



## Installation Manual v1.1: 42RLE Automatic Transmission

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

Thank you for purchasing the ATS Co-Pilot™ transmission management computer. This manual is to assist you with your 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.




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**Figure 1 - Kit Contents**

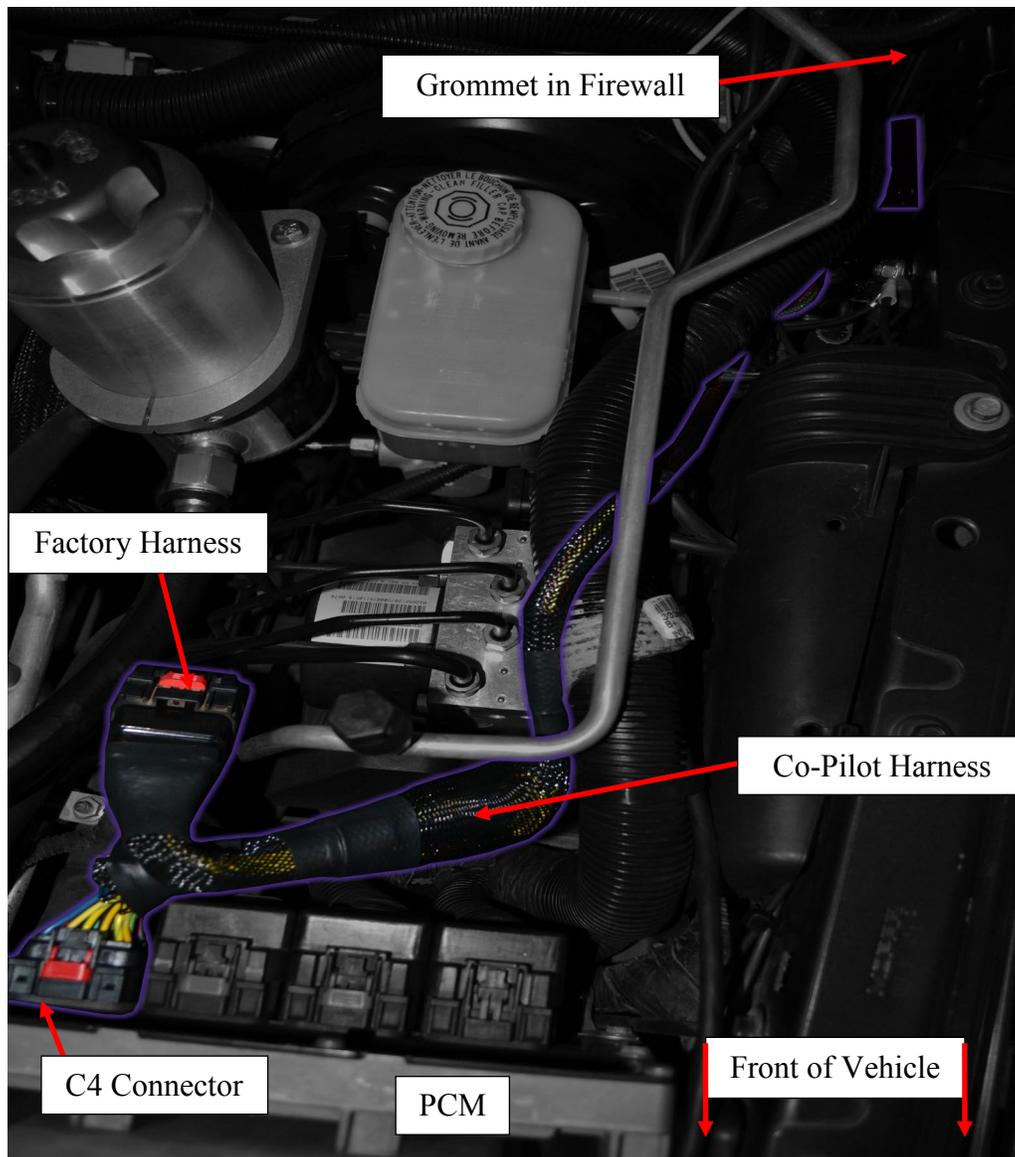
### **The 42RLE Co-Pilot™**

The 42RLE Co-Pilot™ is the ultimate Line Pressure controller for your transmission! Bringing you the best shift quality as well as the highest clutch holding compactly available. The Co-Pilot™ actively modifies line pressure of your 42RLE based on engine load. The Co-Pilot™ also has a closed loop line pressure control system which helps improve the longevity of your transmission. The Co-Pilot™ allows a stock vehicle to have good shift quality as well as a heavily modifies engine such as a Super Charged or turbo charged engine so the transmission will have the same shift quality and keep the transmission from slipping. The 42-RLE Co-Pilot™ can be installed on a stock transmission or any aftermarket modified transmission. The best results are achieved when the Co-Pilot™ is installed on an ATS transmission or you have upgraded your transmission to an ATS Valve body.

**NOTE:** If installing a ATS transmission or any other new transmission, plug in factory harness in order to relearn new transmission. Do not do this process with the Co-Pilot™ plugged into the PCM.

