

## D - ADJUSTMENTS

### Article Text

1989 Volkswagen Golf  
For Volkswagen Technical Site  
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Monday, August 23, 1999 11:45PM

#### ARTICLE BEGINNING

##### 1989 ENGINE PERFORMANCE

##### Volkswagen On-Vehicle Adjustments

Volkswagen; Cabriolet, Fox, Golf,  
Golf GT, Jetta & Vanagon

#### ENGINE COMPRESSION

##### ENGINE COMPRESSION TEST

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.

##### ENGINE COMPRESSION TEST

AA			
Model	Standard		Minimum
	psi (kg/cm <sup>2</sup> )		psi (kg/cm <sup>2</sup> )
Cabriolet .....	131-174 (9.0-12.0)	.....	109 (7.7)
Fox .....	131-174 (9.0-12.0)	.....	102 (7.0)
Golf & Jetta .....	131-174 (9.0-12.0)	.....	102 (7.0)
Golf GT .....	145-189 (10.2-13.2)	.....	109 (7.7)
GTI .....	131-174 (9.0-12.0)	.....	109 (7.7)
Vanagon .....	87-131 (6.1-9.2)	.....	73 (5.2)
AA			

#### VALVE CLEARANCE

NOTE: All models use hydraulic lifters. No adjustments are required.

#### IGNITION TIMING

NOTE: Basic timing readings are only valid when engine idle speed and the idle mixture are within specifications.

#### CHECKING & ADJUSTING

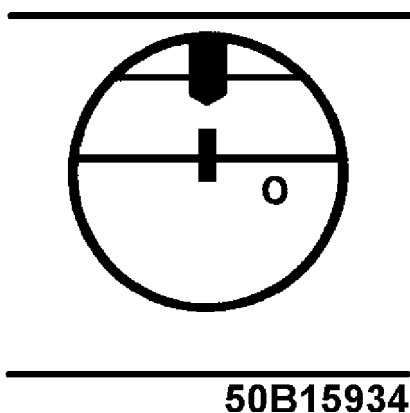
All (Except Vanagon)

1) Warm engine to normal operating temperature (cooling fan should cycle at least once). Remove the 27 mm plastic plug from timing check hole on transaxle bellhousing (if equipped).

2) With ignition off, connect a tachometer and timing light to vehicle. Start engine and briefly raise engine speed above 3000 RPM a few times, then allow engine to idle normally. With distributor

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3) If an adjustment is needed, turn ignition off and loosen distributor hold-down bolt just enough to move distributor by hand. Start engine and allow to idle. Turn distributor until timing mark is aligned with pointer in bellhousing. Stop engine and tighten hold down bolt to 18 ft. lbs. (24 Nm). Readjust if necessary and install plastic plug if removed.



3) If an adjustment is needed, turn ignition off and loosen distributor hold-down bolt just enough to move distributor by hand. Start and allow engine to idle. Turn distributor until timing mark notch on V-belt pulley is aligned with parting line on crankcase.

[illegible]

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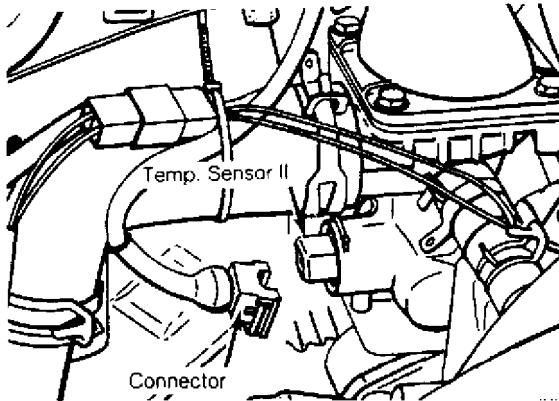


Fig. 2: Coolant Temperature Sensor (Vanagon)  
Courtesy of Volkswagen United States, Inc.

### IDLE SPEED & MIXTURE

**NOTE:** Mixture adjustment is NOT a part of normal tune-up procedure and should not be performed unless mixture control unit is replaced or vehicle fails emissions testing.

#### COLD (FAST) IDLE

Fast idle RPM is not adjustable.

