COMPUSHIFT Mini Manual

COMPUSHIFT Mini Manual

Exported on 12/08/2020

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Thanks for purchasing and installing the COMPUSHIFT Mini.

If you want to get started quickly, please read the COMPUSHIFT Mini Quick Install Guide[1].

The COMPUSHIFT Mini is a standalone plug-and-play system designed to control the torque converter clutch and overdrive on selected transmissions including:

- GM 700R4
- GM 2004R
- Chrysler A518 / 46RH
- Chrylser A618 / 47RH

Unlike other control modules that use vacuum switches or a simple delay timer, the COMPUSHIFT Mini uses throttle position and vehicle speed to optimize its shifting and clutch control.

A built-in display and keypad lets the user adjust and tune for their specific application, and diagnose problems should they occur.

The COMPUSHIFT Mini uses a miniaturized version of same control software and electronics as HGM's COMPUSHIFT II.

1 https://hgmelectronics.atlassian.net/wiki/download/attachments/1127514121/COMPUSHIFT%20Mini%20Quick%20Install%20Guide.pdf?api=v2&cacheVersion=1&modificationDate=1604171838303&version=1

1 Preparing for Your Installation

1.1 Vehicle Preparation

> ⚠ **COMPUSHIFT Mini cannot properly operate a malfunctioning transmission. A malfunctioning transmission may damage COMPUSHIFT Mini and void your warranty.**
>
> Your transmission must be properly installed and in good mechanical condition before using COMPUSHIFT Mini.
>
> A qualified transmission repair shop can inspect, clean, install, and/or rebuild your transmission as required.
>
> If you have any questions about the condition or type of transmission, please contact a qualified transmission repair facility, HGM Headquarters, or one of our distributors for a recommendation.

Prior to installation, you should ensure that your powertrain, engine, transmission, drive shaft, rear axle, are all in good working condition.

The vehicle's electrical system should be properly maintained and working correctly. Battery voltage should be 14.4 - 14.7 volts while the engine is running.

The transmission should shift smoothly and correctly through its gears, and the shift linkage should be correctly adjusted.

Your transmission must have a properly-calibrated speedometer gear.

COMPUSHIFT Mini uses the industry standard 1000 turns per mile speedometer cable speed to determine speed.

1.2 A Word About Adjusting the TV Cable

A properly-adjusted TV cable can make a world of difference in transmission and engine performance.

Two things are important for setting the TV cable:

1. Removing the slack
    - Proper slack in the cable means that the cable has a little bit of tension with the throttle is closed, but no so much that it changes in the main line pressure.As soon as the throttle starts to open, the line pressure should start to increase.
    - Proper travel in the cable means that the cable extends its full range when the throttle is moved to the fully open position, but no further.
2. Setting the travel
    - If the cable fails to move the full range, then full line pressure won't be reached, the transmission may slip, and also the shift points may be too low.
    - A cable that moves too much will cause hard shifts that are too soon, can break the linkage in transmission, and can also prevent achieving a fully open throttle.

Getting both of these right means having the right combination of cams and arm length on the throttle linkage. Some accessory kits, like the Bowler Tru-Shift[2] allow full adjustment and correction of TV cable problems.

The COMPUSHIFT Mini is a valuable aid in doing TV cable adjustment because it can display line pressure on screen in real-time. The cable travel and slack can easily be adjusted to their proper limits because:

- When the pressure starts to increase, the slack has been removed.
- When the pressure stops increasing, the cable is at its full extension.

1.3 GM 700R4 / 2004R

During the years that GM built these transmissions, a number of different combinations of internal switches and wiring looms were fitted. The transmission must have a proper internal wiring harness. It must use a 4th gear pressure switch that is normally open and switches to ground when 4th gear is engaged.

The following are recommended wiring looms:

- Rostra 350-0045
- NATPRO 51870U
- TRANSTAR 54425B

The following are recommended 4th gear switches:

- NATPRO 51876
- TRANSTAR 74411B

1.4 Chrylser A518 / A618

Your engine must have a throttle position sensor in order to use the controller. Aside from being in good, working mechanical condition, no specific preparation is required for this transmission.

1.5 Additional Planning

Prior to installation, you'll also need to decide:

- Where to mount your COMPUSHIFT Mini Controller.
- Where to install the firewall grommets for your wiring harnesses.
- How to route the wiring harnesses to the engine and transmission.

1.6 Other Considerations

- COMPUSHIFT Mini can provide an electronic signal to operate an electronic speedometer.

2 http://bowlertransmissions.com/p/64/tru-shift-throttle-correction-arm-system

- Refer to the COMPUSHIFT Mini Quick Install Guide, also included in the packaging, to get an overview of all the components.

1.7 Tools You Will Need

- 1/8" or 3/16" flat blade screwdrivers
- Drill and small drill bit assortment
- Socket / open-end wrench assortment
- Wire cutters / wire stripping pliers
- Soldering iron and solder or wire crimping pliers
- PTFE / Teflon sealant or tape

1.8 Tools You May Need

Depending on the installation, you may also need:

- File
- Tin snips
- Center punch
- Sheet metal tools
- Insulating tape
- Wire spade lugs
- Wire crimp connectors
- 1.1875" hole saw or chassis punch
- Volt/ohm-meter

1.9 Unpacking and Inspecting the Kit

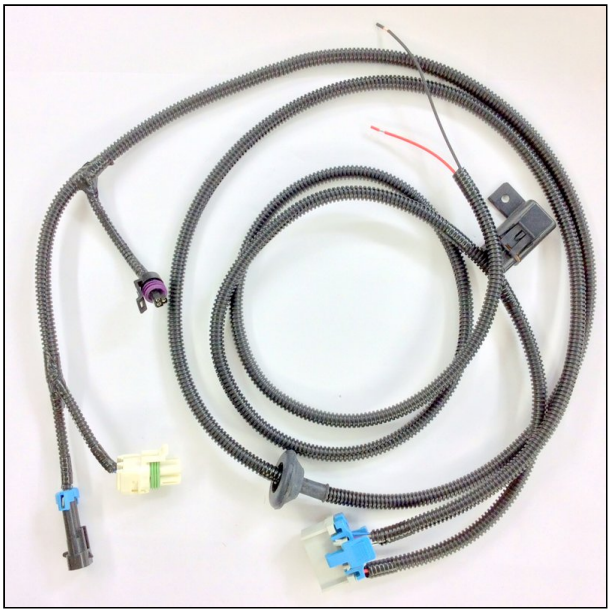
1.9.1 Kit Contents

The kit ships with all of the parts that should be needed for the installation.

The basic kit contains the following items:

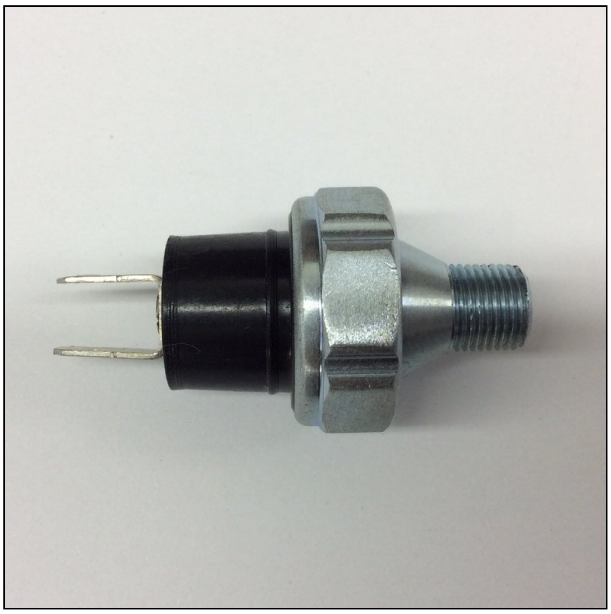
COMPUSHIFT Mini Controller with keypad:

Wiring harness, specific to the kit:

