IGNITION SYSTEMS

260-Z

DIAGNOSTIC PROCEDURES 1974

TECHNICAL ENGINEERING DEPARTMENT

Nissan Motor Corporation in U. S. A.

CHECKING TRANSISTOR IGNITION SYSTEM

260-Z, 1974

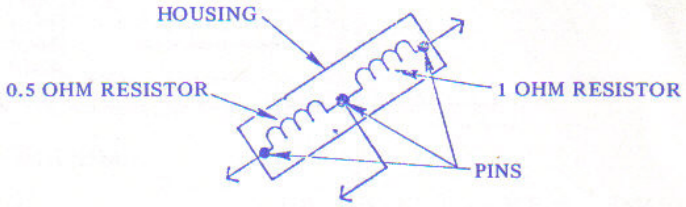
SYSTEM COMPONENTS

This ignition system uses a heavy duty coil, a transistor amplifier, and a "breakerless" type distributor.

Ballast Resistor

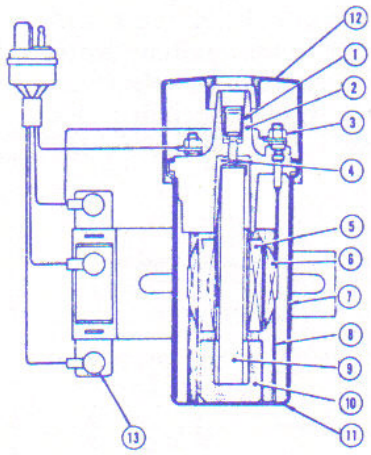
An electrical current limiting device containing:

- ceramic housing
- 1.0 ohm resistor wire
- 0.5 ohm resistor wire
- connector pins



Ignition Coil

A heavy duty coil used to supply a high voltage, low amperage current to the secondary ignition system.



1 Secondary terminal	6 Primary coil	11 Case
2 Cap	7 Side core	12 Rubber cap for ignition coil
3 Primary terminal	8 Insulator oil	13 Rubber cap for terminal
4 Spring	9 Center core	
5 Secondary coil	10 Segment	

Pick-Up and Reluctor

The pick-up is an electromagnetic coil while the reluctor is an iron core. The assembly although not connected directly, consist of the following parts:

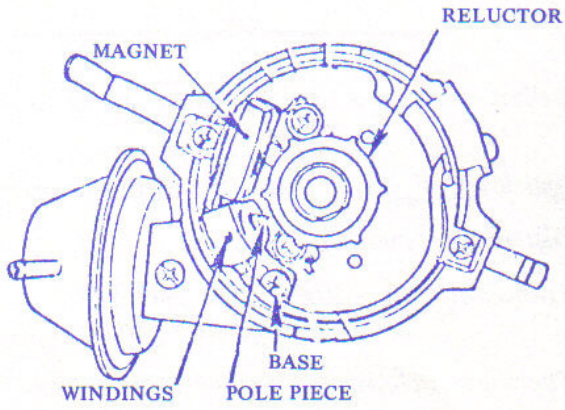
Pick-up

- base plate
- permanent magnet
- pole piece
- windings

Reluctor

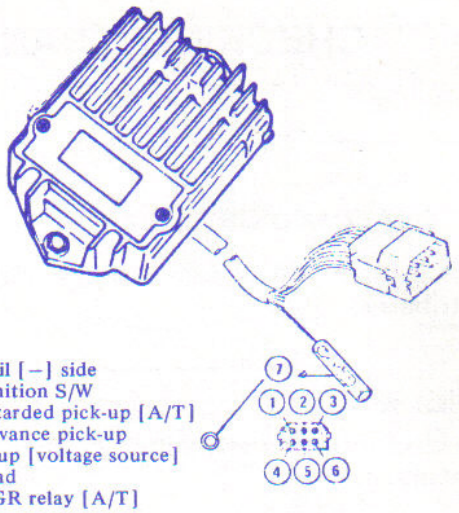
- machined-iron core
- timer points

Manual Type Transmission



Transistor Unit

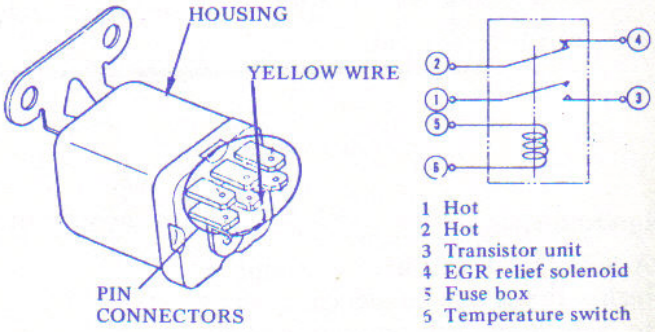
The transistor unit accepts and sends electrical signals, and controls the coil's primary circuit ground.



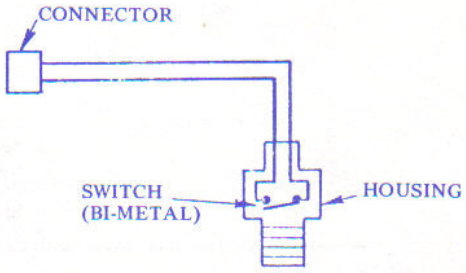
Relay and Switch (A/T Only)

On automatic transmission equipped vehicles, and in addition to the extra pick-up, both the EGR relay and engine temperature switch work together to supply an electrical signal to the transistor unit. This signal determines the ignition timing mode.

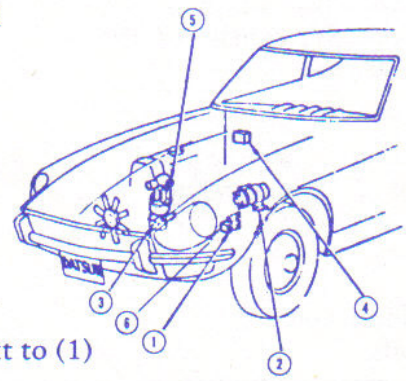
EGR RELAY



TEMPERATURE SWITCH



1. *Ballast Resistor* — Left side inner fender panel below coil
2. *Ignition Coil* — Left side inner fender panel
3. *Distributor (Pick-Up/Reluctor)*
4. *Transistor Unit* — Right side upper dash passenger compartment
5. *Thermostat Housing* — Temperature switch
6. *EGR Relay* — Left side inner fender panel next to (1)



SYSTEM TEST

Classification

All system tests are classified into the following categories:

- Ignition Switch Circuit
- Primary Coil Circuit
- Pick-Up Circuit
- Pick-Up and EGR Relay Circuits (A/T Only)

Ignition Switch Circuit Test

Determines amount of incoming voltage to transistor unit from ignition "on" circuit.

Amount of available voltage received from ignition switch directly affects output signal of pick-up.

Primary Coil Circuit Test

Determines amount of incoming voltage to transistor unit from ignition coil.

Amount of available voltage from ignition coil determines potential coil secondary output.

Pick-Up Circuit Test

Determines amount of resistance through harness and pick-up.

The amount of resistance from transistor unit through pick-up and back to unit directly affects strength of pick-up signal.

Pick-Up and EGR Relay Circuit (A/T only)

Make this test on automatic transmission equipped vehicles only. The procedure consists of an incoming voltage measurement from the EGR relay, and a resistance measurement through the [retarded] pick-up circuit.

