# Sniper Standalone Transmission Controller
# Full User Manual
# 551-102

## Contents



## OVERVIEW

The Sniper Transmission Controller (STC) allows the use of common GM and Ford electronic four speed transmissions. Part Number 551-102 is a stand-alone controller and is intended to work with carbureted or EFI applications that don't support electronic transmission control. You will need a throttle position sensor if one is not already installed. The included 3.5" touch screen is used to perform all the allowable adjustments (shift speed, torque converter lockup, etc.) No programming is available with PC computer software, however the transmission functions can be data-logged and reviewed with Sniper EFI PC software.

## KIT CONTENTS/ADDITIONAL PARTS REQUIRED

This kit contains the Sniper Transmission Control Module, 3.5" Touchscreen handheld tuner, and power/sensor harness.

**The user must purchase a transmission harness separately** that fits their specific transmission. These harnesses are as follows (note that these are the same harnesses used for Holley Dominator and Terminator X Max ECUs):

558-405 – GM 4L60/70/80E

558-455 – 2009+ GM 4L60E*

558-470 – 1998+ Ford 4R70W/4R75W

558-471 – 1992-1997 Ford AODE/4R70W

* The “2009+” 4L60E specifically applies to OEM/factory original applications. When dealing with a GM Performance Parts, reman, or unknown year transmission the transmission connector should be checked per the image below. If pin “F” (Circled in **Figure 1** below) IS PRESENT, you need the 558-455 harness. If it is NOT present you need the 558-405 harness. Go by THIS PIN ONLY as the other pins may vary transmission to transmission. Be sure you compare your connector to the image below by “clocking” the pins based on the connector slot.


**Figure 1**

A throttle position sensor (TPS) is required. If one is not available Holley offers the following:

534-202 – For Holley carbs with electric chokes

534-214 – For Holley Gen 3 Dominator carbs

1951 – For Street Demon carbs

120002 – Can be retrofitted to most carbs

# GENERAL OPERATION

GM and Ford four Speed electronic overdrive transmissions are simple in operation. They have four speeds with the top gear being an overdrive and all have a lockup torque converter that eliminates any slippage when the lockup is applied. With a stock torque converter the lockup should only be applied under light throttle conditions or excessive wear will occur.

Upshifts, downshifts, and torque converter lockup are based on vehicle speed and throttle position (or optionally the MAP sensor) and are adjustable with the 3.5” touch screen.

# WIRING

**Transmission Harness**

Install the (purchased separately) transmission harness. Connected it into the 26 pin (smaller) connector on the STC unit. Instructions for the specific transmission harness can be found at Holley.com under the transmission harness part number. They typically have a power connection to the battery and are plug-and-play to the transmission.

**Loose Wires:**

The included harness with the 34 Pin connector has the following loose wire connections:

**Red (16 Gauge)** – Connect to battery power

**Black (16 Gauge)** – Connect to battery ground

**Red/White (20 Gauge)** – Connect to +12v switched ignition power

***RPM Signal Input*** – ONE of the following two wires (Purple or White) wires need to be connected to an RPM signal input as follows:

**Purple (20 Gauge)** – RPM Signal Input – This should be used when a "12 volt square wave" signal is available to connect to. This would be the "tach out" signal on a MSD/CD box, some MSD Ready-to-Run distributors, or possibly a signal out of an EFI ECU. NEVER, NEVER connect this directly to ANY ignition coil. This should never be connected to an HEI distributor or HEI coil.

**White (20 Gauge)** – RPM Signal Input – If a "12 volt square wave signal" is not available and a MSD/CD ignition box is NOT used. Connect this to the negative side of the coil. This would typically be used on a stock factory vehicle.

**Grey/Red (20 gauge)** – Fan Output 1- Optional – Turns on/off based on transmission temperature. This is a GROUND output and should ALWAYS be used to trigger a relay.

**Grey/Yellow (20 gauge)** – Fan Output 2- Optional – Turns on/off based on transmission temperature. This is a GROUND output and should ALWAYS be used to trigger a relay.

**Blue/White (20 gauge)** – Speedometer Output – Optional – Used to send signal to an electronic speedometer. (configure PPM setting in the 3.5 handheld).

