BD Remote Mount Exhaust Brake
2003-up International VT365

Kit Number # **1027168**

Serial # _____

Date Purchased _____

Purchased From _____

Installed by _____

Mileage _____

*** Please fill out and mail registration card as soon as possible. ***

OWNER'S MANUAL – LEAVE IN GLOVE BOX

BD ENGINE BRAKE, INC.
Plant Address: A10-33733 King Rd, Abbotsford, BC, Canada V2S 7M9
US Shipping Address: 88-446 Harrison St, Sumas, WA 98295 US Mailing Address: PO Box 231, Sumas, WA 98295
Phone: 604-853-6096 Fax: 604-853-8749 Internet: www.bd-power.com

Kit Contents: Control Assembly c/w hoses & harness
Wiring Harness & Toggle Switch
Mounting & harness
Brake Controller

Thank you for purchasing a BD Engine Exhaust Brake. Your kit should have the above-mentioned items for your installation; please check to make sure that you have everything. This manual is to aid you with your installation and operation of your braking unit. We strongly suggest that you fill out the installation information and retain this manual for any future reference.

Options

Description	Part #
Manual Transmission Shifter Switch Kit	1300210
Transmission Gauge Kit (Auto Trans)	1030584
X Monitor (3 in 1 Digital Gauge)	1087210
Performance Torque Convertor	Call
6.0L AutoLoc/PressureLoc	1031300

Battery Disconnect & Removal

Disconnect the negative terminals on both of the vehicle's batteries, and then disconnect the positive terminals. Remove passenger side battery.

Regulator Installation

Install the air regulator assembly in a clean water free easy to access location. Use the provided bracket, bolts and nuts to mount the regulator to the body. The assembly should then be mounted to the body using sheet metal screws or to a support cross member.

Valve Installation

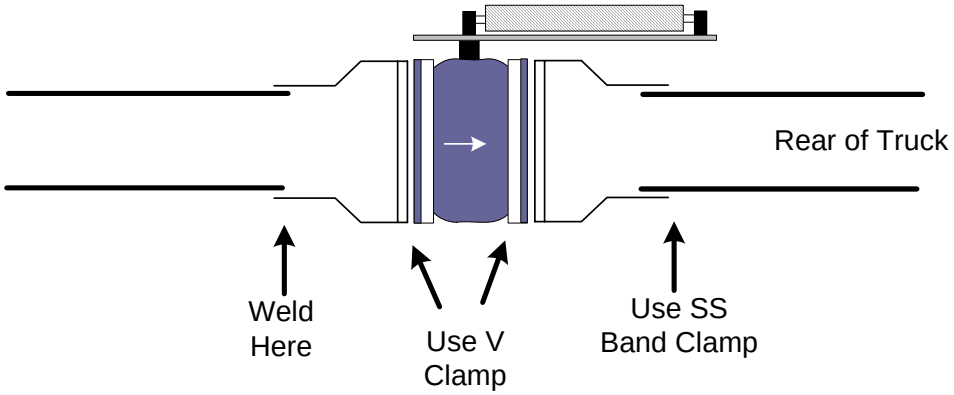
***SAFETY* To prevent injury or damage raise the vehicle to a good working height and support with jack stands or axle stands.**

Locate a straight 11" section of pipe that has the outer clearance to mount the exhaust brake. You can use a sawzall, hacksaw or angle cutter to cut this section.

Slide the supplied flanges over the each side of the cut exhaust. The flange closest to the front of the vehicle will need to be welded. A good clean weld is needed to seal the high backpressure that the exhaust brake will create. The rear flange should be mounted with the supplied stainless band clamp.

