

DELCO-REMY HIGH ENERGY IGNITION

American Motors (4-Cylinder)
 Buick
 Cadillac
 Chevrolet
 Oldsmobile
 Pontiac

DESCRIPTION

The Delco-Remy High Energy Ignition System (HEI) consists of a distributor assembly which combines all ignition components into a solid-state electronic unit. The distributor housing encloses the following components: Vacuum and centrifugal advance mechanisms, electronic module, pick-up coil, pole piece (with internal teeth), timer core (with external teeth), rotor, distributor shaft and a capacitor for radio noise suppression. The distributor cover encloses the ignition coil on all models except Chevrolet Chevette models, these have an external mounted coil.

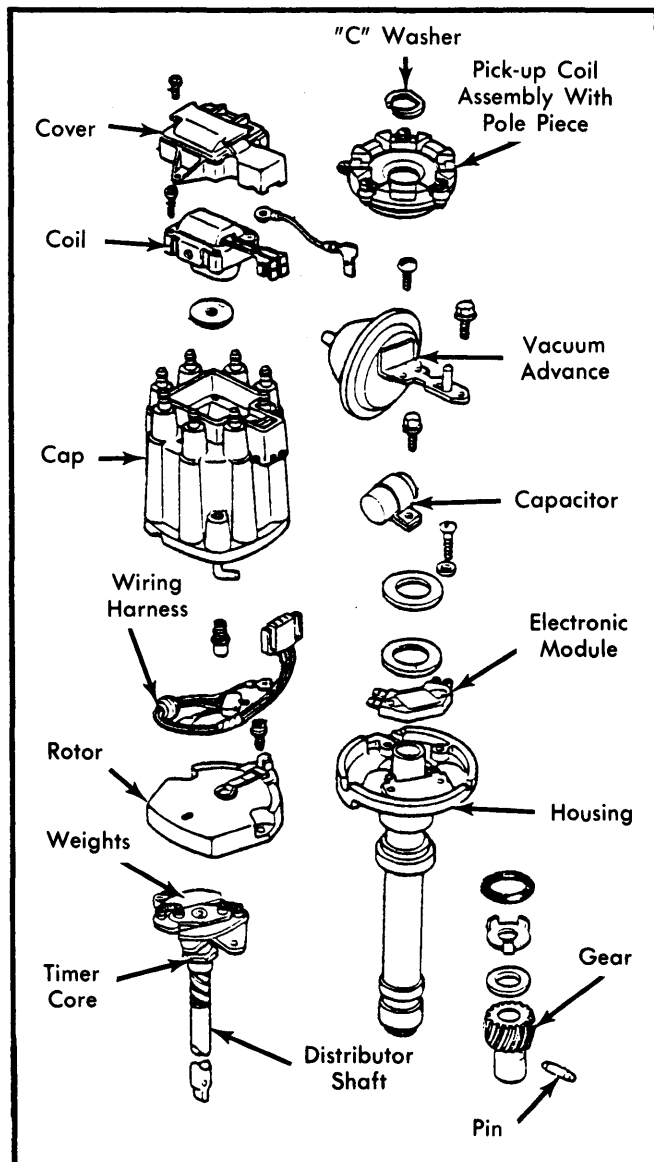


Fig. 1 Exploded View of Integral Coil Type High Energy Ignition Distributor

OPERATION

The pick-up coil assembly consists of a permanent magnet, a pole piece and a pick-up coil. The pick-up coil assembly is stationary, unless it is advanced or retarded by the vacuum diaphragm.

The timer core, mounted on the distributor shaft, rotates with the shaft inside the pole piece portion of the pick-up coil assembly. When the external teeth of the timer core line up with the internal teeth of the pole piece, a voltage is induced in the pick-up coil. This signals the electronic module inside the distributor, which opens the ignition coil primary circuit. See Fig. 2.

