



# **2006-07 Dodge Cummins**

## **BD Remote Mount Exhaust Brake**

### **Installation Instructions**

**P/N# 1027330**

Serial # \_\_\_\_\_

Date Purchased \_\_\_\_\_

Purchased from \_\_\_\_\_

Installed by \_\_\_\_\_

**\*\*\* Please read this manual before starting installation. \*\*\***  
**OWNER'S MANUAL - LEAVE IN GLOVE BOX**

***The brake pressure at idle is required to be checked and adjusted at time of install, at least two weeks after install, and at regular twice a year intervals.***

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## Welcome

Thank you for purchasing a BD Exhaust Brake. This manual is divided into different areas to assist you with your installation and operation of your braking unit. We strongly suggest that you write down the kit and serial numbers of your unit in the spaces provided and retain this manual for any future reference.

## Special Tools Required

- Measuring tape or ruler
- Drill with 1/8", 3/16" bits and Unibit
- Sawsall or hacksaw
- Crimping Pliers
- Test light
- 1/4" Drive Socket Set
- Small bladed flat tip screwdriver
- Welder

## Kit Contents (1027330)

1	1127038	Valve Assembly	1	1220048	Air Solenoid Assy.
1	1220130	Regulator/Control Kit	2	1100400	4" Pipe Adapter
1	1030129-C	Compressor Kit	2	1100404	4" Marmon Clamp
1	1220115	Air Snorkel Kit	1	1100740	4" S/S Exhaust Clamp
1	1321031	Toggle Switch Kit			

## Accessories

Description	Part #
Manual Transmission Push-Pull Shifter Switch Kit	1300210
Manual Transmission Rocker Switch Kit	1030900
TowLoc Transmission & Converter Package	CALL
X-Monitor Digital Gauge Package	1085220
Brake Pressure Gauge Kit	1030550

## Pre-Installation

To prevent damage to electronic components, it is recommended that you disconnect both negative battery terminals before starting.

**Please read this manual thoroughly before installing this exhaust brake.**

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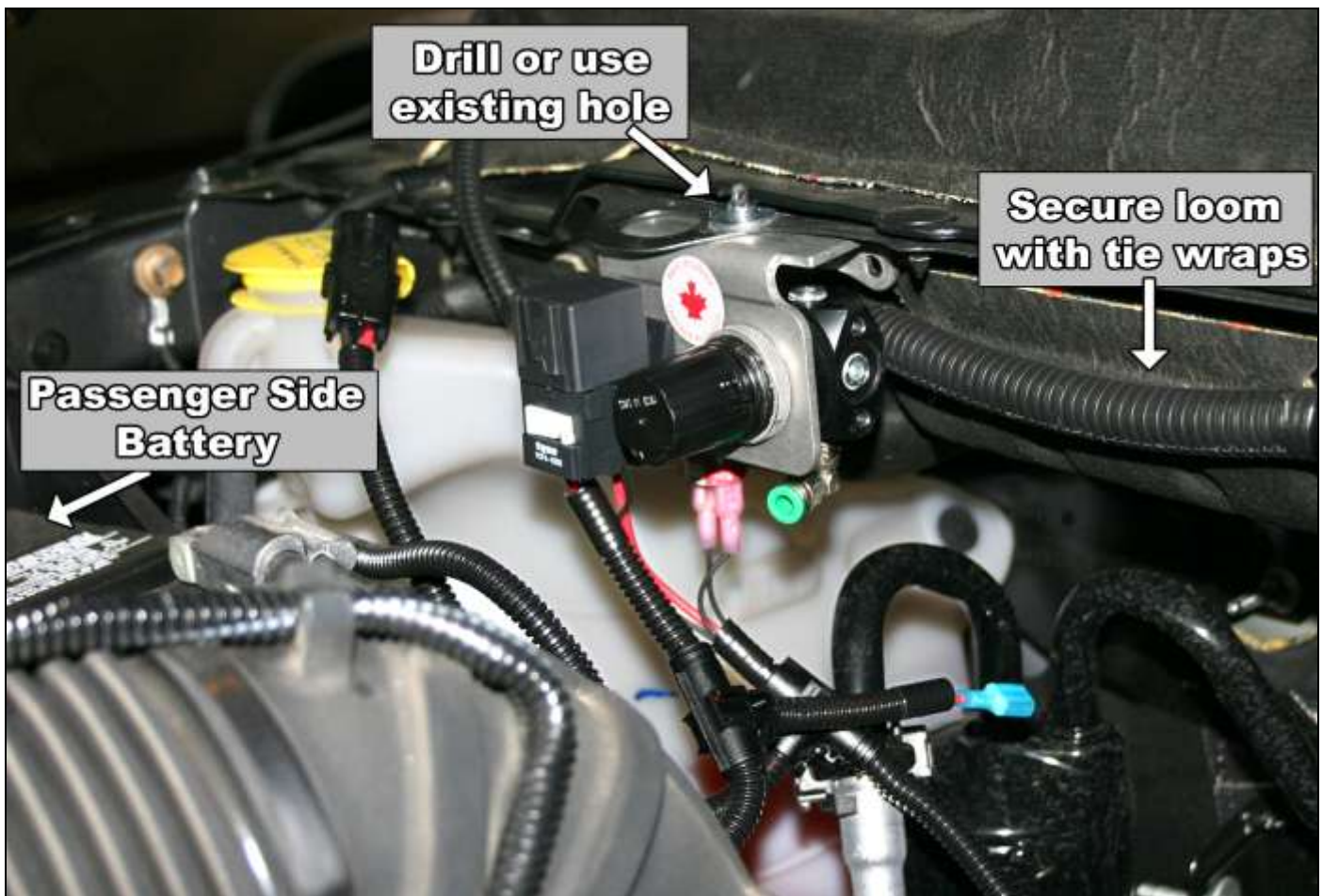
## ***Installation***

### **Compressor & Regulator Installation**

#### ***Regulator Assembly***

Locate the large oval hole on the passenger side of the vehicle near the upper cowling of the firewall. To the right of this you can either drill a 3/8" hole or use the existing hole by removing the factory plastic locking insert.

Install the regulator assembly underneath the hole (shown on figure to the right). The lock washer and flat washer should be installed on top of the plastic cowling with the Phillips screw holding everything in place.



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## ***Air Compressor Mounting Installation***

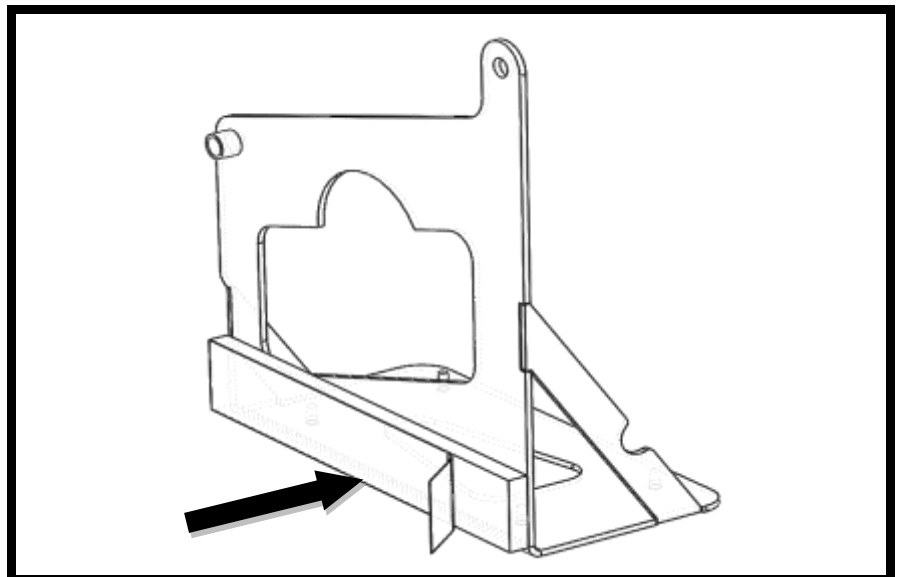
You will need to remove the inner front fender well on the passenger side of the vehicle. There are eight bolts holding the lining in place. If you can put the vehicle on a hoist about 3 feet above the ground it will ease this installation.