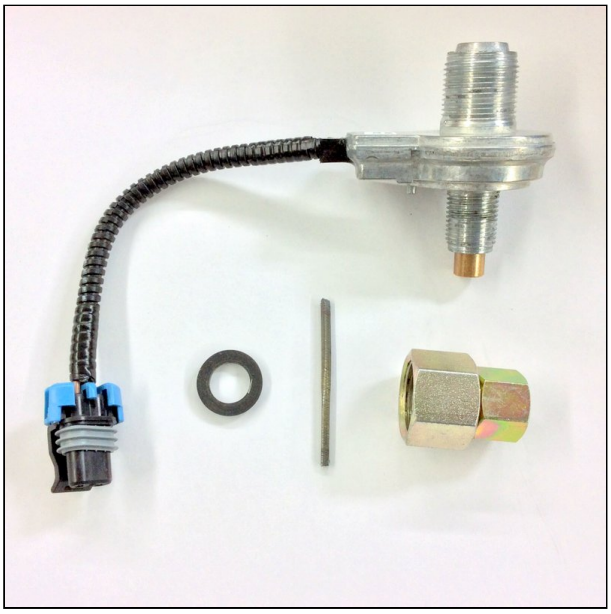


Hydraulic pressure sensor (GM only):

Third gear pressure switch (Chrysler only):



Speed sensor and fittings:



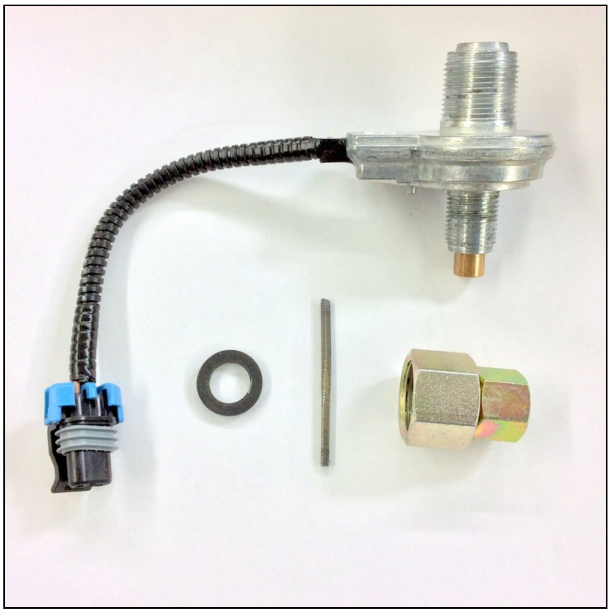
Hook and loop fasteners, terminals and cable ties:

1.10 Assembling the Speed Sensor

A little bit of preparation is required before installing the speed sensor on the transmission.

The speed sensor kit has four pieces:

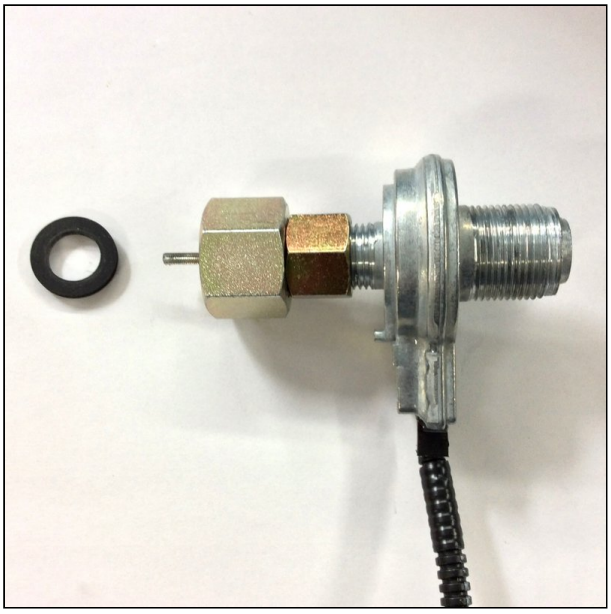
- The sensor
- A small section of drive cable
- A washer
- A cable nut



The assembly is straightforward.

The small end of the nut attaches to the small end of the speed sensor.

The section of drive cable goes into the speed sensor through the nut.



The washer goes into the large end of the nut, leaving the drive cable protruding.

The finished assembly looks like this:

2 Installing the COMPUSHIFT Mini

Installing the COMPUSHIFT Mini is a straightforward operation if you are familiar with working on cars. A simplified breakdown is as follows:

1. Mount the controller in the vehicle.
2. Install the wiring loom in the vehicle, routing the loom though a hole in the firewall.
3. Install the sensors and switches on the transmission.
4. Connect the wiring loom to the transmission and secure it.
5. Install the throttle position sensor (Chrysler only).
6. Calibrate the throttle position sensor.
7. Drive the vehicle.

You can get started with Installation Inside the Vehicle(see page 14).

2.1 Installation Inside the Vehicle

2.1.1 Locating and Mounting the Controller

Look inside your passenger compartment and decide where to mount the COMPUSHIFT Mini controller.

It needs to be in a dry, cool, secure location -- the *farther away* from a heater outlet, the better.

The controller needs to be located in the vehicle near a source of ignition-switched power.

One good place is under the passenger or driver-side dash, but you can also mount the controller on the floor pan or under a seat – provided there's at least 1" of clearance and free-flowing air around all sides. Make sure the engine exhaust system is not heating the spot where you plan to mount it.

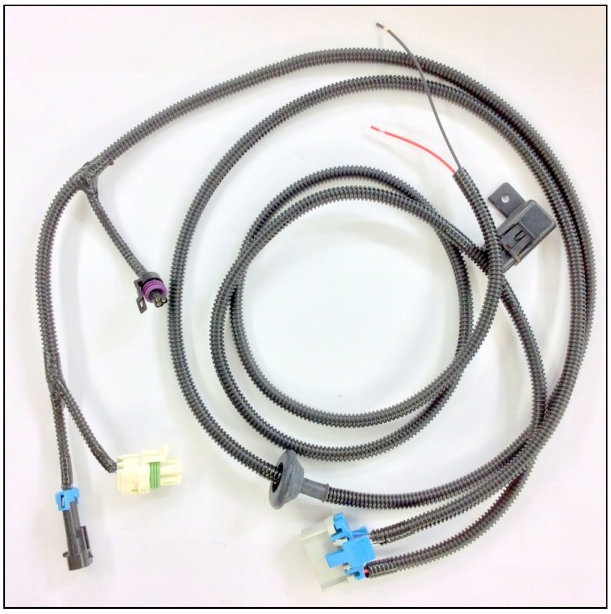
Carefully consider the mounting location. The unit is *not waterproof* so never mount the controller in the engine compartment or under the vehicle. Extreme shock and vibration, high temperature, or high input voltage can damage the unit. You will need to make adjustments to COMPUSHIFT Mini during installation, so be sure that the wiring loom will reach where you can read and adjust it.

A section of tape with hook-and-loop fasteners (Velcro) has been provided to mount the controller. Apply the hook side of the tape to the back of the controller. Apply the loop side of the tape to mounting location.

For now, leave the controller where it can be used during final checkout(see page 29), calibration(see page 30) and tuning(see page 35).

2.1.2 Routing the Wiring Harness

The COMPUSHIFT Mini must be mounted inside the vehicle, so the wiring harness to the transmission needs to be routed through the firewall.



The wiring harness is equipped with suitable rubber grommet that can moved along the wire harness to the desired position.

To fit the grommet, you will have to drill or punch a 1.25" hole through the firewall in an appropriate location. The controller-side connector at the end of the wiring loom is larger than the 1.25" hole, so it the harness must be pushed through the firewall from inside the vehicle rather than up from the transmission.

Once the harness is though, it can be routed along the right side of the transmission and installed.

2.1.3 Connecting to Vehicle Power

The power section of the wiring loom is a separate branch from the section that goes to the transmission.

This lets you mount the controller away from the power source as needed.

The power section of the wiring loom has a dedicated fuse, and can be shortened as necessary.

Connect the red wire to a source of switched 12 volt power.

Connect the black wire to a good ground connection, preferably using a bolt to clean sheet metal through the supplied lug.

2.1.4 Connecting to an Electronic Speedometer

The COMPUSHIFT Mini can drive an electronic speedometer.

If desired, connect the purple wire with a white stripe to the signal input of your electronic speedometer.

2.2 Installation on GM 700R4 / 2004R

2.2.1 Installing the Pressure Sensor

Locate the line pressure plug test port on the left side of the transmission, immediately behind the bellhousing.

