

F - BASIC TESTING

Article Text

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

ARTICLE BEGINNING

1989 ENGINE PERFORMANCE

Volkswagen Basic Diagnostic Procedures

Cabriolet, Fox, Golf, Golf GT, Jetta, Vanagon

INTRODUCTION

The following diagnostic steps are here to prevent overlooking a simple problem. This is also the place to start diagnosis for a "NO-START" condition.

The first step in diagnosing any driveability problem is to verify that the problem exists. This may be accomplished by test driving the vehicle under the conditions during which the problem reportedly occurs.

A careful and complete inspection of several systems is required. Most driveability or "no-start" problems are not related to engine control systems, but are in fact simple mechanical, electrical, fuel or vacuum related faults. Most engine control problems are the result of mechanical breakdowns, poor electrical connections or damaged or misrouted vacuum hoses.

Before considering the control system as a possible cause of problems, ignition high tension wires, fuel supply, electrical connections and vacuum hoses should be checked. Failure to do so may result in improper diagnosis or lost diagnostic time.

NOTE: All voltage tests should be performed with a Digital Volt Ohmmeter (DVOM) with a minimum 10-megohm input impedance, unless specifically stated different in testing procedures.

PRELIMINARY INSPECTION & ADJUSTMENTS

VISUAL INSPECTION

Perform a visual inspection of all electrical wiring. Look for chafed, stretched, cut or pinched wiring. Inspect electrical connectors and connections for a clean, tight fit. Repair as necessary. Inspect all vacuum hoses for proper routing, cuts or pinches. If necessary, see VACUUM DIAGRAMS article to verify correct routing and connections. Repair as necessary. Inspect air induction system for possible vacuum leaks or obstructions in air cleaner (ice, mud, etc.)

MECHANICAL INSPECTION

Compression

Engine mechanical condition can be checked using a compression gauge, vacuum gauge, or an engine analyzer capable of performing a cylinder balance test. See engine analyzer instruction manual for availability and description of relative compression

F - BASIC TESTING

Article Text (p. 2)

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

feature.

On models equipped with CIS fuel injection system, check compression with engine warm, all spark plugs removed and throttle wide open. Ground coil wire from center of distributor cap to engine block. Disconnect one end of duct between airflow sensor and throttle body to disable fuel injection system. Crank engine through at least 6 compression strokes per cylinder to determine engine compression.

On models equipped with Digifant fuel injection system, use a remote starter to crank engine during compression test, not the ignition switch. If use of remote starter is not possible, remove fuel injector(s) wire harness connector. This will prevent triggering of fuel injectors during the cranking mode.

CAUTION: Triggering of fuel injectors during test cranking of engine could create a fire hazard, flooding, crankcase contamination, hydrostatic lock-up, or lubrication to be washed off of cylinder walls.

Exhaust System Backpressure (Pressure Gauge)

Remove O2 sensor. Connect a pressure gauge and run engine at 2500 RPM. If pressure gauge exceeds 2.8 psi (.2 bar), exhaust system should be checked for restriction.

Exhaust System Backpressure (Vacuum Gauge)

Connect vacuum gauge to intake vacuum. Observe vacuum gauge with engine running. Open throttle part way and hold steady. If vacuum gauge slowly drops after stabilizing, exhaust system should be checked for a restriction.

FUEL SYSTEM

CAUTION: High fuel pressure may be present in fuel lines or related component parts. Relieve pressure before attempting to open system for testing or service. Do not allow fuel to flow onto engine or electrical parts or allow an open flame in area while testing fuel system components.

Fuel Pump Circuit

Remove fuel tank cap. Turn ignition on and listen for fuel pump operating sound for approximately 2 seconds. If there is no sound, check fuse, fuel pump relay, fuel pump and all electrical connections.

Visual Check

1) Remove air cleaner and check for any visible fuel leaks. Push airflow sensor plate down manually. Uniform resistance should be felt throughout travel after slight amount of free travel. No binding should be felt when sensor plate is released.