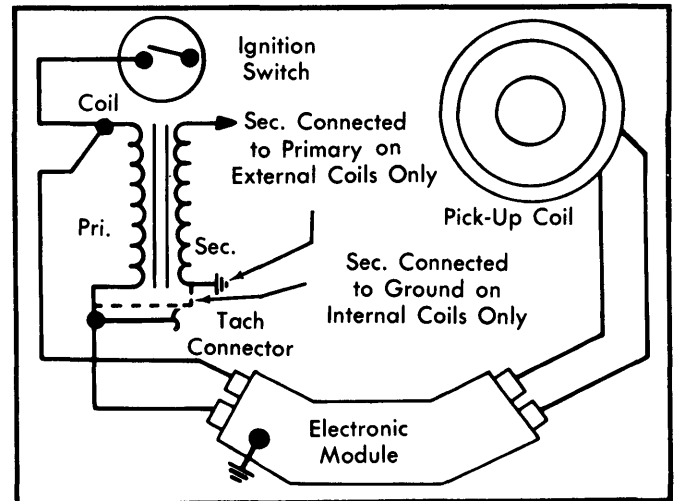


Fig. 2 Delco-Remy High Energy Ignition System Basic Wiring Diagram

Current then decreases in the primary circuit and high voltage is induced in the ignition coil's secondary circuit. This travels through the rotor, distributor cap contact and secondary wires to fire the spark plugs.

The electronic module automatically controls dwell period, stretching it with increasing engine speed. Dwell is not adjustable and periodic checks of dwell are unnecessary. The HEI system features a longer spark duration, which is desirable for firing lean and EGR diluted mixtures.

TESTING

NOTE — During testing procedures, the following precautions must be observed. Do not ground tachometer terminal of distributor before making compression checks. To remove spark plug wires, twist boot 1/2 turn and pull on boot (not on wire). When using a timing light connect at plug end of number 1 spark plug wire (do not pierce plug boot).

Check that wiring connector is properly attached to connector at side of distributor cap and that spark plug leads are properly connected at both ends before continuing with test procedures.

ENGINE WILL NOT START

Connect voltmeter between "BAT" terminal lead on distributor connector and ground. Turn ignition switch on. If voltage is zero, check system for open circuit. If reading is battery

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voltage, connect a modified spark plug (plug that has ground electrode cut off) to center brush contact in distributor cap. Crank engine, if spark occurs trouble is not in ignition system. Check fuel system, spark plugs and wires for trouble. If sparking does not occur, follow procedures under Component Testing.

ENGINE STARTS BUT RUNS ROUGH

Check for proper fuel delivery to carburetor, vacuum hoses for leakage, ignition timing, centrifugal advance for proper operation, spark plugs for defects, and visually inspect and listen for sparks jumping to ground or to other wires. If no defects are found or condition continues after correction, follow procedures under Component Testing.

COMPONENT TESTING

Distributor Cap & Coil Testing – 1) Remove distributor cap and coil assembly by removing wire harness connector, battery lead cap-to-housing latches. Inspect rotor, cap and coil assembly for arc-over. Replace parts as required.

2) To test coil primary resistance, connect one ohmmeter lead to battery terminal on distributor cap (positive terminal external coils). See Fig. 3. Connect other lead to tach terminal of distributor cap (negative terminal on external coils). Ohmmeter reading should be 0.4-1.0 ohms. If not within specifications, replace coil.

3) To test coil secondary resistance, connect one ohmmeter lead to coil secondary contact (cap button on internal coils). See Fig. 3. Connect other lead to tach terminal. Ohmmeter reading should be infinity on integral coils and 6,000-30,000 ohms on external coils.

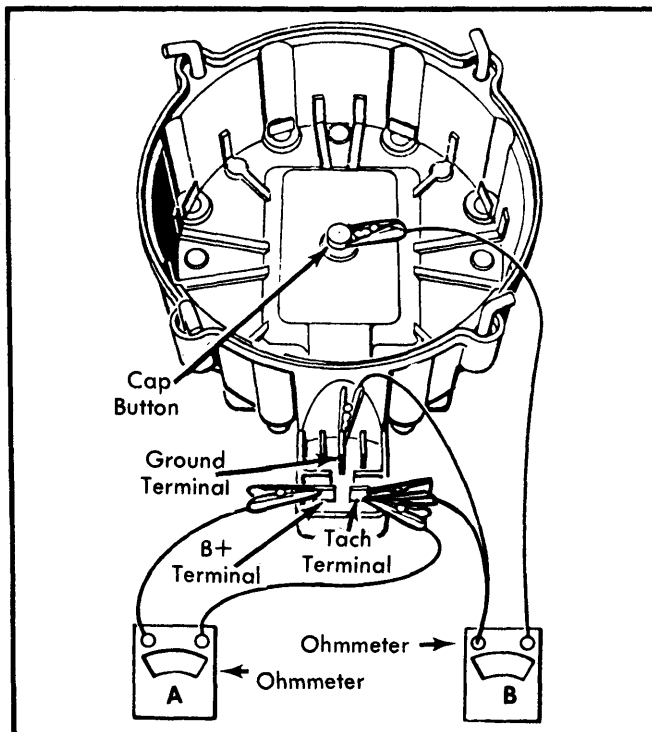


Fig. 3 Distributor Cap and Coil Testing Connections for Delco-Remy HEI Distributor (Integral Coil Only)

4) Move ohmmeter lead from tach terminal and attach to ground terminal. Ohmmeter reading should be 6,000-30,000 ohms on integral coils and infinity on external coils. If these tests are not to specifications, replace coil.

