PRESTOLITE ELECTRONIC BREAKERLESS IGNITION

International Harvester

DESCRIPTION

The Prestolite electronic ignition system used on International Harvester vehicles consists of a battery, ignition switch, wiring, ignition coil and distributor.

The distributor houses a trigger wheel and sensor, an electronic control unit, and a centrifugal advance mechanism, and often a vacuum advance mechanism. The trigger wheel of 4 cylinder engines has 4 teeth; the trigger wheel of V8 engines has 8 teeth. A shield is provided in the distributor to prevent high voltage impulses from affecting operation of the electronic control unit and to act as a spacer providing proper clearance between the distributor cap and rotor.

The electronic control unit is entirely solid state, is permanently sealed and controls the ignition primary circuit in response to the trigger wheel-sensor signals.

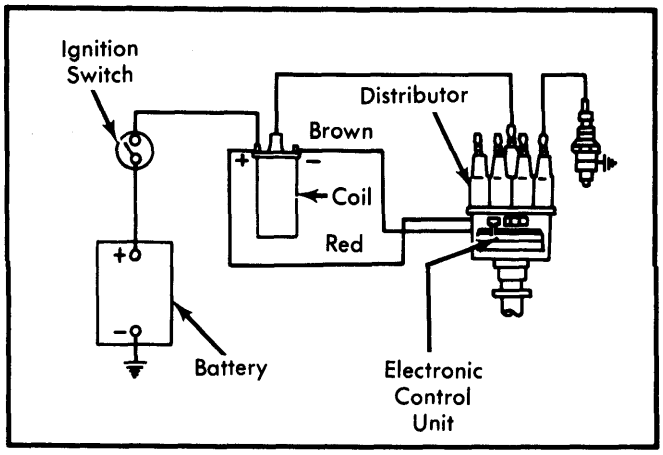

Fig. 1 Prestolite Electronic Ignition System Wiring Diagram

OPERATION

With the ignition switch "ON", an oscillating signal is set up in the sensor circuit, creating a magnetic field around the sensor. When a trigger wheel tooth enters the sensor field, the oscillating signal is weakened.

A circuit in the electronic control unit senses this weakening (as tooth enters field) and strengthening (as tooth leaves field). As the field weakens, the control unit shuts off current to the ignition coil primary circuit. As the field strengthens, current is once more permitted to flow.

When the control unit shuts off flow to the coil primary, a voltage surge builds in the coil secondary, which travels through the distributor to the individual spark plugs. One plug fires each time a tooth enters and leaves the sensor field.

The amount of time current flows in the primary is referred to as dwell. This is determined by the shape of the trigger wheel teeth and the air gap between the teeth and sensor. Once the gap is set, it should require no adjustment as there are no contacting parts to wear out.

The sensor plate, control unit and mounting plate are not serviceable, and must be replaced as a unit in case of failure.

TESTING

BUSHING WEAR

1) To check for bushing wear, secure distributor and remove cap, rotor and shield. Attach a dial indicator as shown in *Fig. 2*. Dial indicator should be attached to distributor housing, with indicator plunger resting against top of trigger wheel assembly.

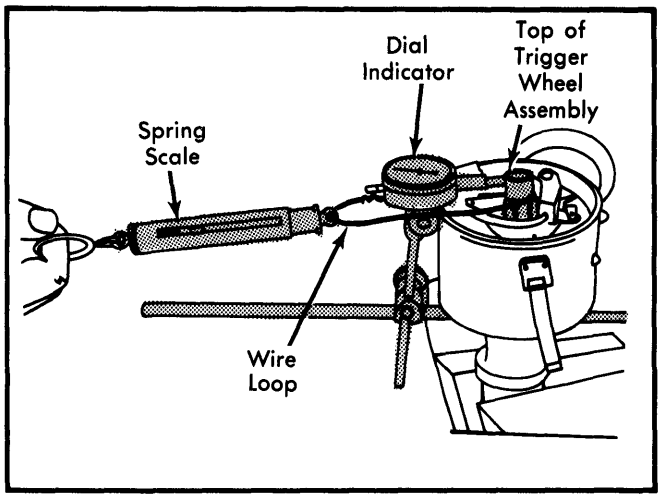

Fig. 2 Checking Distributor Shaft Bushing Wear

2) Secure wire loops around top of trigger wheel assembly and hook a spring scale into loop. Apply ½ lb. pull on spring scale and read dial indicator plunger.

