BOSCH HALL EFFECT ELECTRONIC IGNITION SYSTEM

Audi
Volkswagen
All Calif. Models
Federal Models
Rabbit with Carburetor

DESCRIPTION

The Bosch Hall Effect electronic ignition system consists of a breakerless Hall Effect distributor, an ignition control unit, ignition coil, ignition switch, and battery.

Closely allied with the ignition system is an idle stabilizer, a solid state control unit located between the ignition control unit and the distributor. It replaces the distributor in sending signals to the ignition control unit when engine speeds fall below 940 RPM.

The Hall Effect distributor has normal centrifugal and vacuum advance mechanisms. *See Figs. 1 and 10.*

OPERATION

The Hall sending unit (pick-up coil) is mounted inside the distributor on a switch plate. A trigger wheel (segmented shutter) attached to the distributor shaft under the rotor, passes in and out of the air gap of the Hall sending unit.

At speeds greater than 940 RPM, the Hall sending unit signals the ignition control unit to make and break the primary circuit current flow in the ignition coil. There is one trigger wheel shutter or tooth for each cylinder of the engine. Shutter width determines dwell, which is not adjustable.

As the ignition control unit breaks the primary circuit through the coil, secondary voltage is released through high tension wiring, distributor cap and rotor to spark plugs. *See Fig. 1.*

If engine speed drops below 940 RPM, the idle stabilizer takes over the duty of producing the signal to the ignition control unit, instead of the Hall sending unit. Mounted between the distributor and the ignition control unit, the idle stabilizer senses engine speed earlier, causing ignition timing to advance. Advancing ignition timing causes idle speed to increase, and the Hall sending unit to resume its normal operation.

SPECIFICATIONS

Centrifugal & Vacuum Advance – *See Specifications Pages in this section.*

ADJUSTMENTS

Hall Effect Air Gap – Air gap is pre-set and cannot be adjusted.

TESTING

NOTE – *Be sure battery is at full charge and in good condition before making tests. Check all wiring harnesses, ignition switch, ignition coil, spark plug cables and connectors.*

TESTING PRECAUTIONS

CAUTION – *Do not connect any 12 volt test instruments on terminal 15 of ignition coil, as this could damage electronic components. Do not connect any condenser/suppressor or powered test light to terminal 1 of ignition coil. Only connect and disconnect test instruments when ignition is turned "OFF".*

TACHOMETER ADAPTER

1) An adapter is necessary when attaching a conventional tachometer into the Hall Effect electronic ignition system. *See Fig. 2.* Tachometer black lead is attached to engine ground. Attach adapter to tachometer red lead.

2) Adapter is formed from 2 wires soldered together at one end. One wire (leading to coil terminal 1) must be equipped with a 1000 ohm, 1 watt resistor. The second wire (also leading to engine ground) must be equipped with a 12,000 ohm, 1 watt resistor. Both resistors should be soldered to attaching wires.