If there is no incoming voltage signal from the EGR relay, the ignition timing control system will not operate, resulting in increased emission output.

If resistance value of retarded pick-up is not within specifications, not only will the above results occur, but the possibility of engine stalling is very likely.

PROCEDURE 1
Preliminary 260-Z Ignition System Checks

Make the following checks:

Transistor Unit

- Loose or pushed out pins and/or sockets
- Connector engagement

Ballast Resistor

- Loose or corroded terminals
- Corroded connector
- Resistance — Run resistor 1.3 to 1.50 ohms. Cranking bypass resistor .3 to .5 ohms

Ignition Coil

- Cracked coil tower and/or housing
- Corrosion in terminal
- Loose primary connections
- Primary coil winding resistance — .4 to .5 ohms
- Secondary coil winding resistance — 8.5 to 12.7 ohms

Coil Wire

- Loose or burned cable ends
- Wire resistance — if over 30,000 ohms replace

Distributor

- Cracked distributor cap
- Corroded cap terminals
- Damaged rotor
- Carbon paths
- Corrosion in pick-up coil connector
- Broken pick-up coil leads
- Pick-up coil to rotor air gap — .012 to .016 maximum clearance

Spark Plugs

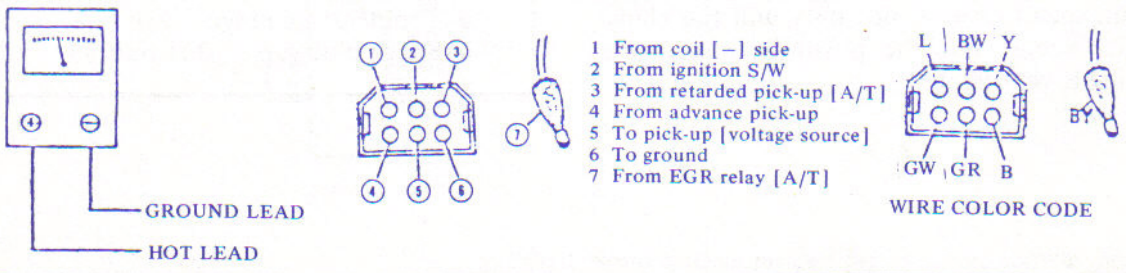
- Glazing
- Temperature range
- Spark plug gap — .031 to .035

PROCEDURE 2
Manual System Volt-Ohm Test

The volt-ohm method of testing is an eliminating type procedure.

Note: **If results, do not meet specifications, go to the Test Results Action Table, pages 5 and 6.**

Circuit Test	Action	Specifications
1. IGNITION SWITCH CIRCUIT • use a volt meter-scale higher than 12 volts. • ignition switch ON	1) Disconnect body harness to transistor unit connector. 2) Hot lead to socket point 2. 3) Ground lead to socket point 6	Should check 11.5 to 12.5 volts
2. PRIMARY COIL CIRCUIT • use a volt meter-scale higher than 12 volts. • ignition switch ON • disconnect body harness to transistor unit connector	1) Put hot lead to socket point 1 2) Ground lead to socket point 6	Should check 11.0 to 12.5 volts
3. PICK-UP CIRCUIT (A) • ignition switch OFF • use ohm meter, calibrated on a scale higher than Rx-1	1) Put hot lead to socket point 5 2) Ground lead to socket point 4	Should check 450 to 750 ohms
STEP 3 COMPLETES TESTS FOR MANUAL TRANSMISSION VEHICLES		
4. ADVANCE/RETARD (EGR RELAY CIRCUIT A/T ONLY) • use a volt meter-scale above 12 volts • ignition switch ON • **Engine coolant must be above 130° F.**	1) Hot lead to pin 7 2) Ground lead to socket point 6	Should check 11.5 to 12.5 volts If resistance value is outside specs. increase in emissions and possible engine stalling will occur.
5. PICK-UP CIRCUIT (A/T ONLY) • ignition switch OFF • use ohm meter calibrated on a scale higher than Rx-1	1) Hot lead to socket point 3 2) Ground lead to socket point 5	Should check 450 to 750 ohms



Test Results Action Table

If the manual system volt-ohm test results do not agree with limits in *Specifications* column, use this table to determine the required action.

1. IGNITION SWITCH CIRCUIT

Upper Limit . . . . 12.5 volts
Lower Limit . . . . 11.5 volts

Diagnosis: Reading below 11.5 indicates circuit has high resistance or is an open circuit.

Action: Repair

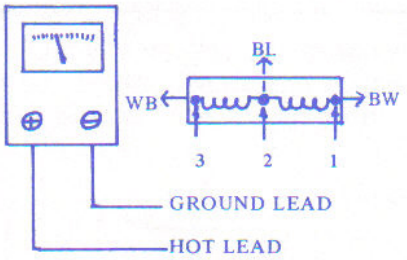
2. PRIMARY COIL CIRCUIT

Lower Limit . . . . 11.0 volts

Diagnosis: Reading below 11.0 volts indicates excessive resistance.

Perform the following tests:

Resistor Test



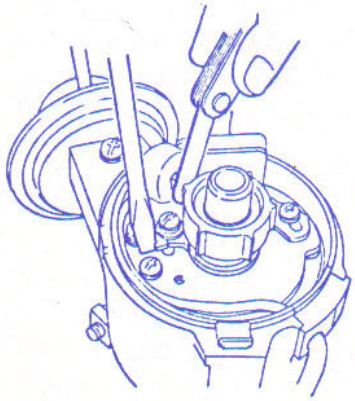
1. Ignition switch OFF
2. Use an ohm meter Rx-1 scale
3. Ground lead to terminal 3

   Hot lead to terminal 1
   at 75° F. should check at 1.3 to 1.5 ohms

   Hot lead to terminal 2
   at 75° F. should check at .3 to .5 ohms

Action: If test reading exceeds ohms shown, replace ballast resistor.

Air Gap Adjustment



1. Use .012 to .016 feeler gauge (Non-ferrous due to the magnetic attraction of pole piece.)
   (Clearance .014 in. – 0.12 to 0.16 allowable.)
2. Remove the distributor cap and rotor.
3. Align reluctor point and pole piece tip.
4. Insert feeler gauge between reluctor point and pole piece tip.
5. As necessary, adjust. Use only the pick-up base attaching screws and adjustment slots.

3. PICK-UP CIRCUIT (MANUAL TRANSMISSION)

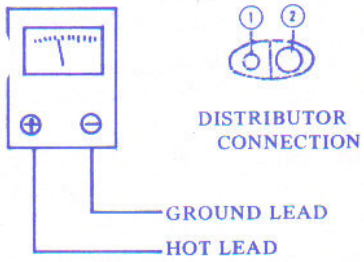
Pick-Up Resistance is the actual resistance through the pole piece windings measured in ohms.

The strength of the pulse signal transmitted to the transistor unit as well as the magnetic field of the pole piece is determined by the electrical current flow and the air gap. If resistance is higher than specifications, both pulse signal and magnetic field would be weakened, which could cause engine misfire or no-run condition.

Limits . . . . . 450 to 750 ohms

Diagnosis: If readings are outside limits, perform the following:

Pick-Up Resistance Test



1. Ignition switch OFF
2. Calibrate on Rx 100 ohms
3. Disconnect the pick-up connector
4. Ground lead to pin 1

   Hot lead to socket 2

Action: If reading exceeds 750 ohms, replace pick-up. If reading is below 450 ohms, replace pick-up and check wiring harness.

