



TAMING THE MOUNTAINS

BD Diesel's Variable Vane Exhaust Brake grants truck owners much more control when descending grades towing a heavy trailer

Pulling a 16,000-pound-plus trailer or fifth-wheel has its challenges, especially when climbing long grades and descending steep and winding mountain passes. Fortunately, diesel engines have plenty of power to handle the uphill chores, but descending grades without building speed to unsafe levels can overtax the tow vehicle's service brakes, which

generally leads to brake fade. While the Big Three provide exhaust braking on their newest models, earlier trucks were missing this important feature.

Fortunately, automatic transmissions are smarter than ever, and in the case of the Ford, for example, the Tow/Haul mode works in conjunction with the high compression of the diesel engine to handle slowdown fairly effectively on up to 5 percent grades;

it's the 7 to 8 percent grades or greater that can create braking problems, especially if the trailer brakes are not very effective. In most cases, you'll never get the transmission out of second gear, creeping down long grades at a slow rate of speed.

Many owners of certain year Ford and Chevy diesel trucks that were built before exhaust braking was offered can now install the new BD Diesel Variable Vane Exhaust Brake without major modifications, since all the auxiliary braking is handled electronically. This exhaust brake is available for 2011 to



1) Two OBD-II devices can be used with an aftermarket splitter. Unfortunately, not all vehicles will accept multiple devices. **2)** BD's Variable Vane Exhaust Brake installation kit is simple and comes with everything needed.



3 and 4) Mounting the three-position exhaust-brake switch needs to be exact, with a small slot cut into the plastic so that the switch will not rotate in the hole. **5)** Removing the plastic pieces from under the dash is very simple. Be mindful not to pull too hard in the wrong direction, which may cause the plastic to break or crack. **6)** BD's OBD-II connector is a diagnostic scanner that can be installed without removing any devices.

2014 Ford and 2000 to 2006 Chevy trucks.

The BD device requires just basic hand tools, by utilizing factory connections and the stock variable gate turbo (VGT) on the engine for a plug-and-play installation. A three-position switch is mounted in the dash that allows the driver to "customize" braking for the particular grade. BD Diesel's

patented exhaust brake electronic module is designed to close the turbocharger's vanes during deceleration, providing up to 120 retarding horsepower and 60 PSI of back pressure at approximately 3,000 RPM. The ability to command transmission downshifts while improving braking capabilities will result in a noticeable difference on steep or downhill grades.

7) Be sure to use the kit's cable ties to secure the OBD-II connection before installing it up under the dash and out of the way. **8)** Before installing any of the connectors, examine each individual piece for corrosion and broken plastic pieces. **9)** Removing the original connectors from the vehicle requires a little bit of finesse. Pulling too hard can cause a connector to break off the tabs. **10)** Secure all wires under the dash with the supplied cable ties. A loose wire can be cut in half with either a brake pedal or an emergency-brake lever. **11)** BD's plug-and-play connectors eliminate mistakes and are quick and easy to install. **12)** When installing the shift-lever connector just behind the hazard-lamp switch, be sure to route the wiring harness out of harm's way.





We installed the BD device on a 2011 Ford F-350 dually with a 3.75:1 rear axle ratio and a 6.7-liter "Scorpion" Power Stroke diesel, the first year Ford offered this engine. The engine runs quietly and is very powerful, but it lacked the ability to hold back our truck and fifth-wheel combo on 7 percent and greater descents, and at times created a white-knuckle experience. Keeping the transmission in second gear at 3,000 to 4,000 RPM with a top speed of about 25 miles an hour was the only option for enough control, and to save the brakes. If we were to shift to third or fourth gear, the truck and trailer combo would continue to pick up speed at an alarming rate. The only option at that point was to keep braking every few seconds to prevent the truck and trailer from rapidly building up too much speed.

15) Engine heat can cause failure of the latches on the connector to the turbo. To prevent separation, use cable ties when re-installing. **16)** Be sure to tighten the plenum bolts during installation, then torque them to 89 inch pounds (7 ft-lbs). **17)** Before installing the connector to the three-way switch, take a moment to cable tie the wires to keep them out of harm's way. While reinstalling the plastic shroud under the dash, make sure that the wire harness is not pinched where the panels meet up. **18)** Removing the rear bolts to the plenum is time consuming. A second set of hands proved to be beneficial for holding the oil and transmission dipsticks to the side.

