HITACHI ELECTRONIC IGNITION SYSTEMS – DATSUN

200SX
210
280ZX (Exc. Turbo)
310
510
810
Pickup

DESCRIPTION

NOTE: Datsun 280 ZX Turbo models use a computer-controlled ignition system. See Datsun ELECTRONIC CONCENTRATED ENGINE CONTROL article in CEC section.

Two different systems are used on Datsun models, however the principle of operation on both systems is the same. Both systems use an electronic distributor, an IC ignition unit, ignition coil(s), battery and wiring harness. *See Figs. 1 through 4.*

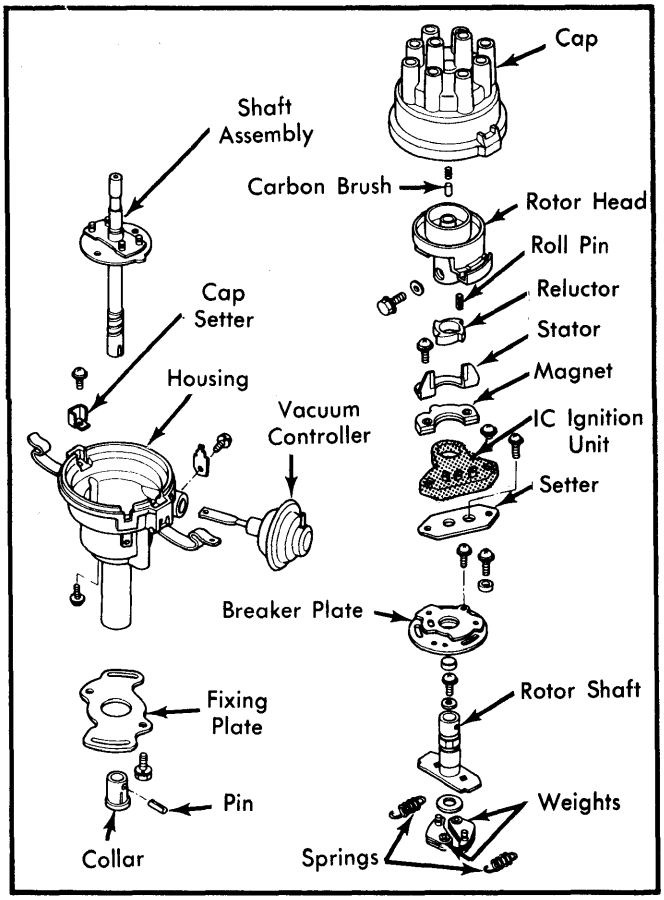

Fig. 1 Dissassembled View of Hitachi Distributor (200SX, 510 and Pickup Models)

The ignition system for 210, 280ZX, 310 and 810 models uses a single coil with a single spark plug for each cylinder. The 200SX, 510 and Pickup models have 4-cylinder engines with 8 spark plugs. These models use a special distributor cap with 8 spark plug wire outlet terminals and 2 coil wire inlet terminals. These models also use 2 ignition coils, one for the spark plugs on the exhaust side of the engine and one for the spark plugs on the intake side.

The 200SX, 510 and Pickup models also differ in that the IC ignition unit is located inside the distributor, stator and magnet assembly has a different shape, IC ignition unit has a 3-pin connector rather than a 2-pin conector, and IC ignition unit contains only 4 internal circuits and 2 transistors, instead of 5 circuits found on other models.

All models except 200SX, 510 and Pickups have IC ignition unit mounted externally on distributor housing. Unit is connected with 2 wires to pick-up coil located inside distributor. These models also have a fusible link between battery and ignition switch. The 280ZX and 810 models, which have 6-cylinder engines, feature reluctors and stators with 6 teeth, while other models have 4-cylinder engines with 4-tooth reluctors and stators.