#### IDLE SPEED & MIXTURE ADJUSTMENT

##### Vanagon

1) Warm engine to normal operating temperature. Engine oil temperature must be at least 176°F (80°C). Connect an inductive tachometer or Tester (VW 1367) to alternator, Test Lead (VW1473) to ignition coil, and timing light lead to No. 1 spark plug wire.

2) Start and run engine at idle. Disconnect electrical connector at coolant temperature sensor. See Fig. 2. Raise engine speed to specification and check and/or adjust ignition timing.

3) Ensure all electrical accessories are off. Disconnect and plug crankcase breather hose. Ensure throttle valve switch is operating properly and throttle screw stop is properly adjusted. Switch must be closed with engine at idle.

4) Ensure that idle stabilizer valve hums/vibrates when ignition is turned on. Ensure test equipment is properly connected. See Fig. 3. Using Adapter (Sun 120.239), connect CO tester at probe receptacle on left exhaust pipe.

5) With ignition off, disconnect idle stabilizer valve and oxygen sensor. Check idle speed. If necessary, turn idle speed screw until idle speed is correct. See Fig. 4. Check CO reading. If CO reading is within specifications, remove intake air sensor. Center punch plug in CO adjusting hole.

6) Using a 3/32" drill bit, drill hole 5/32" deep in center of plug. Remove any metal shavings. Screw in a sheet metal screw and remove plug using pliers to pry plug out.

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7) Start engine. Set idle speed and CO reading by alternately turning mixture and idle speed adjustment screws. Reconnect oxygen sensor connector and idle stabilizer control valve. Let engine idle for 2 minutes.

8) Check CO content. If incorrect, repeat adjusting procedure. If correct, remove and plug hose at pressure regulator. CO reading should increase briefly and then drop in value.

9) If CO reading changes as specified, turn engine off and drive in new adjusting hole plug flush with air intake sensor. Remove all test equipment and reconnect all hoses and wiring.

#### All Others

1) Warm engine at normal operating temperature. Radiator fan must come on at least once and engine oil temperature must be at least 176°F (80°C). Turn off all electrical equipment, including A/C and radiator fan.

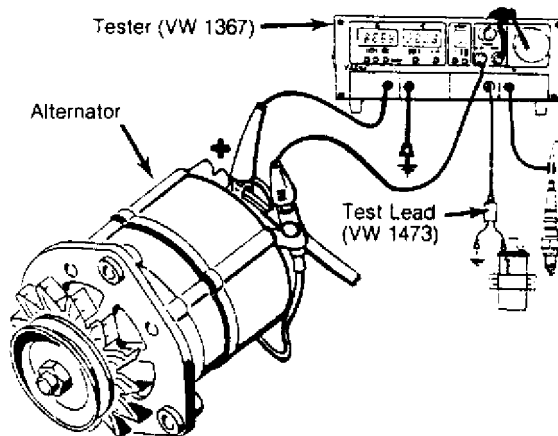


Fig. 3: Tester (VW 1367) & Test Lead (VW 1473) (Vanagon)  
Courtesy of Volkswagen United States, Inc.

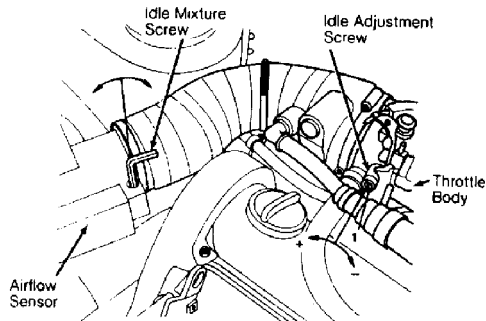


Fig. 4: Idle Mixture Screw & Idle Adjustment Screw (Vanagon)  
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2) Disconnect all fuel pressure test equipment (if installed). If injection lines have been removed or replaced, run engine several times to 3000 RPM for about 2 minutes.

3) Ensure idle switch is properly adjusted. Pull crankcase breather hoses off valve cover and air filter and vent to atmosphere. On Fox, remove suction hose from carbon canister.

