



# **Quick 1**

**PROGRAMMABLE TRANSMISSION CONTROLLER**



**Installation and Operation Manual for 4L60E,  
4L65E, 4L70E, 4L80E, and 4L85E transmissions**

US Shift Transmission Control System instruction and operation manual.

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#### **APPLICATION COVERAGE**

This system works with 4L60E, 4L65E, 4L70E, 4L80E, and 4L85E automatic transmissions (4L60E 1996 and up only). It is recommended that you use the Baumann wiring harness with this system.

## **CONTENTS**

<b>Preparation</b>	<b>Page 4</b>
<b>Connecting the Essentials</b>	<b>Page 5</b>
<b>Setting up the Quick 1</b>	<b>Page 10</b>
<b>Notes on Installation</b>	<b>Page 12</b>
<b>Transmission Diagrams</b>	<b>Page 14</b>
<b>Optional Features</b>	<b>Page 16</b>
<b>Manual Shift Connections</b>	<b>Page 18</b>
<b>Shiftware</b>	<b>Page 22</b>
<b>Important Information</b>	<b>Page 25</b>
<b>Troubleshooting</b>	<b>Page 26</b>
<b>Contact</b>	<b>Page 28</b>

### **READ BEFORE PROCEEDING**

Before installing the Quick 1 unit, we recommend you read the manual from beginning to end. Some of the information in this manual is very important and, if the unit is improperly installed or an error code misunderstood, could result in serious damage to your vehicle and transmission.

## **PREPARATION**

### **4L80E Transmission:**

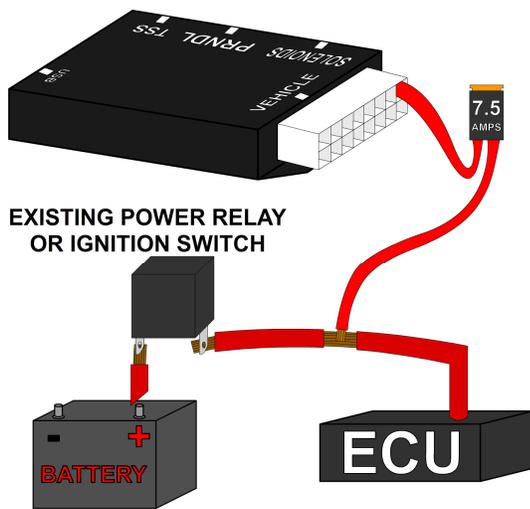
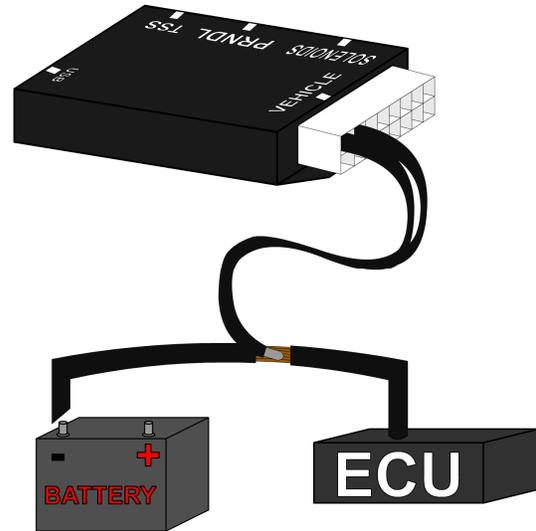
Pre-1993 4L80E transmissions use a different internal wiring harness and pass-through connector. This early harness has a problem with leaking fluid at the pass-through connector. GM recommends upgrading to the newer connector and wiring harness. Because of this, we do not provide a wiring harness for it. If you have one of these early transmissions, it will be necessary to upgrade to the 1993+ internal wiring harness.

The Bosch pressure control solenoid used in pre-1994 4L80E transmissions is not compatible with the Quick 1 TCS. You will need to upgrade it to the 1994+ Holley solenoid. The older Bosch solenoid is silver, while the newer Holley solenoid is black. If your solenoid is already black, you have the right one and it doesn't need to be changed. The GM part number for the Holley pressure control solenoid is 8684216.

## CONNECTING THE ESSENTIALS (ELECTRONIC FUEL INJECTION)

### Step 1: Ground

Splice the ground wires (Pins 15 & 16 Black) from the Quick 1 into the main ECU (Engine Control Unit) ground wire. Do NOT connect the ground wires to sheet metal or other ground sources. The Quick 1 MUST be connected to the Main ECU ground, as close to the ECU as possible.

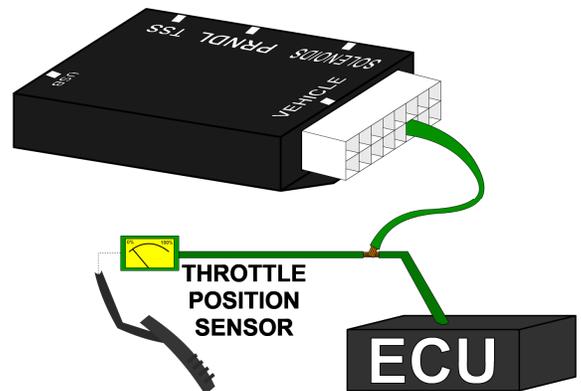


### Step 2: Power

Splice the power wire (Pin 9 Red with 7.5 Amp fuse) from the Quick 1 into the main ECU (Engine Control Unit) ignition-switched power wire.

### Step 3: Throttle Position Sensor or Accelerator Pedal Position Sensor

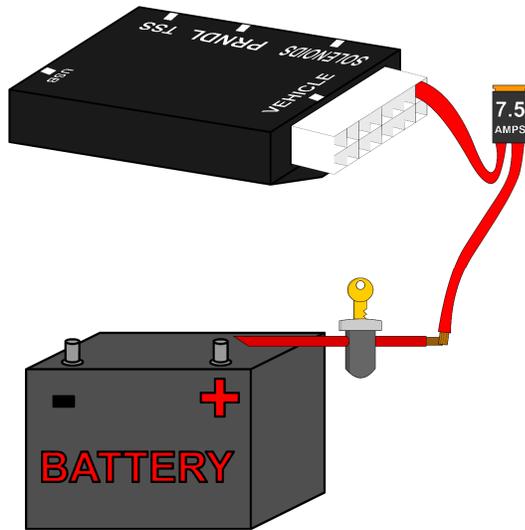
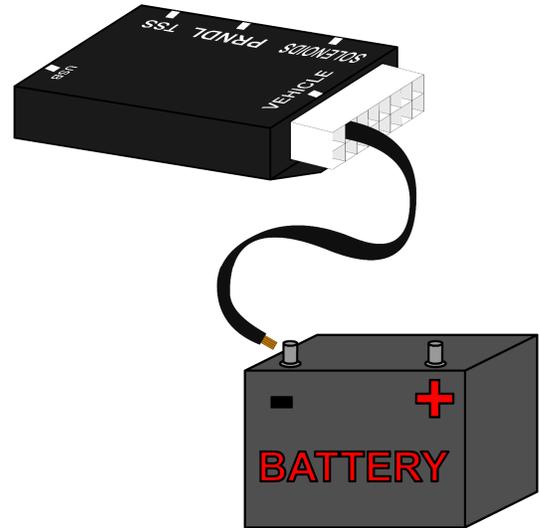
Splice the Throttle Position Sensor signal wire (Pin 3 Green) from the Quick 1 into the Throttle Position Sensor (TPS) signal input of the ECU (Engine Control Unit). If the vehicle has Electronic Throttle Control, use the Accelerator Pedal Position (APP) Sensor instead of the TPS.



## CONNECTING THE ESSENTIALS (CARBURETED AND MECHANICALLY-INJECTED DIESEL)

### Step 1: Ground

Connect the ground wire (Pin 15 Black) from the Quick 1 directly to the battery ground post or negative battery cable. Do NOT connect the ground wire to sheet metal or other ground sources. The Quick 1 MUST be connected directly to the battery ground post or negative battery cable.



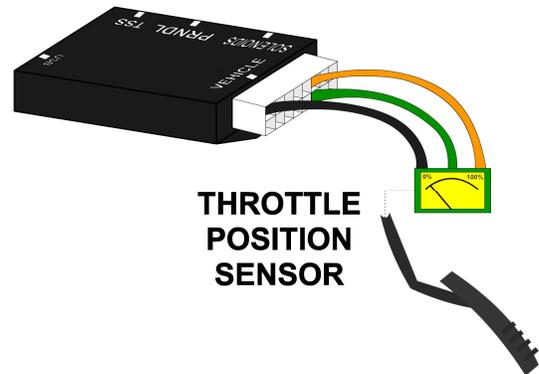
### Step 2: Power

Connect the power wire (Pin 9 Red with 7.5 Amp fuse) from the Quick 1 to ignition-switched power wire. Do NOT use accessory-switched power.

