Bosch Electronic Ignition

Audi: 1978 All Models, 1979 5000
BMW: 1978 All Models,
1979 528i, 633CSi, 733i
Fiat: 1979 X1/9, Strada
Mercedes-Benz: 1976-79 All Models
Peugeot: 1977-78 All Models, 1979 604
Porsche: 1976-79 All Models
Saab: 1978-79 All Models
Volvo: 1975-79 All Models
Volkswagen: 1979 Type 2 (Calif.)

DESCRIPTION

Bosch electronic ignition system consists of Electronic Control Module (often called a trigger box), a breakerless distributor, and a high output coil. Standard centrifugal and vacuum advance units are used.

NOTE: 1979 California Volkswagen Type 2 models use a distributor with a Hall Effect unit, which differs from other distributors covered in this article.

OPERATION

Inside the distributor, a trigger wheel turns with distributor shaft. The trigger wheel has one tooth or lug for each engine cylinder. As trigger wheel rotates past lugs of 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 electronic control module, which controls dwell angle and at the same time interrupts ignition coil's primary current. This induces high secondary coil output voltage that fires spark plugs.

SPECIFICATIONS

DWELL ANGLE

Dwell angle is controlled by Electronic Control Module. No adjustment is possible. See DWELL ANGLE & AIR GAP SPECIFICATIONS table in this article.

CENTRIFUGAL & VACUUM ADVANCE

See appropriate DISTRIBUTOR ADVANCE SPECIFICATIONS table in this section.

PICK-UP COIL AIR GAP

See DWELL ANGLE & AIR GAP SPECIFICATIONS table in this article.

ADJUSTMENTS

PICK-UP COIL AIR GAP

1) Check trigger wheel and pick-up coil assembly for damage. Check air gap between trigger wheel and pick-up coil. If air gap is not within specification, replace distributor (if pick-up coil cannot be replaced separately).
2) Check dwell angle and pick-up coil air gap and compare with specifications. See DWELL ANGLE & AIR GAP SPECIFICATIONS table in this article. If dwell angle and air gap are not within specifications, check pick-up coil resistance and for short. See PICK-UP COIL RESISTANCE CHECK and PICK-UP COIL SHORT CHECK in this article. If okay, replace electronic control module.

DWELL ANGLE & AIR GAP SPECIFICATIONS

Application	Dwell Angle (Degrees) At 1500 RPM	Air Gap In. (mm)
Audi 5000	43-65 [1]	.010 (.25)
BMW	32-52	.016 (.41)
Fiat	[2]	[2]
Mercedes-Benz		
280 Series	33-51	[2]
450 Series	25-39	[2]
6.9	30-35	[2]
Peugeot 604		
Cylinder 1, 2 & 3	41-64	[2]
Cylinder 4, 5 & 6	25-34	[2]
Porsche		
911S & Turbo	[2]	[2]
924	52-70	.010 (.25)
928	25-39	.010 (.25)
Saab	60-80 [1]	[2]
Volkswagen		
1979 Type 2	[2]	[2]
Volvo		
4-Cylinder	33-63	[2]
6-Cylinder	45-63	[2]

[1] – No speed specified by manufacturer.
[2] – Specification not available from manufacturer.

TESTING

NOTE: 1979 California Volkswagen Type 2 models use a distributor with a Hall Effect unit. If Hall Effect unit is suspected, substitute a new unit and attempt to start vehicle. If substitution is not possible, see IGNITION COIL RESISTANCE CHECK and ELECTRONIC CONTROL MODULE CHECK in this article.

SYSTEM SPARK TEST

1) Ensure battery is fully charged and in good condition. Ensure all wires are connections are okay. Due to high voltage, use care when working on electronic ignition system.
2) If starter turns, but engine will not start or fails to develop sufficient power, connect spark plug tester or modified spark plug to coil wire. Hold wire about .4" (10 mm) from engine block and crank engine. If spark jumps gap, check distributor cap, rotor, cables and spark plugs. Ensure ignition timing and fuel system are okay.

ROTOR RESISTANCE CHECK

Using an ohmmeter set to x1000 scale, check rotor resistance. Rotor resistance should be approximately 5000 ohms.

RESISTOR RESISTANCE CHECK

Using an ohmmeter set to low scale, check resistance of each resistor in primary circuit. See RESISTOR SPECIFICATIONS table. Most models use 2 ballast resistors. Some manufacturers use resistor wires instead of ballast resistors.