4. ADVANCE RETARD EGR RELAY CIRCUIT (AUTO. TRANS. ONLY)

Lower Limit . . . . 11.0 volts

Diagnosis: If reading is below 11.0 volts, there is a high resistance or an open circuit.

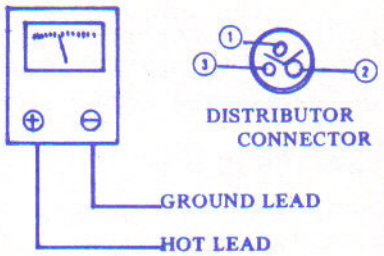
Action: Check complete EGR circuit.

5. PICK-UP CIRCUIT (AUTOMATIC TRANS. ONLY)

Limits . . . . 450 to 750 ohms.

Diagnosis: If readings are outside these limits, make the following check:

Pick-Up Resistance Test



1. Ignition switch OFF
2. Calibrate on Rx 100 ohms
3. Disconnect the pick-up connector
4. Ground lead to pin 1

   Hot lead to socket 2
   Hot lead to socket 3

Action: If reading exceeds or is below limits, replace pick-up.

NOTES

PROCEDURE 3
Datsun Electric Ignition Analyser
99995-00106 Kent-Moore Corp.

Circuit Test	Car State	Instruction	Results
1. *Connection*	Ignition Switch OFF	Disconnect transistor ignition harness and connect tester harness	
2. *Lamp Test*	Ignition Switch ON - Do not start car.	S4 at lamp test depress S2 S3 at A position. Caution: Remove S4 from lamp test position before doing Step 3	Red and green lamps light - OK. Only one lamp lights - replace non-lighting lamp. Neither lamp lights - test car battery. If it is OK replace both lamps.
3. *Ignition Coil* primary winding continuity test	Ignition Switch ON - Do not start car.	S3 at ignition coil S1 at continuity test depress S2	Green light - coil is good. Red light - problem in ignition coil primary.
4. *Pick-up coil A* (retarded side) continuity test	Ignition Switch ON - Do not start car.	S3 at A S1 at continuity test depress S2	Green light - coil A is good. Red light - problem in coil B and associated wiring.
5. *Pick-up coil B* (advance side) continuity test	Ignition Switch ON - Do not start car.	S3 at B S1 at continuity test depress S2	Green light - coil B good. Red light - problem in coil B and associated wiring.
6. *Transistor Unit Test* (manual transmission)	Ignition Switch ON - Do not start car.	S3 at A S1 at module test depress S2	Green light - transistor unit is good. Red light - problem in transistor unit.
7. *Transistor Unit Test* (automatic transmission) (retarded circuit)	Ignition Switch ON - Do not start car.	S3 at A S1 at module test depress S2	Green light - retarded circuit is good. Red light - problem in transistor unit.
8. *Transistor Unit Test* (automatic transmission) (advanced circuit)	Ignition Switch ON - Do not start car. Disconnect Pick-up lead (white wire). Otherwise, red light always results.	S3 at B S1 at module test depress S2	Green light - advanced circuit is good. Red light - problem is transistor unit.

PROCEDURE 4
Oscilloscope Test

An *oscilloscope* can be used to check most of the items in a transistor ignition system. (For remaining items a voltmeter is used.)

A *circuit tester* can not be used for the duty control circuit and power transistor performance tests.

On the last pages several wiring diagrams are provided. The thick lines indicate the objective of each individual item check.

The connection of a tachometer or a timing light in parallel with an oscilloscope or a circuit tester is allowable, provided that the connection is made with due consideration to wiring connections.

1. POWER SUPPLY WIRING CHECK
(See wiring diagram Fig. EE-14)

Procedure:
1. Separate 6-P connector for ignition unit.
2. Turn on ignition switch.
3. Connect a circuit tester or an oscilloscope as shown in the figure below.

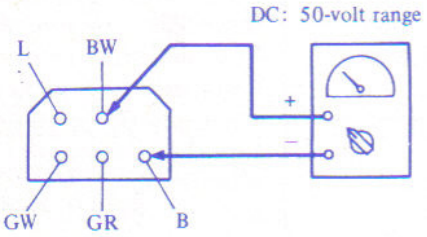


Fig. EE-1 Power supply wiring check

Criterion:

When power source (battery) voltage is indicated . . . . . OK
Lower or no indication . . . N.G.

If the result is "N.G.", take the following measures:

1. Check "BW" and "B" color wire harness respectively, for proper conductance.
2. Check battery terminals for proper connection.
3. Check charge condition of battery if an excessively low voltage is indicated.

2. BATTERY CHECK

This check is involved in the preceeding item 1.

3. CONTINUITY CHECK OF IGNITION COIL PRIMARY WINDINGS

3.1 Checking ignition coil primary winding (See wiring diagram Fig. EE-15)

Procedure:
1. Connect a circuit tester or an oscilloscope as shown in the figure below.

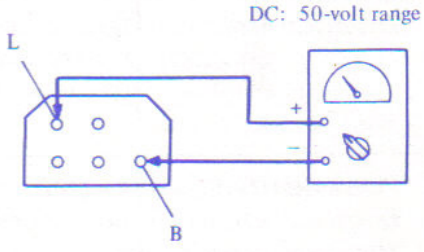


Fig. EE-2 Checking ignition coil primary windings

Criterion:
When normal power source (battery) voltage is indicated . . . . . OK
Lower or no indication . . . N.G.

If the result is "N.G.", take the following measures:

1. Check "L" color wire harness for proper conductance.
2. Check the connector of ignition coil assembly for loose contact.
3. Check resistor and ignition coil terminals for loose contact.
4. Check resistor and ignition coil for discontinuity.
5. Check "WB" color wire harness of ignition coil assembly for proper continuity.

3.2 Checking ignition coil assembly (See wiring diagram Fig. EE-16)

Procedure:
1. Pull out the ignition coil assembly 4-P connector.
2. Connect a circuit tester as shown in the figure below.

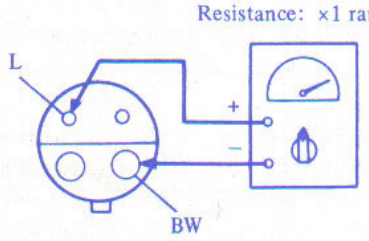


Fig. EE-3 Checking ignition coil assembly

Criterion:
When approximately 0 ohm is indicated . . . . . OK
More than 1.8 ohm . . . . N.G.

If the result is "N.G.", take the following measures:

Replace ignition coil assembly.

4. PICK-UP COIL "A" CONTINUITY CHECK (Retarded Side) (See wiring diagram Fig. EE-17)

Procedure:

1. Connect a circuit tester as shown in the figure below.

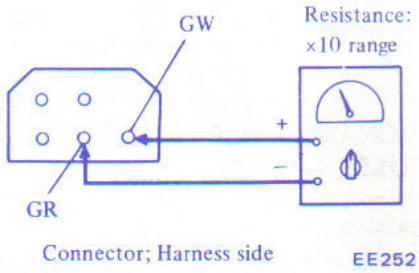


Fig. EE-4 Checking pick-up coil "A"

Criterion:
When approximately 620 ohm is indicated . . . . . OK
Other indication . . . . . N.G.