The test port is usually capped off with a 1/8" NPT plug:

Clean the area around the plug and remove it using an appropriately-sized socket or wrench:

Put a small amount of PTFE / Teflon sealant on the pressure sensor or wrap it with PTFE / Teflon pipe sealant tape.

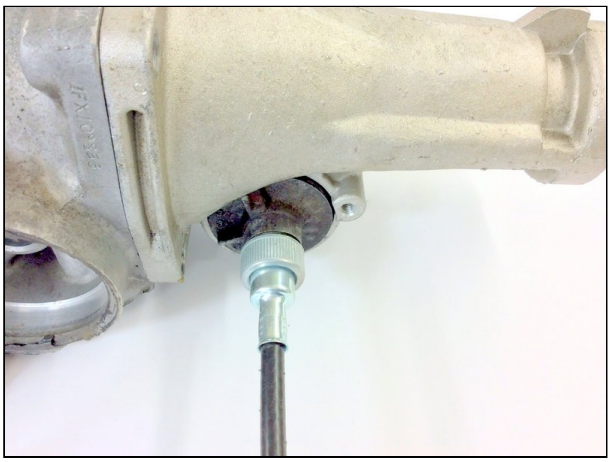
Thread the pressure sensor into the port. Tighten the pressure sensor until it is finger-tight, then use a wrench to tighten it another 1.5 to 3 turns, depending on feel.

Do not overtighten! The transmission case is made of aluminum and the pressure sensor is made of brass. Both are soft metals and will strip easily.

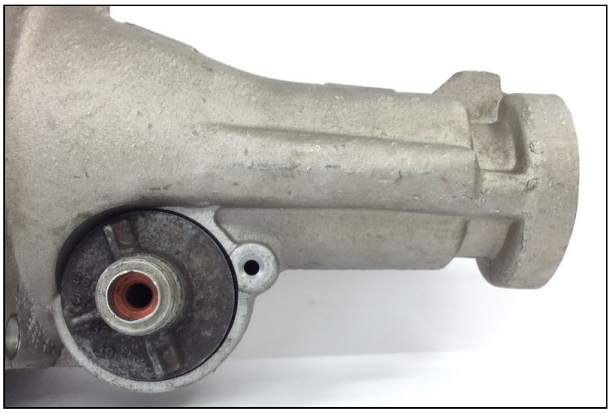
2.2.2 Installing the Speed Sensor

As installed in the vehicle, the transmission should have speedometer cable attached to the speedometer drive output of the trailhousing.

Clean the area around the end of the cable, and unscrew the cable nut from the drive output:



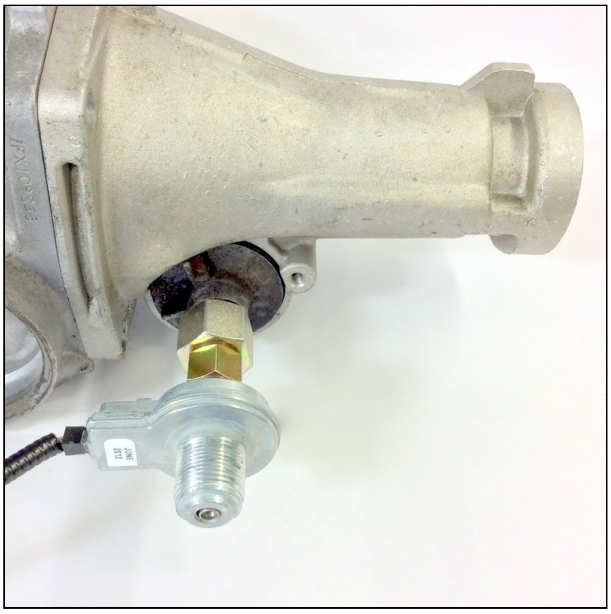
Remove the cable and set it aside. The drive output should look like this:



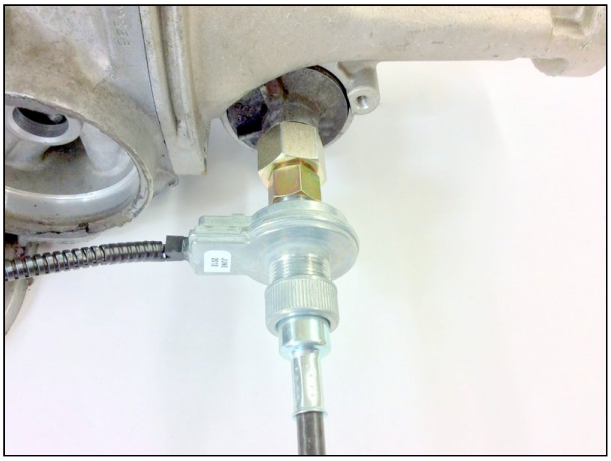
Locate the speed sensor you assembled earlier:

Screw the speed sensor into the speedometer drive on the tailhousing, being sure to engage the short cable inside the drive.

Snug the nut securely with a wrench ensuring that the speed sensor wires point toward the front of the vehicle:



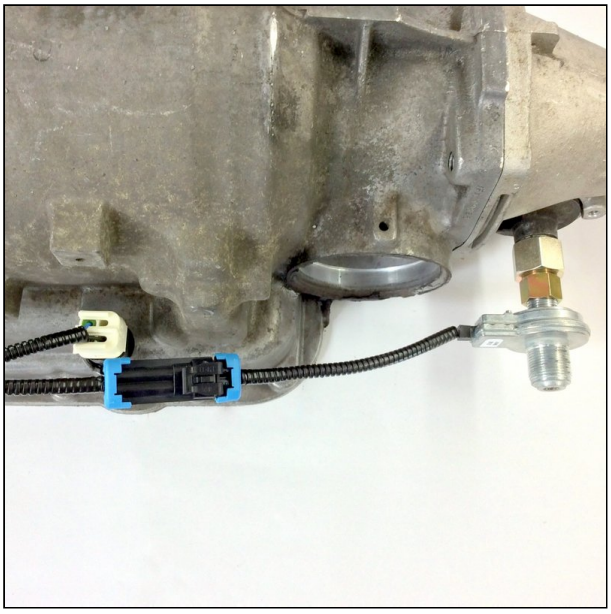
Reattach the speedometer cable to the output of the speed sensor:



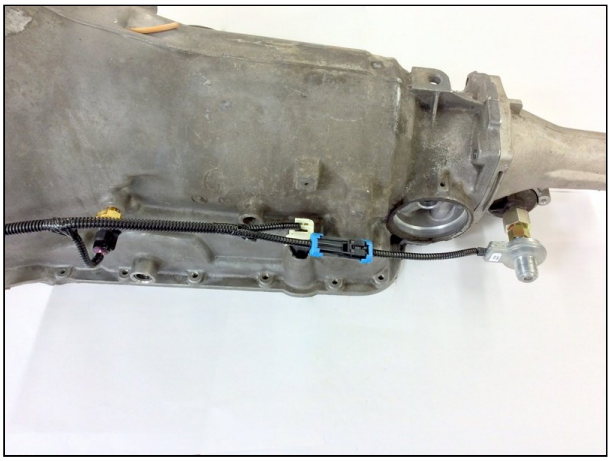
2.2.3 Installing the Wiring Harness

Earlier, you pushed the wiring harness through the firewall and installed the grommet. From the underside of the vehicle, locate the wire harness and begin routing it toward the right rear side of the transmission. Locate the transmission wiring socket, shown below:

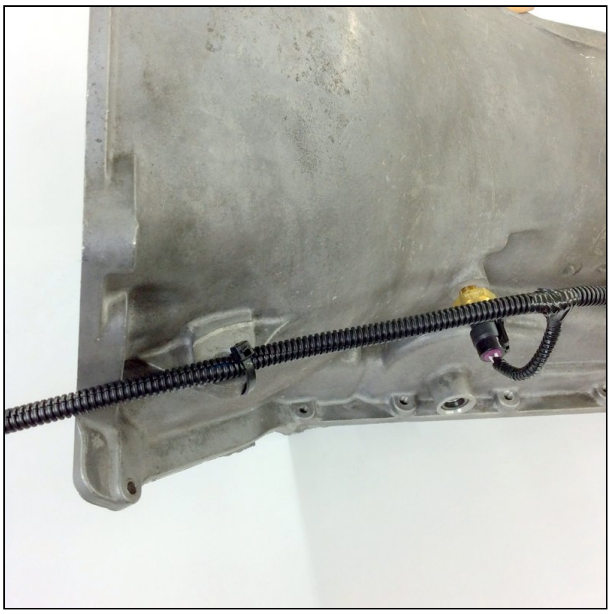
Connect the harness plug into the socket, and then connect the speed sensor at the tailhousing:



Then follow the wires of the harness to the front and plug in the pressure sensor:



Finally, use one of the provided cable ties to fasten the harness to the bellhousing as shown:



Use other cable ties as needed to fasten the wiring harness clear of any rotating parts, linkages, and the exhaust system.