RESISTOR SPECIFICATIONS

Application	Resistance (Ohms)
Audi	1.0
BMW	0.4-0.6
Fiat X1/9 & Strada	.85-.95
Mercedes-Benz	.35-.45 and .55-.65
Peugeot	0.5
Porsche	
924	1.0 and 1.5
928	.35-.45 and .55-.65
Saab	
Starting	0.6
Running	1.0
Volvo	1.0

1974-79 DISTRIBUTORS & IGNITION SYSTEMS
Bosch Electronic Ignition (Cont.)

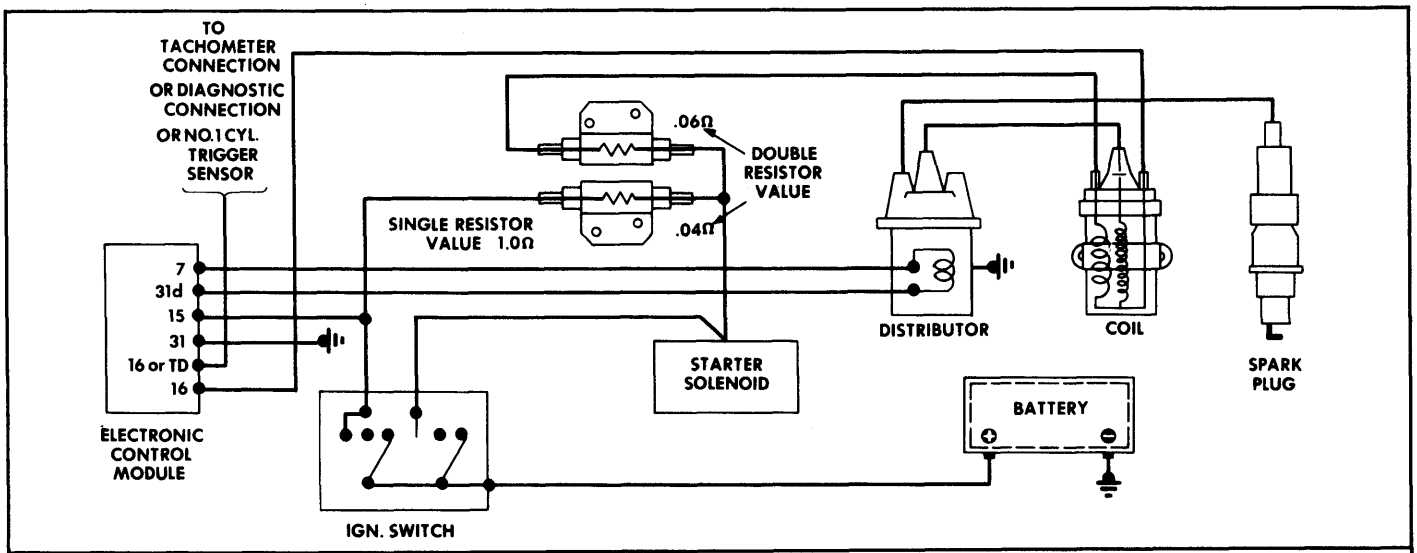

Fig. 1: Bosch Electronic Ignition System Wiring Diagram (Typical)

IGNITION COIL RESISTANCE CHECK

Using an ohmmeter set to low scale, connect ohmmeter leads to ignition coil primary terminals No. 1 and No. 15. Take reading. Connect ohmmeter leads (set to x1000 scale) to negative terminal No. 1 and coil tower terminal No. 4. Take reading. If ohmmeter reading is not within specifications, replace ignition coil. See IGNITION COIL RESISTANCE SPECIFICATIONS table.

IGNITION COIL RESISTANCE SPECIFICATIONS

Application	Primary Resistance (Ohms)	Secondary Resistance (Ohms)
Audi	.95-1.4	5,500-8,000
BMW	.4	5,500-8,000
Fiat		
X1/9 & Strada	1.1-1.7	6,000-10,000
Mercedes-Benz	.33-.46	7,000-12,000
Peugeot	.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	5,500-8,000
Volkswagen		
1979 Type 2	.55-.75	3,000-5,000

IGNITION COIL VOLTAGE CHECK

1) Connect voltmeter between positive coil terminal No. 15 and ground. Voltmeter should read 4-7 volts. If voltmeter reads less than specified, check for voltage drop. Check wiring, connections at ignition switch, resistors, coil, and electronic control module. Repair as required.

2) Connect voltmeter between coil negative terminal No. 1 and ground. Voltmeter should read 0.5-2.0 volts maximum. If voltmeter does not read within specification and all other tests check okay, substitute a known good electronic control module.

