

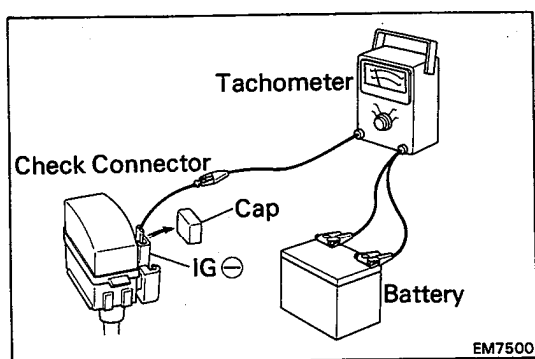
IGNITION SYSTEM

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IG

PRECAUTIONS

1. Do not leave the ignition switch on for more than 10 minutes if the engine does not start.



2. With a tachometer is connected to the system, connect the test probe of the tachometer to terminal IG $\ominus$ of the check connector.
3. As some tachometers are not compatible with this ignition system, we recommended that you confirm the compatibility of your unit before using.
4. NEVER allow the tachometer terminal to touch ground as this could damage the igniter and/or ignition coil.
5. Do not disconnect the battery while the engine is running.
6. Check that the igniter is properly grounded to the body.

TROUBLESHOOTING

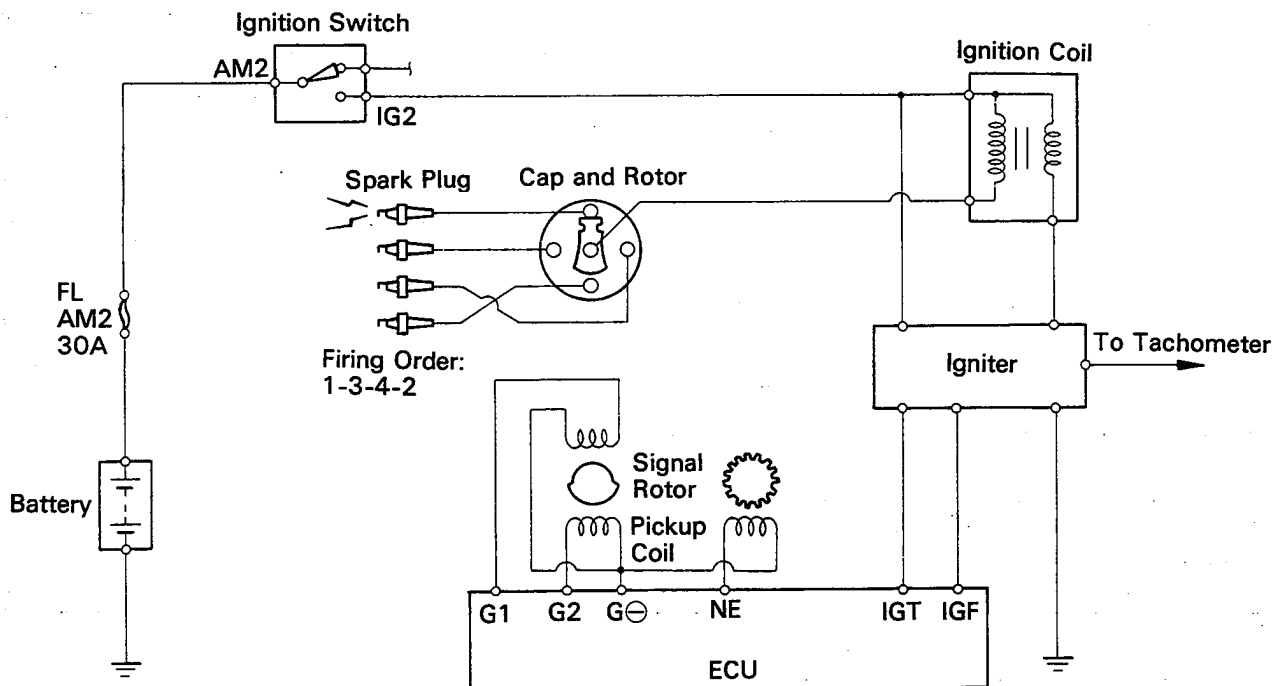
Problem	Possible cause	Remedy	Page
Engine will not start/ hard to start (cranks ok)	Incorrect ignition timing	Reset timing	EM-20,28
	Ignition coil faulty	Inspect coil	IG-8,14
	Igniter faulty	Inspect igniter	IG-9,14
	IIA or distributor faulty	Inspect IIA or distributor	IG-8,14
	High-tension cord faulty	Inspect high-tension cord	IG-7,11
	Spark plugs faulty	Inspect plugs	IG-7,11
	Ignition wiring disconnected or broken	Inspect wiring	
Rough idle or stalls	Spark plugs faulty	Inspect plugs	IG-7,11
	Ignition wiring faulty	Inspect wiring	
	Incorrect ignition timing	Reset timing	EM-20,28
	Ignition coil faulty	Inspect coil	IG-8,14
	Igniter faulty	Inspect Igniter	IG-9,14
	IIA or distributor faulty	Inspect IIA or distributor	IG-8,14
	High-tension cord faulty	Inspect high-tension cord	IG-7,11
Engine hesitates/ poor acceleration	Spark plug faulty	Inspect plugs	IG-7,11
	Ignition wiring faulty	Inspect wiring	
	Incorrect ignition timing	Reset timing	EM-20,28
Engine dieseling (runs after ignition switch is turned off)	Incorrect ignition timing	Reset timing	EM-20,28
Muffler explosion (after fire) all the time	Incorrect ignition timing	Reset timing	EM-20,28
Engine backfires	Incorrect ignition timing	Reset timing	EM-20,28
Poor fuel economy	Spark plugs faulty	Inspect plugs	IG-7,11
	Incorrect ignition timing	Reset timing	EM-20,28
Engine overheats	Incorrect ignition timing	Reset timing	EM-20,28