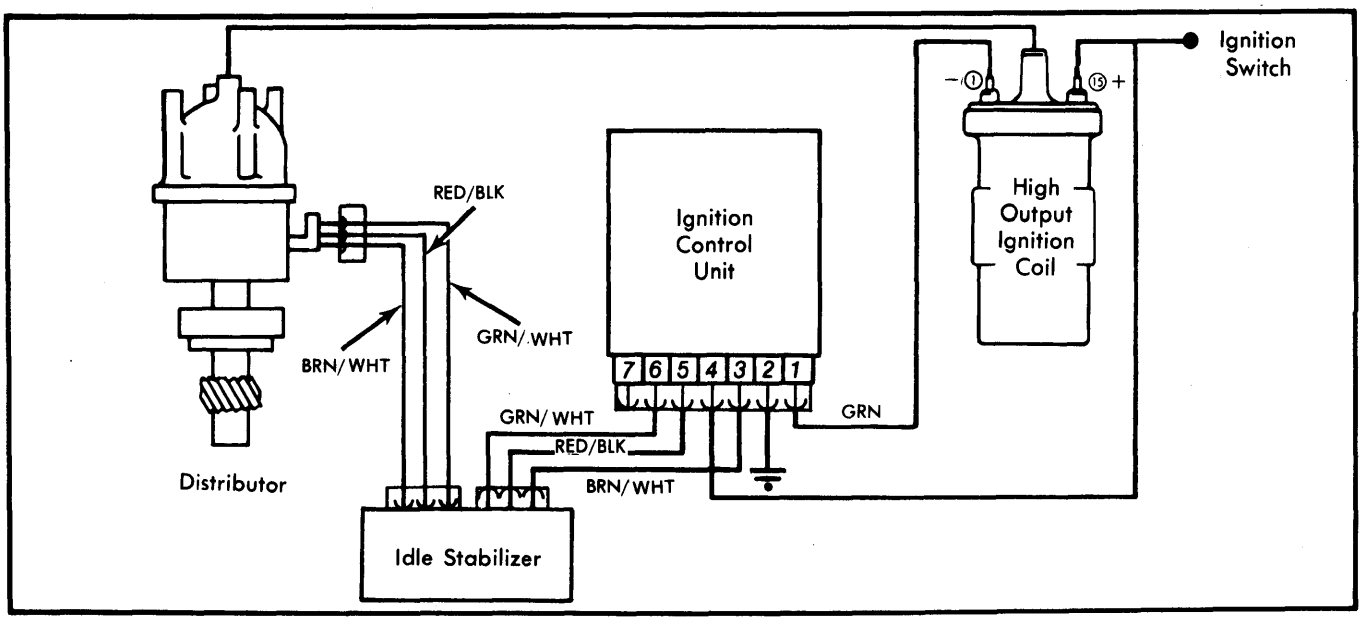

Fig. 1 Schematic Diagram of Bosch Hall Effect Electronic Ignition System

BOSCH HALL EFFECT ELECTRONIC IGNITION SYSTEM (Cont.)

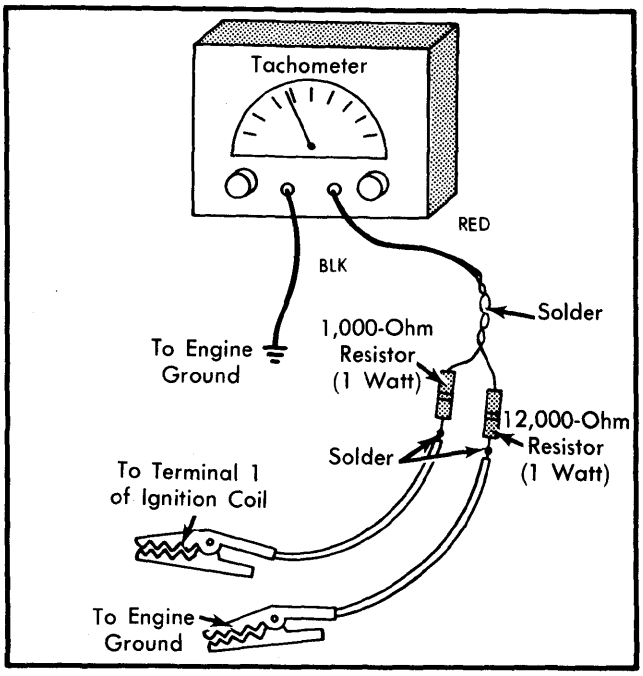

Fig. 2 Assembling Tachometer Adapter

SYSTEM SPARK CHECK

1) If vehicle will not start, check for secondary voltage. Remove coil high tension wire from distributor cap. Hold wire approximately ¼" (6 mm) from engine ground, using insulated pliers.

2) Crank engine and check for a constant blue spark at gap to ground. If there is a good spark, check distributor cap, rotor, spark plug wires, spark plugs, fuel system and engine mechanical components. If there is no spark or only a very weak spark, perform the following checks.

IDLE STABILIZER CHECK

1) If engine will not start, check idle stabilizer first. *See Fig. 3.* Remove both connectors from idle stabilizer and connect them together. This by-passes the idle stabilizer connecting the ignition control unit directly to the distributor. If engine now starts, idle stabilizer is defective.