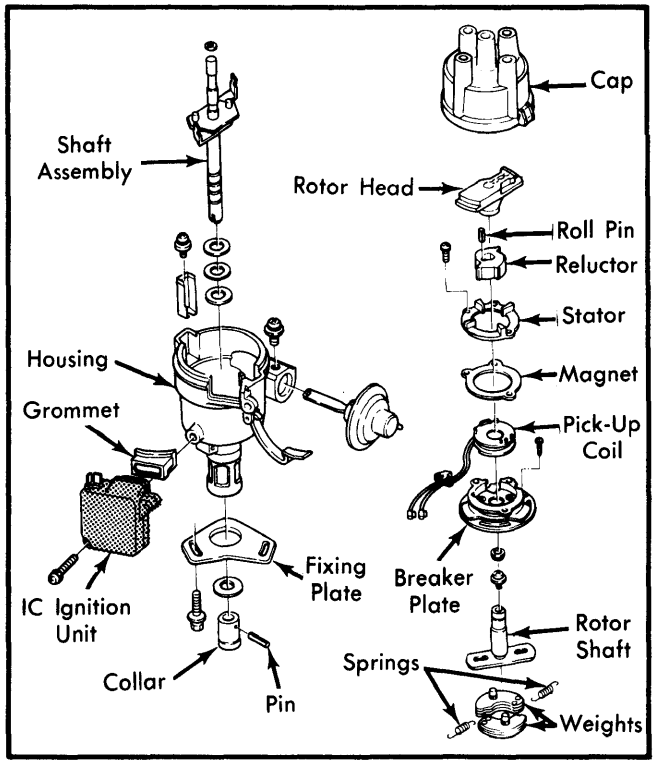

Fig. 2 Disasembled View of Hitachi Distributor on All Models Except 200SX, 510 and Pickups

OPERATION

Regardless of model, all distributors are equipped with a reluctor and stator, although the shapes may differ. The reluctor, which is mounted on the rotor shaft assembly, turns with the distributor shaft inside the stator.

As each reluctor tooth approaches and then passes the stator teeth, the magnetic field changes creating an electrical signal in the pick-up coil. (The pick-up coil is combined with the IC ignition unit on 200SX, 510 and Pickup models.) This signal is received and processed by the IC ignition unit. The IC ignition unit then turns on or cuts off current flow to the ignition coil primary circuit. When current to the primary is turned off, a high voltage surge is created in the secondary circuit which fires the spark plug. Ignition timing is controlled by the relationship of the reluctor to the stator.

The IC ignition unit contains 5 circuits on most models (4 circuits and 2 transistors on 200SX, 510 and Pickup models). These circuits perform the following functions.

- Spark Timing Signal Monitoring Circuit – Monitors and amplifies signal from distributor pick-up coil.

HITACHI ELECTRONIC IGNITION SYSTEMS – DATSUN (Cont.)

- Lock-Preventing Circuit – Cuts off ignition coil primary current when ignition switch is "ON" and engine is not running.
- Duty Control Circuit – Controls the ratio of ignition coil primary current on-off time (equivalent to dwell angle).
- Power Switching Circuit – Makes or breaks the primary circuit current of ignition coil.
- Current Limiting Circuit – Not on 200SX, 510 or Pickup models. Controls the current valve so that excessive current will not flow through power switching circuit.

All circuits are contained in one IC ignition unit. Failure of any circuit requires replacement of entire IC ignition unit.

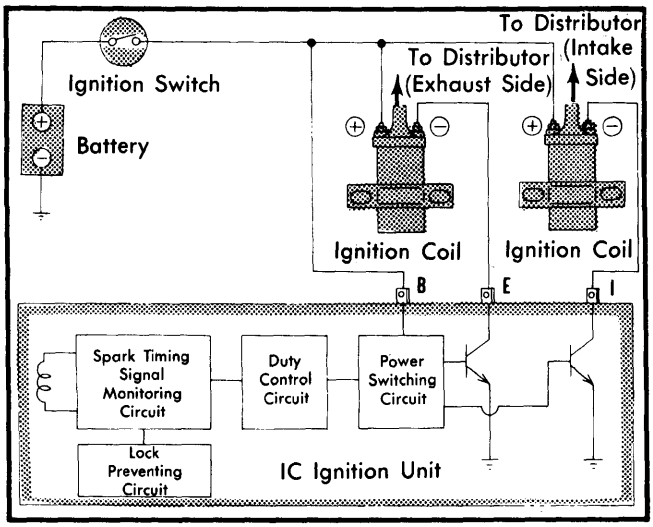

Fig. 3 IC Ignition Unit Circuit Diagram (200SX, 510 and Pickup Models)