3) Apply ½ lb. pull on spring scale in opposite direction and again read dial indicator plunger movement. If total movement is more than .006", replace distributor shaft bushings.

DWELL CHECK

1) With distributor mounted in a test stand, operate distributor at 300 RPM with a 12-13 volt input. Dwell reading should be 28-34°. If not to specifications, check trigger wheel-to-sensor air gap.

2) Moving sensor closer to trigger wheel decreases dwell. Moving sensor away from trigger increases dwell. Air gap setting is nominal (.008"), but should be varied to provide proper dwell.

3) Trigger wheel tooth accuracy must be within ±2° at 45° intervals on V8 engines or at 90° intervals on 4 cylinder engines. If variance is beyond this limit, check trigger wheel for damage. Also check for worn distributor shaft bushings.

IGNITION COIL RESISTANCE CHECK

1) Turn ignition switch "OFF." Disconnect wire from coil to isolate it from remainder of system. Attach leads of an ohmmeter to coil positive and negative primary terminals. Primary resistance reading should be 1.2-1.4 ohms.

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2) To check secondary resistance, attach ohmmeter leads to coil negative terminal and coil tower. With ohmmeter set on high scale, resistance reading should be 9,000-12,000 ohms.

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

HIGH VOLTAGE CABLE RESISTANCE CHECK

Test resistance of cables with an ohmmeter, attaching one lead to each end of cables individually. Resistance should not exceed 30,000 ohms for cables up to 36" in length and should not exceed 45,000 ohms for cables over 36" long.

ROTOR RESISTANCE CHECK

To check resistance type rotor with an ohmmeter, connect meter leads as shown in *Fig. 3*. Replace rotor if resistance reading exceeds 6,000 ohms.

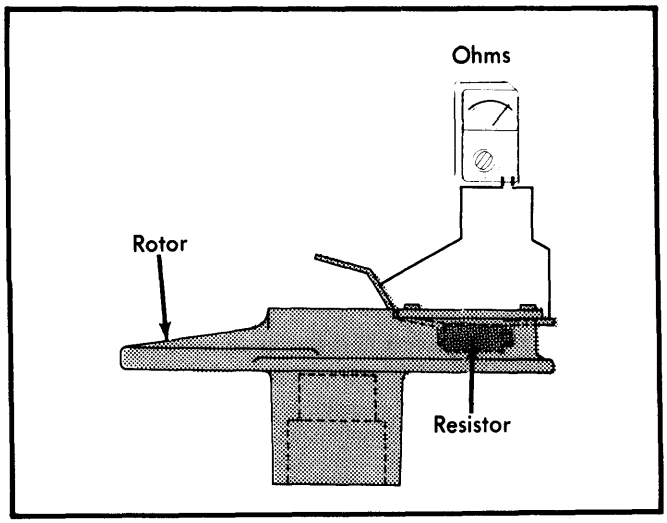

Fig. 3 Checking Rotor Resistance

TRIGGER WHEEL-TO-SENSOR AIR GAP CHECK

1) Remove distributor cap, rotor and shield. Turn engine over until one trigger wheel tooth is aligned with centerline of sensor. Trigger wheel tooth should be perpendicular to flat surface of sensor. *See Fig. 4.*

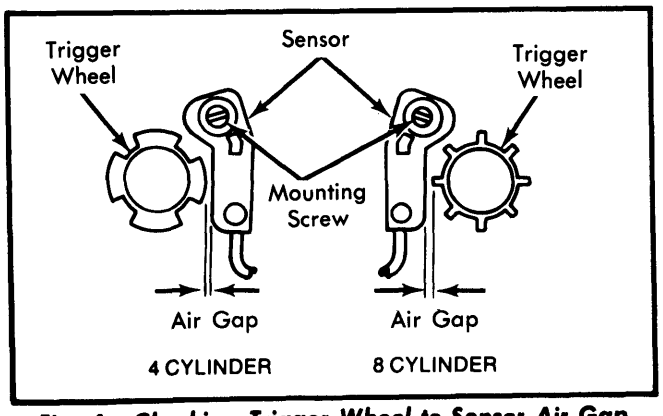

Fig. 4 Checking Trigger Wheel-to-Sensor Air Gap

2) Check air gap between trigger wheel tooth and sensor with an .008" feeler gauge. To adjust gap, loosen sensor mounting screw and move sensor as necessary. Then, tighten mounting screw and recheck air gap.

