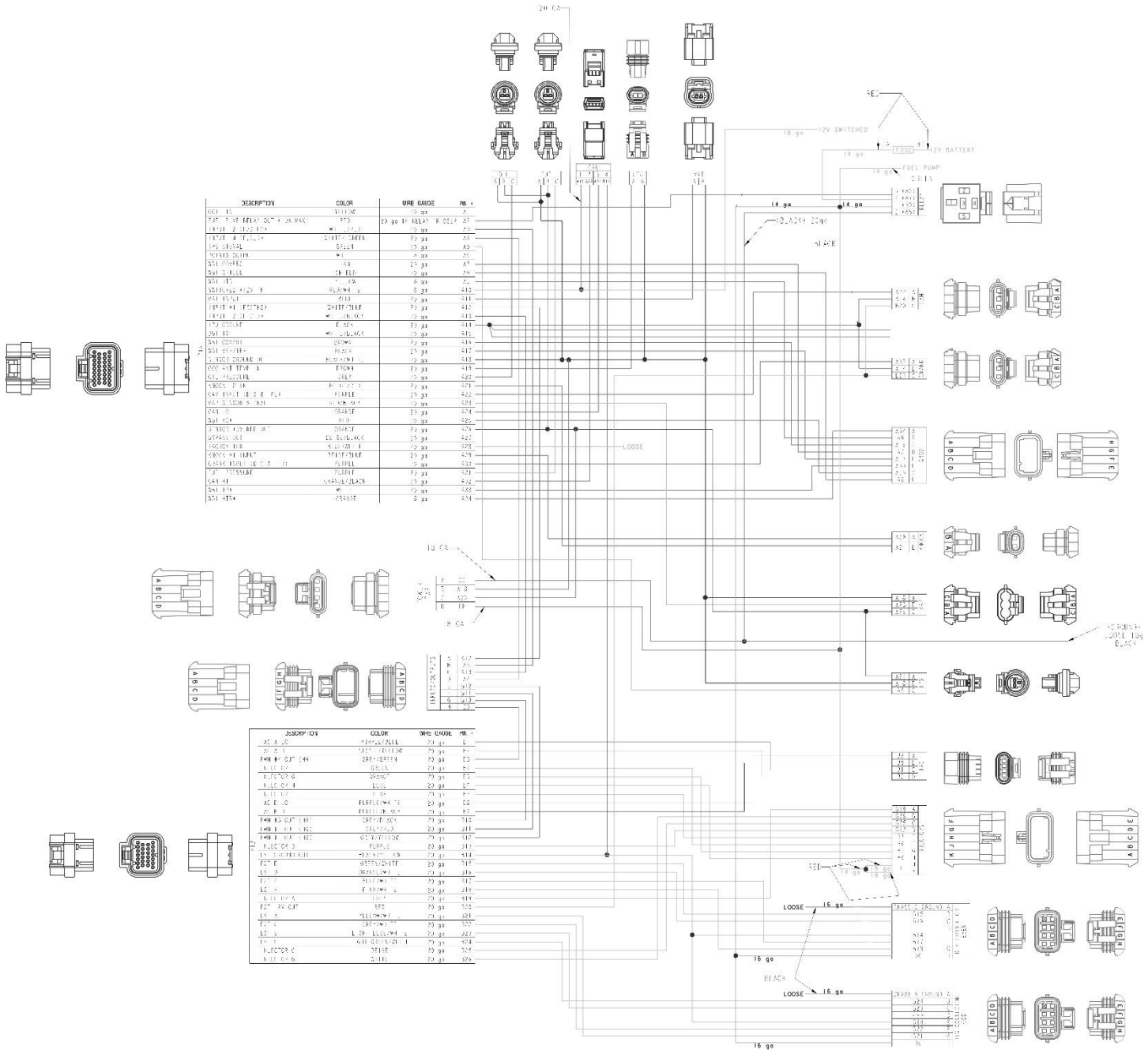
Holley recommends GM P/N - 10379038 which is a passenger car pedal with a 6 pin connector.



