

OWNER'S MANUAL

...with installation instructions

Banks SmartLock™

**2003-Early 2004 Dodge 5.9L
CUMMINS TURBO DIESEL TRUCKS**

THIS MANUAL IS FOR USE WITH SYSTEM 55270

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BANKS

Dear Customer,

Your new Banks SmartLock is an integrated electronic control that seamlessly locks the torque converter, raises transmission line-pressure, reduces transmission temperatures and optimizes braking performance.

If you have any questions concerning the installation of the Banks SmartLock Trans Brake, please call our Technical Service Hotline at (888) 839-2700 between 7:00 am and 5:00 pm (PT). If you have any questions relating to shipping or billing, please contact our Customer Service Department at (888) 839-5600.

Thank you.

General Installation Practices

1. For ease of installation of your SmartLock Trans Brake, please read this 12-page Owner's Manual before starting any work. Become thoroughly familiar with all components and phases of the installation before beginning any work.
2. Inspect all components supplied for any foreign material that may have entered during shipping and handling.
3. The installation should be performed at a time when the vehicle has been allowed to completely cool. This installation requires the installer to work near surfaces that may remain hot after the vehicle has been run. Failure to allow the vehicle to cool may result in personal injury.
4. Pay particular attention to the routing of wires and hoses. Keep them away from exhaust heat, moving parts and sharp edges that may cause cuts or other damage. Route or tie away from critical areas as required. Keep all wires a minimum of 6" from hot exhaust parts, 8" or more is recommended whenever possible.

Warning! Never work under any vehicle supported only by a jack of any kind. DO NOT USE concrete blocks or other masonry items that may collapse under the vehicle weight.

Warning!

DO NOT install the Banks SmartLock if either one of the following applies:

- 1) **The Powertrain Control Module (PCM) is not located on the passenger side firewall behind the battery. (Figure 11).**
- 2) **The engine is a high-output (325-hp rated) engine.**

System Includes:

- SmartLock Trans Brake
- Pneumatic line pressure boost actuator assembly
- SmartLock Wiring harness
- Push Lock Tee-Fitting (2)
- 90 degree Swivel Push Lock Fitting (2)
- Air Hose
- Female Spade Connector (1)
- Male Spade Connector (1)
- T-Tap Connector (2)
- Cable Tie (1)
- Owner's manual
- Warranty Statement
- Product Registration Card

Tools Required:

- Wrench: 1/4", 7/16", 1/2", 9/16"
- Deep socket: 1/4", 3/8", 7/16", 1/2", 9/16", 10mm, 13mm
- Side cutter
- Pliers
- Wire stripper and crimpers
- Phillips screw driver
- Extension: 1/4" and 3/8" drive
- Utility knife
- Water resistant lithium grease

Installation Procedure

Warning!

DO NOT install the Banks SmartLock if either one of the following applies:

- 1) The PCM is not located on the passenger side firewall behind the battery. See Figure 11. The Banks SmartLock is only designed to work with PCMs that are located on the passenger side firewall behind the battery.
- 2) The engine is a high-output (325-hp rated) engines.

Caution: Installation of the SmartLock Trans Brake is **NOT** complete until Functional Testing, described on page 10 of this manual, has been successfully completed.

PRESSURE BOOST ACTUATOR INSTALLATION:

NOTE: The following instructions assume that a Banks Brake system has been previously installed on the vehicle.

1. As a precaution, disconnect the ground of the battery. If there is more than one battery, disconnect both.
2. Screw the two (2) supplied 90-degree swivel push lock fittings onto the actuator assembly. Do not over tighten.
3. Raise and support the vehicle with properly weight rated safety stands, ramps or a commercial hoist. Follow

