



PN 540605

**IDS-Based
6.0L Turbo/
Control Valve
Diagnostics**

Requires both VCM & VMM

PN 540605

TKIT-2007TV-F

418-626
Tool, VMM Vane Position Sensor Cable Kit

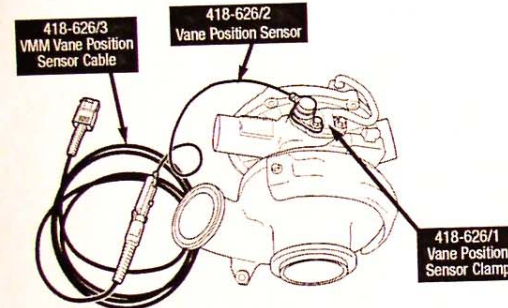
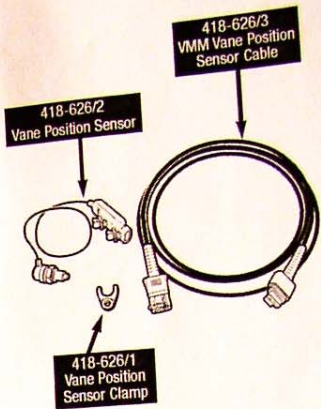
Application: Econoline and Super-Duty
 Diagnostics
 Refer to included Procedure Manual for complete procedure.

418-626
Herramienta, Kit de cable para sensor de posición de las paletas del VMM

Aplicación: Econoline y Super-Duty
 Diagnóstico
 Para conocer el procedimiento completo, consulte el Manual de taller del vehículo.

418-626
Nécessaire de câbles pour capteur de position des pales VMM

Affectation: Econoline & Super Duty
 Diagnostic
 Se reporter à la notice joint pour la méthode complète.



Note: 418-626, Tool, VMM Vane Position Sensor Cable Kit. 418-626/1, Vane Position Sensor Clamp. 418-626/2, Vane Position Sensor. 418-626/3, VMM Vane Position Sensor Cable.

Nota: 418-626, Herramienta, Kit de cable para sensor de posición de las paletas del VMM. 418-626/1, Brida del sensor de posición de las paletas. 418-626/2, Sensor de posición de las paletas. 418-626/3, Cable para sensor de posición de las paletas del VMM.

Turbo Removed in Picture for clarity
Nota: Nécessaire de câbles pour capteur de position des pales VMM 418-626. Bride pour capteur de position des pales 418-626/1; Capteur de position des pales 418-626/2; Câble pour capteur de position des pales du turbo VMM 418-626/3
Turbo déposé pour les besoins de l'illustration

Warranty- Dealers are required to call 1-800-ROTUNDA (Option #5) for product warranty. Phone agents will give the dealer a Warranty Claim Number and instruct dealers where to send the product. Phone agents will assist dealers with warranty concerns and procedures.

Garantía - Para la garantía del producto, los distribuidores deben marcar el 1-800-ROTUNDA (Opción #5). Los telefonistas asignaran al distribuidor un número de reclamación y le informaran adonde enviar el producto. Los telefonistas ayudaran los distribuidores con los problemas y los procedimientos de la garantía.

Garantie - Pour la garantie, les concessionnaires doivent appeler 1-800-ROTUNDA (option 5). Les préposés donneront aux concessionnaires un numéro de réclamation de garantie et des directives d'expédition. Les préposés assisteront les concessionnaires pour toute question relative à la garantie.

Replacement Tool Pricing Information Lista de precios de las herramientas de reemplazo Tarif des outils de rechange	
DURING PILOT PROGRAM NO ADDITIONAL UNITS WILL BE SOLD OF THE 418-626 COMPONENTS. DURANTE EL PROGRAMA PILOTO NO SE VENDERAN NINGUNAS UNIDADES ADICIONALES DE LOS COMPONENTES DE LA HERRAMIENTA 418-626 PENDANT LA DURÉE DU PROGRAMME PILOTE AUCUN ÉLÉMENT SUPPLÉMENTAIRE DU NÉCESSAIRE 418-626 NE SERA VENDU SÉPARÉMENT	
**Prices shown in U.S. Currency. All prices are F.O.B. Owatonna, Minnesota and subject to change without notice. This price list does not include taxes, freight or duty. These charges will be added appropriately upon order.	
**Todos los precios indicados en moneda de E.U.A. Todos los precios F.O.B. Owatonna, Minnesota y sujetos a cambio sin aviso. Esta lista de precios no incluye los impuestos, el transporte ni los derechos de aduana. Estos cargos se agregarán debidamente a su orden.	
**Les prix sont donnés en dollars US. Tous les prix s'entendent départ Owatonna, Minnesota et peuvent être changés sans préavis. Ces prix ne comprennent pas les taxes, les frais de transport ni les droits de douane, qui seront ajoutés au moment de la commande.	

U.S. or Canada - If you have any questions, please call 1-800-ROTUNDA (768-8632), press 5 for tools.
 É.U. ou Canada - Si vous avez des questions, composez le 1-800-ROTUNDA (768-8632) et appuyez sur la touche 5.
 Mexico - If you have any questions, please call 01-800-080-FORD (3673).
 México - Si tiene alguna duda o pregunta, por favor llámenos al 01-800-080-FORD (3673).
 All other countries - If you have any questions, please call 001-507-455-7223.
 Todos los demás países - Si tiene alguna duda o pregunta, por favor llámenos al 001-507-455-7223.