4) On all other models, disconnect "T" fitting from carbon canister at air intake boot. Turn "T" fitting 90 degrees and insert blank side with .059" (1.5 mm) restrictor into hole in intake air boot. If vehicle is not equipped with this type of connector, use Plug (026 133 382D) with .059" (1.5 mm) orifice.

5) On all models, connect an inductive tachometer or Tester (VW 1367) and Test Lead (VW 1473). See Fig. 3. Remove C0 probe receptacle cap and connect C0 meter. Ensure fit is snug to prevent exhaust leaks. Connect Digital Multimeter (US 1119) with Adapter (VW 1315 A/1) to differential pressure regulator. See Fig. 5.

6) Connect adapter between connector and regulator. Connect multimeter to adapter and turn switch to "DCA 200 milliamps" range.

7) Check and/or adjust engine idle speed. Check ignition timing and adjust as required. Read and compare current (4-16 milliamps) and C0 values to specifications. Turn engine off.

8) If C0 reading is more than 1.2% at current reading of 4-16 milliamps, check for exhaust system leaks, ignition timing, injector inserts for leaks, and fuel distributor for uneven fuel distribution. If required, seal injector inserts with sealing compound and tighten to 15 ft. lbs. (20 N.m.).

9) If current reading is less than 4 milliamps or more than 16 milliamps, adjustment must be made with C0 adjustment screw as follows: remove boot from mixture control unit. Center punch hole in C0 adjusting hole and drill a 3/32" hole to a depth of 5/32". DO NOT drill completely through as adjustment screw will be damaged.

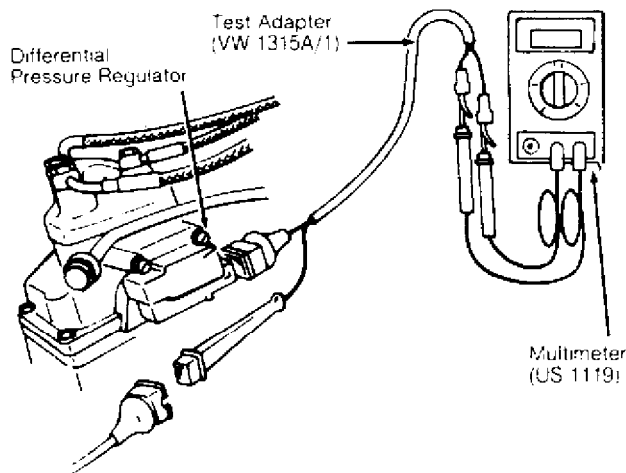


Fig. 5: Digital Multimeter Hook-up  
Courtesy of Volkswagen United States, Inc.

10) Install a 1/8" sheet metal screw and remove plug using pliers. Start engine and run at idle. Adjust current reading to 10 milliamps by turning C0 adjustment screw with Wrench (P 377). Turn

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screw clockwise to lower reading, counterclockwise to raise reading.

11) Readjust idle speed if required. Turn engine off. Install new plug in mixture control unit and seat plug flush with unit. Remove all test equipment and reconnect all hoses and wiring.

**NOTE:** Do not push down on adjustment screw and do not accelerate engine with wrench in place. Remove wrench after each adjustment and accelerate engine briefly before measuring current reading. Always adjust from a high to a low reading.

#### IDLE SPEED & CO LEVEL TABLE

AA			
Application	Idle RPM	CO Level	
Cabriolet .....	850- 1000 .....	...	
Fox .....	800- 1000 .....	0.5- 1.5%	
Golf .....	800- 1000 .....	0.3- 1.2%	
Golf GT .....	800- 900 .....	0.3- 1.2%	
GTI .....	800- 1000 .....	0.3- 1.2%	
Jetta .....	800- 1000 .....	0.3- 1.2%	
Vanagon .....	830- 930 .....	0.3- 1.2%	
AA			

#### DIGIFANT 2 System

1) Remove the cap from the CO tap tube that comes from the exhaust manifold and connect an exhaust gas analyzer. Disconnect the coolant temperature sensor harness connector.

2) Raise the oil dipstick slightly to vent the crankcase). Disconnect and plug the crankcase ventilation hose, or clamp the hose tightly to close it off. Be careful that the clamp does not damage the hose.