If the result is "N.G.", take the following measures:

Replace pick-up coil assembly (retarded side)

5. PICK-UP COIL "B" CONTINUITY CHECK (Advanced Side: Automatic transmission models only) (See wiring diagram Fig. EE-18)

Procedure:
1. Connect a circuit tester as shown in the figure below.

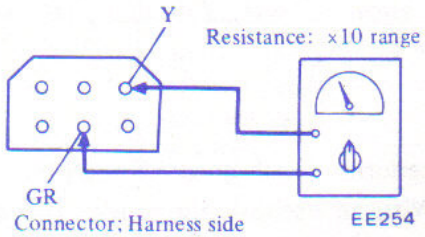


Fig. EE-5 Pick-up coil "B" continuity check

Criterion:
When approximately 620 ohm is indicated . . . . . OK
Other indication . . . . . N.G.

If the result is "N.G.", take the following measures:

Replace pick-up coil assembly (advanced side).

6. PICK-UP COIL POWER SIGNAL PULSE CHECK

Procedure:

1. Connect a circuit tester or an oscilloscope as shown in the figure below.
2. Rotate starter motor.
3. Read the tester indication.

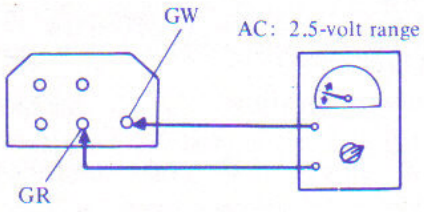


Fig. EE-6 Checking pick-up coil power signal pulse

Criterion:

When pointer deflects slightly . OK

When pointer does not deflect at all . . . . . N.G.

If the result is "N.G.", take the following measures:

Replace pick-up coil assembly. (In a two pick-up type ignition system, also check the advance side, following the same steps as above.)

Procedure: (with an oscilloscope)

4. With an oscilloscope, check the wave form as shown in the figure below.

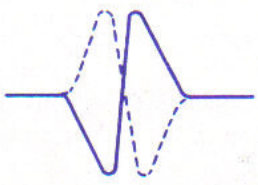


Fig. EE-7 Wave form of pick-up coil

Criterion:

When the wave form takes the shape of a full line . . . . OK

When the wave form takes the shape of a dashed line or when there is no wave form . . N.G.

If the result is "N.G.", take the following measures:

Replace pick-up coil assembly. (In a two pick-up type ignition system, also check the advanced side.)

Note: This item is not included in the item tested by special checker.

7. TRANSISTOR IGNITION UNIT CHECK

(See wiring diagram Fig. EE-19)

Check items 7-2 and 7-3 with an oscilloscope.

Where an oscilloscope is not available, check to make sure that all previous tests are satisfactory and that no spark is issuing from the secondary high-tension wire.

If everything else is satisfactory, then the transistor ignition unit is faulty or there is discontinuity in the secondary high-tension wire. Replace the faulty part. After replacement check the sparks from the secondary wire.

7-1 Checking operation of transistor ignition unit. (If an oscilloscope is not available.)

Procedure:

1. Put 2-P (or 3-P) connector back in the distributor circuit.
2. Put 4-P connector back in the ignition coil assembly circuit.
3. Put 6-P connector back in the transistor ignition unit circuit.
4. Keep the secondary high-tension wire end 4 to 5 mm (0.16 to 0.20 in.) away from engine block, rotate the starter motor, and check whether sparks jump across the clearance.

Criterion:
Where sparks issue . . . . OK
Where no sparks issues . . . N.G.

If the result is "N.G.", the fault lies either in the transistor unit or in the secondary high-tension wire.

Replace these parts.

7-2 Checking operation of transistor ignition unit. (If an oscilloscope is available.)

Procedure:
1. Put 2-P (or 3-P) connector back in the distributor circuit.
2. Put 4-P connector back in the ignition coil assembly circuit.
3. Put 6-P connector back in the transistor ignition unit circuit.
4. Connect oscilloscope as shown in the figure below, rotate the starter motor and observe the wave form on the oscilloscope.

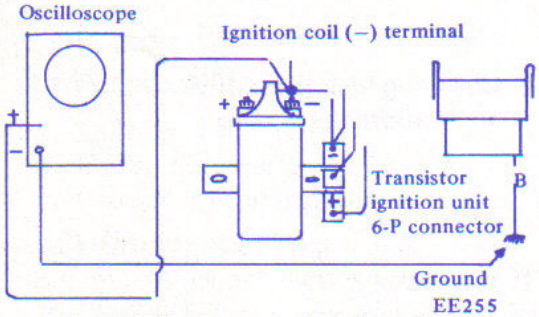


Fig. EE-8 Checking operation of transistor ignition unit

Criterion:
When a wave form similar to (a) is observed . . . . . OK
When a wave form similar to (b) is observed or when no wave form is observed . . . . N.G.

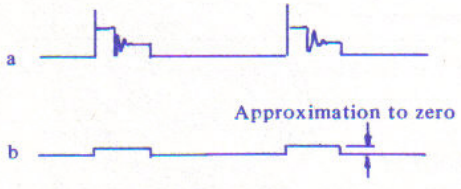


Fig. EE-9 Wave form of pulse EE256

If the result is "N.G.", the fault lies either in the transistor unit or in the secondary high-tension cord.

Replace these parts.

7-3 Checking operation of duty

Procedure:
1. While the engine is idling, observe the wave form on the oscilloscope in the same way as stated in item 7-2, Fig. EE-8. Determine the ratio t/T as shown in Fig. EE-10.

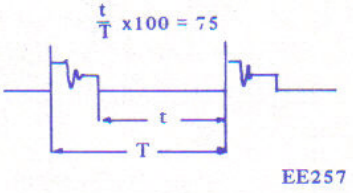


Fig. EE-10 Wave form of duty pulse

Criterion:
When standard ratio of about 75% is obtained . . . . . OK
When the ratio obtained is far less than 75% . . . . . N.G.

If the result is "N.G.", take the following measures:

Replace transistor ignition unit.

7-4 Checking two pick-up switching mechanism (See wiring diagram Fig. EE-20)

Procedure:
1. Disconnect the connections of oscilloscope to the negative terminal on ignition coil and to the ground.
2. Separate a cap connector from the "W" color wire harness leading to ignition unit.

3. Connect "W" color wire harness to the positive terminal of battery (This state corresponds to that in which the thermo-switch is turned on.) Check the firing point with a timing light to see whether the timing is delayed or not.

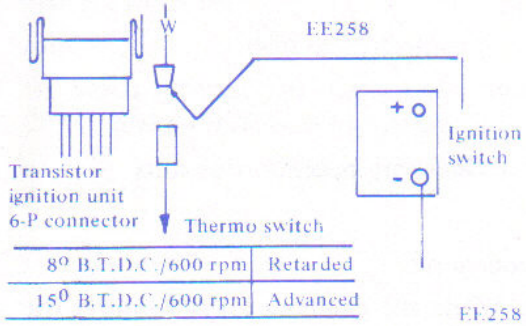


Fig. EE-11 Checking two pick-up switching mechanism

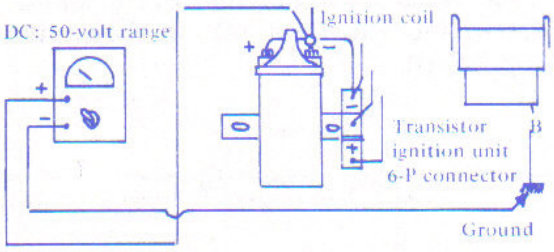


Fig. EE-12 Checking lock preventive circuit

Criterion:

When rated timing delay appears . . . . . OK

When smaller timing delay or no delay appears . . . N.G.

