



**2006-UP GM ALLISON 6 SPEED
LCT-1000/2000/2400
CO-PILOT Parts list**



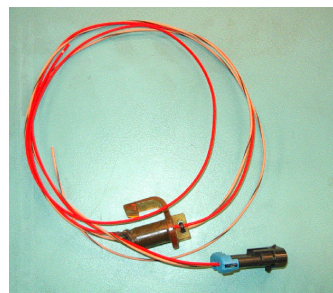
Co-Pilot Computer (1) 601-800-4308



Solenoid Block (1) 601-109-4308



External Wiring Harness (1) 601-011-4308



Internal Wiring Harness (1) 601-015-4308



Installation Manual
Co-Pilot™ for 2006-UP GM Allison 6 Speed
LCT-1000/2000/2400
Version 1.4

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.

Please read all instructions before the installation of the ATS Allison Co-Pilot™

Thank you for purchasing the ATS Co-Pilot™ Allison transmission up-grade package. This manual is to assist you with the installation and operation of the unit. If you are installing the unit for a customer, **please pass this manual on to your customer** for future reference.

Features of the ATS Co-Pilot™ Allison Package

- Increases transmission torque capacity over stock Allison LCT-1000/2000/2400
- Allows full control over transmission shift quality at the touch of a button
- The only system available that will let the driver select shift firmness
- Faceplate on the Co-Pilot™ module indicates the enhancement level the transmission receives
- Allows shift softness/firmness from mild to wild
- 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
- Automatic command of the torque converter clutch apply under high power conditions
- 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 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.

The ATS Co-Pilot™ module allows the driver to have control over the engagement of the torque converter clutch while eliminating the slip in the transmission clutch packs. The Co-Pilot™ module also allows the driver to select the shift quality (firmness) desired during heavy acceleration. With the simple push of a button you can select stock type soft shifts to tire burning performance shifts. This feature is the most popular feature of the ATS Allison Co-Pilot™ Pack. Select a soft shift for every day driving or make a few clicks on the up arrow pad and lay rubber at the racetrack. The glory about this feature is its simplicity.

Operating Instructions

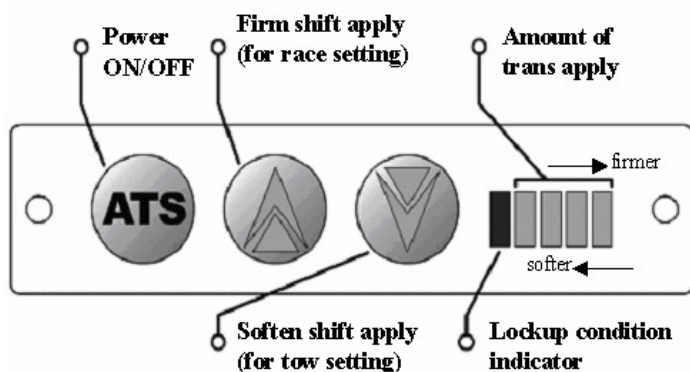
The variable control panel on the face of the ATS Co-Pilot™ Module allows the driver to select the quality of the transmission shift. The “quality” of the shift is the firmness or softness, this is the duration of time the transmission takes to complete a shift from the time the computer commands a shift

tell the transmission completes a shift. Shift quality is very important, when a shift takes longer than desired the clutches glaze and eventually burn up causing premature transmission failure. A glazed clutch also has far less holding ability than a good clutch. This is the condition that is caused by installing power modules on a vehicle with out taking care of the transmissions first. The control panel face also serves as a boost pressure readout, as engine output torque (boost) rises the lights in the panel will light starting at the left going to the right. The blue boost indicator lights indicate when the transmission is being torque enhanced by the ATS Co-Pilot™ Module. When the round button on the left side of the Co-Pilot™ face is depressed and the blue light is turned off, the ATS Co-Pilot™ Module is disabled. This will allow the factory PCM (Power Train Control Module) to operate the vehicle as it is in near stock form. The OFF position is indicated by none of the lights being lit on the face of the box when boost pressure is reached. To activate the unit, depress the round button on the left side of the Co-Pilot™ face, one of the blue lights on the face will light up, the light also indicates the level the Co-Pilot™ was set on before it was last shut OFF. This will tell the ATS Co-Pilot™ Module to watch for engine load. The torque converter clutch engagement is controlled by two different inputs; vehicle speed and engine load. This feature is adjustable on the control pad; the ATS Co-Pilot™ Module controls lock-up engagement automatically when the Co-Pilot™ is adjusted with the Up arrow (Blue L.E.D. lights are to the far right).

