

BD Twin Turbo Kit

2003-2007 Dodge HPCR ISBe

Installation Instructions

Part# 1045330

PLEASE READ ALL INSTRUCTIONS BEFORE INSTALLATION.

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

K I T C O N T E N T S :

Please check to make sure that you have all the parts listed in this kit **before** you start the disassembly your truck.

DODGE 2003-2007 TWIN TURBO KIT (BD# 1045330)			
1405230	1405228	1453109	1452985
			
Primary Turbo (Un-wastegated)	Secondary Turbo (Wastegated)	Primary Turbo Oil Drain	Secondary Turbo Oil Drain
Qty: 1	Qty: 1	Qty: 1	Qty: 1
1453125	1453126	1453127	1453600
			
Primary Turbo Support Bracket	Support Bracket Bolt	Support Bracket Washer	Primary Exhaust Outlet Pipe
Qty: 1	Qty: 2	Qty: 2	Qty: 1
1453602	1452226	1453405P	1453305P
			
Down Pipe V-Band Clamp	Turbo Outlet Cast Elbow	Primary Air Outlet Pipe	Secondary Air Inlet Pipe
Qty: 1	Qty: 1	Qty: 1	Qty: 1
1453710P	1453502	1453265P	1453150
			
Air Filter to Primary Turbo Pipe	Primary to Sec. Pipe	Intercooler Pipe	Oil Drain Adapter
Qty: 1	Qty: 1	Qty: 1	Qty: 1







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1045985		1045986		
				
<i>HD 3-piece Exhaust Manifold</i>		<i>Exhaust Manifold Gasket Set</i>		
Qty: 1		Qty: 1		
1453930	1453931	1453933	1453126	1100740
				
<i>Upper Rec. Dryer Spacer</i> <i>(1" x 1"od x 5/16" id)</i>	<i>Lower Rec. Dryer Spacer</i> <i>(1" x 1 1/4"od x 5/16" id)</i>	<i>Receiver Dryer Fender Washer</i>	<i>Receiver Dryer Bolt</i>	<i>4" Stainless Steel Down Pipe Clamp</i>
Qty: 1	Qty: 1	Qty: 2	Qty: 2	Qty: 1
1452225	1453251	1453135 / 1453136	1453923	
				
<i>V-Band Clamp (Turbo Outlet)</i>	<i>Elbow O-Ring (Viton)</i>	<i>ORB Fitting w/ Ring Seal</i>	<i>Heater Tube Coupler</i>	
Qty: 1	Qty: 1	Qty: 2	Qty: 1	
1453110	1453240	1462430		
				
<i>Primary Turbo Drain</i>	<i>Wastegate Follower</i>	<i>Manifold Studs</i>		
Qty: 1	Qty: 1	Qty: 2		

PRIMARY TURBO HARDWARE KIT (BD# 1453192)					
1453111	1120031	1453121	1453122	1453113	1453115
					
<i>Upper Oil Drain Bolt</i>	<i>Oil Drain Washer</i>	<i>Pri. Support Bolt</i>	<i>Pri. Support Washer</i>	<i>Oil Drain Hose Clamps</i>	<i>Oil Feed Adapter</i>
Qty: 2	Qty: 2	Qty: 1	Qty: 1	Qty: 2	Qty: 1

1453505	1453504	1453983	1453503	1405926 (0406)
				
<i>M10X1.25X30 (FINE)</i>	<i>Stainless Zip Tie</i>	<i>Turbo Mt. Washer</i>	<i>Heat Shield</i>	<i>Down Pipe V-Band Clamp</i>
Qty: 4	Qty: 3	Qty: 4	Qty: 1	Qty: 1

SECONDARY TURBO HARDWARE KIT (BD# 1453293)					
1453980	1453982	1453983	1604102	1604103	1453113
					
<i>Turbo Mt. Bolt</i>	<i>Turbo Mt. Nut</i>	<i>Turbo Mt. Washer</i>	<i>Lock Washer</i>	<i>Bolt</i>	<i>Oil Drain Clamps</i>
Qty: 2	Qty: 2	Qty: 4	Qty: 2	Qty: 2	Qty: 2

TURBO HEAT SHIELD KIT (BD# 1459110)		
1459111	1459112	1459113
		
<i>Heater Wrap</i>	<i>Inner Wrap</i>	<i>S/S Wire</i>
Qty: 1	Qty: 1	Qty: 48"

