MITSUBISHI ELECTRONIC IGNITION SYSTEM — ROTARY ENGINE

Mazda
RX7

DESCRIPTION

The Mitsubishi electronic ignition system used on the Mazda RX7 rotary engine is unique in that it has 2 sets of spark plugs (leading and trailing) with one set in the front rotor housing and one in the rear rotor housing. See *Fig. 1*. There are also 2 ignition coils, 2 pick-up coils in the distributor, and 2 coil-to-distributor high tension wires.

There are 2 separate ignitors mounted on the distributor base. One is for leading side and the other for trailing side. Other system components include a battery, ignition switch, ignition control switches, (water temperature, altitude, etc.), and various relays. All models are equipped with an ignition control system and centrifugal advance mechanisms. All models have vacuum control units for both leading and trailing sides.

OPERATION

A reluctor (signal rotor) is mounted on the rotor shaft and turns inside 2 magnetic pick-up coils, one for the leading side and one for the trailing side. See *Fig. 2*. As each tooth of the reluctor approaches and then passes the leading pick-up coil, a signal is generated that is sent to the leading ignitor, which breaks the primary circuit in the leading ignition coil. As each tooth passes the leading pick-up coil, the previous passing tooth approaches and becomes aligned with the trailing pick-up coil. This triggers a signal to the trailing ignitor, which breaks the primary circuit in the trailing ignition coil.

Therefore, immediately after the leading spark plug fires, the trailing spark plug also fires, providing more complete and efficient combustion and reducing HC and CO emissions.

As the primary circuit is broken in the leading and trailing ignition coils, a voltage surge occurs in the secondary circuit of the ignition coils. This high voltage is transmitted through the leading and trailing high tension wires to the distributor, rotor and spark plugs.

An emission control unit is also included in the ignition control system along with different sensing switches to provide proper timing under varying engine operating conditions.

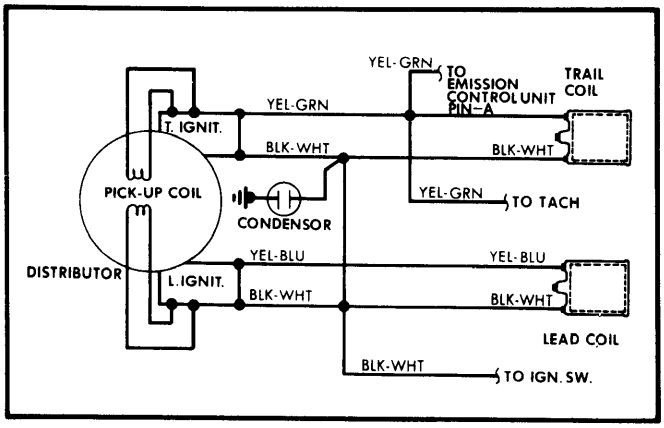

Fig. 1 Schematic of RX7 Ignition System

SPECIFICATIONS

Centrifugal & Vacuum Advance (or Retard) – See *Specifications Tables in this section.*

ADJUSTMENTS

Reluctor-to-Pick-Up Coil Air Gap – 1) Remove distributor cap and rotor. Turn distributor shaft until the extended tooth of the reluctor (signal rotor) aligns with core of pick-up coil. See *Fig. 2*.

2) Using a feeler gauge, check for .020-.035" (.5-.9 mm) air gap. If gap is incorrect, replace pick-up coil and bearing assembly or distributor drive shaft, if necessary.

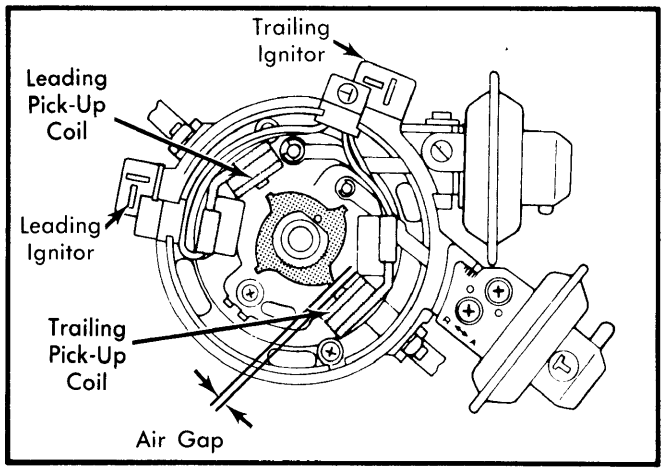

Fig. 2 Adjusting Distributor Air Gap

Ignition Timing – 1) Leading timing is adjusted by loosening distributor lock nut and rotating distributor housing until correct timing is obtained. See *Fig. 3*.