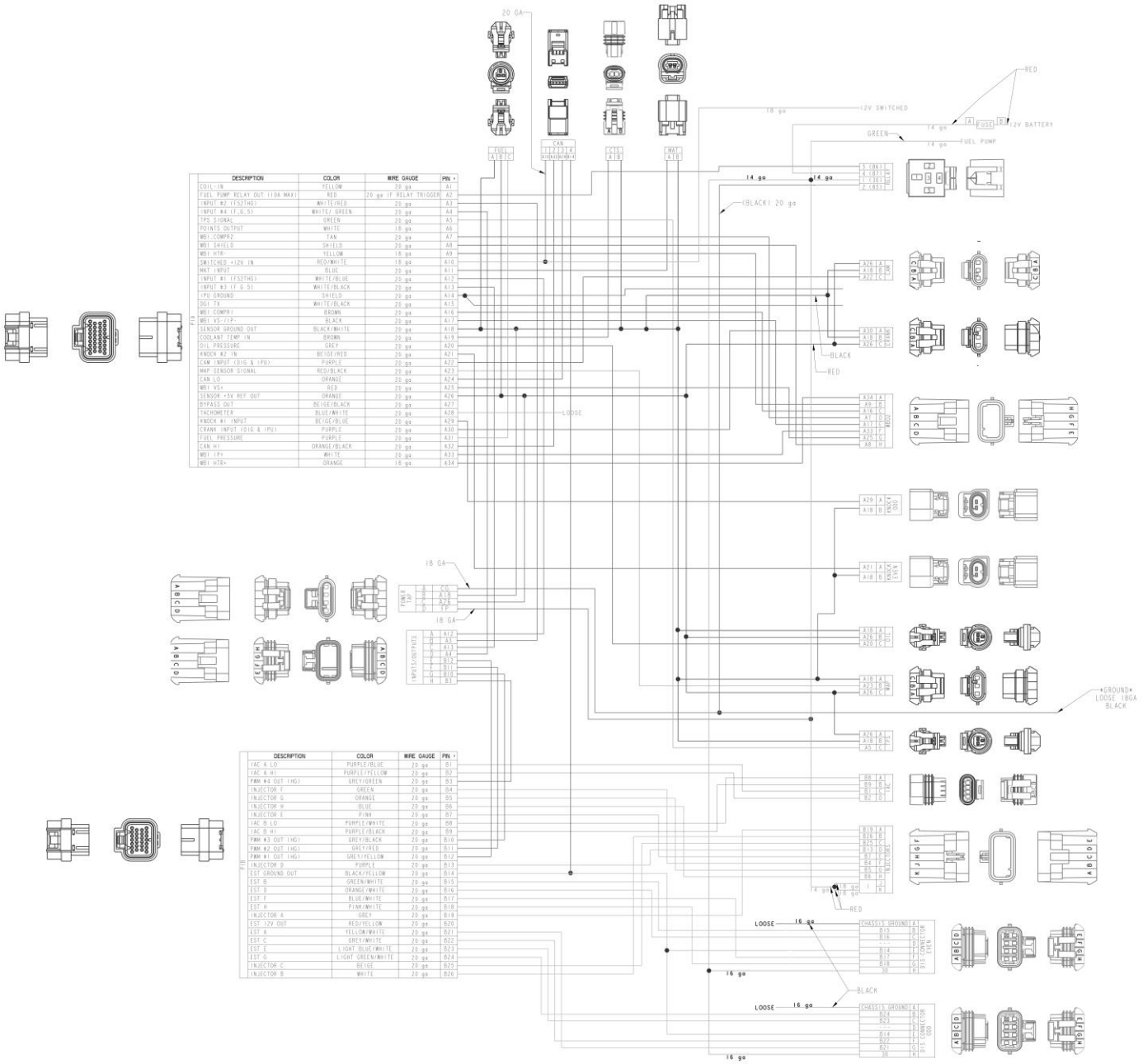
APPENDIX 4.0 – DIAGNOSTIC LEDS

LED#	Function	Color	Definition
1	Heartbeat	Green/Flash	ECU is powered
2	Engine running	Green	Engine is running
		Yellow	Engine is not running
3	Wideband status	Blue	too hot, too cold, slow warmup, uncalibrated
		Green	sensor is active and functioning properly
		Red	sensor is open or needs to be replaced
		Yellow	sensor is heating
		Off	sensor is disabled
4	TPS calibrated	Green	Calibrated
		Red	If DBW = Pedal & TB Calibration Error
			If non DBW - Calibration Error
		Cyan	DBW Pedal Calibration Error
		Purple	DBW TB Calibration Error
5	Off/undefined		Future
6	Crank	Green	When below Crank to Run RPM, tooth detected
		Blue	When below Crank to Run RPM, gap detected
		Red	Crank error detected -If engine continues to run, will stay Red until ECU is powered off -If engine shuts off due to severe signal loss, will stay Red until RPM re-sync OR key cycle
		Off	When above Crank to Run RPM and ECU is properly syncd
7	Cam	Green	When below Crank to Run RPM, tooth detected
		Blue	When below Crank to Run RPM, gap detected
		Red	Cam error detected -If engine continues to run, will stay Red until ECU is powered off -If engine shuts off due to severe signal loss, will stay Red until RPM re-sync OR key cycle
		Off	When above Crank to Run RPM and ECU is properly syncd
8	Off/undefined		Future