HOSE & CLAMP KIT (BD# 1453493)		
1405222	1405221	1405213
		
4"i.d. Hose (4" long/ea)	3"i.d. Hose (4" long/ea)	Clamp (4.11")
Qty: 2	Qty: 2	Qty: 2
1405211	1453701	1453112
		
Clamp (3.00-3.38")	Clamp (4")	Oil Drain Hose (4")
Qty: 4	Qty: 2	Qty: 2
1453140	1453141	
		
Primary Turbo Oil Feed Hose (#6 JIC Straight x #6 JIC Inv. Flare)	Secondary Turbo Oil Feed Hose (#6 JIC Straight x #6 JIC 90°)	
Qty: 1	Qty: 1	

AIR BOX KIT (BD# 1453893)	
1453810	72-90009
	
Air Box	Air Box Filter
Qty: 1	Qty: 1

If you believe you are missing any parts that are displayed here, please contact BD Power at (800) 887-5030 for replacements.

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Pre-Installation

For the purpose of the instruction manual, the term “primary turbo” refers to the larger un-wastegated turbo and the term “secondary turbo” refers to the smaller wastegated turbo.

Installation should occur on a cold vehicle, as turbo and exhaust components become very hot with use.

The BD twin turbo system is recommended for trucks with 400-500 RWHP with a maximum efficient boost pressure of 52psi. Note that even a well maintained Cummins head gasket might blow around 60-65psi. This number varies depending on injection timing and engine compression.

Also note that a stock transmission will not handle this power and torque, transmission modifications are a must.

Options

<u>Description</u>	<u>Part #</u>
BD 'X' Torque Converter	1070217X
BD HD Transmission	CALL
BD Auxiliary Lift Pump Kit	1050226
BD X-Monitor Digital Gauge Package	1085220
BD High Pressure Hose/Boot Kit	1045215
Head Studs	CALL

When either upgrading or installing the twin turbo kit the wastegate will need to be adjusted. This wastegate is adjustable by turning the actuator rod. To adjust the wastegate you will need to unscrew the rod counter clockwise roughly 3 complete turns. You can then take the vehicle for a test drive to customize the boost pressure to the vehicle. BD recommends no more than 52psi of boost pressure on the 1994-2002 vehicles. 2003-2006 vehicles can handle 60psi of boost pressure on a well maintained engine.

Battery Disconnect

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

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Installation - Preparation

1. Record your radio settings and disconnect **both** battery terminals on **both** batteries.
2. Layout all parts, ensure all parts are present and read the instruction manual completely before installation of this product.
3. Lay a protective cover over the passenger side fender to eliminate any scratches or grease marks.
4. Remove the passenger side (right) fender liner with a 5/16" socket.
5. Remove the factory air box and intake tube with a 13mm socket and slot screwdriver. Before discarding the air box, remove the airflow sensor and re-mount it to your new powder coated intake tube in the same orientation to the airflow as before. You will need to set aside the wiring harness for the airflow sensor for a later installation.
6. Remove the intercooler charge air tube with a 7/16" deep socket. Be sure to save the hose clamps from the intercooler end for later installation.
7. On the factory turbocharger you will need to remove the upper oil supply line with 3/4" and 13/16" wrenches. You can discard this oil line if you wish.
8. Remove the exhaust cast turn down elbow and clamps with a 7/16" deep socket and discard.



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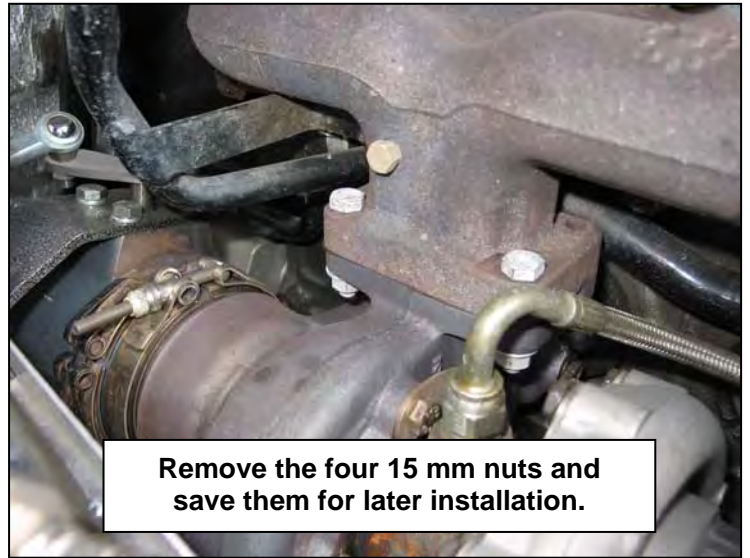
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9. On 2004½ and newer trucks, you will need to unplug the electronic wastegate control solenoid and insert the supplied wastegate fooler.