Locate the hood support bolt up inside of the fender well; it is very close to the bottom of the radio antenna. Remove the bolt closest to the battery tray or closest to the front of the vehicle.



**Use these bolt holes for installation of compressor assembly. While the hood support is threaded, you will need to slide a nut behind the second mounting hole.**

Attach the foam tape to the bottom backside of the bracket.



Slide the compressor assembly up into this space and re-install the hood support bolt. Now raise the compressor assembly so that you can install the provided bolt through the bracket and frame hole into the nut. Note that you can use a magnet to assist in holding this nut into place will you slide the bolt through.



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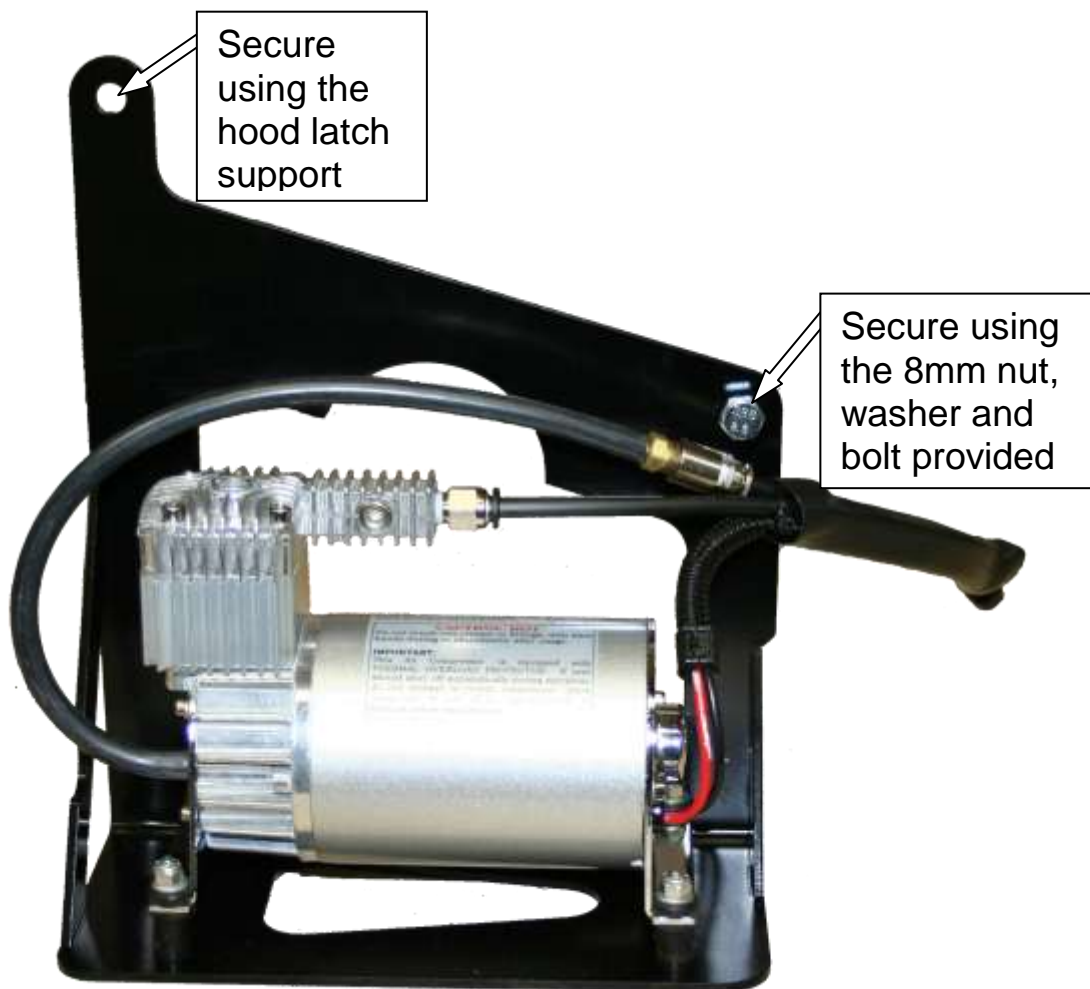
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Tighten all bolts to secure the assembly. Route the compressor hose & wiring harness up through the frame opening at the rear of the battery, then route the harness towards the regulator.

Use the wiring diagram on page 16 as a reference for the wiring of the air hoses and the electrical wiring. NOTE: Be sure to keep all hoses and wiring harnesses away from any moving parts or heat sources.



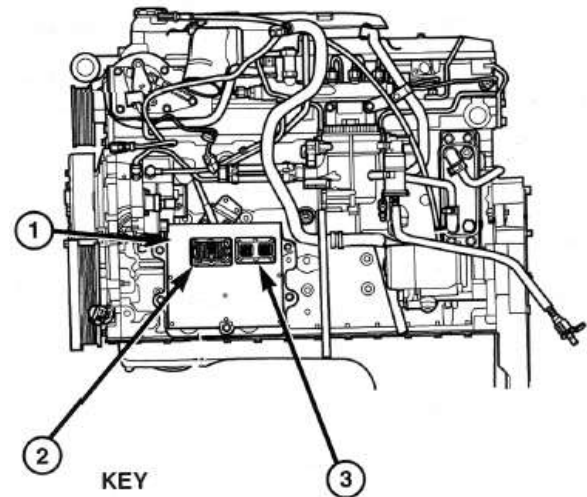
## In-Cab Exhaust Brake Wiring

### ECM Activation Wire Install

In-cab wiring has been made easier with the addition to Exhaust Brake programming through the Chrysler ECM. What used to take 4 wires and multiple OEM wire cutting has now been easily changed to one wire lead going to the ECM.

There are two separate ECM wiring blocks – one 60-pin connector and a 50-pin connector.

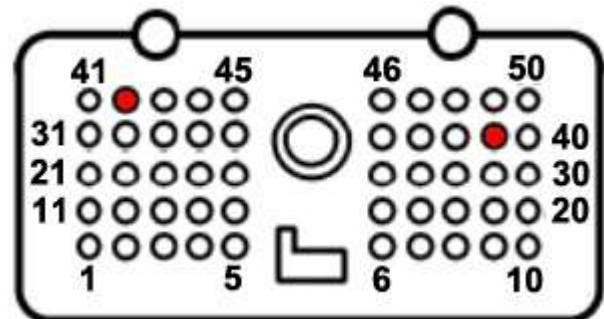
Remove the 50-pin connector (#3 on picture to the right).