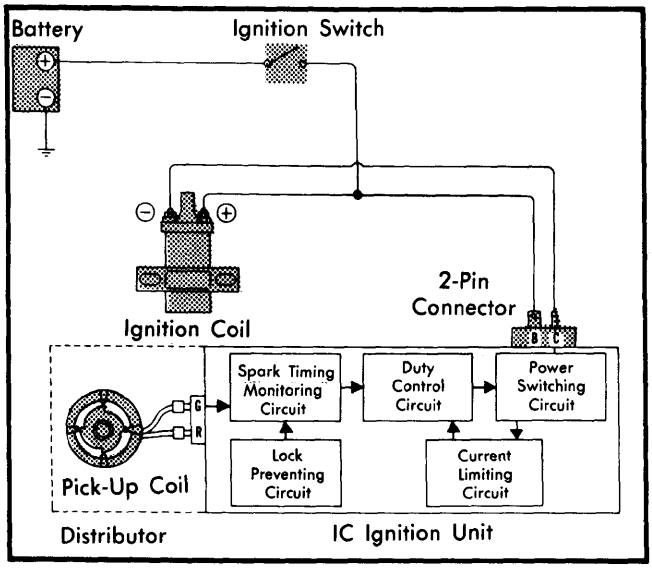

Fig. 4 IC Ignition Unit Circuit Diagram (All Models Except 200SX, 510 and Pickup)

SPECIFICATIONS

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

ADJUSTMENTS

Air Gap – When installing reluctor and stator or checking air gap, loosen screws and center stator around reluctor so that there is equal air gap between each set of reluctor teeth and matching stator teeth. *See Fig. 5.* Then tighten screws securing stator. Standard air gap is .012-.020" (.3-.5 mm).

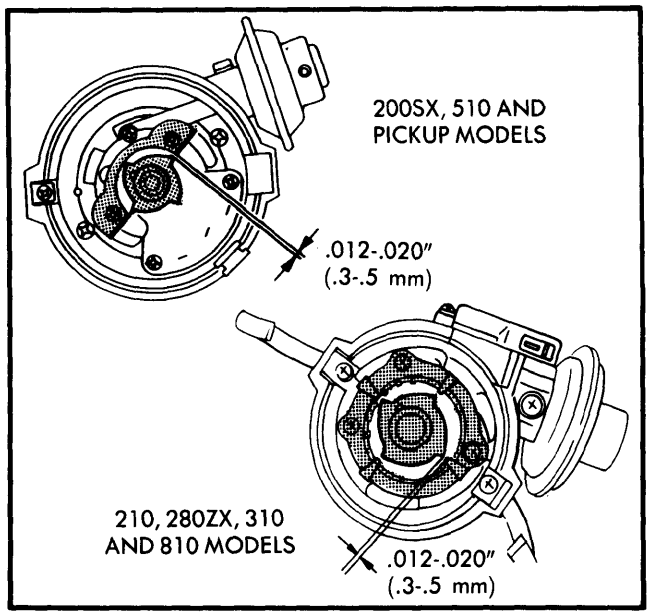

Fig. 5 Checking Reluctor-to-Stator Air Gap

Breaker Plate – If breaker plate does not move smoothly in response to vacuum controller, apply grease to steel balls. If necessary, replace breaker plate assembly.

TESTING

SYSTEM SPARK TEST

1) Turn ignition switch "OFF". On 6-cylinder engines, disconnect EFI fusible link and cold start valve. On 4-cylinder engines, disconnect anti-dieseling solenoid valve connector to cut off fuel supply to engine.

2) Disconnect high tension cable from distributor. Hold cable about ¼" (4-5 mm) from engine block. Crank engine and check for sparks at cable-to-block gap.

3) If sparks occur, the IC ignition system is OK and no further ignition checks are required. If no sparks occur, proceed with tests that follow.

BATTERY VOLTAGE CHECK

1) Turn ignition switch to "OFF" position. Connect positive lead of voltmeter to battery positive terminal. Connect negative lead to battery negative terminal. Read and record battery voltage. If below 11.5 volts, battery charging or starting system is faulty.