10. Remove the turbo oil drain flange bolts with a 10mm wrench and discard it if you wish.

11. You may now remove the four 15mm mounting nuts that hold the turbocharger to the exhaust manifold. Save these four nuts, as you will need them later on.

12. Remove the engine oil filter to gain access to additional installation space.



13. If you have the two-piece oil drain tube you may leave the oil drain block adapter in its place and just remove the oil drain tube. However, if you have the accordion one-piece oil drain assembly, you will need to remove the complete assembly from the block. Once removed, you can install the provided oil drain adapter.

14. You will now need to drain about 10 quarts of engine coolant into a clean container for re-use later on.

15. Remove the exhaust manifold. To do this you must first remove the nut retainers, then the 15mm and 13mm bolts. Remove two of the four turbo-mounting studs and install them into new HD exhaust manifold.



16. Remove the steel heater core supply tube and save for re-installation later on. This tube runs directly underneath the exhaust manifold.

17. Install the new heavy-duty manifold in an inverted manner, so that the turbo mounting face is pointed up rather than down. Torque the socket cap screws to

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45 ft-lbs. ***These cap screws should be re-tightened after a number of heat cycles.*** You will also need to re-install two of the factory studs into this manifold.

NOTE: FOR ASSEMBLY OF THE HEAVY DUTY MANIFOLD PLEASE SEE INSTRUCTIONS INCLUDED IN THE MANIFOLD KIT.

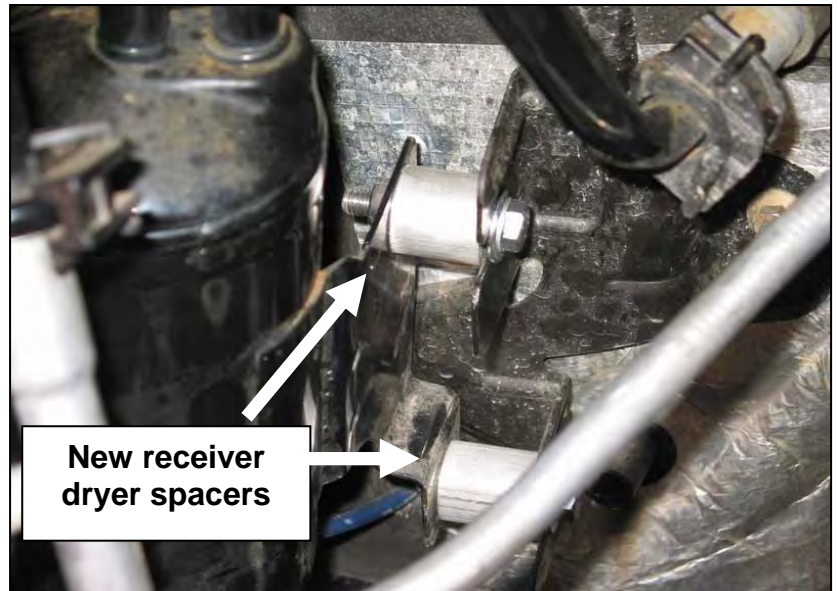
18. You will need to locate the frost plug behind the oil filter and remove it. This can be done by drilling a hole into it and prying it out; be careful not to contaminate the oil. You can coat the drill bit with grease to contain a lot of the metal shavings.

19. Install the provided long, curved oil drain adapter into the front oil return port in the engine block behind the oil filter. The installation is a press fit and will require tapping it in with a punch on all sides until the flange is firmly seated up against the block.



20. You will need to remove the two receiver dryer mounting bolts holding the A/C system in place and discard. Be sure not to discharge the A/C system.

21. You will need to bend the receiver dryer and supply tubes towards the passenger side of the vehicle. Once the dryer has been repositioned, the receiver dryer spacers should fit between the dryer and bracket, the longer spacer should fit on the bottom, while the shorter one will fit on the top. We have supplied bolts and fender washers to complete this installation.



