

G - TESTS W/CODES

Article Text

1993 Volkswagen Passat

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Wednesday, March 22, 2000 10:15PM

ARTICLE BEGINNING

1993 ENGINE PERFORMANCE
Volkswagen Self-Diagnostics

Passat GL, Passat GLX

INTRODUCTION

If no faults were found while performing preliminary inspection procedures, proceed with self-diagnostics. If no fault codes or only pass codes are present after entering self-diagnostics, proceed to H - TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.).

NOTE: Scan Tester (VAG 1551) must be used to make full use of the self-diagnostic system capabilities.

SELF-DIAGNOSTIC SYSTEM DESCRIPTION

Hard Failures

Hard failures of monitored sensors and/or components, cause Malfunction Indicator Light (MIL) to come on and remain on until problem is repaired. If malfunction indicator CHECK ENGINE light comes on and remains on during vehicle operation, cause of malfunction must be determined.

If malfunctions are present for more than 5 seconds, they are stored as Diagnostic Trouble Codes (DTCs) and will be displayed as a permanent malfunction even though the malfunction is not occurring at the time DTCs are displayed. Malfunctions that affect oxygen sensor control can only be read accurately after a test drive of at least 5 minutes.

Intermittent Failures

If a malfunction occurs for a maximum of 5 seconds, they are stored and considered to be "sporadic" (intermittent failures). When displayed on scan tester, malfunctions will have "SP" (sporadic) code.

RETRIEVING CODES

NOTE: See ENTERING SELF-DIAGNOSTICS for additional scan tester operating instructions.

Passat GL (2.0L)

1) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC) located in center console, in front of shift lever. See Fig. 1. Attach Black connector first, wait for VAG SELF-DIAGNOSIS display, then connect White connector. DO NOT connect scan tester Blue connector.

2) Turn ignition on. Operate scan tester and observe display. Press PRINT button to turn on printer. Indicator light on button

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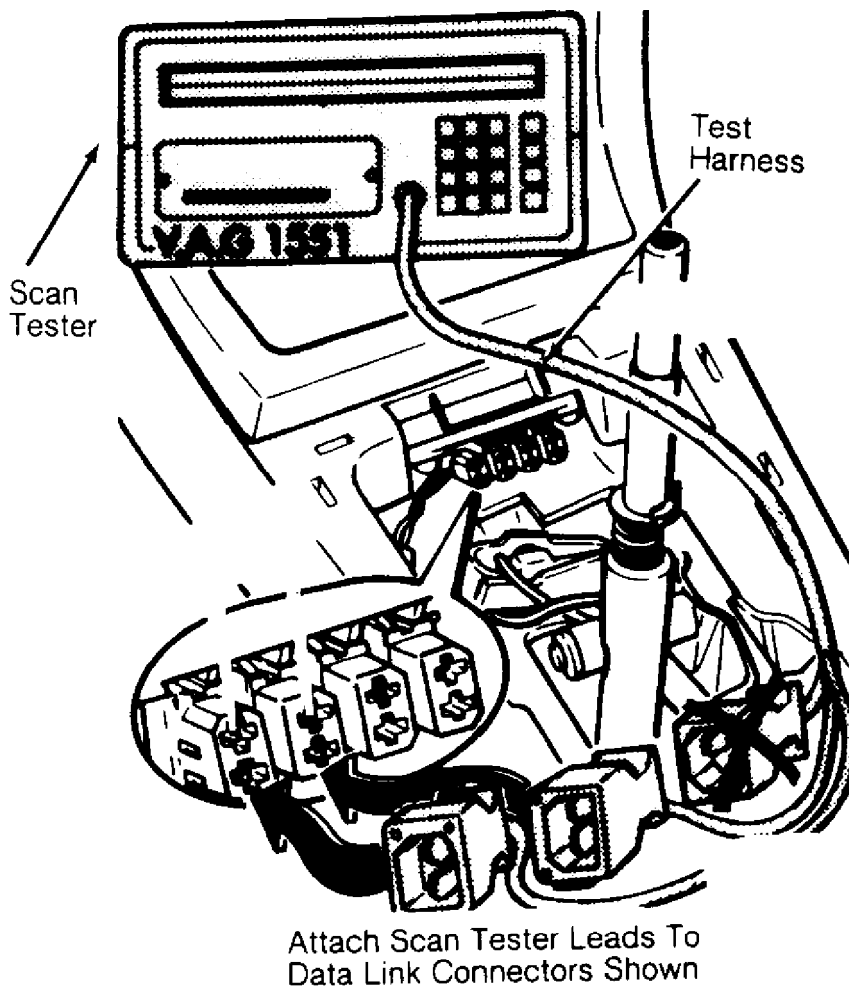
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should come on. Press "1" button to select RAPID DATA TRANSFER function.