Pick-up Coil – 1) Connect test stand vacuum source to vacuum advance unit. If vacuum advance unit is inoperative, replace unit. Connect ohmmeter at position "A". See Fig. 4. Set on middle scale of meter. Operate vacuum advance through range. Reading should be infinite at all times. If not, replace pick-up coil.

2) Connect ohmmeter at position "B". See Fig. 4. Again use middle scale. Operate vacuum advance through range. Ohmmeter should read 500-1500 ohms in all advance positions. If readings are not as specified, replace pick-up coil.

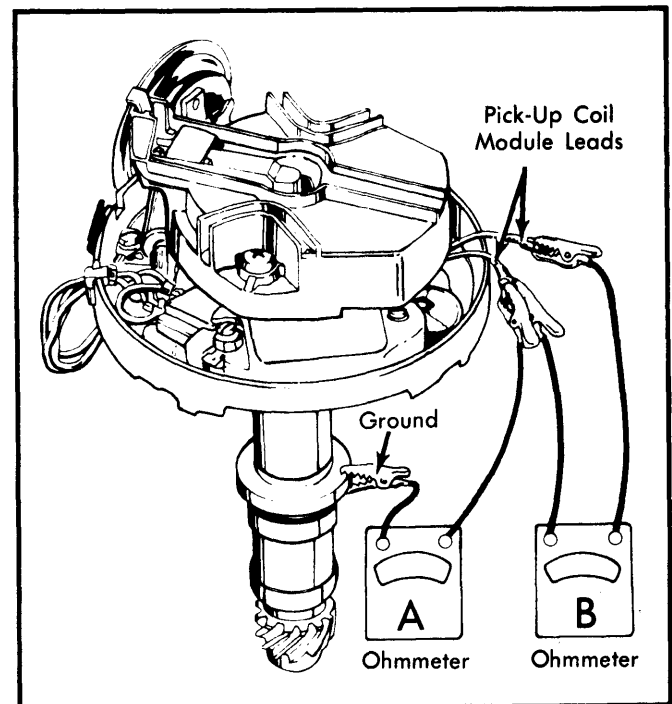


Fig. 4 Distributor Pick-Up Coil Testing Connections

Electronic Module – If engine operation remains rough after preceding test procedures are completed, replace the electronic module.

OVERHAUL

NOTE: If the distributor is to be removed on Chevette models, the fuel pump and fuel pump rod **MUST** be removed first.

DISASSEMBLY

1) Disconnect wiring harness from cap. Disconnect coil wire and all power wires going to coil on external coils. Remove distributor cap and disconnect vacuum hose from vacuum advance mechanism. Mark rotor position to distributor housing and distributor housing to engine for reassembly reference. Remove hold down bolt and remove distributor housing from engine.

2) Remove rotor, two advance springs, weight retainer and advance weights. Mark distributor shaft and gear so they may

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be assembled in same position. Drive out roll pin from drive gear while supporting gear so no damage will occur to distributor shaft. Remove gear, shim and tanged washer from distributor shaft and clean any burrs from shaft. Remove distributor shaft from housing.

NOTE— Do not attempt to service shaft bushings in housing.

3) Remove 2 attaching screws holding module-to-housing and position module to disconnect pick-up coil and wiring harness connectors. Remove "C" washer from housing and lift pick-up coil assembly from advance unit and distributor shaft.

4) Remove 2 attaching screws and remove vacuum advance mechanism. Disconnect capacitor lead, remove attaching screw and capacitor. Remove wiring harness from position in distributor housing.

5) Remove 3 coil cover attaching screws and lift off cover. Remove 4 ignition coil attaching screws, disconnect coil leads and remove coil from cap. Remove ignition coil arc seal.

REASSEMBLY

Reverse disassembly procedures while noting following: Ensure there is special silicone lubricant between module and distributor base to provide heat transfer for module cooling. Lubricate felt washer with a few drops of engine oil. After installation of distributor shaft, rotate to check for even

clearance between external timer core teeth and internal pole piece teeth. Notch on side of rotor must engage tab on cam weight base.