### **Routing Co-Pilot™ Wiring Harness**

The Co-Pilot™ harness is designed to be simple and easy to install. There is a small hole located on the driver's side firewall it is about 1" in diameter. Fold the 24-Pin connector parallel to the harness to put through the small fire wall hole. You can also drill a hole in the fire wall if desired but we suggest the use of the factory hole locations, for a cleaner install. Plug the 24-pin connector into the Co-Pilot™ control box, mounting and the TPS connection is covered later in this manual. Route the harness through the engine bay as shown below. Be sure to secure the harness away from major heat sources like the turbo(s) and exhaust manifold using the zip ties provided.



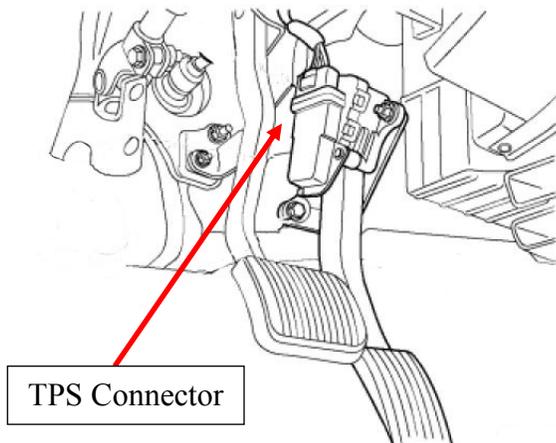
**Figure 2 - Co-Pilot™ Harness Routing**

**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.

**Pink Wire - Throttle Position Sensor (TPS)**

The TPS connector is located in the Co-Pilot™ harness inside the cab. Locate the TPS connector at the top of the accelerator pedal arm under the dash and disconnect the connector. Install the T-connector harness (Figure 4) in line and connect the single wire connector to the Co-Pilot™ harness.



**Figure 3 - TPS Connector Location**



**Figure 4 TPS T-Connector**

**Verifying that the TPS wire is connected correctly:**

With the engine running and your left foot pressed firmly on the brake pedal quickly stroke the throttle position pedal from 0% to 100% while watching the lights on the face of the Co-Pilot™ box. (NOTE: this test should only take about 3 seconds to perform) The purple lights should go from the right side of the box to the left side of the box. This will indicate that the Co-Pilot™ box is receiving the commanded engine load signal so it can properly control the transmission, if for any reason the Co-Pilot™ box does not operate in this manner do not drive the vehicle until the condition is corrected.

