



**Installation Instructions - Allison 5-speed LCT 1000/2000/2400
 ATS Co-Pilot® Transmission Controller Computer
 Fitment: 2001-2005 GM 6.6L Duramax
 PN: 601-904-4248**

⚠ PLEASE READ ALL INSTRUCTIONS BEFORE INSTALLATION.



BILL OF MATERIALS:

1. Co-Pilot Control Box, LCT-1000 Co-Pilot · 601-800-4248
2. ATS 5-Speed Allison Co-Pilot External Wiring Harness · 601-011-4248
3. Co-Pilot Allison MAP Adapter · 601-017-4248
4. 24-Pin Co-Pilot Jumper, 5-Speed Allison · 601-014-4248
5. CoPilot GM LCT1000 5-Speed Internal Wiring Harness · 601-015-4248
6. Solenoid Block, 5-speed · 601-009-4248
7. General Co-Pilot Hardware Kit · 601-123



Installation Manual

Co-Pilot TOW for 2001-2005 GM Allison LCT-1000/2000/2400 Version 1

This kit makes it possible to transfer increased power levels over stock developed by a modified engine to the rear wheels without causing the dreaded transmission slip and “Fail Safe” condition that plagues the Allison transmission. The Co-Pilot™ package alone, without any internal transmission modifications, allows the transmission to handle approximately 85 more horsepower and 120 foot pounds of torque over the power level at which the stock Allison will typically enter into “Fail Safe” mode, roughly 425HP/650Tq. The Co-Pilot™ kit allows the transmission’s clutch packs to receive full line pressure (clamping force needed to apply clutches) during high power situations. The stock Allison LCT-1000/2000 and 2400 transmission’s torque capacity has been reduced by the limited pressure that is available in the clutch packs. The stock Allison transmission only receives approximately 86-PSI oil pressure to the clutch packs when in 5th gear. After the addition of the Co-Pilot™ transmission system the transmission clutch packs receive approximately 230-PSI, more than 2.5 times the stock pressure.

By allowing the available line pressure to the clutch packs, we have designed a system that increases the torque capacity of the stock Allison transmission by over 280 foot pounds of torque with the simple addition of our Co-pilot™ transmission kit. This increased pressure is only applied during high engine torque output, unlike other mechanical kits that do not use electronic controls. This removes the concern of excessive pressure on vital transmission parts such as delivery rings, drums, shafts, etc. during normal operation. Other valve body kits being sold today perform this hydraulically, only after the trim valve has completed the shift. The problems with these hydraulic kits lie in two areas. The first is the lack of ability to sense engine torque and to anticipate a shift. This causes the clutches to endure an excessive amount of slip, causing heat during the shift and eventually glazes the shifting clutch packs. The other problem with these mechanical kits is the valves supply full line pressure to the delivery rings in the transmission at all times. This constant high pressure causes excessive wear in the transmission. We have spent a great amount of time in the engineering and development of this kit to ensure long transmission life, along with great performance. If the Co-Pilot™ kit is installed into a transmission that has been pushed into the fail-safe protection mode (neutral) the effect the Co-Pilot™ will have on the transmission is not as apparent as when installed on a stock transmission that has not been previously damaged. After the C-3 (3rd-5th) clutch pack has been glazed a few times the clutch pack loses about 20% of its holding force, in this case the complete ATS Heavy Duty Transmission package may be necessary to repair the previously damaged components inside the transmission.



Features of the ATS Co-Pilot Allison Package

- Increases transmission torque capacity over stock Allison LCT-1000/2000/2400
- Keeps the engine off of the rev-limiter at wide open throttle, during high torque demand
- Increases transmission life and durability, and reduces transmission fail-safe condition that exists from increased power output of engine
- Allows towing in all gears, including overdrive, with a modified engine
- Works with all add on power modules including propane assist
- Works in conjunction with the factory computer
- Will work with all other transmission shift calibration kits

Understanding the ATS Allison Tow Co-Pilot™ Transmission Package

The ATS Co-Pilot module controls and increases the load capacity of the Allison LCT-1000 automatic transmission based on the amount of increased engine torque. This allows for up to 100% of the power developed by the engine to be transferred through the transmission. The ATS Co-Pilot module provides normal factory operation of the transmission when the engine is operated in the lower power ranges. As the torque of the engine is operated at increased loads the ATS Co-Pilot module will prevent the transmission from slipping; delivering all of the normally unusable power to the ground. In certain high power situations, the converter clutch is turned on eliminating the slippage through the fluid coupling in the torque converter. This feature is best used with the ATS Five Star™ torque converter. The transmission performance is exceptional and oil temperature will remain low because of little to no slippage occurring when the ATS Co-Pilot module is turned on. When the ATS Co-Pilot module is turned on, you can expect exceptional performance and very responsive shifts.