3) Press "0" and "1" buttons to select ENGINE ELECTRONICS function. Press "Q" button to enter input. Press right arrow button, then "0" and "2" buttons to select CHECK FAULT MEMORY function. Press "Q" button to enter input.

4) Scan tester will display malfunction numbers (if any). If NO FAULTS RECOGNIZED is displayed, press right arrow button to return to RAPID DATA TRANSFER function. Press "0" and "6" buttons to select END OUTPUT function. Press "Q" button to enter input.



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Fig. 1: Connecting Scan Tester To Data Link Connectors
(Passat GL & Passat GLX)

Courtesy of Volkswagen United States, Inc.

NOTE: On Passat GL (2.0L), if ignition is turned off between reading and erasing DTC memory, DTC memory (fault codes) will not be erased.

5) If one or more DTCs are stored, look up DTCs and repair as necessary. After repairs, press "0" and "5" buttons to select ERASE

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DTC MEMORY function. Press "Q" button to enter input. After DTCs are erased, press right arrow button.

6) Press "0" and "6" buttons to select END OUTPUT function. Press "Q" button to enter input. Test drive vehicle for at least 5 minutes. During test drive, ensure that engine coolant temperature reaches 176°F (80°C).

7) Ensure that accelerator pedal is momentarily, but completely pushed down (wide open throttle) at least once. Ensure engine speed reaches at least 3000 RPM. Select READ FAULT MEMORY function once again to ensure DTCs (malfunctions) have been cleared (corrected).

ECM LOCATION

ECU/ECM LOCATION

Application Location

Passat GL & Passat GLX Underneath center of
windshield cowl, directly
behind engine compartment
firewall.

TROUBLE CODE IDENTIFICATION

PASSAT GL (2.0L 4-CYLINDER) TROUBLE CODE I.D.

TROUBLE CODE IDENTIFICATION (PASSAT GL) (1)

DTC (2) System/ Possible

(Blink) Code Affected Circuit Cause/Repair

65535 (1111) Electronic Control Module Replace Faulty ECM

00281 (1231) Transmission Speed Sensor Open Ckt (No
Signal to ECM)

00514 (2112) ... Ignition Reference Sensor Open Ckt (No
Signal to ECM)

00515 (2113) Hall Effect Sensor Open Ckt (No
Signal to ECM)

00516 (2121) Idle Switch Open/Short Ckt To
Ground Or Battery
Voltage

00517 (2123) Full Throttle Switch Short Ckt To Ground

00535 (2141) Knock Regulator (3) Repair Ckt Or
Replace Component(s)

00524 (2142) Knock Sensor
(Cylinders No. 1 & 2) Open Ckt (No
Signal to ECM)