2) With ignition switch still "OFF" and voltmeter still hooked to battery, remove coil wire from distributor and connect it to a good ground. Crank engine and record cranking voltage registered on voltmeter. If voltage reading is less than 9.6 volts, battery charging or starting system is faulty.

HITACHI ELECTRONIC IGNITION SYSTEMS – DATSUN (Cont.)

SECONDARY WIRING CHECK

Connect an ohmmeter, in turn, to each spark plug wire. Attach one lead to terminal inside distributor cap and other lead to other end of wire. Resistance reading should be less than 30,000 ohms. If resistance is higher, replace high tension cables and/or distributor cap.

IGNITION COIL RESISTANCE CHECK

Primary Resistance – 1) Turn ignition switch "OFF". Remove coil wires to isolate coil from system. See *Fig. 6*. Set ohmmeter to x1 range. Connect ohmmeter leads to the 2 primary terminals of coil. 200SX, 510 and Pickup models should show a resistance reading of 1.04-1.27 ohms. All other models should read 0.84-1.02 ohms.

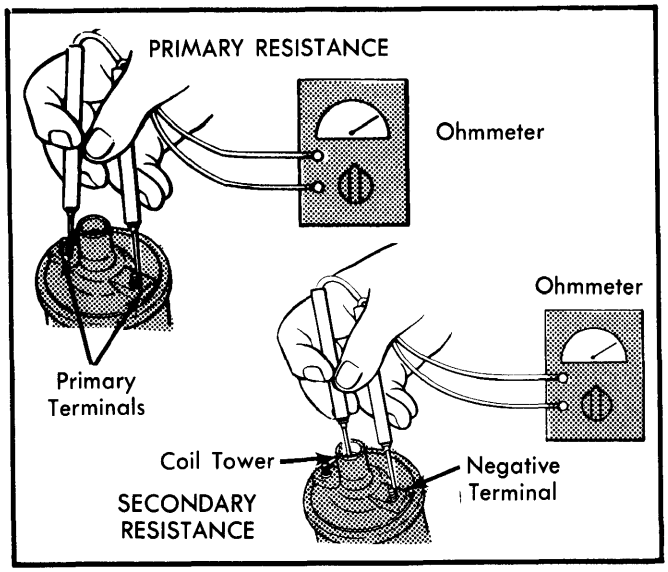

Fig. 6 Ohmmeter Hookup for Coil Resistance Checks

2) If resistance reading is OK, but engine will not start, check ignition switch and wiring from switch to coil and IC ignition unit. If reading is not within specifications, replace ignition coil.

Secondary Resistance – With ignition switch "OFF", set an ohmmeter to the x1000 range. Connect one lead to coil negative terminal and the other lead to coil tower. See *Fig. 6*. Resistance for 200SX, 510 and Pickup models should be 7,300-11,000 ohms. All other models should be 8,200-12,400 ohms. If not, replace ignition coil.

POWER SUPPLY CIRCUIT CHECK

200SX, 510 and Pickup – Connect a voltmeter positive lead to connector removed from "B" terminal of IC ignition inside distributor. See *Fig. 7*. Connect voltmeter negative lead to side of distributor. Turn ignition switch "ON". If reading is less than 11.5 volts, check wiring from ignition switch to IC ignition unit.

All Other Models – 1) Connect voltmeter positive lead to "B" terminal (black and white wire) of IC ignition unit connector. See *Fig. 8*. Connect negative lead to side of distributor. Turn ignition switch "ON". If below 11.5 volts, check wiring from ignition switch to IC ignition unit.

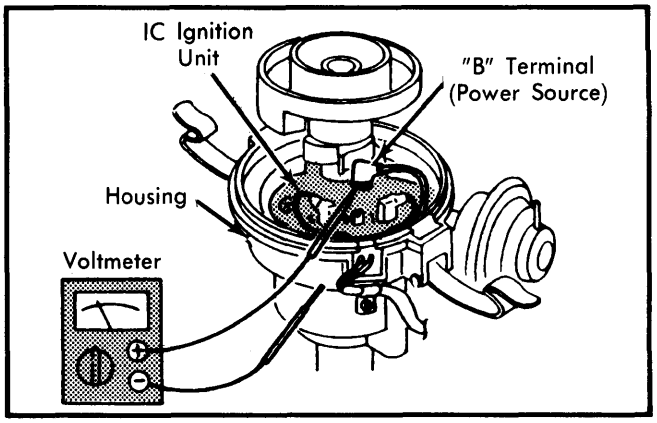

Fig. 7 Voltmeter Hookup for Power Supply Check (200SX, 510 and Pickup Models)