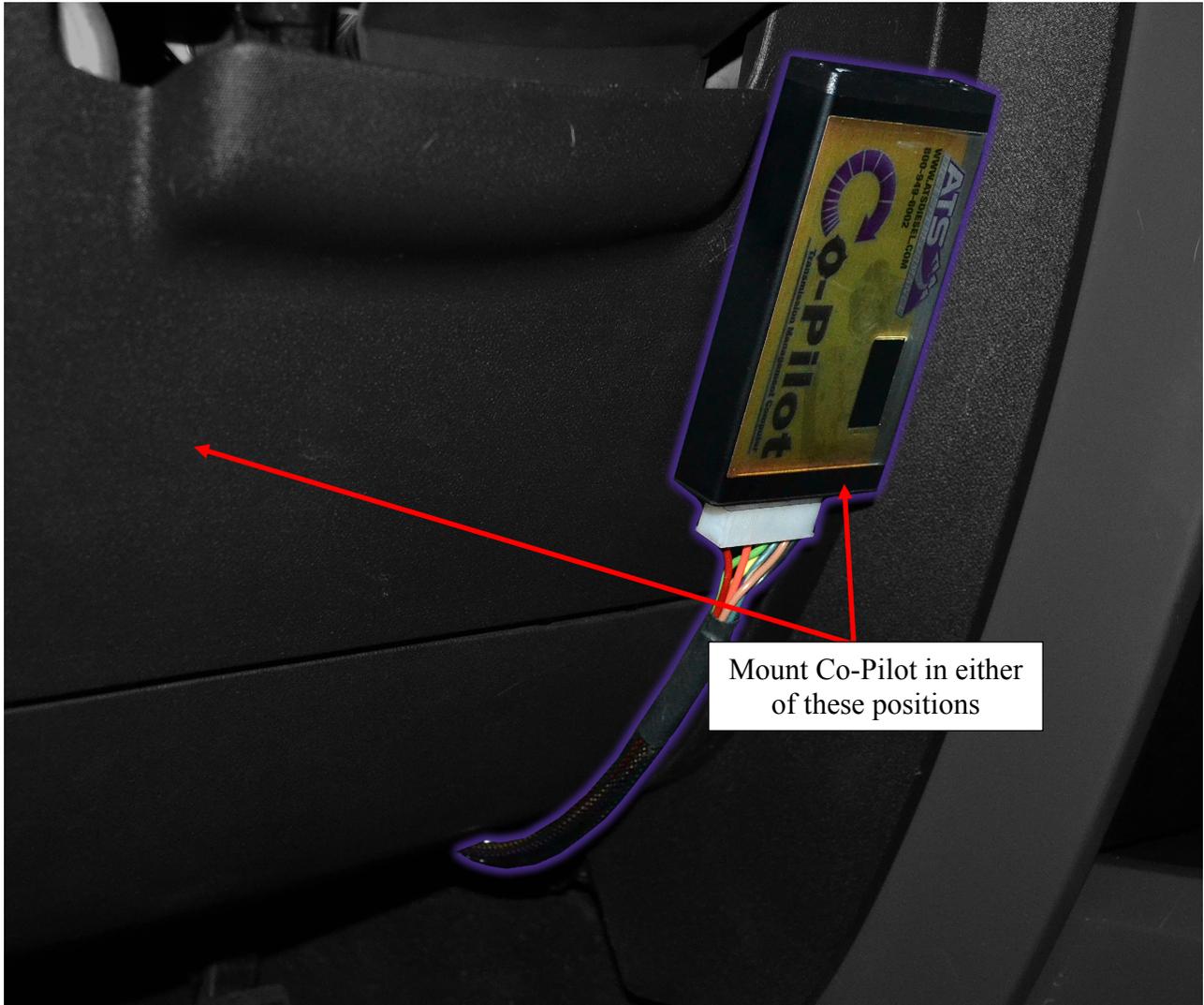
**Ground: - Black wire with the eyelet**

Route the black wire up over the engine to the negative terminal of the battery, using the cowl to hide and secure the wire. Zip tie in place.

