

BOSCH ELECTRONIC IGNITION SYSTEM

BMW	Porsche
320i	911SC
528i	924
633CSi	928
733i	Saab
Fiat	99
Strada	900
X1/9	Volvo
Mercedes-Benz	DL
280 Series	GL
450 Series	GT
Peugeot	GLE
604	Coupe

DESCRIPTION

The Bosch electronic ignition system consists of a control module, a breakerless distributor, a single or dual resistor (some models may have a resistor wire), a high output ignition coil, an ignition switch and battery. Standard centrifugal and vacuum advance mechanisms are used. See Fig. 1.

NOTE — Some Strada models are equipped with the Marelli Electronic Ignition system.

OPERATION

Inside the distributor, a trigger wheel turns with the distributor shaft. The trigger wheel has one tooth or lug for each engine cylinder. As the trigger wheel rotates past the lugs of the magnetic pick-up coil, a magnetic field is built up that continually builds and collapses. This produces a low voltage electrical signal.

This signal passes to the control module, which controls the dwell angle and at the same time interrupts the ignition coil's primary current. This induces the high secondary coil output voltage that fires the spark plugs.

SPECIFICATIONS

Dwell Angle — Controlled by Electronic Control Module. Not adjustable. See table later in this article.

Centrifugal & Vacuum Advance (and/or Retard) — See Specifications Tables in this section.

ADJUSTMENT

NOTE — No adjustment should be attempted on ignition system except spark plug gap and ignition initial timing. Air gap should be visually checked when testing, but if specified clearance does not exist, replace components. Air gap is non-adjustable.

TESTING

NOTE — Before testing ignition system, be sure battery is fully charged and in good condition, that all wires are sound and connections are good. Due to high voltage, use care when working on electronic ignition system.

SYSTEM SPARK TEST

1) If starter turns, but engine will not start or it fails to develop sufficient power, hold distributor end of coil wire about $\frac{3}{8}$ " (10 mm) from engine block and crank engine. See Fig. 2.