Insert the valve assembly in between the two flanges and ensure that there is ample room when welding and tightening the two flanges. Also take note that there is an exhaust flow direction arrow cast into the

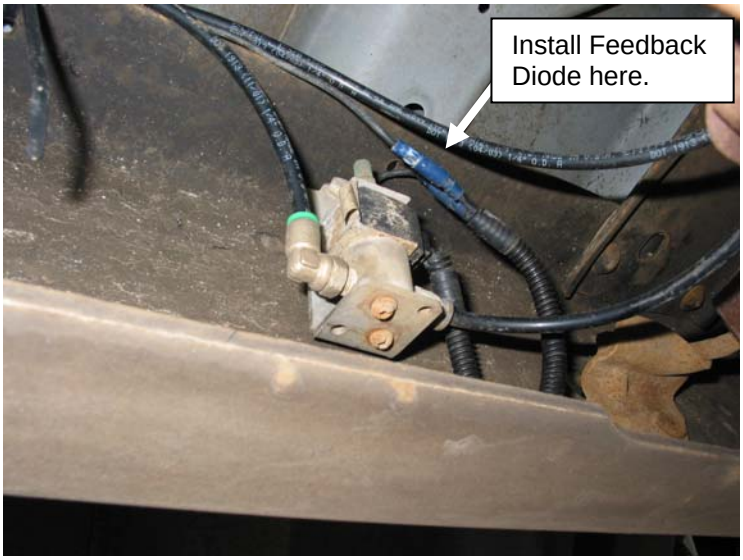
exhaust brake. This arrow should be pointing towards the rear of the vehicle. Once you have finalized the fit by welding the front flange and securing the rear the flange, tighten the two supplied V clamps around both flanges on either side of the exhaust brake. The exhaust brake should now be held securely in place.



Note: This kit can be purchased for 4" exhaust or the factory 3.5" exhaust.

Air Solenoid Installation

Just across from the exhaust brake on the inside of the frame rail you will need to mount the brass solenoid valve. Make sure that the Air Solenoid assembly is as close as possibly to the exhaust brake to ensure a quick engagement and disengagement of the valve.



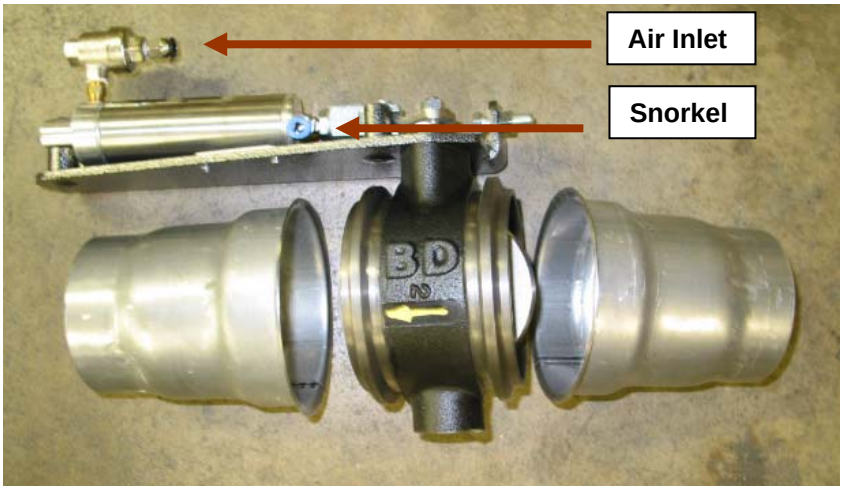
At the same time it is probably a good idea to install the Feedback Diode assembly. Just connect the quick connectors together matching Black to Black (Ground) and Red to power.

Air Hose wiring

Consult the wiring diagram for proper connections.