Installation Instructions

There are three (3) basic installation steps to this kit

- A. Valve Body Section
- B. Wiring harness installation and the Co-Pilot box
- C. Connect wiring harness to sensors

NOTE: If you already have an ATS Transmission, the internal harness and solenoid block are already installed. Please skip steps 1-16

A. Valve Body Section

- 1) Drain the transmission pan; use a 14 mm socket to remove the drain plug from the bottom of the transmission pan. You will need a pan with a fluid capacity of approximately 6 quarts of fluid. After draining the transmission pan, place the drain plug back into the pan and torque it to 16-foot pounds of torque.
- 2) Next remove the bolts from the outside of the pan that attach it to the transmission case and remove it from the case, use a 13mm socket. Remove the black plastic filter from the transmission; pull the filter straight down while rotating from side to side to remove it from the case.
- 3) After the pan and filter has been removed from the transmission allow the valve body to drip for a while to minimize the mess. You are now ready to proceed with the valve body up-grade.
- 4) Un-plug the 20-pin connector from the back of the transmission (Figure 1). The connector can be difficult to disconnect from the transmission, squeeze the connector and wiggle it from left to right while exerting pressure to the rear of the vehicle. The connector will disconnect from the transmission with a little effort.

Note: The valve body does not need to be removed from the transmission to install the Co-Pilot.



Figure 1: 20-pin connector

- 5) Remove the (2) two-solenoid retainer clips that attach the internal wiring harness to the valve body, use a flat blade screwdriver to pry the retaining clips out of the valve body, hold your hand over the clips when removing them so that they do not pop out or grab them with a pair of pliers and pull them out (Figure 2). Place the two retaining clips aside for later.



Figure 2: Removal of solenoid retaining clips

- 6) Next you will need to remove the internal wiring harness connector from the transmission case. The internal connector protrudes through the back of the transmission case. The connector will need to be pushed from the outside of the case to the inside. There are two methods to remove the connector from the case. The preferred method is to use the appropriate tool to compress the locking pins while pushing the connector to the inside of the transmission (Figure 3).

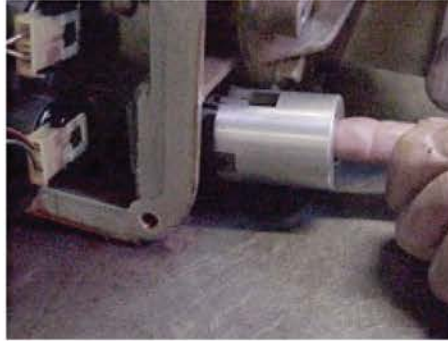


Figure 3: Case connector removal with appropriate tool

The other method of removing the case connector involves possibly damaging the original internal wiring harness. The original wiring harness will be discarded with the installation of this kit, there is a new internal wiring harness supplied with the Co-Pilot™ kit. If the second method is used to remove the internal wiring harness from the transmission case it can be removed by knocking it through the case using a dead blow hammer. This method will usually damage the internal connector, it will need to be thrown away, if it is reused later the connector will likely leak transmission fluid through the connector. Now that the connector is released from the case the wiring harness is ready to be removed from the valve body.

- 7) Remove the wiring harness from the valve body; there are 6 solenoid connectors that need to be disconnected (Figure 4). The wiring harness can be discarded; it will be replaced with the new harness provided.



Figure 4: Disconnecting solenoids

- 8) Install the new supplied wiring harness. It will fit 2001 to 2005 transmissions. The pigtail wrapped with wire loom is only used on 2004 and later units. For earlier units the wire (marked in Figure 5) can be placed under the filter.



Figure 5: New wiring harness

- 9) Insert the solenoid retainer clips to secure the wiring harness to the valve body. When installing the clips, it helps to move the solenoids slightly to seat clips (Figure 6).