2) Upward movement of sensor plate should be slow with slight resistance from control piston adjusting lever. No binding should be felt. Push airflow sensor plate down and hold briefly. Slight fuel seepage past control is acceptable.

F - BASIC TESTING

Article Text (p. 3)

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

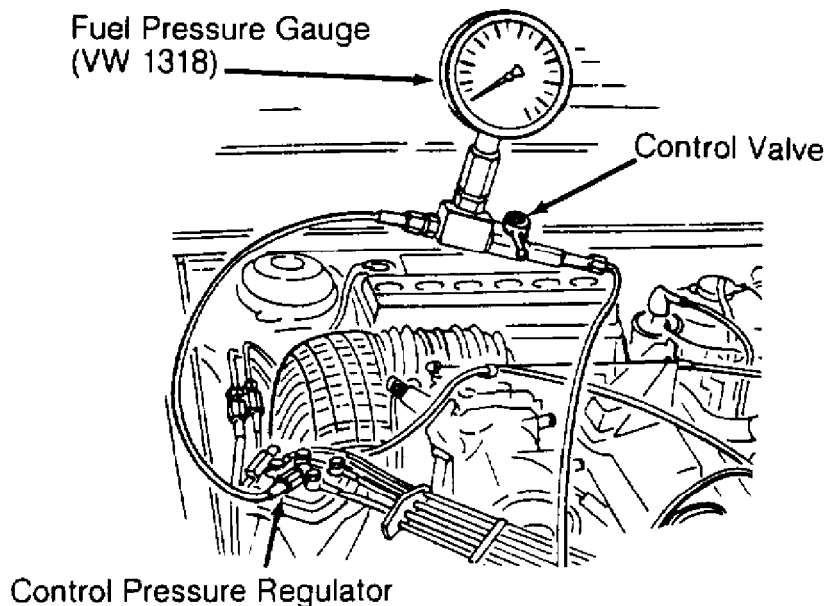
Monday, August 23, 1999 11:52PM

NOTE: Raw gasoline fumes will be exposed during test procedure. Do not allow fuel to flow onto engine or electrical parts or allow an open flame in area while testing fuel system components.

Fuel Pressure (Golf & Jetta)

1) Install Fuel Pressure Gauge (VW 1318) and Adaptor (VW 3118-5) between the fuel distributor test port and cold start valve. Ensure control lever is in the closed position. See Fig. 1. Bleed excess air from system cycling control valve with gauge upside down.

2) Remove fuel pump relay and attach Remote Switch (4480/3). Open fuel pressure gauge control lever and activate fuel pump using remote switch. Fuel pressure should be 75-82 psi (5.2-5.6 bar). If fuel pressure is low, perform fuel volume check. If fuel volume is okay, replace fuel pressure regulator.



50101782

Fig. 1: Fuel Pump Testing Arrangement (Except Vanagon)
Courtesy of Volkswagen United States, Inc.

3) If fuel pressure is above specification, remove return hose from pressure regulator and repeat test. Fuel pressure should 75-82 psi (5.2-5.6 bar). If okay, check for restricted fuel return line. If pressure is incorrect, replace fuel pressure regulator.

Fuel Pressure (Vanagon)

1) Install Fuel Pressure Gauge (VW 1318) at fuel supply hose 3-way "T" connector. See Fig. 2. Using a jumper wire, connect terminals No. 30 and 87 on fuel pump relay. Turn ignition on.

2) With fuel pump operating, minimum pressure should be 33 psi (2.2 bar). If fuel pressure is incorrect, inspect for restricted fuel lines, defective fuel pump or weak control pressure regulator. If

okay, perform FUEL VOLUME CHECK.