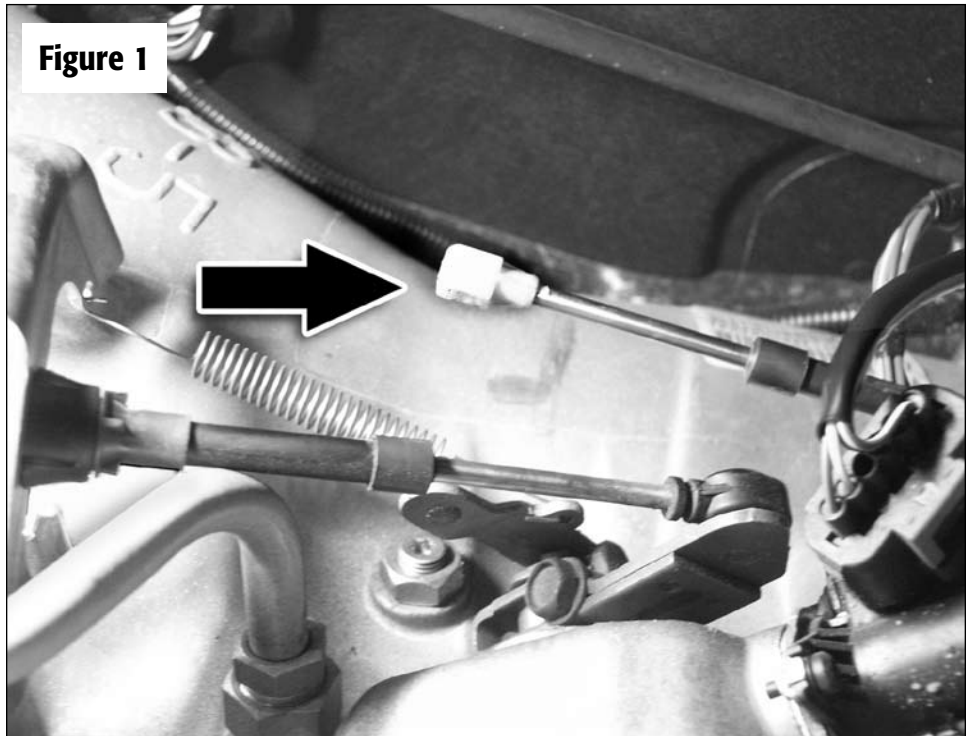


Figure 1

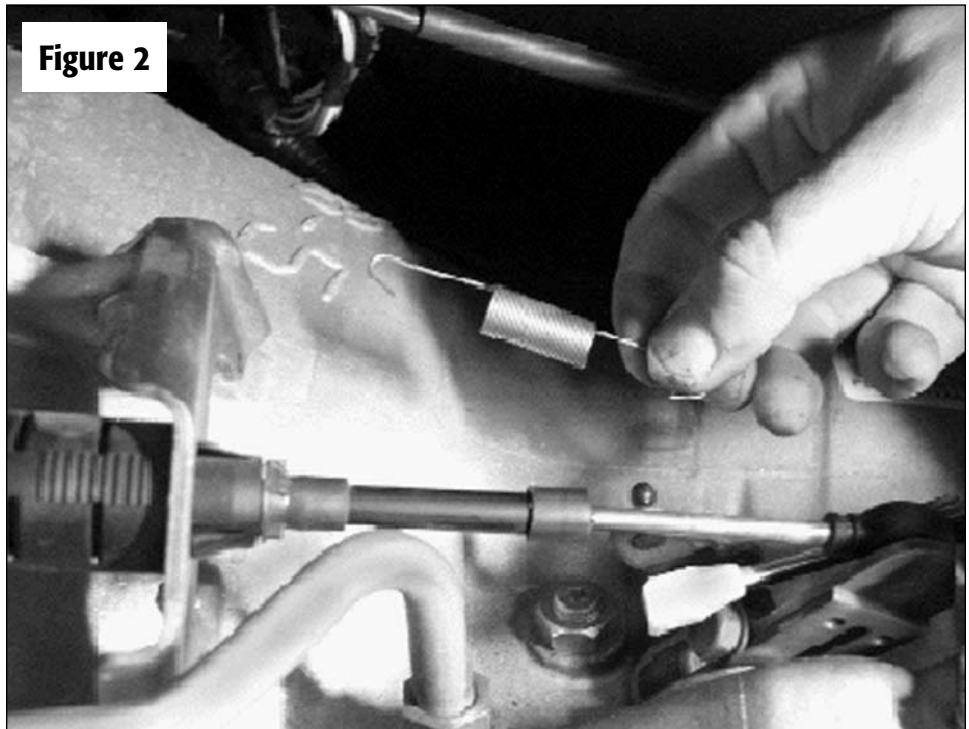


Figure 2

the manufacturer's safety precautions. Take care to balance the vehicle to prevent it from slipping or falling. When using ramps, be sure the front wheels are centered squarely on

the topsides; place transmission in park; set the parking brake and place blocks behind the rear wheels.

4. Disconnect the cable from the kick-down lever on the side of the transmission case as shown in **Figure 1**.

5. Disconnect the return spring attached to the kick-down lever as shown in **Figure 2**. Retain the spring for reuse later.

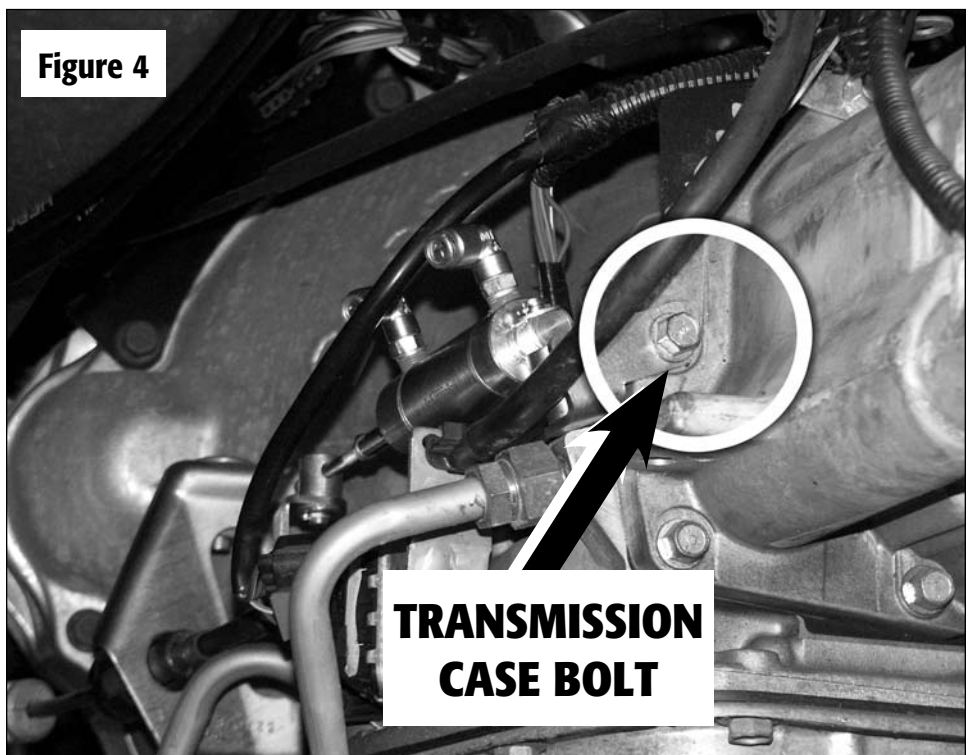
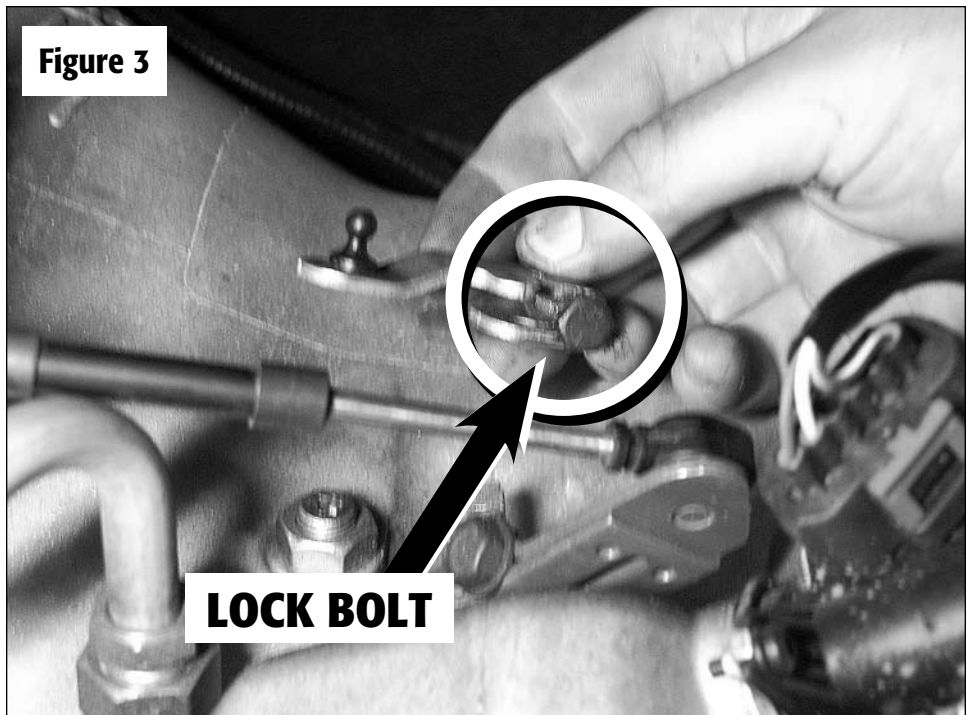
6. Loosen the lock bolt and remove the factory kick-down lever from the throttle valve shaft as shown in **Figure 3**.