If the result is "N.G.", take the following measures:

1. When a small delay appears, adjust the advance-side pick-up coil in the distributor.
2. When no delay appears, adjust the advance-side pick-up coil in the distributor (to advance further). If delay is still too small, replace the transistor ignition unit.

7-5 Checking lock preventive circuit (If a circuit tester is used.)

Procedure:

1. Put the cap connector back on the "W" color wire harness leading to the ignition unit.
2. Connect a circuit tester as shown in Fig EE-12; positive terminal of tester is connected to negative terminal of ignition coil and negative terminal of tester is grounded.
3. Start the engine and then remove the connector from distributor. Check to see whether the tester indicates the voltage of power source (battery) within 10 seconds after disconnection of distributor.

Criterion:

When power source voltage is indicated . . . . . OK

When approximately zero-voltage is indicated . . . . . N.G.

If the result is "N.G.", take the following measures:

Replace transistor ignition unit.

7-6 Checking lock preventive circuit (If an oscilloscope is used.)

Procedure:

1. When using an oscilloscope instead of a tester, arrange the connection in the same way as shown in item 7-2, Fig. EE-8. Start the engine, and after a 2 or 3 second internal, remove the connector from the distributor.

Check to see whether the wave form on the oscilloscope rises up to the power source voltage within about 10 seconds after disconnection of distributor.

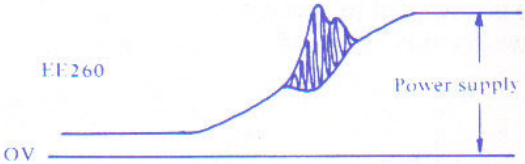


Fig. EE-13 Wave form of lock preventive circuit

Criterion:

The same as described before for use of a tester.

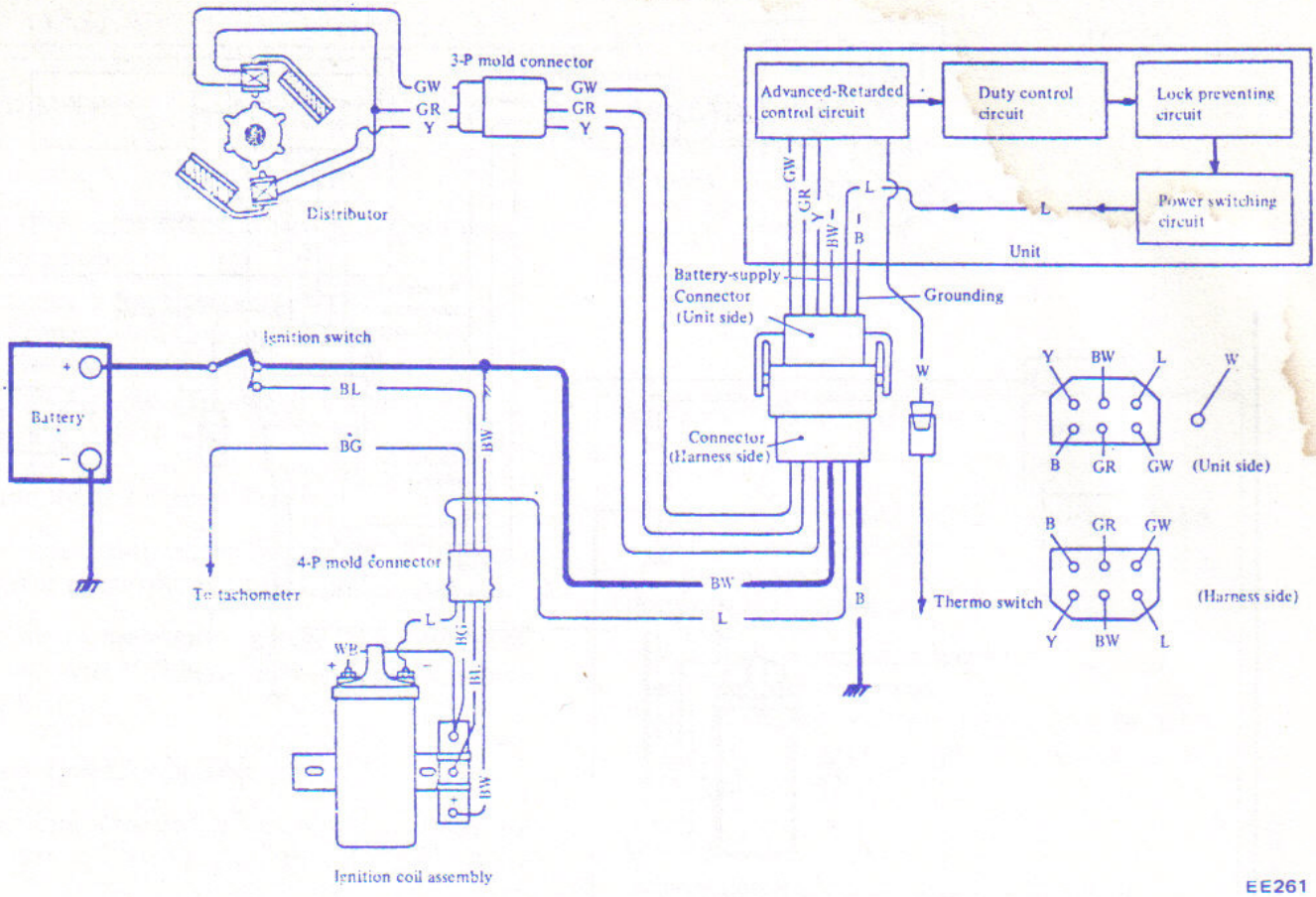


Fig. EE-14 Wiring diagram for item (1) (Power supply wiring and battery check)