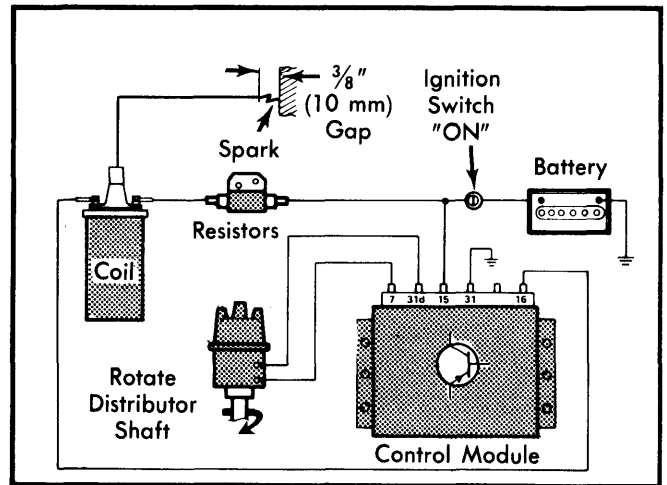


Fig. 2 Coil Wire Hookup for Making System Spark Test

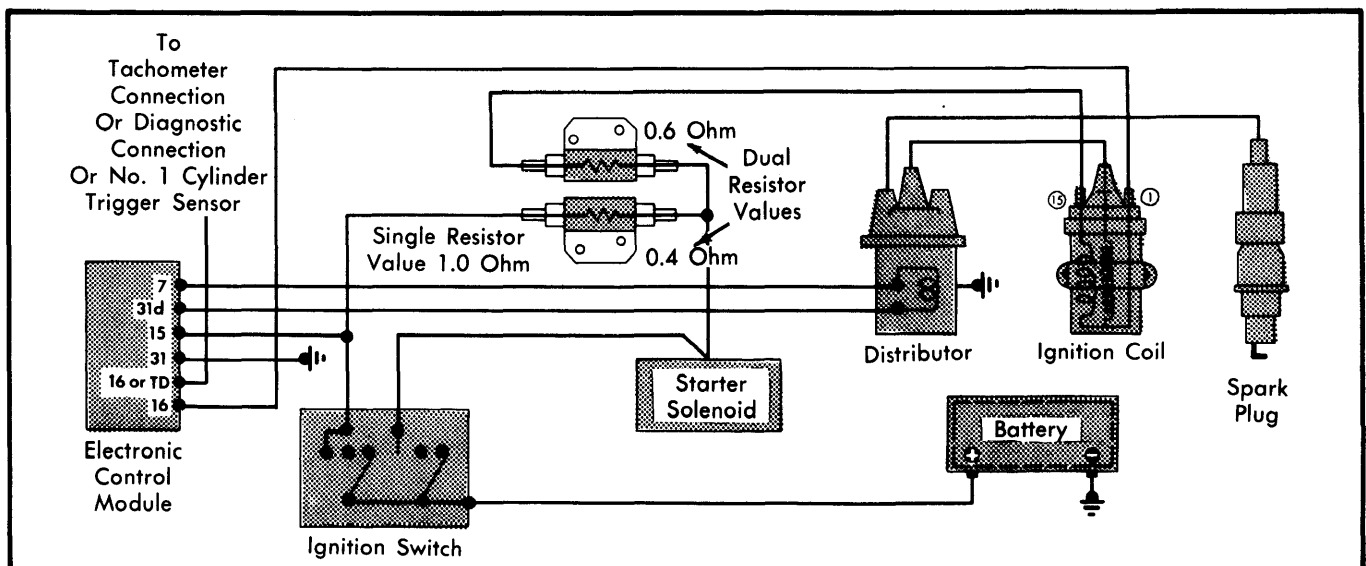


Fig. 1 Wiring Diagram of Typical Bosch Electronic Ignition System

Distributors & Ignition Systems

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2) If spark jumps gap, check distributor cap, rotor, cables and spark plugs. Be sure ignition timing and fuel system are OK. If no sparks occur, perform the following tests

ROTOR RESISTANCE CHECK

Set an ohmmeter to the x1000 scale. With ignition switch "OFF", attach ohmmeter leads to rotor. Resistance should be approximately 5,000 ohms.

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.

RESISTOR RESISTANCE CHECK

Set an ohmmeter in the low scale. Be sure ignition switch is "OFF". Check resistance of each resistor in the primary circuit. See Fig. 3. Some manufacturers use resistor wires instead of ballast resistors. Most use 2 ballast resistors.

Application	Ohms
BMW	0.4 and 0.6
Fiat Strada & X1/9	.85-.95
Mercedes-Benz	.35-.45 and .55-.65
Peugeot 604	0.5 and 0.5
Porsche	0.4 and 0.6
Saab	0.4 and 0.6
Volvo	1.0

Application	Primary	Secondary
BMW	.4	
Fiat Strada & X1/9	1.1-1.7	6,000-10,000
Mercedes-Benz	.38-.42	8,000-11,000
Peugeot 604	.33-.46	7,000-12,000
Porsche		
924	1.0-1.35	5,500-8,000
928	.33-.46	7,000-12,000
Saab	1.05-1.35	5,500-8,500
Volvo	1.0-2.0	

IGNITION COIL VOLTAGE CHECK

1) Connect voltmeter positive lead to positive coil terminal 15. Connect negative lead to terminal 1. Turn ignition switch "ON". A reading of 4-7 volts should be indicated. If less, check wires, connections at ignition switch, resistors, coil and control unit to eliminate voltage drop.

2) Connect voltmeter positive lead to negative coil terminal 1, and negative lead to a good ground. Reading should be 0.5-2.0 volts (maximum 2.0 volts). If previous tests and pick-up coil resistance, starting voltage and control module voltage checks prove OK, substitute a known good control module. If system is now operative, install new module.

STARTING VOLTAGE CHECK

Disconnect line leading to starter terminal 15a at the .4 ohm resistor (most models). Attach voltmeter and crank engine. Voltage should be the same as battery voltage. If not, check for break in electrical supply line or contact 15a in starter relay.