00540 (2144) Knock Sensor
(Cylinders No. 3 & 4) Open Ckt (No

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00533 (2231) Idle Speed Regulation	Signal to ECM) (4) Control Limit Exceeded Or Not Reached
00520 (2232)	..... Airflow Sensor	Open/Short Ckt To Ground Or Battery Voltage
00522 (2312)	.. Coolant Temperature Sensor	Open/Short Ckt To Ground Or Battery Voltage
00537 (2341)	..... Oxygen (O2) Sensor	(5) Control Limit Exceeded Or Not Reached
00525 (2342)	..... Oxygen (O2) Sensor	Open Ckt (No Signal to ECM)
00558 (----)	..... Fuel Mixture (Lean)	(6) Control Limit Exceeded Or Not Reached
00559 (----)	..... Fuel Mixture (Rich)	Leaking Cold-Start Valve Or Injectors Or Incorrect Idle Speed
00560 (2411)	.. Exhaust Gas Recirculation	Open/Short Ckt To Ground Or Battery Voltage
01257 (4431)	... Idle Stabilizer Valve	Open/Short Ckt To Ground Or Battery Voltage
00000 (4444)	..... No Fault	

- (1) - For testing information, see J - PIN VOLTAGE CHARTS article.
- (2) - Blink code is 4-digit malfunction indicator CHECK ENGINE light code.
- (3) - Check fuel for low octane rating, improperly set ignition timing, or damaged knock sensor wiring shield. Also check for mechanical noise due to loose bolts or brackets.
- (4) - Check throttle body basic adjustment. Check intake system and fuel evaporative system for leaks. Check ignition timing. Also check for loss of signal from A/C compressor (idle-up function).
- (5) - Ensure CO level is within specification. Check cold-start valve and intake system for leaks. Check for stuck open fuel evaporative valves. Ensure ground connection between ECM and intake manifold is okay. Oxygen sensor circuit shorted to ground.
- (6) - Ensure idle speed is correctly adjusted. Check intake system for leaks. Ensure ground connection between ECM and intake manifold is okay.

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PASSAT GLX (2.8L VR6) TROUBLE CODE I.D.

TROUBLE CODE IDENTIFICATION (PASSAT GLX) (1)

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DTC (2) (Blink) Code	System/ Affected Circuit	Possible Cause/Repair
00281 (1231)	Vehicle Speed Sensor	Open Ckt (No Signal From Speedometer)
00513 (2111)	Engine Speed Sensor	Open Ckt Or Loose Or Faulty Sensor
00515 (2113)	Hall Effect Sensor	Open/Short Ckt To Ground Or Battery Voltage
00518 (2212) ...	Throttle Valve Potentiometer ..	Open/Short Ckt To Ground Or Battery Voltage
00522 (2312)	Coolant Temp. Sensor	Open/Short Ckt To Ground Or Battery Voltage
00524 (2142)	Knock Sensor I	Open Ckt Or Short Ckt To Battery Voltage
00525 (2342)	Oxygen (O2) Sensor	Open/Short Ckt To Ground Or Battery Voltage
00527 (2412)	Intake Air Temp. Sensor	Open/Short Ckt To Ground Or Battery Voltage
00532 (2234)	Supply Voltage	Battery Voltage Less Than 10.0 Volts Or More Than 16.0 Volts
00533 (2231) ..	Idle (IAC Valve) Regulation ..	Intake System Leaks Or IAC Valve Stuck Or Dirty
00535 (2141)	Knock Sensor (Primary)	Defective Knock Sensor In ECM (Replace ECM)
00537 (2341) ..	Oxygen (O2) Sensor Regulation ...	(3) Control Limit Exceeded Or Not Reached
00540 (2144)	Knock Sensor II	Open/Short Ckt (No Signal to ECM)
00543 (2214)	Maximum RPM Exceeded ..	RPM Signal Interference; Engine RPM Exceeded Cut-Off Point
00545 (2314) ...	Engine/Transmission Signal ..	Short Ckt To Ground
00549 (2243) (4) ..	Fuel Consumption Signal	Short Ckt To Battery Voltage
00553 (2324)	Mass Airflow Sensor	Short Ckt To Ground Or Battery Voltage
00561 (2413) ...	Fuel Mixture Adaptation	(5) Control Limit Exceeded Or Not Reached
00585 (2411) ...	EGR Temperature Sensor	Short Ckt To Ground Or Faulty Sensor