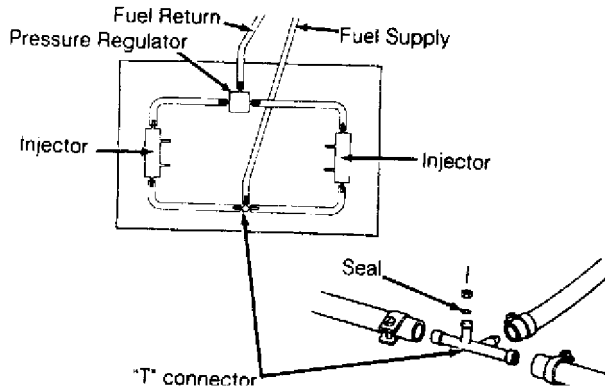


Fig. 2: Fuel Pump Testing Arrangement (Vanagon)
 Courtesy of Volkswagen United States, Inc.

REGULATED FUEL PRESSURE TABLE

REGULATED FUEL PRESSURE TABLE			
Application	Engine Off (1)		At Idle
	psi (bar)		psi (bar)
Cabriolet & Fox	28 (2.6)	.....	68-78 (4.7-5.4)
Golf, Golf GT, Jetta	29-36 (2.0-2.5)	.....	75-82 (5.2-5.6)
Vanagon	29-36 (2.0-2.5)	.....	(2) 33 (2.2)

- (1) - After checking fuel pressure at idle, turn ignition switch to the "OFF" position.
- (2) - With pressure regulator vacuum hose disconnected, pressure should be 36 psi (2.5 bar).

Transfer Pump Fuel Volume Check (Cabriolet & Fox)

- 1) Turn ignition off. To check transfer pump (in tank), remove rear seat (if necessary). Remove fuel sending unit access cover. Disconnect ignition coil secondary wire and jumper to ground.
- 2) Activate fuel pump by removing fuel pump relay and attaching jumper wire between terminals No. 30 and No. 87. Terminal identification is molded on fuse/relay panel. If pump does not operate, remove transfer pump wiring harness connector. See Fig. 3. Using test light, check for voltage between Brown (-) and Green (+) wire at connector. If voltage is present, replace transfer pump. If not, repair open or short circuit in wiring.
- 3) If transfer pump operates correctly, remove fuel pump relay jumper wire. Disconnect and plug transfer pump output hose. Attach a hose to pump outlet connector and place other end of hose in a graduated container. Activate fuel pump for 10 seconds.
- 4) Minimum fuel flow for Cabriolet should be 9 ounces (.31L). Minimum fuel flow for Fox should be 13 ounces (.41L). If fuel flow is low, check fuel tank filter for restriction. If okay, replace transfer pump.

F - BASIC TESTING

Article Text (p. 5)

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

Transfer Pump Fuel Volume Check (Golf & Jetta)

1) To check transfer pump (in tank), remove fuel tank cap.

Remove and plug black feed hose from fuel tank sending unit.

2) Attach a piece of hose between feed hose connection and a graduated container. See Fig. 3. Using Remote Switch (US 4480/3), activate fuel pump for 10 seconds. Minimum fuel flow should be 12-13 ounces (.8L).

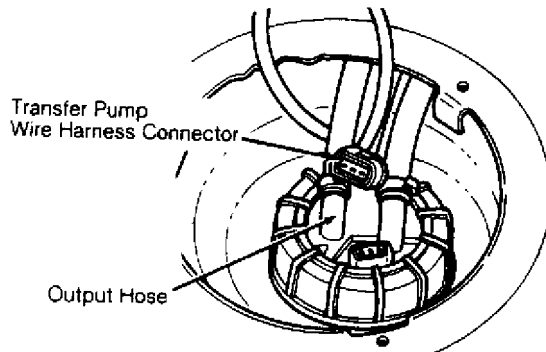


Fig. 3: Transfer Pump Fuel Volume Check (Typical)
Courtesy of Volkswagen United States, Inc.

Main Fuel Pump Volume Check (Cabriolet)

1) Remove fuel return line located near left strut tower.

Remove fuel tank cap. Attach a piece of hose between return line and a graduated container.

2) Activate fuel pump for 30 seconds by removing fuel pump relay and attaching jumper wire between terminals No. 30 and No. 87. Remove fuel pump relay from fuse/relay block. Compare volume with specifications.

