

# 6.0L TURBOCHARGER CARBON DEPOSIT DIAGNOSTICS AND SERVICE TIPS—LACK OF POWER, WHITE OR BLACK SMOKE, SURGE, P0238, P0299, P0404, P0478, P2262, AND/OR P2263

TSB 07-16-1

**FORD:**  
2003-2005 Excursion

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

This article supersedes TSB **06-23-2** to update the vehicle model years, and for the Vane Position Sensor (VPS) tool kit.

For vehicles built on or after 9/30/2003, install the VPS kit (TKIT-2007VP-F/TKIT-2007TV-F) along with IDS/VMM.

## **ISSUE**

Some 2003-2007 F-Super Duty, 2003-2005 Excursions, and 2004-2007 E-350/450 vehicles equipped with a 6.0L diesel engine may exhibit any one, or a combination, of the following concerns: lack of power, white/black smoke or a surge.

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.

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 only diagnosing and cleaning a turbo that is coked because of excess oil.

## **ACTION**

Follow the Service Procedure steps to correct the condition.

## **SERVICE PROCEDURE**

For 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 lead to turbocharger replacement, use the Turbocharger Cleaning Procedure to check for internal turbocharger oil leaks and to determine if the turbocharger can be cleaned instead of replaced.

## **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 Cleaning Procedure to check for internal turbocharger oil leakage and to determine if the turbocharger can be cleaned instead of replaced.

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

**NOTE:** The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle. Warranty Policy and Extended Service Plan documentation determine Warranty and/or Extended Service Plan coverage unless stated otherwise in the TSB article. The information in this Technical Service Bulletin (TSB) was current at the time of printing. Ford Motor Company reserves the right to supersede this information with updates. The most recent information is available through Ford Motor Company's on-line technical resources.

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### NOTE

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

### Turbocharger Cleaning 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 1).

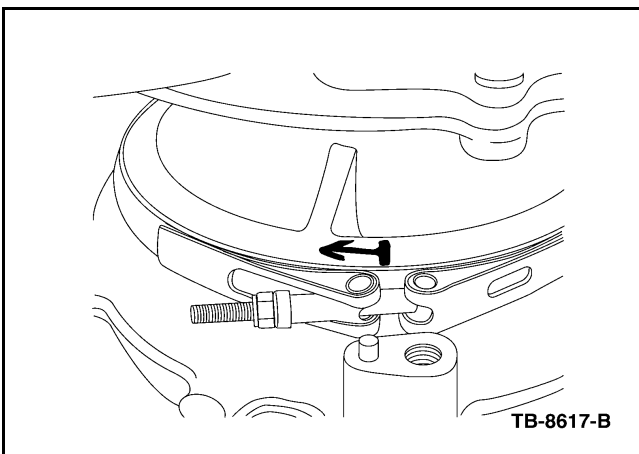


Figure 1 - Article 07-16-1

6. Using a paint pen, mark the location of the turbine housing at unison ring crank to make reassembly easier (Figure 2).

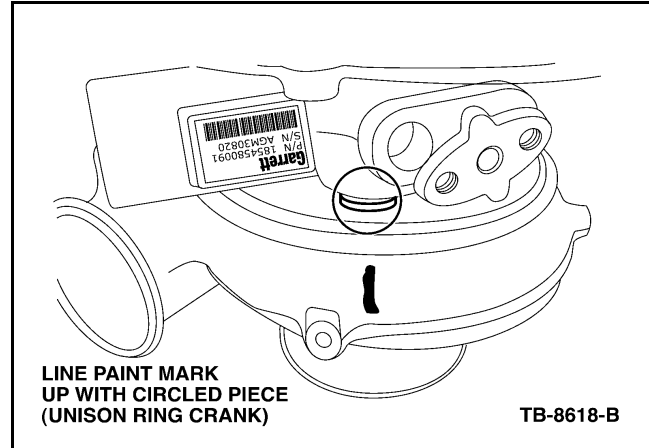


Figure 2 - Article 07-16-1

### NOTE

DO NOT REMOVE TURBINE WHEEL/COMPRESSOR WHEEL ASSEMBLY OR COMPRESSOR HOUSING.