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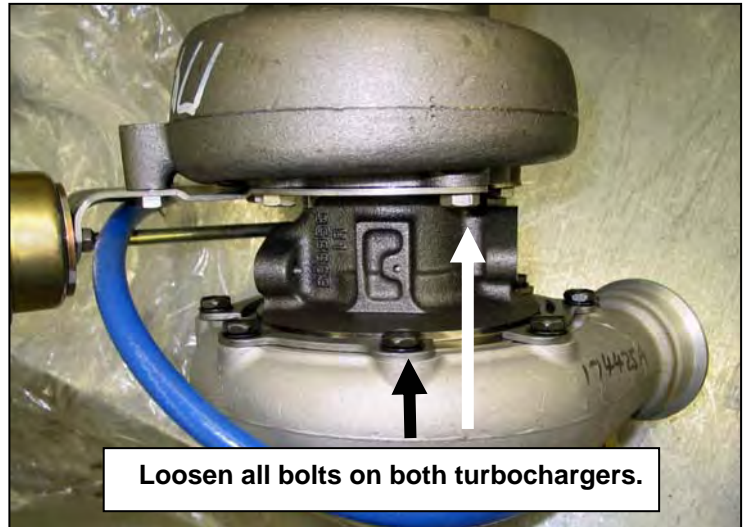
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Installation - Turbochargers

22. Loosen the turbine and compressor housings on both the primary (larger non wastegated) turbo and the secondary (small wastegated) turbo.
23. Align the oil inlet, exhaust turbine inlet, and compressor housing outlet all in an upward direction on the primary turbo.



CAUTION: DO NOT TO LOOSEN THE COMPRESSOR AND EXHAUST HOUSINGS TO THE POINT THAT THEY WILL CONTACT THE COMPRESSOR OR EXHAUST WHEELS. THIS WILL DAMAGE THE WHEEL AND VOID THE WARRANTY.

24. Locate the cast flanged turbine adapter, and wrap the supplied heat shielding around the adapter. The heat shield has been formed in a specific pattern to completely wrap around the elbow. Use the 3 supplied stainless steel zip ties to secure the heat shield. One at the bottom, one at the middle and one at the top. Be sure that neither the heat shield or zip tie will interfere with the circular marmon flange when the band clamp is applied.



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25. You can now bolt the flanged turbine adapter to the primary turbo. Use the four M10x1.25x30 FINE threaded bolts and washers to secure the two. At the same time mount the SS primary turbo support bracket to the assembly.

Note that the support bracket bolts on the bottom side of the turbine housing.



26. Place the turbo and turbine adapter assembly onto the frame rail. Be sure that it does not fall.

27. With the secondary turbo, bolt it loosely to the manifold and align the oil inlet straight up and the compressor outlet towards the bottom of the passenger battery.



TO ALLEVIATE ANY FITMENT PROBLEMS, ALL TURBOCHARGER SUPPORT BOLTS, HOUSING BOLTS AND CLAMPS MUST BE LEFT LOOSE. ONCE EVERYTHING HAS BEEN FIT TOGETHER, THEN TIGHTEN ALL BOLTS AND NUTS.

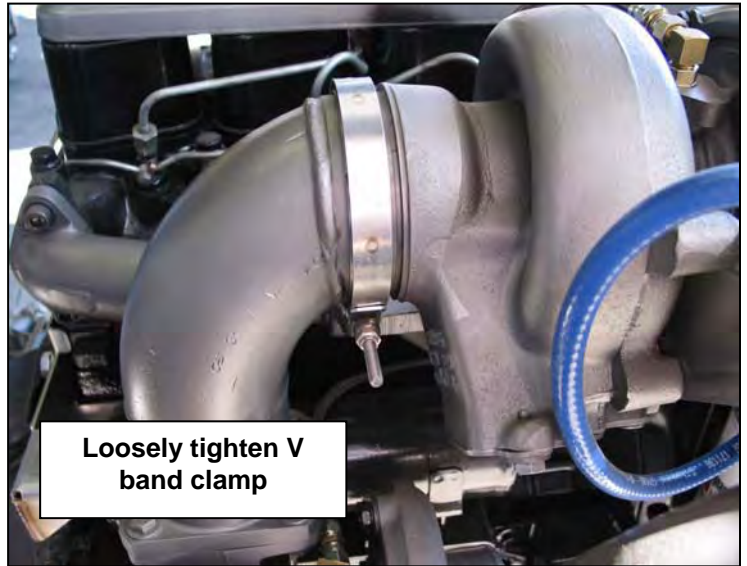
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28. Using the supplied v-band clamp (clamp will be labeled 995L2-0406) tighten the secondary exhaust housing to the primary turbo-turbine adapter assembly.