NOTE – *Dwell is more critical than air gap. Adjust air gap as necessary to change dwell. See Dwell Check.*

BATTERY VOLTAGE CHECK

Attach positive voltmeter lead to battery positive post and negative voltmeter lead to battery negative post. Voltage should be 12-13 volts. If necessary, charge or replace battery. Record voltage prior to conducting the following tests.

SECONDARY CHECKS

1) Disconnect high voltage wire from one spark plug and using insulated pliers, hold wire ½" from engine. Crank engine and check for spark. If spark occurs, ignition system is OK.

2) If no spark occurs, disconnect high voltage coil wire from distributor. Using insulated pliers, hold it ½" from engine. Crank engine and check for spark. If spark occurs now, problem is with distributor cap, rotor or spark plug wires. If no spark occurs, proceed with following tests until problem is corrected.

PRIMARY IGNITION VOLTAGE CHECK

1) Turn engine over until sensor coil is centered between 2 teeth of trigger wheel. Connect voltmeter positive lead to ignition coil positive terminal (red wire). Connect voltmeter negative lead to ground. *See Fig. 5.*

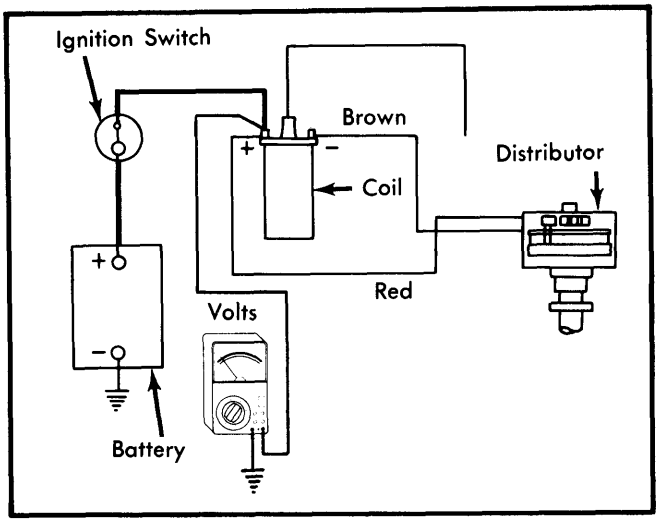

Fig. 5 Checking Primary Ignition Voltage

2) Turn ignition switch "ON". Available voltage should be within 1 volt of battery voltage, recorded earlier. If there is more than a 1 volt drop in voltage, check circuitry for defective or inoperative battery cables, ignition switch, main wiring harness connector and wiring.

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COIL NEGATIVE TERMINAL VOLTAGE CHECK

1) Turn engine over until sensor coil is centered between 2 trigger wheel teeth. Connect voltmeter positive lead to coil's negative terminal. Connect voltmeter negative lead to ground. *See Fig. 6.*

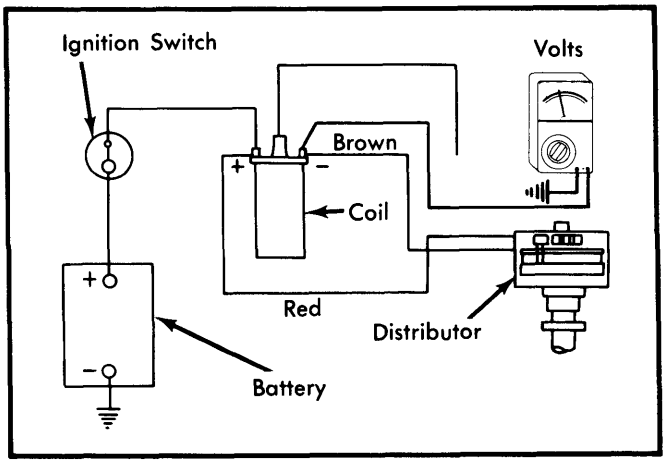

Fig. 6 Checking Coil Negative Terminal Voltage

2) Turn ignition switch "ON". Available voltage should be 5-8 volts. If voltage is to specifications, proceed to next test. If voltage is 12-13 volts, proceed to step **3)**. If voltage is 0-5 volts, proceed to step **5)**.

