DUCELLIER ELECTRONIC IGNITION SYSTEM – RENAULT

Le Car

DESCRIPTION

The Ducellier electronic ignition system consists of a Ducellier breakerless distributor, a Delco-Remy ignition coil, an electronic control unit, ignition switch and necessary wiring.

The distributor contains both centrifugal and vacuum advance mechanisms, main and secondary impulse sender coils (pick-up coils), a trigger (reluctor), seal, rotor and cap. *See Fig. 1.*

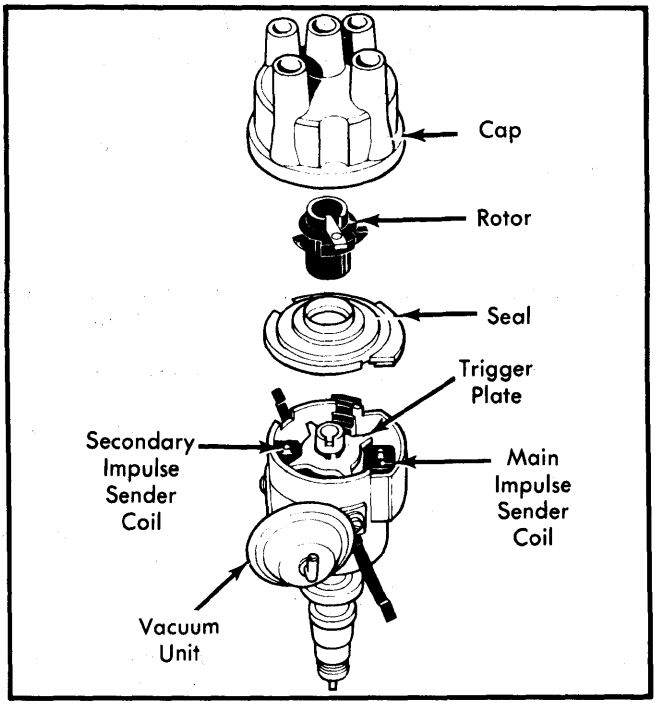

Fig. 1 Exploded View of Ducellier Electronic Distributor

The ignition coil and electronic control unit are mounted to a common support that provides both good grounding and cooling of the electronic control unit. *See Fig. 2.* Silicone grease, which comes with each electronic control unit, is applied between the unit and support to provide improved heat transfer. Since both units are grounded through the common support base, all mounting bolts should be snug.

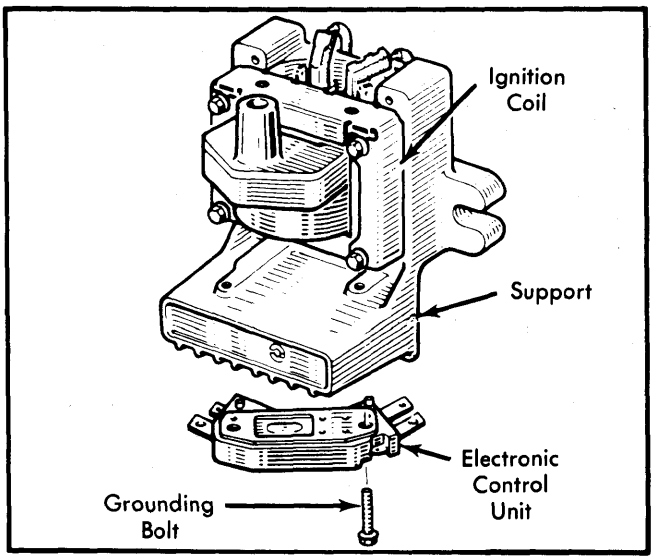

Fig. 2 Ignition Coil and Electronic Control Unit Assembly

The ignition coil is encased in epoxy resin instead of oil. The electronic control unit receives, amplifies and sends electronic signals to provide proper spark timing.

OPERATION

The distributor contains a trigger plate that turns with the distributor shaft. *See Fig. 3.* Two impulse sender coils are housed in the distributor – the main coil near the vacuum diaphragm and the secondary coil directly opposite (offset 3° for proper ignition timing during warm-up).