13) The mass-airflow sensor is critical to the engine's performance. If any of the latches are broken when removing the connector, be sure to cable tie them together so they will not separate. **14)** Routing wires past the brake pedal can be critical. Make sure that there is enough slack where the brake pedal moves up and down so the wires will not get pinched.

The hands-on portion of installation was not complicated, but following the directions was a big challenge. The small black-and-white, non-descriptive pictures were difficult to follow, but thankfully the plugs and/or connectors needed to complete the install were specific, which prevented the wrong connector from being used in the wrong place.

The first 21 steps proved to be the easy part, consuming about 1.2 hours with no surprises. Steps 22 through 26 were quite a bit more difficult and stirred up a few "colorful" words. Perhaps having a diesel mechanic complete this task would be wise.

One source of frustration was working with the truck's plenum, or intake, which needed to be removed to





gain access to the turbo's connector. Some of the 15 itty-bitty bolts in the intake plenum were darn near impossible to remove and replace. When the bolts were finally taken out, the removal of the plastic plenum required a few gymnastics, since the clearances were so close.

We found that removing the fuel-filter assembly proved to be very beneficial, but disconnecting the turbocharger oil-control solenoid connector was even more difficult, mostly due to the tight space to work in. To complicate the process further, the locking tabs that keep the connectors together snapped off before we could get them apart. Using a cable tie will help ensure that the connection will not come apart.

Next, we reinstalled the intake manifold plenum and torqued all 15 bolts to 89 inch pounds (7 ft-lbs). The following few steps were quite simple, requiring the connection of the mass airflow sensor (MAF) and positioning of the supplied cable ties to ensure the entire wiring harness was secured to the recommended locations across the firewall. We then connected the positive and negative cables to the starting battery on the driver's side, turned on the ignition without starting the engine and checked that the three-position switch mounted in the dash was functioning properly.

The test drive started by taking the truck on a familiar route without using the newly installed BD Variable Vane Exhaust Brake. When letting off on the throttle, the truck rolled quite easily without much resistance on

19) Installing the electrical connection was challenging because of limited working space. Check that the connectors are secure and will not pull apart before reinstalling the plenum. 20) Make sure to use the factory heat deflector on the new connectors at the turbocharger. The tremendous heat from the turbo can melt the connectors, if not well protected. 21) Dielectric grease should be used on the connectors at the mass-airflow sensor and the turbocharger connector. This small packet is supplied in the installation kit.

level or hilly roads and steep grades. Next we ran the same route with the exhaust brake in the number one position with new BD exhaust brake without the trailer. The difference was very noticeable. The truck, even at low RPM, had considerably more rolling resistance, and the brakes were not needed as often by comparison. With the selector in the Downshift mode, it literally felt like the brakes were applied every time the truck downshifted at roughly 3,000 RPM, which is in the optimal RPM for this engine's effectiveness. Using the Manual Downshift mode on the truck customized the stopping experience. We did notice, however, when in the Manual mode, the shifting wasn't always completed without a second or third try.

With the 17,000-pound fifth-wheel trailer attached, we headed out on the same route. The 4 to 5 percent grades were not challenging with the BD exhaust brake engaged. On the 7 and 8 percent grades, the BD system improved slowing control at a significant rate. We could definitely feel a noticeable difference holding back the load with no brakes applied while running in second gear. We negotiated the 7 percent grade in third gear and could definitely feel the combo starting

to pick up speed at 3,000 to 3,500 RPM, but nowhere near as quickly as running in stock form.

Stopping at the bottom of the 7 percent grade with the BD system set in the Downshift mode was quite impressive. Coupled with the truck and trailer brakes, it felt like we could stop in half the distance than we could have without the BD exhaust brake engaged. If used properly, especially on steep, winding downhills with Downshift mode engaged, brake fade should prove to be a thing of the past.

One thing to watch for when this system is installed on trucks with emissions equipment is a possible DTC fault code that may appear under prolonged extreme conditions, which relates to diesel particulate filter (DPF) sensor output.

Modern truck performance is aided by technology, and enhancing these advancements with the BD Variable Vane Exhaust Brake will prove to be important for safe travel on grades when pulling trailers and fifth-wheels. The kit for the Ford retails for \$627 and is covered by a one-year limited warranty. 📞

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