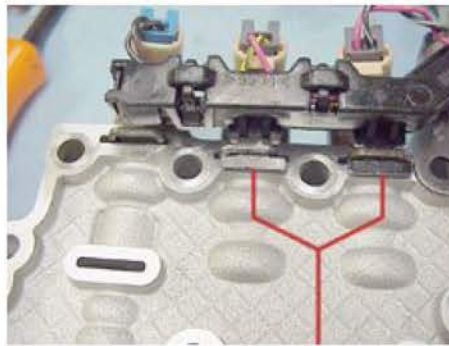


Figure 6: Reinstallation of solenoid retaining clips

- 10) You will need to modify the original stainless steel tube that was earlier removed from the valve body. Measure the stainless steel tube 1/2 inch from the bracket and cut using a tubing cutter (Figure 7). After cutting the tube, remove exactly 3/4 in from the other section of the tube.



Figure 7: Tube modification

- 11) Add a small chamfer to the outside of the tube. The purpose of this is to not cut the o-rings inside the block which can cause a pressure leak. We recommend using a chamfer tool but a similar result can be achieved using a bench grinder or belt sander (Figure 8).



Figure 8: Tube after chamfering

- 12) There should be a 3/4 inch gap between the two tubes after the cuts have been made. Place the two modified tubes into the valve body and measure the gap between the sections. **You must have exactly 3/4 inch between the two tube halves** and some modification to the length may be necessary to fit the valve body (Figure 9).



Figure 9: 3/4" gap

- 13) Place the two modified tubes into the new solenoid block provided; use the valve body for assistance when aligning the tubes to the block (Figure 10).



Figure 10: Solenoid block

- 14) Install the auxiliary valve body assembly and the two tubes into the lower valve body section. Be careful when installing the metal tubes into the lower valve body, gently tap the two tubes in equally where marked in Figure 11; the tubes will drop right in.

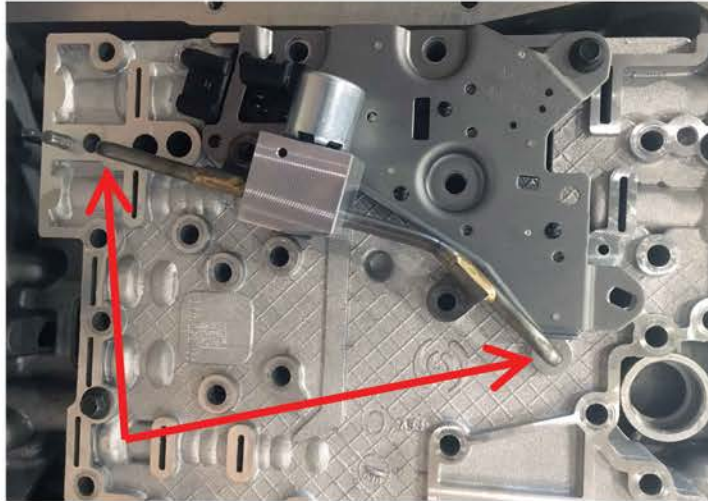


Figure 11: Installing the tubes

- 15) Install the long gold bolt (Figure 12, Arrow A), and the other bolt that holds the tube and pressure manifold block to the lower valve body (Figure 12, Arrow B).

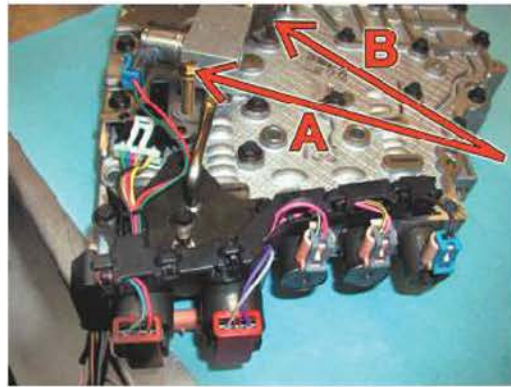


Figure 12: Reassembly

- 16) Plug the 5 pin wiring harness into the pressure manifold block (Figure 13, Arrow 2)

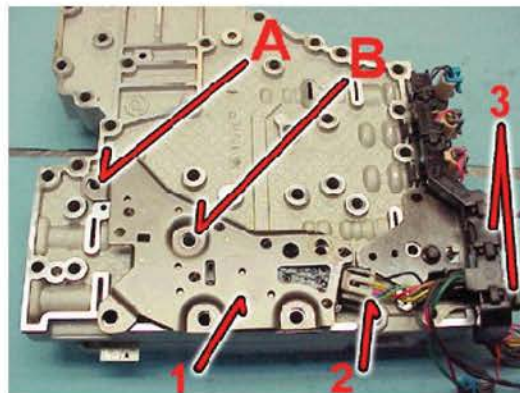


Figure 13: 5 pin harness location (Arrow 2)

B. Harness installation Section:

The following section will show and describe how to install the Co-Pilot harness. Disconnect the negative ground (**black**) terminals on all vehicle batteries before starting installation. The ATS Co-Pilot is designed to be nearly completely plug and play. We following instructions will be divided up for wiring up each individual connector and wire color on the ATS Co-Pilot. These wire connections must be shielded from the elements.