7. Remove the mounting bolt from the transmission case and install the line pressure boost actuator and bracket as shown in **Figure 4**. Temporarily finger-tighten the bolt to allow for adjustment.

8. Slide the actuator control lever over the throttle valve shaft and tighten the bolt. Re-attach the return spring to the transmission case actuator control bracket as shown in **Figure 5**. Re-attach the kick down cable removed in **Step 4**. Actuate the lever by hand several times and ensure there is no binding or the system will fail to function properly. There should be a small gap between the knurling and the slider when the actuator rod is fully extended.

Adjust the length of the actuator rod if necessary by loosening the nut on the rod. Increase or decrease the length of the rod by turning it. Adjust rod to the correct length. Secure the rod by tightening the nut.

Also ensure the return spring is sufficient to return the lever to a



stop. If not, use a pair of side cutters to shorten the spring as necessary. Remove $\frac{1}{4}$ " at a time until the spring is able to return the lever to the stop. Use needle-nosed pliers to reform the hooked ends after they are cut. The rear-mounting bracket can be loosened and rotated to eliminate

binding. Apply general purpose water resistant lithium grease to all sliding surfaces, such as the actuator shaft extension, to reduce sliding friction.

9. Securely mount the actuator cylinder by tightening the bolt (in **Step 7**) on the transmission case to 25 ft-lbs. Ensure the lock bolt on the

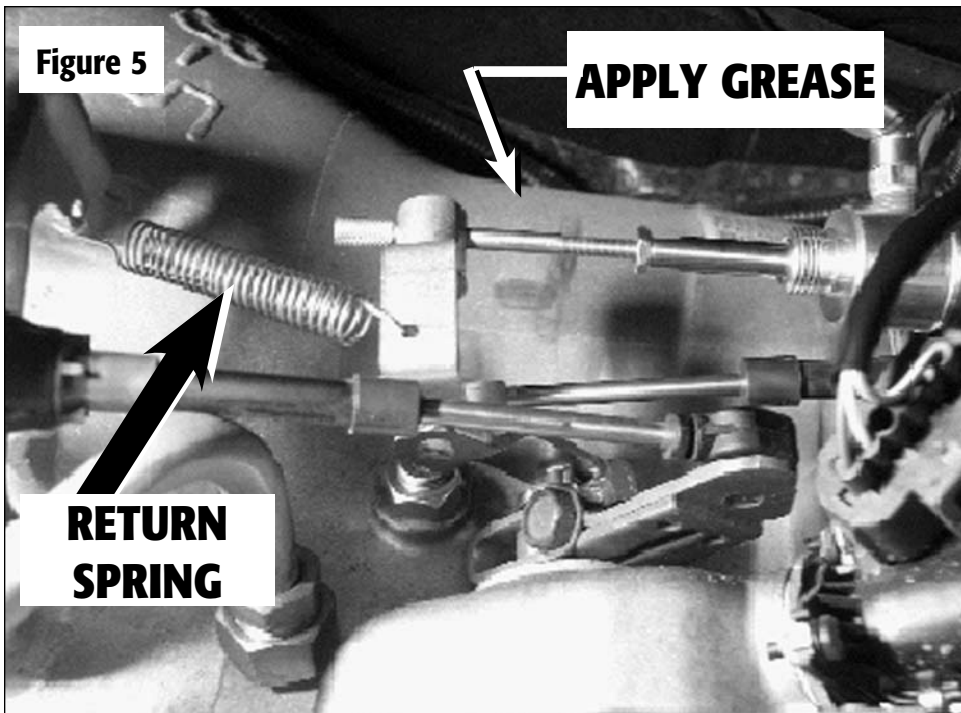


Figure 5

**RETURN
SPRING**

APPLY GREASE

directly at the 90-degree swivel push lock fitting on the rear of the actuator control assembly (the fitting farthest away from the actuator bracket). Mark this location on the hose and cut it with a sharp knife or razor. Remove 1" from the air hose. Install the tee-fitting. See **Figure 6**.

12. Insert the provided air hose into the 90-degree swivel push lock fitting on the rear of the actuator control assembly. Route the air hose toward the tee fitting just installed. Cut the air hose and insert it into the tee fitting. *NOTE: Ensure the length of the hose is long enough for proper routing and sealing. For proper installation, it is required to insert air hose 1/2" into the push lock fitting.* See **Figure 6**.