Make sure that heat shield or stainless zip tie does not interfere with the band clamp. Tighten the v-band clamp just enough so that you can still rotate the exhaust elbow.



29. Install the oil drain adapters and gaskets onto both turbochargers. The shorter adapter belongs to the primary turbocharger, while the longer tube belongs to the secondary turbocharger. Align the tubes before final tightening of any bolts, and you may need to pry them lightly for proper alignment. You will need to utilize the two 4" pieces of oil drain tubing and hose clamps to connect the drain adapters to the block adapters. Make sure that the hoses are securely clamped and that no kinks exist.



YOU MAY NEED TO TRIM THE TURBOCHARGER OIL DRAIN LINES IN LENGTH AS EVERY INSTALLATION IS SLIGHTLY DIFFERENT.

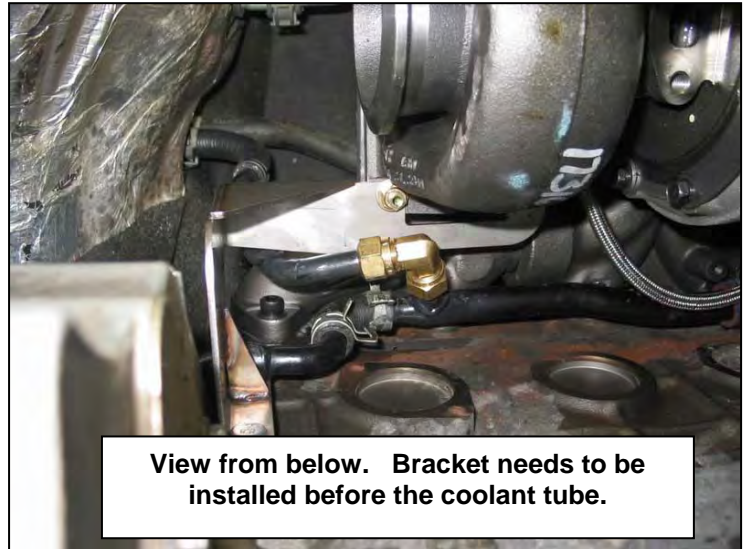
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30. Cut the heater coolant tube as shown (1.5" from the big tube). You will need to clean off the paint and install the 90° brass fitting. On standard transmission equipped vehicles, you will not need to install this fitting. Just bend the coolant line enough to be able to install the turbo support bracket.



2006 VEHICLES WILL REQUIRE YOU TO CUT THE COOLANT LINE IN A DIFFERENT LOCATION. DUE TO THE COMPLEXITY OF THE BRACKET AND COOLANT LINE IT IS BEST TO USE YOUR OWN JUDGMENT.

31. You can now re-install your modified heater coolant supply tube. When installing, make sure that everything is secure and no leaks are present, and you will need to remove the coolant heater hose from heater core and cut 2.5" off of the longer end.



32. Now is a good time to pre-oil your turbochargers with clean 15W40 turbo diesel rated oil. Pour roughly half a cup down each turbocharger oil inlet, while turning the compressor to distribute the oil evenly.

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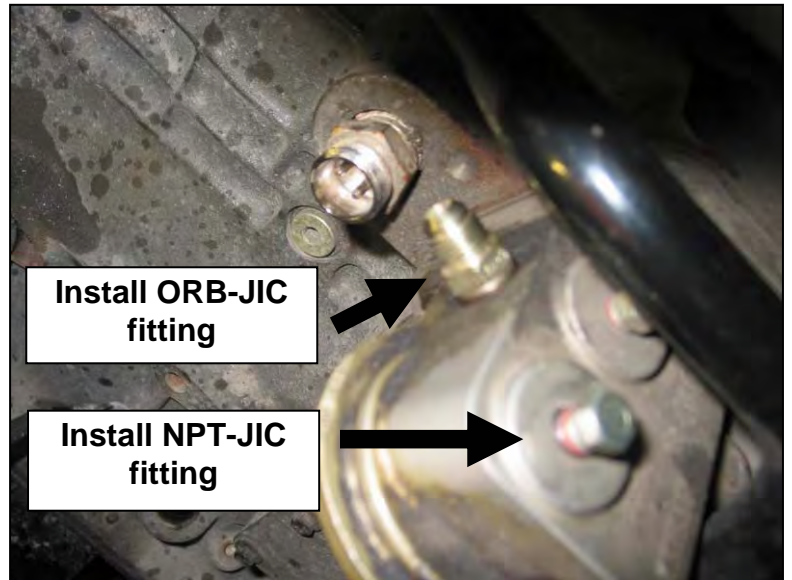
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33. Install the NPT-JIC conversion fitting into the NPT port of the oil filter housing. Then you can install the ORB-JIC conversion fitting into the threaded port on the side of the filter housing.