KEY

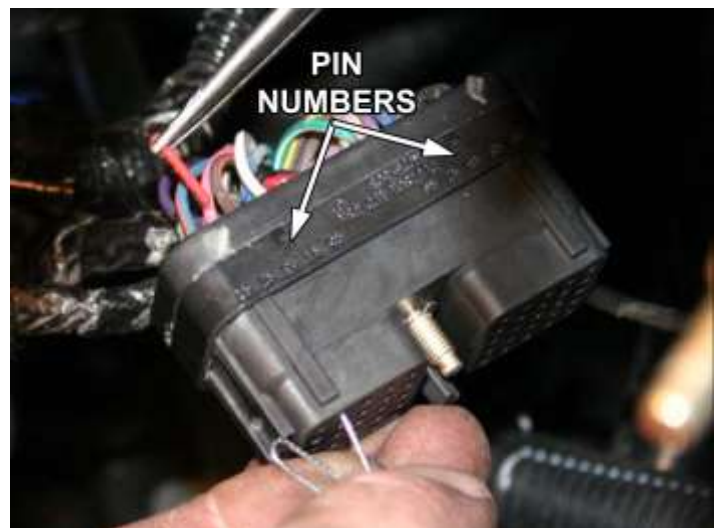
1. Engine Control Module (ECM)
2. 60-Way Connector
3. 50-Way Connector

Locate Pin #39 (for the activation wire from the cab) and Pin #42 (for the black wire in the control harness). These pins have a plug in them from the factory. They will have to be removed.



For this step you will need a pair of needle-nose pliers and a paper clip. Bend out the paper clip enough so that there is a straight shaft.

The easiest way to remove the OEM plug pins is to take the paper clip and insert it into the bottom end of the pin connector hole. This will poke out the top of the plug which then can be removed with pliers.



The two wire leads from the exhaust brake control harness (with the ECM pins pre-crimped) can now be plugged into the ECM. Insert the tan wire into Pin #39, and the black wire to Pin #42. They should snap into place. Once this is complete, you can re-install the ECM plug. Secure the wiring loom using the supplied tie wraps.

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### **Switch Install (Required if using main toggle switch)**

Remove attaching screws of the dashboard bezel and remove covering trim by pulling rearward on the corners of the trim panels.



**Note:** Placing the transmission all the way into 1<sup>st</sup>/low gear and ensuring the tilt steering is all the way down will allow for easy removal.

Pull the left hand and right hand dash panels away from their secured positions and let them hang.

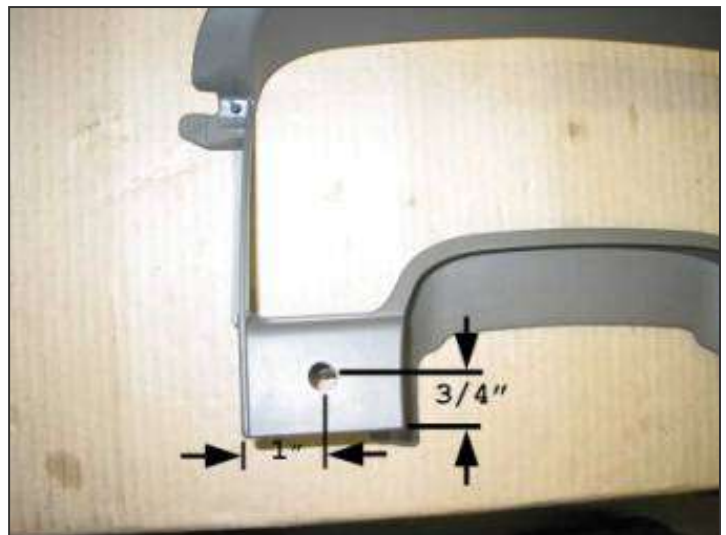


Once the dash trim has been removed place it on a large working surface like a table or workbench.

Measure and mark a spot for the Toggle Switch 3/4" up from the bottom edge of the dash panel and 1" in from the left edge of the accessory panel as shown in the photo.

Drill a pilot hole with a 1/8" bit and finish by enlarging the hole with a Unibit to exactly 1/2".

**NOTE:** YOU MAY HAVE TO GRIND DOWN PART OF THE SUPPORT RIB ON THE BACK OF THE TRIM PANEL TO ACCOMMODATE THE SWITCH BODY.



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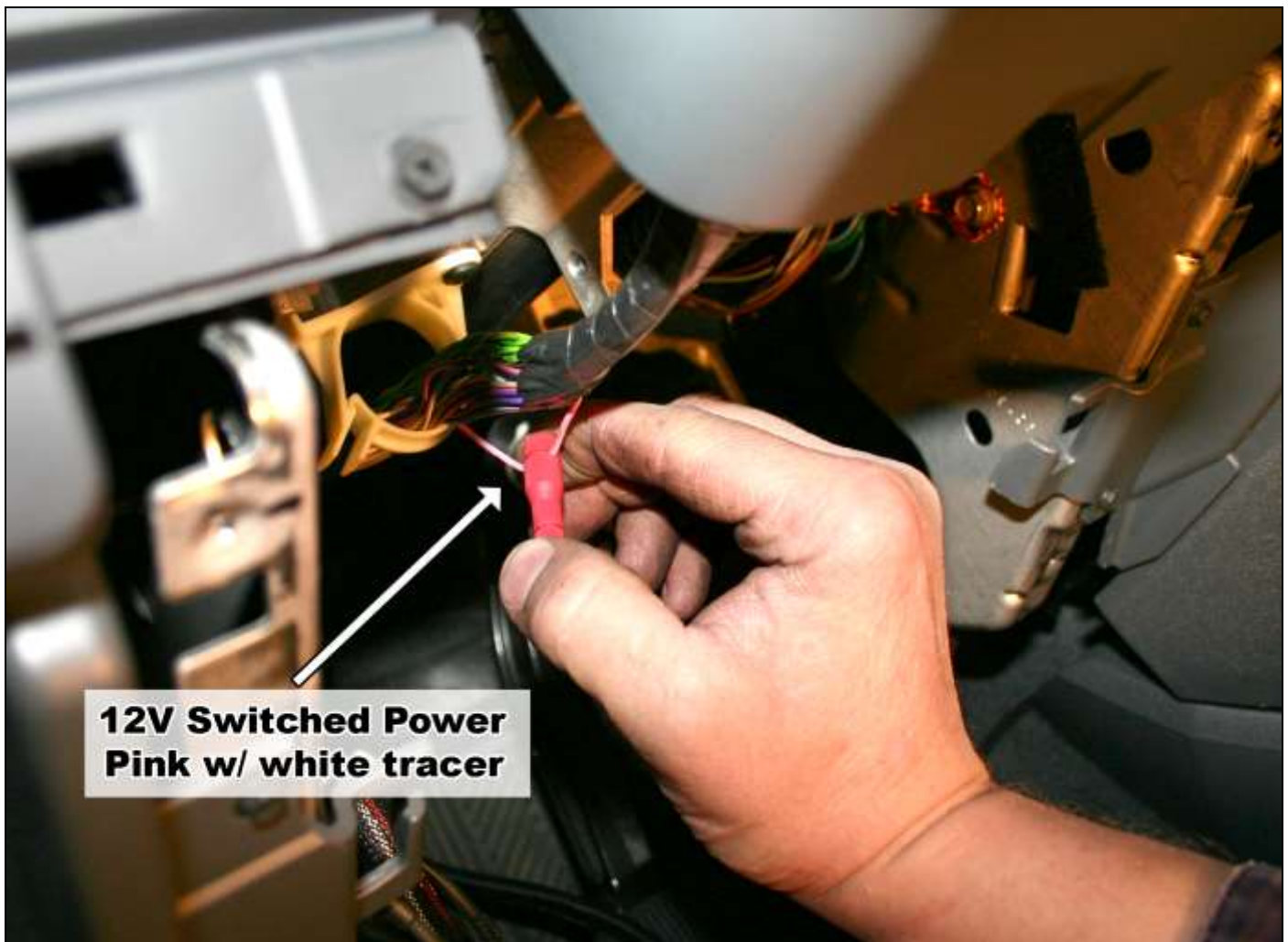
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Install the switch into the drilled hole and secure it with the plastic lock ring. Reinstall the dash trim panels by reversing the removal procedure.