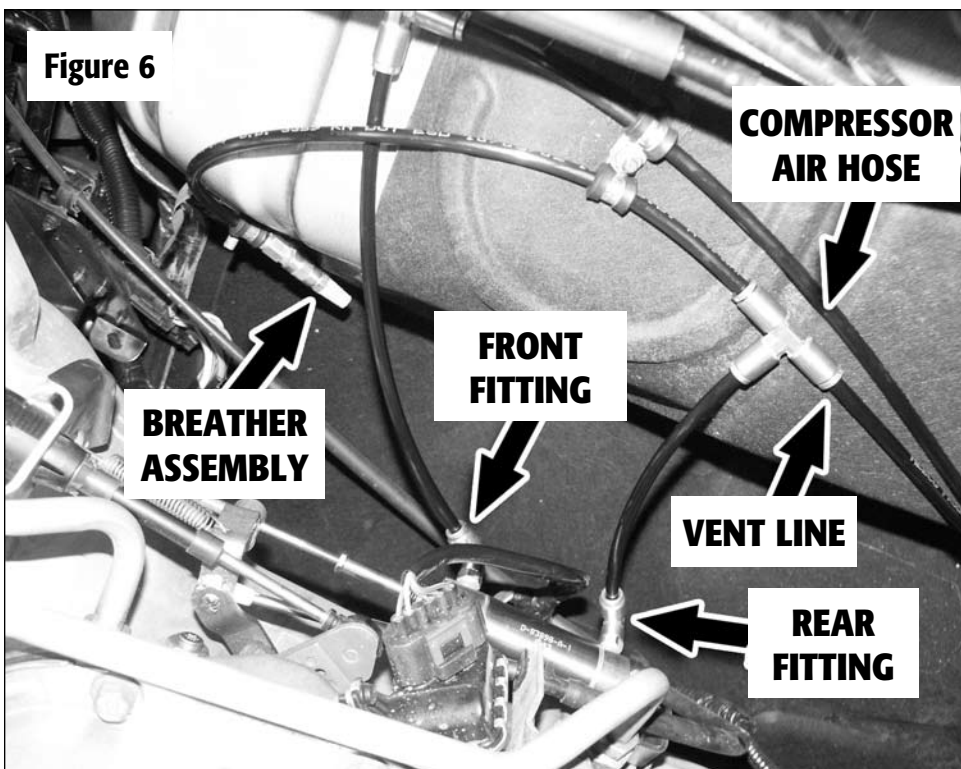


Figure 6

**BREATHER
ASSEMBLY**

**FRONT
FITTING**

**COMPRESSOR
AIR HOSE**

VENT LINE

**REAR
FITTING**

13. Locate the compressor air hose to the Banks Brake. It is the air hose running from the Banks compressor panel to the Banks brake assembly housing (it should be next to the vent air hose). Align a push lock tee-fitting on the vent hose so the tee-fitting points directly at the 90-degree swivel push lock fitting on the front of actuator control assembly (the fitting closest to the actuator bracket). Mark this location on the hose and cut it with a sharp knife or razor. Remove 1" from the air hose. Install the tee-fitting. See **Figure 6**.

lever is also tightened.

10. Inspect the end of the supplied pneumatic hose and ensure that the end of the hose is free from burrs and is cut squarely. The hose can be trimmed with a sharp knife or razor blade. Avoid cutting the hose with scissors or side cutters because it will

collapse the hose before it cuts and may cause a pressure leak in the future.

11. Locate the vent air line on the Banks Brake. It is the air hose running from the Banks Brake assembly housing to the breather assembly. Align a push lock tee-fitting on the vent hose so the tee-fitting points

14. Insert the provided air hose into the 90-degree swivel push lock fitting on the front of the actuator control assembly. Route the air hose toward the tee fitting just installed. Cut the air hose and insert it into the tee fitting. *NOTE: Ensure the length of the hose*

is long enough for proper routing and sealing. For proper installation, it is required to insert air hose 1/2" into the push lock fitting. See **Figure 6**.

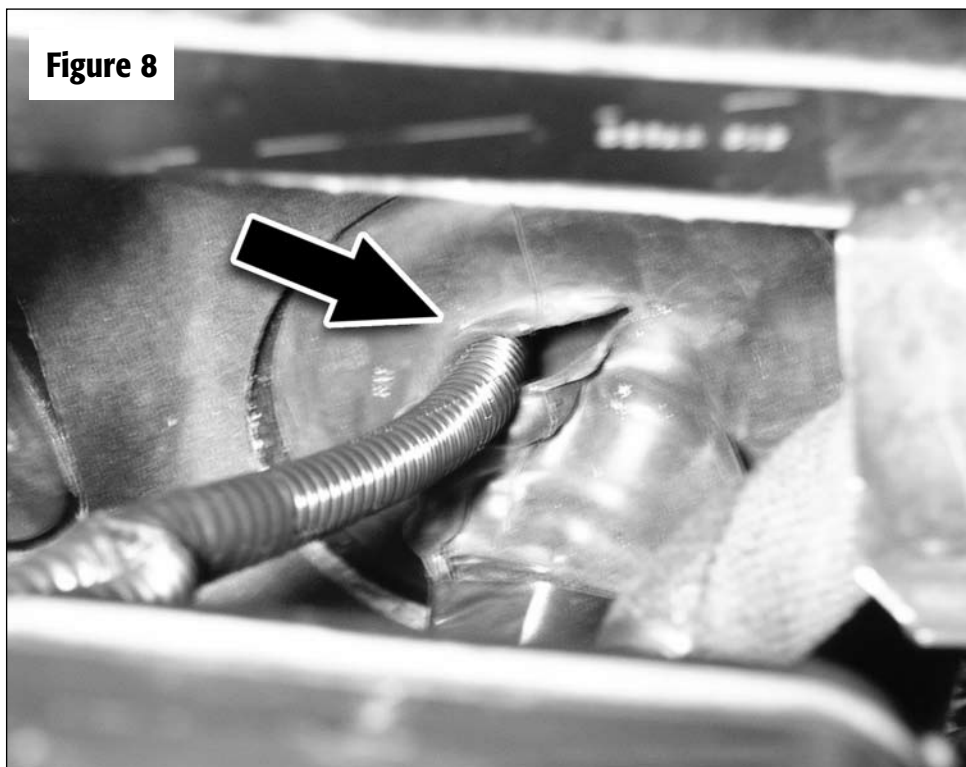
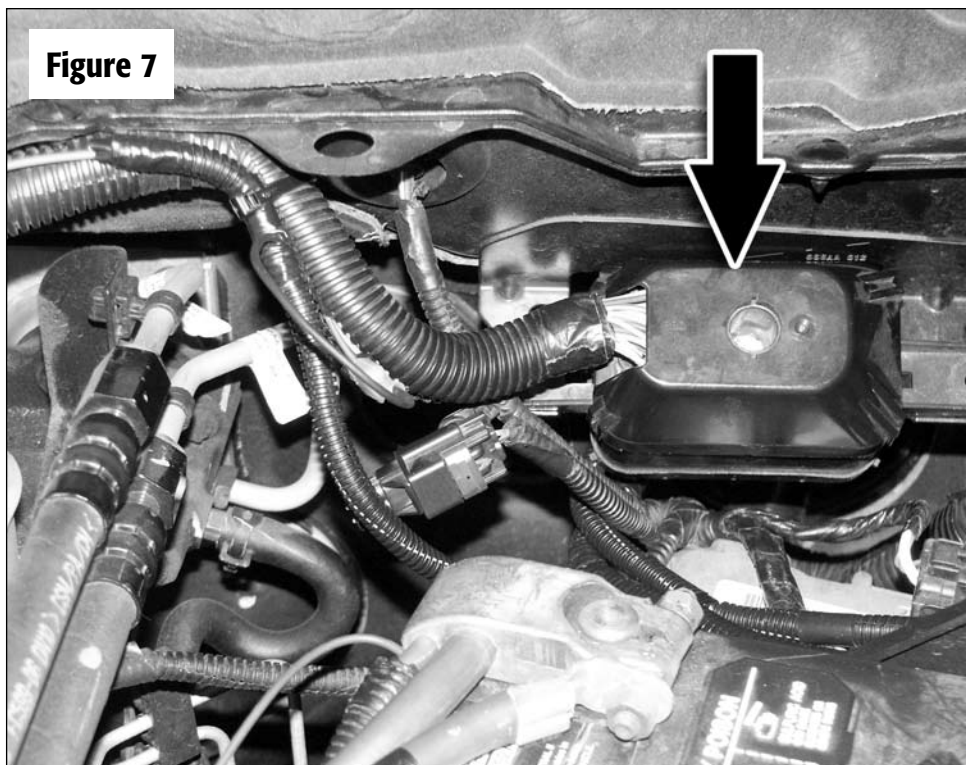
15. Lower the vehicle.