STARTING VOLTAGE CHECK

Disconnect line leading to starter terminal No. 15a at .4 ohm resistor (most models) and connect a voltmeter. Crank engine. Voltage should read within battery voltage. If not, check for break in electrical supply line or poor connection at terminal No. 15a.

PICK-UP COIL RESISTANCE CHECK

1) Disconnect electronic control module and connect ohmmeter (set to x100 scale) between terminals No. 7 and No. 31d of harness connector. Measure pick-up coil resistance. See PICK-UP COIL RESISTANCE SPECIFICATIONS table.

2) If resistance is not within specification, remove electrical connections at distributor and connect ohmmeter leads directly to pick-up coil terminals. If resistance is still not within specification, replace distributor (if pick-up coil cannot be replaced separately).

PICK-UP COIL RESISTANCE SPECIFICATIONS

Application	Resistance (Ohms)
Audi	890-1285
BMW	520-700
Mercedes-Benz	450-750
Peugeot 604	485-700
Porsche	
924	890-1285
928	485-700
Saab	895-1285
Volvo	
240 Series	850-1250
260 Series	540-660

PICK-UP COIL SHORT CHECK

1) Connect ohmmeter to electronic control module harness terminal No. 7 and ground, and then to terminal No. 31d and ground. Ohmmeter should read infinity. If ohmmeter does not read infinity, make same check at distributor connector.

2) If ohmmeter still does not read infinity, replace distributor (if pick-up coil cannot be replaced separately). If ohmmeter reads infinity, replace electronic control module harness.

ELECTRONIC CONTROL MODULE CHECK

1979 Volkswagen Type 2 - 1) Disconnect coil wire from distributor and connect securely to a known good ground. Disconnect wire between distributor and electronic control module.

2) Turn ignition on. Using a voltmeter, connect positive lead to ignition coil negative terminal No. 1 and negative lead to ground. Voltmeter should read at least 12 volts. If not, turn ignition off immediately.

3) Disconnect Green/White wire at distributor connector (center terminal) and connect it to ground. Turn ignition on. Voltage at ignition coil negative terminal No. 1 should be at least 12 volts.

4) Disconnect Green/White wire from ground. Voltage should briefly move to approximately 6 volts. Replace electronic control module if it does not test as described.

All Other Models - 1) To check electronic control module voltage, Disconnect electronic control module harness connector. Connect a voltmeter to harness connector terminal No. 15 and ground. Voltage should read within battery voltage. If not, check voltage drop in harness between ignition switch and electronic control module.

Bosch Electronic Ignition (Cont.)

2) To check electronic control module ground, disconnect connector at electronic control module. Connect voltmeter between terminal No. 31 and ground. Voltmeter should read zero (0) volts. Check module ground wire. Repair as necessary.

IGNITION COIL CHECK

1) If ignition coil is suspected to be defective, substitute a known good coil and attempt to start vehicle. If vehicle starts, replace with new coil.
2) If electronic control module is suspected, substitute a known good module and start vehicle. If vehicle starts, install new electronic control module.
3) If system still fails to operate, disconnect tachometer connector at instrument cluster. Attempt to start engine. If engine now starts, replace tachometer.

OVERHAUL

DISASSEMBLY

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

1) Remove distributor cap, rotor and dust cover. Remove vacuum unit screws and lock clasp screws. Remove screws securing electrical leads. Remove electrical leads by carefully pulling straight out.
2) Remove trigger wheel snap ring and shims. Remove screws securing pick-up coil and stator assembly carrier plate. Remove trigger wheel and small lock pin. Remove snap ring and lift carrier plate straight up off shaft. Remove screws and separate stator winding from carrier plate.
3) Disconnect springs to centrifugal governor. Mark drive shaft relationship to distributor shaft for reassembly reference. Secure distributor shaft in a soft-jawed vise. Carefully tap on distributor housing with a plastic mallet until circlip releases. Remove triggering contacts and attaching screws (if equipped).
4) Remove resilient ring. Mark location of flange to distributor shaft for reassembly reference. Support distributor shaft. Using a pin punch, remove pin. Remove flange and distributor shaft. Remove lock springs and centrifugal weights.