558-102 LS1/6 ENGINE MAIN HARNESS



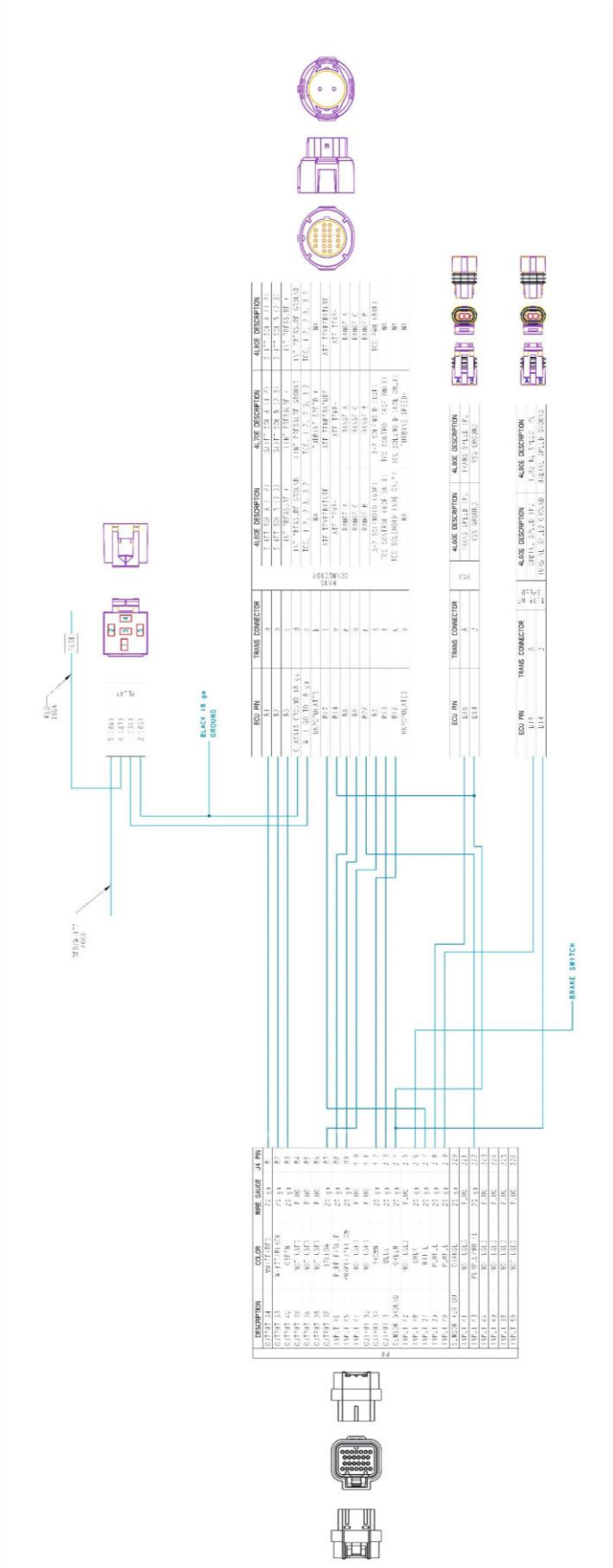
558-103 LS2/3/7+ ENGINE MAIN HARNESS



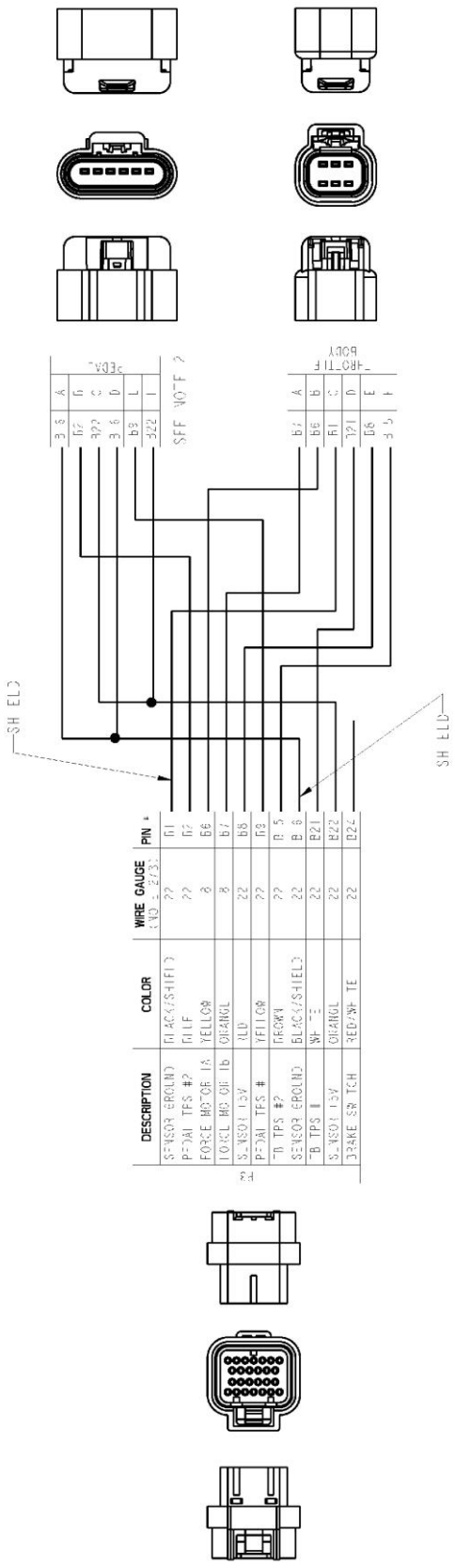
DESCRIPTION	COLOR	WIRE GAUGE	PIN #
COIL -IN	YELLOW	20 ga	A1
FUEL PUMP RELAY OUT (10A MAX)	RED	20 ga IF RELAY TRIGGER	A2
INPUT #2 (FS2THG)	WHITE/RED	20 ga	A3
INPUT #4 (F,G,S)	WHITE/ GREEN	20 ga	A4
TPS SIGNAL	GREEN	20 ga	A5
POINTS OUTPUT	WHITE	18 ga	A6
WSI COMPR2	TAN	20 ga	A7
WSI SHIELD	SHIELD	20 ga	A8
WSI HTR-	YELLOW	18 ga	A9
SWITCHED +12V IN	RED/WHITE	18 ga	A10
MAT -INPUT	BLUE	20 ga	A11
INPUT #1 (FS2THG)	WHITE/BLUE	20 ga	A12
INPUT #3 (T,G,S)	WHITE/BLACK	20 ga	A13
TPU GROUND	SHIELD	20 ga	A14