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Diagnostics

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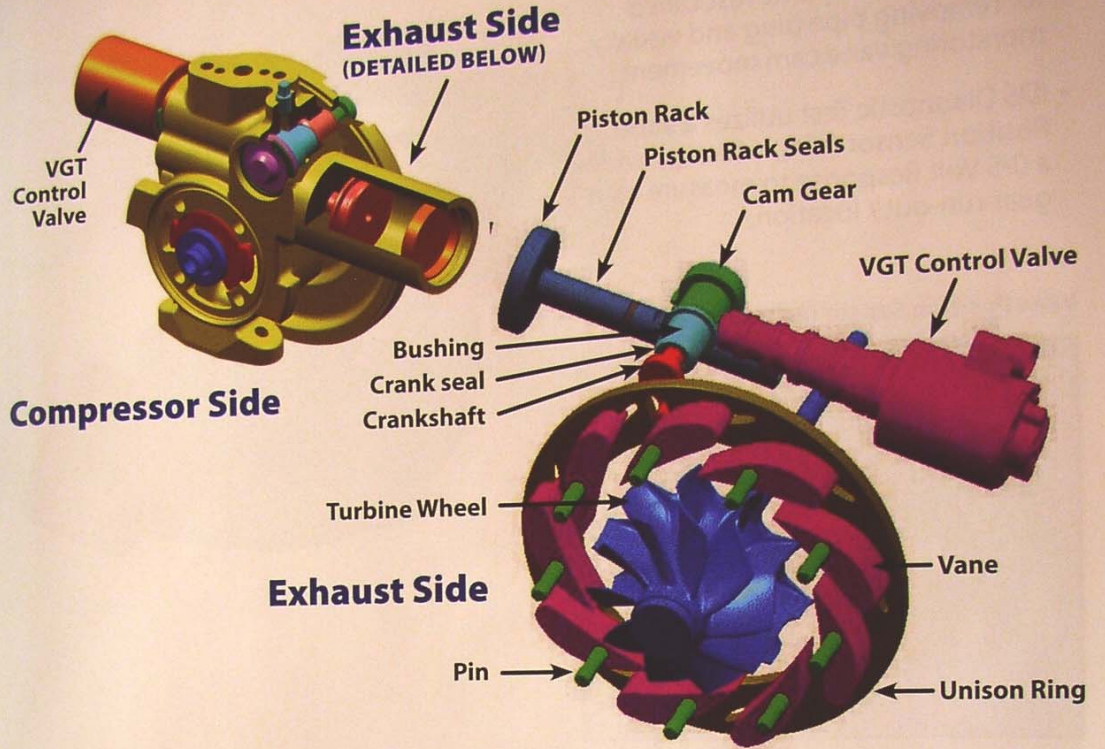
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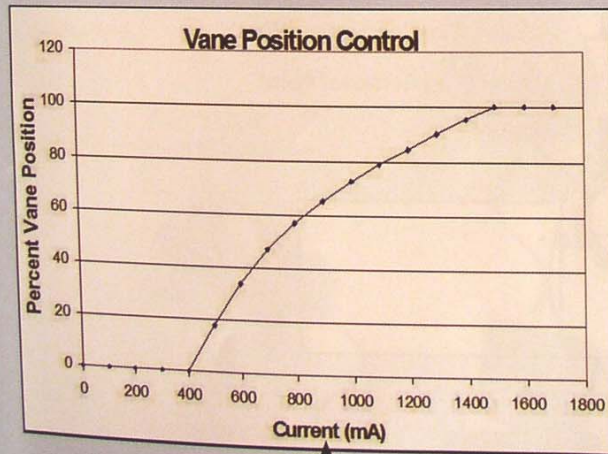
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Turbo Hardware Review

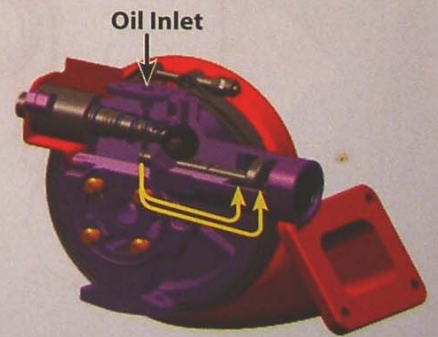


Variable Geometry Turbo Operation



Controlled by VGTDC% PID

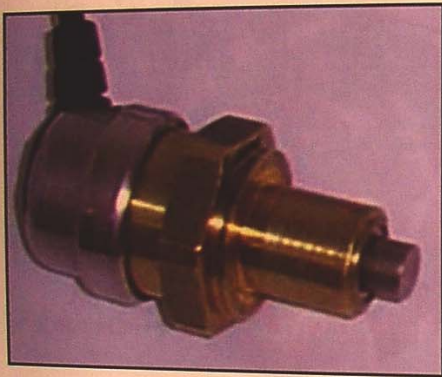
- VGT Control Valve Routes Oil to A or B Side of Piston
- Pressure Differential Slides Piston, turning Vane's Crankshaft