2) In other cases where engine starts but idle stabilizer is suspected, by-pass the stabilizer by removing the 2 connectors and connecting them together. Turn off all electrical accessories and set idle speed and timing.

3) Then, reconnect the idle stabilizer. Ignition timing at idle may fluctuate, but should be between 3° ATDC (±3°). Turn all power accessories in step **2)** back on. Ignition timing should be advanced to keep engine speed to specifications. If not, replace idle stabilizer.

NOTE – *An alternative manner of checking idle stabilizer can be used. With engine oil temperature above 140° F (60° C), connect test equipment according to manufacturer's instructions. Start engine and slowly increase engine speed while applying foot brake. Let engine idle. On vehicles with manual transmission, engage 4th gear and release clutch slowly. On vehicles with automatic transmission, move selector into "DRIVE" position. As engine load increases, ignition timing must advance. If not, idle stabilizer control unit is defective and must be replaced.*

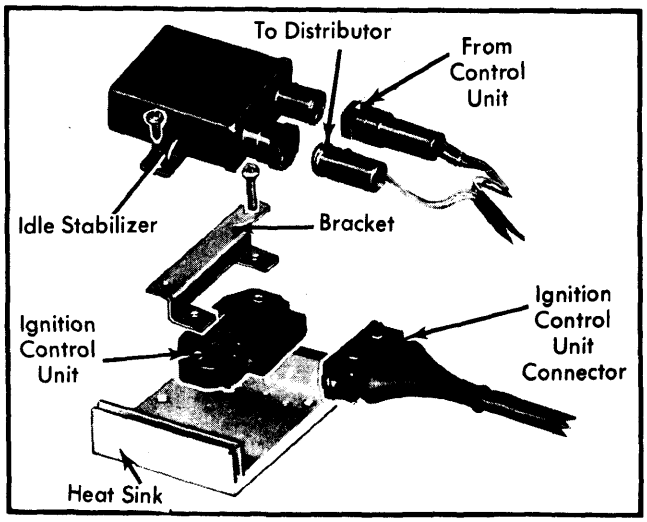

Fig. 3 Idle Stabilizer and Ignition Control Unit

SPARK PLUG WIRE RESISTANCE

If spark plug connectors have sheet metal jackets carrying the following symbol (–▶◀–), they contain "air gap" resistors. Wires cannot then be checked for resistance using an ohmmeter. An oscilloscope must be used.

ROTOR RESISTANCE CHECK

Connect leads of an ohmmeter set in x1000 scale to distributor rotor. Resistance should be approximately 1000 ohms. If not to specification, replace rotor.

DISTRIBUTOR VOLTAGE CHECK

1) Remove connector from distributor and connect voltmeter leads to each of the two outer terminals. *See Fig. 4.* Turn ignition switch "ON". Battery voltage should be read on voltmeter.

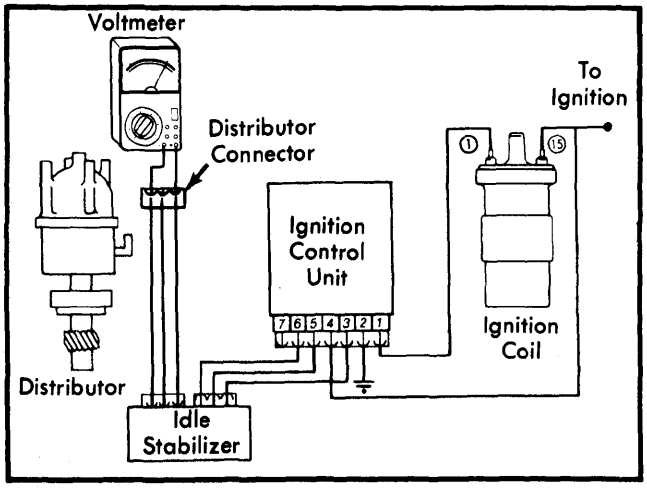

Fig. 4 Voltmeter Hookup for Distributor Voltage Check

2) If there is no voltage, check wiring harness from distributor to control unit before proceeding to Control Unit Voltage Check.

BOSCH HALL EFFECT ELECTRONIC IGNITION SYSTEM (Cont.)