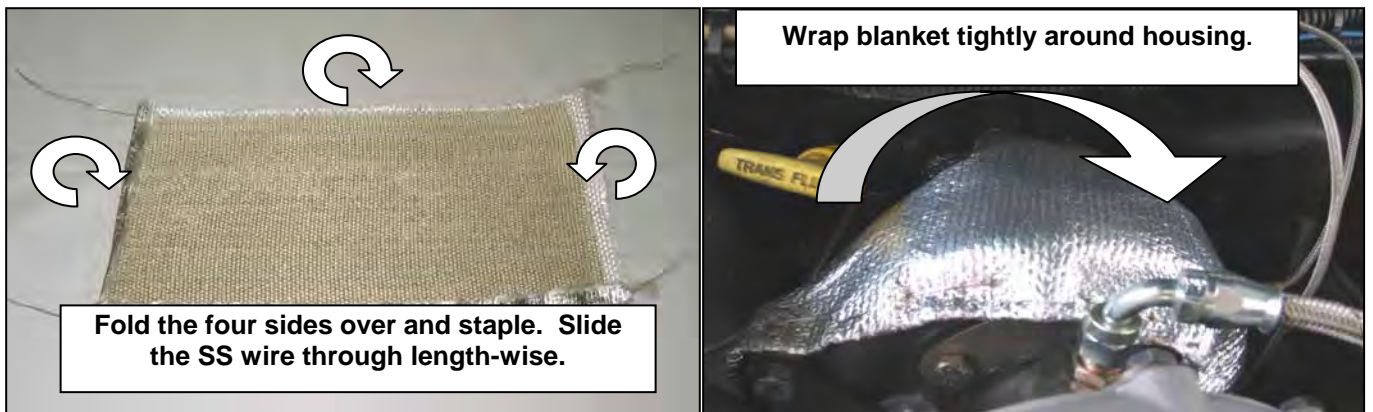
34. Install the other ORB-JIC conversion fitting into the top of the secondary turbo. As this is an O-ring seal, make sure not to over tighten, as it will damage the O-ring.



35. Install both new oil feed lines to both the primary and secondary oil feed supplies. Make sure that the oil lines are routed away from any moving parts, obstructions or hot surfaces.

36. Re-install your engine oil filter.

37. Wrap the secondary turbocharger in the exhaust wrap we have provided. Lay the brown wrap inside the silver wrap and use the supplied stainless wire to stitch the two together. Wrap the blanket around the secondary exhaust housing, using the stainless wire to hold it tight.



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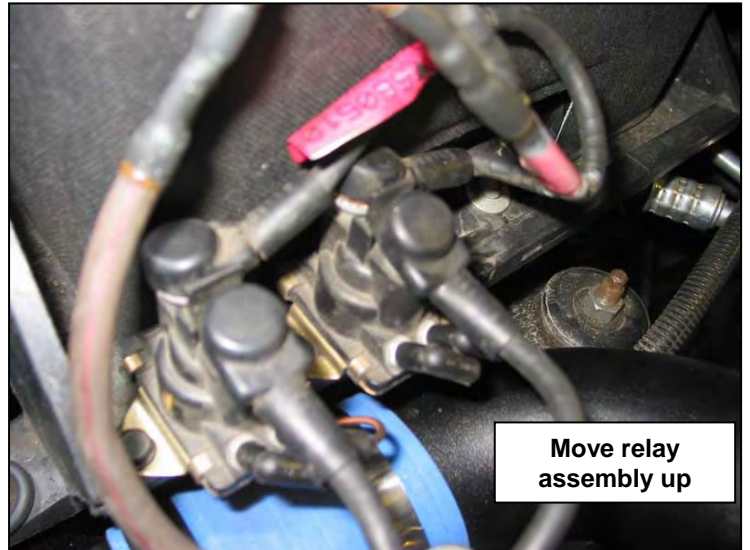
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38. Remove the pre-heat relay assembly from the battery tray, discard the bracket and re-mount the relays directly to the battery tray. You will need to drill three 3/16" mounting holes. You will reuse the original mounting screws.

39. Install the primary intake tube with the 4" x 4" silicone hose and the two light duty hose clamps. Be sure that this pipe is securely mounted to the primary turbocharger. Connect the wiring harness to the airflow sensor you mounted in the pipe earlier.