The **up** and **down** arrow keys select the amount of additional load capacity the transmission receives from the Co-Pilot™ module based on engine load. This will cause the Co-Pilot™ to send a variety of signals to the transmission to enhance the torque capacity of the transmission. This option is only available when the unit is powered on. When the Co-Pilot™ is powered off the transmission operates in stock form, therefore the transmission will receive no inputs from the Co-Pilot™ module. Below is a description of how to adjust the shift quality.

Adjusting Shift Firmness

Shift Firmness is adjustable at any time by simply arrowing **up** or **down**. The **up** arrow will **firm** up the shift quality while the **down** arrow will **soften** the shift quality. The Co-Pilot™ has been designed this way so you can customize the quality of your shift during your drive. Note: The buttons must be held down to change the settings. Please see the diagram below.



For racing applications hold the **UP** arrow (increasing shift firmness) for approximately five seconds until all of the blue lights simultaneously illuminate. All of the blue lights coming on at once indicates the Co-Pilot™ computer has been placed into Race Mode. In some cases the Race Mode may cause a check engine light. This light will not cause any performance problems and will reset itself after a few

ignition cycles. When the Co-Pilot™ is placed in the firmest setting (blue L.E.D. all the way to the right) the Co-Pilot™ computer will place itself into Race Mode automatically once the transmission reaches operating temperature. To allow firm shifting without the engagement of the torque converter clutch, place the Co-Pilot™ computer one setting below the maximum (the right two blue LEDs will be on and no check engine light will be set at this point).

In some cases the transmission computer may inhibit reverse if the check engine light is triggered. Do not be alarmed if this condition exists. After an ignition cycle, reverse will be restored.

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

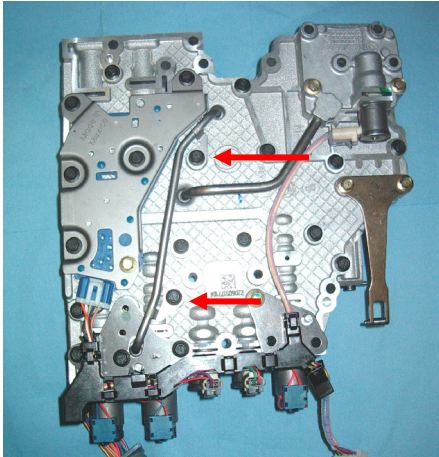
A) Valve Body Section

- 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.

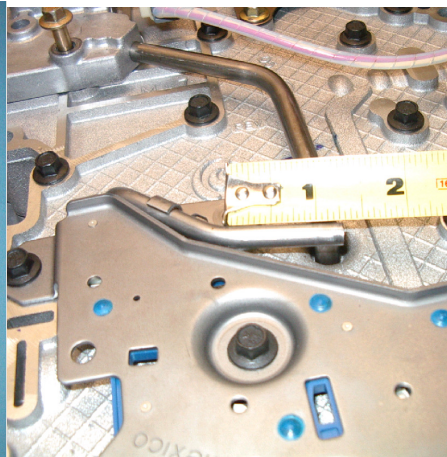


Note: The valve body does not need to be removed from the transmission to install the Co-Pilot™.

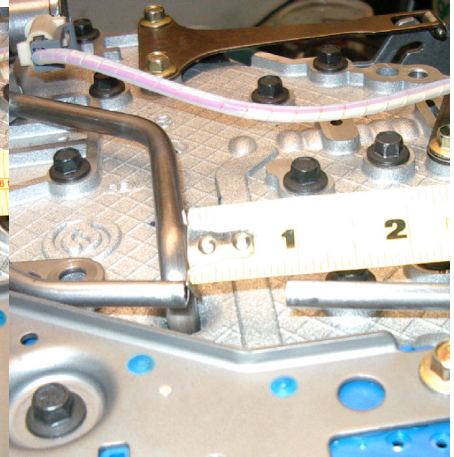
- 5) Install the supplied connector from the Co-Pilot™ harness in the factory connector's place. Plug the factory connector that you removed into the other side of the Co-Pilot™ harness.
- 6) Remove the stainless steel tube that is held down by the two bolts shown below in the left picture. With a tubing cutter, cut the tube 1-1/4" from the bend shown in the middle picture. Then cut 7/8" off of the section of tubing that does not have the bend you measured from.