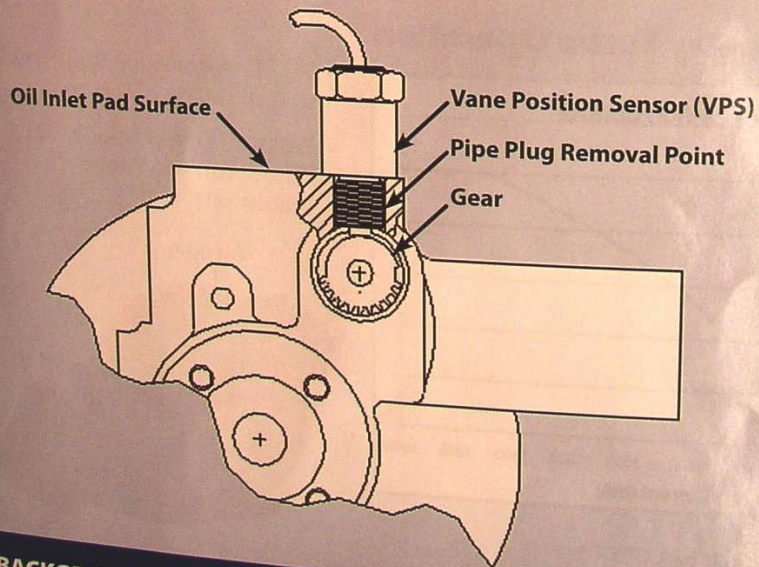
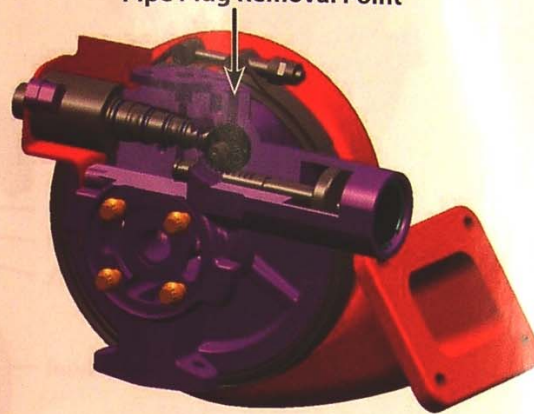
VPS Diagnostic Hardware

- Original "KA" Pinpoint Test called for removing pipe plug and visually monitoring vane cam movement.
- IDS Diagnostic Test utilizes a Vane Position Sensor (VPS) which provides a 0-5 Volt Response to measure cam gear run-out / location.

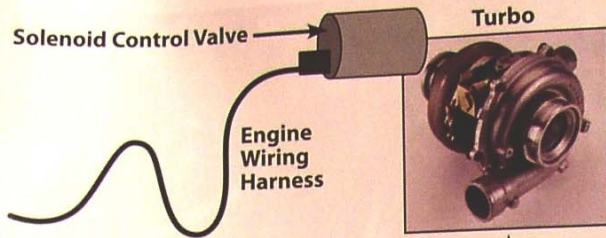
Vane Position Sensor (PN 418-626/2)



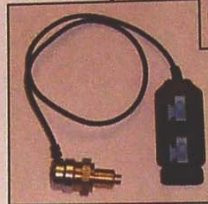
Pipe Plug Removal Point



Diagnostic Hardware Setup

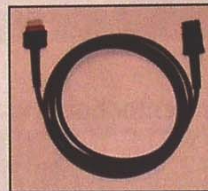


TOOL:
**VMM Vane Position
Sensor Cable Kit
(3 pieces)**
PN 418-626
PROVIDED FOR PILOT