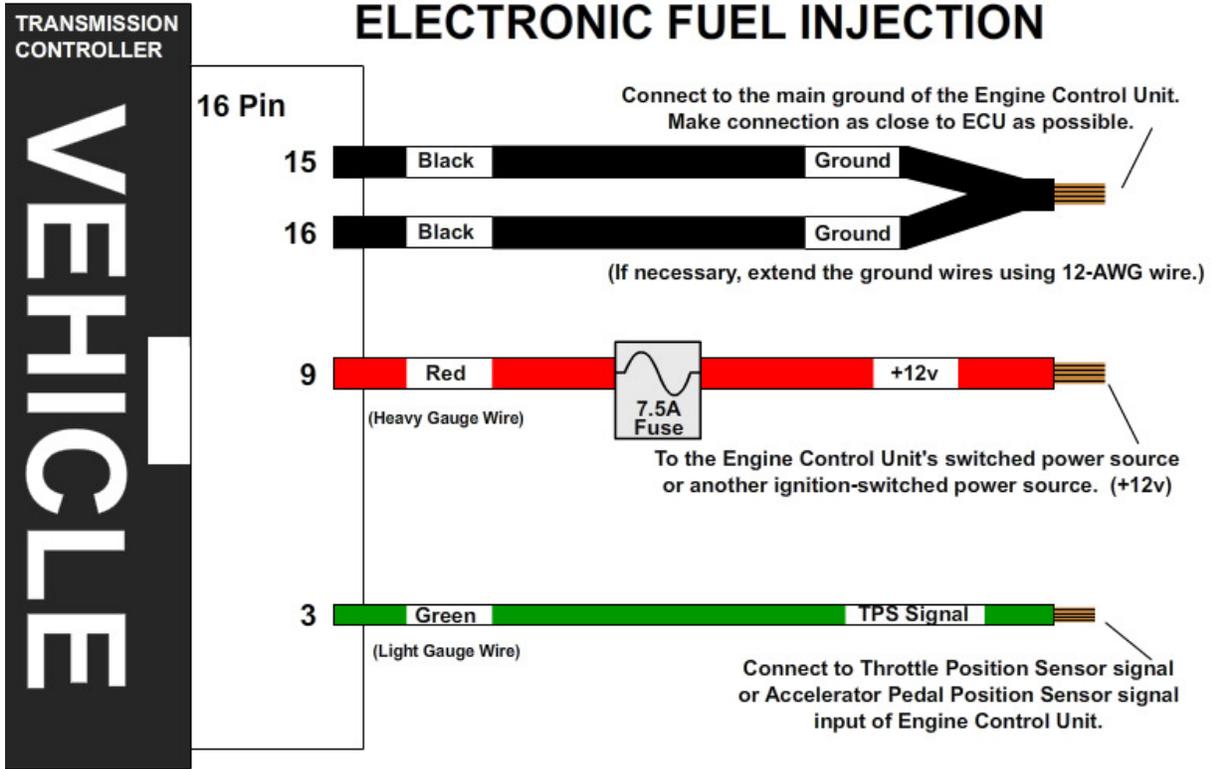
### Step 3: Throttle Position Sensor

Attach the 3 Throttle Position wires from the Quick 1 to the Throttle Position Sensor. Pin 16 Black is dedicated ground. Pin 11 Orange is +5v reference feed. Pin 3 Dark Green is the position sensor signal.

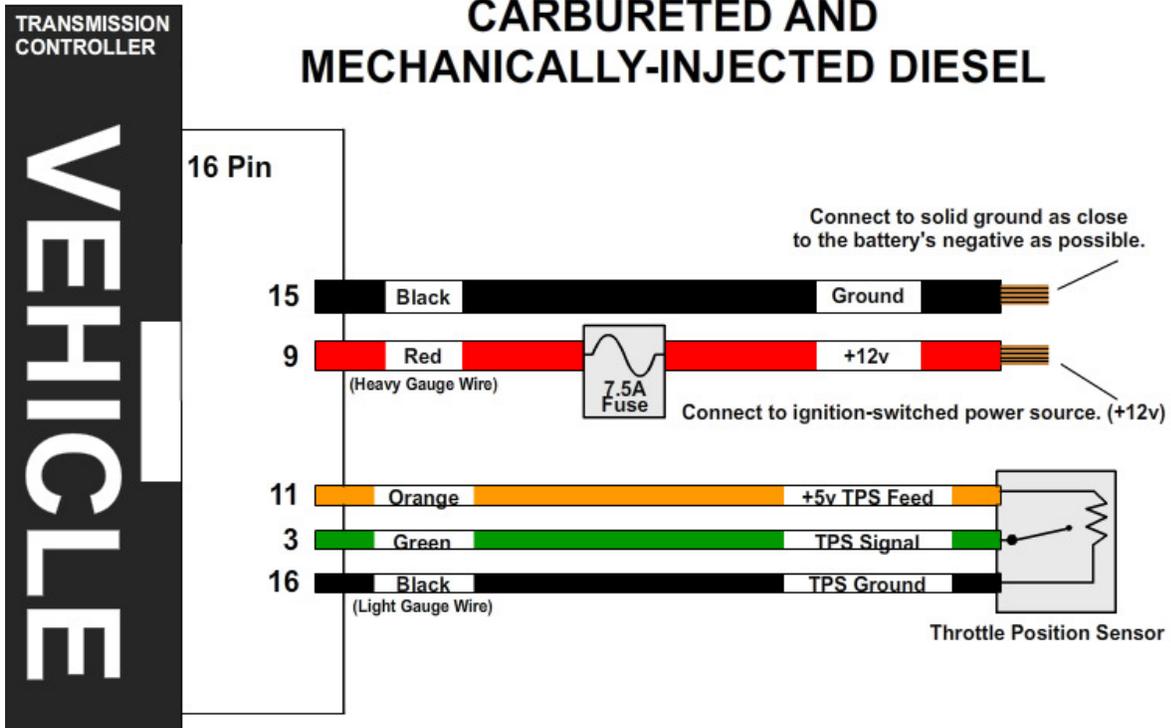
See the "Throttle Position Sensor" section for details.