3) If voltage is 12-13 volts, connect a jumper wire between distributor housing and negative terminal of battery. If voltage remains 12-13 volts, electronic control unit in distributor is inoperative and must be replaced.

4) If voltage drops to 5-8 volts with jumper wire connected, there is a problem in the ground circuit between distributor housing and battery. Check battery ground cable, engine ground strap and other ground wires.

5) If voltage is 0-5 volts, remove voltmeter and disconnect brown wire at coil negative terminal. Reconnect voltmeter with positive lead to negative terminal and negative lead to ground.

6) Turn ignition switch "ON". If voltmeter still reads 0-5 volts, coil is inoperative and must be replaced. If voltage now increases to 12-13 volts, electronic control unit is defective and must be replaced.

ELECTRONIC CONTROL UNIT OPERATION CHECK

1) Connect voltmeter positive lead to brown wire at coil negative terminal. Connect voltmeter negative lead to ground. *See Fig. 7.*

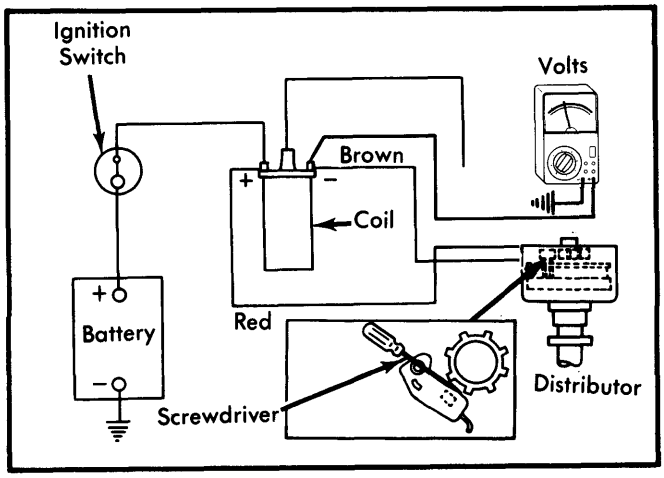

Fig. 7 Checking Electronic Control Unit Operation

2) Turn ignition switch "ON". Place the blade of a small screwdriver against face of sensor while observing voltmeter. Voltage should increase to 12-13 volts. When screwdriver is removed, voltage should drop to 5-8 volts.

3) If voltage does not switch up and down when screwdriver is against sensor and then removed, electronic control unit is inoperative and must be replaced.

COIL OPERATION CHECK

1) Remove coil wire from distributor cap. Hold end of coil wire ½" from engine ground. *See Fig. 8.*

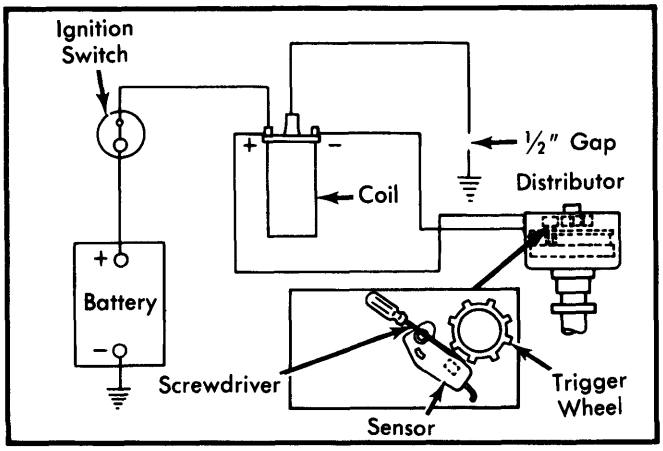

Fig. 8 Checking Ignition Coil Operation

2) Turn ignition switch "ON". Check for spark across gap each time blade of small screwdriver contacts face of sensor.

3) If spark does not occur across gap when screwdriver blade contacts sensor, coil is inoperative and must be replaced.