NOTE: When routing the Co-Pilot harness, be sure to route the harness away from hot areas in the engine compartment (i.e. **exhaust, turbo and EGR**) to avoid damage to the wiring and harness. Reconnect all ground terminals on batteries after completing installation.

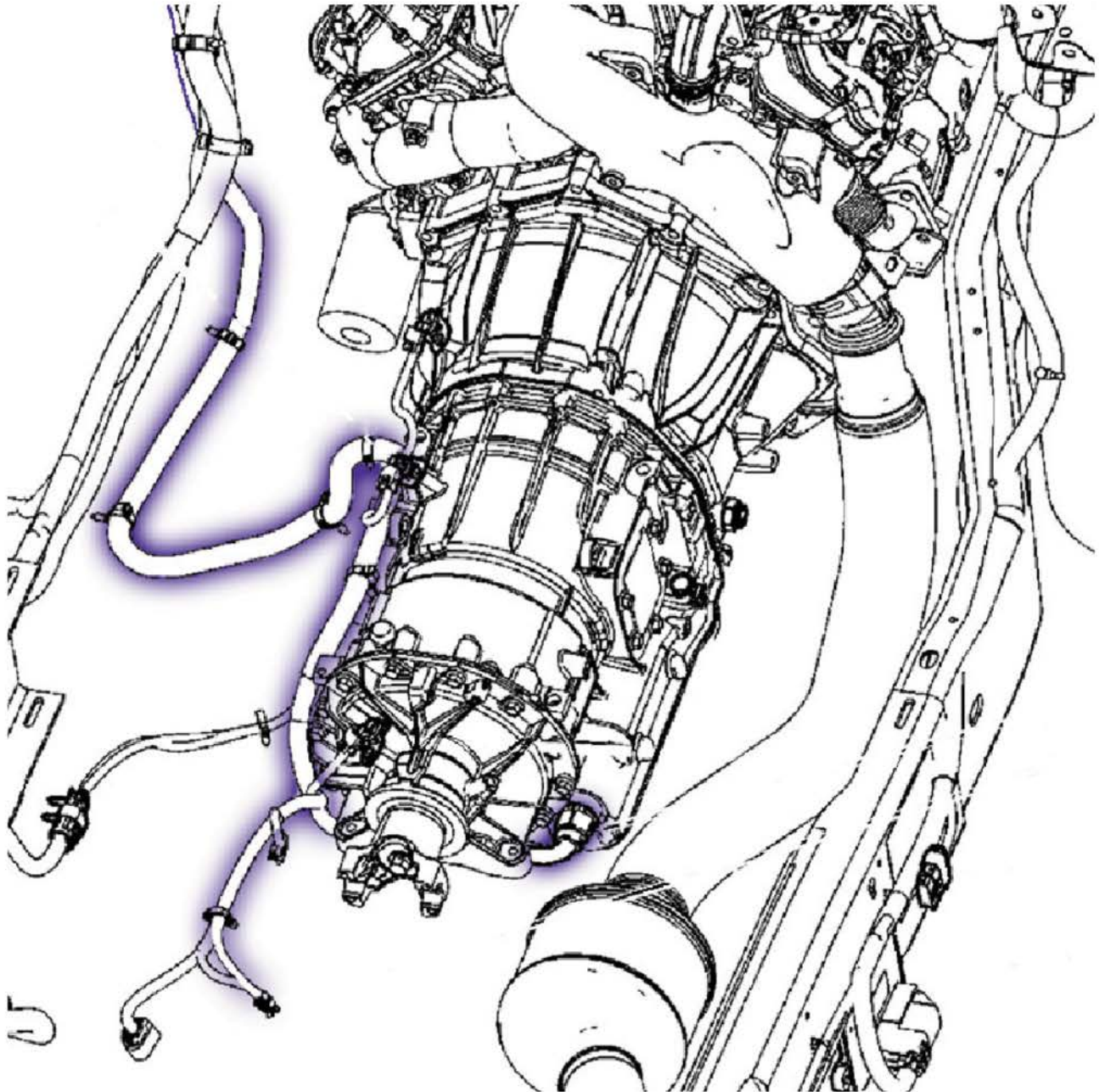


Figure 14: Harness routing

Transmission Valve body Connectors:

The Co-Pilot has two connectors for the valve body, one male and one female connector. The valve body connector is located on the rear passenger's side of the transmission. Starting at the Valve Body connectors route the Co-Pilot harness above or below the Allison tail -housing. If you route your harness above the transmission case, be sure the harness clears the exhaust by at least four inches. Always be sure it clears drive shafts and is not hanging down where it could be caught on something on the road while you are driving.. As pictured below, this part of the install is plug and play. Simply unplug the factory connector, plug the Co-Pilot connector into the valve body, and then plug the other connector into the factory harness.



Figure 16: Valve body connection



Keep the connectors and harness away from the exhaust!

Routing Co-Pilot Wiring Harness

Route the Co-pilot so that it does not run close to any exhaust pipes. Be sure to keep away from moving parts such as drive shafts. Also we recommend routing your Co-Pilot So that it follows the factory harness. Be sure to keep the harness as high as possible so that it will not get caught on things while driving. The Co-Pilot harness was designed to have enough length so that no connectors or wires needed to be stretched to fit, causing wear and premature failure. Pictured below is the recommended routing for the Allison Co-Pilot harness. Make sure to zip tie the harness so there is very little slack, but still leaving enough to allow for some flex and movement.



Figure 15: Harness routing

We recommend routing your harness as pictured above.

C: Connect wiring harness to sensors

Orange Wire- Manifold Absolute Pressure (MAP) Sensor

Connect at the MAP sensor connector located on the driver's side of the engine, mounted on the backside of the intake manifold. Use the supplied jumper harness that makes this connection plug and play with the MAP sensor. The Pigtail that comes out of the jumper harness has a single pin connector on it. Plug the Co-Pilot MAP orange wire in to the pigtail on the MAP sensor jumper harness.

- On 2002-2004 LB7 Duramax the MAP wire is located in the intake tube in the center of the engine.
- On 2004.5-2005 and later LLY Duramax Engines the sensor is covered slightly. Remove the intake pipe going to the turbocharger to get a better view at the MAP sensor and the connector.
- On 2006-2010 LBZ/LMM Duramax engines the MAP Sensor is located on the cast metal intake pipe on the passenger side of the engine, near the intake air heater.



Figure 17: Map sensor



IMPORTANT: If the vehicle has any aftermarket power modules installed, be sure to plug the MAP sensor wire **BEFORE** any taps from these power modules, i.e. place the Co-Pilot's plug closest to the sensor. The Co-Pilot may not work properly if it receives signals that have been modified by other aftermarket devices.

Ground, Black Wire with Eyelet

Connect the eyelet of the black ground wire to the negative terminal of the vehicle's battery.

Routing Co-Pilot Wiring Harness through the Firewall

The Co-Pilot harness is designed to be simple and easy to route; however coming through the firewall can be a tight fit. Take care not to damage the Co-Pilot harness or any other factory wires when going through firewall and take your time.