**3.5" Touch Screen LCD Connection:**

Connect the 3.5 Touch Screen into the 4 pin CAN bus connector.

**Terminated Connectors:**

There are two terminated connectors in the harness, the TPS (Throttle Position Sensor) and MAP (Manifold Air Pressure) sensor. One or both are required depending on the calibration. All base calibrations are intended for use with a TPS input (TPS is REQUIRED for proper operation), and no MAP sensor input. A MAP sensor is typically used with boosted applications for the Line Pressure table (OPTIONAL).

TPS – The TPS connector is a common style used for a variety of Throttle Position Sensors. If your TPS uses a different connector, replace the one on the harness. The pinout is as follows:

Orange Wire – 5 Volt Reference

Black Wire – Sensor Ground

Green – TPS Signal

MAP – The MAP sensor connector is for the common GM 1 Bar MAP. (Holley PN 538-24). The pinout is as follows:

Orange Wire – 5 Volt Reference

Black Wire – Sensor Ground

Red/Black – MAP Signal

STC 34 Pin Connector Pinout (pins not shown are not used):

| Description | Color | Pin |
|---|---|---|
| Coil – Input | White | A1 |
| Battery Power (A2/3/4 tied together) | Red | A2 |
| Battery Power (A2/3/4 tied together) | Red | A3 |
| Battery Power (A2/3/4 tied together) | Red | A4 |
| TPS Input | Green | A5 |
| Ground (A6/7/8 tied together) | Black | A6 |
| Ground (A6/7/8 tied together) | Black | A7 |
| Ground (A6/7/8 tied together) | Black | A8 |
| Fan Output | Grey/Red | A9 |
| Switched +12V Input | Red/White | A10 |
| Fan Output 2 | Grey/Yellow | A17 |
| Sensor Ground | Black | A18 |
| MAP Sensor Input | Red/Black | A23 |
| CAN Low | Orange | A24 |
| CAN Power | White | A25 |
| Sensor +5V | Orange | A26 |
| Speedometer Out | Blue/White | A28 |
| Crank/RPM Input | Purple | A30 |
| CAN Hi | Tan | A32 |
| CAN Ground | Black | A33 |
| | | |

# INITIAL USE

Turn on the vehicle's ignition power. When powered up you'll see the main screen (**Figure 2**). The Sniper EFI as well as the Transmission controller functions (tuning, gauges, wizards, logging) will all be performed through the same icons in **Figure 2**.


**Figure 2**

# PERFORM WIZARD

The STC wizard must be performed. This will prompt the user to select the proper transmission, tire size, etc. This is required for the transmission controller to function.

Numeric entries can be entered using the "slider bar" or clicking on the numeric value and using the keypad. Select "Next" after making a selection or "Back" to a previous entry.

Select the "Wizards" icon.

Select the "STC Wizard" icon (**Figure 3**).


**Figure 3**

1) Select Transmission Type (**Figure 4**) – more detailed information on these selections are a few pages down in the manual if needed. Note: The 1.63 ratio is by far the most common 4L60E version.


**Figure 4**

**2)** Select Ignition Type – See the WIRING section above. If you connected the WHITE wire, select "Coil (-)", if you connected the purple wire, select "CD Box".

3) Number of Cylinders


4) Select MAP Sensor – If your application is naturally aspirated (no turbo or supercharger), you'll almost always not need/use a MAP sensor. Select "None Used" if none is used.


5) Enter Tire Diameter (**Figure 5**) – Enter Height/Diameter for rear tire in inches.


**Figure 5**

6) Enter Rear Gear Ratio (**Figure 6**).


**Figure 6**

7) The next entry is "Automatically Scale Shift Tables" (**Figure 7**). It is advised to select "Yes" to this. This will rescale all of the up/down shift tables for the user's specific tire diameter and rear gear ratio (compared to the base calibration values of a 4.10 gear and 27.7" tire). If this is not done, up/downshifts may occur early or late and a lot of manual adjustment may be required.


**Figure 7**

8) At this point a base calibration will be created and you'll see a file name of "AT" or "FAT" (**Figure 8**). Select "Start" and you will be prompted to cycle the ignition power. Select "Finish" (**Figure 9**).