Bolts for Removal

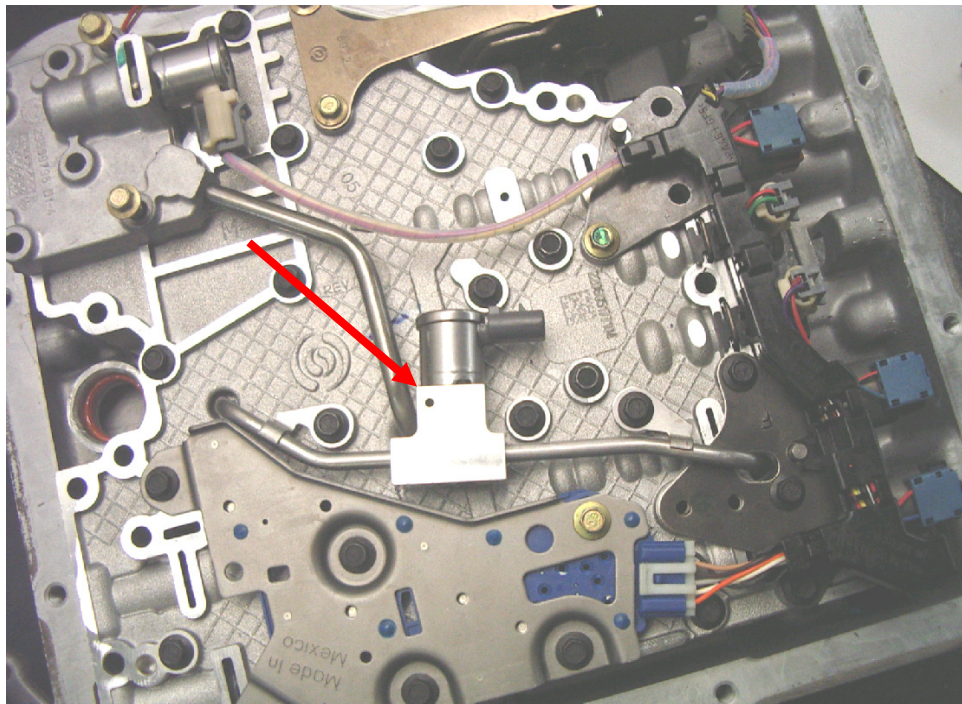


1-1/4" from bend



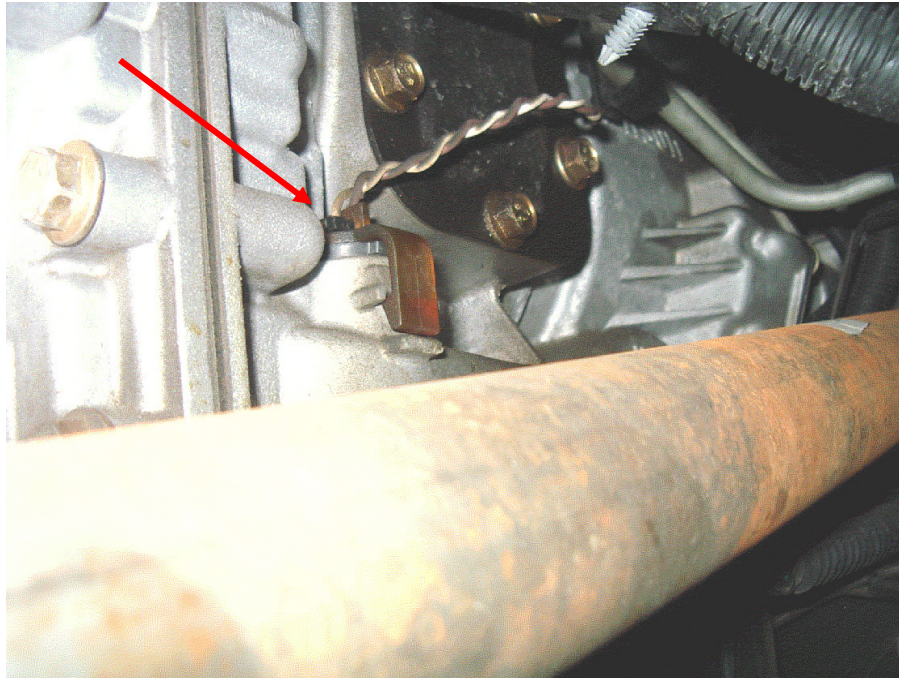
7/8" gap

- 7) Remove any burrs from the tubing and make sure to remove all debris. Install the solenoid block between the tubes as shown and put the assembled tube back onto the valve body. NOTE: Be careful when installing the metal tubes into the valve body, gently tap the ends if necessary.