Once the switch is installed, attach the ground wire to a good metal ground under the dash.

With a test light, locate a switched 12 Volt power source (quite frequently a pink w/ white tracer wire) and install the supplied black (12-18ga) Posi-Tap™ to it then attach the red fused wire from the switch to this Posi-Tap™.



**12V Switched Power  
Pink w/ white tracer**

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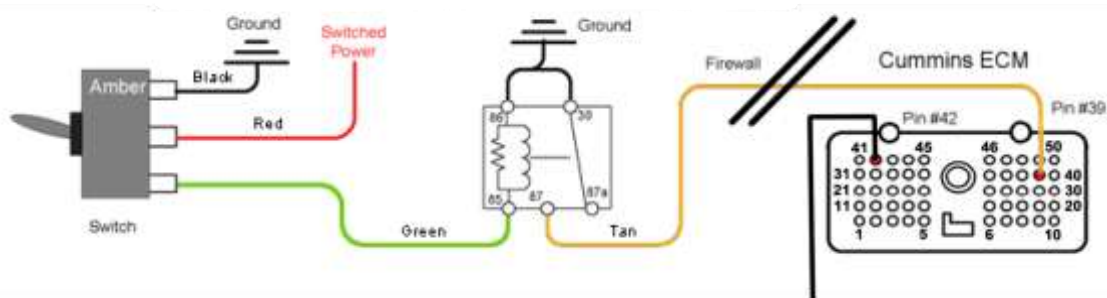
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## ***Attaching the switch relay***

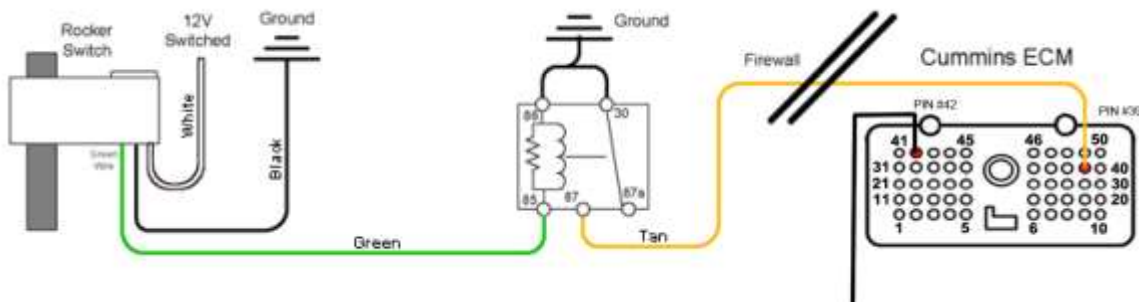
Due to the characteristics of running the exhaust brake controls through the ECM, a relay kit has to be installed (unless you are installing the push-pull switch for the manual transmissions). This is so the light on the toggle switch (or rocker switch for the manual transmissions) can be lit while the exhaust brake is engaged. This relay comes pre-wired from the factory and is included in the main toggle switch kit.

Connect the tan wire coming from the ECM to terminal #87 on the relay. Connect the green wire leading from the switch to terminal #85 on the relay. Connect the black Y-wire to a ground source nearby. Blade terminals have been included loose in the bag, but not pre-crimped, so you can strip the wire to the desired length.

### **Wiring With The Default Toggle Switch**



### **Wiring With The Rocker Switch (Manual Trans)**



This switch relay is **not required** when wiring the exhaust brake with the push-pull style switch.

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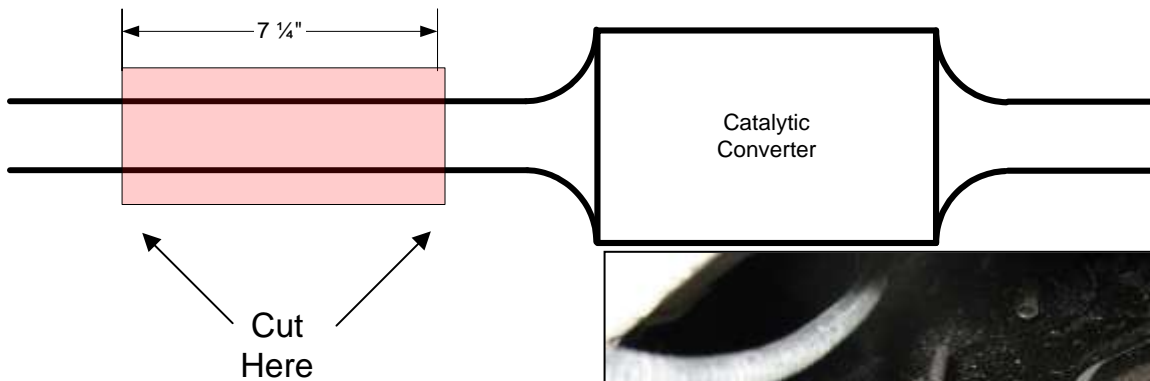
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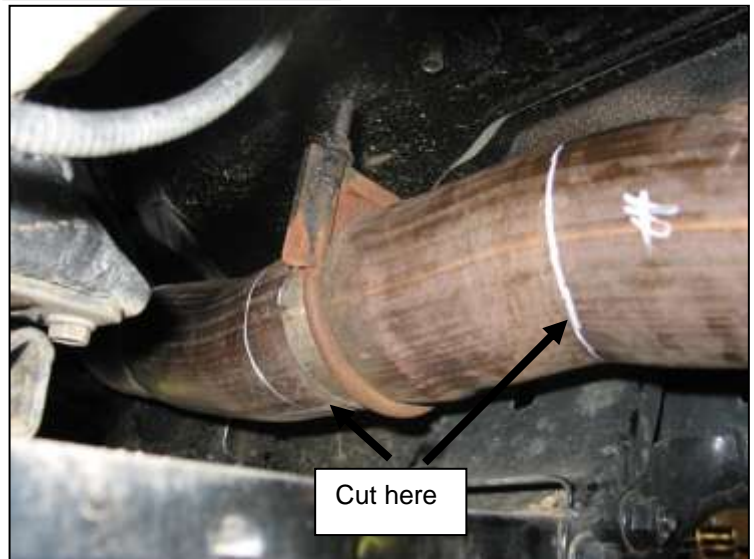
## Brake Valve Installation

**\*SAFETY\*:** To prevent injury or damage raise the vehicle to a good working height with either a hoist or proper jack stands.

From underneath the vehicle, locate the turbo down pipe and the catalytic converter. You will need to cut a 7-1/4" section from this pipe. Although the pipe has a number of unusual bends, you will need to choose the straightest section possible, especially for the rear adapter of the brake, as this is a SS band clamp. As well mock up the installation of the brake so that when the brake cycles, the actuator will not come in contact with anything. Use a Sawsall or cutting disc to remove this section.



Clean off the cut ends of the intermediate pipe with a file to remove burrs left from cutting and then insert the adapter pipes onto each end of the now exposed pipes.



Insert the exhaust brake install with supplied 'V' band clamps. Be sure that the air cylinder bracket extends toward the rear of the vehicle.

Tighten all mounting nuts and bolts that secure the brake to the flanges.