# BASIC VEHICLE CONNECTIONS: ELECTRONIC FUEL INJECTION



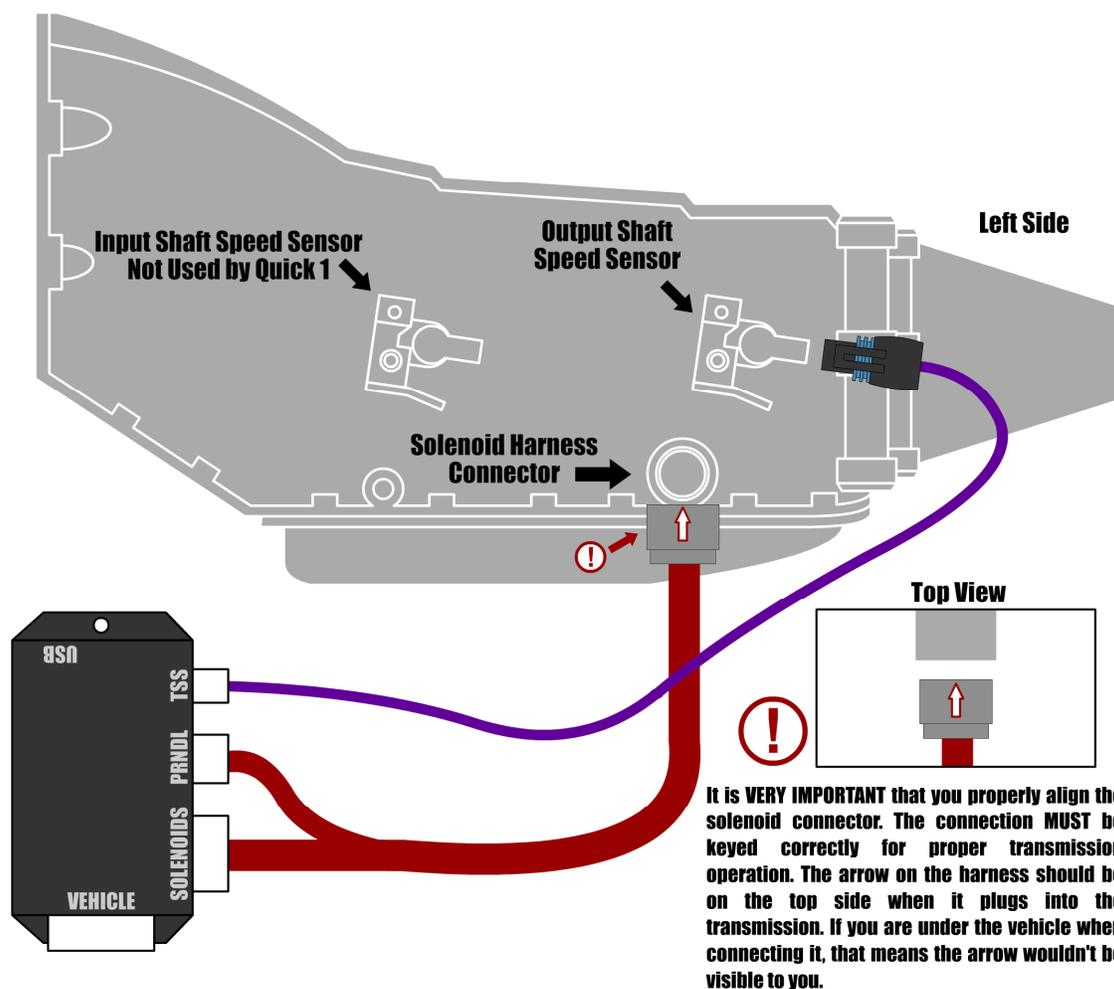
# CARBURETED AND MECHANICALLY-INJECTED DIESEL



#### Step 4: Transmission Connectors (4L80E)

Connect the Solenoid and TSS cables to the transmission. **THE CONNECTORS MUST BE KEYED CORRECTLY** for proper transmission operation (see the diagram below for details). Connect both TSS cables according to their labels. Additionally, connect the Neutral Safety Switch and the Backup Lamp Switch. The neutral safety switch isn't related to the Quick 1 controller or harness, but should be included in every installation.

In some 4x4 transmissions, the output speed sensor may be missing or non-functional due to lacking a tone ring. You can use a speed sensor in the transfer case instead or install a 40 pulse tone ring in the transmission. A similar type of 40 pulse sensor may be used in transfer cases that do not have a mechanical speedometer drive.

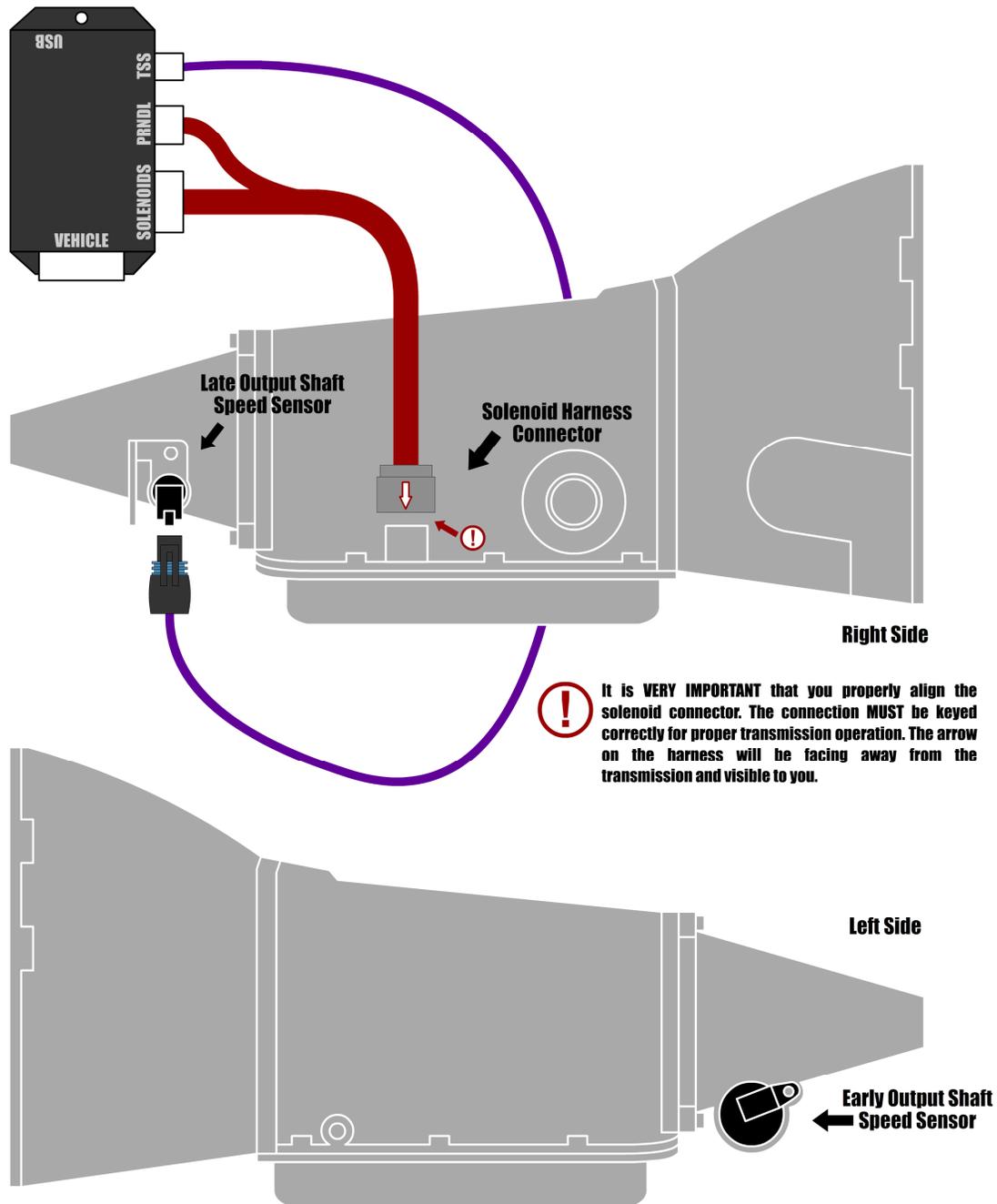


#### Step 5: Optional Features

Connect any extra features you wish to use. See the "Optional Features" section for details.

#### Step 4: Transmission Connectors (4L60E)

Connect the Solenoid and TSS cables to the transmission. **THE CONNECTORS MUST BE KEYED CORRECTLY** for proper transmission operation (see the diagram below for details). Additionally, connect the Neutral Safety Switch and the Backup Lamp Switch. The neutral safety switch isn't related to the Quick 1 controller or harness, but should be included in every installation.



#### Step 5: Optional Features

Connect any extra features you wish to use. See the "Optional Features" section for details.