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00586	(----	EGR Control	EGR Valve Sticking Open
00609	(----	(4)	..	Ignition Input Short Ckt To Battery Voltage
00624	(----	(4)	..	A/C Compressor Signal	... A/C System Malfunction Or Faulty Wiring
00640	(3434)	(4)		Oxygen (O2) Sensor Relay	..... Open/Short Ckt To Ground Or Battery Voltage
01025	(----		..	Malfunction Indicator Light	.... Open/Short Ckt To Ground Or Battery Voltage
01242	(4332)		.....	ECM Output Stage	..... Faulty Ckt To Output Check Controlled Components
01247	(4343)		...	EVAP Frequency Solenoid	..... Open/Short Ckt To Ground Or Battery Voltage
01249	(4411)		.....	Injector No. 1	..... Open/Short Ckt To Ground Or Battery Voltage
01250	(4412)		.....	Injector No. 2	..... Open/Short Ckt To Ground Or Battery Voltage
01251	(4413)		.....	Injector No. 3	..... Open/Short Ckt To Ground Or Battery Voltage
01252	(4414)		.....	Injector No. 4	..... Open/Short Ckt To Ground Or Battery Voltage
01253	(4415)		.....	Injector No. 5	..... Open/Short Ckt To Ground Or Battery Voltage
01254	(4422)		.....	Injector No. 6	..... Open/Short Ckt To Ground Or Battery Voltage
01257	(4431)		..	Idle Air Control (IAC) Valve	... Open/Short Ckt To Ground Or Battery Voltage
01259	(4433)		.....	Fuel Pump Relay	..... Open Ckt Or Short Ckt To Battery Voltage
01265	(4312)		..	EGR Frequency (2-Way) Valve	.... Open/Short Ckt To Ground Or Battery Voltage
65535	(1111)		...	Electronic Control Module	.... Replace Faulty ECM

(1) - For testing information, see J - PIN VOLTAGE CHARTS article.

(2) - Blink code is 4-digit malfunction indicator CHECK ENGINE light code.

(3) - Check intake and exhaust systems for leaks. Check for too low or too high a fuel pressure. Also check for malfunctioning fuel injectors or engine misfire.

(4) - Code applicable to Passat GLX only.

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- [illegible]

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Passat GLX (2.8L)

1) Ensure battery voltage and fuses No. 18 and 22 are okay.

Ensure engine ground connections at cylinder head cover and at manifold are okay.

2) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC) located in center console, in front of shift lever. Attach Black connector first, wait for VAG ON-BOARD DIAGNOSTIC display, then connect White connector. DO NOT connect scan tester Blue connector.

3) Turn ignition on or start engine depending on function being selected. See appropriate SELECTABLE FUNCTIONS table. Press "1" button to select RAPID DATA TRANSFER function.

4) Press "0" and "1" buttons to select ENGINE ELECTRONICS function. Press "Q" button to enter input. Electronic Control Module (ECM) identification will be displayed on scan tester.

5) If CONTROL MODULE DOES NOT ANSWER message is displayed, press HELP button to print a list of possible causes. With scan tester in RAPID DATA TRANSFER function, press right arrow button. Press "02" to "08" buttons to select desired function. Press "Q" button to enter input.

SELECTABLE FUNCTIONS (PASSAT GLX) (1)

Function Ignition On Engine On

02 (Read DTC/Fault Memory)	..	.....	.....	X
03 (Output Check/ 03 Diagnostic Test Mode)	.....	X	.....	.....
04 (Start Basic Setting)	.....	.....	.....	X
05 (Erase DTC/Fault Memory)	..	.....	.....	X
06 (End Output)	.....	X	.....	X
08 (Read Measuring Value Block)	X	.....	.....	X

(1) - Press HELP button at any time to obtain additional scan tester operating instructions.