CONTROL UNIT VOLTAGE CHECK

1) Disconnect connectors from idle stabilizer and connect them to each other. Reconnect connector to distributor. Remove connector from electronic ignition control unit. See *Fig. 5*. Connect positive voltmeter lead to terminal 4 of control unit harness connector. Attach negative lead to terminal 2 (ground).

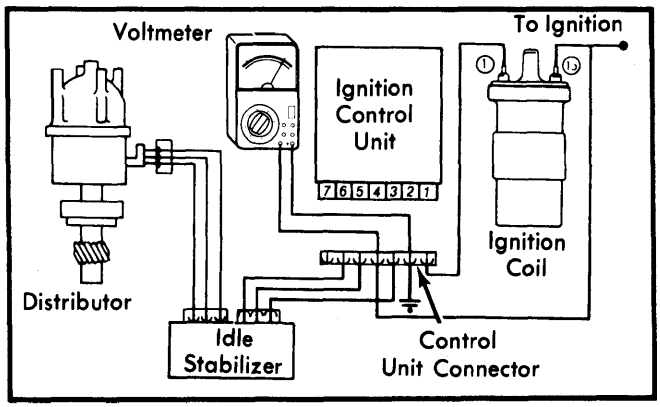

Fig. 5 Voltmeter Hookup for Control Unit Voltage Check

2) Turn ignition switch "ON". Voltmeter should register approximately 12 volts. If voltage at connector is within specification, replace defective control unit. If not within specification, check wiring circuit.

IGNITION COIL RESISTANCE CHECK

1) Remove all wires from ignition coil. Set an ohmmeter in the low scale and attach its leads to ignition coil primary terminals 1 and 15. See *Fig. 6*. Coil primary resistance should be .52-.76 ohm.

NOTE – *It may be impossible to check primary resistance with ordinary shop equipment. If electronic ignition checks OK, but there is no spark available at high tension wire, replace ignition coil and retest.*

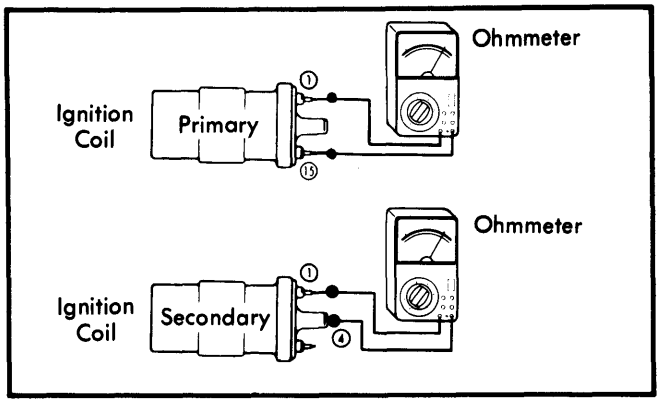

Fig. 6 Ohmmeter Hookups for Coil Resistance Checks

2) Reset ohmmeter to x1000 scale and connect leads to primary terminal 1 and to coil tower, terminal 4. See *Fig. 6*. Resistance should read 2400-3500 ohms.

3) If either reading is not to specification, replace ignition coil.

IGNITION CONTROL UNIT CHECK

Vanagon Only – 1) Remove connector from distributor. Connect positive lead of voltmeter to terminal 15 of ignition coil. Connect negative lead to terminal 1 of coil. See *Fig. 7*. Turn ignition switch "ON".

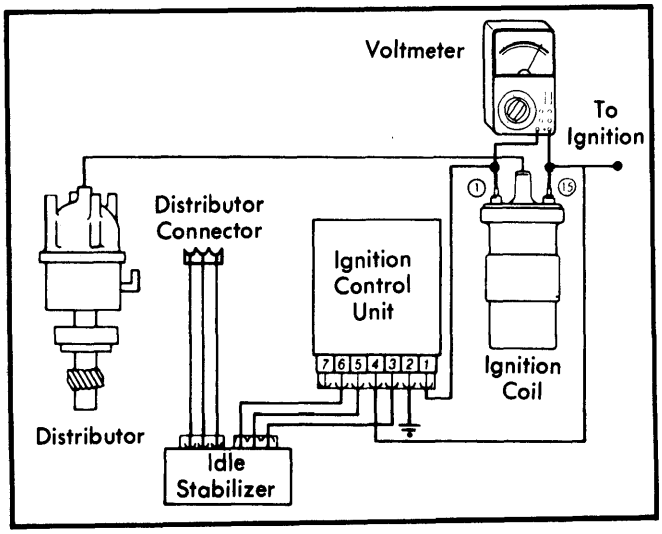

Fig. 7 Voltmeter Hookup for Ignition Control Unit Operation Check (Vanagon)

