FORD:
2003-2005 Excursion

2003-2007 F-Super Duty
2004-2008 E-350, E-450

This article supersedes TSB 08-4-7 to update the Service Procedure.

ISSUE

These concerns may or may not be accompanied by any one, or a combination, of the following diagnostic trouble codes (DTCs): P0238, P0299, P0404, P0478, P2262 and/or P2263. These concerns and/or DTCs could be a result of coking deposits inside the turbocharger.

ACTION
Follow the Service Procedure steps to correct the condition.

SERVICE PROCEDURE
Coking deposits inside the turbocharger turbine housing can impede vane response causing high or low instances of exhaust pressure. Unexpected exhaust pressure results can cause over-boost, under-boost, insufficient or excessive exhaust gas recirculation, or unexpected EGR valve position, resulting in these symptoms.

This TSB is for diagnosis and cleaning of the variable geometry turbocharger (VGT) vane set and the center housing and rotating assembly (CHRA), and for replacement of a corroded CHRA.

For F-Super Duty, Excursions, and E-Series vehicles built on or before 9/29/2003, follow pin point test KA in the Powertrain Controls/Emissions Diagnosis (PC/ED) manual diagnostics. If the pin-point test in the PC/ED manual diagnostics leads to turbocharger replacement, use this Turbocharger Inspection Procedure first to check for internal turbocharger oil leaks, and to determine if the turbocharger can be repaired with a CHRA replacement, or if it can be cleaned, instead of replacing the entire turbocharger. (Figure 1)
For F-Super Duty, Excursions, and E-Series vehicles built on or after 9/30/2003, install the VPS tool 418-626 along with IDS/VMM. The 418-626 was shipped in kit TKIT-2007VP-F and TKIT-2007TV-F. Dealers should have received one or the other of these two kits.

**To Install VPS**

1. Remove the threaded pipe plug from center housing of turbo.
2. Remove the oil supply flange bolt closest to the turbo label.
3. Drop in the VPS and secure with provided clamp flat side up.
4. Torque the oil supply line bolt 7 lb-ft (10 N•m).
5. The gasket is reusable and need only be replaced if an oil leak is present after final assembly.

To run test, start new session in IDS with VPS/VMM connected to the vehicle. Then select the Toolbox-Powertrain-Air Management-Boost test and follow the IDS screen prompts, and then continue with VVT test. Both the boost and VVT test should be run in order.

Once each of the tests are complete, use the IDS help icon on the right side of the screen in each test to help analyze the results. If the turbo fails and leads to turbocharger replacement, continue with the Turbocharging Inspection Procedure to check for internal turbocharger oil leakage and to determine if the turbocharger can be repaired with a CHRA replacement, or if it can be cleaned, instead of replacing the entire turbocharger.

If the turbocharger passes the turbo tests, do not continue with this TSB. Follow the online KA pin point test found on the Professional Technician Society (PTS) website and continue air management diagnosis without replacing the turbocharger.

**NOTE**

VEHICLE PERFORMANCE ISSUES RELATED TO FUEL QUALITY, MAINTENANCE AND AFTERMARKET MODIFICATIONS ARE NOT COVERED BY FORD MOTOR COMPANY WARRANTY.

**Turbocharger Inspection Procedure**

1. Remove the turbocharger for inspection following Workshop Manual, Section 303-04D: Fuel Charging and Controls.
2. Inspect compressor and turbine wheel fins for damage. Replace the turbocharger if fins are damaged. If fins are damaged, inspect the air intake system for damage allowing dirt or contamination to bypass the air filter.
3. Perform a turbocharger bearing clearance check following Workshop Manual, Section 303-04D. Replace turbocharger if bearing fails the check.

4. Cover the inlet and outlet of the turbocharger compressor housing with duct tape or covers. Clean the oil supply line mounting surface and cover with duct tape or covers. Place a clean paper towel or cover into the turbocharger oil drain passage.

5. Using a paint pen, mark the location and direction of the v-clamp (Figure 2).

6. Using a paint pen, mark the location of the turbine housing at unison ring crank to make reassembly easier (Figure 3).

7. Remove the v-clamp retaining nut completely from clamp assembly. Move v-clamp from flanges so the turbocharger housings can be separated (Figure 4).

8. Separate the housings using a hammer and brass drift.

9. Separate vanes and unison ring from turbine housing and center housing and check for coking from oil. If turbocharger is coked with carbon deposits from oil, the deposits will be wet and black and cover the complete inside of the turbo (Figure 5).

**NOTE**
DO NOT REMOVE COMPRESSOR HOUSING AT THIS TIME, OR TURBINE WHEEL/COMPRESSOR WHEEL ASSEMBLY.

- a. Inspect the unison ring for cracks. Replace the turbocharger if the unison ring is cracked.
- b. If the turbocharger is oil coked, go to the Turbo Cleaning Procedure, below.
c. If the turbocharger is not oil coked, and/or if corrosion is present on the bearing housing flange, use the CHRA Replacement Procedure, below, and the Turbine Housing and Vane Set Cleaning procedure.