IGNITION COIL RESISTANCE CHECK

Turn ignition switch "OFF". Using an ohmmeter set at the low scale, attach leads to ignition coil primary terminals 1 and 15 (wires removed). See Fig. 3. Take primary resistance reading. Set ohmmeter to x1000 scale, then connect ohmmeter leads to negative terminal 1 and coil tower terminal 4. Take secondary resistance reading. If not within specifications, replace ignition coil.

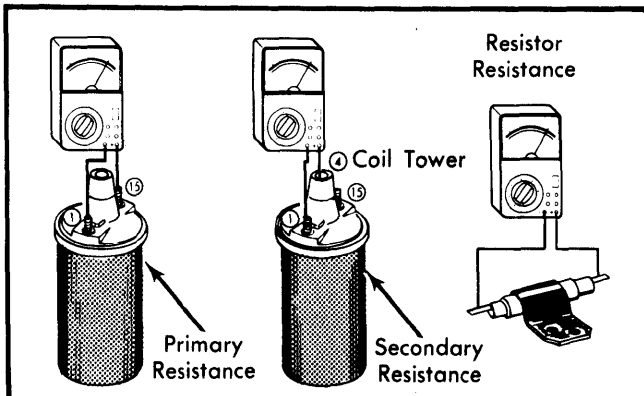


Fig. 3 Ohmmeter Hookup for Ignition Coil Primary and Secondary Resistance Checks and for Resistor Resistance Check

PICK-UP COIL RESISTANCE CHECK

Turn ignition switch "OFF". Disconnect connector from control module and attach ohmmeter leads (set in x100 scale) to terminals 7 and 31d of harness connector. See Fig. 4. Measure pick-up coil resistance. If not to specifications, remove electrical connections at distributor and connect ohmmeter leads directly to pick-up coil terminals. If still not to specifications, replace pick-up coil assembly.

Application	Ohms
BMW	520-700
Fiat Strada & X1/9	890-1285
Mercedes-Benz	500-700
Peugeot 604	485-700
Porsche	
924	890-1285
928	485-700
Saab	895-1285
Volvo	
4-Cylinder	950-1250
6-Cylinder	540-660

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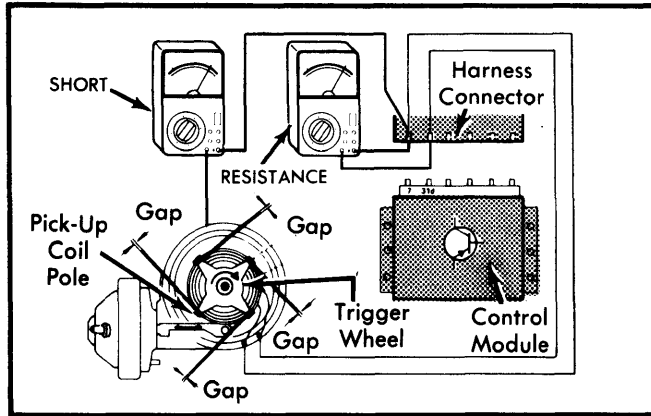


Fig. 4 Ohmmeter Hookups for Pick-Up Coil Resistance and Short Checks

PICK-UP COIL SHORT CHECK

Turn ignition switch "OFF". Connect an ohmmeter to control module harness terminal 7 and ground and then to terminal 31d and ground. Resistance reading should be infinity. If not, make same check at distributor connector. If infinity reading is not obtained, replace pick-up coil assembly. If infinity is shown, replace harness.

DWELL ANGLE CHECK AND VISUAL CHECK OF PICK-UP COIL ASSEMBLY

Check trigger wheel and pick-up coil assembly for damage. Also check visually for air gap between trigger wheel and pick-up coil. See Fig. 4. If damaged or if air gap is not to specifications, replace distributor (if components cannot be replaced individually). Check dwell angle and compare with specifications. If not within specifications, repeat Pick-Up Coil