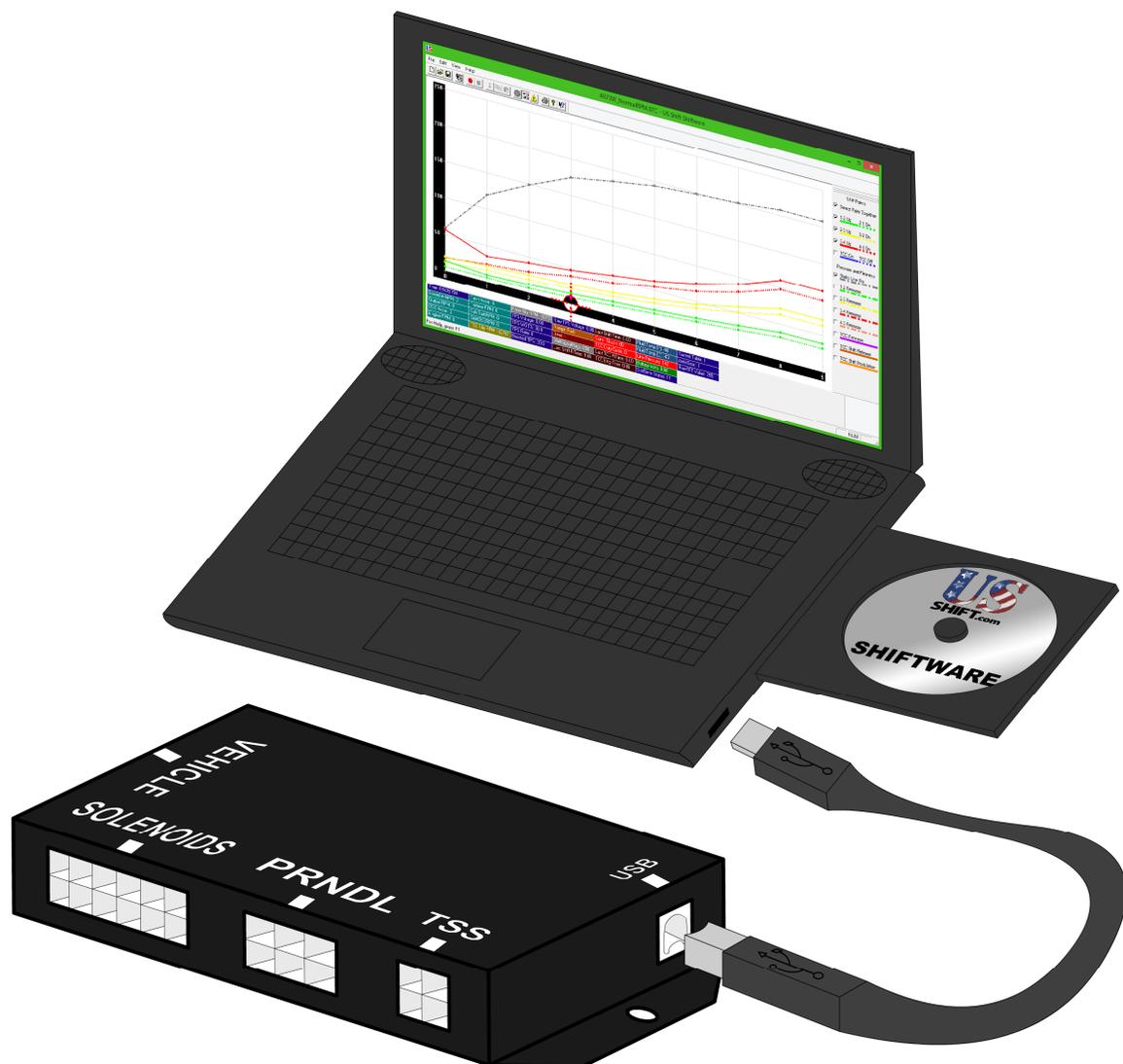
## SETTING UP THE QUICK 1

### Step 6: Calibration

For a detailed video walkthrough of the setup process, scan the QR code to the right using your smart phone. You can also find the video on USshift.com.



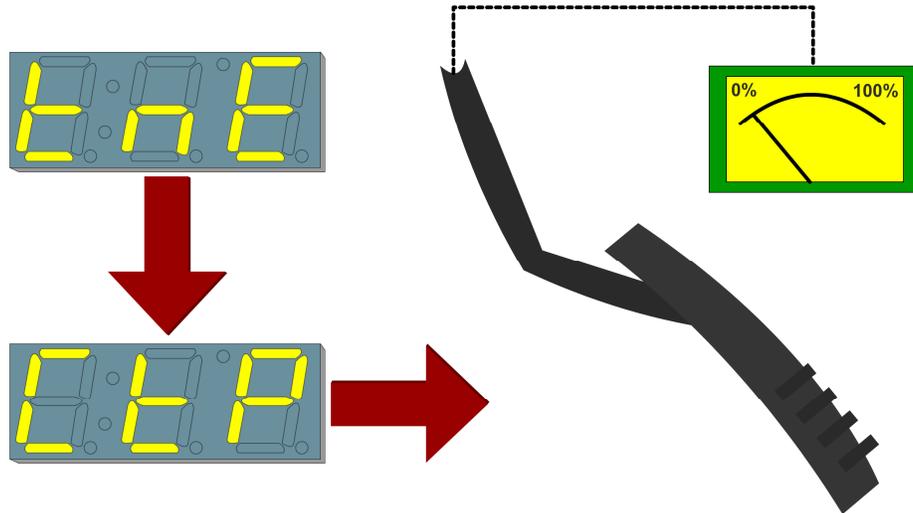
Verify that the correct calibration is loaded on the Quick 1. A standard calibration specific to your order is loaded before shipment. However, if the transmission configuration has changed since the order was placed, you'll need to connect the Quick 1 to a Windows PC and install the Shiftware Tuning Software. (See the "Shiftware" section for installation instructions.) Using the software, load the calibration that matches your transmission's configuration.



### Step 7: Throttle Position Sensor Calibration

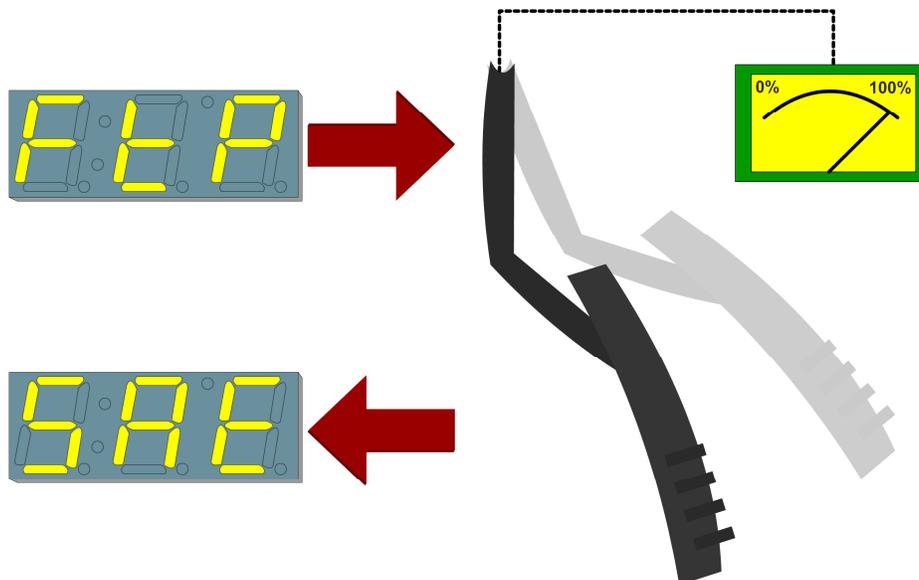
Set the Closed Throttle and Full Throttle Positions. This step should be done with the ignition turned to “ON”, but the engine off. The engine should also be warm.

Turn the knob to “Tune” (tnE) and click once. “Closed Throttle Position” (CtP) should be displayed. Leave the accelerator untouched. Click the knob once, then double-click to set the current Closed Throttle Position. Click again to exit.



Turn the knob to “Full Throttle Position” (FtP). Hold the accelerator all the way down. Click the knob once, then double-click to set the current Full Throttle Position. Click again to exit.

Turn the knob to “Save and Exit” (SAE). Click once to save and exit.



## **NOTES ON INSTALLATION**

### **General Installation:**

The Quick 1 unit should be mounted within the passenger compartment of the vehicle in a protected location. Good mounting areas include under the dash, behind a kick panel, or under the seat, as long as the unit and wiring are not subject to damage. Under-hood mounting is **NOT** possible with the Quick 1 unit. It is not waterproof or rated for under-hood temperatures. Passenger compartment mounting is also necessary to provide easy access to the USB port, which is used to interface with a PC for programming and diagnostics, as well as the display and function control knob. For this reason, be sure to mount the unit in a way that gives easy access to the USB port. If you will be using a desktop PC for programming, install the unit so that it can be unplugged and moved easily.

All electrical connections should be made using 60/40 rosin core solder. Cover the connection with heat-shrinkable tubing for improved insulation and mechanical strength. Individual connector terminals can be connected using a “piggy-back” method, where the terminal is removed from the plastic connector housing to allow the new wire to be soldered on to the terminal atop the original wire. Two wires may be connected together by twisting them together longitudinally, soldering, then covering with the appropriate size heat-shrink tubing.

### **Before Driving the Vehicle:**

Start the engine and move the shifter through all positions, ensuring that the gear position and all sensor readings shown on the controller are correct. Most importantly, make sure that no error codes are shown on the Quick 1 display. It is a good idea to periodically check the Quick 1 display for errors as you drive, so it is wise to consider an accessible mounting location. If any error codes or unexpected characters are displayed, please refer to the user interface manual for detailed explanations. If possible, perform a line pressure check to ensure that line pressure is correct at idle (typically 60 - 80PSI), and that it smoothly increases toward maximum (typically 190-240PSI) as the throttle position increases. If you have any questions about the installation or line pressure readings, please contact our technical support department.

### **Adaptation for Factory-Equipped Transmissions:**

It is possible to use the Quick 1 TCS in a vehicle which was originally equipped with one of the intended transmissions. This could be done in conjunction with an engine management system upgrade that no longer supports the transmission. Use of the TCS for this purpose allows flexibility in choosing the engine management system, in addition to the increased control, performance, and transmission durability afforded by Quick 1. If you retain the stock PCM/VCM, it can probably be modified or re-flashed to disable the transmission functionality.

### **Identifying the Terminals of an Unknown Throttle Position Sensor:**

This is a procedure for identifying the correct terminal connections of any potentiometer-style throttle position sensor (almost all three-terminal TP sensors). A DVOM or analog Ohmmeter is required.

**1.** Set the meter to resistance mode and set it to a scale that can read up to 10K or 20K Ohms (if it is not auto-ranging). Please keep in mind when setting up and reading the meter that "K" means thousands of Ohms. In other words, 15K Ohms is the same as 15,000 Ohms.