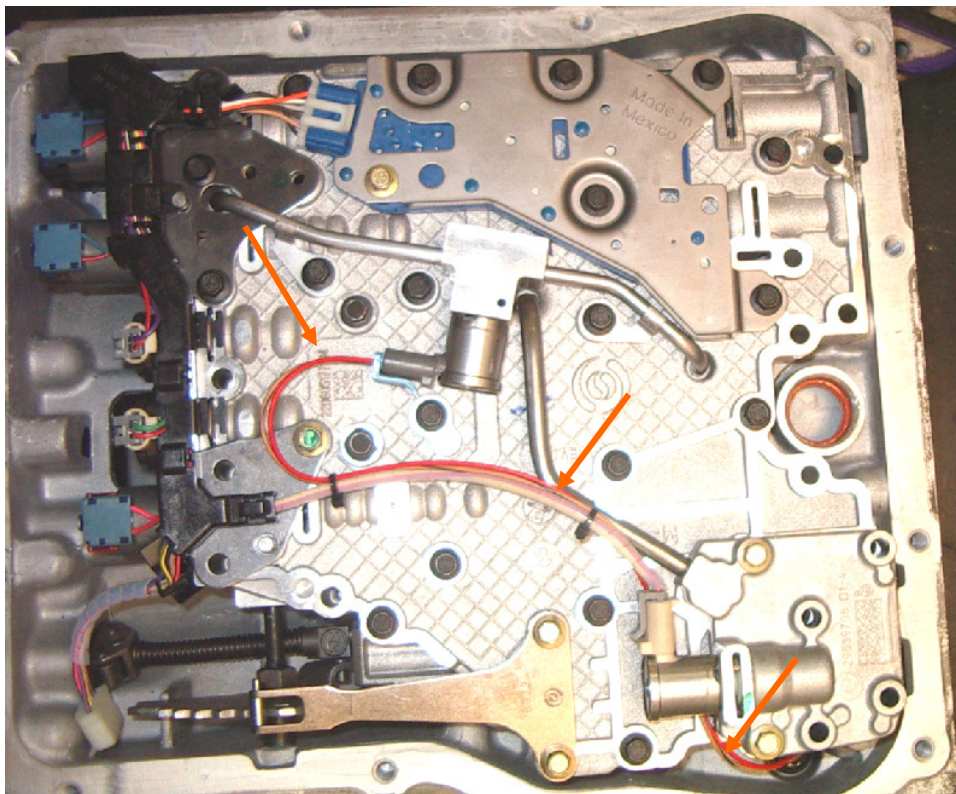


Make sure the solenoid's pin hole is oriented as shown in the picture above.

- 8) Connect the ATS secondary harness to the external harness. Put the Brown plug into the port next to the PTO cover as shown below.



- 9) Route the wires as shown in the picture below. Wire tie it where convenient and out of the way. Plug the connector into the solenoid.