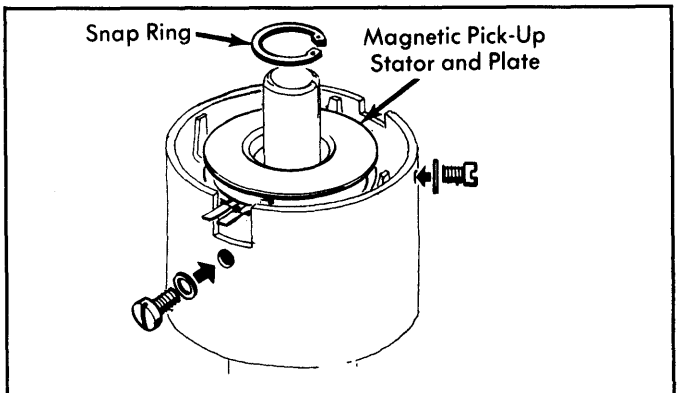

Fig. 2: Removing or Installing Pick-Up, Stator, & Carrier Plate

REASSEMBLY

1) To reassemble, reverse disassembly procedure. Place a light coat of grease on centrifugal 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, connector pins should be positioned opposite and above attachment ear for carrier plate. Install lock pin with lift facing ridge on distributor shaft. Slot on trigger wheel should be opposite ridge on distributor shaft.

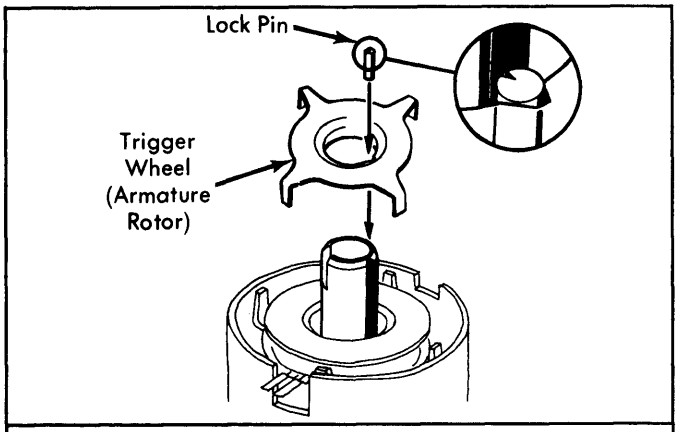

Fig. 3: Installing Trigger Wheel (Armature) & Lock Pin

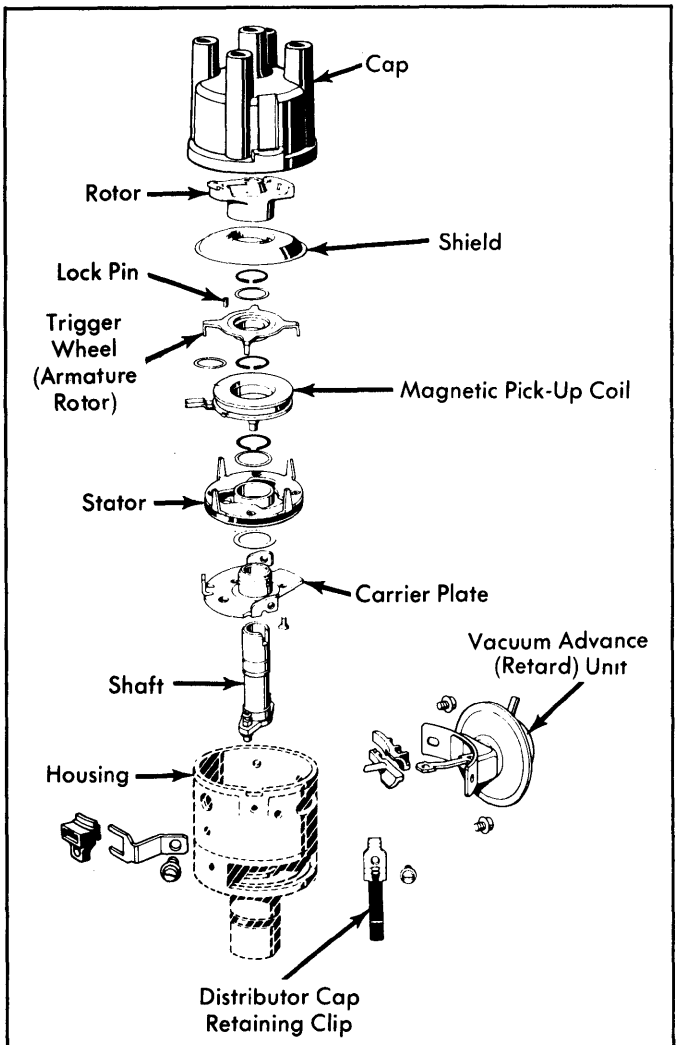

Fig. 4: Exploded View of Bosch Breakerless Distributor