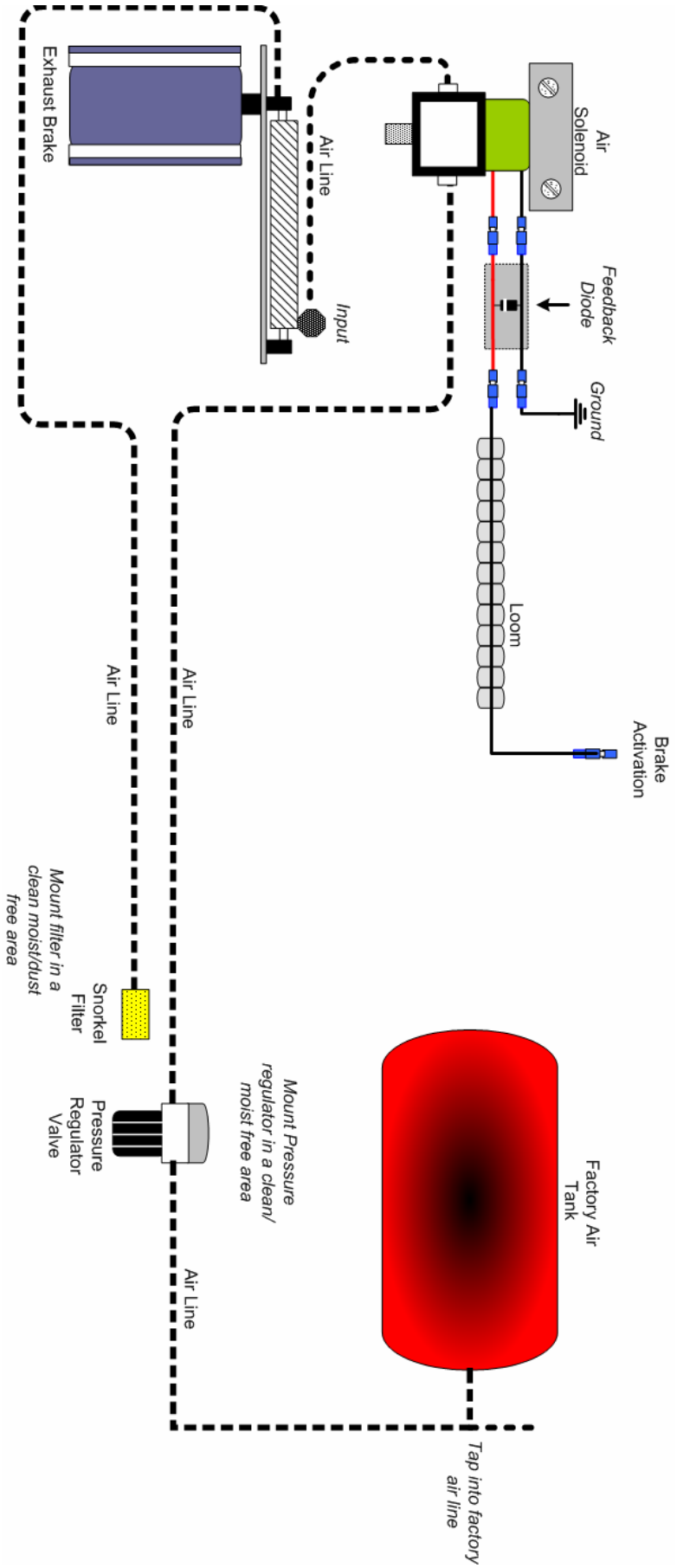
You will need to tap into the factory air system to control the brake on and off. The easy location to do this is at the compressed air tank. A brass 'T' has been provided ease the installation. With brass 'T' installed you can connect the quick connect fitting and install the Nylon air tubing into the port.

You will need to route the nylon hose to the air regulator you installed earlier. The hose from the air tank should enter at the 'IN' port. Exiting the air regulator via the 'EXIT' port the nylon tubing should be routed to the brass solenoid valve 'IN' port. From the exit of the solenoid valve the tubing should be run to the exhaust brake cylinder air inlet.



You must next run the snorkel line from the exhaust brake cylinder to underneath the hood of the vehicle in a dry clean area. You should see this connection on the front end of the exhaust brake air cylinder.

Keep all air hoses and electrical wire away from moving parts or any heat sources.