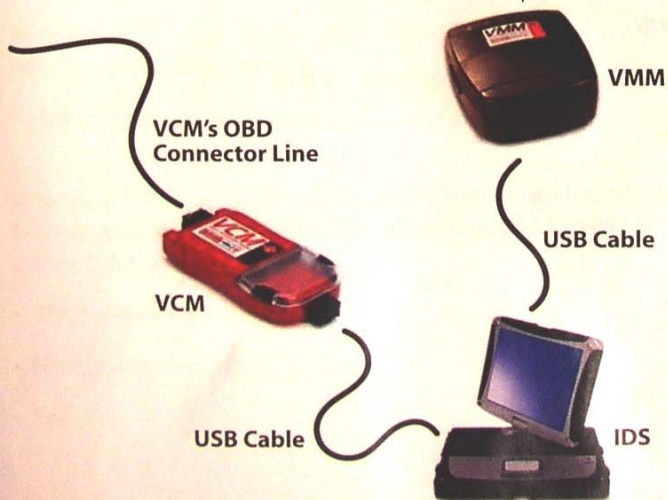


**VMM Vane Sensor
Clamp**
PN 418-626/1

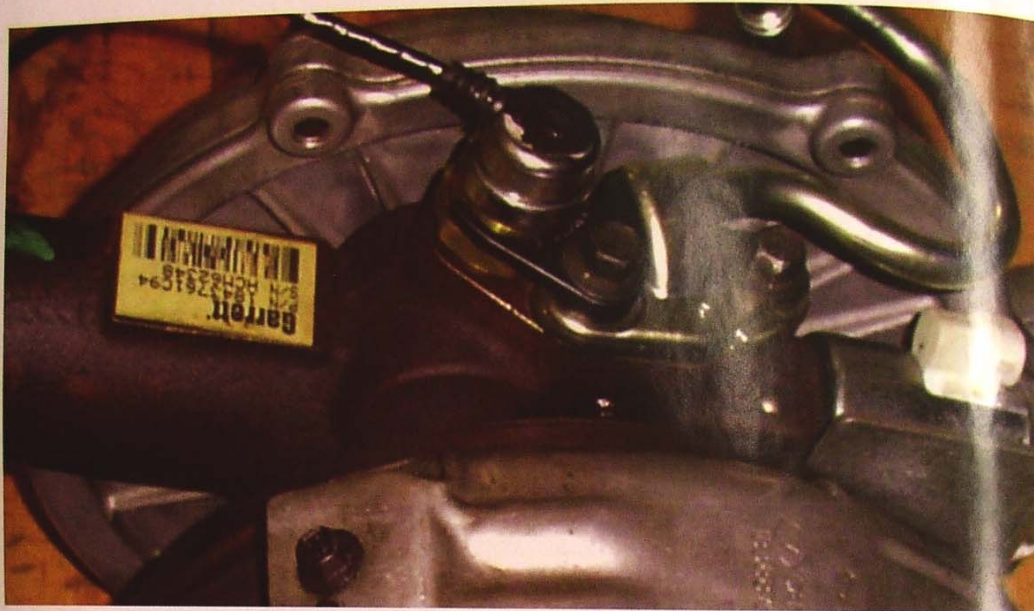
Vane Position Sensor
PN 418-626/2



**VMM Vane Position
Sensor Cable**
CONNECT TO PORT 1 OF VMM
PN 418-626/3



Vane Position Sensor Installation



1. Remove threaded pipe plug from center housing of turbo.
2. Remove the oil supply flange bolt closest to the turbo label.
3. Drop in Vane Position Sensor and secure with provided VPS Clamp – flat side up.
4. Retorque oil supply flange bolt.
5. The gasket is reusable and need only be replaced if an oil leak is present after reassembly.

NOTE: Turbo removed from vehicle only to provide clear picture. Dealership installation of sensor does not require turbo removal.

When To Run These Tests

THESE DIAGNOSTIC PROCEDURES ARE INTENDED FOR IN-BAY TESTING ONLY. DO NOT USE ON-ROAD.

In summary, anytime turbo functionality is being assessed:

- Some clues may be DTC's like P0299, P2263, P0404, etc.
- When customers complain of lack of power, black smoke, overboosting, underboosting, etc.
- After encountering Inferred EBP learn issues.
- Anytime Pinpoint Test KA is called for (Diagnostic can be incorporated as shown in the flowchart.)

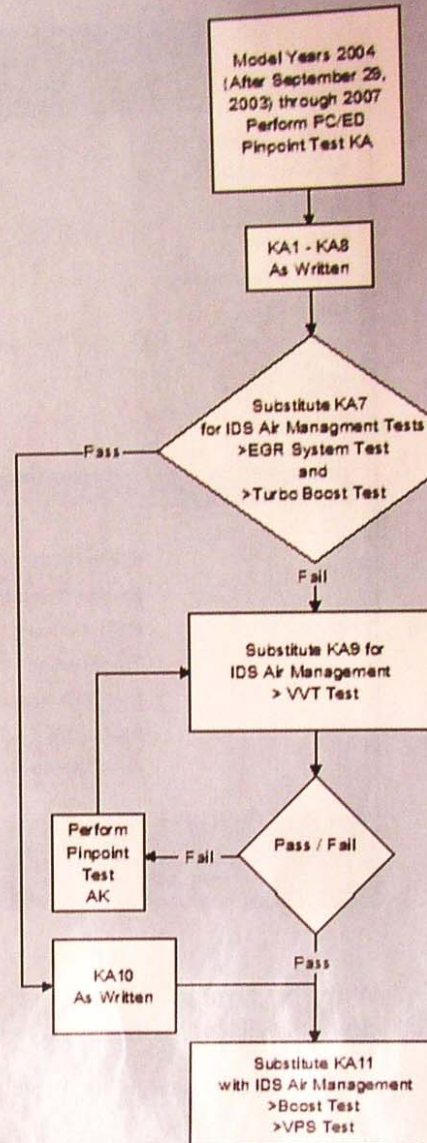
How To Run These Tests

In general, it is best to run these diagnostic tests when the engine is hot:

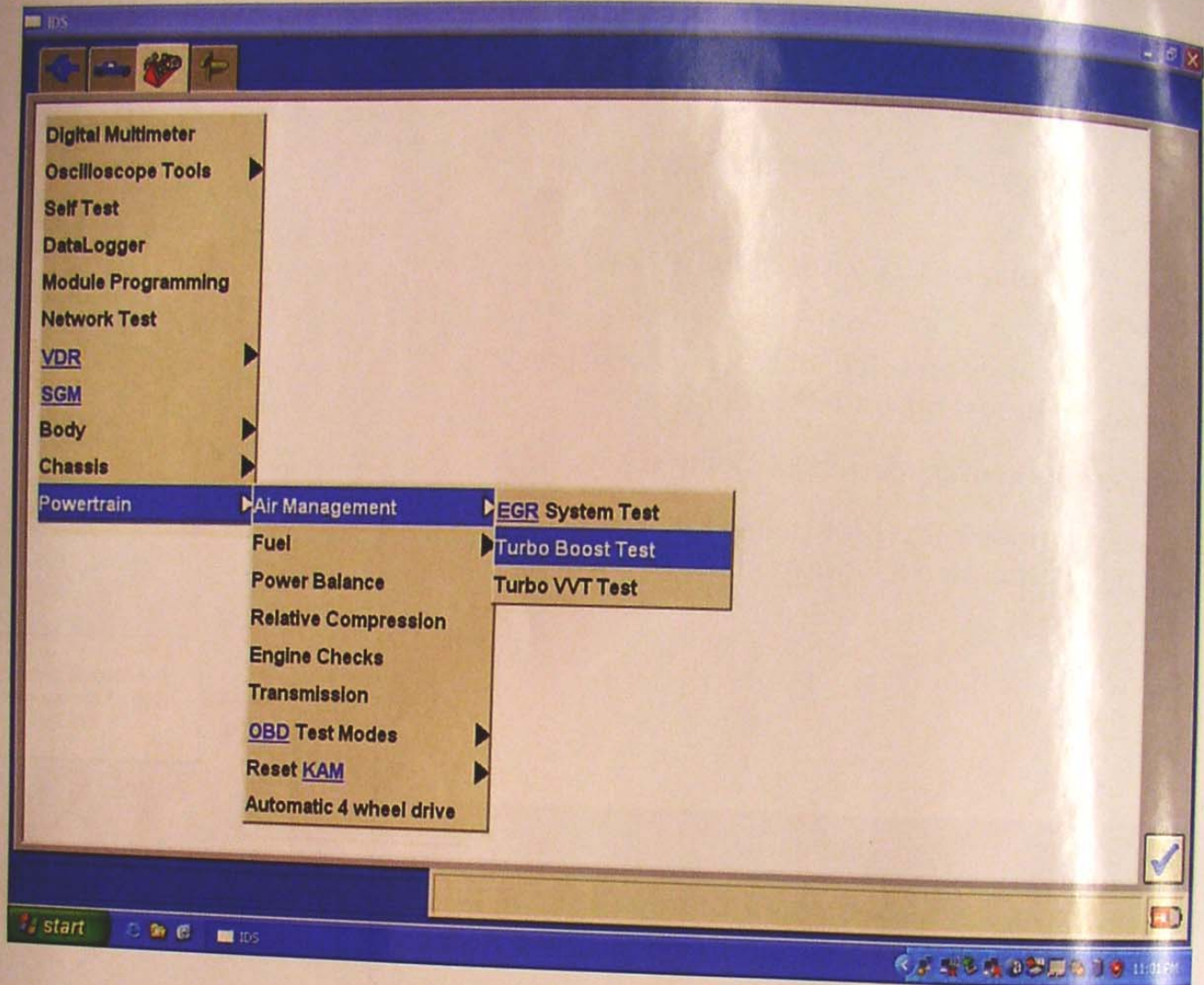
- Hot is defined as Engine Oil Temp 205+ F