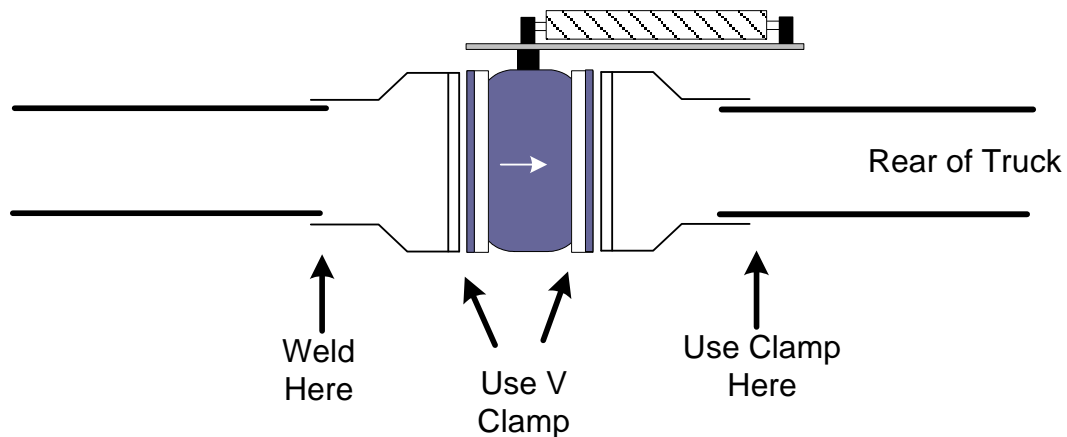
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Ensure the exhaust brake and rear exhaust sections are pushed all the way forward on the front pipe so that the front adapter flange is up against the stop that is on top of the front pipe section then WELD the pipe in place. Install the clamp on the rear exhaust adapter.



**NOTE:** SECURING WITH JUST A HORSESHOE CLAMP WILL CAUSE LEAKAGE AND NOT ALLOW THE BRAKE TO OBTAIN FULL BRAKING PRESSURE.

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## Air Solenoid Installation

To mount the air solenoid assembly, you will need to drill a hole on the inside frame rail to accommodate the 5/16" mounting bolt.

Make sure that the air solenoid assembly is as close as possible to the exhaust brake to ensure a quick engagement and disengagement of the valve.



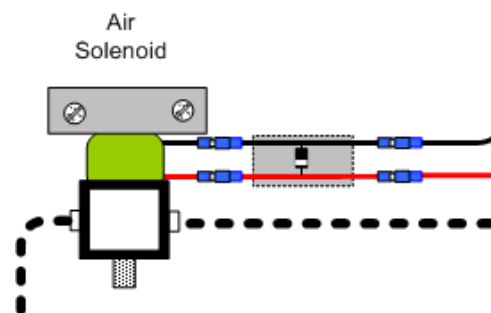
### **\*IMPORTANT\***

Inside the labeled package (1220048B) you will find a bag labeled (1230125).



Remove this part from the bag labeled (1230125) as it is **not** required for this application.

Connect the Air Solenoid first then the Feed Back Diode. Please reference the Wiring and Plumbing Diagram's on pages 16 - 18.



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## Air Hose Installation

Included in the brake kit is an air snorkel kit. It has two sections of air tubing, along with a red wire to trigger the air solenoid, and a black wire that triggers the air solenoid when the brake is activated. Both of these connect to the control harness.

Locate the end of tubing in the snorkel kit that has no fittings on the wires - this is the end where the hoses connect to the brake and solenoid. The wires have no connectors so that you can cut them to size. The loose connectors are located in the switch/install kit.

Insert one end of the 1/4" plastic hose (9' is included in the control kit) into the quick release valve that is mounted on top of the air cylinder and route it to the air solenoid you mounted on the frame rail. This hose may need to be cut for a custom fit. If so, make sure that it is a STRAIGHT cut, leaving no burrs or angled pieces on the end of the hose. If it cut improperly, it may not seal properly, causing a leak. Insert the open end of the plastic tubing into the "CYL" connection on the air solenoid.

Secure the plastic hose by installing a clamp provided to the body of the cab. Drill a 1/8" pilot hole in the cab body, as shown in the photo. Install the anchor clamp, securing with a self-tapping screw.

CARE MUST BE TAKEN NOT TO KINK THE PLASTIC HOSE OR ROUTE IT NEAR A HEAT SOURCE.

**NOTE:** Removal of the plastic hose from the quick coupler is accomplished by pushing the colored ring toward the fitting and pulling the hose out.

REFER TO THE WIRING DIAGRAMS FOR CORRECT HOOK UP OF HOSES AND WIRING.



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There are two sections of air tubing in the snorkel kit – one hose has no fittings whatsoever, and the other has a yellow filter at the end. Plug the end of the tube that has no fittings on it into the air solenoid marked “In”.

Once you have determined the length of wire you will require to connect to the solenoid, connect the female butt connector to the red wire. Connect the red 14ga wire into the power (red) connection at the air solenoid.

Crimp the male butt connector onto the black wire and connect it to the black wire on the solenoid.

Locate the other section of air tubing in the snorkel harness with an open end (the other end has the yellow snorkel filter on it). Plug the open end into the brake’s 90° quick-connect fitting located at the end of the air cylinder.



***Route the snorkel wire through OEM stabilization brackets when possible.***

Run the harness along the bottom of the truck and up towards the engine compartment in a clean, dry location, securing it away from any moving or heated parts.

In the engine compartment, connect the open ended section of tubing (the other end that was plugged into the “In” connection at the air solenoid) and route it to the regulator assembly. Insert it into the straight quick-connect fitting that is hooked into the regulator. Push firmly to ensure a full connection is made.