SMARTLOCK TRANS BRAKE COMPUTER AND HARNESS INSTALLATION:

NOTE: The following instructions assume that a Banks Brake system has been previously installed on the vehicle.

16. Locate the large black connector on the driver side between the battery and the firewall in the engine compartment. See **Figure 7**. Remove the two (2) plastic screws on the sides of the connector and move the connector aside. Retain the two (2) screws and the two (2) retainers for re-installation. Locate the rubber grommet on the driver's side firewall below the connector that was just removed. The SmartLock wire harness will come through here. See **Figure 8**.

17. Inside the vehicle, remove the lower dash panel by removing the two (2) screws along the bottom of the panel. Retain the screws for re-installation. *NOTE: There are also two (2) clips located at the top corners of the panel, which hold the panel in place. These clips can be released by gently pulling on the corners of the panel. Use caution to avoid damaging the panel during removal.*

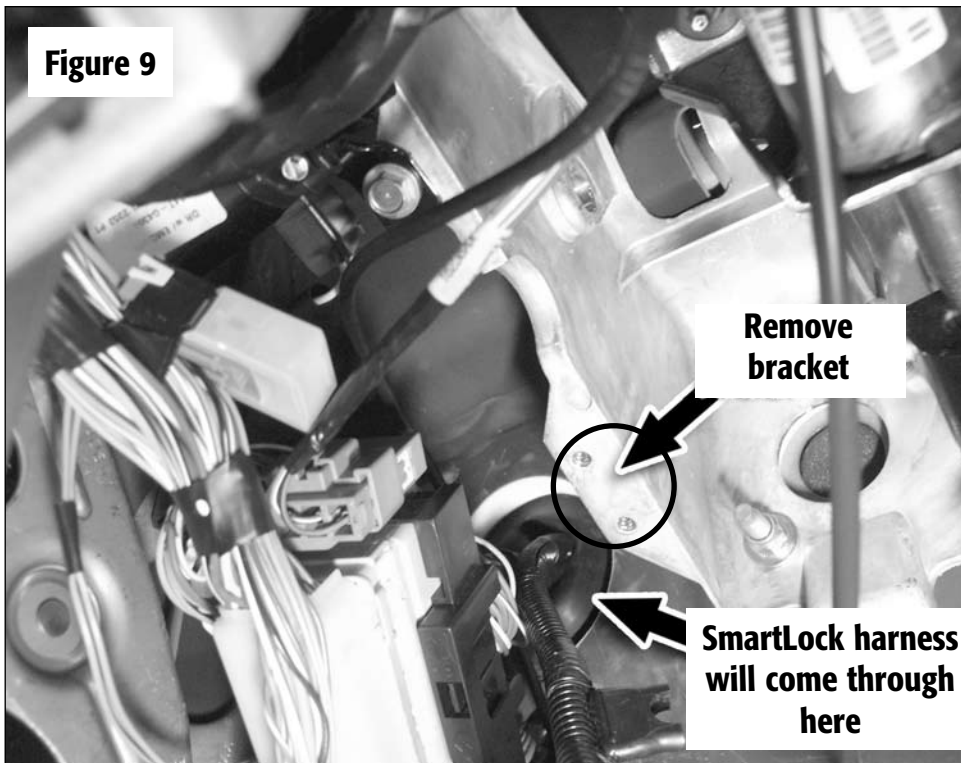


18. Remove the electric connector bracket on the left hand side of the support below the steering column in front of the firewall by removing the two (2) bolts. Keep the two (2) bolts for re-use. This will gain access to the inner grommet. See **Figure 9**.

If necessary, enlarge the hole to allow the SmartLock wiring harness to pass through. Be careful not to damage any vehicle harness.