OUTPUT CHECK DIAGNOSIS (OUTPUT DIAGNOSTIC TEST MODE)

NOTE: See ENTERING SELF-DIAGNOSTICS for additional scan tester operating instructions.

Passat GL (2.0L)

1) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC) located in center console, in front of shift lever. With scan tester in OUTPUT CHECK DIAGNOSIS function, the differential pressure regulator, carbon canister (fuel evaporative) frequency valve, idle stabilizer valve, and cold-start valve may be actuated in sequence listed.

2) Attach Test Harness (VAG 1315A/1) to differential pressure regulator. Connect Digital Volt-Ohmmeter (DVOM) to test harness terminals. See Fig. 2. Press right arrow button to actuate regulator

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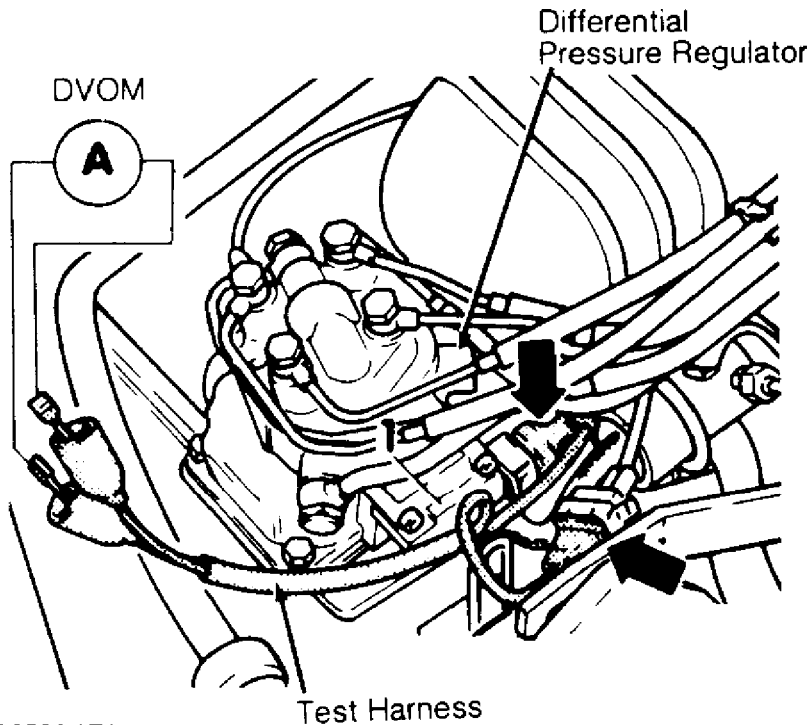
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and observe control current on DVOM. Control current must fluctuate from 0 to 100 milliamps.

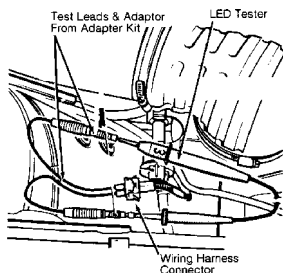


93I80471

Fig. 2: Diagnosing Differential Pressure Regulator Ckt (Passat GL)
Courtesy of Volkswagen United States, Inc.

3) If control current does not fluctuate, check wiring harness. If wiring harness is okay, check resistance of differential pressure regulator. If wiring and pressure regulator are okay, replace Electronic Control Module (ECM).

4) If control current fluctuates, press right arrow button to actuate carbon canister (fuel evaporative) frequency valve. Frequency valve must click. If not, disconnect frequency valve. Connect LED Tester (US 1115) to wiring harness connector using leads and adapter from Adapter Kit (VW 1594). See Fig. 3. LED tester must flash. If LED tester does not flash, check wiring harness. If wiring harness is okay, replace ECM.