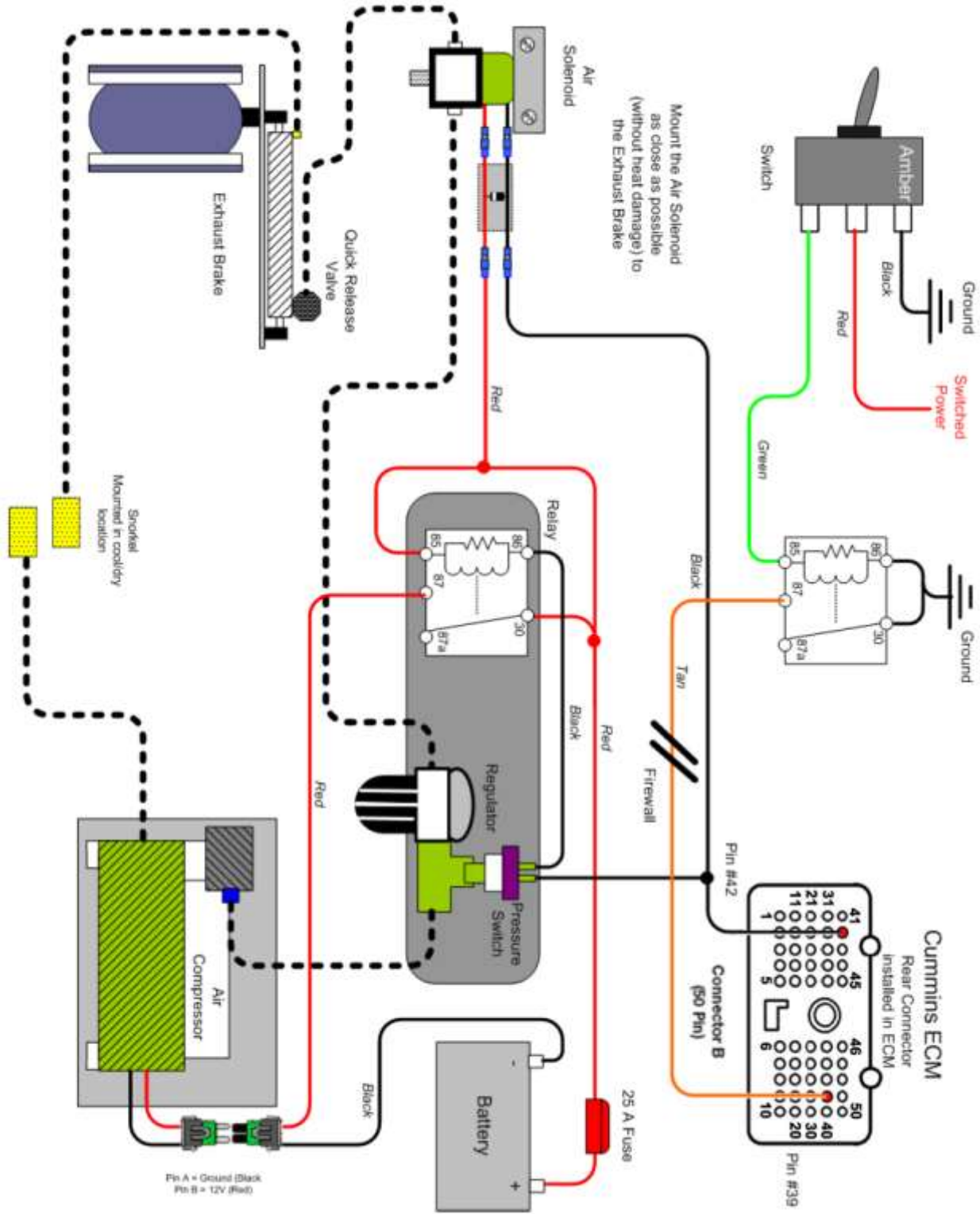
Connect the red wire from the snorkel harness into the red wire (with the blade connector) located on the control/regulator wiring harness. Connect the black wire from the snorkel kit onto the black wire (with the butt connector) on the control/regulator wiring harness.

The section of tubing with the yellow snorkel filter should be routed into the cab of the truck to avoid any moisture or condensation from entering the filter.

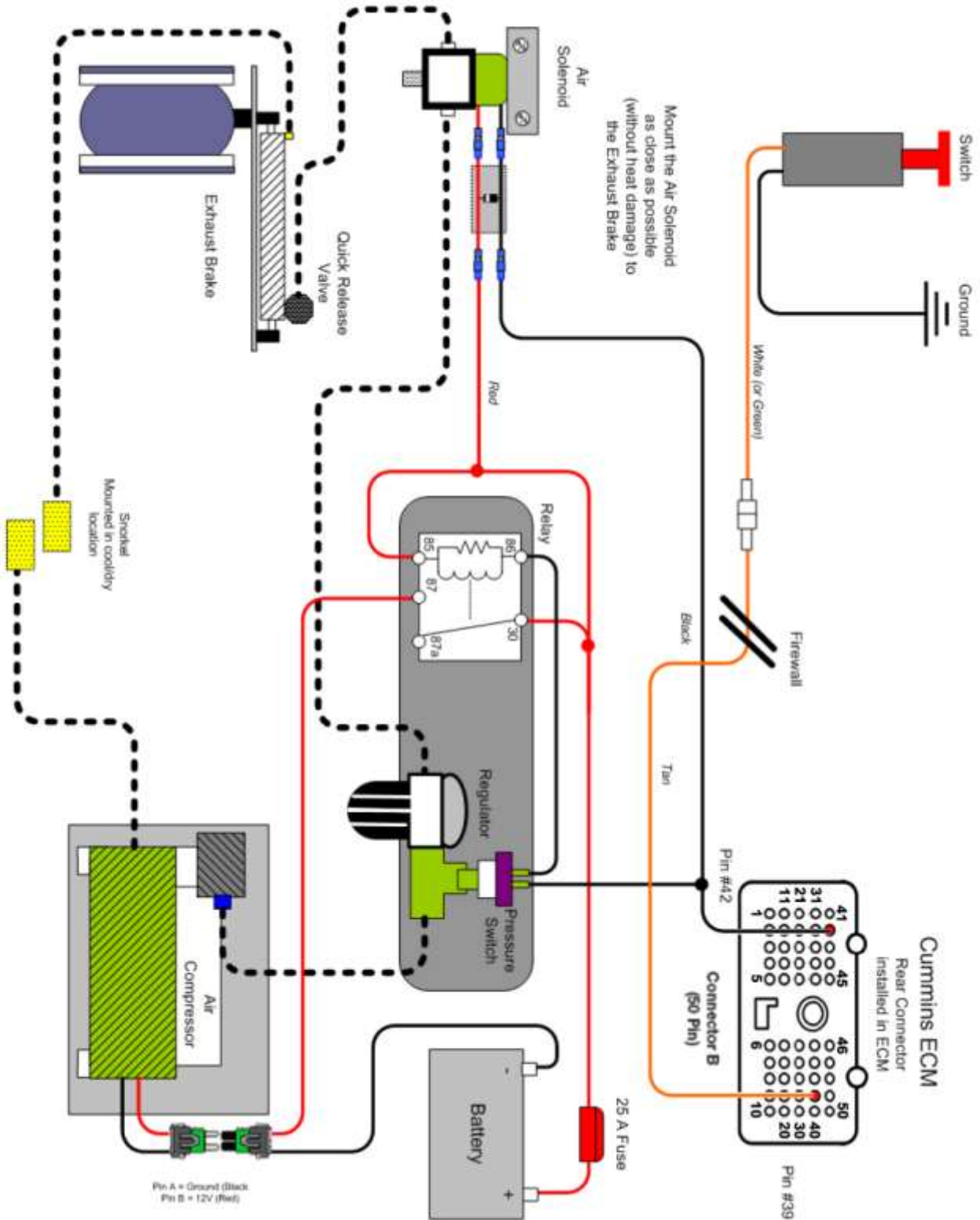
Reference the wiring diagram for an example.

# Wiring & Plumbing Diagrams

## Using Main Toggle Switch Only



### Using Push/Pull Shifter Switch (Manual Trans)



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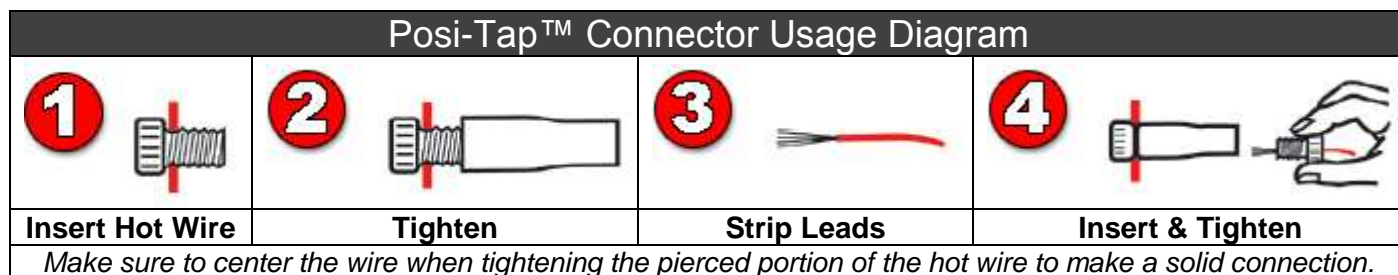


## Notes On Connectors

The kit includes a number of Posi-Tap™ connectors (Gray or Red/Black/Green or Yellow) to tap onto OEM wiring. It is important to select the correct color of connector so that it matches the gauge of the OEM wire that it is being installed on. Using the incorrect connector could cause an inadequate connection and/or the OEM wire could be severed.