However, it is specifically best when run at the temperature conditions where the customer concerns exist.

- After overnight cold soak
- Hot conditions after towing
- Etc.



Accessing IDS Diesel Turbo Tools



With the January 2007 release of IDS v47, participating pilot dealers will have access to new turbocharger diagnostics.

These tests can be found within the Powertrain, Air Management selectable menu.

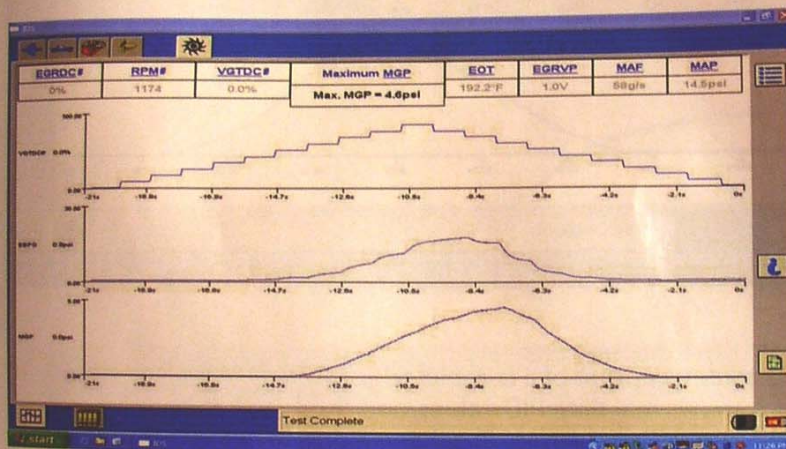
Turbo Boost Test

Goal

To assess gross turbo functionality by verifying an expected change in boost after ordering vane movement.

Procedure

1. EGR valve is closed by commanding EGRDC PID to Zero (prevents system interaction). Verifies that EGRVP < 1.2 volts to ensure EGR Valve Closure.
2. RPM is commanded to 1150-1200 PRM.
3. VGTDC PID is commanded from 0% to 85% back to 0% at 8.5% increments per second for a period of 21 seconds.
4. VGTDC, EBP and MGP PIDs are displayed in an X/Y Plot format to allow monitoring increases in pressure in relation to VGTDC being commanded open and then closed.
5. Maximum MGP is recorded in the center of the data row.



Turbo Boost Test – Interpretation Tips

- Vehicles with the Inferred EBP Update will not have the EBP PID available.
- MY2005 Job 2 Vehicles did not have a MAFS sensor and will therefore not have the MAF PID available.
- Be aware that peak MAP/MGP levels will increase as engine warms up.
- A cold engine (EOT ~125 F) should make > 1.25 psi peak MGP [near sea level].
- A hot engine (EOT ~200F) should make > 2.25 psi peak MGP [near sea level].
- The MGP plot must start and end at 0.0 psi. Failure to reach absolute 0 MGP indicates a problem is present. (Raw data can be accessed by clicking on the "scroll icon" at the right side of the IDS screen.)
- Follow normal troubleshooting procedures (MAP sensor check, intake & exhaust seal integrity, etc.) if engine demonstrates overboosting / underboosting condition.