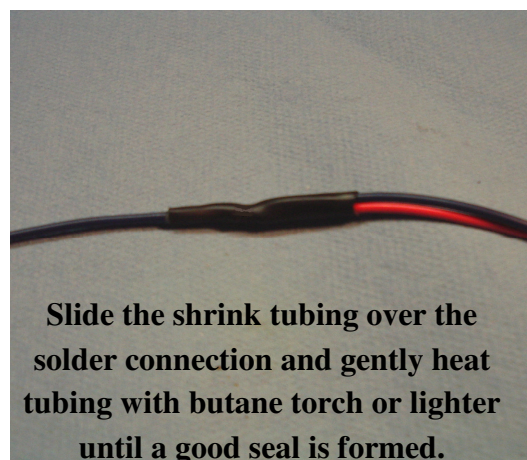
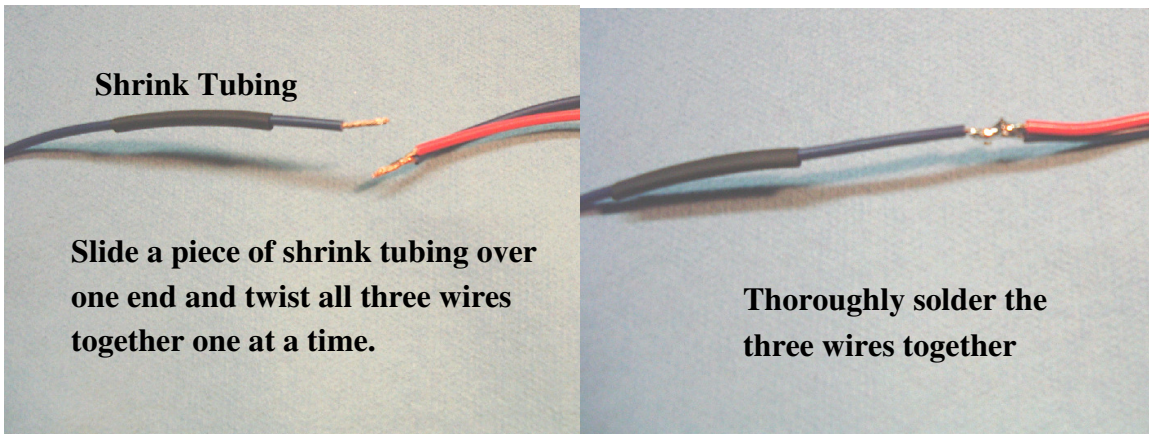
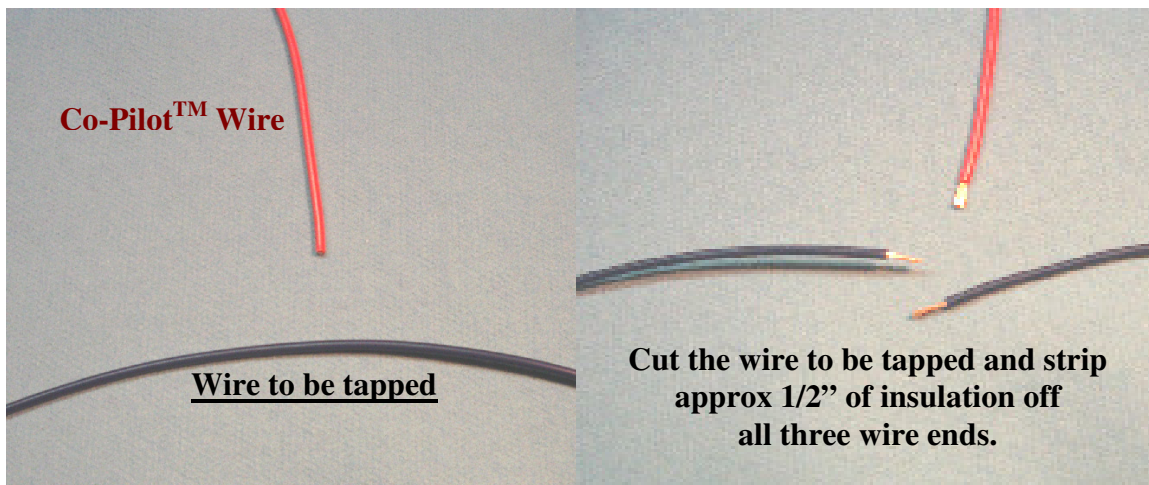
- 10) Take the time to do one last check over the valve body assembly, be sure all of the electrical connectors are plugged in and all of the bolts are tight then install the internal filter.
- 11) Install the pan and gasket; this is also the time to install an aluminum deep pan if you have one.
- 12) Torque the pan bolts to 18-foot pounds of torque.
- 13) Add 6 quarts of transmission fluid to the transmission after securing the transmission pan to the case.
- 14) The transmission internal section is done; after the remaining portion of the ATS Co-Pilot™ kit is completed the transmission fluid needs to be checked immediately after start up. Note: It is common to have a check engine light immediately after start up due to low fluid level, after the transmission is full of fluid and a few ignition cycles the check engine light will reset.
- 15) **IMPORTANT!** Make sure to recheck the fluid level in the transmission after the vehicle is driven for a short distance, as it is common for the level to drop.