OEM Wire	Posi-Tap™ Color
18-22ga	Gray or Red
12-18ga	Black
10-12ga	Green or Yellow

Though these connectors offer a quicker installation, the best option would be to solder the wires and isolate the joints with heat shrink or liquid electrical tape. Proper soldering techniques should be used to ensure adequate connections.



**The ground terminals of the vehicle’s batteries should be disconnected before performing any piercing/posi-tapping onto any ECM/PCM wire.**

## ***Optional Manual Shifter Switch (Push-Pull Style)***

Mount the shifter switch onto the shift lever using the clamp supplied (either 5/8" or 3/4").

Run the electrical cable down the shifter shaft, securing the cable with zip-ties or electrical tape, and run it under the carpet to the firewall and under the dash to the relays, leaving enough slack for proper shifting of the transmission lever and to prevent any rubbing of wire.

At the end of the cable, cut off any excess and strip away about 1 to 2 inches of the black rubber covering exposing the black and white (or green) wires, and then strip the insulation from the ends of the two wires.



Connect the white (or green) wire to the Tan brake activation wire leading to the ECM. Connect the black wire to a nearby ground source.

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## Optional Manual Shifter Switch (Rocker Switch Style)

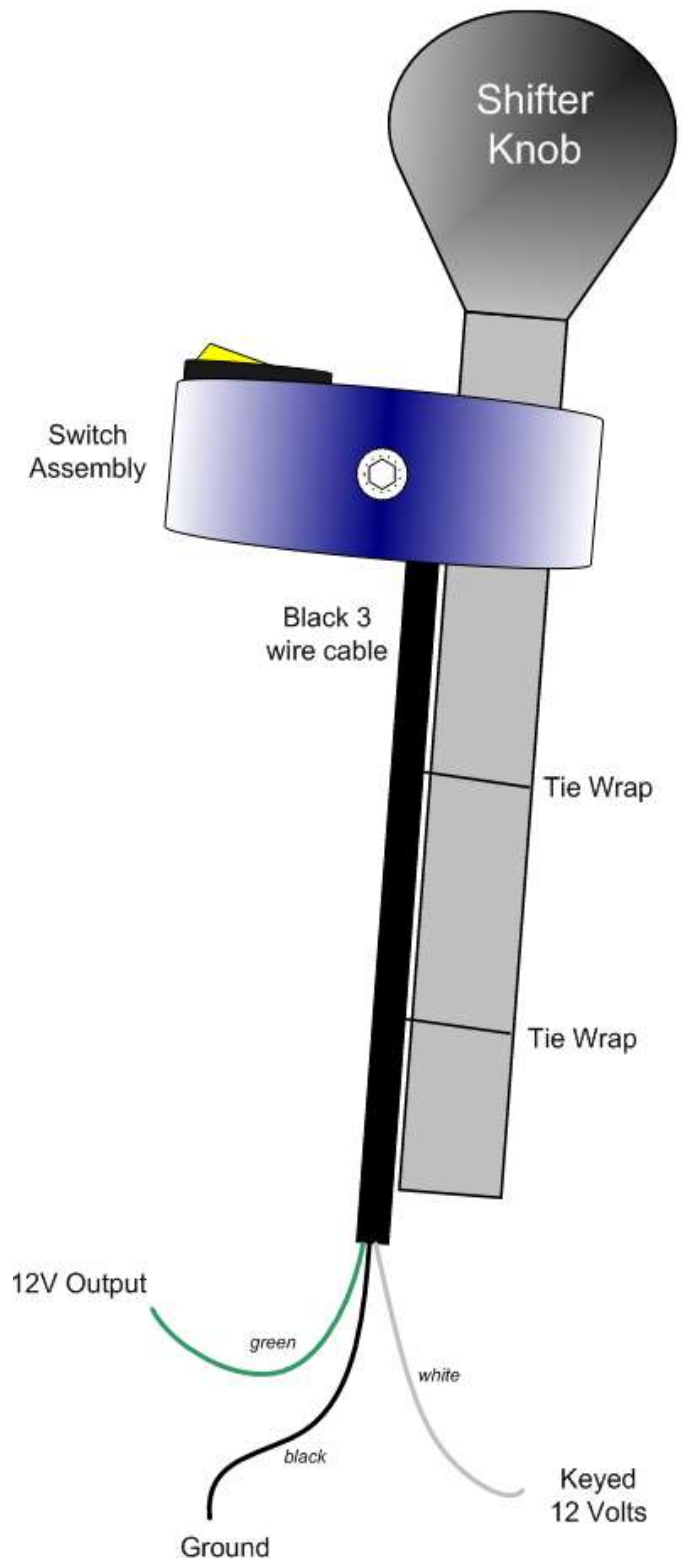
Mount the shifter switch onto the shift lever using the clamp supplied (either 5/8" or 3/4"). Run the electrical cable down the shifter shaft, securing the cable with zip-ties or electrical tape, and run it under the carpet to the firewall and under the dash to the relays, leaving enough slack for proper shifting of the transmission lever and to prevent any rubbing of wire.

At the end of the cable, cut off any excess and strip away about 1-2" of the black rubber insulation exposing the black, white and green wires, then strip the insulation from the ends of the three wires.

Connect the green 12V output green wire to #85 on the switch relay, which then leads to the Tan brake activation wire going to the ECM.

Attach the 5/16" ring connector to the black ground wire and attach it to a good ground nearby.

Locate one of the ignition switched power fuses in the fuse panel underneath the steering column. Traditionally this wire will be pink with a white tracer. Use a voltmeter to check the voltage of the wire. Use the supplied fuse tap to supply ignition switched power to the "Keyed 12 Volts" (white) wire of the rocker switch assembly.



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## **Idle Pressure Adjustment**

Exhaust Brake pressure is preset at the factory but if more holdback performance is required with the vehicle loaded, adjust the regulator using small increments to give 50 – 55psi under load.

Test the exhaust brake pressure by installing a pressure gauge into the test port on the bottom of the brake valve, if pressure is not 15 - 17psi at idle the pressure will need to be adjusted for the vehicle.

Turn on key but DO NOT START engine and turn brake switch ON.

On the brake assembly, loosen the 9/16” lock nut and back the stop bolt AWAY from the actuating lever.

Cycle the brake ON and OFF at least once and then leave brake ON.

Turn the bolt to touch the actuating lever plus 1 flat more then tighten the lock nut.

Start the engine and check the backpressure, if pressure is ABOVE 17psi, loosen the lock nut and turn the bolt in 1 additional flat.

**CAUTION: Backing the stop bolt all the way to allow the actuating arm to go all the way forward will cause the butterfly valve to contact the wall of the brake housing causing damage to the brake and warranty will be voided.**

The maximum REGULATED pressure is adjusted with the pressure regulator under the hood and under driving conditions.

Turning the regulator **clockwise** will increase pressure.

Turning the regulator **counter clockwise** will decrease pressure.

**\*\*\*DO NOT EXCEED 65# REGULATED BACK PRESSURE\*\*\***

## **Maintenance & Troubleshooting**

To extend life of the exhaust brake, do not operate the vehicle for extended periods of time without activating the brake. We suggest activating the exhaust brake at least a couple times a day while operating the vehicle to prevent any carbon or rust build up on inner parts of the brake valve assembly.