**Figure 8**


**Figure 9**

9) Next, return to the "Wizards" menu and select "TPS Autoset". Select this icon and follow the instructions. Press the pedal fully, twice, when requested. If the TPS Autoset is not successful it means the TPS wiring is not correct or there is a sensor issue.


At this point, the transmission controller programmed with a base calibration and is in a drivable condition. Use the Tuning Parameters to adjust transmission shifting, torque converter, and other operations. Information is provided below. It is highly advised to read all of these instructions and perform any adjustments before driving the car.

# TUNING AND SETUP PARAMETERS

All Sniper Transmission Control tuning and setup parameters are accessed from the home screen via the "Tuning" and "Transmission" icons. The following goes through all these which includes how to tune transmission operation. **Figure 10** are the choices shown under the "Tuning" icon from the home screen.


**Figure 10**

Select the "Transmission" icon. The icons in Figure 11 are displayed.


**Figure 11**

## Setup Icon

Select the Setup icon, and the choices in **Figure 12** are displayed.  Most (not all) of these were configured during the wizard process.


**Figure 12**

## General Icon

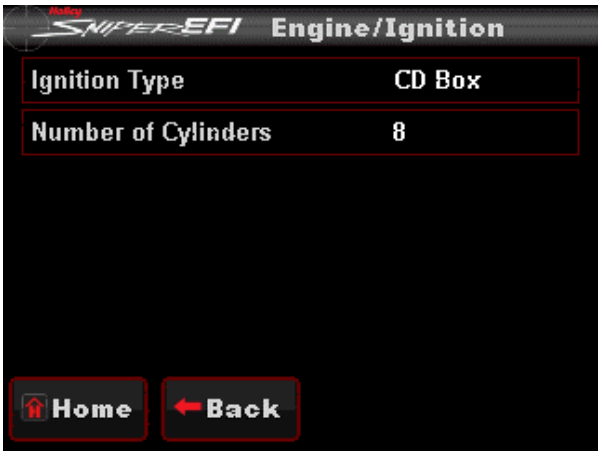
Select the general icon.  The transmission types are displayed (previously selected in the wizard).

Transmission Type – Select the proper type from the following:

- GM 4L60/5E with 1.75 second gear, Pre-2009 (this is an uncommon transmission found in some 305 engine applications)
- GM 4L60/5E with 1.63 second gear Pre-2009 (most common application, select this if you are unsure)
- GM 4L70E (2009+)
- GM4L80/5E
- Ford AODE
- Ford 4R70W (92-97)
- Ford 4R70W (98-03)
- Ford 4R70W (2003+)

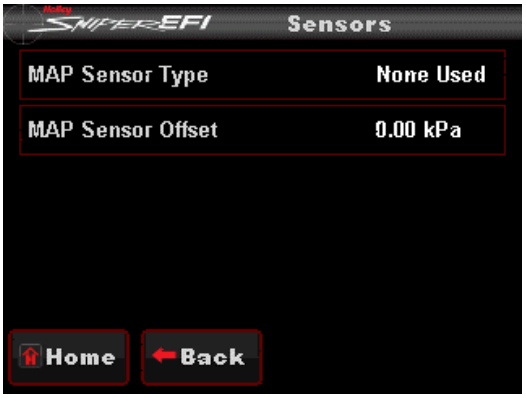
## Engine/Ignition Icon

These were selected in the wizard process.



## Sensors Icon

This area can be used to change/add a MAP sensor. The “MAP Sensor Offset” shouldn’t need to be changed from 0, but can be use if the sensor value is off by a few percent.




## Gear Ratios Icon

Gear Ratios – This was entered when the “STC Wizard” was used. Allows the choice of “Stock” or “Custom” ratios. Unless the transmission was custom built with different gear sets, “Stock” will always be chosen. When Custom is selected it will allow editing of the gear ratios.


**Figure 13**

## Speed Calculation Icon

Tire Diameter – This should already be entered if the “STC Wizard” was used. Enter the tire diameter (height) in inches

Rear Gear Ratio – This was entered when the “STC Wizard” was used. Enter the rear axle gear ratio.

Speedometer Output – The speedometer is a 12v pulsed output typically used to drive an electronic speedometer. It is pre-programmed to be enabled. There’s no harm in leaving it enabled even if it isn’t being used, make sure the loose speedometer output wire isn’t shorted however.