19. Locate the 10-pin connector at the end of the Banks SmartLock

Figure 9

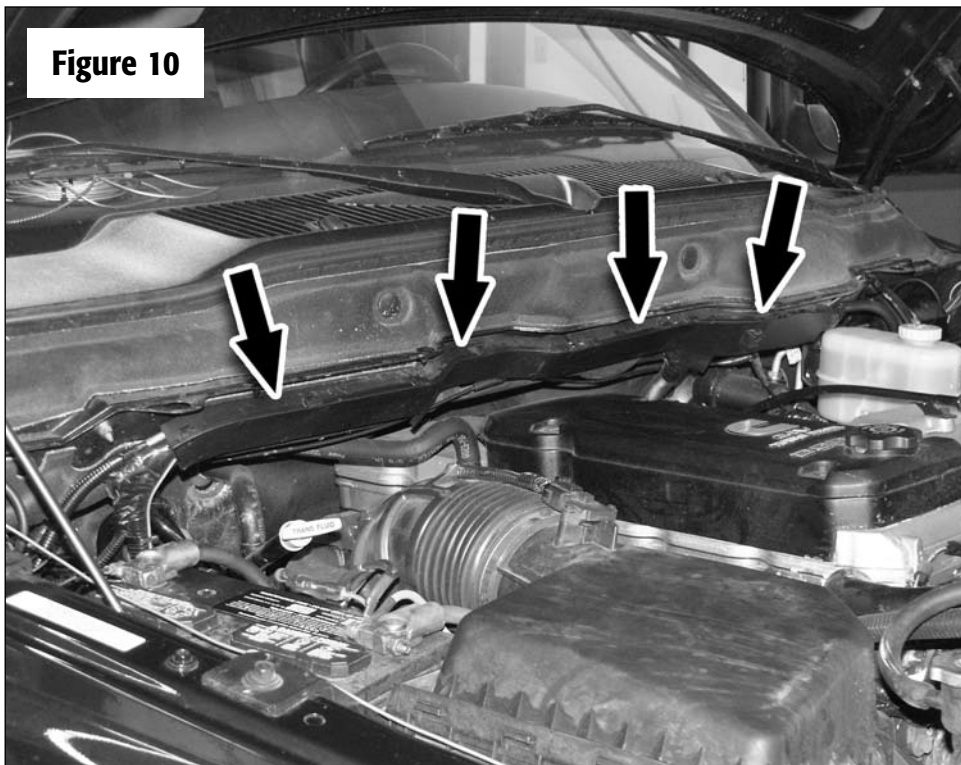


CAUTION: Pull gently to avoid damage to the wire harness connectors. Always pull on the wire harness convolute sheath rather than the wires themselves.

20. From inside the vehicle, continue to pull the harness through the firewall until the main harness joint containing the two (2) red wires comes through.

21. In the engine compartment, route the SmartLock wire harness end that contains the yellow, orange, violet and pink wires along the top of the firewall toward the PCM on the passenger side. Undo the clips (10 locations) that run along the top of firewall and lay the wires next to the factory wires. See **Figure 10**. Use cable tie to secure the inlet and outlet of the SmartLock harness to the factory harness.

Figure 10



wire harness . From the engine compartment, push the end of this wire through the hole cut in the firewall grommet. *NOTE: Taping the end of the harness to a piece of stiff wire (i.e. coat hanger) may make routing the harness through the*

firewall a simpler task. The stiff wire should be pushed through the slit in the grommet and then the wires can be attached to the stiff wire and pulled through the hole in the firewall.

22. Locate the three (3) PCM connectors on the passenger side as shown in **Figure 11**. Find the orange wire with black stripe on the white PCM connector (the middle one). Cut the wire. Install a female spade connector on the side going into the PCM, and a male spade connector on the side coming from the transmission. Connect the SmartLock yellow wire to the PCM side, and the orange wire to the transmission side. See **Figure 12**. *Note: Detaching the PCM connectors might make the task easier.*

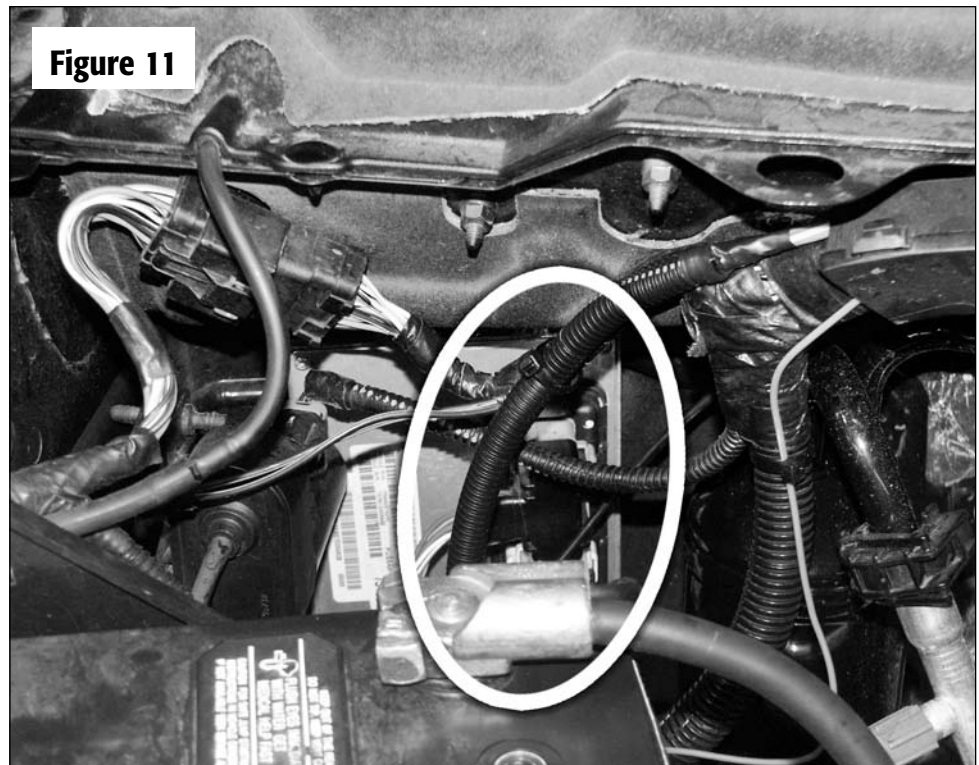


Figure 11

23. Find the gray wire with black stripe on the entirely black PCM connector (the bottom one). Install a T-tap on the wire and connect the SmartLock violet wire to it.

24. Find the orange wire with white strip on the partially gray PCM connector (the top one). Install a T-tap on the wire and connect the SmartLock pink wire to it.

25. Route the red wires along the fender on the driver side behind the battery tray toward Banks Brake. Disconnect the green wire on the Banks Brake compressor. Connect SmartLock red wire female to the green Brake male, and SmartLock red wire male to the green Brake female.

26. Inside the cab, locate the end of the wire harness with the white 10-pin connector. Plug this connector into the SmartLock Trans Brake module.