3) Start the engine. Briefly raise the engine speed to at least 2100 RPM, and let it return to idle. Repeat this step four times to cancel the control unit's hot-start fast idle function.

4) Check idle speed and adjust if necessary. With the crankcase ventilation plugged and the coolant sensor disconnected, idle speed should be 800  $\pm$  50 RPM. At idle the CO reading should be within the specifications given in Fig. 6.

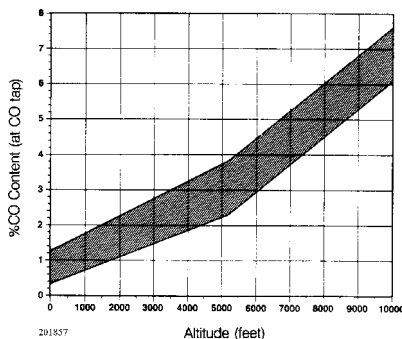


Fig. 6: Idle Mixture CO Tolerance Chart  
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5) To change the idle mixture C0, remove the anti-tampering plug in the top of the air flow sensor housing. With the plug removed, adjust the idle mixture using a 5 mm hex wrench. Adjust the C0 idle mixture to the specification on Fig. 7.

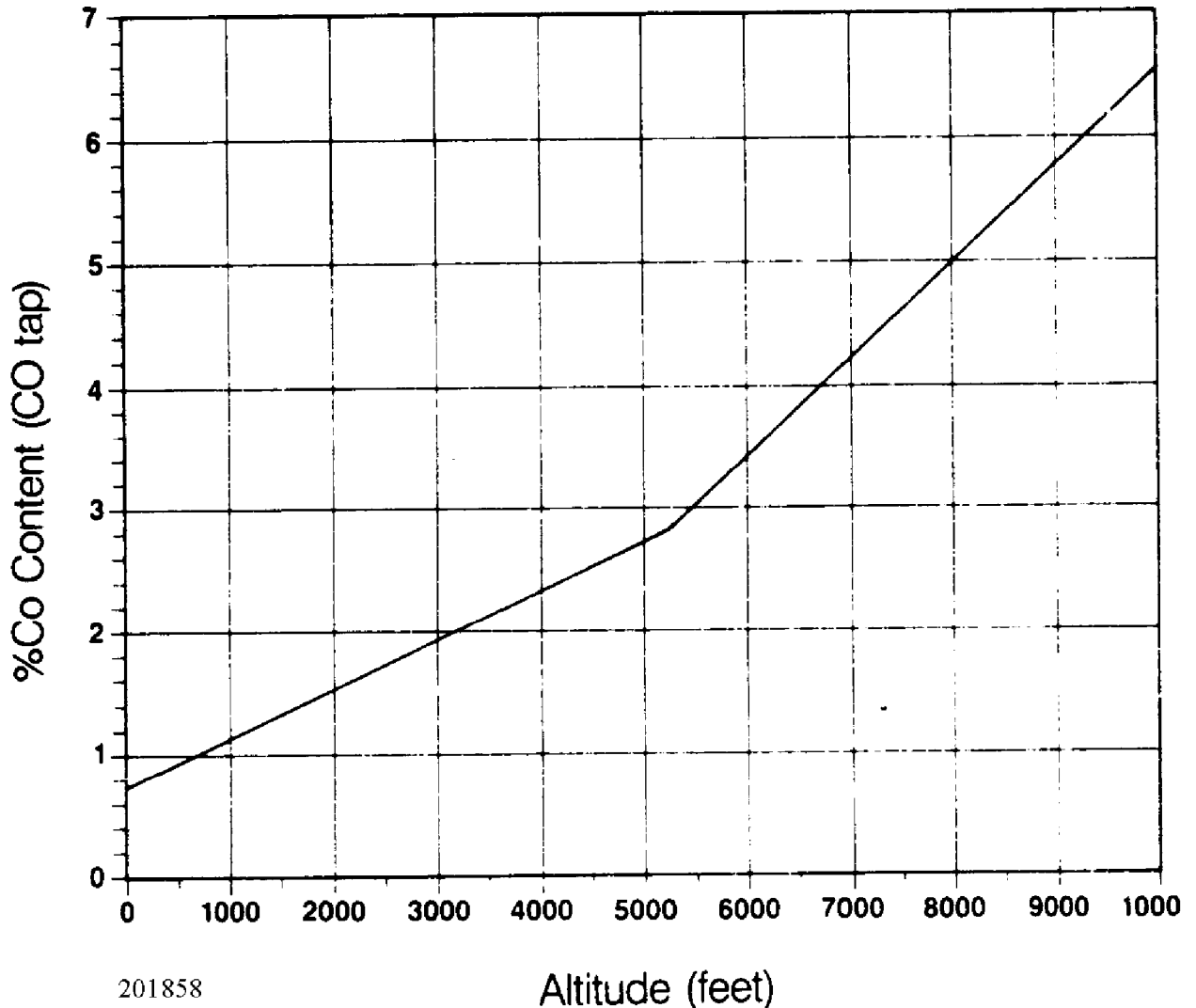


Fig. 7: Idle Mixture C0 Specification Chart  
Courtesy of Volkswagen United States, Inc.

### THROTTLE POSITION SENSOR (TPS)

#### THROTTLE POSITION SENSOR (TPS) ADJUSTMENT

1) Raise sensor plate to lower edge of air flow sensor (fuel distributor side) using Tool (US 1348-1). Connect test Adapter (VW 1501) to sensor switch terminal and wiring harness connector.

2) Connect digital multimeter to test adapter leads No. 1 and 2 and switch multimeter to volts scale. Turn ignition switch to "ON" position. Loosen sensor hold-down screws.

3) Adjust sensor position until it reads 0.2-0.3 volts.

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Tighten screws. Lift sensor plate up to stop, voltage reading should be approximately 7 volts. Secure screws with locking paint.