Main Fuel Pump Volume Check (Fox)

1) Disconnect wire harness connector from fuel pump. See Fig. 4. With voltmeter attached to terminals, activate fuel pump by removing fuel pump relay and attaching jumper wire between terminals No. 30 (Red) and No. 87 (Red/White).

2) Record voltage. Remove fuel line from outlet side of accumulator. See Fig. 4. Attach a piece of hose between return line and a graduated container. Activate fuel pump for 15 seconds. Compare volume with specifications given in FOX MAIN FUEL PUMP VOLUME table.

FOX MAIN FUEL PUMP VOLUME TABLE

Fuel Pump Voltage		Fuel Delivery
		0z. (L)
8.0	.....	10.1 (.3)
10.0	.....	17.0 (.5)
12.5	.....	20.3 (.6)
14.0	.....	27.2 (.8)

F - BASIC TESTING

Article Text (p. 6)

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

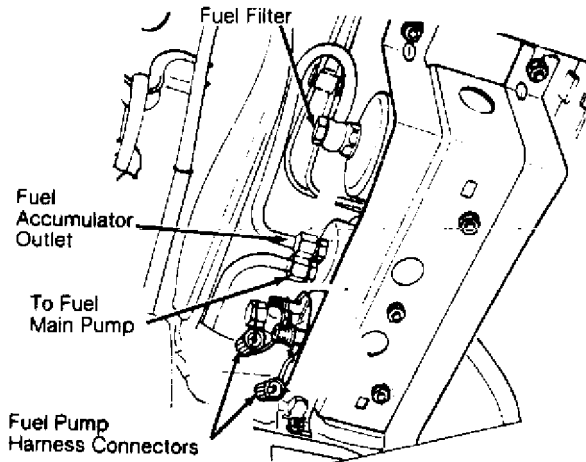


Fig. 4: Fox Main Fuel Pump Mounting Arrangement
Courtesy of Volkswagen United States, Inc.

Main Fuel Pump Volume Check (Golf & Jetta)

1) Remove fuel return line. Attach a piece of hose between feed hose connection and a graduated container. Remove fuel pump relay and connect Remote Switch (US 4480/3). Using switch, activate fuel pump for 30 seconds. Compare volume with specifications given in GOLF & JETTA MAIN FUEL PUMP VOLUME table.

GOLF & JETTA MAIN FUEL PUMP VOLUME TABLE

Fuel Pump Voltage		Fuel Delivery Oz. (L)
9.8	.....	11.0 (.3)
11.0	.....	16.0 (.5)
12.0	.....	20.0 (.6)

Fuel Pump Volume Check (Vanagon)

1) Disconnect and plug fuel return line at pressure regulator. Attach hose to return line fitting on pressure regulator. Place other end of hose in a graduated container.

2) Using a jumper wire, connect terminals No. 30 and 87 on fuel pump relay. Fuel pump should deliver one pint (.5L) of fuel in 30 seconds. If not, check for fuel lines, fuel filter and pump.

FUEL PUMP PERFORMANCE TABLE

Application		Volume in 30 sec. Pts. (L)
Cabriolet (1)	.....	(2) 1.5 (.75)

F - BASIC TESTING

Article Text (p. 7)

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

Fox	(1)
Vanagon	1 (.5)
Golf, Golf GT, Jetta	(2)

(1) - See FOX MAIN FUEL PUMP VOLUME table.

(2) - See GOLF & JETTA MAIN FUEL PUMP VOLUME table.

AA

IGNITION CHECKS

Spark

1) Using an ohmmeter, check resistance of each spark plug wire. See HIGH TENSION WIRE RESISTANCE table. Check for a strong Blue spark at coil wire and each spark plug wire by holding wire terminal 5/16" ground while cranking engine.

2) Disconnect and inspect all related ignition system connectors and harness. Clean or repair as necessary. If okay, remove negative battery cable. Disconnect secondary lead from coil Remove primary leads from ignition coil.