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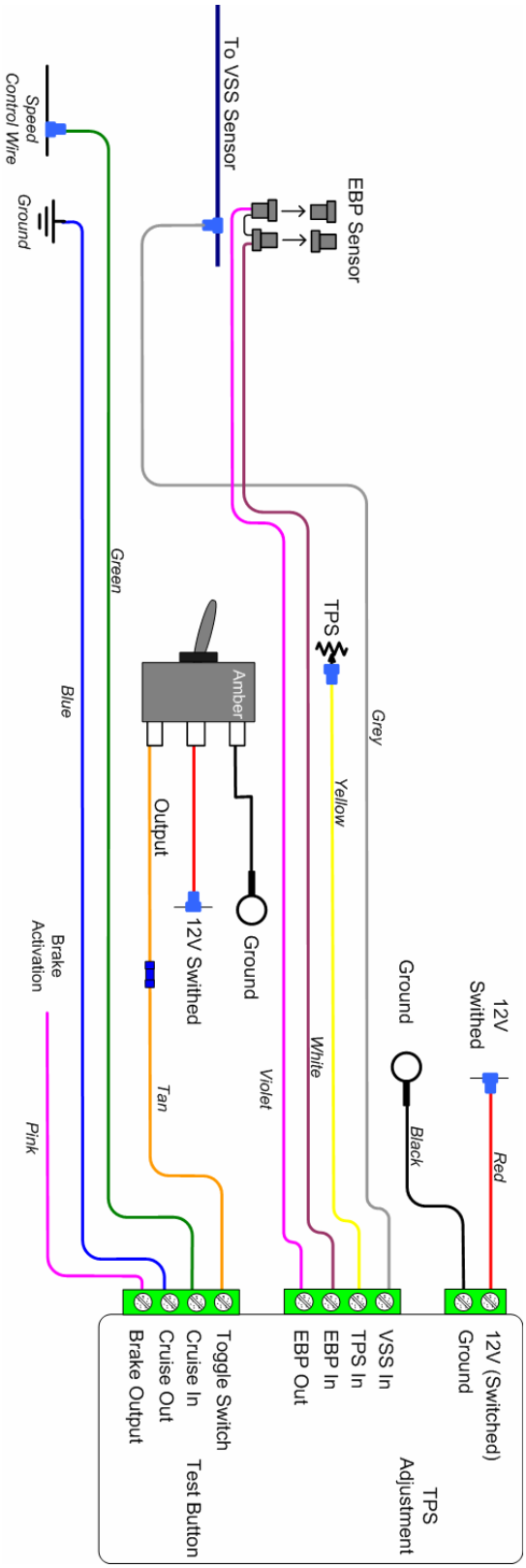
Cab Wiring

CAUTION: Before installing any wiring modifications or equipment ensure to disconnect the battery Ground (Negative) terminals on all the vehicle batteries as damage to the vehicle's ECU and/or installed components may result.



Mount the brake controller in a discreet location beneath the dash, this location still needs to be readily accessible as you will have to make some adjustments.

First you will need to find a source of the 12 volt switched or accessory power. You will need to route this power connection in the 12V(Switched) input of the brake controller.

Next find a good electrical ground for the control unit. A location that is common to electrical components is a good idea.

For the VSS (Vehicle Speed Sensor) connection, you can locate the wire on pin X4-10 of the chassis ECM (White). If you cannot locate it there, you can use the supplied T-Tap to connect the wire to the sensor located on tail shaft of the transmission.

The TPS connection can be made right at the pedal or at pin X4-18 of the chassis ECM (white). The TPS/APPS voltage should increase as the pedal is depressed, typically the voltage will range from 1.5 volts at idle all the way to 4.00 volts at full throttle.

We have provide the factory plugs for the Exhaust Back Pressure sensor (EBP) connections. The sensor is located near the front of the engine driver's side. Be sure that the sensor's signal travels first to the brake controller then leaving the brake controller and back to the plug then to the ECM.

The toggle switch input should be wired to the output of the toggle switch. When the brake is active or armed a 12 volt signal should be travel in the Switch input of the brake controller.

For the 'Cruise IN' connection you will need to locate the wires controlling the steering wheel cruise control. The wire you will need to locate and T-tap into is circuit B96-18VT. This wire travels to the vehicle systems controller (1600) and inserts into pin #10. Once you

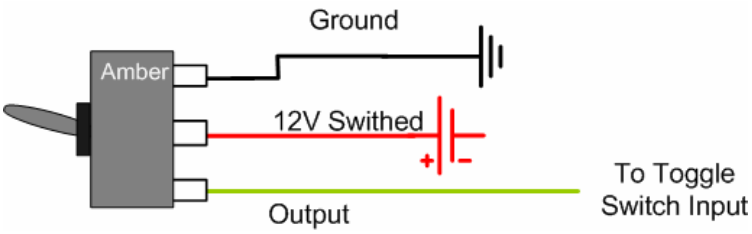
have T-tap into this wire you will need to connect it to the Cruise In connection.