**2.** Connect the meter to two pins at a time while operating the lever or cam of the TPS. Watch the meter while rotating the sensor. Check all three pairs of pins until you find a pair that does not change resistance when you rotate the sensor. The two pins that do not change resistance are the fixed ends of the resistance element (+5V and ground). The remaining pin that did change is known as the "wiper". It is the moving contact that slides along the resistance element to give the varying voltage. This is the output terminal of the sensor and should be connected to our green wire (Vehicle pin 3).

**3.** Next, with the sensor at the idle or closed throttle position, measure the resistance between the wiper (output) and each of the end terminals (the two whose resistance did not change in step 2) of the sensor. The end terminal with the lowest resistance to the wiper (at idle) is the ground terminal, and should connect to the black main ground wire of the TCS (Vehicle pin 16). The terminal with the higher resistance to the wiper is the 5 volt reference input to the sensor and should connect to the orange wire (Vehicle pin 11) in our harness.

### **General Guidelines for setting up Throttle Position Sensors:**

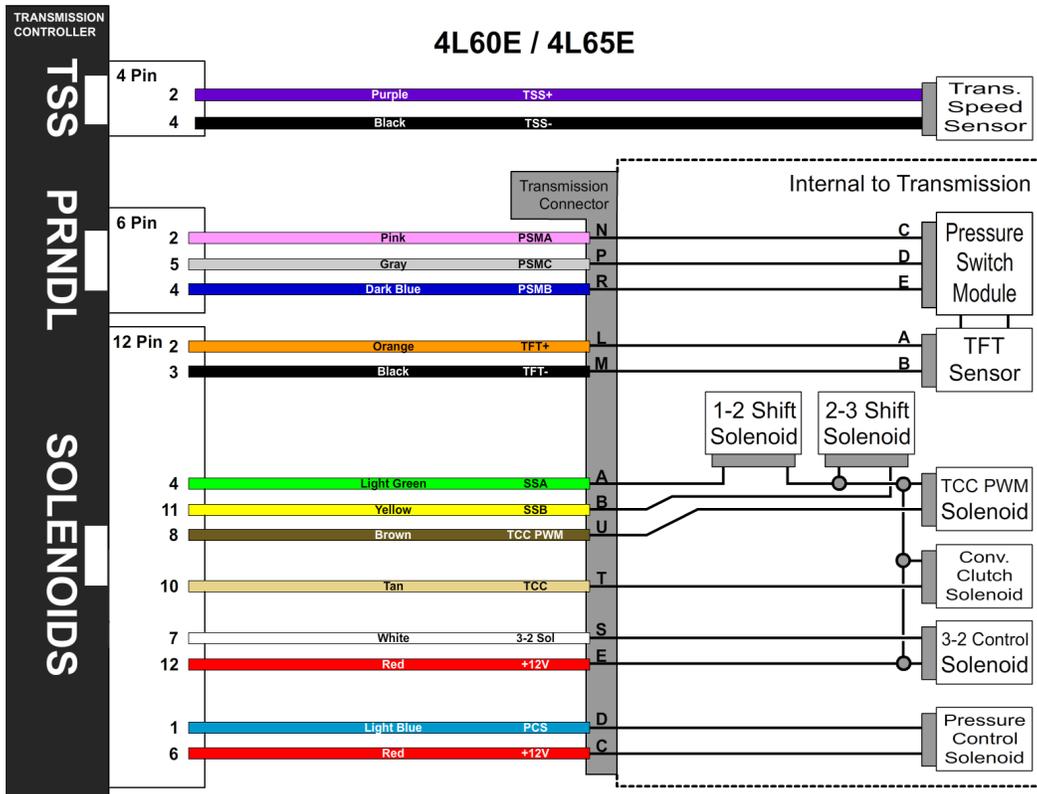
The linkage to a throttle position sensor should use most of the rotating range of the throttle position sensor. This can be adjusted by changing the ratio of the linkage. Also, please make sure that a small amount of the sensor's travel is being used at idle. You will want a TPS voltage at idle of at least 0.35 volts. This is done to allow the TCS to detect problems with the TP sensor. For instance, if the sensor becomes disconnected or the linkage falls off, the TPS voltage will fall below the set idle threshold. If the TPS voltage goes below the idle threshold, the TCS assumes that the TPS is bad and will switch to failsafe line pressure and default shift points. This is done to prevent damage to the transmission from low line pressure and will provide a safe "limp home" mode.

# TRANSMISSION DIAGRAMS

## 4L80E / 4L85E



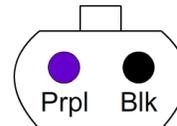
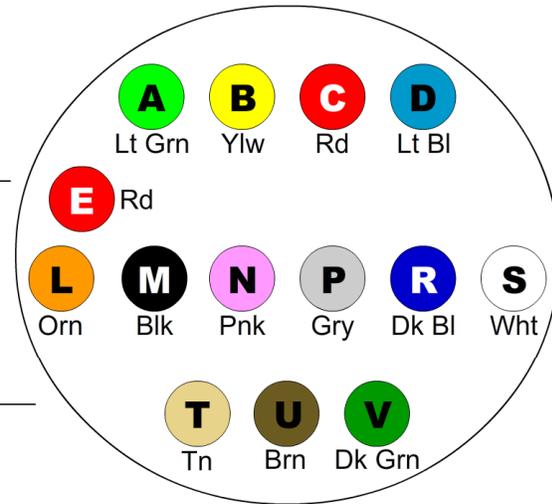
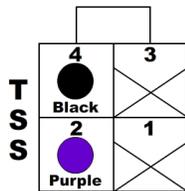
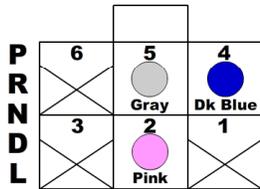
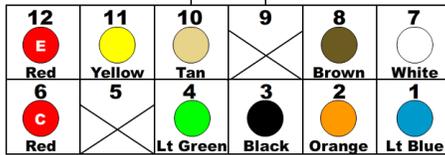
## 4L60E / 4L65E



# 4L80E/4L60E PINOUT

BACK VIEW  
(FRONT PLUGS IN, WIRES COME OUT OF THE BACK)

## Solenoids



## OPTIONAL FEATURES

### **Table Select:**

The table selection switch should be an On-Off type switch (such as a toggle or latching push-button switch) which applies ground to the table select input at Vehicle connector pin 5 when turned on. When the switch is turned on, the TCS will use the secondary calibration tables, allowing a completely different calibration to be selected for the transmission at any time. The Table Selection input may also be connected to a nitrous oxide system to provide an alternate calibration for use when the nitrous system is engaged. Other uses for this input include a "Sport/Economy" switch or a "Normal/Aggressive" switch. The usefulness of this input is limited only by your imagination.

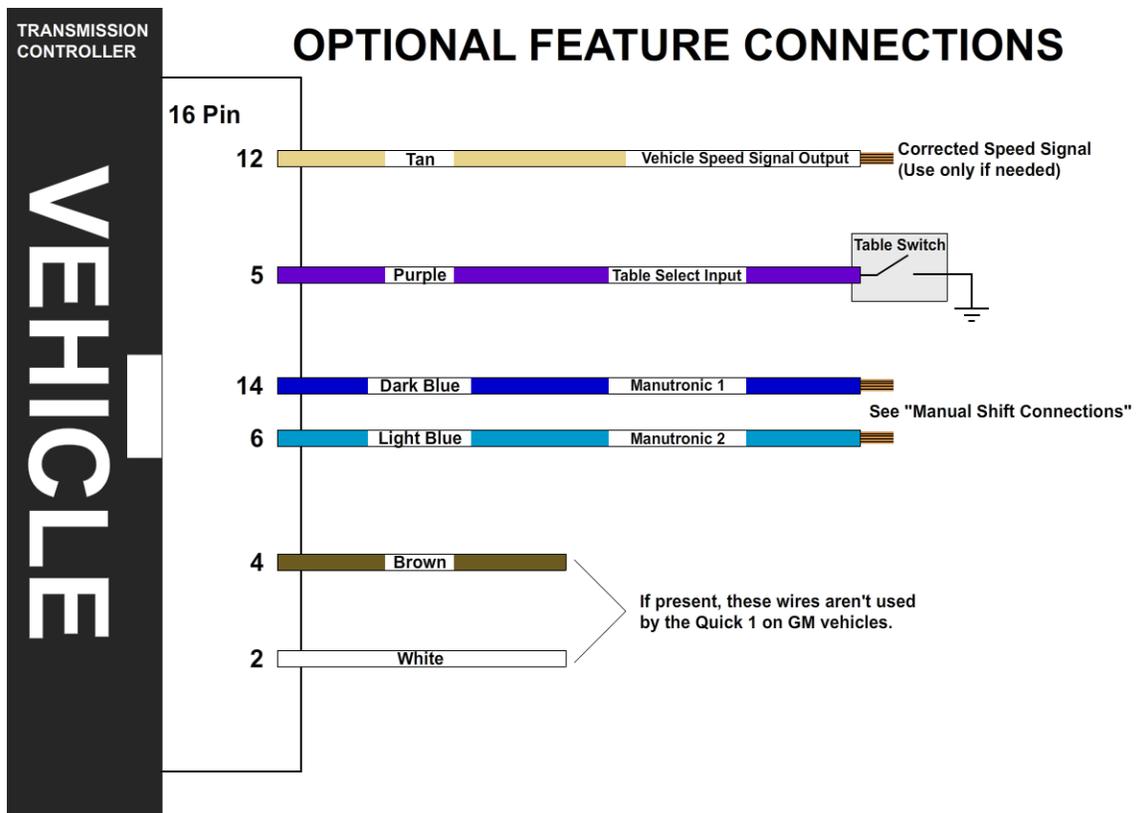
### **Speedometer Output:**

We have provided an adjustable speed signal output that can be used to drive an electronic speedometer, if desired. Use of this output signal is not necessary, but it can be helpful if your speedometer can not be driven correctly from another source. This signal can also be corrected for different gear ratios and tire heights, so it can be very useful in some applications. The speedometer output signal is normally provided as a 5 Volt square wave, but it can also be configured to provide a 12 Volt square wave when required (please refer to the "jumper settings" document for more information).