2) To check power supply while cranking engine, remove high tension wire from distributor and ground it. Connect voltmeter positive lead to "B" terminal (black and white wire) of IC ignition unit connector. Connect negative lead to side of distributor. Turn ignition switch to "START" position. Note voltmeter reading.

3) If voltage reading is more than 1 volt below battery CRANKING voltage and/or is below 8.6 volts, check ignition switch and wiring from switch to IC ignition unit.

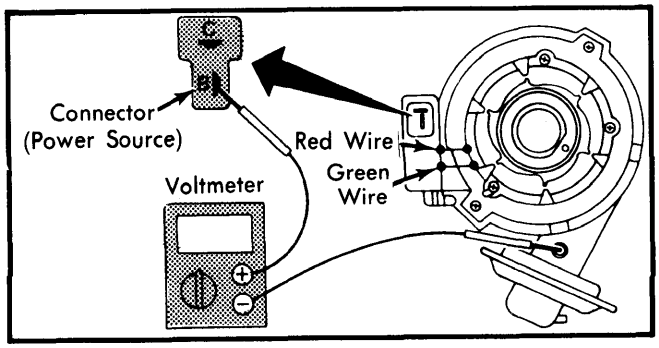

Fig. 8 Voltmeter Hookup for Power Supply Check (All Models Except 200SX, 510 and Pickup)

IGNITION PRIMARY CIRCUIT CHECK

200SX, 510 and Pickup – 1) Attach a voltmeter negative lead to side of distributor. Connect the voltmeter positive lead to "I" terminal of IC ignition unit connector then to the "E" terminal of IC ignition unit connector. See *Fig. 9*.

2) Turn ignition switch "ON" after lead has been attached to each terminal. Voltage readings on both terminals should be 11.5-12.5 volts. If reading is below specifications, recheck coil primary resistance. If voltage is correct, proceed to IC Ignition Unit Ground Circuit Check.

All Other Models – 1) Connect voltmeter positive lead to "C" terminal (blue wire) of IC ignition unit connector. See *Fig. 10*. Attach negative lead to side of distributor. Turn ignition switch "ON".

HITACHI ELECTRONIC IGNITION SYSTEMS – DATSUN (Cont.)

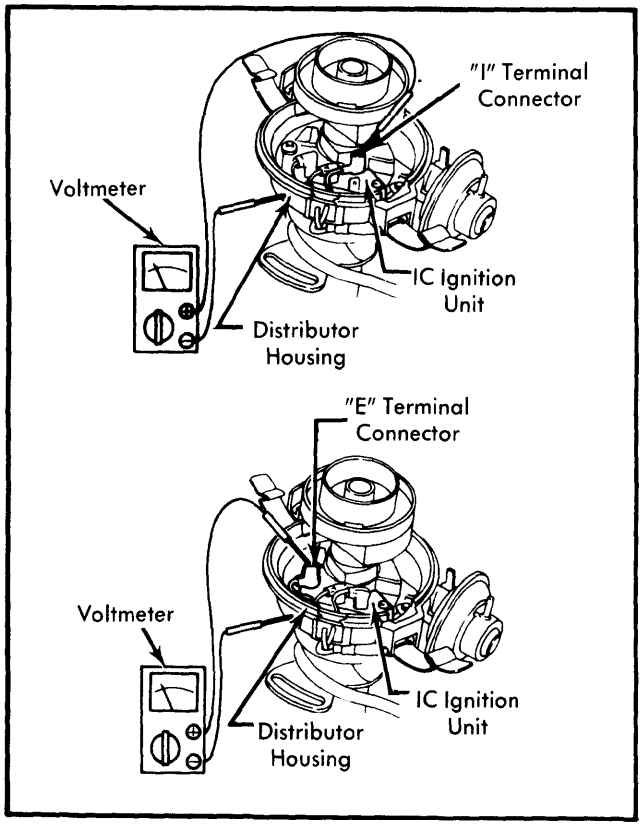

Fig. 9 Voltmeter Hookup for Ignition Primary Circuit Check (200SX, 510 and Pickup)