B) Wiring harness installation and Co-Pilot™ Box

- 1) Plug the Co-Pilot™ wiring harness into the transmissions round 20-pin connector located on the backside of the transmission. The supplied connector will plug in between the factory wiring harness and the transmission. Connect the factory 20-pin connector into the other end of the Co-Pilot™ harness supplied. Be sure the two 20 pin connectors are securely locked into place, the two tabs on ether side of the connector make a snapping sound when fully engaged.
- 2) After connecting the male and female ends of the Co-Pilot™ wiring harness route the 10-foot section of the harness over the top of the transmission. The white connector will need to be routed to the inside of the cab.
- 3) Route the small white connector side of the wiring harness into the driver's side compartment through the firewall of the vehicle. There is an access hole in the firewall that can be enlarged to accommodate the harness.
- 4) Pull the wiring harness through the firewall just enough to connect it to the Co-Pilot™ module, ideally to the right side of the driver just below instrument cluster.
- 5) Plug the wiring harness into the Co-Pilot™ module; place it in a good location that can be easily accessed by the driver. Use brake clean or solvent on the dash where the Velcro will be put to insure that it sticks properly. Secure the Velcro and Co-Pilot™ to the dash.

C) Connecting the wiring harness

We *strongly* recommend that you solder all wire connections and protect the soldered connections with shrink-wrap.



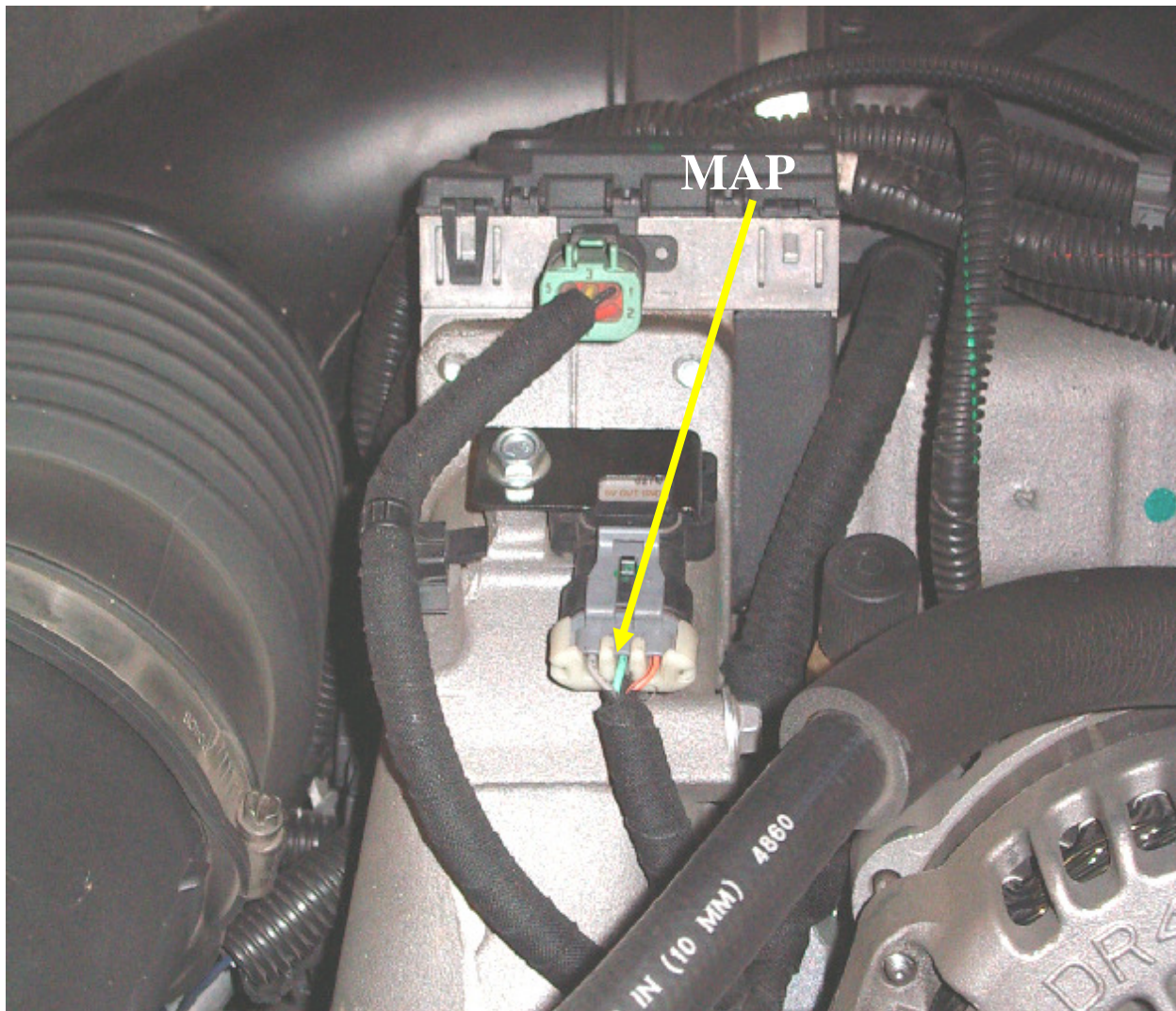
Making all of your taps this way will give you reliable and long lasting connections.