93I80472

Fig. 3: Diagnosing Fuel Evaporative Frequency Valve Ckt (Passat GL)
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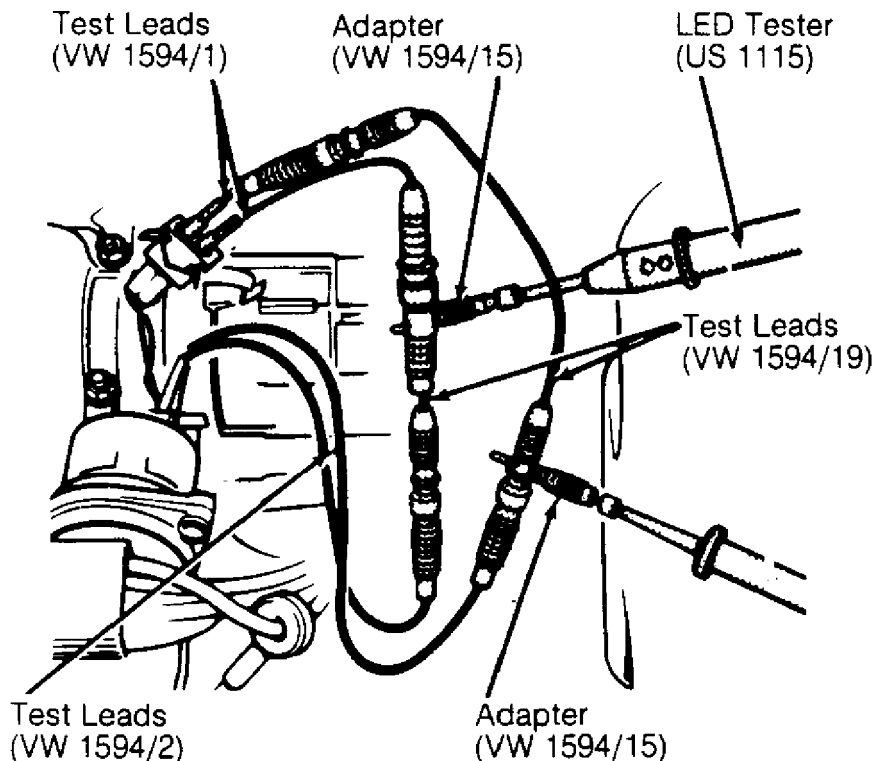
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5) If carbon canister operates properly, press right arrow button to actuate idle stabilizer valve. Idle stabilizer valve must click. If valve does not click, turn ignition off and disconnect idle stabilizer valve. Connect LED tester using Test Leads and Adapter (VW 1594/1, 2, 15 and 19). See Fig. 4.

6) Repeat idle stabilizer valve output check diagnosis. LED tester must flash. If LED flashes, measure idle stabilizer valve resistance. If resistance is not 4-12 ohms, replace valve. If LED does not flash, check wiring harness. If wiring harness is okay, replace ECM.

7) If idle stabilizer valve operates properly, press right arrow button to and open throttle slightly to actuate cold-start valve. Cold-start valve must click. If cold-start valve does not click, disconnect valve.



93A80473

Fig. 4: Diagnosing Idle Stabilizer Valve Circuit (Passat GL)
Courtesy of Volkswagen United States, Inc.

NOTE: Cold-start valve is only actuated one time to prevent engine from flooding. To repeat diagnosis, cold-start valve output check diagnosis must be repeated from the beginning.

8) Connect LED Tester (VAG 1527) to wiring harness connector using Adapter Kit (VW 1594). See Fig. 5. Repeat cold-start valve output check diagnosis while observing LED. LED tester must flash 10 times. If LED flashes, replace cold-start valve. If LED does not flash, check wiring harness. If wiring harness is okay, replace ECM.