3) Using ohmmeter, check resistance between primary terminals of coil. Check secondary resistance between coil secondary terminal and primary positive terminal. Replace coil if readings are not within specifications. See IGNITION COIL RESISTANCE table.

HIGH TENSION WIRE RESISTANCE TABLE

AA

Application	Ohms
-------------	------

Cabriolet, Golf, & Jetta

Coil Wire Only	(1)
Spark Plug Wire Only	(1)
Spark Plug Connector	4000-6000
Suppressor (2)	600-1400

Fox

Coil Wire With Connectors	1600-2400
Spark Plug Wire With Connectors	4800-7200
Spark Plug Connector	14000-6000
Suppressor (2)	800-1200

Vanagon

Coil Wire With Connector	11200-2800
Spark Plug Wire With Connector	14600-7400
Spark Plug Connector	4000-6000
Suppressor (2)	600-1400

(1) - Check for continuity.

(2) - Suppressor is located between ignition wire and distributor cap.

AA

IGNITION COIL

F - BASIC TESTING

Article Text (p. 8)

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

IGNITION COIL RESISTANCE TABLE (OHMS)

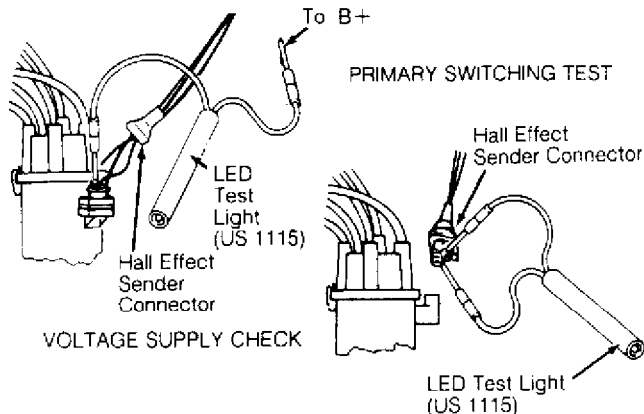
Application			Primary	Secondary
Fox	.60-.70	2500-3500		
All Other Models	.52-.76	2400-3500		

DISTRIBUTOR

Hall Sender (Cabriolet, Golf & Jetta)

1) Remove coil secondary and attach to ground. Disconnect hall sender wire harness connector at distributor. Using a LED Test Light (US 1115), check for voltage between outer terminals of connector. See Fig. 5. With ignition on, light should be on. If not, check wiring for short or open circuit. If not, replace ignition control unit.

2) If light came on in step 1), pull back hall sender boot to expose contact terminals. Apply LED Test Light (US 1115) probe to center contact and battery positive terminal. See Fig. 5. Observe test light while cranking engine. If test light blinks, hall sender is okay. If not, replace hall sender.



121505

Fig. 5: Typical Hall Sender Test Procedure
Courtesy of Volkswagen United States, Inc.

Hall Sender (Fox)

1) Remove coil secondary and attach to ground. Disconnect hall sender wire harness connector at distributor. Using a voltmeter, measure voltage between outer terminals of connector. With ignition on, minimum voltage should be 5 volts. If not, replace ignition control unit located under rear seat or in luggage compartment.

2) If voltage was okay in step 1), pull back hall sender boot to expose contact terminals. Apply LED Test Light (US 1115) probe to center contact and battery positive terminal. See Fig. 5. Observe test light while cranking engine. If test light blinks, hall sender is okay. If not, replace hall sender.