The remainder of the harness is comprised of the connectors that will plug IN-LINE with the C4 (green) connector on the Powertrain Control Module (PCM). This portion is designed to plug into the factory harness to make installation of the Co-Pilot™ as simple as possible given the complexity of the wiring. The PCM is located on the driver side of the radiator core support as shown in figure 2. The C4 connector is the connector location marked by green on the PCM. Remove this connector and plug the Co-Pilot™ harness into the PCM until the locking tab snaps over the ramp on the PCM. Connect the opposing connector in the Co-Pilot™ harness into the factory C4 connector (it will snap and lock into place.)

## Co-Pilot™ Mounting Location

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). See figure 5. 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.)



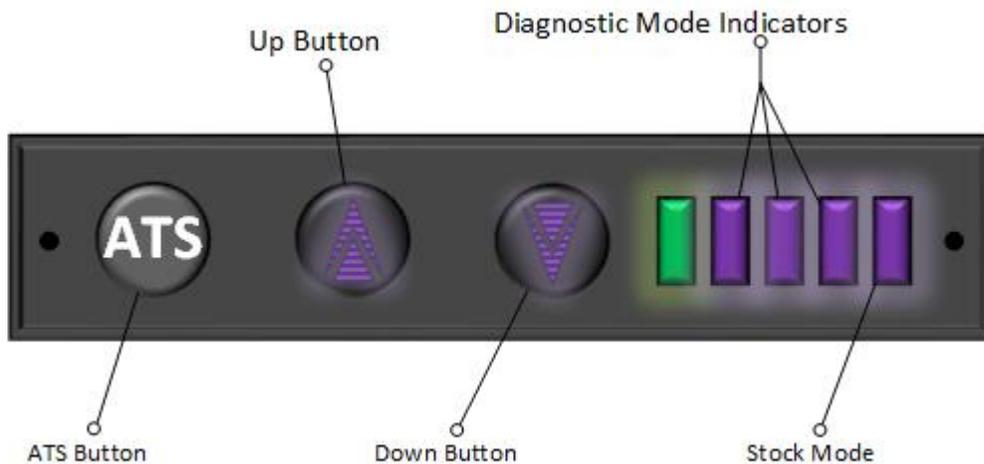
**Figure 5 - Co-Pilot™ Mounting Location**

## Understanding the operation of the ATS Co-Pilot™

The ATS Co-Pilot™ improves shift quality, determining and commanding optimum line pressure and internal clutch timing within the transmission to improve the reliability of the 42RLE 4-speed transmission.

### Mode Selection

The front panel of the ATS Co-Pilot™ has 3 buttons and a series of LED indicators as shown below in figure 6.



**Figure 6 - Co-Pilot™ Face Description**

The ATS Co-Pilot™ has 2 diagnostic modes. To change these modes, press any button on the front panel of the display. The mode is indicated by the position of the purple lights on the front panel. To change the diagnostic mode, simply use the UP and DOWN arrow keys on the front panel to change modes. This can be done while driving.

The main difference between the 2 positions is what sensor it is displaying. The 2 different modes are for diagnostics only. There is no difference in the way the transmission is controlled. The far left shows TPS position while the right shows the transmission line pressure.

**Throttle Position Sensor (TPS) - Mode 1 (Down arrow button, purple light to far right)**

This shows the TPS angle from 0% to 100%.

**Transmission Pressure - Mode 2 (Purple light in right-center of display to far left of display)**

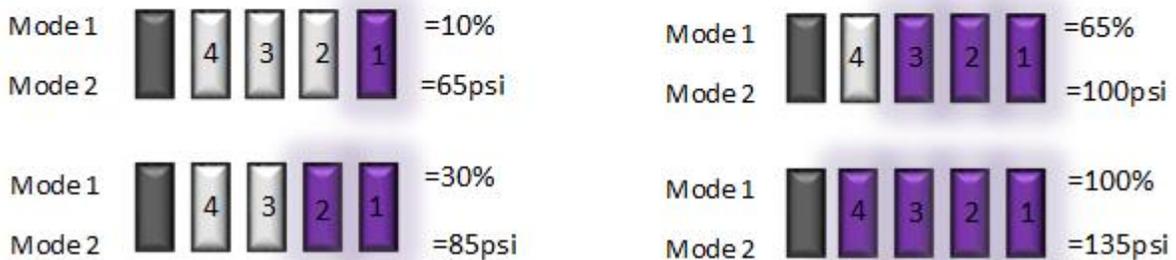
This setting shows the actual transmission line pressure.