Speedometer PPM – This is how many “Pulses per Mile” are output on the speedometer output. 4000PPM is a commonly used value.


**Figure 14**

## Table Config Icon

Line Pressure Scale – Chooses whether the MAP (Manifold Air Pressure) sensor or TPS (Throttle Position Sensor) is used for the line pressure table. Naturally aspirated engines should use TPS and boosted engines typically use MAP, as engines can generate boost under non-WOT TPS conditions which require higher line pressure. The base Wizard calibrations are set to use TPS. If you're engine is boosted you should highly consider changing this and tuning so that you have maximum line pressure (0% duty cycle) at by at least 100 kPa/0 PSI of boost as a base recommendation.

Torque Converter Lockup Scale - Chooses whether the MAP (Manifold Air Pressure) sensor or TPS (Throttle Position Sensor) is used for the torque converter lockup table. Naturally aspirated engines should use TPS and boosted engines can use either depending on the preference of the tuner. The base Wizard calibrations are set to use TPS.


**Figure 15**

## Shifts Icon

**<u>Up/Down Shift Tables</u>**

These tables are used to command the up and down shifts between each gear. **Figure 16** gives the low/high range of each gear. Select each one separately to edit the up and downshifts for each gear. **Figure 17** is the graphical editing screen. The Y axis (up and down) is based on vehicle speed. The X axis (right to left) is based on TPS (throttle position). One gear change at a time is graphed and can be edited. The red line is the up-shift line. The blue line is the down-shift line. The down-shift line should ALWAYS be below the up-shift line. The touch screen display is programmed to not allow for a downshift to be above an upshift in each gear (it always forces a 2 MPH spread, minimum and will give the user a warning if this occurs). Only one item (upshift or downshift per gear) is editable on each selection.

There should be enough "space" *horizontally* (left to right) between the up-shift and down-shift lines such that the transmission does not shift back and forth between gears when the TPS or MAP values change at the same speed. This occurs when you depress the pedal and the car isn't accelerating at a fast rate.


**Figure 16**

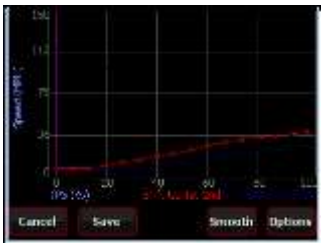



**Figure 17**


**Figure 18**

**Figure 18** is opened by selecting the "Options" tab on **Figure 17**. The "Increase" and "Decrease" allows a single upshift or downshift line to be moved up or down by a percentage. *This is the easiest way to change a curve*. The "Entire Curve" and "Point-by-point" changes whether the curve is changed by an individual point or the entire curve moved. The Digitally and Graphically selection are choices on how the graph is edited. Digitally is usually easiest.

Using a stylus/pointer, is the easiest way to edit.

Tuning the up/down shift tables dramatically affects the "feel" of how the transmission operates. Many times this is up to the preference of the user. Raise or lower the shift points until they suit individual tastes.

You also never want a lower gear up shift or down shift point to occur at a higher vehicle speed than a higher gear shift point. So, scroll through every table to make sure this is the case at each TPS/MAP point.

Up/Down Shift Calibration DON'TS:

- Never allow for a downshift point to be at a higher vehicle speed than the up shift point (the user will be prompted with a warning and this will not be allowed if this is attempted)

- Never allow for an up-shift point on a lower gear, to occur at a higher vehicle speed than a higher gear shift point. This can be checked by looking at the “Shifts” screen and viewing the lowest and highest shift MPH for each upshift and making sure the “Shift Up 1st-2nd” values are lower than the “Shift Up 2nd-3rd” values for example.

## WOT Shifts Icon

The WOT shift tables (**Figure 19**) are purely based on RPM. Enter the engine speed at which you want them to occur when at wide open throttle.


**Figure 19**

## TCC Icons

The TCC icons (**Figure 20**) allow complete tuning of all torque converter lockup operations.


**Figure 20**

**Activation Icon**

The TCC Activation parameters (**Figure 21**) allow for various parameters to adjust when the converter is locked.


**Figure 21**

Minimum Gear to Enable - Selects the minimum gear that the TCC will be applied. The TCC is typically only applied in an overdrive gear.