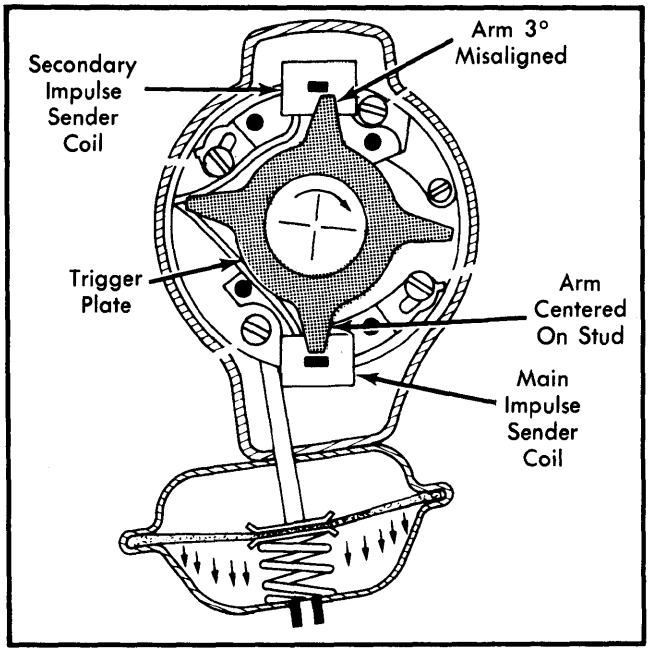

Fig. 3 Ducellier Internal Distributor Components

When oil temperature is below 59° F (15° C), the secondary impulse sender operates to provide 3° additional advance (6° total). When oil temperature reaches 59° F (15° C) or higher, a relay switches operation to the main impulse sender which takes over the function from the secondary. Ignition timing returns from 6° to 3° BTDC. The two impulse senders never operate simultaneously.

As the rotating trigger plate approaches and passes the proper impulse sender coil, a magnetic field builds and collapses, sending a signal to the electronic control unit. This signal opens and closes a transistor in the electronic control unit, turning the primary circuit in the ignition coil on and off.

When the primary coil circuit is turned off, a high voltage surge occurs in the coil secondary circuit, providing spark to the spark plugs through the distributor rotor, cap and secondary wires.

The electronic control unit has 4 terminals. *See Fig. 4.* Terminals "W" and "G" are connected to the distributor impulse sender coils, terminal "G" through a relay switch that activates either the main or secondary impulse sender coil. Terminal "B" is connected to the coil positive terminal and terminal

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"C" to the coil negative terminal. The unit is grounded through one of its mounting bolts to the support shared with the ignition coil.

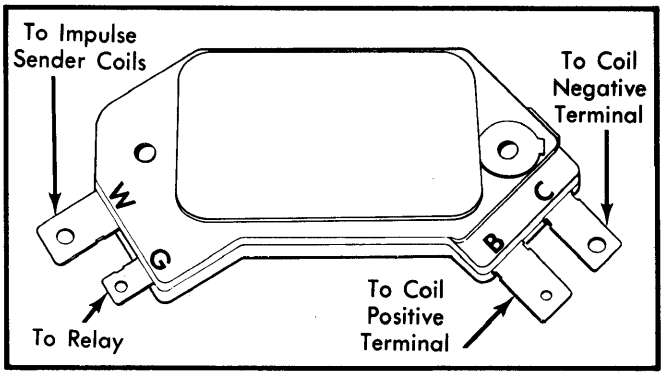

Fig. 4 Electronic Control Unit Terminals

SPECIFICATIONS

Centrifugal & Vacuum Advance – *See Specifications Tables in this section.*

ADJUSTMENTS

Trigger Plate-to-Impulse Sender Coil Air Gap – Loosen screws "A" and "B". *See Fig. 5.* Place an .018" (.45 mm) feeler gauge between either pick-up coil stud and one arm of the trigger plate. *See Fig. 6.* Move slotted coil base on screw "B" until stud on top of coil touches feeler gauge. Tighten screws "A" and "B". Check air gap at all 4 arms of trigger plate. If gap is not within .012-.024" (.3-.6 mm) range for any arms of trigger plate and cannot be adjusted correctly, replace distributor.