7. Remove the v-clamp retaining nut completely from clamp assembly. Move v-clamp from flanges so the turbocharger housings can be separated (Figure 3).

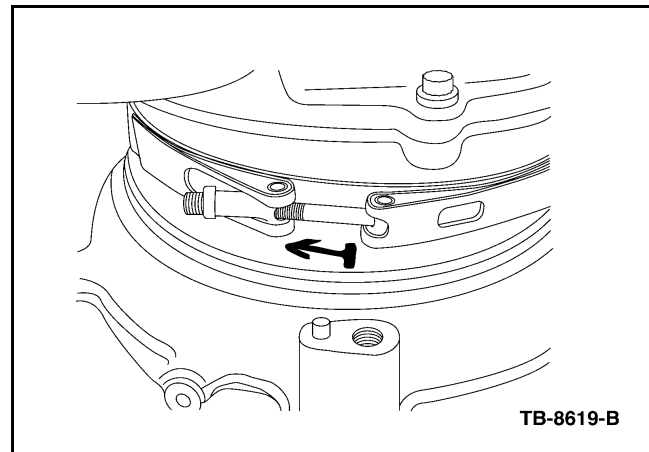


Figure 3 - Article 07-16-1

8. Separate the housings by 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 4) .

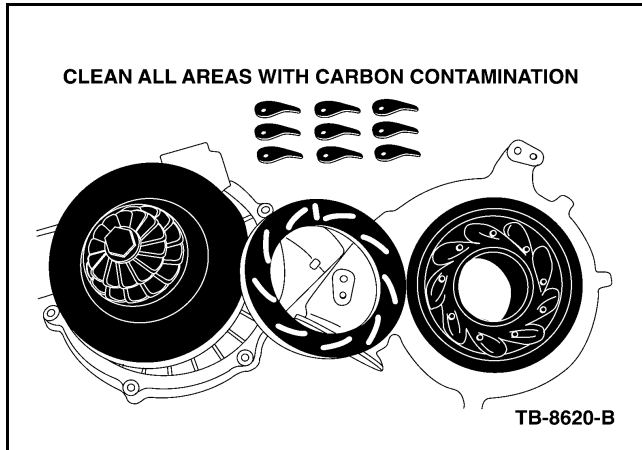


Figure 4 - Article 07-16-1

- a. If the turbocharger is oil coked, continue with this TSB.
- b. If the turbocharger is not oil coked, replace the turbocharger and do not continue with this TSB. This TSB is only for cleaning a turbo that is coked because of excess oil.

**NOTE**

DO NOT ATTEMPT TO CLEAN RUST OR CORROSION.

**NOTE**

IF THE REPLACEMENT TURBO DOES NOT COME WITH A VGT, TRANSFER THE VGT FROM THE TURBO BEING REPLACED.

10. Inspect the unison ring for cracks. Replace the turbocharger if the unison ring is cracked.
11. To clean the carbon deposits, wet the unison ring, vanes, and turbine housing and center housing unison ring and vane contact areas with Carburetor Tune-Up Cleaner (Figure 5).