2) Trailing timing is changed by loosening the screws securing the vacuum unit and moving the vacuum unit outward (to advance) or inward (to retard). Retighten screws when correct timing is obtained.

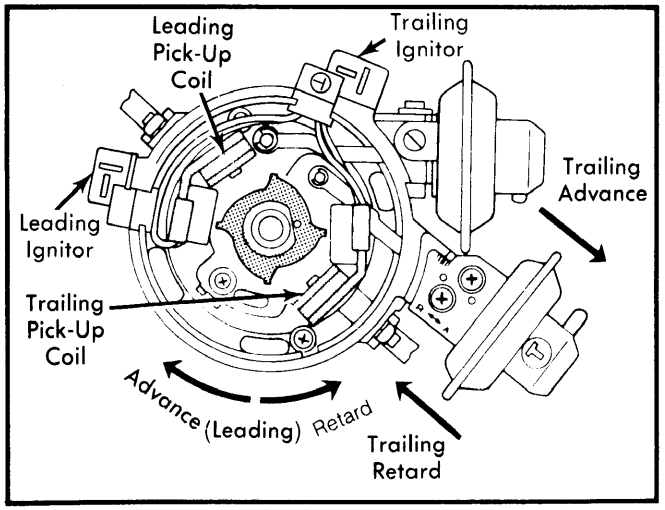

Fig. 3 Adjusting Ignition Timing

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TESTING

HIGH TENSION WIRE RESISTANCE CHECK

Turn igntion switch "OFF". Connect ohmmeter leads to each end of coil-to-distributor high tension wire. Resistance should not exceed 16,000 ohms (±6,400 ohms) per 39.37" (1 m).

IGNITION COIL RESISTANCE CHECK

Set an ohmmeter in the low scale. With ignition switch turned "OFF", and coil wires disconnected, attach ohmmeter leads to primary terminals of leading coil and then trailing coil. Primary resistance should be 1.22-1.48 ohms for each ignition coil.

PICK-UP COIL RESISTANCE CHECK

1) Set an ohmmeter in the x100 scale. Turn ignition switch "OFF". Disconnect connector between ignitor and distributor. See *Fig. 4*.

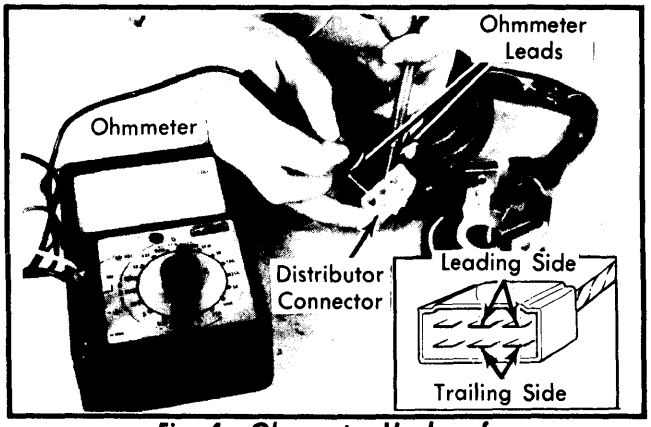

Fig. 4 Ohmmeter Hookup for Pick-Up Coil Resistance Check

2) Connect ohmmeter leads to leading terminals and then to trailing terminals. Resistance should be 600-700 ohms at 68° F (20° C) for each set of pick-up coils. If not, replace pick-up coil and bearing assembly.

PICK-UP COIL OPERATION CHECK

1) With distributor connector still disconnected, touch ammeter leads to leading terminals and then to trailing terminals.

2) Place a screwdriver against core of pick-up coil being tested. Indicator of meter should move each time screwdriver is taken quickly away from core. If not, replace pick-up coil and bearing assembly.

IGNITOR CHECK

1) Remove ignitor from distributor base. Make a circuit as shown in *Fig. 5* with wire and a test bulb. Use 12 volts and a bulb of less than 10 watts.