2.3 Installation on Chrysler A518/46RH and Chrysler A618/47RH

2.3.1 Installing the 3rd Gear Pressure Switch

Locate the front servo test port on the right side of the transmission, immediately behind the bellhousing, but ahead of the pressure test port.

The test port is usually capped off with a 1/8" NPT plug.

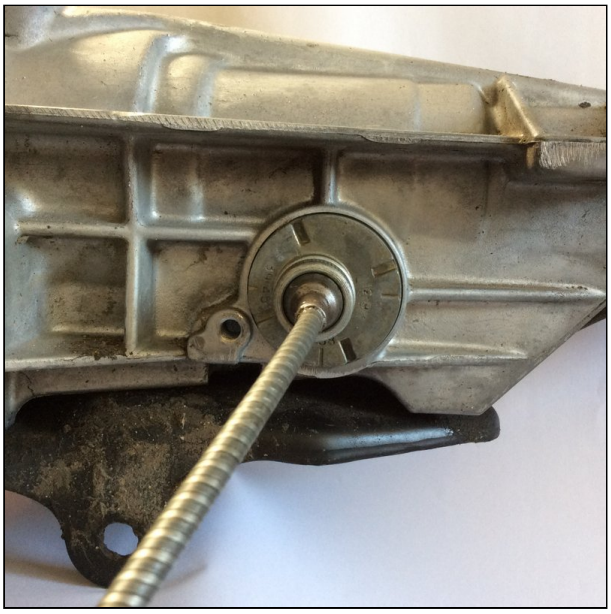
Clean the area around the plug and remove it using an appropriately-sized socket or wrench:

Thread the switch into the port. Tighten the switch until it is finger-tight, then use a wrench to tighten it another 1.5 to 3 turns, depending on feel. Do not use pipe sealant on this switch as it must make electrical contact with the body of the transmission.

Do not overtighten! The transmission case is made of aluminum and the pressure switch is made of brass. Both are soft metals and will strip easily.

2.3.2 Installing the Speed Sensor

As installed in the vehicle, the transmission should have speedometer cable attached to the speedometer drive output of the trailhousing.



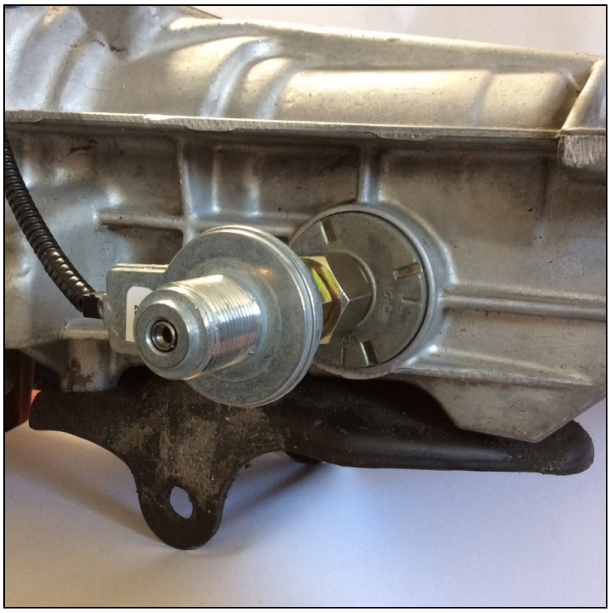
Clean the area around the end of the cable, and unscrew the cable nut from the drive output.

Remove the cable and set it aside. The drive output should look like this:

Locate the speed sensor you assembled earlier:

Screw the speed sensor into the speedometer drive on the tailhousing, being sure to engage the short cable inside the drive.

Snug the nut securely with a wrench ensuring that the speed sensor wires point toward the front of the vehicle.



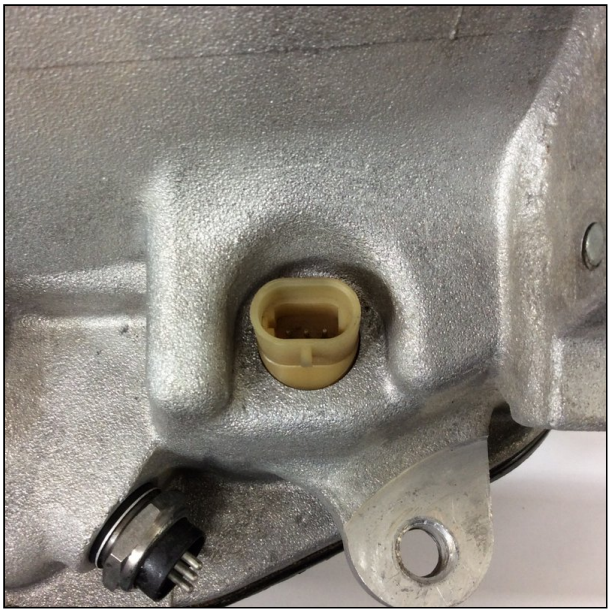
Reattach the speedometer cable to the output of the speed sensor.

2.3.3 Installing the Wiring Harness

Earlier, you pushed the wiring harness through the firewall and installed the grommet.

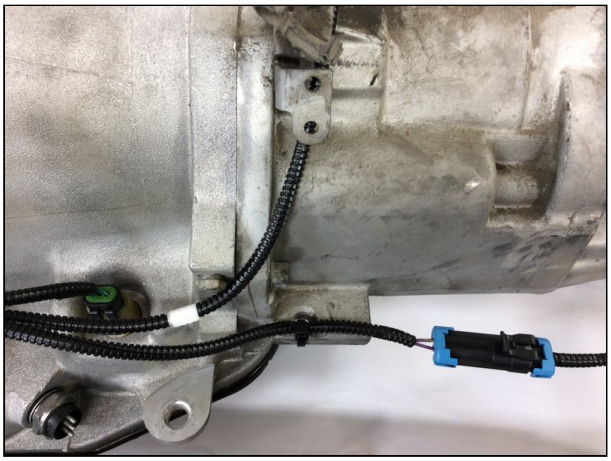
From the underside of the vehicle, locate the wire harness and begin routing it toward the right rear side of the transmission.

Locate the transmission socket, shown below:

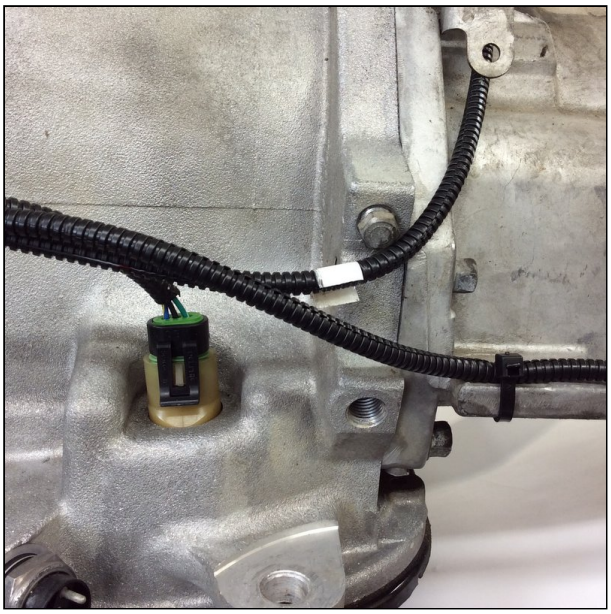


Connect the harness plug into the socket, and then connect the speed sensor.