IGNITION SYSTEM CIRCUIT

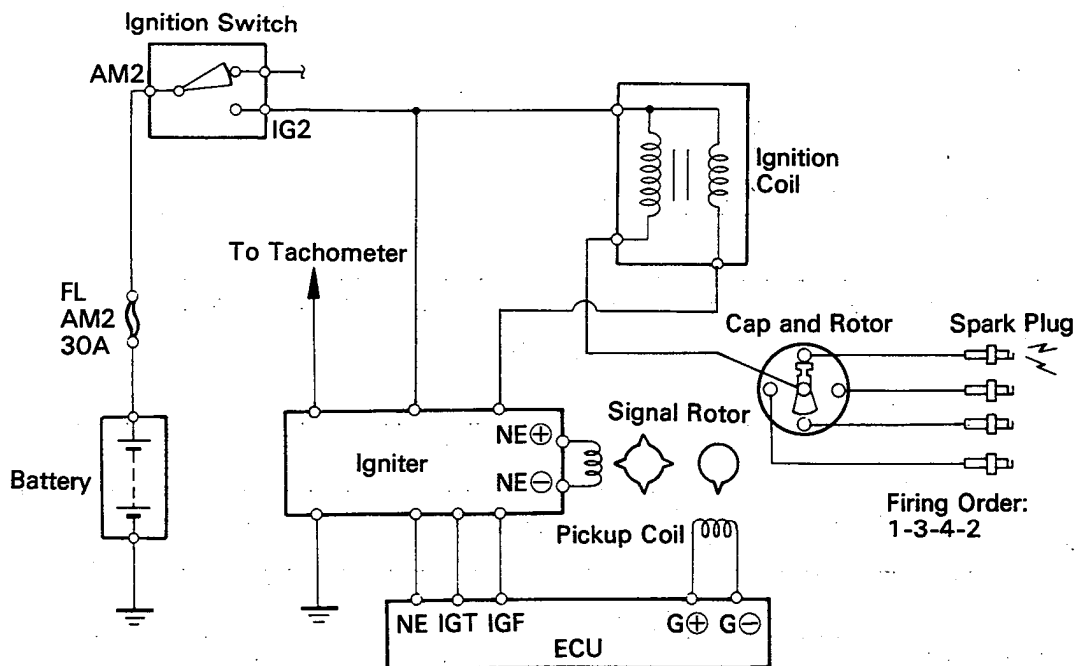
ELECTRONIC SPARK ADVANCE (ESA)

IGNITION SYSTEM CIRCUIT (Cont'd)

4A-GE (w/o Air Flow Meter)



4A-GE (w/ Air Flow Meter)