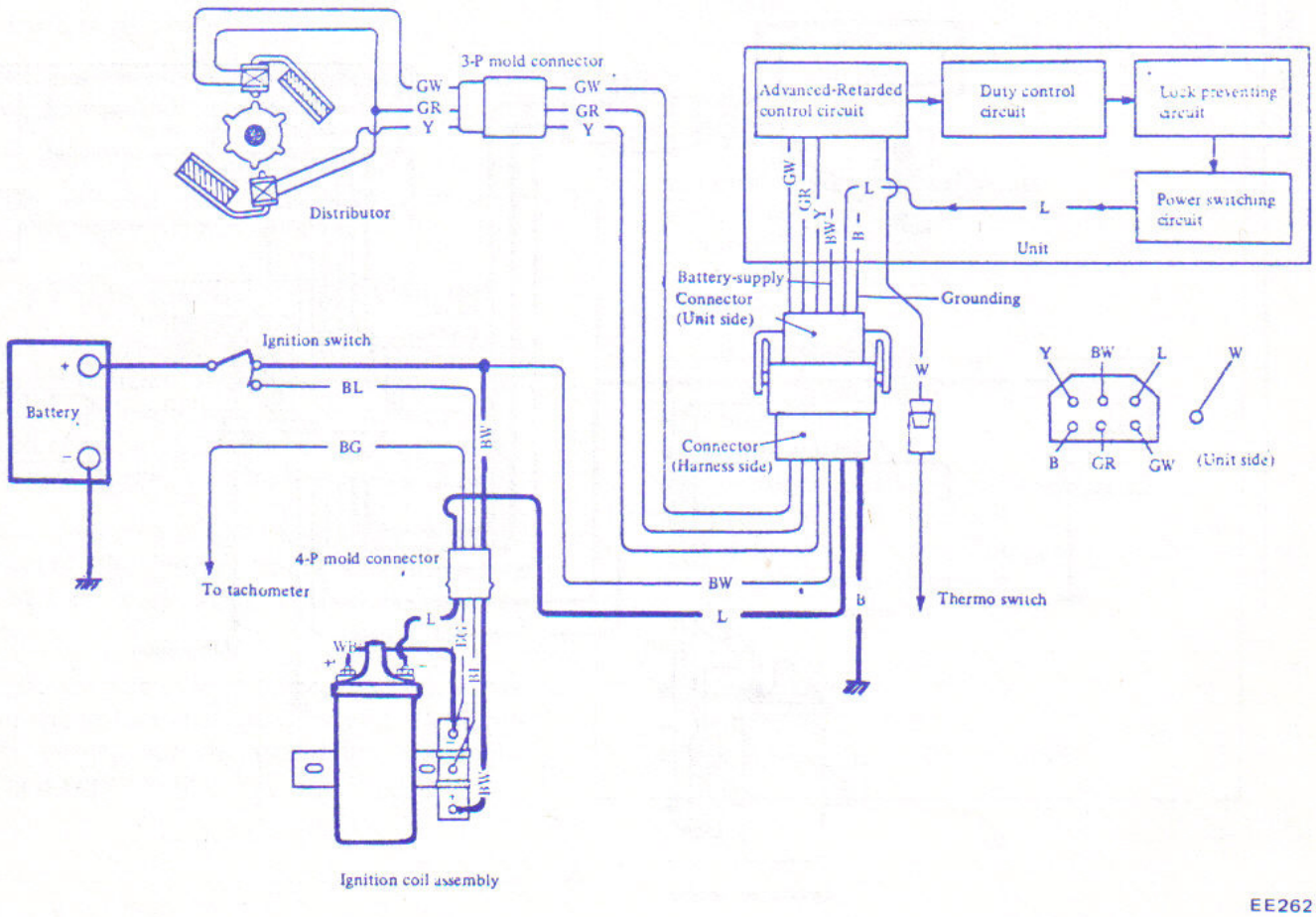


Fig. EE-15 Wiring diagram for item (3)-1 (Checking ignition coil primary windings)

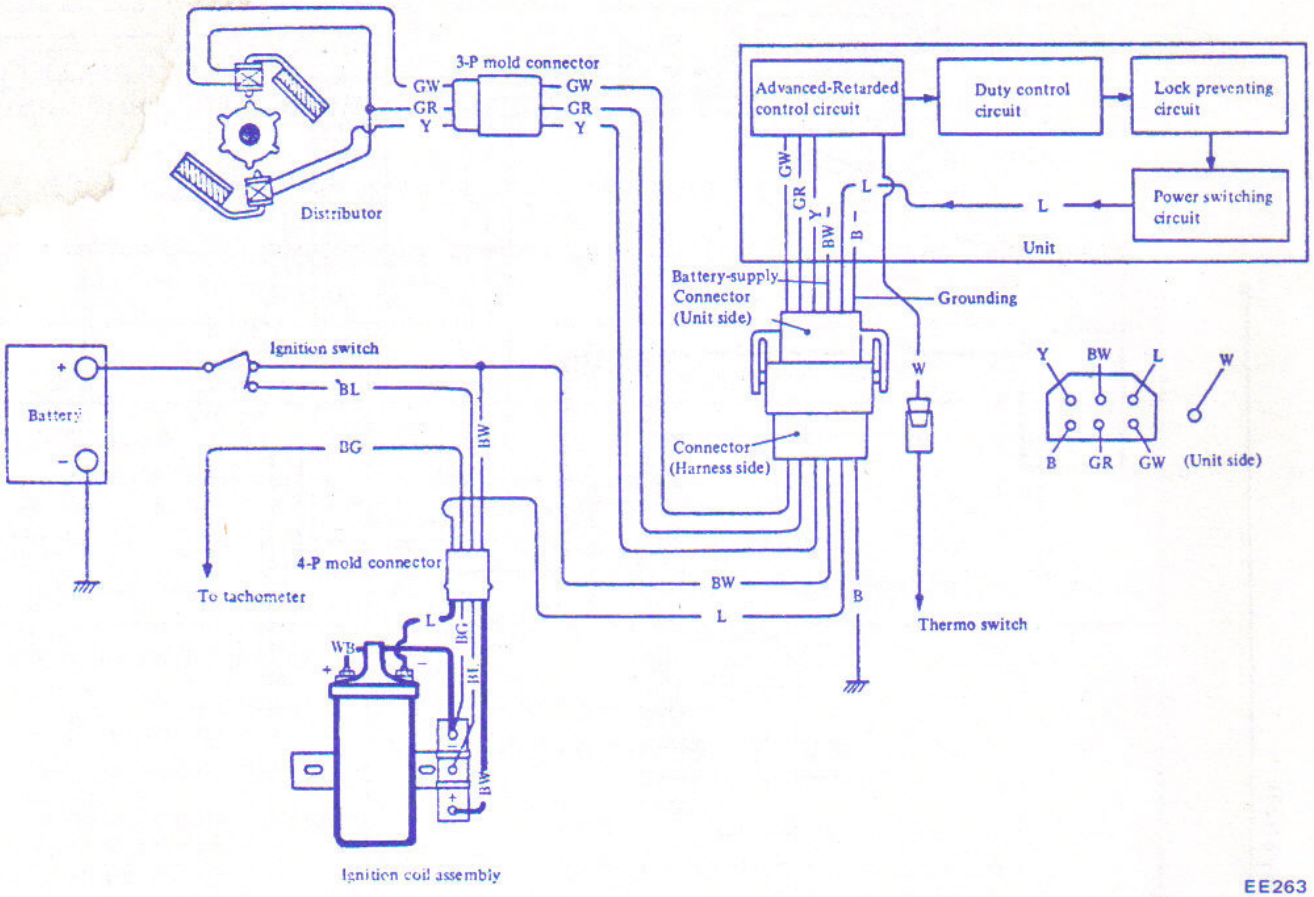


Fig. EE-16 Wiring diagram for item (3)-2 (Checking ignition coil assembly)