DGI TX	WHITE/BLACK	20 ga	A15
WSI COMPR1	BROWN	20 ga	A16
WSI VS-/TP-	BLACK	20 ga	A17
SENSOR GROUND OUT	BLACK/WHITE	20 ga	A18
COOLANT TEMP IN	BROWN	20 ga	A19
OIL PRESSURE	GREY	20 ga	A20
KNOCK #2 IN	BEIGE/RED	20 ga	A21
CAM INPUT (DIG & TPU)	PURPLE	20 ga	A22
MAP SENSOR SIGNAL	RED/BLACK	20 ga	A23
CAN LO	ORANGE	20 ga	A24
WSI VS+	RED	20 ga	A25
SENSOR +5V REF OUT	ORANGE	20 ga	A26
BYPASS OUT	BEIGE/BLACK	20 ga	A27
TACHOMETER	BLUE/WHITE	20 ga	A28
KNOCK #1 INPUT	BEIGE/BLUE	20 ga	A29
CRANK INPUT (DIG & TPU)	PURPLE	20 ga	A30
FUEL PRESSURE	PURPLE	20 ga	A31
CAN HI	ORANGE/BLACK	20 ga	A32
WSI TPI	WHITE	20 ga	A33
WSI HTR+	ORANGE	18 ga	A34