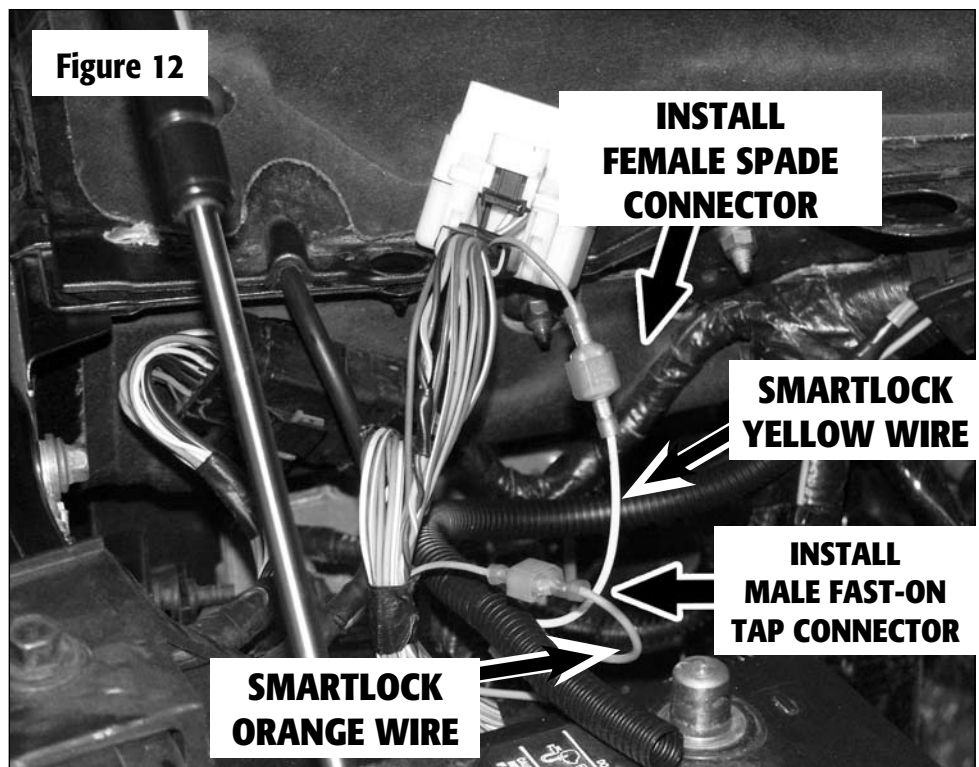
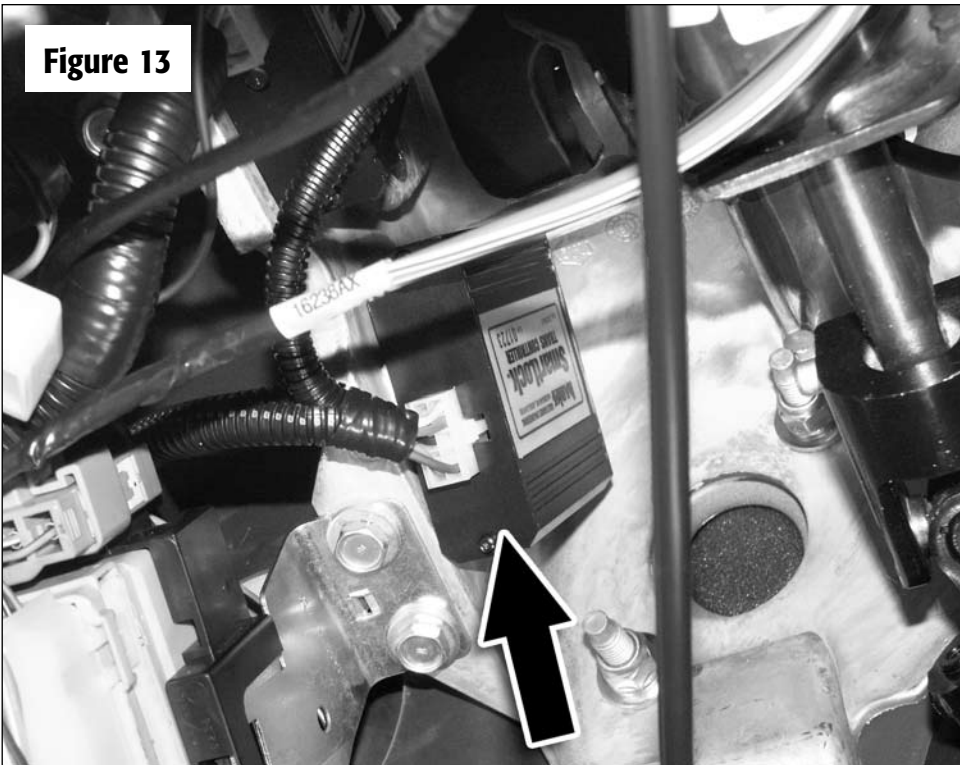


Figure 12

27. Locate the cast aluminum support frame surrounding the steering column under the dash. The inside vertical surface of the frame just to the left of the steering column will be used to mount the SmartLock Trans Brake module. See **Figure 13**.

Ensure the surface is clean and free of oil, grease and dirt. Clean and dry using a cloth dampened with rubbing alcohol or similar cleaning solution.

Figure 13



29. Locate a stud bolt on the left of the bottom of the steering column and attach the black SmartLock wire with ring terminal to it. Bolt the terminal on with the supplied set of $\frac{5}{16}$ " washer, 8mm lock washer, and 8mm nut. See **Figure 14**.