Use one of the provided cable ties to fasten the harness to the bellhousing as shown:



Then route the wires of the harness over the top of the tailhousing toward the front left side...



and connect the third gear pressure switch.

Use other cable ties as needed to fasten the wiring harness clear of any rotating parts, linkages, and the exhaust system.

2.3.4 Install / Connect the Throttle Position Sensor

If you purchased a throttle position sensor for your kit, you will need to install it now and connect to to the TPS wires on the wiring loom.

If you are using an existing throttle position sensor, an adapter should be provided to connect it.

2.4 Using the Display

The COMPUSHIFT Mini is equipped with an 8-character LCD and a 3-key keypad as shown below.

The three keys from left to right are: down (downward-pointing arrow), up (upward-pointing arrow), and select (round dot).

The display has two major modes: navigation and editing.

2.4.1 Navigation Mode

The system always powers up in navigation mode. The title of each screen is printed (sometimes abbreviated) on the display, like this:

```
SPEED
```

This mode lets you move or navigate between different screens using the "up" and "down" keys. Pressing the "up" key goes to the next screen. Pressing the "down" key goes to the previous screen.

All of the screens are arranged in a continuous sequence or loop. If you press the "up" or "down" key enough times in navigation mode, you will end up back where you started.

When you press the "select" key in navigation mode, you enter edit mode.

2.4.2 Edit Mode

Edit mode lets you see and adjust (if allowed) the value of the item or parameter you selected in navigation mode, like this:

```
  30 MPH
```

On screens that can be edited, the "up" and "down" keys can be used to increase or decrease the value shown. Holding the arrow button will cause it to repeat, letting you change a value quickly.

On screens that can not be edited (status screens), the display continually shows the value and the arrow keys do nothing.

In some cases, the arrow keys are used to start a function like throttle position sensor calibration(see page 30) or factory reset(see page 43).

The "select" key is used to save your edits and return to navigation mode.

2.5 System Checkout

2.5.1 Power On!

Without starting the engine, turn the ignition on. If everything has been correctly wired, the display on the COMPUSHIFT Mini will briefly show either:

```
GM 700R4
```

or

```
CHRY 518
```

depending on which model is installed. After that, it should should show:

```
SPEED
```

If display is blank or shows something else, then there is some kind of problem, most likely with the wiring.

2.5.2 Pressure Sensor Check

With the vehicle in park, start the engine. Press the "up" key once to select the pressure screen.

```
PRESSURE
```

Press the "select" key. The display should show something like:

```
  90 PSI
```

Verify that the screen shows some pressure and that this pressure changes with throttle.

Turn off the engine.

2.5.3 Speed Sensor Check

With the vehicle in park, start the engine. The display should show this screen:

```
SPEED
```

Press the "select" key once. The display should now show:

```
   0 MPH
```

Have an assistant sit in the passenger seat and hold the COMPUSHIFT Mini.

Drive slowly and verify that the on screen speed display matches the vehicle speedometer.

If all of these tests pass, then you are ready to calibrate the throttle position sensor(see page 30).

2.6 Throttle Position Sensor Calibration (GM)

2.6.1 Introduction

The throttle valve cable, or TV cable, connects between the throttle assembly on the engine and the transmission. The TV cable communicates the position of the throttle to the transmission hydraulics and governor assembly. This is used to scale shift points and control shift firmness. Because the TV cable directly affects the line pressure in the transmission, measuring the line pressure tells you what the throttle position is. This is how the COMPUSHIFT Mini uses a pressure sensor to determine the throttle position.

The pressure variation in each transmission is different depending on the make, model, and customization of the transmission. The throttle position sensor calibration process measures the lowest and highest line pressures as the TV cable is moved, and internally associates those pressures with the 0% and 100% throttle positions. Once set, those positions are used to calculate the actual throttle percentage.

2.6.2 Calibration Procedure

⚠ Put SAFETY FIRST. You should not attempt the throttle sensor calibration unless you are thoroughly familiar working around engines.

Begin by starting the vehicle in park. Let the engine run long enough for it to come off the the fast idle or choke setting. This ensures that at idle the throttle is in the fully closed position.

Using the arrow keys, navigate to the throttle position sensor calibration screen.

TPS CAL

Press the "select" key. The display shows the current calibration status. This will read out as either:

CAL BAD

or

CAL GOOD

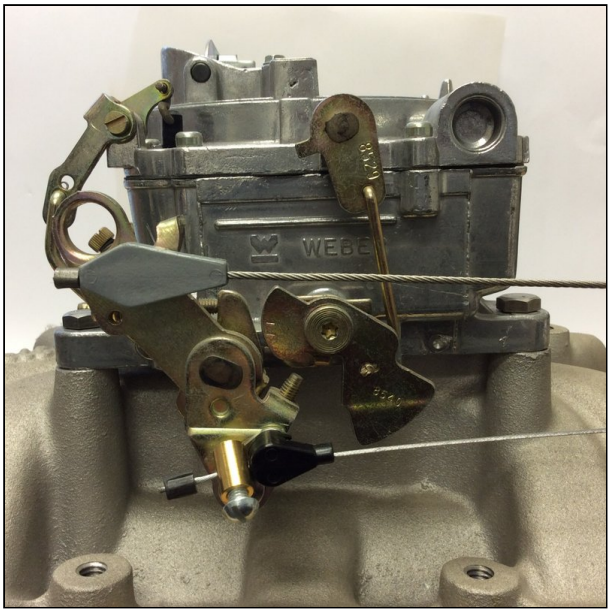
depending on whether or not you have successfully calibrated the sensor before.

This picture shows a typical carburetor with throttle cable (upper cable) and transmission TV cable (lower cable).

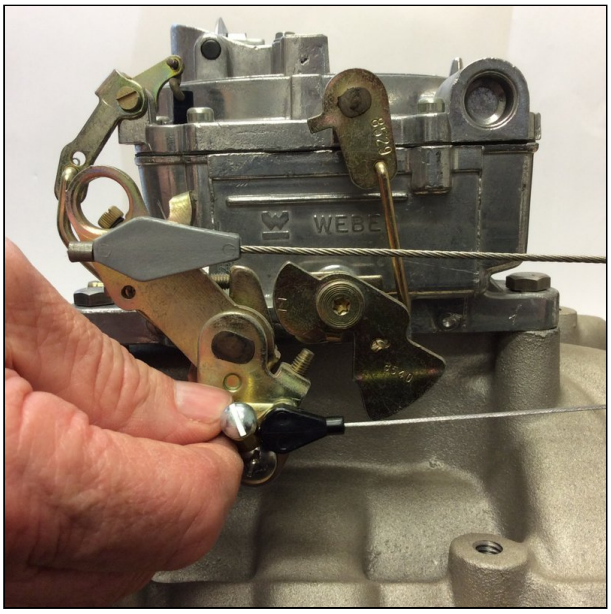
In order to calibrate the throttle position sensor, the TV cable must be moved through its entire range with the engine running.

For safety reasons, this won't be done by moving the throttle, but instead by just moving the TV cable.

In most cases, the TV cable is on a slip joint or can be unclipped from the throttle linkage.

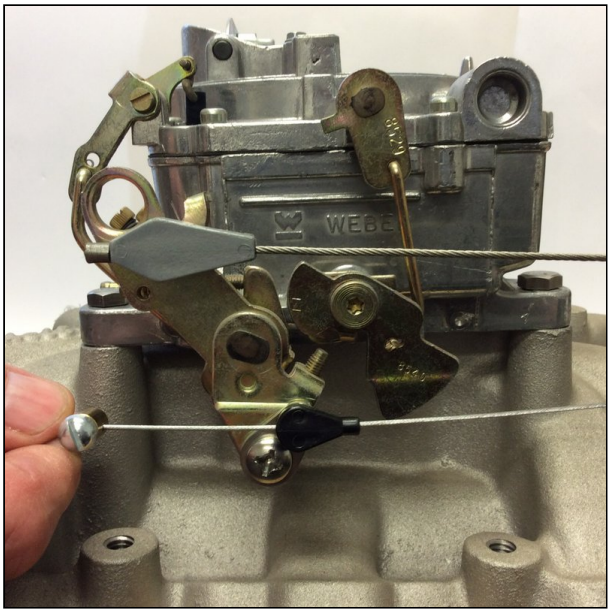


Grab the end of the TV cable with your fingers or a pair of pliers.



