



## **AA - USING THIS SECTION (GENERAL HELP INFORMATION)**

### **Article Text (p. 2)**

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For Volkswagen Technical Site  
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If you want "TUNE-UP" type information, see D - ADJUSTMENTS for the adjustment procedures. If you are familiar with the procedures, but need a quick way to find the specification, go to C - TUNE-UP SPECS or C - SPECIFICATIONS for the specifications pertaining to the vehicle.

When diagnosing driveability problems, first go to F - BASIC TESTING. This article is here to help eliminate wasted diagnostic time. If the basic systems are working properly, go to G - TESTS W/ CODES.

If the vehicle still is having a driveability problem or if the vehicle has no self-diagnostic system, go to H - TESTS W/O CODES. This article will help you diagnose the problem by symptom, locate the symptom exhibited by the vehicle, and inspect or test the items which may be causing the problem.

After finding which specific system or component requires testing, use the I - SYS/COMP TESTS article to tests the systems and components. We have also included (when available) pin voltage charts and sensor range charts. These can be found in J - PIN VOLTAGE CHARTS and K - SENSOR RANGE CHARTS.

Also included in this section are wiring diagrams and vacuum diagrams. These can be found in L - WIRING DIAGRAMS and M - VACUUM DIAGRAMS.

When all diagnostic tests have been performed and the problem has been discovered, it may be necessary to replace or overhaul the defective part. This information can be found in N - REMOVE/INSTALL/OHAUL.

The content of each of these articles is outlined below. As a summary of the driveability diagnosis, see ROUTINE OUTLINE in this article.

### **A - ENGINE/VIN ID**

This article shows how to identify the model and engine by its Vehicle Identification Number (VIN). A model coverage chart shows each model and engine, the fuel system, ignition system and engine code. The engine serial number locations are also included in this article.

### **B - EMISSION APPLICATION**

These charts identify the emission systems and sub-systems applicable to each model and engine combination.

### **C - TUNE-UP SPECS**

This is a collection of quick-reference type specifications. This article is helpful when you are familiar with proper adjustment procedures and only need specifications. Included in this section are:

- \* Battery specifications.
- \* Fluid capacities.

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- \* Replacement intervals.
- \* Belt adjustment.
- \* Engine Compression.
- \* Valve clearance.
- \* Valve Arrangement.
- \* Ignition coil specifications.
  
- \* High tension wire resistance.
- \* Spark plug type and gap.
- \* Firing order.
- \* Ignition timing.
- \* Fuel pump performance and injector resistance specifications
- \* Slow and fast idle speed and mixture specifications.
- \* Carbon monoxide (CO) level specifications.
- \* Throttle position sensor/switch specifications.

## C - SPECIFICATIONS

This is a collection of quick-reference type specifications. This article is helpful when you are familiar with proper adjustment procedures and only need specifications. Included in this section are:

- \* Battery specifications.
- \* Fluid capacities.
- \* Replacement intervals.
- \* Belt adjustment.
- \* Engine Compression.
- \* Valve clearance.
- \* Valve Arrangement.
- \* Ignition coil specifications.
  
- \* High tension wire resistance.
- \* Spark plug type and gap.
- \* Firing order.
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- \* Fuel pump performance and injector resistance specifications
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- \* Carbon monoxide (CO) level specifications.
- \* Throttle position sensor/switch specifications.

## D - ADJUSTMENTS

This article contains the information that use to be included in the TUNE-UP section. Checking and adjusting valves, spark plugs, spark plug wires, base ignition timing and idle speed are found in this section. Use this article for routine maintenance. Also, if you have a driveability problem, ensure all on-vehicle adjustments are correct before proceeding with any diagnosis.

## E - THEORY/OPERATION

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This article covers basic theory and operation of engine performance-related systems and components. Before diagnosing vehicles or systems with which you are not completely familiar, read this article.

### **F - BASIC TESTING**

When diagnosing driveability problems, there are certain "BASIC DIAGNOSTIC PROCEDURES" which must FIRST be performed. It is necessary to perform a careful, complete check of basic engine mechanical and electrical conditions, and verify spark availability and adequate fuel supply.

The procedures apply to both computerized and non-computerized systems. If all systems are okay, go to G - TESTS W/ CODES for vehicles with self-diagnostic systems or H - TESTS W/O CODES for diagnosis by symptom.