-Gray Wire with Black Tracer- GND-Exhaust Brake

Connect to the ground-side of the exhaust brake solenoid. Cut the existing solenoid ground and butt-connect to the wire end that goes to the solenoid. The Co-Pilot™ will act as the ground to give optimal braking performance.

-Brown Wire with Green Tracer- MAP Sensor

The MAP sensor is located on the front of the passenger side of the engine, between the alternator and the air intake pipe. The sensor connector has three wires, tap the MAP sensor's **Light Green wire** (middle wire of the connector) with the Co-Pilot™ **Brown wire with Green tracer**.



This connection is *critical* as it is subjected to harsh conditions. We advise a good solder joint for this connection and shrink-wrap. Some power modules may also plug into this sensor, if there is an additional connector plugged into this sensor wire, **be sure the Co-Pilot™ tap is the closest to the sensor.**

-Black Wire- Ground

Connect to a bolt or screw under the dash that provides a good ground. For best results, splice this wire into the black wire with white tracer that comes from ECM pin #1 with solder.

-Yellow Wire with Black Tracer- VSS

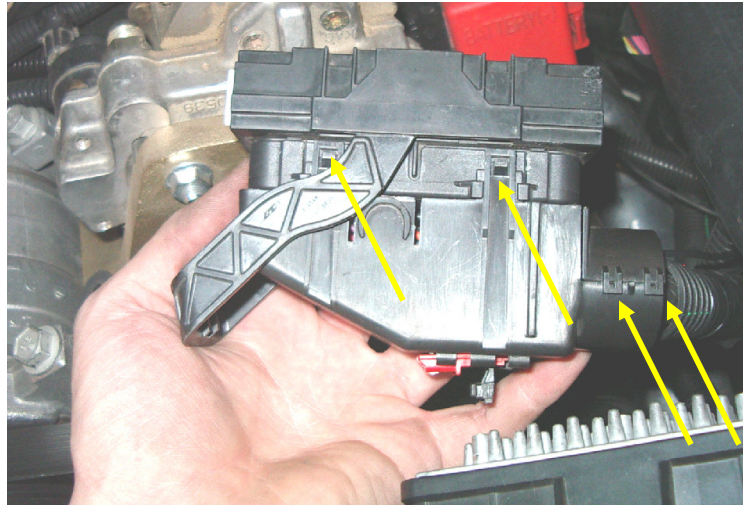
- 1) Route the Yellow with Black tracer wire from the Co-Pilot™ to the Transmission Control Module (TCM) at driver's side of the fan shroud.



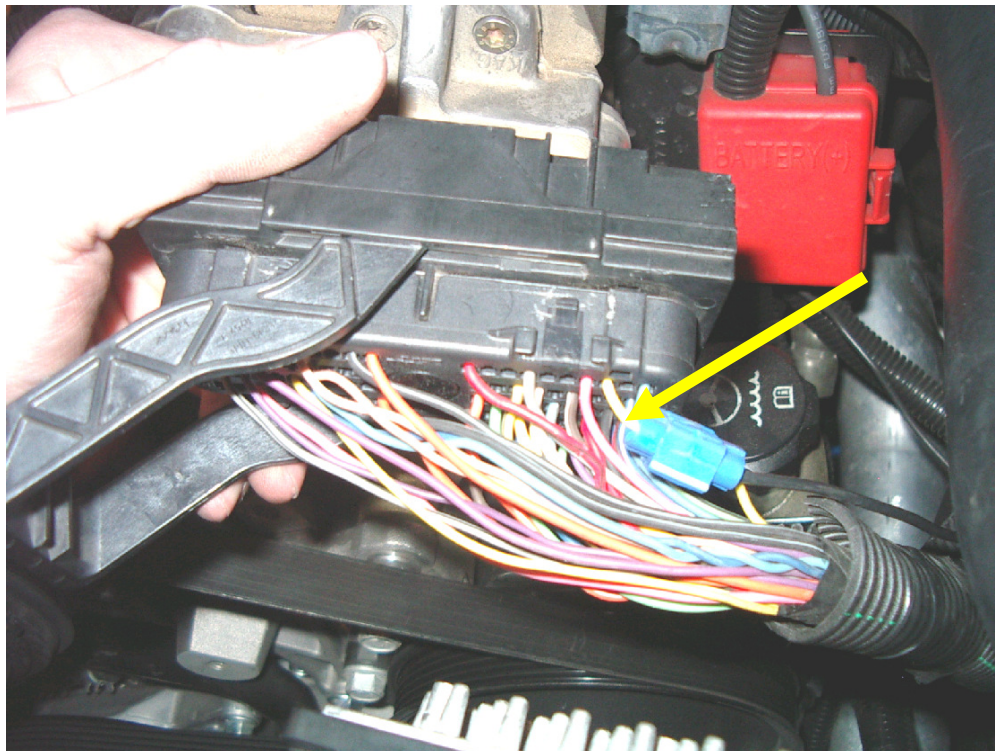
- 2) Disconnect the plug on the bottom of the TCM by pulling the locking tab towards the fan.