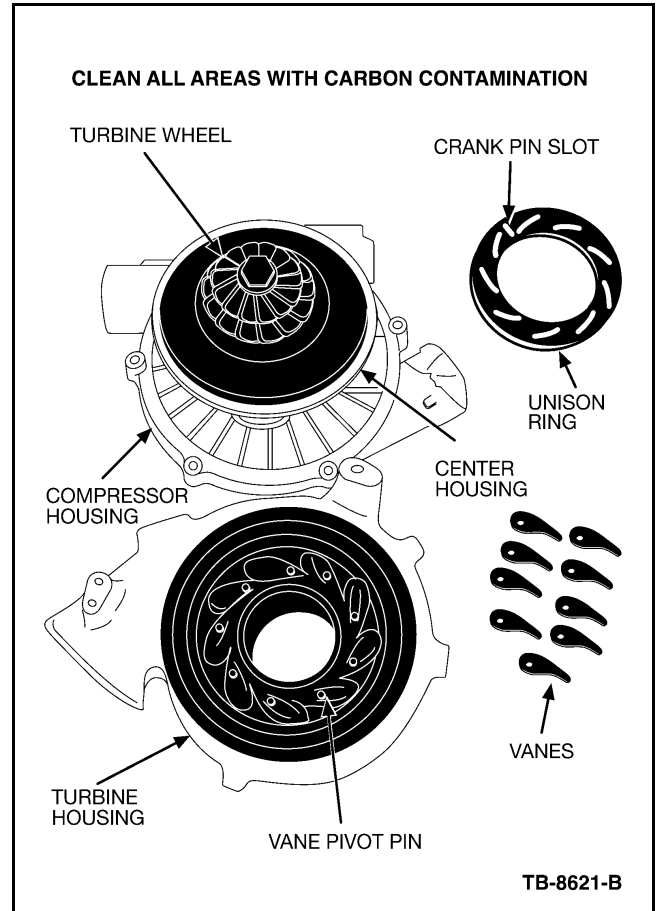


Figure 5 - Article 07-16-1

**NOTE**

DO NOT CLEAN THE TURBINE WHEEL AND USE CAUTION WHEN CLEANING AROUND IT.

**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 TURBO CHARGER SURFACES.

12. Finish cleaning the center housing, unison ring and vanes with a Scotch-Brite™ 2" (5 cm) abrasive disc 051131-07480, or equivalent (obtain locally). Ensure these areas are free of carbon (Figure 5):
  - Center housing unison ring hub
  - Center housing facing surface
  - Unison ring inner diameter
  - Unison ring outer diameter
  - Unison ring facing surfaces
  - Unison ring crank hole

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- Unison ring vane slots
- Vanes - all contact points

13. 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 6 and 7).

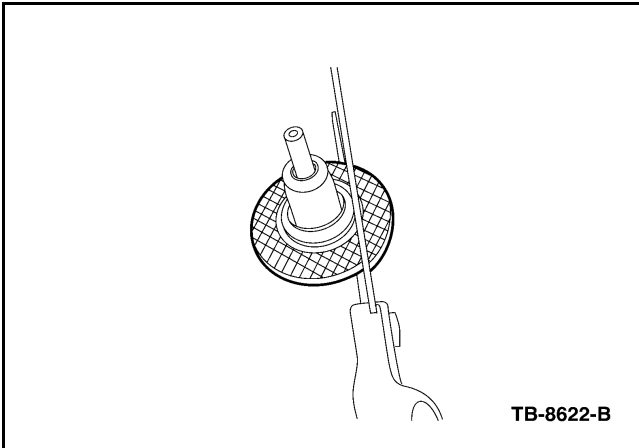


Figure 6 - Article 07-16-1

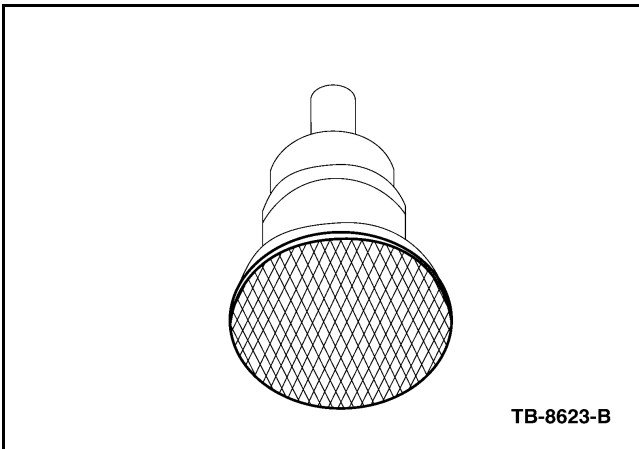


Figure 7 - Article 07-16-1

### **NOTE**

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

### **NOTE**

NOTE: AVOID DAMAGING VANE PIVOT PINS DURING THE CLEANING PROCESS. PIN DAMAGE CAN CAUSE UNWANTED NOISE AND/OR IMPAIR TURBOCHARGER PERFORMANCE (FIGURE 5).