NOTE
DO NOT ATTEMPT TO CLEAN RUST OR CORROSION, OR PITTING FROM THE CENTER HOUSING FLANGE OR HUB. (Figure 6)

Figure 6 - Article 08-16-13

NOTE
SCALY RUST, CORROSION OR PITTING MAY BE PRESENT INSIDE THE TURBINE HOUSING. THIS IS NORMAL. DO NOT TO REPLACE THE TURBINE HOUSING. VANE SET CLEANING WILL BE SUFFICIENT

NOTE
TRANSFER THE VGT SOLENOID FROM THE TURBOCHARGER OR CHRA BEING REPLACED.

CHRA Replacement Procedure

1. Temporarily set the CHRA with attached compressor housing onto the turbine housing, compressor side up, for the following steps.

2. For 2003 model year vehicles only: Examine compressor housing attachment to CHRA. If the six (6) compressor housing screws thread into separate clamp plates, then the turbocharger is of early 2003 vintage. In this case, place a mark on the compressor housing directly in line with the mark previously placed on the turbine housing. If the six (6) screws thread directly into the CHRA, it is a later version, and there is no need to align-mark the compressor housing. This change is not associated with a specific VIN number, but the correct configuration CHRA kit must be ordered. (Figure 7)

3. Remove the six (6) compressor housing screws.

4. Tap the compressor housing loose with a mallet, and remove it from the CHRA. Take care to not damage the old compressor wheel fins.

5. Carefully set aside the old CHRA core.

6. Temporarily set the new CHRA onto the turbine housing, and install a new rubber seal ring to the CHRA flange. (Figure 8)

7. Align and install the compressor housing onto the new CHRA. The compressor housing can only be assembled one way for late model turbochargers. For the early 2003 turbocharger only, the mark on the compressor housing will need to be aligned with the mark on the turbine housing. Take care to not damage the new compressor wheel fins. Tap the compressor housing flange down with a mallet as needed to fully seat it.
8. Install the six (6) compressor housing screws and torque to 200 lb-in (23 N·m).

9. Go to the Vane Cleaning sub-procedure (in Turbocharger Cleaning Procedure, below).

**Turbocharger Cleaning Procedure**

**NOTE**

A RAZOR BLADE IN A HOLDER MAY BE USED WHERE THERE IS SUFFICIENT ACCESS TO REMOVE THE BULK OF CARBON DEPOSITS.

**NOTE**

USE A DUST MASK WHEN CLEANING TURBOCHARGER SURFACES.

1. Wet the areas to be cleaned (unison ring, vanes, vane contact areas on the turbine housing, and unison ring contact area on the center housing) with Motorcraft® Carburetor Tune-Up Cleaner. (Figure 9)

**NOTE**

THE DISC MUST BE MODIFIED TO THE 1” (2.5 cm) SIZE TO COMPLETE THE CLEANING EFFECTIVELY.

**NOTE**

AVOID DAMAGING VANE PIVOT PINS DURING THE CLEANING PROCESS. PIN DAMAGE CAN CAUSE UNWANTED NOISE AND/OR IMPAIR TURBOCHARGER PERFORMANCE. (FIGURE 9)

4. Using scissors, cut the Scotch-Brite™ disc used in step 12 to match a 1” (2.5 cm) 3M™ ROLOC™ Holder (61-5000-7982-9). (Figures 10 and 11)
5. Finish cleaning the turbine housing using the modified disc. Remove the carbon deposits from all surfaces that contact moving parts, as well as the mating surfaces of the housing. (Figure 9 and 12)

6. Apply a thin layer of engine oil to the turbine housing, center housing and unison ring. This procedure is to temporarily protect against surface corrosion. Applying anti-seize is not recommended.

7. Continue on to the Turbocharger Assembly Procedure.

**Turbocharger Assembly Procedure**

1. Install the vanes into the turbine housing:
   a. Index the unison ring onto the vanes.
   b. Align the crank pin slot with the paint pen mark on the turbine housing. (Figure 3 and 8)
   c. Verify free movement of the vanes and unison ring.

2. Position v-clamp on the turbine housing in direction of paint pen mark.

3. Lower the center housing section onto the turbine housing, aligning the unison ring crank first, then the housing dowel.

4. Align the v-clamp with the paint marks. Coat the threads with Motorcraft® High Temperature Nickel Anti Seize.

5. Install the locknut using steps a through d:
   a. Torque to 13 lb-ft/160 lb-in (18 N·m).
   b. Loosen nut and torque to 4 lb-ft/50 lb-in (5 N·m).
   c. Stand turbocharger on exhaust outlet. For early 2003 turbocharger only, verify correct alignment of compressor housing to turbine housing. Now tap around the aluminum compressor housing with a rubber mallet to ensure complete seating.
   d. Torque to 12 lb-ft/150 lb-in (17 N·m).

6. Remove the duct tape or covers from the turbocharger. Remove any tape residue with a paper towel dampened with Motorcraft® Metal Brake Parts Cleaner.