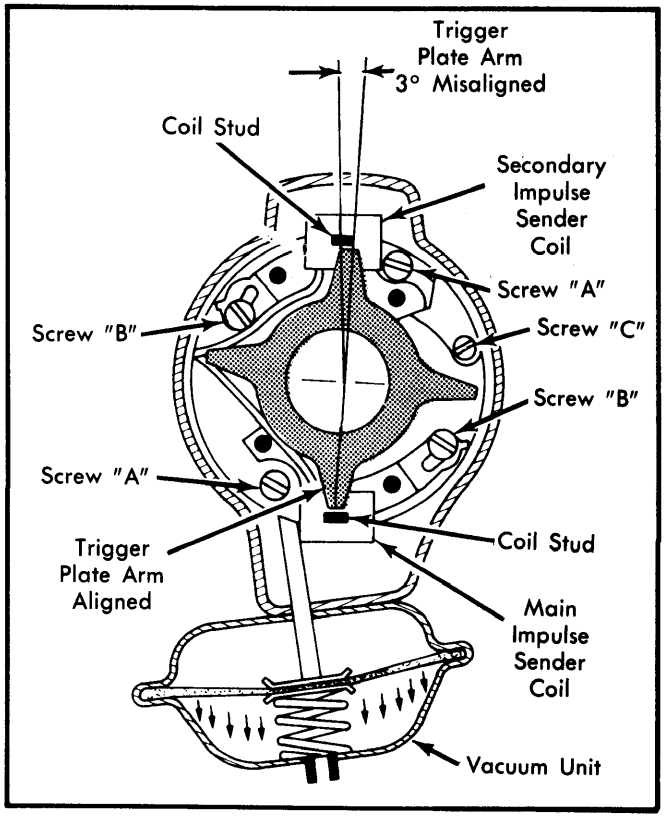

Fig. 5 Adjusting Ignition Timing by Misaligning Trigger Plate Arm 3°

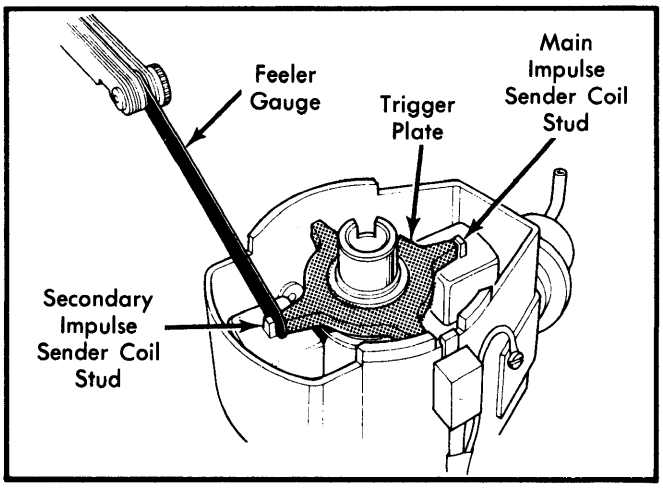

Fig. 6 Adjusting Distributor Air Gap

Ignition Timing of Secondary Impulse Sender – Set trigger plate-to-impulse sender coil air gap. Loosen screw "B" (for secondary sender) and screw "C". *See Fig. 5.* Align one trigger plate arm with main impulse sender coil stud. Then, move secondary impulse sender coil so that the center of its stud aligns with edge (not center) of trigger plate arm. Tighten screws "B" and "C". This provides 3° additional advance when engine oil temperature is below 59° F (15° C).

TESTING

NOTE – *Before testing components, be sure battery is properly charged, all wires are sound and connections are secure. Inspect distributor cap and rotor for cracks or carbon-tracking. Turn ignition "OFF" when connecting test equipment or when replacing parts.*

CAUTION – *Before replacing "defective" parts such as the ignition coil, distributor or electronic control unit, check that the electrical system is operative. Particularly check the oil thermoswitch on the right-hand side of the oil pan and the relay which it controls. Also check all wiring and connectors.*

ENGINE STARTS WHEN COLD BUT STALLS WHEN IT WARMS UP

If engine starts normally and runs well, but stalls when oil temperature reaches 59° F (15° C), the main impulse sender coil is defective. Both impulse coils must be replaced.

IGNITION DEFECT OCCURS DURING ENGINE OPERATION

If ignition defect occurs during normal engine operation, check condition of spark plug wires, coil high tension wire and spark plugs. If engine surges or misfires due to ignition malfunction, and wires and spark plugs are not defective, replace electronic control unit.

NOTE – *Never disconnect spark plug wires when engine is running. This may cause high voltage to seek ground through distributor body, causing trigger plate deterioration.*

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TESTING SYSTEM WHEN ENGINE WILL NOT START

In cold start situations where the engine will not start, perform the following tests.

SPARKING TEST

1) With engine oil temperature below 59° F (15° C), turn ignition switch to "ON" position. Remove distributor cap.

2) Disconnect the high tension coil wire from distributor and hold it approximately ¼" (6 mm) from a good ground. Ground should be as far away as possible from the ignition coil and electronic control unit.

3) Move a magnet in a spiral motion back and forth over secondary impulse sender stud (furthest from vacuum diaphragm). A spark should jump the gap to ground as magnet passes back and forth over coil stud. If it does, but engine will not start, problem probably lies in distributor cap, rotor or spark plug wires or in fuel system. If no spark occurs, proceed with component checks.