#### THROTTLE STOP SCREW

**NOTE:** Stop screw is set by manufacturer and should not be moved.

##### Throttle Plate Stop Screw

If basic factory setting has been changed, turn throttle stop screw counterclockwise until there is a gap between stop and screw. Turn screw in until it just touches stop. Turn screw 1/2 turn (180 degrees) further. Check and adjust idle speed and C0.

#### IDLE SWITCH

##### IDLE SWITCH ADJUSTMENT

##### Idle Switch (Except Fox)

1) Connect Test Harness (VW 1501) between vehicle harness and throttle switch lead. Turn ignition on. Connect voltmeter between terminal No. 1 of test harness and ground. If battery voltage is NOT present, check voltage supply between terminal no. 2 of test harness and ground.

2) If battery voltage is NOT present, check and repair wiring. See **WIRING DIAGRAMS** at end of this article for wiring color and terminal numbers. If battery voltage is present, open and slowly close throttle valve.

3) Check switch-on point of idle switch, using feeler gauge between throttle lever and idle stop. Switch-on point gap should be .006-.002" (.15-.05 mm) before idle stop. See Fig. 8. If switch-on point is incorrect, loosen and adjust idle switch position. Idle switch is located on underside of throttle valve housing, opposite idle stop.

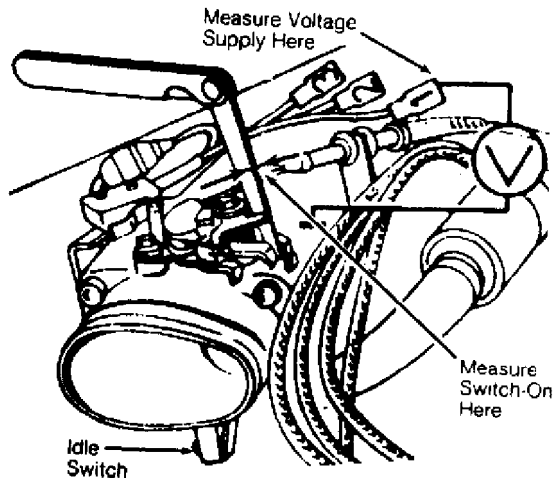


Fig. 8: Checking Idle Switch Adjustment  
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**END OF ARTICLE**