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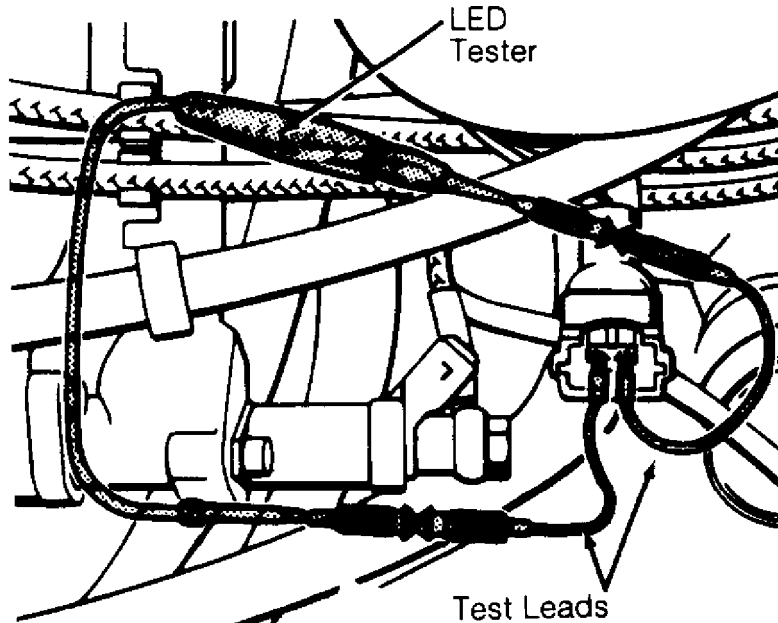
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9) If cold-start valve operates properly, press right arrow button to select RAPID DATA TRANSFER function on scan tester. Press "0" and "6" buttons to select END OUTPUT function. Press "Q" to enter input. Turn ignition off. Disconnect scan tester.



93B80474

Fig. 5: Checking Cold-Start Valve Circuit (Passat GL)
Courtesy of Volkswagen United States, Inc.

Passat GLX (2.8L)

1) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC) located in center console, in front of shift lever. With scan tester in OUTPUT DIAGNOSTIC TEST MODE, the injectors, Idle Air Control (IAC) valve, evaporative frequency (solenoid) valve, oxygen sensor relay, and EGR frequency valve (if equipped) may be actuated in sequence listed.

2) The injector(s) must click by opening and closing throttle. To trigger injectors 2 through 6, open and close throttle once for each injector. If injector(s) do(es) not click, test circuit(s) using the J - PIN VOLTAGE CHARTS article in this section.

3) If injectors are okay, switch to next output test by pressing the right arrow button. Press right arrow button to actuate IAC valve. IAC valve must pulsate noticeably until switched to next output test by pressing the right arrow button.

4) If IAC valve does not pulsate, turn ignition off. Disconnect IAC valve and connect LED Tester (US 1115) to IAC valve wiring harness connector using jumper wires from Adapter Kit (VW 1594).

5) Turn ignition on and repeat IAC valve output test. If LED blinks, replace IAC valve. If LED does not blink, test circuit using the J - PIN VOLTAGE CHARTS article in this section. If IAC and circuit are okay, replace ECM.

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6) If IAC valve pulsates properly, locate evaporative frequency solenoid valve (located behind air cleaner housing, on wheelwell). Disconnect hose, coming from fuel vapor canister, from frequency solenoid. Attach auxiliary hose to solenoid.

7) Blow into auxiliary hose, in direction of throttle housing, while performing solenoid output test (pressing right arrow button to actuate evaporative frequency solenoid). If solenoid does not actuate (open and close), disconnect wiring harness from solenoid. Connect LED tester to solenoid wiring harness connector using jumper wires from adapter kit.

8) Repeat evaporative solenoid valve output test. If LED blinks, replace evaporative frequency solenoid valve. If LED does not blink, test circuit using the J - PIN VOLTAGE CHARTS article. If evaporative solenoid valve and circuit are okay, replace ECM.

9) If evaporative frequency solenoid operates properly, press right arrow button to actuate oxygen sensor relay (mounted on fuse/relay panel with a clip). If relay does not click, test relay and its circuit using the J - PIN VOLTAGE CHARTS article in this section.