14. 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 5 and 8)

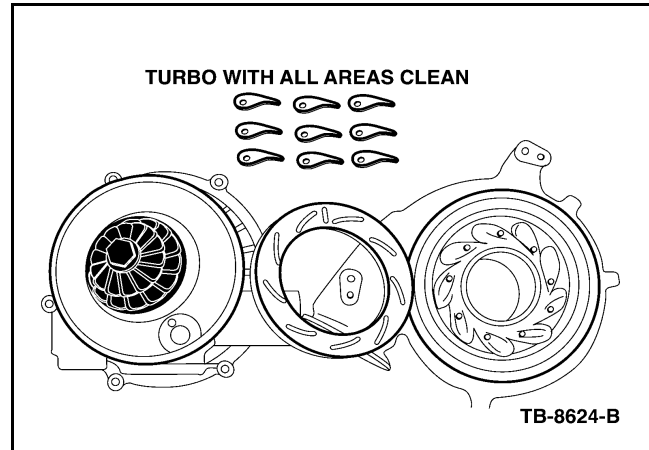


Figure 8 - Article 07-16-1

15. 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.
16. 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 2 and 5)
  - c. Verify free movement of the vanes and unison ring.
17. Position v-clamp on the turbine housing in direction of paint pen mark.
18. Lower the center housing section onto the turbine housing, aligning the unison ring crank first, then the housing dowel.
19. Align the v-clamp with the paint marks. Coat the threads with Motorcraft® High Temperature Nickel Anti Seize.
20. 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 then 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).

21. Remove the duct tape or covers from the turbocharger. Remove any tape residue with a paper towel dampened with brake cleaner.

**NOTE**

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

22. Reinstall the turbocharger with a new oil drain tube following Workshop Manual, Section 303-04D: Fuel Charging and Controls. The oil drain tube has been revised for greater turbocharger oil flow.

PART NUMBER	PART NAME
PM-2	Motorcraft® Carburetor Tune-Up Cleaner
6C3Z-9T515-A	Oil Drain Tube
XL-2	Motorcraft® High Temperature Nickel Anti Seize

**WARRANTY STATUS:** Eligible Under Provisions Of New Vehicle Limited Warranty Coverage And Emissions Warranty Coverage  
**IMPORTANT:** Warranty coverage limits/policies are not altered by a TSB. Warranty coverage limits are determined by the identified causal part.

OPERATION	DESCRIPTION	TIME
071601A	2003-2004 Super Duty, 2003-2004 Excursion 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 If Turbocharger Can be Cleaned, Turbo Fails Inspection, Replace Turbocharger, Includes Time To Remove Turbo For Inspection, Transfer The VGT Control To The New Turbocharger And Install (Do Not Use With 6089A, 9438A Or Any 6005 or 12650D Series Diagnostic Labor Operations)	5.6 Hrs.

071601B	2003-2004 Super Duty, 2003-2004 Excursion 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 If Turbocharger Can be Cleaned, Turbo Pass's Inspection 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)	6.4 Hrs.
071601C	2004-2007 Super Duty, 2004-2005 Excursion 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 If Turbocharger Can be Cleaned, Turbo Fails Inspection, Replace Turbocharger, Includes Time To Remove Turbo For Inspection, Transfer The VGT Control To The New Turbocharger And Install (Do Not Use With 6089A, 9438A Or Any 6005 or 12650D Series Diagnostic Labor Operations)	3.1 Hrs.

## TSB 07-16-1 (Continued)

071601D	2004-2007 Super Duty, 2004-2005 Excursion 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 If Turbocharger Can be Cleaned, Turbo Pass's Inspection 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)	3.7 Hrs	071601F	2004-2007 Econoline Follow Procedure In This Article To Install The VPS Kit. If It Leads To Turbocharger Replacement, Follow Service Procedure To Determine If Turbocharger Can be Cleaned, Turbo Pass's Inspection 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)	4.6 Hrs
071601E	2004-2007 Econoline Follow Procedure In This Article To Install The Vane Position Sensor Kit (VPS). If It Leads To Turbocharger Replacement, Follow Service Procedure To Determine If Turbocharger Can be Cleaned, Turbo Fails Inspection, Replace Turbocharger, Includes Time To Remove Turbo For Inspection, Transfer The VGT Control To The New Turbocharger And Install (Do Not Use With 6089A, 9438A Or Any 6005 or 12650D Series Diagnostic Labor Operations)	4.0 Hrs.	<b>DEALER CODING</b>  BASIC PART NO. 6K682	<b>CONDITION CODE</b> 42	