DESCRIPTION	COLOR	WIRE GAUGE	PIN #
IAC A LO	PURPLE/BLUE	20 ga	B1
IAC A HI	PURPLE/YELLOW	20 ga	B2
PWM #4 OUT (HG)	GREY/GREEN	20 ga	B3
INJECTOR F	GREEN	20 ga	B4
INJECTOR G	ORANGE	20 ga	B5
INJECTOR H	BLUE	20 ga	B6
INJECTOR E	PINK	20 ga	B7
IAC B LO	PURPLE/WHITE	20 ga	B8
IAC B HI	PURPLE/BLACK	20 ga	B9
PWM #3 OUT (HG)	GREY/BLACK	20 ga	B10
PWM #2 OUT (HG)	GREY/RED	20 ga	B11
PWM #1 OUT (HG)	GREY/YELLOW	20 ga	B12
INJECTOR D	PURPLE	20 ga	B13
EST GROUND OUT	BLACK/YELLOW	20 ga	B14
EST S	GREEN/WHITE	20 ga	B15
EST D	ORANGE/WHITE	20 ga	B16
EST F	BLUE/WHITE	20 ga	B17
EST H	PINK/WHITE	20 ga	B18
INJECTOR A	GREY	20 ga	B19
EST 12V OUT	RED/YELLOW	20 ga	B20
EST A	YELLOW/WHITE	20 ga	B21
EST C	GREY/WHITE	20 ga	B22
EST E	LIGHT BLUE/WHITE	20 ga	B23
EST G	LIGHT GREEN/WHITE	20 ga	B24
INJECTOR C	BEIGE	20 ga	B25
INJECTOR B	WHITE	20 ga	B26