2) Voltage should be approximately 6 volts and then drop to zero (0) volts within 1 or 2 seconds. If not, replace ignition control unit. Also check ignition coil.

All Except Vanagon – 1) Disconnect both plugs at idle stabilizer control unit and connect them together. Attach positive lead of voltmeter to terminal 15 and negative lead to ground. Turn ignition switch "ON". Voltage must be present.

2) Disconnect coil high tension wire from distributor cap. Disconnect connector at distributor. Connect positive terminal of voltmeter to terminal 1 of ignition coil and negative lead to ground. Turn ignition switch "ON". A voltage reading of at least 12 volts should be read. If voltage drops below 12 volts within 1 second, turn ignition switch "OFF" and replace defective ignition control unit.

3) Disconnect green/white wire at connector on distributor and ground the wire. Voltage reading must be approximately 12 volts. Disconnect green/white wire from ground and voltage must drop shortly to 6 volts.

4) If voltage does not drop, replace defective ignition control unit. Connect voltmeter positive lead to red wire (connected to terminal 5) at distributor connector. Attach negative lead to brown wire (connected to terminal 3). Turn ignition switch "ON". Voltmeter must read about 10 volts. If not, replace ignition control unit.

5) If other tests fail to locate defective components, substitute a known good ignition control unit and retest for secondary voltage spark.

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HALL SENDING UNIT (GENERATOR) CHECK

1) Reconnect the control unit harness connector to control unit. See *Fig. 8*. Pull back rubber boot on connector. Attach voltmeter positive lead to connector terminal 6 and negative lead to terminal 3. Make sure connector is attached securely to control unit.

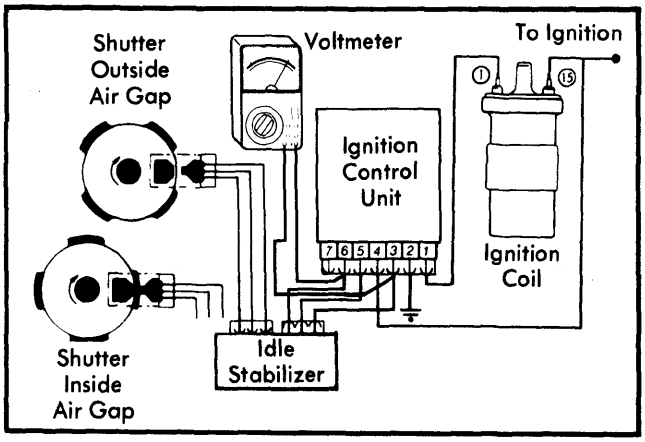

Fig. 8 Voltmeter Hookups for Hall Sending Unit Check

2) Turn ignition switch "ON". With trigger wheel shutter outside Hall sending unit air gap, check voltage reading. It should be 0.4 volts or less.

3) Now turn distributor until trigger wheel shutter is inside Hall sending unit air gap. See *inset in Fig. 8*. Voltmeter reading should increase to 9 volts.

4) Connect voltmeter leads in same manner to terminals 3 and 5 of control unit. See *Fig. 9*. Turn ignition switch "ON". Voltage should be a minimum of 7.5 volts.