Ignition Control Unit (Except Vanagon)

F - BASIC TESTING

Article Text (p. 9)

1989 Volkswagen Golf

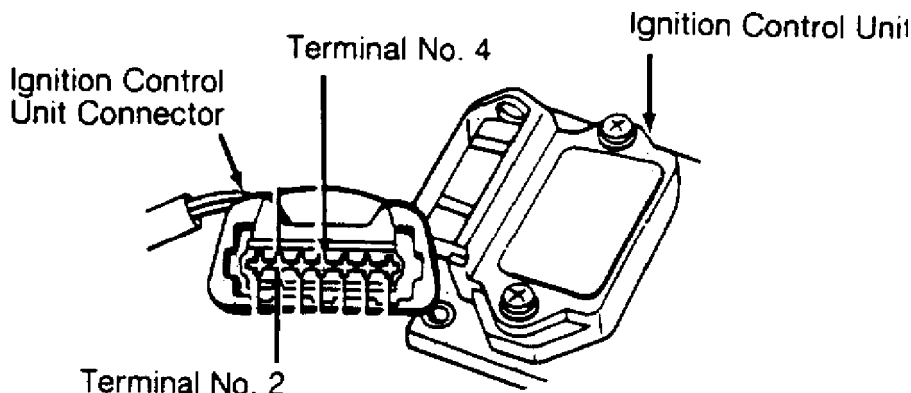
For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

1) Perform SPARK check. If secondary spark is present, ignition control unit is okay. If not, turn ignition off. Disconnect ignition control unit wire harness connector. Turn ignition on. Using a voltmeter, measure voltage between terminal No. 2 (-) and terminal No. 4 (+) of connector. See Fig. 6.

2) Voltage should be present. If not, ensure continuity exists between terminal No. 2 and ground. Continuity must also exist between terminal No. 4 and ignition coil positive terminal. Repair wiring if necessary. If wiring is okay, replace ignition control unit.



50A01783

Fig. 6: Typical Ignition Control Unit Voltage Supply Check
(Except Vanagon)

Courtesy of Volkswagen United States, Inc.

Hall Sender (Vanagon)

1) Remove coil secondary and attach to ground. Disconnect hall sender wire harness connector at distributor. Using a voltmeter, measure voltage between outer terminals of connector. With ignition on, minimum voltage should be 10 volts. If not, replace control unit located under rear seat or in luggage compartment.

2) If voltage was okay in step 1), pull back hall sender boot to expose contact terminals. Apply LED Test Light (US 1115) probe to center contact and other probe alternately to outer contacts while cranking engine. If test light blinks, hall sender is okay. If not, check wiring for short or open circuit. If wiring is okay, replace hall sender.

Ignition Control Unit (Vanagon)

1) Turn ignition off. Attach DVOM to primary terminals of ignition coil. Disconnect hall sender wire harness connector from distributor. Turn ignition on.

2) While observing DVOM reading, attach center terminal of connector to ground for 3 seconds. DVOM reading should briefly increase to 4.5 volts. If not, check wiring for short or open circuit. If wiring is okay, replace ignition control unit.

IDLE SPEED, CO LEVEL & IGNITION TIMING

F - BASIC TESTING

Article Text (p. 10)

1989 Volkswagen Golf

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Monday, August 23, 1999 11:52PM

Ensure idle speed, CO level and base ignition timing are set to specification. If necessary, see D - ADJUSTMENTS article.

IDLE SPEED & CO LEVEL TABLE

Application			Idle RPM	CO Level %
Cabri o l e t	.....	850- 1000	.....	...
Fox	.....	800- 1000	.....	0. 5- 1. 5
Gol f	.....	800- 1000	.....	0. 3- 1. 2
Gol f GT	.....	800- 900	.....	0. 3- 1. 2
Jetta	.....	800- 1000	.....	0. 3- 1. 2
Vanagon	.....	830- 930	.....	0. 3- 1. 2

IGNITION TIMING TABLE (Degrees BTDC @ RPM)

Application		Checking	Adjusting
1. 8L	.....	4- 8 @ 2250- 2350	... 5- 7 @ 2250- 2350
2. 1L (1)	...	4- 8 @ 2250- 2350	... 5- 7 @ 2250- 2350

(1) - With coolant temperature sensor disconnected.

SUMMARY

If no faults were found while performing BASIC TESTING, proceed to H - TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO-START, etc.), or intermittent diagnosis procedures.

END OF ARTICLE