Have an assistant press the "up" key on the COMPUSHIFT Mini to start the calibration process.

Pull the TV cable smoothly as far as it will easily travel, hold it for a second, then release it smoothly. You have five seconds to do this.



During the calibration process, a 5-second timer counts down and shows on screen.

```
5.00
4.00
3.00
2.00
1.00
```

When the time finishes, the screen should show:

CAL GOOD

Without pressing the "select" button, move the TV cable though its range of motion slowly.

If the calibration has been performed properly, "CAL GOOD" should remain on the screen.

If not, and "CAL BAD" shows up, you will need to carefully repeat the calibration process.

Once the throttle position sensor has been successfully calibrated, you should be ready to drive.

2.6.3 Diagnosing Problems with TPS Calibration

Here a few common calibration problems and recommendations on how to solve them.

- If the transmission does not have proper line pressure variation, the calibration may fail. A pressure variation (from least to most) of at least 90 lbs is needed. This corresponds to about 1.25 volts in pressure sensor output.
- The line pressure sensor must be screwed into the line pressure test port, not a clutch or accumulator test port.
- If the TV cable is not moved through its entire range, the pressure change will not be enough, and the calibration can fail. Be sure that the TV cable can move freely.
- In some circumstances, a low engine idle speed will prevent the transmission pump from developing full line pressure during calibration. Running the calibration with the engine on a fast idle or at 1000 RPM may resolve this.

2.7 Throttle Position Sensor Calibration (Chrysler)

2.7.1 Introduction

The COMPUSHIFT Mini needs an accurate throttle position sensor signal in order to operate properly.

2.7.2 Calibration Procedure

⚠ Put SAFETY FIRST. You should not attempt the throttle sensor calibration unless you are thoroughly familiar with working around engines.

Begin by starting the vehicle in park. Let the engine run long enough for it to come off the the fast idle or choke setting. This ensures that at idle the throttle is in the fully closed position.

Turn the engine off, but then turn the ignition switch back on so that the engine is ready to start, but not running.

Using the arrow keys, navigate to the throttle position sensor calibration screen on the COMPUSHIFT Mini as shown:

TPS CAL

Press the "select" key. The display shows the current calibration status. This will read out as either:

CAL BAD

or

CAL GOOD

depending on whether or not you have successfully calibrated the sensor before.

Press the "up" key on the COMPUSHIFT Mini to start the calibration process.

Press the accelerator pedal completely to the floor and release it. You have five seconds to do this.

During the calibration process, a 5-second timer counts down and shows on screen.

```
5.00
4.00
3.00
2.00
1.00
```

When the time finishes, the screen should show:

```
CAL GOOD
```

Without pressing the "select" button, move the accelerator pedal though its range of motion slowly.

If the calibration has been performed properly, "CAL GOOD" should remain on the screen.

If not, and "CAL BAD" shows up, you will need to carefully repeat the calibration process.

Once the throttle position sensor has been successfully calibrated, you should be ready to drive.

3 Tuning and Driving

As shipped from the HGM factory, the COMPUSHIFT Mini has a reasonable group of default settings. If the throttle position sensor has been properly calibrated, and the speed sensor is working properly, the rest of the system should simply work.

However, if you decide to tune further, here are some recommendations to keep in mind:

- Drive your vehicle with an assistant. Distracted drivers are much more likely to cause an accident.
- Have your assistant take notes and listen to your comments as you drive. Make systematic changes based on these notes.
- Familiarize yourself and your assistant with the status screens(see page 35) so you understand what the controller is doing as you drive.
- Make sure your engine and transmission work properly to begin with. Fine-tuning the torque converter clutch and overdrive (on Chrysler A518 / A519) is pointless if the vehicle is running poorly.
- Based on your assistant's notes, make changes to a single parameter at a time, and then retest.
- Do not attempt to make adjustments while you are driving, as this is safety hazard.
- Make realistic, smooth changes to the throttle and vehicle while you are testing. Do not drive erratically as you try to explore every possible setting!
- Consult your dealer or HGM for recommendations on how to set the parameters. You aren't the first to do this job, so there is no reason not to consult an expert.

If you are setting up a Chrylser A518/46RH or Chrysler A618/47RH, we recommend setting up the overdrive parameters firs(see page 42)t, then the torque converter clutch(see page 37).

You can temporarily disable the torque converter clutch by setting the minimum lock speed very high.

What's next:

3.1 Driving with COMPUSHIFT Mini

No special considerations are needed when driving with the COMPUSHIFT Mini. Properly tuned, your vehicle should have better gas mileage during cruising, and be responsive to the throttle.

Once tuning is complete, the COMPUSHIFT Mini can be mounted in its final location and left alone. No further adjustment or maintenance is needed.

3.2 Status Screens

3.2.1 Vehicle Speed

This screen shows the current vehicle speed in MPH or KPH, depending on your units setting.

SPEED

When you press the "select" button, the speed is shown continuously.

```
  56 MPH
```

Pressing "select" again exits.

3.2.2 Throttle Position

This screen shows the current throttle position as percentage from 0 to 100.

```
TPS
```

When you press the "select" button, the throttle position is shown continuously.

```
    100%
```

This value should smoothly vary as the accelerator pedal is pressed.

Note that this will not show correct throttle position unit the throttle position sensor has been calibrated.

Pressing "select" again exits.

3.2.3 Transmission Pressure (GM Only)

This screen shows the current transmission main line pressure in PSI or kilopascals, depending on your units setting.

```
PRESSURE
```

When you press the "select" button, the pressure is shown continuously.

```
 130 PSI
```

For most transmissions, this value will be in the 80-100 PSI range in neutral at an idle.

Pressing "select" again exits.

3.2.4 Overdrive

This screen shows whether or not 4th gear or overdrive is engaged.

```
OD
```

When you press the "select" button, the overdrive status is shown continuously.

```
       ON
```

On the GM 700R4 / 2004R, this screen shows the status of the 4th gear switch.

On the Chrysler A518/46RH and Chrysler A618/47RH, this screen shows the status of the 4th gear / overdrive solenoid.

Pressing "select" again exits.

3.2.5 Torque Converter Clutch

This screen shows whether or not the torque converter clutch is engaged.

TCC

When you press the "select" button, the torque converter clutch status is shown continuously.

ON

Pressing "select" again exits.

3.3 Torque Converter Clutch Parameters (GM)

3.3.1 Introduction

The torque converter is hydraulic coupling that trades slippage for torque multiplication, effectively providing an additional spread of gear ratios for drive-off, acceleration, and passing.

The torque converter clutch locks all of the elements of the torque converter together, preventing slippage and losses in the torque converter when isn't needed.

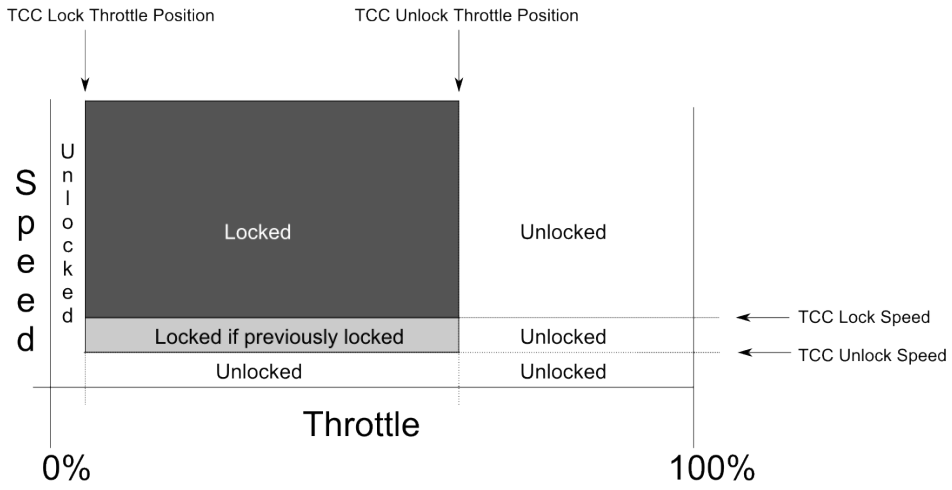
This improves fuel economy, reduces engine speed, and builds less heat in the transmission.