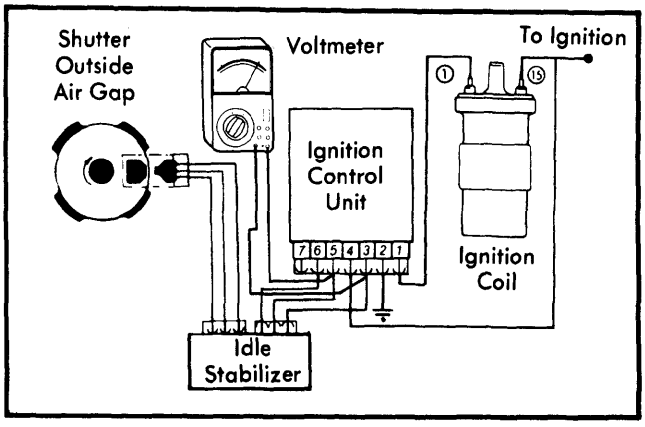

Fig. 9 Voltmeter Hookup for Final Hall Sending Unit Check

5) If any of the above voltage readings are incorrect, replace the Hall sending unit.

ALTERNATIVE HALL SENDING UNIT OPERATION CHECK

1) Disconnect high tension wire at distributor and connect it to ground. Connect a test light (4-24V) between terminal 1 and 15 of ignition coil. Crank engine with starter for approximately 5 seconds.

2) Test light must flicker. If not, replace Hall sending unit in distributor.

OVERHAUL

Disassembly – 1) Loosen ground strap and remove static shield from distributor cap. See *Fig. 10*. Remove cap, rotor, carbon brush and spring. Remove dust cover.

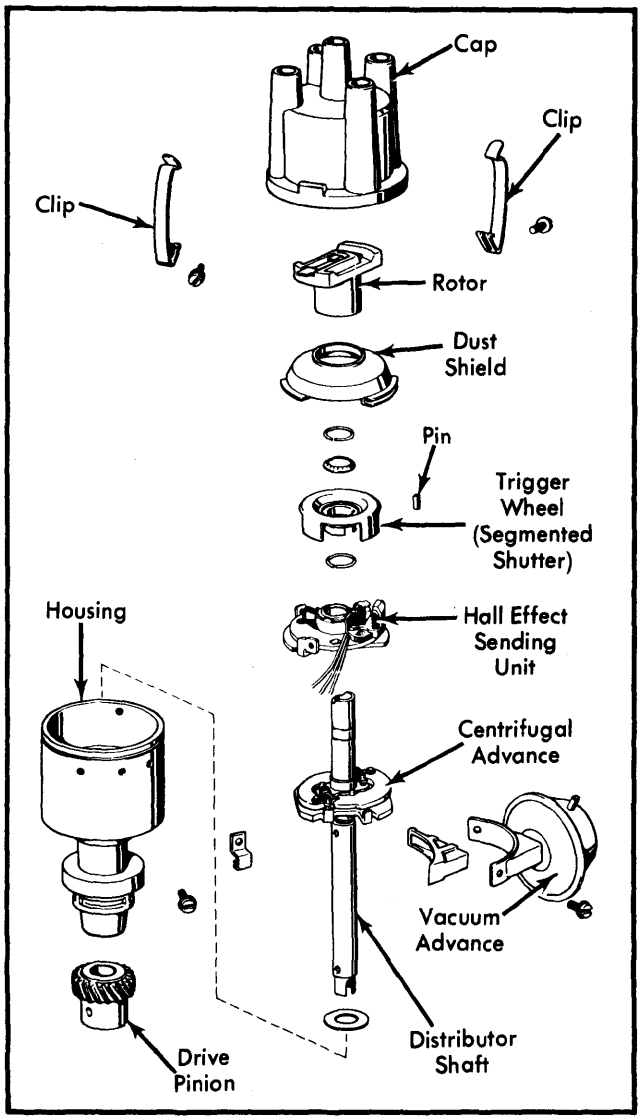

Fig. 10 Disassembled View of Bosch Hall Effect Distributor

2) Remove connector from distributor (Hall generator connector and harness leading to idle stabilizer). Remove retaining snap ring and trigger wheel (segmented shutter). Remove washers. Remove screws and lift out Hall sending unit and connecting socket.

3) Remove base plate and vacuum unit. Remove pin and distributor drive pinion and shims.

Reassembly – To reassemble, reverse disassembly procedure. Replace seals and check components for cracks, corrosion and wear. Clean cap before installing.