The 'Cruise Out' is much easier as you just need to provide a ground to this input.

The Brake Output connection will need to be wired to the brake activation circuit that you installed earlier on. This wire will be connected to a long black wire that will control the solenoid valve.

Toggle Switch Wiring

When wiring the on/off switch be sure to leave yourself enough wire length when mounting the switch in the dash. You will need to drill a ½" hole in the dash to accommodate the toggle switch. Like previously mentioned connect the ground (black) and power (red) wires to the switch using the supplied female blade connectors. The ground wire must be connected to the terminal labeled "AMBER". The provided tan wire should go to the TOGGLE SWITCH terminal on the brake controller and be connected to the output of the switch.



Battery Reinstall

Re-install battery. Reconnect the positive terminals on both batteries then reconnect the negative terminals.

Brake Controller Calibration

Ensure the connections of the corresponding wires to the Brake Controller Module are correct as shown in the wiring diagram.

To achieve the correct setting for the activation of the exhaust brake in relation to the throttle pedal the Brake Controller Module must be calibrated for your vehicle.

The Brake Controller has an LED inside of the case that should be visible through the case indicating brake activation.

With the throttle at idle, start the engine and turn on brake switch. Then, using a small flat bladed screwdriver, turn the small adjusting screw on the right side of the Brake Control Module counterclockwise or clockwise until the brake engages and the LED JUST turns on.

You will need to hold the small test button on the side of the Brake Controller during this process. This button must be pressed to calibrate the engagement/disengagement point of the exhaust brake, as normally the exhaust brake disengages at 15mph.

CAUTION: THE ADJUSTING SCREW IS A MICRO-SWITCH WHICH IS VERY DELICATE, SO TURN USING SMALL ADJUSTMENTS.

Test by revving up the engine to approximately 1000 RPM and releasing the throttle. As the accelerator pedal is applied the test light should turn off just before the engine starts to rev, indicating proper calibration of the Brake Controller Module with the TPS. Remember to keep the test button depressed.

The exhaust brake and LED should activate again when the throttle pedal returned to idle. If not, readjust the Brake Control Module so that it does. Reinstall lower dash cover.

Exhaust Brake Testing

Start the vehicle and check for idle pressure.

The idle pressure should be 10–15 lbs the exhaust brake is pre set from the factory so it should not need to be adjusted. If an adjustment is thought to be necessary, please go to the exhaust brake adjustment section.

NOTE: The butterfly valve has been preset at the factory and should not be adjusted.

Start the vehicle and take it for a test drive. The brake will only engage above 15 mph, it will not operate below this speed. Take the vehicle above this set speed, turn on the brake activation switch and let off of the throttle. The brake should apply and you should feel the vehicle slow. Once 15 mph is reached the brake will disengage automatically. Accelerate past the threshold speed once more, and let off the throttle once again. Re-apply the throttle and make sure the brake **quickly** disengages.

The brake must quickly disengage, if it does not an PCM error code maybe generated. Some common reason for a slow reacting brake would be, Brake controller not adjusted correctly, or the Air Solenoid Valve to far away from the brake.

Next you will need to test the brake for maximum retarding pressure. You can either do this under load from a large hill or perhaps from letting off the throttle at high RPM.

The Regulated Pressure is adjusted with the regulator on the Control Assembly and has been preset to allow aMAX of 45 psi of exhaust back pressure. Note that you should try to attain this maximum pressure.

CAUTION: Do NOT exceed 45 psi of backpressure.

If for some reason you do not have a back pressure gauge, you can measure the voltage at the "EBP IN" pin of the 6.0L Brake Controller. Under peak exhaust brake use (High Load & High RPM) you should see just under **4.0 Volts**.