The hoses, wires, fittings and clamps should be inspected on a regular basis for any deterioration, damage or leaks.

**To increase the life of your exhaust brake, we recommend daily operation. By simply switching the brake on and off a couple times a day, it will prevent the butterfly valve from sticking due to carbon build-up.**

Following the diagrams in this manual, tracing hoses and wiring, checking continuity through electric components or checking for any lines that are disconnected, should solve any problems that may arise. If you have any problems or need replacement parts, call us at 1-800-887-5030, between 8:30am and 5:00pm Pacific Time.

## **Operating Guidelines**

Thank you for taking interest in the BD Engine Exhaust Brake. As a driver, you probably already know the need for extra braking power that your vehicle requires on the hills and long grades. With loads being towed behind you, the extra push when slowing down or maintaining speed on downward grades can prove to be a great strain on your vehicles hydraulic braking system, even to the point of “burn-up”. These guidelines were designed to offer you a better understanding of the benefits of exhaust brakes and are partly based upon material developed by the U.S. Department of Transportation National Highway Traffic Safety Administration.

The emphasis on today’s vehicles is to give the consumer a product that can give them usable power with fuel efficiency. But, in the transition, the vehicles have lost their natural braking power, making it more easy for the vehicle to continue to roll and harder to stop. Of course, this gets more noticeable with the increase of weight, on or behind the vehicle. This is where an exhaust brake becomes a useful tool in increasing the driveline drag of the vehicle without the use of the hydraulic brakes; a tool that with maximum use or even occasional use can reduce wear on hydraulic braking parts and at the same time increase safety.

The BD Exhaust Brake can be used to help maintain a controlled vehicle speed on a downward grade, as well as slowing the vehicle down for such times as turns or exit ramps, without you using your hydraulic brakes. **But, the exhaust brake cannot be used as a parking brake or will not bring your vehicle to a complete stop.** By using a BD Exhaust Brake, the life and effectiveness of your hydraulic brakes will increase.

BD Engine Brake Inc.

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This is because of the decreased use of the hydraulic brakes in situations like hills, the wear factor is reduced and there is less opportunity for your hydraulic brakes to heat up which would reduce the efficiency. When you ride your hydraulic brakes, make hard stops or have poorly adjusted brakes, this creates high temperatures and as your brakes get hotter, the more chance there is for failure.

With terrain that is a series of up and down grades, the BD Exhaust Brake will help reduce warping in the exhaust valves. Because of the power needed to pull your vehicle and load up a hill, this generates a lot of heat. When you have reached the crest of the hill and are coasting down the other side, the heated valves are cooled too quickly. With the exhaust brake engaged, the heat loss to the valves will be reduced, which can prevent valve warping.

When the toggle switch is turned to the "On" position, the valve is activated every time the driver takes his foot off of the throttle pedal. When the driver puts pressure back on the throttle pedal, the DFIV/switch is deactivated and the valve opens again.

Exhaust brakes are designed to operate with the throttle at idle - not to be used in conjunction with cruise controls, and not designed to aid in gear shifting.

Such cases may cause damage to engine and/or exhaust brake. There is a pressure regulating system incorporated with the BD Exhaust Brake that will control the created backpressure. If the backpressure reaches the set limit while under engine braking, the exhaust valve will open slightly to relieve the excess pressure.

The best scenario for exhaust braking is when going down hill, select a gear that lets you maintain a constant speed with little or no use of the hydraulic brakes, or the same gear that would be used to go up the same grade of hill. This also depends on the weight, load or road conditions that the vehicle will come upon. So, in summary, by using the BD Exhaust Brake, you reduce the need for use of your hydraulic brakes in situations where you need to slow down or maintain (i.e. hills, off ramps, corners, approaching speed changes or traffic lights). Reducing the use of your hydraulic brakes in these situations will reduce the heat build up, as well as wear and damage to linings and drums. And, when you reduce these factors, you save your hydraulic brakes for when you really need them (for stopping or emergencies).

The BD Exhaust Brake is not a substitute for your hydraulic brakes and, cannot correct or compensate for poorly maintained or misadjusted brakes. But, when you need to slow down or maintain a constant speed, the BD Exhaust Brake will be a valuable and effective tool. Exhaust Brakes are more efficient at preventing rather than correcting an over speed condition.

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## ***Exhaust Back Pressure Testing Air Actuated Brakes***

***It is recommend that you purchase the BD pressure gauge kit #1030050***



***NOTE: The brake stop-bolt and regulator have been preset at the factory and should not need to be adjusted.***

***You do not need to measure the air pressure in the system, just the exhaust backpressure, which is located on the cast valve.***



### **Idle Pressure Test**

With the BD brake engaged and the engine at idle check the exhaust backpressure using a pressure gauge (such as BD PN 1030050) at the test port on the brake valve.

If the back pressure is below 13 psi at idle you have a number of likely causes. The most common being an exhaust leak either at the clamp joint or at the welds (only on some models). Apply the exhaust brake and have someone assist you looking for soot trails or the visible leak. Another culprit would be an exhaust manifold leak, turbocharger gasket leak, turbocharger problem or an EGR issue.

If the back pressure is greater than 25psi, you will need to make an adjustment on the stop bolt. Loosen the jam nut, and lengthen the stop bolt towards the actuator, this will shorten the stroke distance. Only turn 1/4 rotation at a time and re-secure the jam nut. Retest idle pressure.

We generally do not recommend adjusting the stop bolt, please consult BD before doing this as it may void your warranty.

### **Off-Idle Pressure Test & Adjustment**

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Your BD exhaust brake is a variable-orifice design so when the brake is active and the engine is at higher RPM the brake lever does not rest on the stop bolt. Off-idle backpressure is set by adjusting the air pressure regulator which will in turn increase or decrease off-idle exhaust backpressure. You will need to secure your pressure gauge somewhere that you can see it while you are driving. Using a long extension hose & bringing the gauge into the cab through an open window or clipping it under a windshield wiper works well.

Get the truck up to speed (a downhill grade or a load in the truck is helpful) and activate the exhaust brake. Note the maximum backpressure achieved. You should get peak backpressure at higher RPM (try 3000 RPM in Drive). If you cannot reach the desired backpressure (compare table below) you can begin troubleshooting, the first step is to look for exhaust leaks either from the clamps, exhaust manifolds or feed pipes. Also look for leaks at the clamps located at the back of the turbo and also at the down pipe. If all connections are sealed, you can then use the adjusting regulator to increase the backpressure. Note that small regulator adjustments can have a significant effect on off-idle backpressure.

Turning the regulator **clockwise** will increase pressure.

Turning the regulator **counter clockwise** will decrease pressure.



**NOTE:** Over the next two weeks, the backpressure at idle may rise due to initial carbon build up on the inside of the brake housing and on the butterfly. The stop bolt may need to be adjusted again to compensate.

Application	Maximum Back Pressure
GM/Chevy 6.5	35 psi
GM/Chevy Duramax	55 psi
Ford Powerstroke	45 psi
Dodge Cummins 1988-98 12V w/o 60lbs Springs	40 psi
Dodge Cummins 1988-98 12V with 60lbs Springs	60 psi
Dodge Cummins 2002 and Newer	60 psi

\*HD Spring part# is 1030060.

**CAUTION:** Do NOT exceed the maximum back pressure value in the exhaust system. Exceeding this pressure will force the exhaust valves open during the intake stroke which could cause engine damage.

Thank you and happy motoring.  
BD Engine Brake, Inc.

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