Here are the basic rules used for controlling the torque converter clutch or "TCC":

- The most important considerations for deciding when to lock and unlock the TCC are vehicle speed and engine load / throttle.
- At lower speeds and higher loads, the torque converter should be active, so the clutch should be unlocked to allow torque multiplication.
- At higher speeds and lower loads, the torque converter isn't needed, so the clutch should be locked to improve efficiency.
- The torque converter helps absorb shift shock, so the torque converter clutch should be unlocked during shifting.
- The torque converter clutch shouldn't lock too soon after a shift completes.
- For simplicity sake, the torque converter clutch is only engaged in 4th gear.

The parameters below take these factors into account and allow you to tune for your engine and vehicle.

The drawing below illustrates the relationship between throttle, speed, and the torque converter clutch control parameters.



3.3.2 Torque Converter Clutch Lock Throttle Position

LK TPS

This parameter is the lowest throttle position for which the torque converter clutch will lock.

Usually this can be left set to 0%, but if there is shudder during deceleration with the torque converter clutch locked, this parameter can be set to a very small value (just a couple of %) to allow the TCC to unlock when the throttle is closed.

3.3.3 Torque Converter Clutch Unlock Throttle Position

ULK TPS

This parameter is the highest throttle position for which the torque converter clutch will stay locked. Or, put another way, this is the throttle position at which the torque converter clutch will unlock and allow the torque converter to multiply torque.

This should be set somewhat above the throttle percentage used for ordinary driving and cruising in 4th gear.

3.3.4 Torque Converter Clutch Lock Speed

LK SPD

The is the slowest speed at which the torque converter clutch will lock. This should usually be toward the lower end of the 4th gear operating range.

3.3.5 Torque Converter Clutch Unlock Speed

`ULK SPD`

This is the speed at which the torque converter clutch will automatically unlock if previously locked. This gives some buffer room after the lock occurs (based on the Torque Converter Clutch Lock Speed).

Adjusting this parameter properly can help prevent a "hunting" or cycling situation where the TCC turns on and off.

In most circumstances, this parameter will be set to a speed below the minimum 4th gear speed and thus won't be used because the 4-3 shift will always unlock the TCC.

3.3.6 Torque Converter Clutch Lock Delay

`LK DLY`

This parameter adjusts how long after a 3-4 shift until the torque converter clutch will be allowed to lock.
After the transmission shifts into 4th gear, a timer countdown begins. Once the timer reaches zero, the clutch can lock, subject to the other parameter settings.

The main function of this parameter is to prevent a 3-4 shift from being immediately followed by a torque converter clutch lock. Depending on the vehicle, and especially the torque converter stall speed, this rapid sequence of shift and lock events can be unpleasant.

3.4 Torque Converter Clutch Parameters (Chrysler)

3.4.1 Introduction

The torque converter is hydraulic coupling that trades slippage for torque multiplication, effectively providing an additional spread of gear ratios for drive-off, acceleration, and passing.

The torque converter clutch locks all of the elements of the torque converter together, preventing slippage and losses in the torque converter when isn't needed.

This improves fuel economy, reduces engine speed, and builds less heat in the transmission.

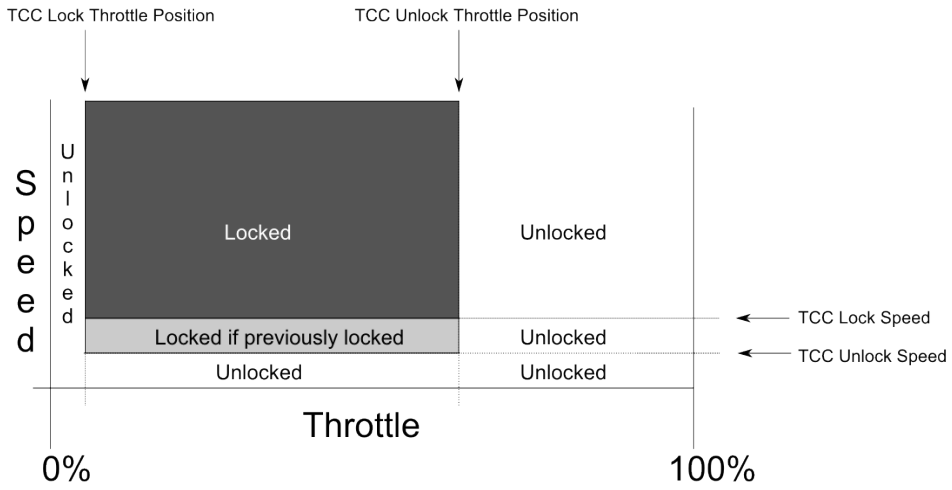
Here are the basic rules used for controlling the torque converter clutch or "TCC":

- The most important considerations for deciding when to lock and unlock the TCC are vehicle speed and engine load / throttle.
- At lower speeds and higher loads, the torque converter should be active, so the clutch should be unlocked to allow torque multiplication.

- At higher speeds and lower loads, the torque converter isn't needed, so the clutch should be locked to improve efficiency.
- The torque converter helps absorb shift shock, so the torque converter clutch should be unlocked during shifting.
- The torque converter clutch shouldn't lock too soon after a shift completes.
- The torque converter clutch should only be locked in certain gears, for example 3rd and 4th.

The parameters below take these factors into account and allow you to tune for your engine and vehicle.

The drawing below illustrates the relationship between throttle, speed, and the torque converter clutch control parameters.



3.4.2 Torque Converter Clutch Enable Gear

LK GEAR

This parameter selects the first gear for which torque converter clutch lock is permitted. The allowed choices are second, third and fourth. The table below summarizes the settings.

Setting	Lock Allowed
2	2nd, 3rd, 4th gear
3	2nd, 3rd, 4th gear
4	2nd, 3rd, 4th gear

Note that the torque converter clutch will usually stay locked during upshifts and will unlock during downshifts.

3.4.3 Torque Converter Clutch Lock Throttle Position

LK TPS

This parameter is the lowest throttle position for which the torque converter clutch will lock.

Usually this can be left set to 0%, but if there is shudder during deceleration with the torque converter clutch locked, this parameter can be set to a very small value (just a couple of %) to allow the TCC to unlock when the throttle is closed.

3.4.4 Torque Converter Clutch Unlock Throttle Position

ULK TPS

This parameter is the highest throttle position for which the torque converter clutch will stay locked. Or, put another way, this is the throttle position at which the torque converter clutch will unlock and allow the torque converter to multiply torque.

This should be set somewhat above the throttle percentage used for ordinary driving and cruising in 4th gear.

3.4.5 Torque Converter Clutch Lock Speed

LK SPD

The is the slowest speed at which the torque converter clutch will lock. Note that this speed and the enable gear must be met in order for a lock to occur.

3.4.6 Torque Converter Clutch Unlock Speed

ULK SPD

This is the speed at which the torque converter clutch will automatically unlock if previously locked. This gives some buffer room after the lock occurs (based on the Torque Converter Clutch Lock Speed).

Adjusting this parameter properly can help prevent a "hunting" or cycling situation where the TCC turns on and off.

3.4.7 Torque Converter Clutch Lock Delay

`LK DLY`

This parameter adjusts how long after a shift until the torque converter clutch will be allowed to lock.
After the transmission shifts into a gear where torque converter lock is permitted, a timer countdown begins. Once the timer reaches zero, the clutch can lock, subject to the other parameter settings.

The main function of this parameter is to prevent a shift from being immediately followed by a torque converter clutch lock. Depending on the vehicle, and especially the torque converter stall speed, this rapid sequence of shift and lock events can be unpleasant.

3.5 Overdrive Parameters (Chrysler)

3.5.1 Introduction

The overdrive is engaged and disengaged based on the vehicle speed and throttle position.

At wide-open throttle, the system will 3-4 upshift at the wide-open throttle overdrive speed.