IMPULSE SENDER COIL CHECK

NOTE – *Do not use a test light to check distributor impulse sender coil. High voltage may damage the coil.*

1) Be sure impulse sender coil feed wires have not been cut. Disconnect the 5-wire relay connector and the 3-wire distributor connector (2 black wires, 1 gray). *See Fig. 7.*

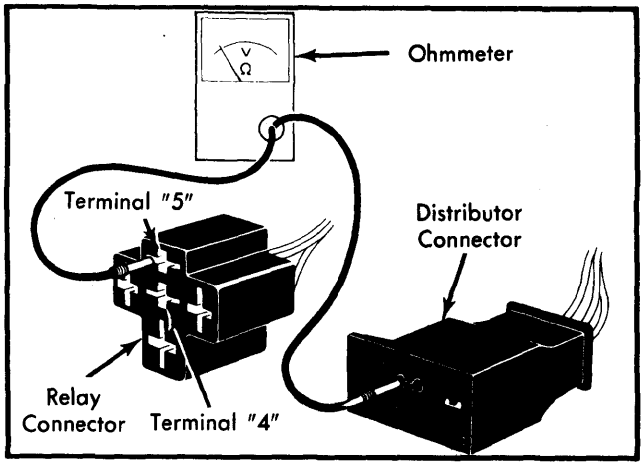

Fig. 7 Ohmmeter Hookup for Checking Impulse Sender Coils

2) Connect one lead of an ohmmeter to terminal 5 of the 5-wire relay harness connector. Connect other ohmmeter lead to double black wire terminal of distributor connector. Then move ohmmeter lead from terminal 5 to terminal 4.

3) The needle should move in each instance. If not, replace both impulse sender coils as an assembly.

4) To check impulse sender coils for shorts, connect one ohmmeter lead to terminal 5 (and then terminal 4) with second ohmmeter lead connected to distributor body. The needle should not move in either instance. If it does, replace both impulse sender coils as an assembly.

IGNITION COIL AND ELECTRONIC CONTROL UNIT CHECK

1) Turn the ignition switch to the "ON" position. Connect positive voltmeter lead to ignition coil positive terminal. Connect remaining lead to ignition coil negative terminal. *See Fig. 8.*

2) Quickly move a magnet back and forth over the secondary impulse sender coil. If the voltmeter needle moves, but engine would not start, replace the ignition coil. If the voltmeter needle does not move, replace ignition control unit.

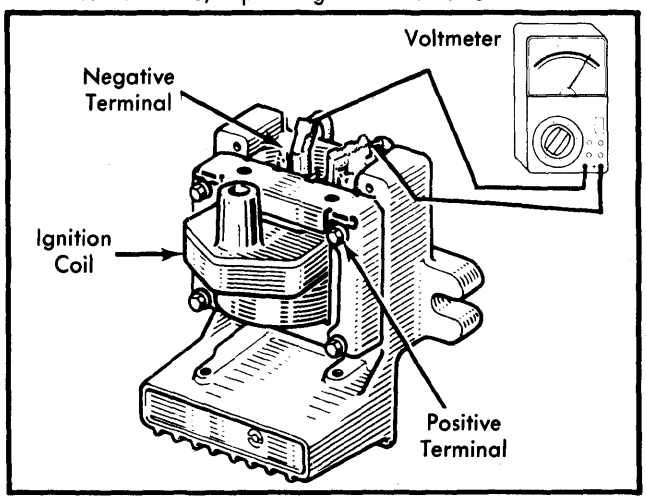

Fig. 8 Voltmeter Hookup for Checking Ignition Coil & Electronic Control Unit

ELECTRICAL CIRCUIT TEST

1) Connect a 12-volt test light between the coil positive terminal and ground. Turn ignition switch "ON". Test light should light. If not, check feed wire to coil. *See Fig. 9.*

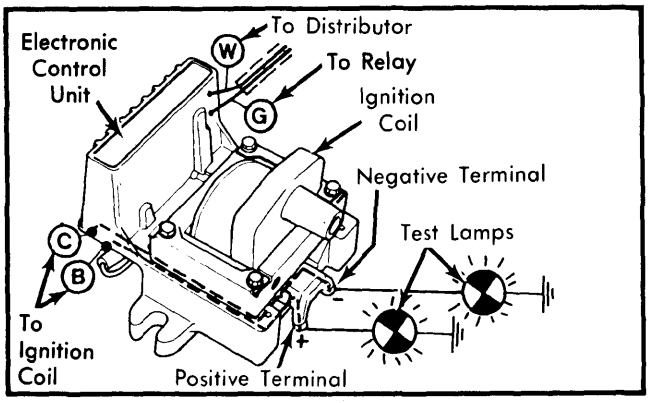

Fig. 9 Test Lamp Hookup for Checking Ignition Coil Voltage

2) Connect test light between coil negative terminal and ground. Turn ignition switch "ON". Test light should again light. If not, check if coil primary circuit is broken or if electronic control unit's power transistor is shorted.

OVERHAUL

Disassembly – Remove distributor cap, rotor and plastic seal. Remove 4 screws attaching main and secondary impulse sender coils and remove coils and trigger plate. Remove electrical connector from distributor body. Remove vacuum advance unit. Remove drive pinion from distributor shaft and remove shaft and centrifugal advance mechanism from housing.

Reassembly – Reverse disassembly procedure, adjusting air gap and ignition timing at secondary impulse sender coil.