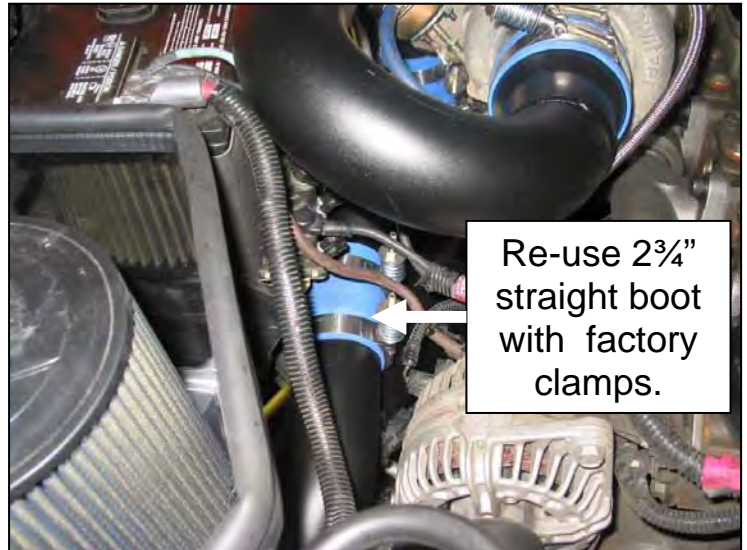
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40. Install the cast secondary compressor outlet elbow with the v-band clamp and o-ring provided. You can then connect the new charge air intercooler pipe with the factory 2 3/4" brown ribbed straight boot. Utilize the stock 2 3/4" clamps to secure this connection. The other end of the charge air intercooler pipe should be connected to the intercooler utilizing the stock boot and stock clamps you saved earlier on.



41. Install the short 90° intermediate pipe to primary compressor outlet" pipe using the two HD band clamps and a 3" x 4" piece of silicone hose. Connect the 'U' shaped intermediate pipe to the newly installed 90° compressor outlet pipe using two heavy-duty hose clamps and another 3" x 4" piece of silicone hose. Connect the last end of the intermediate 'U' pipe to the 4" inlet of the secondary turbocharger using the two larger heavy-duty band clamps and the 4" x 4" piece of silicone hose.



42. You can now finalize the installation of the primary down pipe to the vehicles exhaust. Loosely clamp the down-pipe to the turbo using the supplied V-band clamp and tighten once everything is aligned.



DO NOT ADJUST THE DOWN-PIPE ONCE THE V-BAND CLAMP HAS BEEN TIGHTENED. FAILURE TO ADHERE TO THIS WILL DESTROY THE V-BAND CLAMP AND ITS ABILITY TO SEAL.

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43. Tighten both primary and secondary turbocharger compressor and exhaust housings, elbow bolts, support brackets and anything else that was kept loose for fitting reasons.

44. Install the stainless steel air box with air filter over top of the primary turbo intake pipe.

Note: The air filter will be mounted in a vertical orientation rather than horizontally.



The air box has two mounting points: one by the battery, and the other by the radiator support. You will have to un-screw the factory bolts to mount the brackets at these locations. Be sure to tighten the air filter to primary intake tube. Point the hose clamp end towards to the front of the vehicle for easier access.

45. Re-fill your coolant system with the coolant you saved earlier. If you need to add coolant, be sure that it correlates with the correct specification for the vehicle.

BE SURE TO PURGE THE AIR FROM THE COOLANT SYSTEM BEFORE RUNNING THE VEHICLE.

46. Re-connect the vehicles batteries and reset radio stations.

47. Idle the engine for a period of time and check for any leaks before road testing.

48. Road test the vehicle and be sure to check for any boost, exhaust, oil or coolant leaks. As well, you will need to monitor for peak EGT's and boost levels. Keep in mind the system is designed to operate at a peak boost level of 52psi.

49. You may need to adjust (turn) the wastegate to control your EGT's and boost levels. For more boost, you will need to tighten (turn it clockwise) the waste gate rod, and for less boost loosen the rod (turn it counter clockwise).

50. Again, you should re-check **all** bolts after a number of heat cycles in a week or so, this will help prevent any leaks.