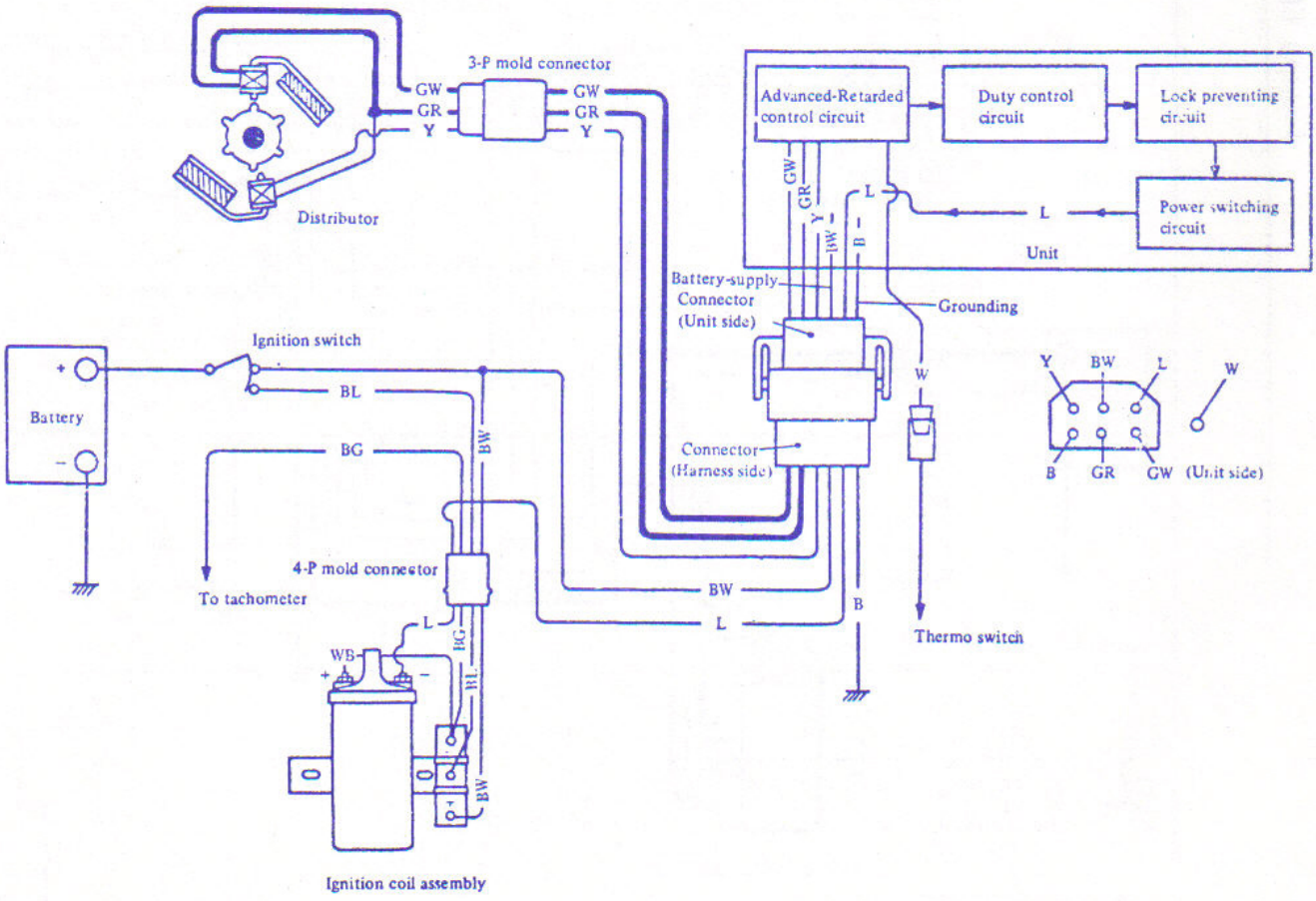


Fig. EE-17 Wiring diagram for item (4) (Pick-up coil "A" continuity check)

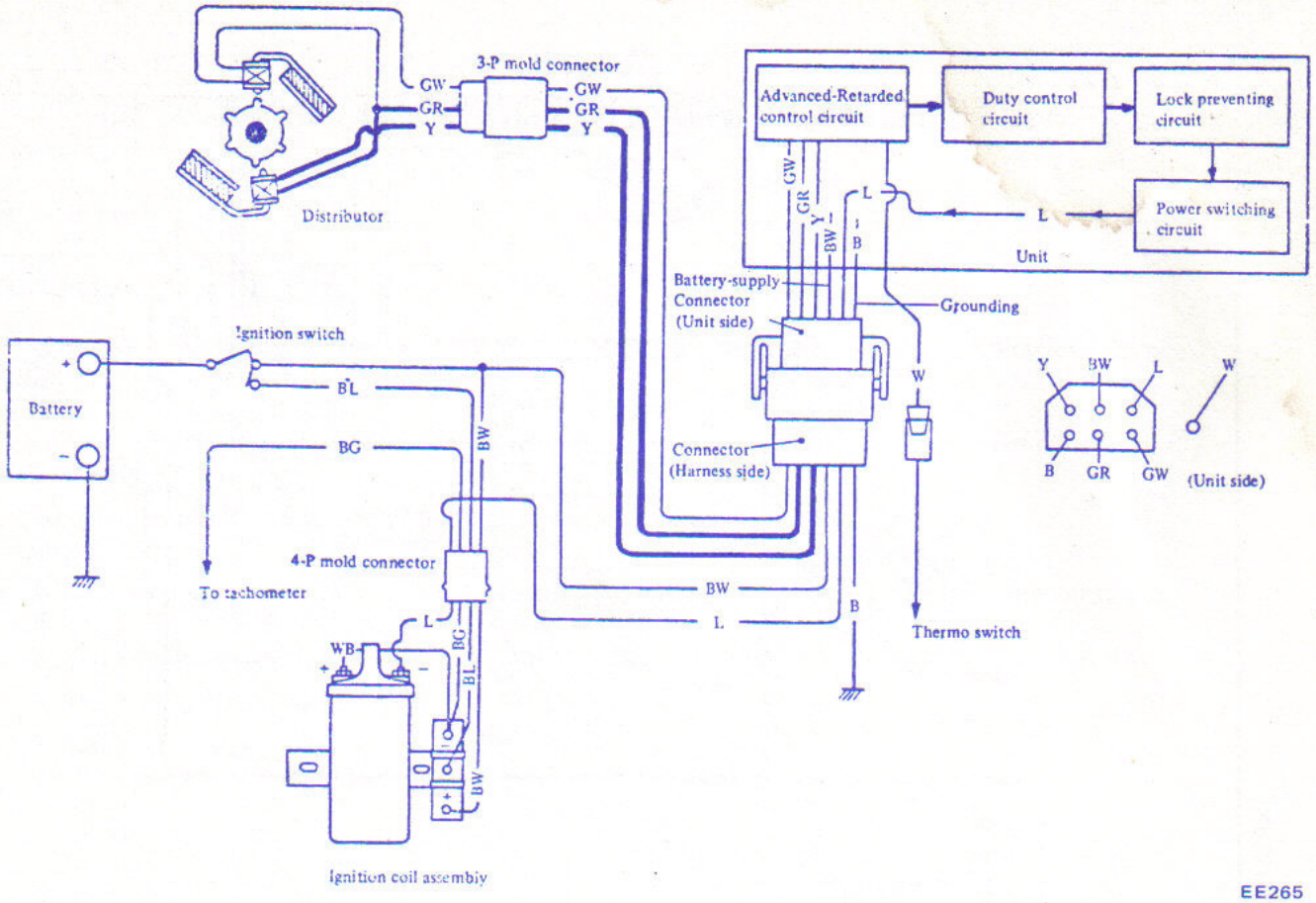


Fig. EE-18 Wiring diagram for item (5) (Pick-up coil "B" continuity check)