Boost Test Example – Turbo Passed

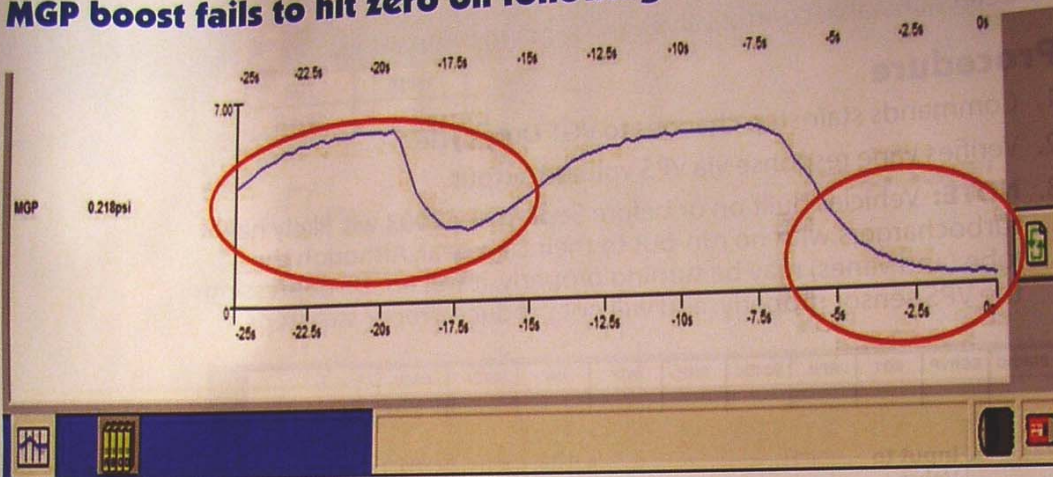


Shown above is an IDS screen capture of a completed Turbo Boost Test. The top row shows real time PID values, and displays the Maximum Manifold Gauge Pressure (MGP) achieved during the test. Also displayed are plots of VGTDC being commanded, along with EBP and MGP (as calculated from the EBP, MAP, and BARO sensors).

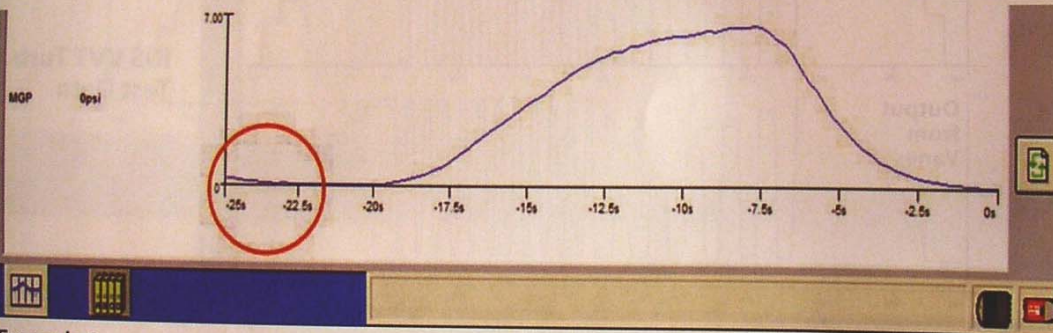
This particular test was done on a brand new, perfectly functioning turbocharger. Slight differences are normal and expected.

Boost Test Examples - Turbo Failed

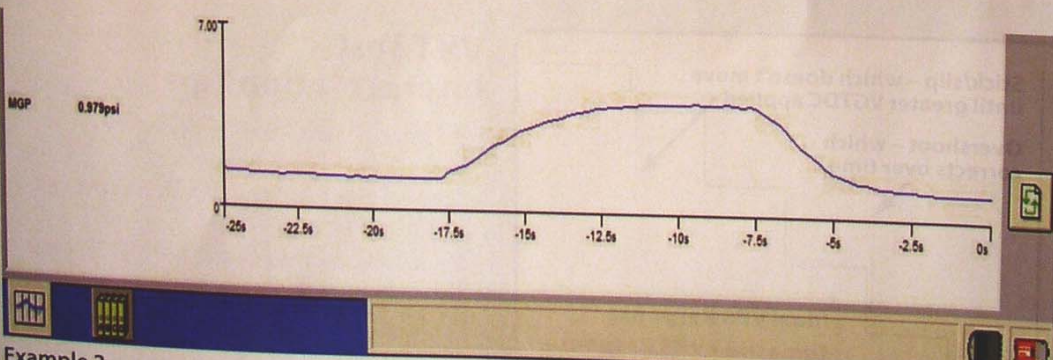
MGP boost fails to hit zero on following examples...



Example 1



Example 2



Example 3

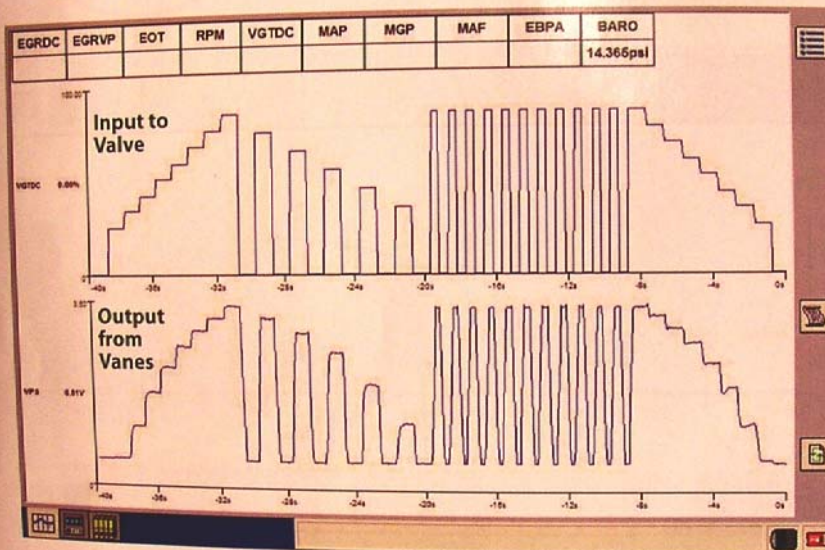
VVT Testing

Goal

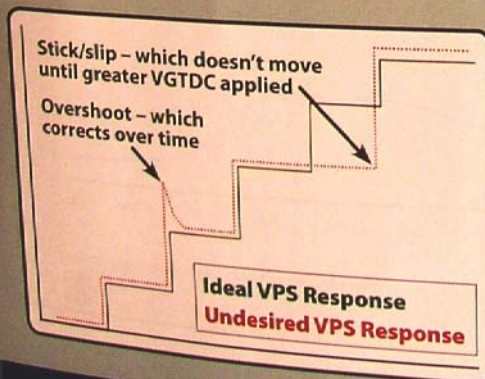
To detect unstable control valves and binding turbo vanes.