Dwell Angle & Air Gap Specifications		
Application	Dwell Angle	Air Gap
BMW	32-53°@1500 RPM014-.028" (.36-.72 mm)
Fiat Strada & X1/9	②011-.019" (.3-.5 mm)
Mercedes-Benz		
280 Series	33-51°@1500 RPM	②
450 Series	25-39°@1500 RPM	②
Peugeot 604		
Cyls. 1, 2 and 3	41-64°@1500 RPM	②
Cyls. 4, 5 and 6	25-34°@1500 RPM	②
Porsche		
911SC	②	②
924	52-70°@1500 RPM ..	.010" (.25 mm)
928	25-39°@1500 RPM ..	.010" (.25 mm)
Saab	60-80°①	②
Volvo		
4-Cylinder	45-63°@1500 RPM	②
6-Cylinder	45-63°@1500 RPM	②

① - No speed specified by manufacturer.
② - Specification not available from manufacturer. Be sure there is clearance and that no parts are damaged.

Resistance, Short and Visual Checks. If OK, then replace control module.

CONTROL MODULE VOLTAGE

Disconnect connector from control module and turn ignition switch "ON". Attach voltmeter positive lead to terminal 15 of control module harness connector. Connect negative lead to ground. Battery voltage should be shown. If not, check for voltage drop in harness between ignition switch and control module.

CONTROL MODULE GROUND CHECK

Disconnect connector at control module. Turn ignition switch "ON". Connect voltmeter positive lead to terminal 31 of control module (not harness). Connect negative lead to ground. Reading should be zero (0) volts. Check module ground wire and repair as necessary if reading is not zero (0).

FINAL CONTROL MODULE OR IGNITION COIL CHECK

If ignition coil is suspected of being defective, substitute a known good coil and attempt to start vehicle. If it starts, reinstall old coil and start vehicle. If it then fails to start, replace with new coil. If control module is suspected, substitute a known good module and start vehicle. If it starts, reinstall original module. If vehicle fails to start now, install new control module. If system still fails to operate, disconnect tachometer connector at instrument cluster. Attempt to start engine. If engine now starts, replace tachometer.

OVERHAUL

Disassembly - 1) Remove distributor cap, rotor and dust cover. Remove vacuum unit screws and lock clasp screws. Remove screws securing electrical leads and remove leads by carefully pulling straight out.

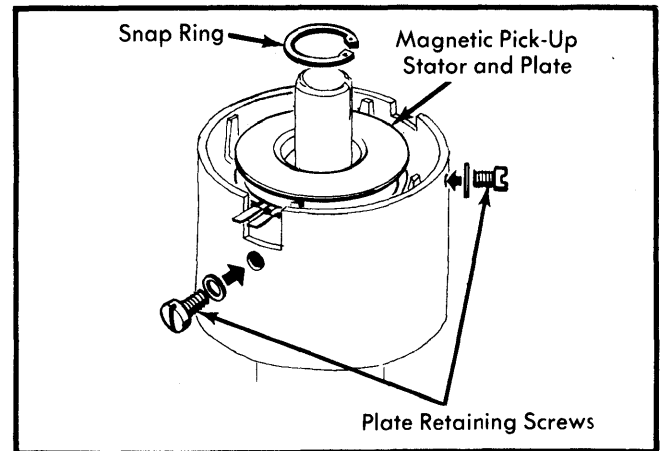


Fig. 5 Removing or Installing Pick-Up, Stator and Carrier Plate

NOTE - Keep screws with component they attach, as screws are different lengths and damage could result if installed in wrong location.

Distributors & Ignition Systems

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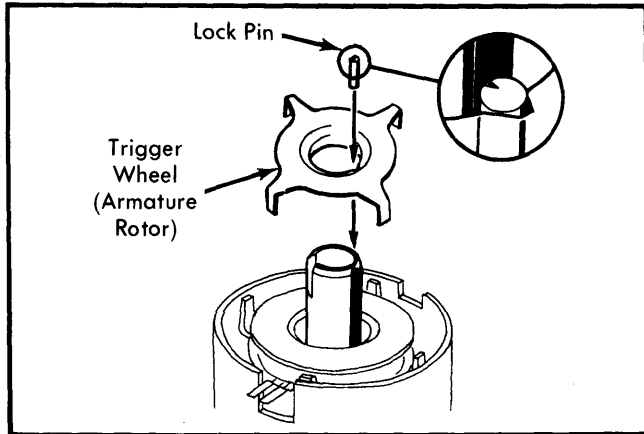


Fig. 6 Installing Trigger Wheel (Armature) and Lock Pin

2) Remove trigger wheel snap ring and then shims. Using 2 screwdrivers, carefully pry upward on trigger wheel. Remove trigger wheel and lock pin. Remove screws securing pick-up coil and stator assembly carrier plate. Remove snap ring and retaining clips. Lift carrier plate and stator straight up off shaft. Remove 3 screws to separate stator winding from carrier plate.