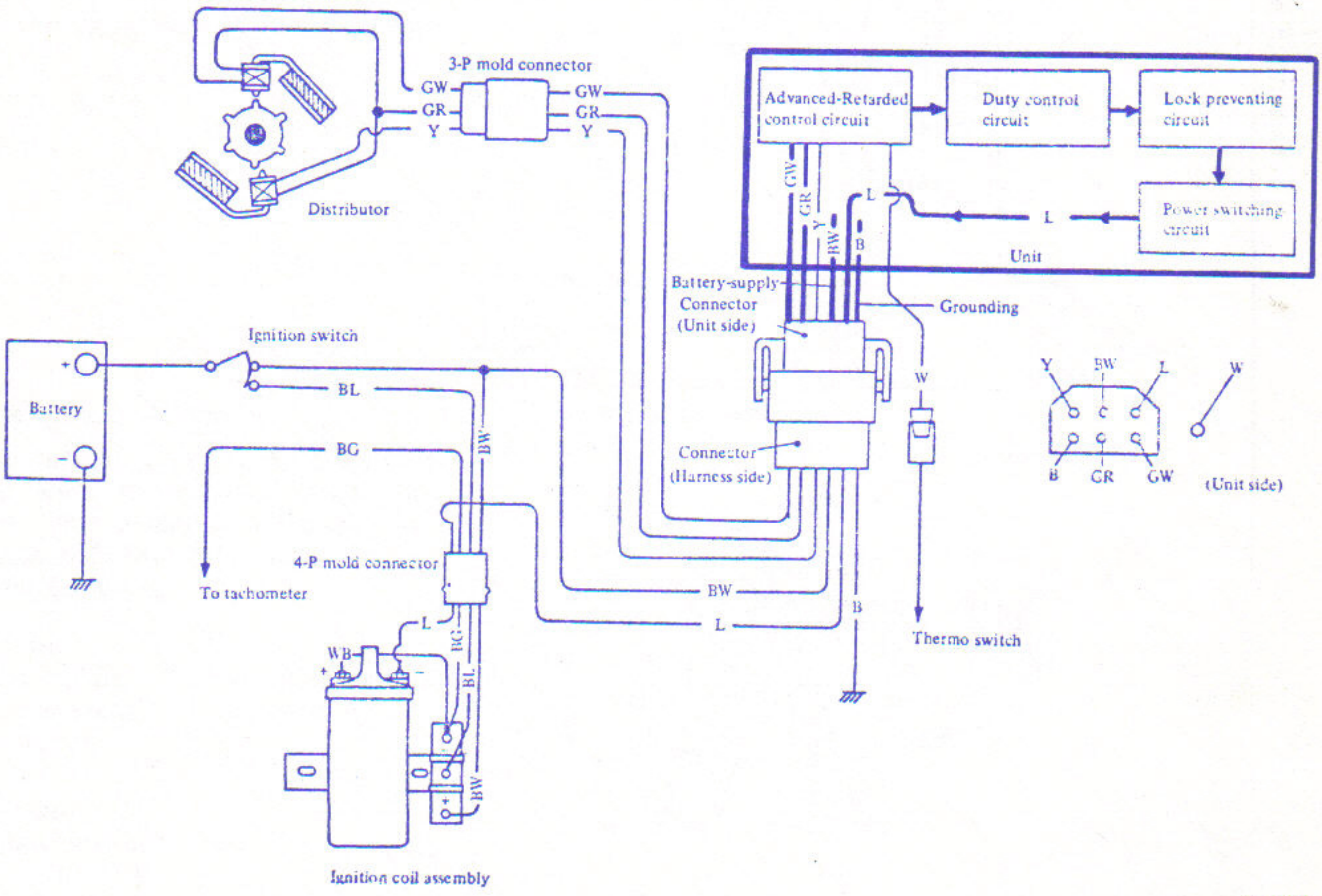
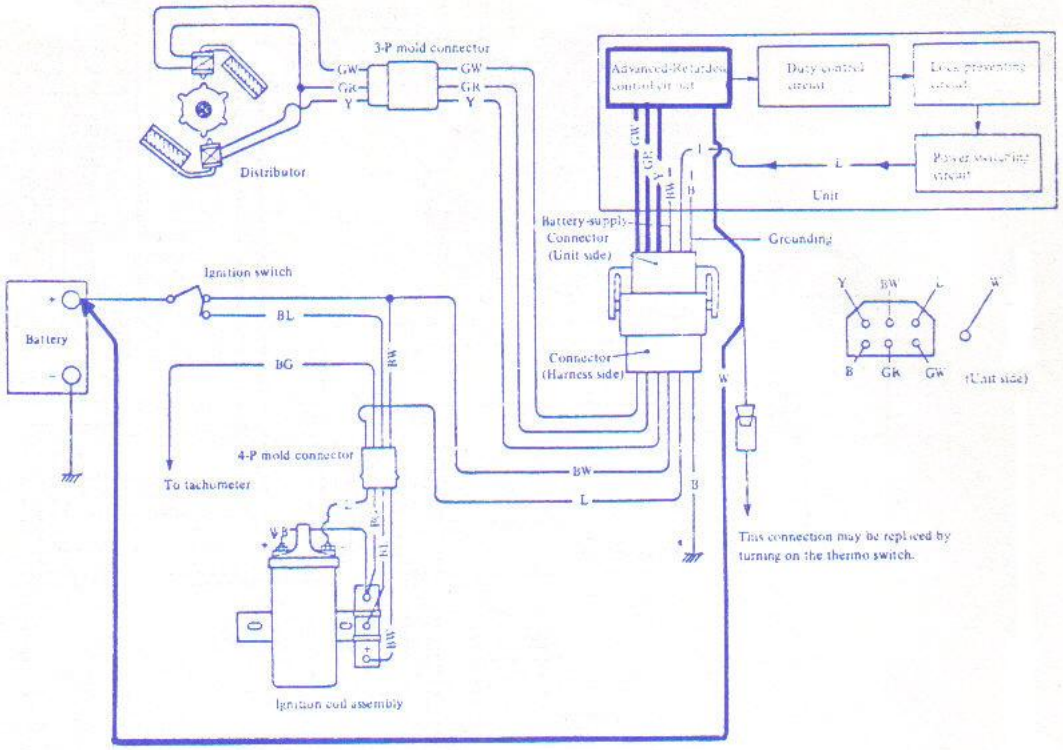


Fig. EE-19 Wiring diagram for item (7) (Transistor ignition unit check)



EE267

Fig. EE-20 Wiring diagram for item (7)-3 (Checking two pick-up switching mechanism)

260-Z IGNITION SYSTEM DIAGNOSTIC PROCEDURES, 1974

Service Information. This booklet supplies procedures for diagnosing possible malfunctions in the 260-Z ignition system.

Service Procedures: If engine operation indicates a possible malfunction in the ignition system, make the following initial checks:

1. Complete Procedure 1, Page 3.
2. After completing the above checks and adjustments, if the malfunction still exists, perform two of the three procedures listed below:

Volt-OHM Meter	Procedure 2
Kent-Moore Tester	Procedure 3
Oscilloscope	Procedure 4

(Caution: When using the oscilloscope to check the system, do not reverse polarity of the lead wires.)

NISSAN MOTOR CORPORATION IN U.S.A.
Technical Communications Department