Procedure

1. Commands stair-step changes to VGT Duty cycle.
2. Verifies vane response via VPS voltage output.
3. **NOTE:** Vehicles built on or before September 2003 will likely have turbochargers with no run-out to their cam gear. Although the lobe (and vanes) may be turning properly, it will not be depressing the VPS sensor properly, and will not produce proper stairsteps.



IDS VVT Turbo Test Data



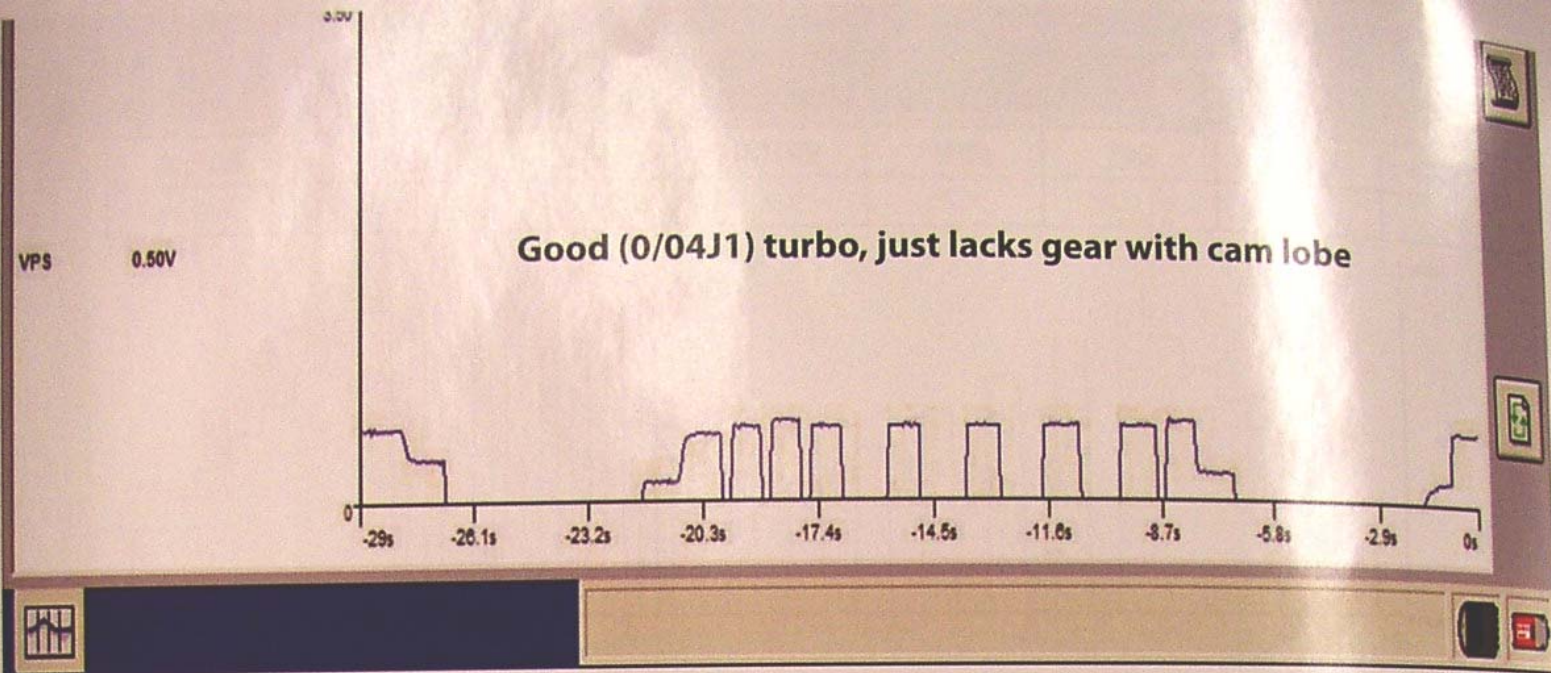
VVT Test - Interpretation Tips

- All steps will be a little jittery, which is expected and acceptable.
- Stair corners may "round" a little as the vehicle warms up.
- Stairs will become less tall as VGDC increases. This is normal, and is caused by run-out on the turbo's vane cam lobe.



Shown above is an IDS screen capture of a completed Turbo VVT Test. The top portion is a plot of the VGTDC PID signal (in %) being given through the engine PCM, and the bottom portion is a measured response (in volts) from the vane position sensor.

This particular test was done on a brand new, perfectly functioning turbocharger. Slight differences are normal and expected.