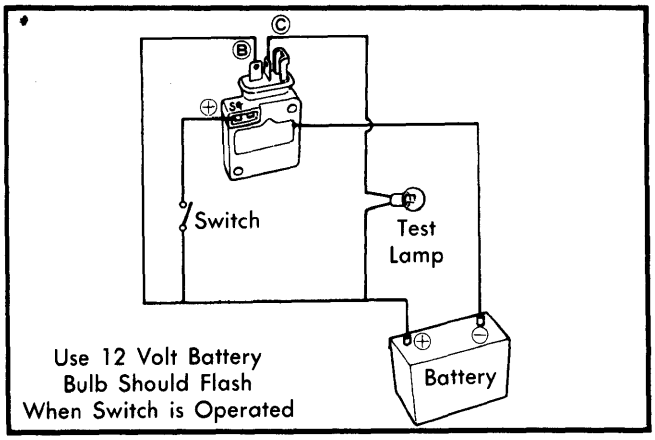

Fig. 5 Test Lamp Hookup for Checking Ignitor Operation — Bulbs Should Flash

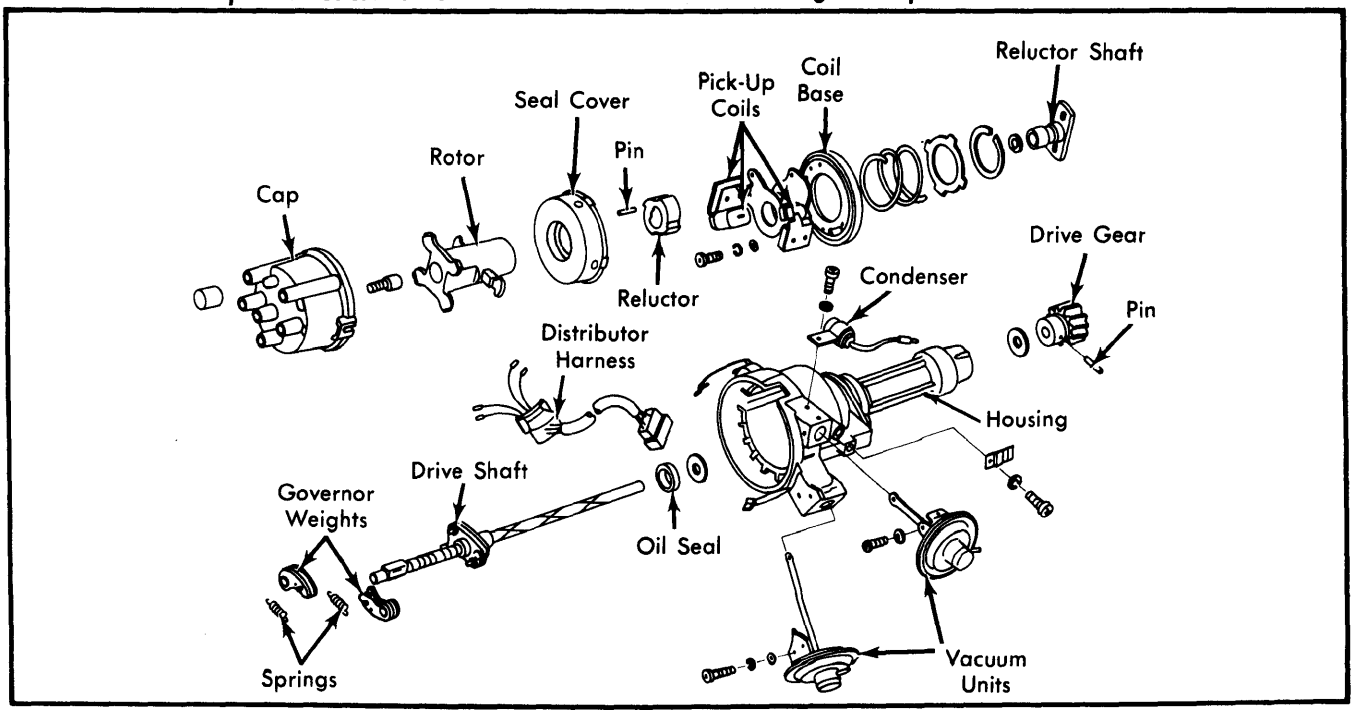

Fig. 6 Disassembled View of RX7 Distributor for Overhaul Purposes

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2) Quickly operate switch "ON" and "OFF" and make sure test lamp flashes. If not, replace ignitor.

OVERHAUL

Disassembly – **1)** Remove distributor cap, rotor and seal cover. See *Fig. 6*. Remove ignitors and attaching screws from distributor housing. Remove clips holding vacuum diaphragm links. Remove attaching screws and vacuum control units from distributor housing. Remove condenser.

2) Remove reluctor (signal rotor) shaft attaching screw from end of shaft. Remove pick-up coil base bearing attaching screws. Remove reluctor, reluctor shaft, pick-up coils and coil base bearing assembly from top of distributor drive shaft.

3) Remove reluctor from reluctor shaft, using suitable puller. Remove spring pin. Remove governors by removing springs. Drive lock pin out of driven gear, using a small drift. Remove gear and washers. Remove drive shaft through top of distributor housing.

Reassembly – Inspect distributor cap and rotor for cracks, carbon tracks, and burned or corroded terminals. Assemble distributor in reverse order of disassembly, noting the following: Install reluctor shaft onto distributor drive shaft, engaging slots of reluctor shaft and governor pins. Install pick-up coil and coil base bearing assembly and tighten attaching screws. Install reluctor on shaft, driving spring pin in with a suitable punch.