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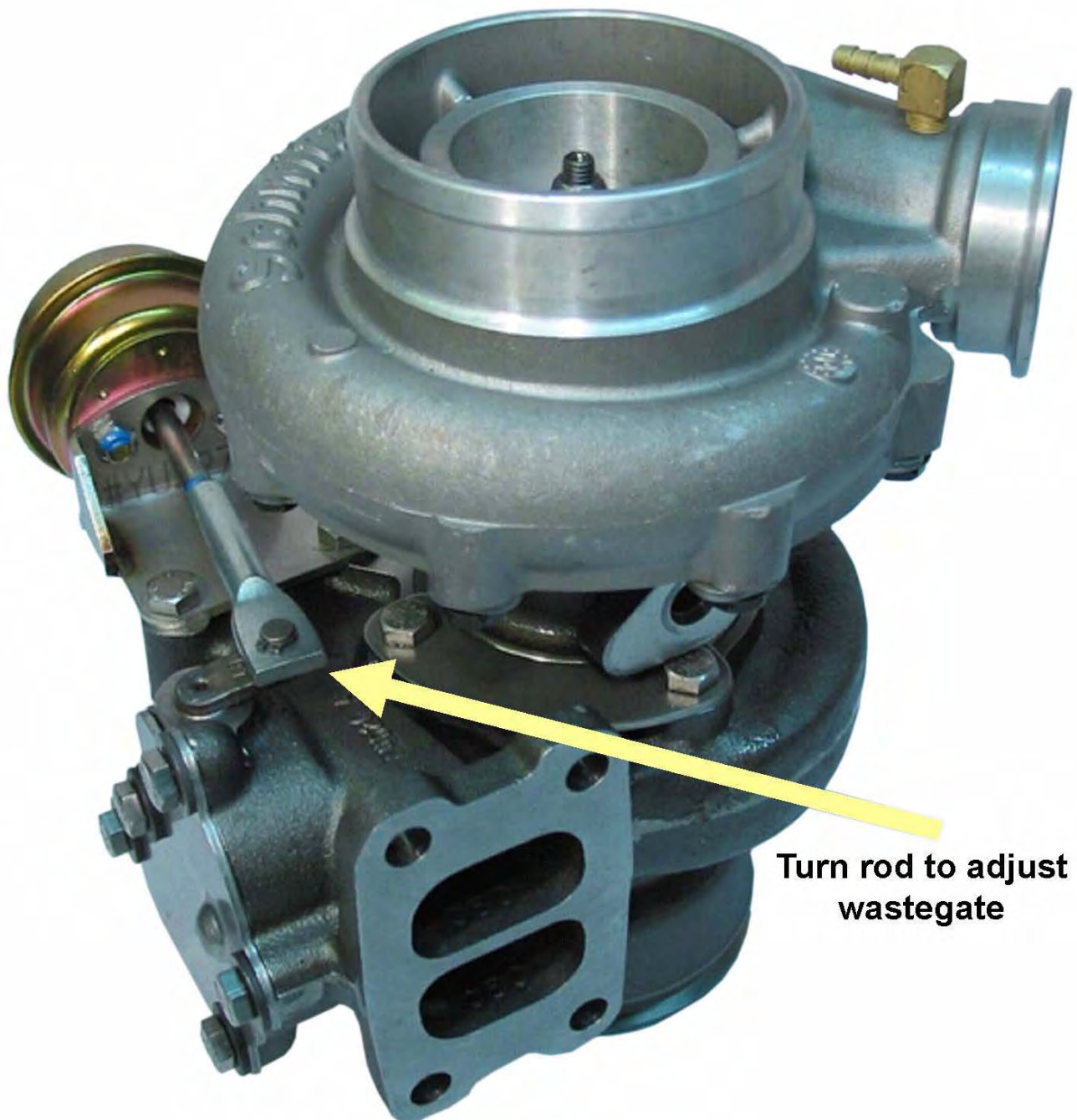
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Wastegate Adjustments

The wastegate is adjustable by turning the actuator rod. For more boost pressure you will need to tighten (clockwise) the waste gate rod for less boost pressure you can loosen the rod (counter clockwise). The turning effect preloads the wastegate actuator spring. This adjustment is very finicky, be very careful, as you should not have to adjust the rod all that much.

BD WILL NOT BE RESPONSIBLE FOR ANY FAILURES OF THE VEHICLE'S HEAD GASKET.



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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 one (1) year from the date of sale. Until BD has approved the claim, the consumer may be responsible for these costs.

A Return Material Authorization (RMA) 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.

Damaged or blown head gaskets will not be covered under warranty. It is the responsibility of the user to regulate cylinder pressures to protect the head gasket.

BD ENGINE BRAKE, INC.

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