- 3) Separate the plastic housing by removing the 8 tabs (4 on each side), be careful not to break them.

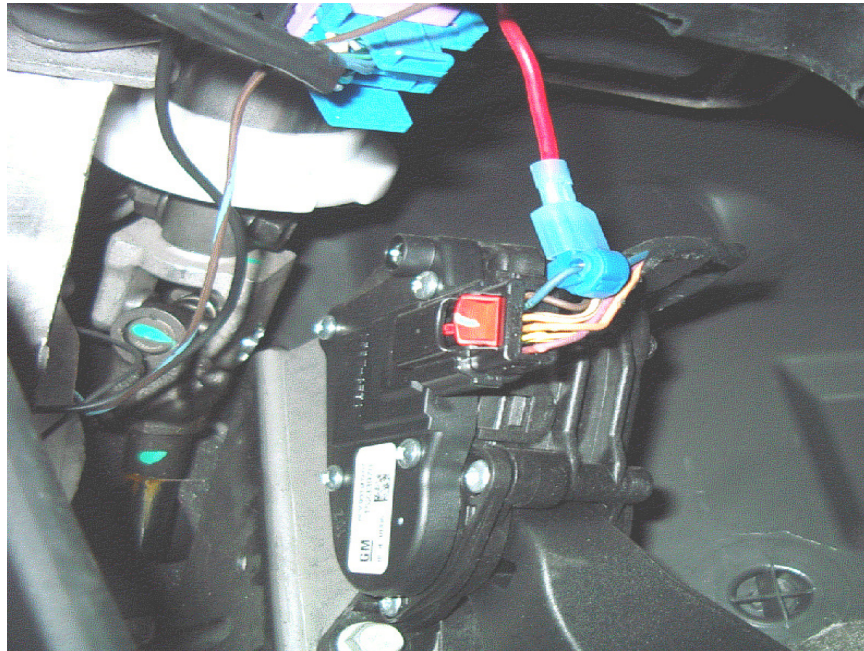


- 4) 2006-2007 LBZ Model Trucks: Locate the **yellow wire** shown below. Splice the wire about 2 inches from the connector. Splice the **yellow wire with black tracer** from the ATS wiring harness into the yellow wire coming from the connector. Make this splice a couple inches from the connector so you have room to work. We recommend solder and shrink wrap for this connection over using tapping hardware. 2007.5 LMM Model Trucks: Locate the Purple with White tracer wire in PIN#60. Connect the Yellow with Black tracer wire to the Purple with White tracer as described above.



- 5) Put the plastic cover back over the wires and reinstall the plug, make sure the locking tab is secure.

Installing the Throttle Wire



Hook up the **Brown wire with blue tracer from the Co-Pilot™ harness** to the **throttle position sensor's Blue wire** by tapping with solder. Be sure to tie the wire up out of the way. On 2007.5 LMM model trucks, connect the Brown w/Blue tracer wire of the copilot harness to the Dark-Blue wire in the TPS connector PIN E.

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 tools 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.

Bill of Materials

1. Co-Pilot controller 601-800-4308
2. Solenoid block assembly 601-109-4308
3. External wiring harness 601-011-4308
4. Internal wiring harness 601-015-4308
5. Hardware kit (not pictured) 601-001-4248