Minimum RPM to Enable - Minimum engine speed at which the TCC will apply. This value can be adjusted so that engines with large camshafts, etc., do not hesitate if the TCC is applied at too low of an engine speed, causing the engine to lug.

RPM to Disable - The RPM to Disable TCC is applied 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.

Time in Gear Before Lockup – This is a delay that occurs before the converter locks when it shifts into a gear where lockup occurs. 2 seconds is a good starting point for good drivability.

**De-activation Icon**

The De-activation parameters (**Figure 22**) are various parameters to adjust when the converter unlocks.


**Figure 22**

Max 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. If that is the case, it is best to unlock the converter when more power is being applied which can simply be performed by inputting a TPS value typically between 25-50%.

TCC Disable – This is used to turn all TCC functionality On and Off. It would always be on unless there was a problem or reason to completely disable it.

Unlock During Upshift – This parameter only comes into play if the converter is locked in multiple gears (for example both 3rd and 4th). If enabled the converter will unlock when an upshift is commanded then relock after the "Time in Gear Before Lockup" occurs.

Unlock During Downshift – This parameter only comes into play if the converter is locked in multiple gears (for example both 3rd and 4th). If enabled the converter will unlock when a downshift is commanded then relock after the "Time in Gear Before Lockup" occurs.

**Lock/Unlock Icon**

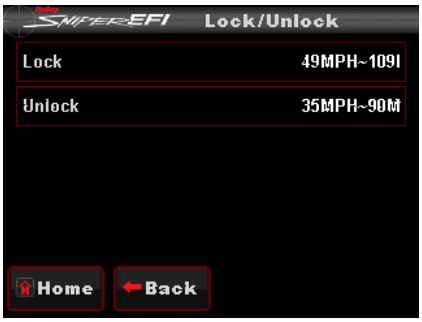



**Figure 23**

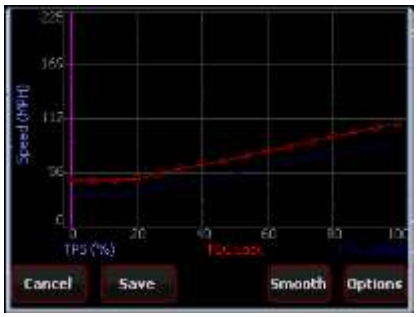



**Figure 24**

Lock and Unlock – These parameters (**Figures 23** & **24**) 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.

**Slew Rate Icon**


**Figure 25**

These parameters (**Figure 25**) are used to adjust "how hard the lockup hits". The can be adjusted so that the lockup clutches slip some at apply.

Lockup Beginning Duty Cycle - This is typically set at 50%

Lockup Ending Duty Cycle – This needs to be set at 100%

Lockup Time – This is how long it takes to go from the beginning to ending duty cycle. .5 seconds makes for a quick, hard apply, increasing this value to 1-3 seconds will smooth the lockup apply.

Unlock Beginning Duty Cycle – This should be set to 100%

Unlock Ending Duty Cycle – This is typically set to 50%

Unlock Time – This is typically set to .5 seconds.

## Line Pressure Icon


**Figure 26**

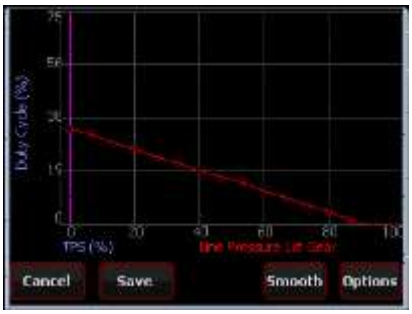



**Figure 27**

The line pressure table (**Figures 26** & **27**) determines how much line pressure is applied in each gear based on TPS or MAP. Each gear is separately editable. The following reviews what "Gear to Edit" affects what area:

1st Gear – Pressure in 1st gear

2nd Gear – Pressure on 1-2 shift and 2nd gear

3rd Gear – Pressure on 2-3 shift and 3rd gear

4th Gear – Pressure on 3-4 shift and 4th gear

The higher the Duty Cycle Percentage, the LESS line pressure there will be. The Duty Cycle should increase as the TPS or MAP sensor increases (load increases).