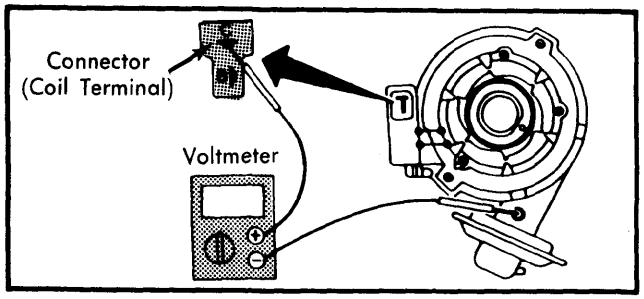

Fig. 10 Voltmeter Hookup for Ignition Primary Circuit Check (All Models Except 200SX, 510 and Pickup)

2) If voltage is 11.5-12.5 volts, proceed to IC Unit Ground Circuit Test. If voltage reading is below 11.5 volts, check Coil Primary Resistance, if not previously done.

IC IGNITION UNIT GROUND CIRCUIT CHECK

1) Connect voltmeter negative lead to battery negative terminal. See *Fig. 11*. Connect positive lead to exterior of vacuum controller. Pull high tension wire from distributor cap and ground it. Turn ignition switch to "START" position and observe voltmeter reading while cranking engine.

2) If voltage reads 0.5 volts or less, proceed to Pick-Up Coil Resistance Check. If voltage is more than 0.5 volts, check distributor ground wiring from chassis to battery, including battery connections.

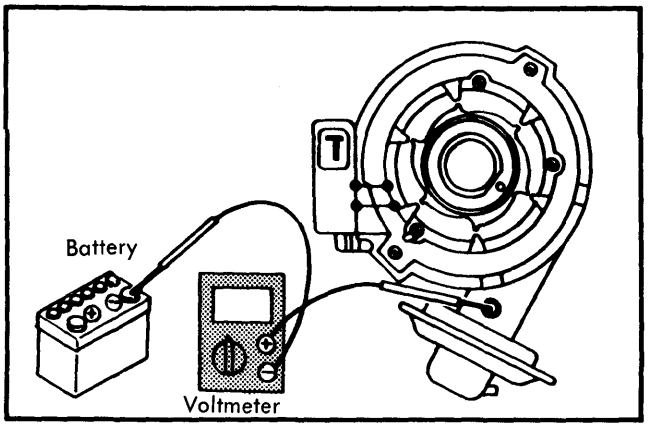

Fig. 11 Voltmeter Hookup for IC Ignition Unit Ground Circuit Check

PICK-UP COIL RESISTANCE CHECK

1) For this test, engine should be at operating temperature. Turn ignition switch "OFF". Connect an ohmmeter, set to the x10 scale, to pick-up coil terminals (red and green wires). See *Fig. 12*.

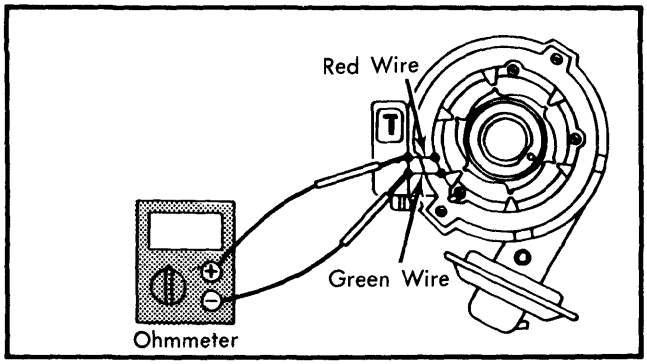

Fig. 12 Ohmmeter Hookup for Pick-Up Coil Resistance Check

2) If ohmmeter reading is approximately 400 ohms, proceed to Pick-Up Coil Output Check. If ohmmeter reading varies widely from 400 ohms, check pick-up coil and wires leading to it.