**Brightness Setting**

To change the brightness of the front panel, press the ATS button 2 times (all 4 purple lights will illuminate). Then use the UP and DOWN arrows to adjust brightness. Once selected, wait 4-5 seconds and the Co-Pilot™ will save the brightness setting.

**Throttle Position Indication**

Once a diagnostic setting is selected, the front display will revert to indicating throttle position. The graduated scale is shown below. As long as the orange Co-Pilot™ wire is connected to the TPS before any other aftermarket electronics the indicated TPS level will be accurate.



**Figure 7 - Co-Pilot™ Transmission Line Pressure & TPS Definition**

## **Troubleshooting**

The ATS 42RLE Co-Pilot™ incorporates troubleshooting features for the transmission. If the Co-Pilot™ detects a problem within the transmission, it will flash certain purple lights on the front panel to indicate a problem. If the Co-Pilot™ flashes the purple lights while driving, refer to figure 8 below to diagnose the issue.

# **LINE PRESSURE QUICK TROUBLESHOOTING GUIDE**

## **Indicated by flashing purple LED's**



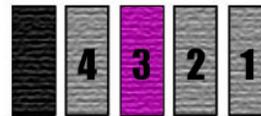
**Low Pressure Circuit Voltage**  
Possible open circuit or low fluid level  
(will flash with key on, engine off)



**Low Line Pressure**  
Line pressure too low, check pump and leak test



**High Pressure Circuit Voltage**  
Short to reference voltage or faulty sensor



**High Line Pressure**  
Line pressure higher than expected

**Figure 8 - Co-Pilot™ Trouble Shooting LED Description**

If the Co-Pilot™ detects any of these conditions, the Co-Pilot™ will force the pressure signal sent to the PCM to also set a corresponding diagnostic trouble code. This scheme allows isolation of pressure problems/connectivity issues between the Co-Pilot, transmission and PCM.

**IMPORTANT:** Flashing lights on the Co-Pilot™ should be dealt with promptly. If line pressures are too low, serious transmission damage can occur.



## **Why do we Use TPS instead of the MAP for watching engine load?**

Those of you that are installing the Co-Pilot™ on a Super Charged gas engine may be wondering why we use the TPS to calculate engine load instead of using a MAP or Boost sensor. We have found that the TPS is a better, responsive, and more accurate method of gathering the data we need to control the transmission on a low boost (0 to 12PSI) engine. Due to many reasons these engines tend to have a torque and HP curve that closely follows the throttle pedal percentage and change. You will find that the Co-Pilot™ pressure adjustment has a wide swing. Generally mild to moderately (normally aspirated) engines will only require the lower pressure settings of the Co-Pilot. While very modified high boost application engines will use the higher pressure settings of the Co-Pilot. Regardless of what engine modifications there are you will be able to adjust the perfect shift quality. In all settings the transmission and converter clutch holding capacity will be greatly increased allowing full power shifts through all gears including over drive!

## **Recommended Performance Parts:**

The stock transmission and converter is capable of handling increased power levels over stock to a great degree but there are limitations of the stock transmission. One of these limitations is the mechanical line pressure limit that is built into the transmission. In order to get beyond these limitations the transmission will require internal modifications. There are many internal modifications that can be up graded in the event you find your stock transmission needs to be replaced. Some of these modifications include a billet torque converter, Heavy duty pump, Heavy duty clutch drums, heavy duty clutch packs, modified valve body, billet pistons etc. All of these components can be purchased in an ATS package that is custom tailored to fit your specific needs. If you find you need more information please contact one of our specialists for more information.