There are two speedometer output modes that can be selected via the tuning software or the built-in tuning interface. It can also be disabled if not used. In the replicated speed sensor output mode, the speedometer output provides an amplified and squared version of the original speed sensor signal. Replicated mode is useful for applications that require a signal with the exact pulse rate of the speed sensor being used. There is also an adjustable corrected mode, which is very useful for correcting speedometer errors, or providing unusual speedometer output signal frequencies.

Adjustable mode is essentially the electronic equivalent of a ratio corrector gear box for a mechanical speedometer. In adjustable mode, the correction factor is entered as a decimal number. The correction factor is the frequency ratio of the speedometer output frequency to the speed sensor frequency. This number can be easily adjusted to synchronize the vehicle speedometer to a GPS or other instrument.

In some cases, such as driving the input of an engine control ECU, the 0-5 Volt (or 0-12 Volt) square wave signal will not be able to properly drive the device that it is connected to. This is because some devices are only designed to accept an input signal from a variable reluctance (magnetic coil) sensor. Because of this, they may expect the input signal to swing below ground (0 Volts). To drive this type of input, use the included capacitor to "offset" the DC value of the speedometer signal to 0 Volts. As a result, the driven device will see a -2.5V to +2.5V signal instead of 0V to 5V. To make this signal work, install the provided 10 $\mu$ F, 25v, non-polar, electrolytic capacitor inline between the speedometer output of the Quick 1 and the device that it is driving. To install the capacitor, cut the speedometer output wire and solder a capacitor lead to each of the two cut wires.



## MANUAL SHIFT CONNECTIONS

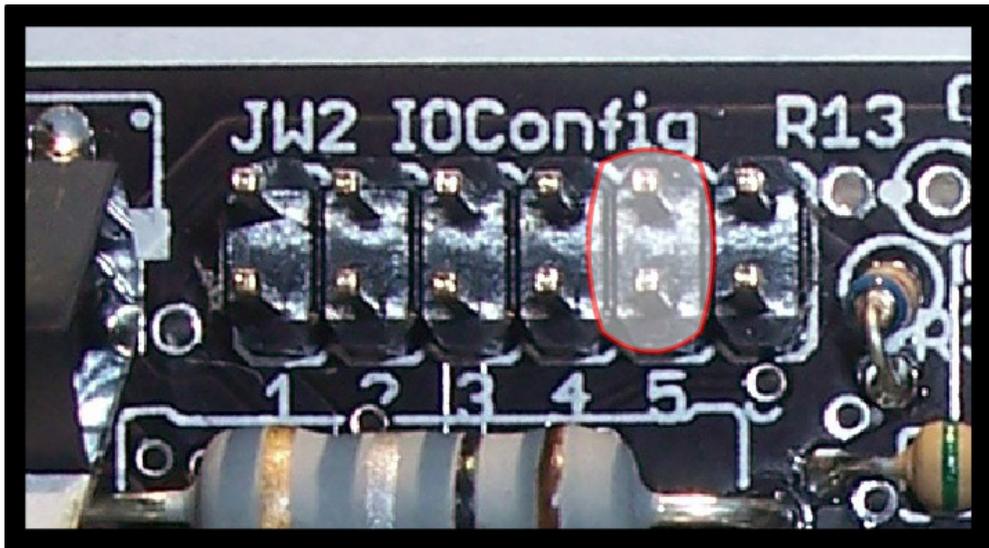
### **Manutronic Overview:**

If connected and enabled in the software, the ManuTronic feature will allow manual selection of all forward gears using paddles, push-buttons, or another type of switch. With ManuTronic engaged, a brief press of the **UPSHIFT** button will change to the next higher gear, while **DOWNSHIFT** will change to the next lower gear. ManuTronic also has a safety feature which inhibits downshifting if the engine RPM is too high, which prevents over-revving of the engine due to a driver's error.

### **Manutronic Reference Supply (JW2-5)**

There are several different ways to configure the Manutronic to meet your specific needs. Depending on your Manutronic configuration, you may need to install or uninstall the Manutronic jumper (JW2-5). You can find the jumper settings manual on the Quick 1 software disc in PDF format.

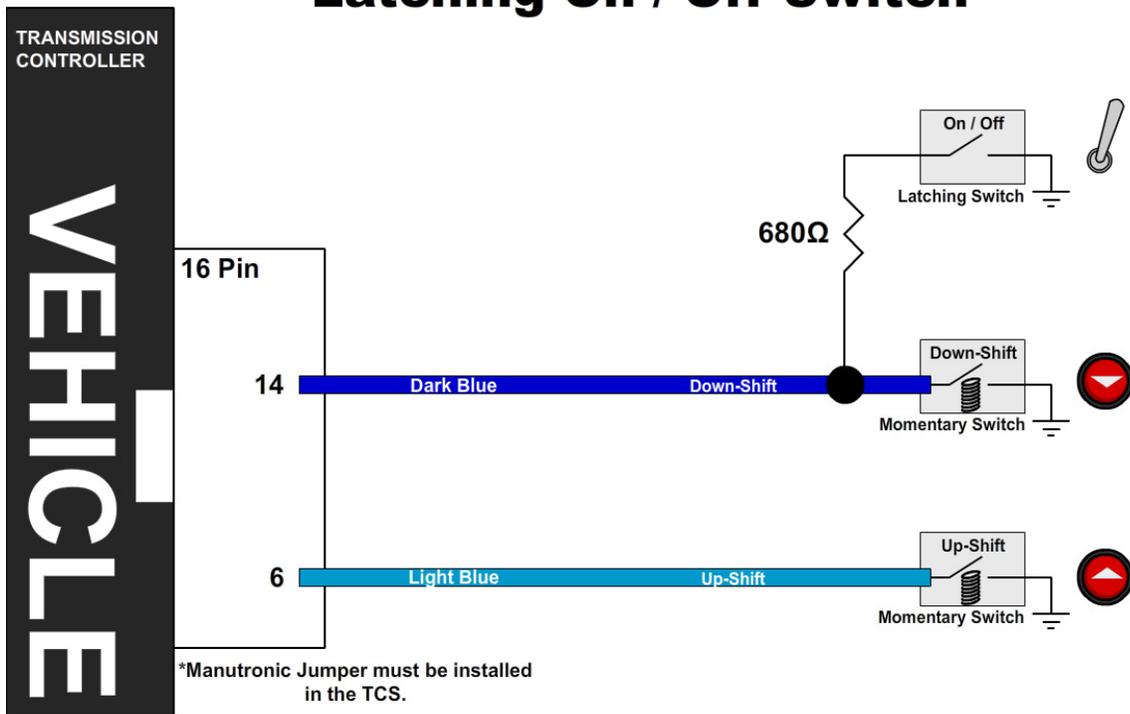
This jumper supplies 5V to the Manutronic 1 input and should be installed for all Manutronic configurations (except for a Ford cruise control system). See the sections below for further explanation.



## Momentary Shift Buttons with Latching On / Off Switch:

For this configuration, you will need to connect the Dark Blue wire (Pin 14 on the Vehicle Connector) to your down-shift button (momentary) and connect the Light Blue wire (Pin 6 on the Vehicle Connector) to your up-shift button (momentary). To connect the on / off switch (latching), solder the switch's wire onto the Dark Blue down-shift wire with a 680 Ohm resistor between them. (Follow the guidelines for soldering found in the "General Installation" section.) Remember that the Manutronic jumper must be installed in the Quick 1 controller and the correct settings used in the Shiftware setup. Manutronic will be enabled when the toggle switch is turned on and disabled when it is turned off.