If a shift is too harsh, lower the line pressure for that shift, at the specific MAP or TPS position the shift occurred. When online, the graph will be highlighted to show the present TPS/MAP location. The feel may be dependent on the torque converter used. A stock torque converter may require less line pressure so the shifts aren't overly harsh. A "high stall" converter may use more line pressure to give a better feel on a shift.

At idle and cruise, values above 40-50% typically are not suitable, resulting in low line pressure which will damage the transmission quickly. Idle values are typically 35-40 and will decrease to 0 at 80-100% throttle.

At WOT, the line pressure should be at or close to the maximum pressure (0% duty cycle).

**Figure 28** is opened when "Options" is selected. It is easiest to us the "Softer" and "Firmer" buttons on it to soften and firmware shifts/line pressure.


**Figure 28**

**Temperature Modifier**

The Temp vs. Line Pressure table (**Figure 29**) is used to alter the line pressure base on transmission fluid temperature. When the fluid is cold, it is thicker. The line pressure can be increased to maintain the same end "feel" when the fluid is cold as when warm. To "increase" line pressure, enter a negative value in the Temp vs. Line Pressure chart. Values of -5 to -7% are typically used at temps below 100°F.

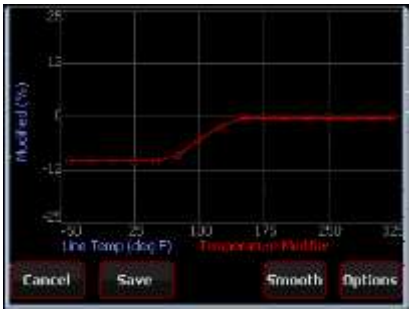



**Figure 29**

## Outputs Icon

Enable Line Temp Fan #1 (**Figure 30**) – This is pre-programmed in a disabled state. To use, it must be enabled with the handheld. When enabled, an output (Pin A9, Grey wire with red stripe) is triggered that is intended to turn on a fan based on the transmission line temperature. The "On" temperature is when the output is activated and the "Off" temperature is when the output will be deactivated. The Off temp must be lower than the on temp.

Enable Line Temp Fan #2 (**Figure 30**) - This is pre-programmed in a disabled state. To use, it must be enabled with the handheld.When enabled, an output (Pin A17, Grey wire with yellow stripe) is triggered that is intended to turn on a fan based on the transmission line temperature. The "On" temperature is when the output is activated and the "Off" temperature is when the output will be deactivated. The Off temp must be lower than the on temp. *Note that the gauge screens do not show Fan #2 status.*


**Figure 30**

# MONITORS/GAUGES

You can view the transmission parameters by selecting the “Monitor” icon and then either the “Monitors” or “Mulit-Gauge” icons. Monitors has two transmission specific screens (Trans #1 and #2) (**Figures 31-33**) and Multi-gauge has a “Trans/Engine” screen (**Figures 34-35**). You can set up a custom screen using the “Dash #1/2/3” screens.


**Figure 31**


**Figure 32**


**Figure 33**


**Figure 34**


**Figure 35**

**LED Definition**

The unit has 8 LEDs. Three of them are used as follows:

LED #1 – Blinks green to indicate the unit is powered and basic operation is being properly performed.

LED #2 – This LED will light up blue when an ECU (such as a Sniper EFI unit) is connected and the STC is properly receiving CANbus information. If an ECU is connected and powered and this LED is not lit up, there is a CANbus issue (wiring connection, etc.). Note: Having the 3.5” handheld display connected by itself will not cause this LED to light up as is the cae in standalone mode.

LED #3 – This will light up red when the unit does not have a proper calibration loaded. When it is operating properly it should not be lit.

LEDs #4-8 – None of these will be active.

# FIRMWARE UPDATES

**Firmware Updates – Updating the STC**

To update the STC firmware (there shouldn’t be a need to do this typically, so unless you are aware of a specific need don’t do it), copy the new firmware to the SD card. Copy it to the “STC” directory on the SD card. Insert the SD card into the 3.5 handheld. Select the “File” icon, the “STC HW/FW” icon. Next select the “Upgrade STC Firmware” button. Select the desired firmware to update to.

**Holley Performance Products**
**Toll Free Technical Service: 1-866-464-6553**
**Technical Service: 1-270-781-9741**
**For online help, please refer to the Technical Information section of our website: www.holley.com**



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