**If you experience problems after installation, simply unplug the wiring harness from the PCM and harness and reconnect the factory PCM connector.**

*If your vehicle behaves normally after disconnecting the Co-Pilot:* Check all wire connections and verify that your plug is fully connected. Make sure PCM connectors snap into place when reinstalled. If the problem continues, contact our Technical Support department at Tech@ATSDiesel.com or 800-949-6002.

*If the problem continues after disconnecting the Co-Pilot:* There is a problem with a wire connection. Double-check all connections. Make absolutely sure that all taps were made on the *correct* wires. If the problem continues, contact our Technical Support department at Tech@ATSDiesel.com or 800-949-6002.

### **Have Any Questions?**

Thank you for purchasing the ATS 42RLE Co-Pilot. Please check our website at <http://www.atsdiesel.com> for technical support and other performance products such as the 5-Star™ torque converter, ATS High Performance Valve Body and ATS High Performance Transmission along with our full line of power enhancers. Please call or e-mail our Technical Service Department, 8:00am to 5:30pm Mountain Standard Time, Monday through Friday.

### **Contact Information**

Toll Free: 800-949-6002

Local: 303-431-7973

Fax: 303-431-0135

Website: [www.ATSDiesel.com](http://www.ATSDiesel.com)

Email: [info@ATSDiesel.com](mailto:info@ATSDiesel.com)

**We strive to make our instructions as clear and complete as possible. To achieve this, our instructions are under constant construction. We encourage you to visit our website to check for the most up-to-date manuals and diagrams as well as other information. If you have any suggestions as to how we can improve this installation manual, let us know at <mailto:Suggestions@ATSDiesel.com>**

### Limited Warranty Statement

ATS Diesel Performance warrants the original purchaser that any parts purchased shall be free from defects in material and workmanship. ATS Diesel Performance is the warrantor of this product, in the event this produce is purchased form a distributor or retailer other that ATS Diesel Performance the customer must contact ATS Diesel Performance for any warranty concerns, not the purchasing dealer. A defect is defined as a condition that would render the product inoperable. This warranty does not cover deteriorating of plating, paint or any other coating. ATS liability is limited to the repair or replacement, at ATS's option, of any warrantable product returned prepaid with a complete service history and proof of purchase to the factory. A valid proof of purchase is a dated bill of sale. Repaired or replaced, product will be returned to the customer, freight collect on a like-for-like part number basis. Accepted warranty units, which have been replaced, become the sole property of ATS.

A Return Product Authorization number obtained in advanced from an ATS customer service representative must accompany products returned for warranty determination. ATS will be the final authority on all warranty decisions.

This warranty shall not apply to any unit which has been improperly stored or installed, subjected to misapplication, improper operating conditions, accidents, or neglect; or which has been improperly repaired, altered or otherwise mistreated by the owner or his agent.

This warranty shall terminate at the end of 12 months in service with the original user. Labor cost incurred by the removal and replacement of an ATS product, while performing warranty work, will be the responsibility of the vehicle owner; in no case does the obligation of ATS Diesel Performance exceed the original purchase price of the product as indicated on the original bill of sale.

Except as set forth in this warranty, ATS disclaims any implied warranty, including implied warranties of merchantability and fitness for a particular purpose. ATS also disclaims any liability for incidental or consequential damages including, but not limited to, repair labor, rental vehicles, hotel costs or any other inconvenience costs. This warranty is in lieu of all warranties or guarantees, either expressed or implied, and shall not extend to any customer or to any person other than the original purchaser residing within the boundaries of the continental US or Canada.

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Rev 1.2 db

### **Bill of Materials**

1. Electronics Box, 42RLE Co-Pilot™ 601-800-8320
2. Wiring Harness, 42RLE Co-Pilot™ 601-011-8320
3. Hardware Pack, 42RLE Co-Pilot™ 601-001-8320