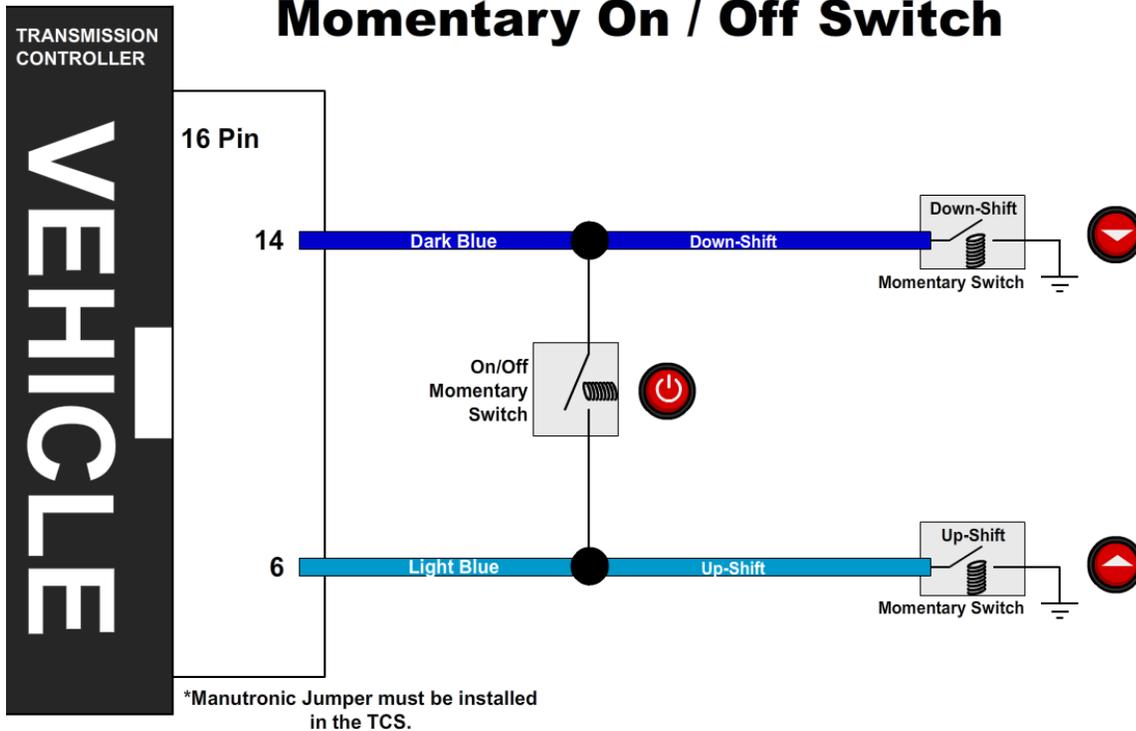
## Momentary Shift Buttons with Latching On / Off Switch



## Momentary Shift Buttons with Momentary On / Off Switch:

For this configuration, you will need to connect the Dark Blue wire (Pin 14 on the Vehicle Connector) to your down-shift button (momentary) and connect the Light Blue wire (Pin 6 on the Vehicle Connector) to your up-shift button (momentary). To connect the on / off switch (momentary), solder one side of the switch onto the Dark Blue down-shift wire and the other side to the Light Blue up-shift wire. (Follow the guidelines for soldering found in the “General Installation” section.) Remember that the Manutronic jumper must be installed in the Quick 1 controller and the correct settings used in the Shiftware setup. To enable the Manutronic, press the On/Off button once and do the same to disable it.

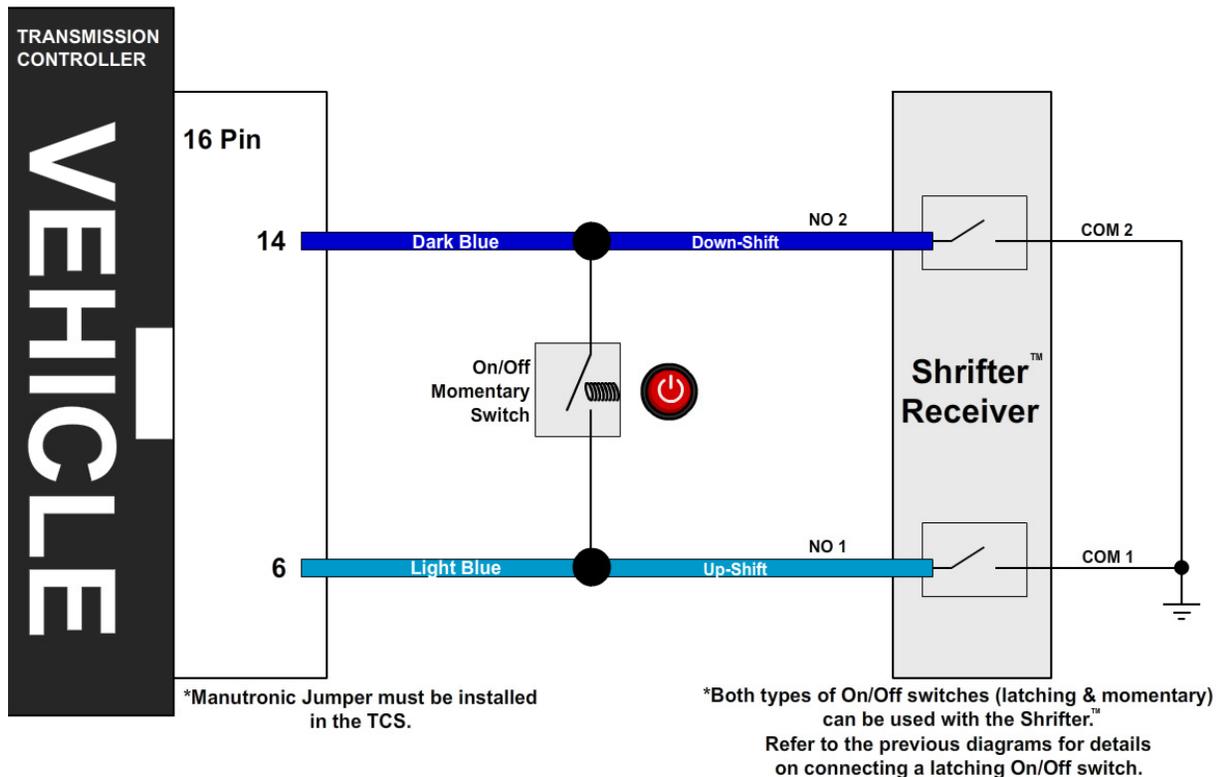
## Momentary Shift Buttons with Momentary On / Off Switch



## Twist Machine Shrifter™:

For this configuration, you will need to connect the Dark Blue wire (Pin 14 on the Vehicle Connector) to COM2 of the receiver and connect the Light Blue wire (Pin 6 on the Vehicle Connector) to COM1 of the receiver. You can use either a momentary push-button on / off switch or a latching toggle on / off switch. (Refer to the previous two sections on how to install and use the on / off switch.) Remember that the Manutronic jumper must be installed in the Quick 1 controller and the correct settings used in the Shiftware setup.

### Manutronic Connections for Shrifter™



# SHIFTWARE

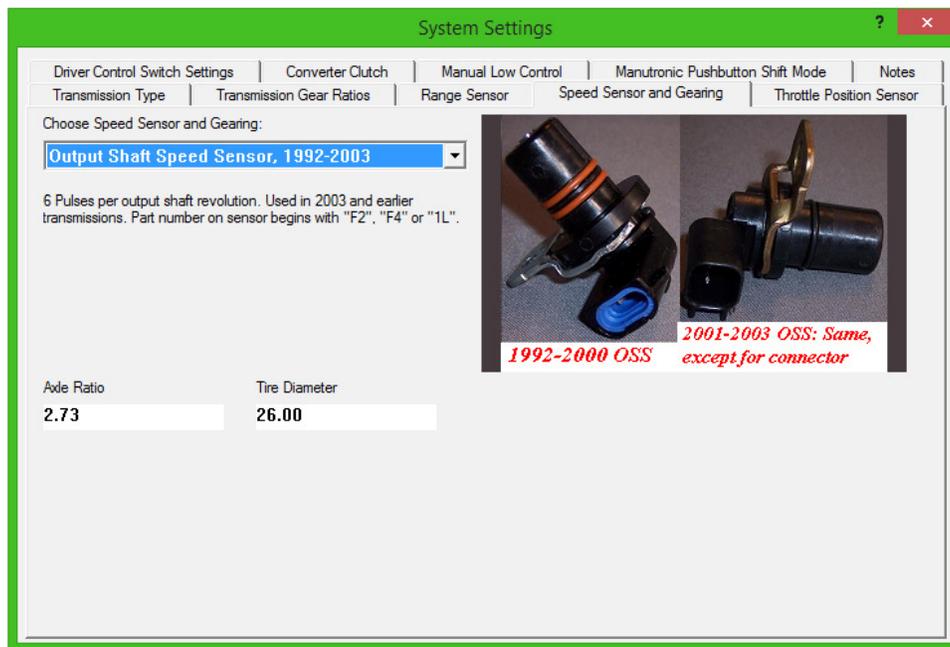
## Introduction:

Using the Shiftware software allows you to modify the way your Quick 1 Transmission Control System behaves. You can customize shift-points as well as monitor and diagnose the Quick 1 unit in real-time.