3) Disconnect springs to centrifugal governor. Mark drive shaft relationship to distributor shaft and then secure drive shaft in a soft-jawed vise. Carefully tap on distributor housing with a plastic mallet until circlip releases. If equipped, remove triggering contacts and attaching screws.

4) Remove resilient ring. Mark location of flange to distributor shaft. Support distributor shaft and using a pin punch, remove pin. Remove flange and distributor shaft. Remove lock springs for centrifugal weights and then weights.

Inspection — Springs for weights must not be deformed or damaged. Holes in centrifugal governor weights must not be oval or deformed. Distributor shaft-to-cam clearance should not exceed .004" (.1 mm). Distributor shaft-to-housing clearance should not exceed .008" (.2 mm).

Reassembly — 1) To reassemble distributor, reverse disassembly procedure, while noting the following: Place a light coat of grease on weights and a couple of drops of oil on felt wick in center of shaft. Do not get grease or oil on pick-up coil and stator assembly.

2) When attaching stator to plate, the connector pins should be positioned opposite and above the attachment ear for carrier plate. Install lock pin with lift facing ridge on distributor shaft. Slot on trigger wheel should be aligned with groove on distributor shaft.

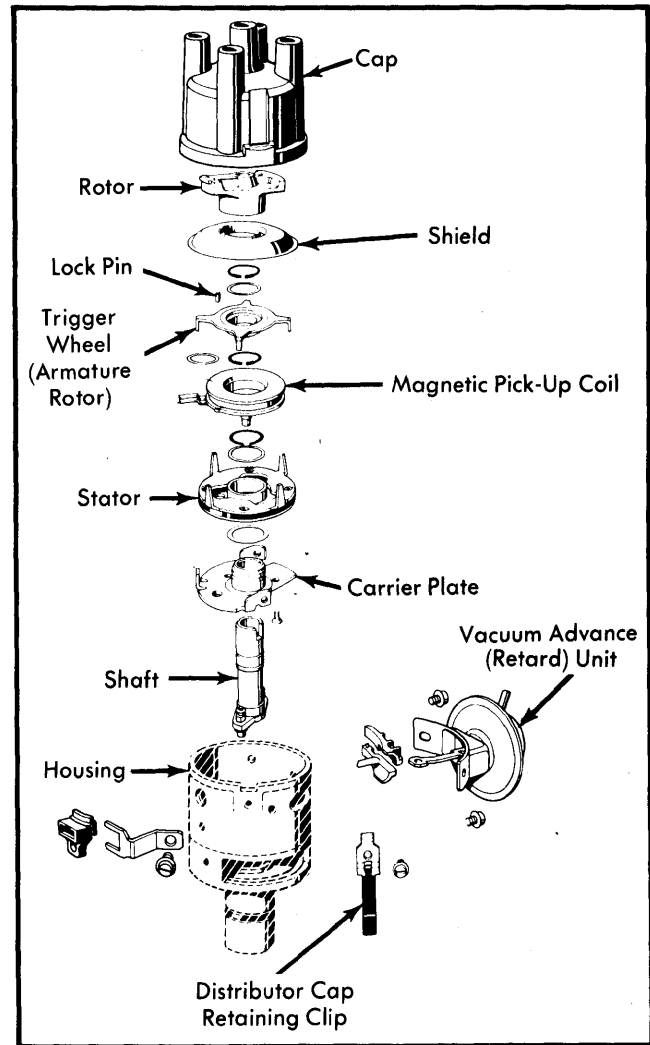


Fig. 7 Exploded View of Bosch Breakerless Distributor