10) If relay operates properly, press right arrow button to actuate EGR frequency valve. Frequency valve must click until test mode is switched to next output test by pressing the right arrow button.

11) If frequency valve does not click, disconnect valve. Connect LED tester using jumper wires from Adapter Kit (VAG 1594) to frequency valve wiring harness connector.

12) If LED blinks, replace EGR frequency valve. If LED does not blink, test circuit using the J - PIN VOLTAGE CHARTS article. If EGR frequency valve and circuit are okay, replace ECM.

13) If EGR frequency valve operates properly, press right arrow button twice to select END OUTPUT function on scan tester. Press "Q" to enter input. Turn ignition off. Disconnect scan tester.

READ MEASUREMENT & READ MEASURING (TEST) VALUE BLOCK

NOTE: See ENTERING SELF-DIAGNOSTICS for additional scan tester operating instructions.

Passat GL (2.0L)

1) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC) located in center console, in front of shift lever. With scan tester in READ TEST VALUE BLOCK function, press "0" button twice to select INDICATOR GROUP 00 function. Press "Q" to enter input.

2) Scan tester will display channels one (1) through ten (10). Select desired channel. See INDICATOR GROUP table for channel displays. With READ TEST VALUE BLOCK function completed, select END OUTPUT function on scan tester. Turn ignition off. Disconnect scan tester.

INDICATOR GROUP (PASSAT GL)

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Channel Number

(1) Parameter

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1	Engine Temperature
2	Engine Load
3	Engine Speed (RPM)
4	Idle Stabilizer (Adaptive Value)
5	.....	Idle Stabilizer (Working Value)
6	.....	Differential Pressure Regulator (Working Value)
7	.....	Differential Pressure Regulator (Adaptive Value)
8	.....	Vehicle Speed
9	.....	Switching Input Signals
10	Ignition Timing (ECU Supplied)

(1) - See VAG 1551 operator's manual for parameter display values.

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Passat GLX (2.8L)

1) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC) located in center console, in front of shift lever. With scan tester in READ MEASURING VALUE BLOCK function, press "01" to "06" buttons to select desired display group. See appropriate DISPLAY GROUP table.

2) When display group is selected, only the second number is shown on display (the zero does not appear on display). With READ MEASUREMENT BLOCK function completed, select END OUTPUT function on scan tester. Turn ignition off. Disconnect scan tester.

DISPLAY GROUP (PASSAT GLX)

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Display Group Number & Channel Number	Display Parameters
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01		
1	Engine Speed
2	Engine Coolant Temperature
3	Oxygen Sensor Signal
4	Ignition Timing
02		
1	.....	Engine Speed
2	.....	Injection Time
3	.....	System Voltage
4	.....	EGR Temperature (If Applicable)
03		
1	.....	Engine Speed
2	.....	Engine Load
3	.....	Throttle Angle
4	Intake Air Temperature (At Manifold)
04		
1	Engine Speed
2	Engine Load
3	Vehicle Speed

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4 ..... Switch Positions (Operating Status)
05
1 ..... Engine Speed
2 ..... Idle Air Control (IAC) Valve
3 ..... IAC Duty Cycle
4 ..... Switch Positions (A/C & Auto. Trans.)
06
1 ..... Oxygen Sensor Signal
2 ..... Oxygen Sensor Adaptive Learning (Idle)
3 .. Oxygen Sensor Adaptive Learning (Part Throttle)
4 .. Oxygen Sensor Adaptive Learning (Full Throttle)
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CLEARING CODES

See RETRIEVING CODES.

ECM LOCATION

ECU/ECM LOCATION

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Application                               Location

Passat GL & Passat GLX ..... Underneath center of
                                windshield cowl, directly
                                behind engine compartment
                                firewall.
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SUMMARY

If no hard fault codes (only "sporadic" codes) are present, driveability symptoms exist or intermittent codes exist, proceed to the H - TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.) or intermittent diagnostic procedures.

END OF ARTICLE