**NOTE**

VGT SOLENOID REPLACEMENT IS NO LONGER NECESSARY. THE NEW OIL DRAIN TUBE WILL RESOLVE THE COKING ISSUE.

7. Anytime the turbocharger is removed and prior to installation, check the drain tube. Identify the tube by its end configuration, the new larger tube has a wide inner shoulder and a tube OD larger than the o-ring groove bottom. If an earlier design tube is present, replace it. (Figure 13)
8. Install the turbocharger with the correct oil drain tube following WSM, Section 303-04D: Fuel Charging and Controls.

### PART NUMBER | PART NAME
--- | ---
6C3Z-9T515-A | Oil Drain Tube
W302676 | V-Band Clamp
W302677 | Locknut
PM-2 | Motorcraft® Carburetor Tune-up Cleaner
PM-4A | Motorcraft® Metal Brake Parts Cleaner
XL-2 | Motorcraft® High Temperature Nickel Anti Seize

**NOTE**

THE FOLLOWING PARTS MUST BE ORDERED THROUGH THE LOCAL FORD AUTHORIZED DISTRIBUTOR (FAD).

### PART NUMBER | PART NAME
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3C3Z-9G489-AARM | Center Housing (Clamp Plate) - 2003 F-Super Duty/Excursion
3C3Z-9G489-BARM | Center Housing - (Bolted w/o Clamp Plate) 2003 F-Super Duty/Excursion

**OPERATION DESCRIPTION TIME**

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>DESCRIPTION</th>
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081613C 2003-2004 Super Duty, 6.6 Hrs. 2003-2004 Excursion 6.0L Built Before 9/29/2003: Follow Pin Point Test KA In The PC/ED Manual. If It Leads To Turbocharger Replacement, Follow Service Procedure To Determine Turbocharger Repair Perform Procedure To Replace CHRA, Includes Time To Remove Turbo For Inspection, Transfer The Necessary Parts To The New CHRA And Install (Do Not Use With 6089A, 9438A Or Any 6005 or 12650D Series Diagnostic Labor Operations) 081613E 2004-2007 Super Duty, 3.7 Hrs. 2004-2005 Excursion 6.0L Built On Or After 9/30/2003: Follow Procedure In This Article To Install The VPS Kit. If It Leads To Turbocharger Replacement, Follow Service Procedure To Determine Turbocharger Repair Perform Procedure To Clean Turbocharger Includes Time To Remove Turbo For Inspection And Reinstall After Cleaning (Do Not Use With 6089A, 9438A Or Any 6005 or 12650D Series Diagnostic Labor Operations) 081613D 2004-2007 Super Duty, 3.1 Hrs. 2004-2005 Excursion 6.0L Built On Or After 9/30/2003: Follow Procedure In This Article To Install The Vane Position Sensor Kit (VPS). If It Leads To Turbocharger Replacement, Follow Service Procedure To Determine Turbocharger Repair Perform Procedure To Replace CHRA, Includes Time To Remove Turbo For Inspection, Transfer The VGT Control Parts To The New Turbocharger And Install (Do Not Use With 6089A, 9438A Or Any 6005 or 12650D Series Diagnostic Labor Operations) 081613F 2004-2007 Super Duty, 4.0 Hrs. 2004-2005 Excursion 6.0L Built On Or After 9/30/2003: Follow Procedure In This Article To Install The Vane Position Sensor Kit (VPS). If It Leads To Turbocharger Replacement, Follow Service Procedure To Determine Turbocharger Repair Perform Procedure To Replace CHRA, Includes Time To Remove Turbo For Inspection, Transfer The Necessary Parts To The New CHRA And Install (Do Not Use With 6089A, 9438A Or Any 6005 or 12650D Series Diagnostic Labor Operations)
Follow Procedure In This  Follow Procedure In This
Article To Install The VPS  Article To Install The VPS
Kit. If It Leads To  Kit. If It Leads To
Turbocharger  Turbocharger
Replacement, Follow  Replacement, Follow
Service Procedure To  Service Procedure To
Determine Turbocharger  Determine Turbocharger
Repair Turbo Damaged,  Repair Perform Procedure
Replace Turbocharger,  To Replace CHRA.
Includes Time To Remove  Includes Time To Remove
Turbo For Inspection,  Turbo For Inspection,
Transfer The VGT Control  Transfer The Necessary
To The New Turbocharger  Parts To The New CHRA
And Install (Do Not Use  And Install (Do Not Use
With 6089A, 9438A Or Any  With 6089A, 9438A Or Any
6005 or 12650D Series  6005 or 12650D Series
Diagnostic Labor  Diagnostic Labor
Operations)  Operations)

081613H  2004-2008 Econoline 6.0L  4.6 Hrs.
Follow Procedure In This  CONDITION
Article To Install The VPS  CODE
Kit. If It Leads To  6K682  42
Turbocharger  BASIC PART NO.
Replacement, Follow  6089A, 9438A Or Any
Service Procedure To  6005 or 12650D Series
Determine Turbocharger  Diagnostic Labor
Repair Perform Procedure  Operations)