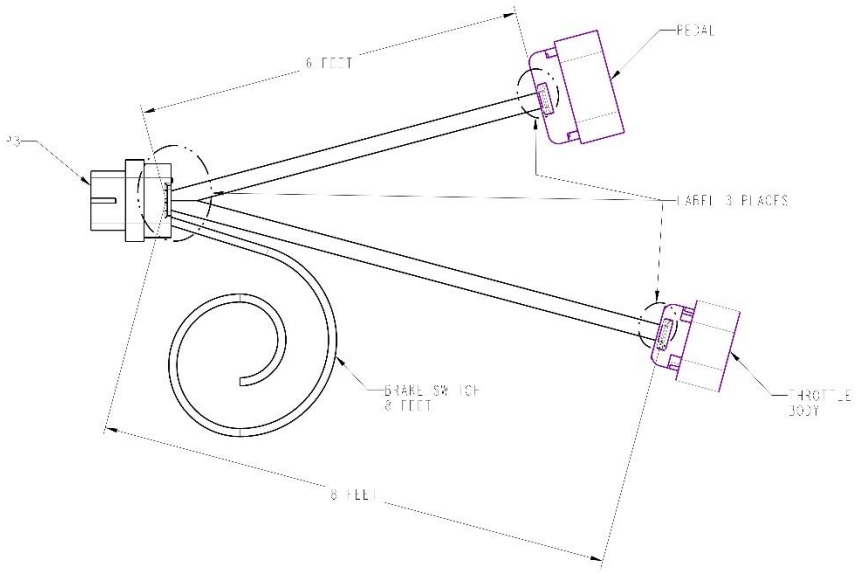
558-405 4L60/80E TRANSMISSION HARNESS

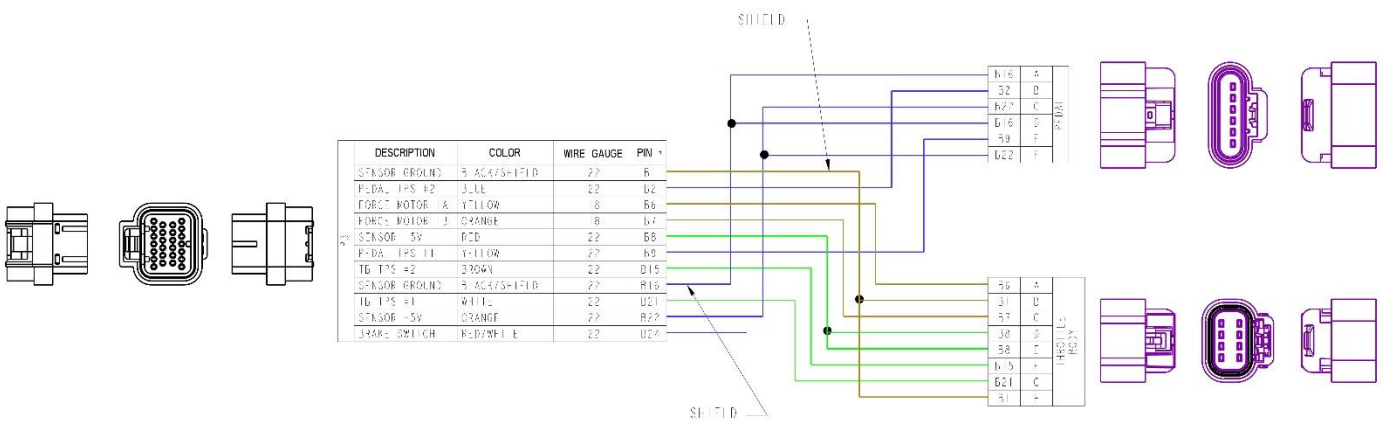


558-406 DRIVE BY WIRE HARNESS (LATE)



558-429 DRIVE BY WIRE HARNESS (EARLY TRUCK)





J3	DESCRIPTION	COLOR	WIRE GAUGE	PIN #
	SENSOR GROUND	B AG475-FILD	22	5
	PEDAL TPS #2	BLUE	22	62
	FORCE MOTOR A	YELLOW	18	66
	FORCE MOTOR B	ORANGE	18	67
	SENSOR 5V	RED	22	68
	PEDAL TPS #1	YELLOW	22	69
	TB TPS #2	BROWN	22	D15
	SENSOR GROUND	B AG475-FILD	22	B16
	TB TPS #1	WHITE	22	U21
	SENSOR +5V	ORANGE	22	B22
	BRAKE SWITCH	RED/WHITE	22	U24