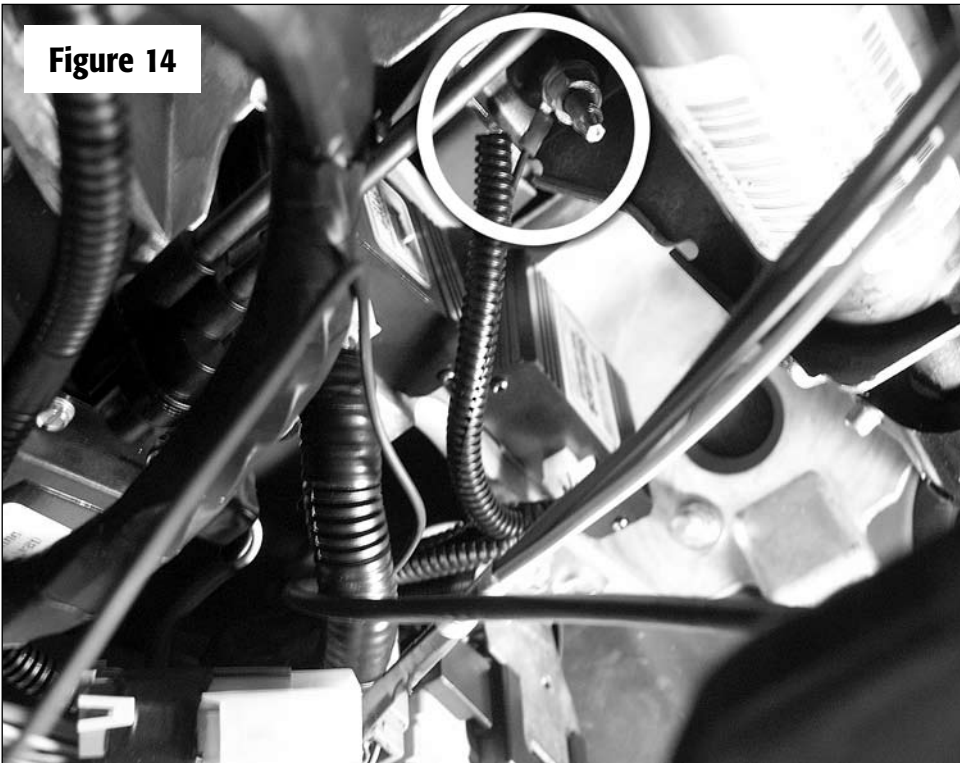
30. Re-install the electric connector bracket on the left hand side of the support below the steering column.

31. Re-install the lower dash panel with the original screws.

32. Re-install the black wire connector with the original screws and plastic retainers.

33. Re-connect the previously disconnected ground terminals at the battery (if there is more than one battery, re-connect both).

Figure 14



28. Peel the protective backing from the foam tape on the SmartLock Trans Brake module. The SmartLock Trans Brake should be oriented so that the electrical connector is facing down toward the floor of the vehicle. Attach the SmartLock Trans Brake

to the aluminum frame. Apply light pressure to the Trans Brake box by hand for approximately 60 seconds to seat the foam tape and create a strong bond.

FUNCTIONAL TESTING

Once the installation is complete, a test drive should be performed to ensure that the SmartLock Trans Brake is functioning properly. The following procedure should be used to verify that the torque converter is locked when the brake is active and that it disengages at the proper vehicle speed.

34. Obtain a steady vehicle speed of 40 to 45 mph (engine speed of 2000 to 2200 rpm) in 3rd gear with overdrive cancelled and the torque converter locked on a flat road where it is safe to allow the vehicle to slow to approximately 20 mph.

35. While maintaining this speed, turn the power switch for the Banks Brake to the "ON" position. Release the accelerator pedal to activate the exhaust brake and SmartLock Trans Brake.

36. Once the exhaust brake is activated the torque converter will remain locked and engine RPM will begin to decrease at the same rate as vehicle speed decreases. Allow the vehicle to slow until the engine reaches a speed of approximately 1200 RPM.

At an engine speed of approximately 1200 RPM, the SmartLock Trans Brake will return control of the torque converter to the factory computer and it will unlock causing the engine RPM to decrease rapidly. This is an indication that the SmartLock Trans Brake is functioning properly.

37. Obtain a steady vehicle speed of 50 MPH in overdrive on a flat road where it is safe to allow the vehicle to slow to approximately 20 MPH.

38. While maintaining this speed, turn the switch for the Banks Brake to the "ON" position. Release the accelerator pedal to activate the exhaust brake.

39. Once the exhaust brake is activated, the torque converter will remain locked and the engine rpm will begin to decrease at the same rate as vehicle speed decreases. Activate the overdrive cancel switch and ensure that the vehicle downshifts to 3rd gear. Apply light throttle pressure to allow the torque converter to re-lock. Release the accelerator pedal and ensure that the torque converter remains locked until the engine speed drops to approximately 1200 RPM.

40. Once this functional testing is completed, the SmartLock Trans Brake is ready for service.

TROUBLE SHOOTING

If the system fails to function properly, verify that the wire taps are installed correctly and on the proper wires.

If the SmartLock Trans Brake should ever need to be removed from the vehicle, the system includes a by-pass plug that must be connected to the white 10-pin connector in place of the SmartLock Trans Brake. Failure to utilize the by-pass plug will result in a "Check Engine" light on the dash and a Diagnostic Trouble Code being stored in the factory computer.

SMARTLOCK TRANS BRAKE FUNCTIONAL DESCRIPTION COMPARED TO FACTORY TRANSMISSION

OEM Transmission Function for Line Pressure Boost

The Dodge transmission includes a throttle valve that is actuated by a mechanical lever. An interconnect linkage between the throttle valve and accelerator pedal allows the transmission line pressure to be controlled as a function of accelerator pedal position. As pedal position opening increases, transmission line pressure will increase.

SmartLock Trans Brake Function

The SmartLock Trans Brake uses the OEM transmission's capability of locking the torque converter and raising transmission line pressure to optimize the functionality of the Banks Brake exhaust brake system.

To allow 100% of the available retarding force to be transferred to the drive wheels, the SmartLock Trans Brake interrupts the torque converter lockup command from the vehicle's PCM and causes the torque converter to remain locked under conditions that the PCM would otherwise unlock the torque converter. The torque converter lockup command will remain in effect until engine speed of approximately 1200 rpm.

There are two operating conditions that will require light throttle pressure to engage the torque converter clutch. These are:

(1) Activating the exhaust brake switch under dropped throttle and (2) Re-locking the torque converter after an overdrive to 3rd gear downshift. Under these conditions, simply apply light throttle pressure until the vehicle's computer engages the lockup clutch (indicated by a slight drop in engine rpm) and release the accelerator pedal. Clutch engagement should remain in effect until approximately 25 mph.

To further optimize transmission function under exhaust braking conditions, the SmartLock Trans Brake will pneumatically actuate the throttle valve lever under dropped throttle conditions to increase transmission line pressure.

NOTE: The SmartLock System is designed to compliment the function of the Banks Brake. It is not designed or intended for use under acceleration as a means to hold the torque converter locked or raise transmission line pressure. This device does not increase the torque capacity of the vehicle's transmission under acceleration.

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