PICK-UP COIL OUTPUT CHECK

1) Engine should be at operating temperature. Connect a voltmeter, set to the low scale (0-5 volt), with positive lead connected to pick-up coil terminal with red wire. See *Fig. 13*. Attach negative lead to side of distributor.

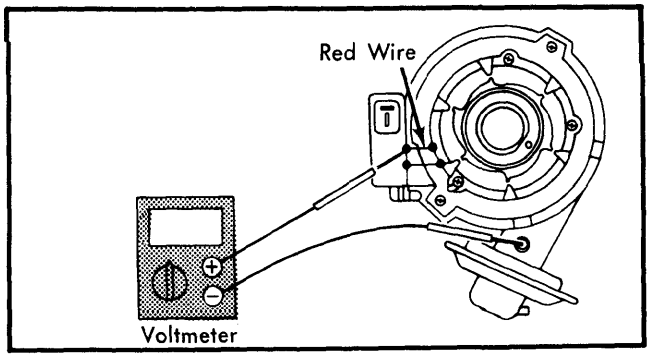

Fig. 13 Voltmeter Hookup for Pick-Up Coil Output Check

HITACHI ELECTRONIC IGNITION SYSTEMS – DATSUN (Cont.)

2) Turn ignition switch to "START" position and check for movement of voltmeter needle while cranking engine. If needle wavers and the no spark condition still exists, replace IC ignition unit.

3) If needle is steady, check physical condition of pick-up coil and reluctor. Check wiring and connector between pick-up coil and IC ignition unit.

OVERHAUL

Disassembly (200SX, 510 and Pickup) – **1)** Remove distributor cap and rotor head. Pry reluctor from rotor shaft assembly. Use care not to damage teeth.

2) Remove IC ignition unit and unit setter. Remove stator and magnet. Remove vacuum controller and breaker plate. Mark housing and fixing plate. Remove fixing plate and collar. Remove rotor shaft and drive shaft. Mark rotor shaft and drive shaft. Remove packing from top of rotor shaft and remove rotor shaft from drive shaft.

3) Mark one governor spring and its bracket and one weight and its pivot pin. Remove springs and weights and apply grease to weights.

Disassembly (All Other Models) – **1)** Remove distributor cap and rotor head. Remove IC ignition unit by disconnecting harness connector, removing screws and disconnecting pick-up coil wires.

2) Remove stator and magnet. Remove vacuum controller and carefully pry reluctor from shaft. Remove roll pin, pick-up coil assembly and breaker plate assembly. Remove pin and pinion gear. Remove rotor shaft and drive shaft assembly.

3) Mark rotor and drive shafts for later assembly. Remove packing and rotor shaft set screw. Mark one of governor springs and its bracket; also one weight and its pivot pin. Remove weights and springs.

Reassembly (All Models) – **1)** To assemble, reverse disassembly procedure. Clean surfaces of IC ignition unit and distributor before assembling. Be sure pick-up coil leads (if equipped) are securely attached to IC ignition unit terminals. See *Fig. 14*.

2) Align match marks so parts are assembled in original positions. Be sure reluctor is centered in stator, before tightening stator screws. Drive in roll pin with its slit toward outer end of shaft. Grease top of rotor shaft. Check governor operation before installing distributor.

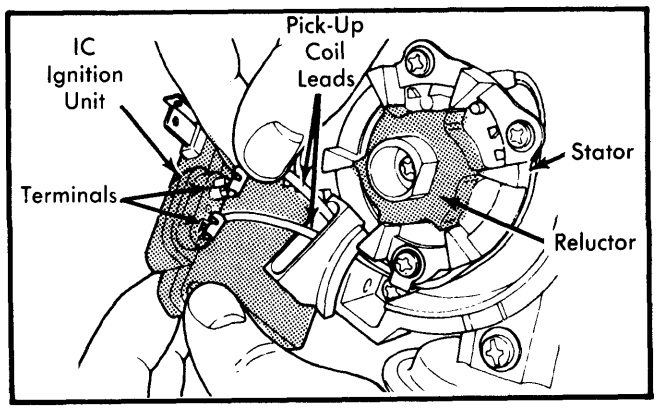

Fig. 14 Connecting Pick-Up Coil Terminals (All Models Except 200SX, 510 and Pickup)