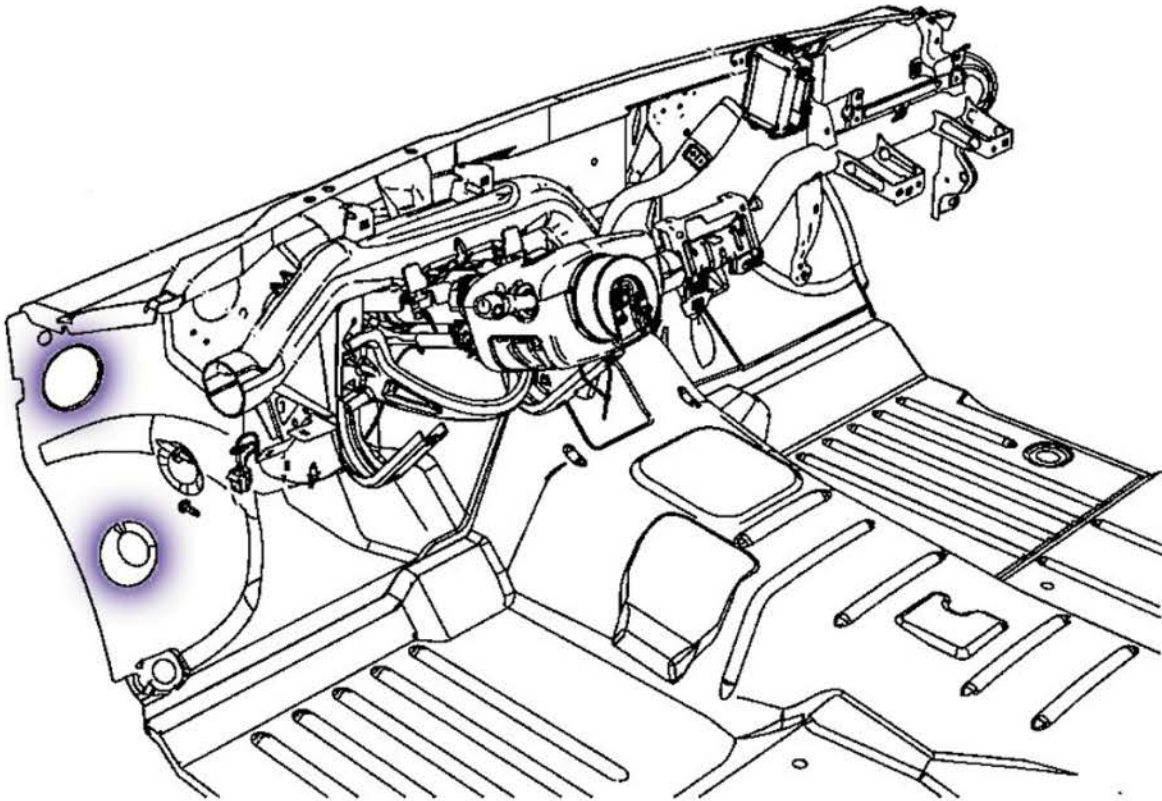


Figure 148 - Under Dash Components

Co-Pilot Mounting Location

Connect the 24-pin connector from the harness to the connector on the Co-Pilot control box and secure the box to the dash. Find a convenient location to mount the Co-Pilot within reach and view of the driver. We recommend locating the unit just to the right of the driver on the lower dash panel (above the driver's right knee). Use the supplied Velcro to secure it to the dash. Before sticking the Velcro to the dash thoroughly clean the area with a cleaner such as alcohol or brake clean (apply the cleaner to a clean rag or towel and wipe the area clean).



Figure19: Suggested Co-Pilot Mounting Location

Notes about first startup procedure after installation

For the first 50 miles after installation, set your Co-Pilot so that the center LED light is on.

To avoid a 'fail safe' condition and/or check engine light the recommended procedure is to fill the transmission with a minimum of 6 quarts (with stock pan) of fluid before startup. With the high capacity pan you will want to add 11 to 12 quarts before startup. Once the engine is started, allow it to run for 4-5 seconds and then shut off the ignition. Allow the vehicle to sit for 5-10 seconds and then restart the engine. This will purge the air from the system before the OEM computer detects the low pressure (therefore setting the check engine light and trouble code).

Scan Tools

Different scan tools can often be misleading. The only scan tool that ATS has found to be completely effective at clearing trouble codes in the computer is the GM Tech II scanner and the Viewtronics hand-held scanner. Many other scan tools on the market display to the user that they are clearing codes, when in-fact they are not. This condition of not completely clearing the codes has been exhibited repeatedly with the Snap-On scanners. Disconnecting the battery cables from the battery terminals WILL NOT clear the codes or the adaptive strategy that governs shift behavior. Feel free to contact our Technical Support Department with questions or for more details.

Diagnostics

The factory 20 pin connector on the back of the transmission can be plugged directly into the transmission after the Co-Pilot internals have been installed. This is one method that can be used to isolate possible electrical issues with the ATS external harness or Co-Pilot controller.

Have Any Questions?

Thank you for purchasing the ATS Co-Pilot. Please check our website at <http://www.atsdiesel.com> for technical support and other performance products that ATS has developed for the Duramax such as Aurora Turbochargers, Five Star™ torque converters, ATS High Performance Transmissions, Performance Injector Nozzles, CP3 fuel pumps, Torque Pro Propane Systems, Stainless Steel exhaust, and a full line of performance electronics. Please call or e-mail our Sales or Technical Service Department, 8:00am to 5:30pm Mountain Standard Time, Monday through Friday.

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