### **G - TESTS W/ CODES**

Use this article to retrieve and interpret trouble codes from the engine computer self-diagnostic system. Once information is retrieved, diagnostic procedures are given to help pinpoint and repair computer system/component faults. Necessary steps for clearing trouble codes are also given. If faults indicated by trouble codes are not present at time of testing, proceed to TESTS W/O CODES for intermittent testing procedures.

### **H - TESTS W/O CODES**

This article helps trouble shoot driveability problems based upon available "SYMPTOMS" and "INTERMITTENT TESTING" procedures. Procedures in this section should lead you to specific component or system tests which may or may not be computer monitored/controlled.

### **I - SYS/COMP TESTS**

In this article, you will find tests for systems and components related to air induction systems (turbochargers), fuel control, ignition control, and emissions control systems.

### **J - PIN VOLTAGE CHARTS**

PIN VOLTAGE CHARTS are supplied (where available) to speed up the diagnostic process. By checking pin voltages at the electronic control unit, it is possible to determine if the control unit is receiving and transmitting proper voltage signals.

### **K - SENSOR RANGE CHARTS**

Use the SENSOR OPERATING RANGE CHARTS to determine if a

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sensor is out of calibration. A sensor that is out of calibration may not set a trouble code, but it will cause driveability problems.

### **L - WIRING DIAGRAMS**

Use these WIRING DIAGRAMS to identify and trace component circuits, locate shorts and opens in circuits, and understand how individual circuits function as part of a system. The diagrams in this article are only for fuel, ignition and emission systems

### **M - VACUUM DIAGRAMS**

The VACUUM DIAGRAMS will assist you in finding incorrectly routed vacuum hoses which may cause driveability problems or computer indicated malfunctions.

### **N - REMOVE/INSTALL/OHAUL**

N - REMOVE/INSTALL/OHAUL contains information found in the sub-headings of REMOVAL, OVERHAUL & INSTALLATION. These are procedures and specifications required to remove, overhaul (if possible) and install components related to engine performance.

### **WHERE TO START**

#### **PERFORM BASIC INSPECTION**

- 1) Verify customer complaint.
- 2) Perform visual inspection. See F - BASIC TESTING.
- 3) Test engine sub-system to determine that the following systems are functioning properly. See F- BASIC TESTING.

- \* Mechanical conditions (compression)
- \* Ignition output
- \* Fuel Delivery

- 4) Check air induction system for leaks.
- 5) Check & adjust basic engine settings listed below to ensure they are to specification. See D - ADJUSTMENTS.

- \* Ignition timing
- \* Idle speed

#### **CHECK FOR TROUBLE CODES**

- 1) If equipped with self-diagnostics, check for trouble codes. Refer to G - TESTS W/ CODES.
- 2) Repair causes of trouble code(s).
- 3) Clear control unit memory.

#### **SYMPTOM DIAGNOSIS**

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- 1) If no self-diagnostics available, or no trouble codes present, identify symptom.
- 2) See trouble shooting procedure to repair complaint. See H - TESTS W/O CODES

### TEST SYSTEM

- 1) Perform necessary systems and component tests. See I - SYS/COMP TESTS.
- 2) Verify that complaint is repaired.

### SAFETY PRECAUTIONS

- \* Always refer to Engine Tune-Up Decal in engine compartment before performing tune-up. If manual and decal differ, always use decal specifications.
- \* DO NOT allow or create a condition of misfire in more than one cylinder for an extended period of time. Damage to converter may occur due to loading converter with unburned air/fuel mixture.
- \* Always turn ignition off and disconnect negative battery cable BEFORE disconnecting or connecting computer or other electrical components.
- \* DO NOT drop or shock electrical components such as computer, airflow meter, etc.
- \* DO NOT use fuel system cleaning compounds that are not recommended by the manufacturer. Damage to gaskets, diaphragm materials and catalytic converter may result.
- \* Before performing a compression test or cranking engine using a remote starter switch, disconnect coil wire from distributor and secure it to a good engine ground, or disable ignition.
- \* Before disconnecting any fuel system component, ensure fuel system pressure is released.
- \* Use a shop towel to absorb any spilled fuel to prevent fire.
- \* DO NOT create sparks or have an open flame near battery.
- \* If any EFI components such as hoses or clamps are replaced, ensure they are replaced with components designed for EFI use.
- \* Always reassemble throttle body components with new gaskets, "O" rings and seals.
- \* If equipped with an inertia switch, DO NOT reset switch until fuel system has been inspected for leaks.
- \* Wear safety goggles when drilling or grinding.
- \* Wear proper clothing which protects against chemicals and other hazards.

END OF ARTICLE