While driving, turn Cruise Control on, then try to activate brake, the activation of the brake should disconnect cruise. Turn brake off and activate cruise again, this time pressing down on the hydraulic brake pedal to ensure cruise disconnects when the brake pedal is applied.

You may also notice that every time the vehicle is started the exhaust brake is cycled for a $1/10^{th}$ of second. This should help everything stay free and clear and reduce the possibility of the valve being contaminated.

NOTE: Over the next two weeks, the backpressure at idle may rise due to initial carbon build up and the brake valve will need to be adjusted again.

Check for any exhaust leaks and recheck all connections and hoses for security and interference from moving or heated items. After about 100 miles (160 km), re-torque the turbo exhaust clamp and flange bolts.

Maintenance & Trouble Shooting

Your exhaust brake has been designed so that every time the vehicle is started the exhaust brake will cycle for $1/10^{th}$ of a second. This will extend the operating life of the brake substantially.

On a twice-yearly interval, check and adjust the brake pressure to 10-15 lbs while the engine is at idle. The hoses, wires, fittings and clamps should be inspected on a regular basis for any deterioration, damage, or leaks.

By following the diagrams in this manual, trace hoses and wiring, check continuity through electric components, and check for any lines that are disconnected.

This should solve any problems that may arise but if you should need any assistance or need replacement parts, call our **Technical Service** department at 1-604-853-6096, between 8:30am and 4:30pm Pacific Time.

Common Problems

Brake cycles ON/OFF upon disengagement speed – To cures this problem a new ground should be found for the Brake Controller. Electrical noise on the ground and the VSS line cause this symptom.

Brake does not activate – Obviously check all the wire connections and make sure than when the brake is supposed to be energized that 12V exists on the Brake output of the Brake Controller. Also note that whenever the brake should energized a red LED will be lit inside of the brake controller, you can check to operation by pressing the test button on the side of the controller. Check to make sure that the idle verification Potentiometer has been adjusted correctly and that the activation switch is in the ON position and provide 12V to the switch input.

Upon disengagement of brake, Vehicle bogs down – Make sure that the feedback diode wiring assembly is installed at the solenoid valve, without this sporadic operations will result.

Exhaust Brake Adjustments

As mentioned in these installation instructions, the backpressure must be measured and adjusted when the vehicle is at idle. There is a 1/8" NPT port on the side of the exhaust brake casting designed for a pressure gauge.

It is required that a standard pressure gauge be used to make the necessary adjustments to the brake valve. Adjust the brake to reach approximately 10-15 lbs while the engine is at idle.

You will need to loosen the stop bolt on the top of the exhaust brake. To do this first loosing the lock nut then turn the stop bolt in or clockwise into the exhaust brake frame. Activate the brake, at this time the brake will stroke until it hits the sides of the valve casting. Re-adjust the stop bolt until it touches the actuator arm, at this point turn it another 60°, so that the stop bolt pushes the valve just off the sides of the casting. Tighten the locknut, and the check the back pressure gauge for the 10-15 psi idle pressure. If you are still having problems please contact BD Technical Support.

DO NOT SET THE VALVE TO STROKE AGAINST THE VALVE CASTING WALLS; WARRANTY WILL BE VOIDED.

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 the vehicle hydraulic braking system, even to point of "burn-up".

These guidelines were designed to offer a better understanding of the benefits of using exhaust brakes and are based on material developed by the US 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, with maximum use or even occasional use, that 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.

However, the exhaust brake cannot be used as a parking brake or a service brake to bring your vehicle to a complete stop.
By using a BD Exhaust Brake, the life and effectiveness of your hydraulic brakes will increase. 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 fading or failure. With terrain that is a series of up and down grades, the BD Exhaust Brake will aid in reducing exhaust valve warpage. 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 now coasting down the other side, the heated valves are too quickly cooled. With the exhaust brake engaged, the heat loss to the valves will be reduced, which can prevent valve warpage. 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 relay is activated 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 could cause damage to engine and/or the exhaust brake. Vehicles may require downshifting to obtain the necessary retarding force.