At closed throttle, the system will 4-3 downshift at the minimum overdrive speed.

For throttle positions between fully-closed and fully-open, the system calculates a proportional speed between the minimum and wide-open throttle parameter settings.

The drawing below illustrates the relationship between throttle, speed, and the overdrive parameters:

3.5.2 Minimum Overdrive Speed

`OD MIN`

This parameter adjusts the minimum speed at which the overdrive will engage.
This is also the approximate speed at which a closed-throttle 4-3 downshift will occur.

3.5.3 Wide Open Throttle Overdrive Speed

`OD WOT`

This parameter adjusts the speed at which the 3-4 shift occurs when the throttle is at 100% or fully-open.

3.6 Other Status Information and Adjustments

Several other screens and adjustments are available for diagnostics and fine tuning.

3.6.1 Throttle Position Sensor Voltage

`TPS VOLT`

This screen shows the current voltage on the pressure / throttle position sensor. This provides diagnostic information only.

```
2.50V
```

3.6.2 Throttle Position Sensor Calibration Low Voltage

`TPS LOW`

This screen shows the voltage on the pressure / throttle position sensor that represents the 0% throttle position.

```
1.50V
```

Usually this value is automatically determined by the TPS calibration. If it needs to be fine tuned, it can be adjusted here. Press "select" to adjust, then use the "up" and "down" keys to increase or decrease the value. Press "select" again to exit.

3.6.3 Throttle Position Sensor Calibration High Voltage

`TPS HIGH`

This screen shows the voltage on the pressure / throttle position sensor that represents the 100% throttle position.

```
4.50V
```

Usually this value is automatically determined by the TPS calibration. If it needs to be fine tuned, it can be adjusted here. Press "select" to adjust, then use the "up" and "down" keys to increase or decrease the value. Press "select" again to exit.

3.6.4 Speedometer Adjustment

`SPD ADJ`

This adjustment provides the ability to fine tune the output that drives an electronic speedometer.

3.6.5 Speed Sensor Calibration

There are two menus that allow calibration of the vehicle speed sensor. The default pulses per mile for both GM and Chrysler applications is 8000, but if the on screen speed reading needs to be adjusted, these menus can be used to compensate for final drive gear ratio and tire size differences.

`PPM CRSE`

This menu adjusts the pulses per mile in a course fashion. Each press of the up or down arrow changes the pulses per mile by 1000 counts.

`PPM FINE`

This menu adjusts the pulses per mile by one count at a time.

3.6.6 Measurement Units

`UNITS`

The measurement units for the system can be set to US customary units or metric. Press "select" to adjust, then use the"up" or "down" key to select either

`US`

or

`METRIC`

Press "select" again to exit.

3.6.7 Factory Defaults

`FAC DFLT`

If necessary, all of the original settings from the factory can be restored using this screen.

Press "select" and then the "up" key to confirm.

The COMPUSHIFT Mini will reset and all previously-set parameters will be restored to their defaults.

4 Diagnostics

Screen Label	Description	Type	Typical Range		Units
			Min	Max	
SW1	State of the external switch 1.	Boolean	OFF	ON	
SW2	State of the external switch 1.	Boolean	OFF	ON	
SW3	State of the external switch 1.	Boolean	OFF	ON	
SW4	State of the external switch 1.	Boolean	OFF	ON	
SW5	State of the external switch 1.	Boolean	OFF	ON	
SW6	State of the external switch 1.	Boolean	OFF	ON	
FET1	State of driver FET switch 1	Boolean	OFF	ON	
FET2	State of driver FET switch2	Boolean	OFF	ON	
FETINH	State of driver FET inhibit signal	Boolean	OFF	ON	
SNS VOLT	Voltage on the differential sensor (usually throttle position or pressure sensor), depending on the application.	Voltage	0	5	Volts
BUS VOLT	12 V power supplied to the controller.	Voltage	8	15	Volts
FET CRNT	Measured current in amps supplied to the FET switches.	Current	0 to 5	5	Amps
SW1 PLUP	State of the programmable pullup current source on external switch 1.	Boolean	OFF	ON	
SW2 PLUP	State of the programmable pullup current source on external switch 2.	Boolean	OFF	ON	
SW3 PLUP	State of the programmable pullup current source on external switch 3.	Boolean	OFF	ON	
SNS GND	Enable / disable for the grounding switch on the differential sensor.	Boolean	OFF	ON	

Screen Label	Description	Type	Typical Range		Units
			Min	Max	
FREQ IN0	Measured frequency on the speed / tachometer input 0.	Frequency	0	6000	Hz
FREQ IN1	Measured frequency on the speed / tachometer input 1.	Frequency	0	6000	Hz
FREQ OUT1	Output frequency of the programmable tachometer / speed output.	Frequency	0	6000	Hz
ENG. RPM	Measured engine speed in RPM.	Rotational Speed	0	15000	RPM
TOSS RPM	Measured transmission output shaft or speedometer cable speed.	Rotational Speed	0	10000	RPM
SPEED	Vehicle speed in MPH.	Speed	0	200	MPH
TPS	Throttle position in percentage.	Percentage	0	100	%
CLOCK	Running time clock.	Time	0		seconds
LK TPS	Throttle position above which the torque converter clutch is always unlocked.	Percentage	0	100	%
ULK TPS	Throttle position below which the torque converter clutch is always unlocked. Must be less than LK TPS.	Percentage	0	100	%
LK SPD	Minimum speed at which the torque converter clutch may be locked.	Speed	30	100	MPH
ULK SPD	Speed below which the torque converter clutch is always unlocked. Must be less than LK SPD.	Speed	30	100	MPH
LK DLY	Time, in seconds, after 4th gear engagement, to allow torque converter clutch actuation.	Time	0	2.5	seconds
TPS VOLT	Voltage on the throttle position sensor.	Voltage	0	5	Volts

Screen Label	Description	Type	Typical Range		Units
			Min	Max	
TPS LOW	Voltage on the throttle position sensor that corresponds to 0% throttle	Voltage	0	4.5	Volts
TPS HIGH	Voltage on the throttle position sensor that corresponds to 100% throttle	Voltage	0.5	5	Volts
PRESSURE	Measured pressure in PSI when a pressure sensor is connected to the differential sensor input.	Pressure	0	300	PSI
OD MIN	Overdrive engagement speed at closed throttle (0%)	Speed	30	100	MPH
OD WOT	Overdrive engagement speed at wide open throttle (100%).	Speed	30	100	MPH

5 Additional Guides and Information

- Connector Pinouts(see page 48)
- COMPUSHIFT Mini Quick Install Guide[3]

5.1 Connector Pinouts

5.1.1 Connector Layout

1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12

5.1.2 Pinout Chart

ROW	PIN	FUNCTION
TOP	1	EXTERNAL SW 3
TOP	2	EXTERNAL SW 2
TOP	3	EXTERNAL SW 1
TOP	4	SPEED SENSOR 1 HIGH
TOP	5	SPEED SENSOR 2 HIGH
TOP	6	SENSOR +5 V
TOP	7	SENSOR INPUT
TOP	8	SENSOR GROUND
TOP	9	SOLENOID DRIVER 1
TOP	10	SOLENOID DRIVER 2
TOP	11	+12 V POWER
TOP	12	+12 V POWER

3 https://hgmelectronics.atlassian.net/wiki/download/attachments/1127514121/COMPUSHIFT%20Mini%20Quick%20Install%20Guide.pdf?api=v2&cacheVersion=1&modificationDate=1604171838303&version=1

ROW	PIN	FUNCTION
BOTTOM	1	TACHOMETER INPUT
BOTTOM	2	NO CONNECTION
BOTTOM	3	GROUND
BOTTOM	4	SPEED SENSOR 1 LOW
BOTTOM	5	SPEED SENSOR 2 LOW
BOTTOM	6	EXTERNAL SWITCH 4
BOTTOM	7	EXTERNAL SWITCH 5
BOTTOM	8	EXTERNAL SWITCH 6
BOTTOM	9	SPEED OUTPUT AC
BOTTOM	10	SPEED OUTPUT DC
BOTTOM	11	POWER GROUND
BOTTOM	12	POWER GROUND