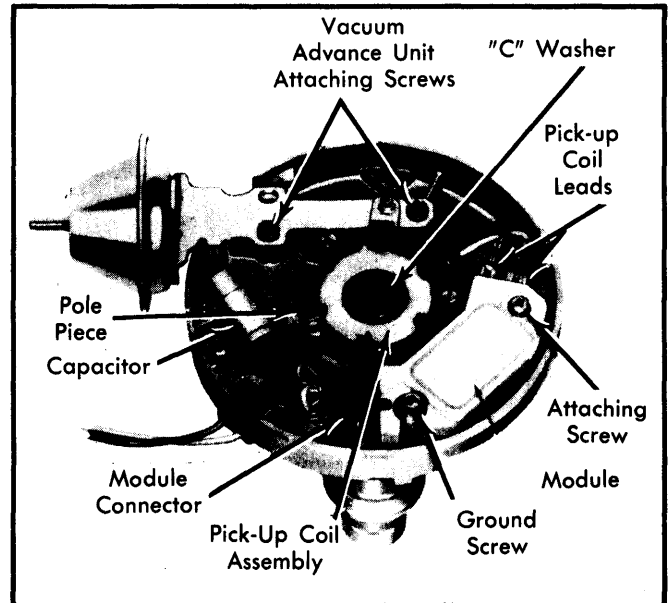


Fig. 5 Internal Components of HEI Distributor

TYPICAL GENERAL MOTORS HIGH ENERGY IGNITION OSCILLOSCOPE PATTERNS (EXCEPT FOR ALL ELECTRONIC SPARK SELECTION SYSTEMS)

PRIMARY PATTERNS (TYPICAL)

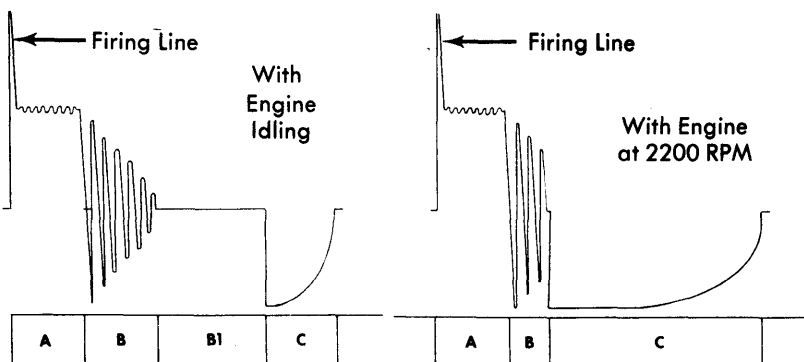
Scope Instructions for Primary Parade Only:

NOTE — Also refer to scope manufacturers' instructions.

- 1) Scope secondary pick-up cannot be connected because coil center terminal is inside distributor.
- 2) Connect pick-up to No. 1 spark plug wire as usual.
- 3) Connect primary pick-up to "Tach" terminal at distributor connector plug.

Reading Scope Primary Pattern

- A) Spark Zone — spark plug arcing.
- B) Coil and Condenser Zone
- B1) Firing Zone — no plug arc.
- C) Dwell Zone — displays current through coil primary with module turned on.



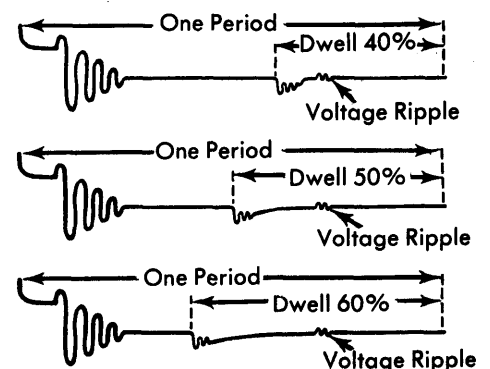
Primary Parade Pattern for One Cylinder Only

SECONDARY PATTERNS (TYPICAL)

NOTE — A special adapter placed on top of the coil-cap assembly may be used with some scopes to view the secondary pattern. The output voltage will read low with the adapter; this is normal. Refer to the scope manufacturers' instructions.

Secondary Voltage Patterns:

It is normal if dwell time varies from cylinder to cylinder. A 40 to 60 percent variation is shown below. It could be more, or it could be less. The voltage ripple shown may or may not appear; either is normal. Variation in dwell time or voltage ripple, as shown, does not necessarily indicate a bad module.



Typical Secondary Scope Patterns. See Scope Instructions for Actual Patterns