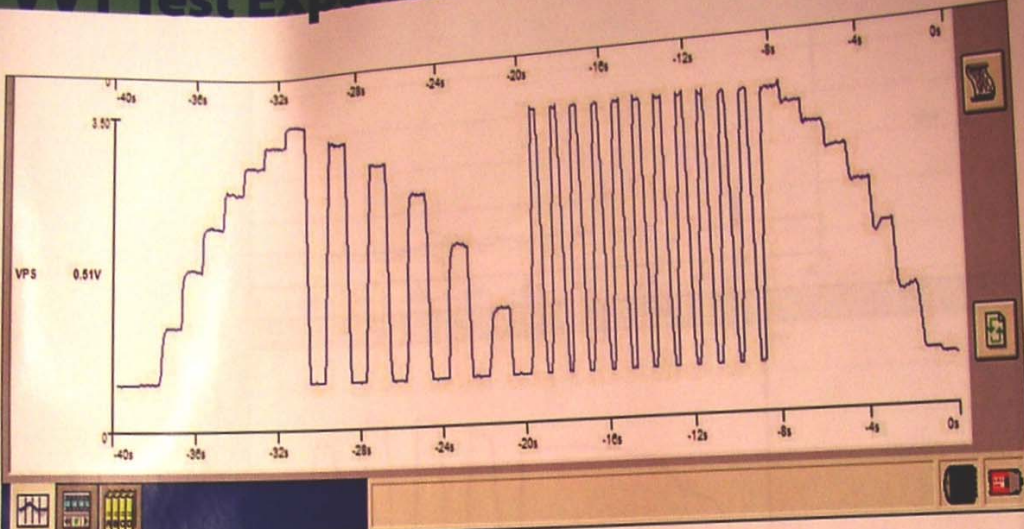


2003MY and early 2004MY (Built Sept 2003 and earlier)

Part Number: 3C3Z-6K682

NOTE: This vintage turbocharger (whether OEM or Remanufactured) has an internal gear which lacks the proper cam lobe profile. VVT Response will not match VGTDC input and will seem erratic, as shown above. This does not necessarily indicate a bad turbocharger.

VVT Test Expanded & Inverted



Three Primary Portions to the VVT Test:

1. Stairs Up and Stairs Down
2. Five Descending Plateaus
3. Rapid Vane Response

1 Eight individual steps should be visible in both sets of stairsteps.
NOTE: The first and last step will be less visible during cooler engine oil temps.

Some corner rounding is allowed and expected

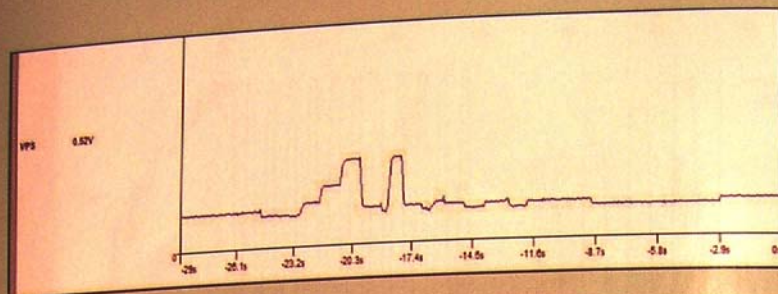
Some signal "jitteriness" is allowed and expected

2 Some corner rounding is allowed and expected

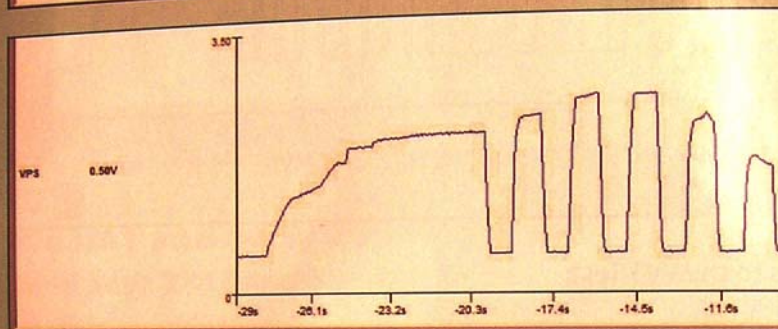
Five individual plateaus should be visible after the first set of stairs and before the rapid vane response portion

3 The rapid vane response portion should achieve full travel between min and max vane position values

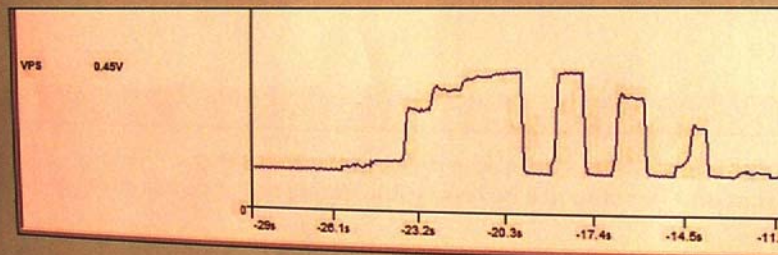
VVT Test Examples - Seized Vanes



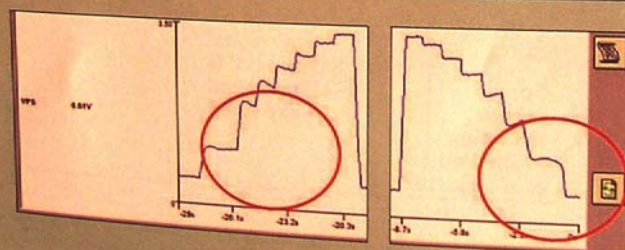
Grossly stuck vanes



Binding or corroded vanes



Binding or corroded vanes



Binding or corroded vanes



Rapid vane response portion (failed example)

SPX OTC

255 Elmwood Drive, Chaska, MN 55628-0195

418-626/3

**VMM VANE POSITION SENSOR CABLE
MADE IN USA**