## Setup:

To create a calibration for the Quick 1, it is best to start with one of the standard calibrations which are included with the software. To load a standard configuration for your transmission, click the **Open**  button on the toolbar, then browse to the folder where the transmission calibration files are located. (Default location is C:\BTS\) The files are named according to the transmission and RPM range and have the .btc file extension. Choose the calibration file and click **Open**.

Once the calibration file is loaded, click the **System Settings**  button on the toolbar to check the settings and make sure that they are correct for your transmission. The System Settings window has several tabs within it. Click each one to see each section of settings specific for your transmission.



The System Settings Window

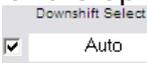
## Customize:

The main window is where all of the shift points and line pressure editing is done. The graph displays the up-shift and down-shift speeds in relation to throttle position for each shift. It also displays the line pressure curve (otherwise known as the EPC current) in relation to throttle position. The *lower* the line pressure curve is on the graph, the *higher* line pressure will be. You can use the checkboxes on the right to turn on the curves for individual shift firmness and adjust them independently.



The Main Window

You can get help on anything by clicking the **Question**  button (or the F1 key) and then clicking on an item. This can be used in any area of the software. The help messages in the settings pages are transmission-specific and are more like getting professional advice than normal help tips.

The graph has ten points from left to right, 0 being idle and 9 being Wide-Open-Throttle (WOT). On the left side of the graph is speed in miles per hour. Click on a point in the graph to select it. (If Automatic Down-shift is enabled, then the corresponding down-shift point will be automatically selected along with the up-shift point. This can be turned off by clicking the **Downshift Select**  dropdown menu on the right.) You can select multiple points by holding CTRL while clicking the points, or a range of points by holding SHIFT and clicking the two points on each end. You can move between adjacent points using the LEFT and RIGHT arrow keys.

Once a point (or points) is selected, you can drag it with the mouse to raise and lower its value. A yellow box will appear in the graph telling you what the value of the point is.

## Tables:

You can create more than one calibration, and use the **Table**  buttons on the toolbar to select whether the current calibration file will be read from or written to table 1 or 2. The two table spaces in the controller are separate and independent, and each can hold a separate calibration file. An optional Table Select Switch can be added to the Quick 1 system to switch between them. (See “Optional Features”)

## Save & Load:

Once you have created your calibration, you can save the file to your hard drive or an external storage device. To save, click the **Save**  button on the toolbar. Then browse to the location where you want it saved and click **Save**. Use “Save As” under the FILE menu to leave the original file unchanged and create a new version. Type the desired filename and click **Save**. Files are saved with a “.BTC” extension.

To load a calibration file, click the **Open**  button on the toolbar. Then, browse to the file and click **Open**.

## Writing a Calibration to the Quick 1:

For the changes you've made to take effect on the Quick 1 TCS, you first must write the calibration to the unit. Connect the Quick 1 to your computer using a standard USB cord (Type A to Type B). First, select the table you wish to write to the Quick 1 unit by clicking either the **1** or **2**  buttons on the toolbar. Then, click the **Write Calibration**  button on the toolbar. Once the Shiftware is finished writing the calibration, you can repeat these steps for the other table. When the Quick 1 unit is disconnected from the computer, the **Write Calibration**  button will be grayed out.

## **IMPORTANT INFORMATION**

### **How to Avoid Errors:**

The Shiftware software gives you complete freedom and flexibility to customize your shifting calibration however you want. This freedom requires diligence to avoid errors.

It is *very* important that the up-shift and down-shift curves for a given gear do not cross. The up-shift point at any throttle position should usually be at least 15% greater than the down-shift point. For instance, if the 2-3 up-shift point at ½-throttle is 45MPH, then the 3-2 down-shift point should usually be less than 40MPH.

The “On-Off” differential between up-shift and down-shift points is called Deadband (also known as Hysteresis). The more deadband you use for your shift points, the more stable the system will be. Not using enough deadband can result in erratic shift behavior. Too much deadband will result in sluggish behavior due to a reluctance to down-shift.

Pay close attention to the interaction between different shifts. Overlapping the 1-2 and 2-3 shifts can cause skipped gears and other drivability problems.

Also note that torque converter slip at low speeds renders engine RPM values meaningless. It is usually desirable to have light-throttle shift points within a low RPM range. In this case, it is best to base light-throttle shift points on vehicle speed, rather than engine RPM (as most auto manufacturers do).

## TROUBLESHOOTING

**WARNING!** If the transmission does not begin to operate correctly within the first few feet of the road test, **STOP** immediately, check the troubleshooting guide, and call Baumann Electronic Controls if you need assistance. In some cases, just a few blocks of operation with low fluid pressure can destroy a transmission.

### **Error Codes for 4L60E Transmissions:**

The following error codes will be shown on the controller's display when faults are detected. For more detailed error messages, you can also view the **Controller Fault Display** in the tuning software. The software is not limited to currently set faults, but can show fault history as well. History is cleared when the controller powers down completely (ignition turned off and USB cable removed from computer.)

Scan the QR Code to be directed to the corresponding troubleshooting guide webpage or visit **t1x.us**.



### **OCP**

Pressure control solenoid overcurrent error  
(Pressure control disabled, max line pressure)  
[t1x.us/313](http://t1x.us/313)



### **OC1**

Overcurrent error in solenoid bank 1  
(Outputs disabled)  
[t1x.us/314](http://t1x.us/314)



### **OC2**

Overcurrent error in solenoid bank 2  
(Outputs disabled)  
[t1x.us/315](http://t1x.us/315)



### **OC3**

Overcurrent error in solenoid bank 3  
(Outputs disabled)  
[t1x.us/316](http://t1x.us/316)



### **F:tP**

Throttle position sensor value has dropped  
below the minimum (idle) voltage setting  
[t1x.us/310](http://t1x.us/310)



### **F:rS**

There are several errors which can cause this code to appear. The **Controller Fault Display** in the tuning software will differentiate between all of the errors listed which show the F:rS error code on the controller.

Ranger sensor error

Range sensor voltage or PWM duty cycle below low limit (Possible short to ground).

Range sensor voltage or PWM duty cycle above high limit (Possible open sensor).

[t1x.us/303](http://t1x.us/303)

## Error Codes for 4L80E Transmissions:

The following error codes will be shown on the controller's display when faults are detected. For more detailed error messages, you can also view the **Controller Fault Display** in the tuning software. The software is not limited to currently set faults, but can show fault history as well. History is cleared when the controller powers down completely (ignition turned off and USB cable removed from computer.)

Scan the QR Code to be directed to the corresponding troubleshooting guide webpage or visit **t1x.us**.



### OCP

Pressure control solenoid overcurrent error  
(Pressure control disabled, max line pressure)  
[t1x.us/413](http://t1x.us/413)



### OC1

Overcurrent error in solenoid bank 1  
(Outputs disabled)  
[t1x.us/414](http://t1x.us/414)



### OC2

Overcurrent error in solenoid bank 2  
(Outputs disabled)  
[t1x.us/415](http://t1x.us/415)



### OC3

Overcurrent error in solenoid bank 3  
(Outputs disabled)  
[t1x.us/416](http://t1x.us/416)



### F:tP

Throttle position sensor value has dropped  
below the minimum (idle) voltage setting  
[t1x.us/410](http://t1x.us/410)



### F:rS

There are several errors which can cause this code to appear. The **Controller Fault Display** in the tuning software will differentiate between all of the errors listed which show the F:rS error code on the controller.

Ranger sensor error

Range sensor voltage or PWM duty cycle  
below low limit (Possible short to ground).

Range sensor voltage or PWM duty cycle  
above high limit (Possible open sensor).

[t1x.us/403](http://t1x.us/403)

# Contact

If you have any questions, problems, or product orders,  
don't hesitate to call our customer service line.

**(864) 646-8920**

(Monday-Friday 10AM-6PM EST).

If no one is available, please leave a detailed message and we will reply promptly. Whenever possible, we will try to return urgent technical support calls left after hours or over the weekend.

You can also email customer service at **[support@usshift.com](mailto:support@usshift.com)**



Scan this code to copy the customer service phone number and email address to your phone.