Automatic transmissions with lock-up clutches in the converters can achieve the best retarding force with the use of a clutch control device (i.e. AutoLoc).

Incorporated with the BD Exhaust Brake, there is a pressure regulating system that will control the created backpressure. If the backpressure reaches the set limit, the exhaust valve will open slightly to relieve the excess pressure.

The brake pressure at idle is required to be checked and adjusted at time of installed, two weeks after installed, and on a regular twice a year interval.

Using a standard pressure gauge and the pressure port on the exhaust valve, the brake pressure at idle must be set between 10 and 15 psi. 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.

Therefore, 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). By reducing the use of your hydraulic brakes in these situations, this reduces 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 (i.e. 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 than correcting an over-speed condition.

You may also notice that every time the vehicle is started the exhaust brake is cycled for a 1/10th of second. This should help everything stay free and clear and reduce the possibility of the valve being contaminated.

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

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BD ENGINE BRAKE, INC.
LIMITED WARRANTY STATEMENT

THE INSTALLATION OF THIS PRODUCT INDICATES THAT THE BUYER HAS READ AND UNDERSTANDS THIS AGREEMENT AND ACCEPTS ITS TERMS AND CONDITIONS.

DISCLAIMER OF LIABILITY

BD Engine Brake Inc., its successors, distributors, jobbers, and dealers (hereafter "**BD"**) shall in no way be responsible for the product's proper use and service. THE **BUYER** HEREBY WAIVES ALL LIABILITY CLAIMS.

BD disclaims any warranty and expressly disclaims any liability for personal injury or damages. **BD** 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 by reason of use or sale of any such equipment. The **BUYER** acknowledges and agrees that the disclaimer of any liability for personal injury is a material term for this agreement and the **BUYER** agrees to indemnify **BD** and to hold **BD** harmless from any claim related to the item of any equipment purchased.

This warranty shall not apply to any unit that has been improperly stored or installed, or to misapplication, improper operation conditions, accidents, neglect, or which has been improperly repaired or altered or otherwise mistreated by the **BUYER** or his agent. **BD** also assumes no liability regarding the improper installation or misapplication of its products. It is the installer's responsibility to check for proper installation and if in doubt, contact the manufacturer.

LIMITATION OF WARRANTY

BD Engine Brake Inc. (hereafter "**BD**") warrants to the **BUYER** that any parts purchased shall be free from defects in material workmanship. A defect is defined as a condition within the product that would render the product inoperable. **BD** gives Limited Warranty as to description, quality, merchantability, fitness for any product's purpose, productiveness, or any other matter of **BD's** product sold herewith. **BD** shall be in no way responsible for the product's open use and service and the **BUYER** hereby waives all rights other than those expressly written herein. This Warranty shall not be extended or varied except by a written instrument signed by **BD** and the **BUYER**.

The Warranty is Limited to two (2) years from the date of sale. Labor costs incurred by the removal and replacement of the BD product, while performing warranty work, will be covered for 1 (one) year, payable at BD rates, at authorized centers and with prior approval. Until BD has approved the claim, the consumer may be responsible for these costs.

A Return Authorization (WA) number, obtained in advance from **BD**, must accompany all products returned for warranty consideration. All products must be returned, shipping prepaid, to **BD** and must be accompanied by a dated proof of purchase receipt. All Warranty claims are subject to approval by **BD** and repaired or replaced product will be returned to the customer freight collect. Accepted warranty units, which have been replaced, become the sole property of **BD**.

This warranty is in lieu of all other warranties or guaranties, either expressed or implied, and shall not extend to any consumer or to any person other than the original purchaser residing within the boundaries of the continental U.S. or Canada.

IN THE EVENT THAT THE BUYER DOES NOT AGREE WITH THIS AGREEMENT, THE BUYER MAY PROMPTLY RETURN THIS PRODUCT, IN A NEW AND UNUSED CONDITION, WITH A DATED PROOF OF PURCHASE, TO THE PLACE OF PURCHASE WITHIN THIRTY (30) DAYS FROM DATE OF PURCHASE FOR A FULL REFUND.