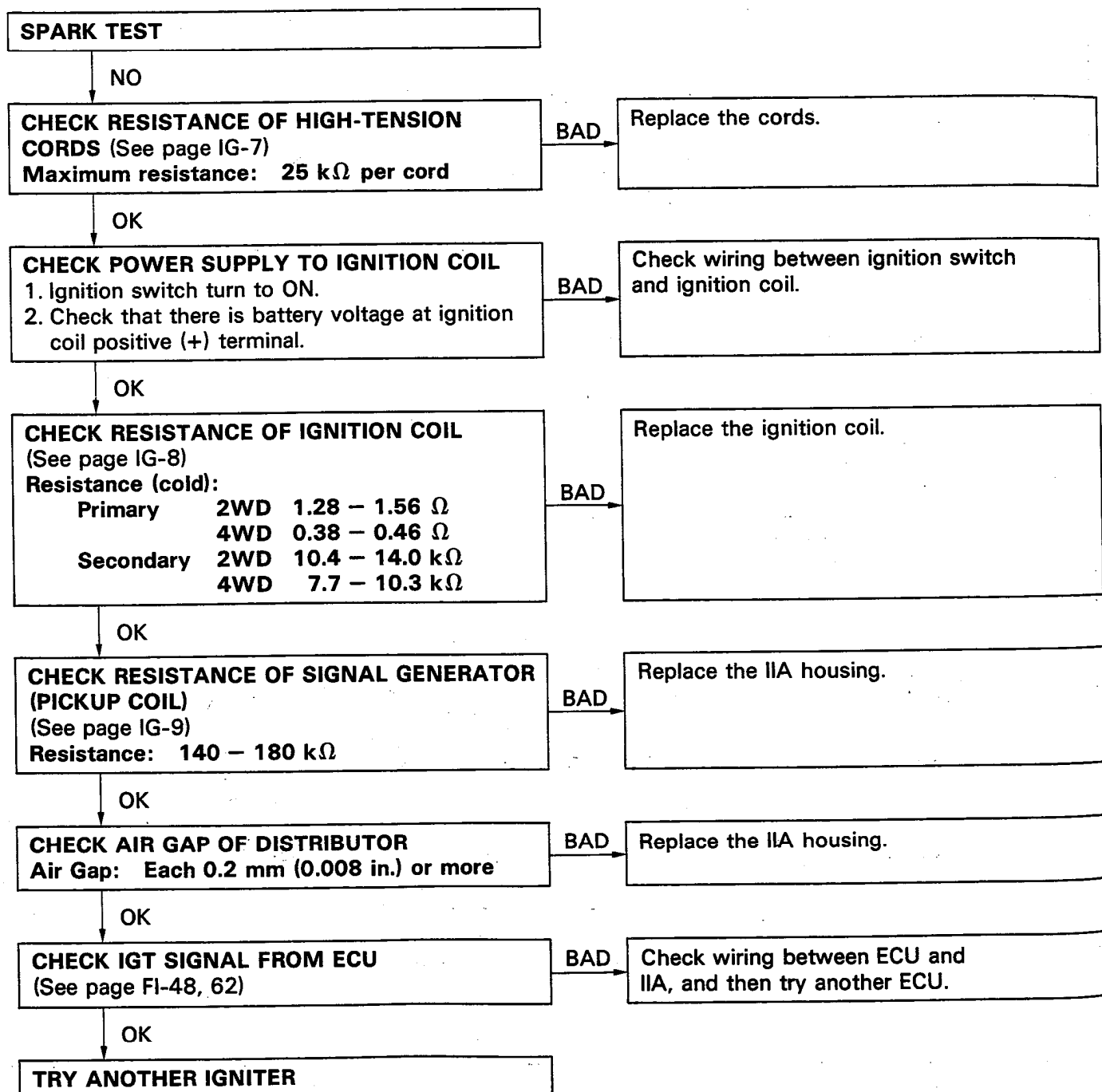


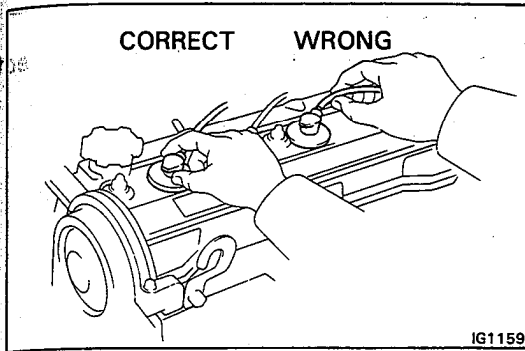
ON-VEHICLE INSPECTION (4A-FE)**SPARK TEST****CHECK THAT SPARK OCCURS**

- (a) Disconnect high-tension cords from spark plugs.
- (b) Remove the spark plugs. (See page IG-7)
- (c) Install the spark plugs to each high-tension cord.
- (d) Ground the spark plug.
- (e) Check if spark occurs while engine is being cranked.

HINT: To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 1-2 seconds at a time.

If the spark does not occur, perform the test as follows.



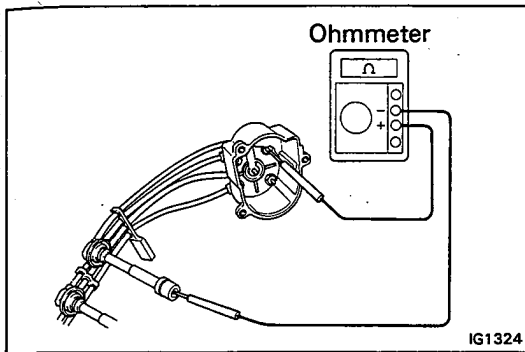


INSPECTION OF HIGH-TENSION CORDS

1. CAREFULLY DISCONNECT HIGH-TENSION CORDS BY THEIR RUBBER BOOTS FROM SPARK PLUGS

NOTICE: Pulling on or bending the cords may damage the conductor inside.

2. REMOVE IIA CAP WITHOUT DISCONNECTING HIGH-TENSION CORDS



3. INSPECT HIGH-TENSION CORD RESISTANCE

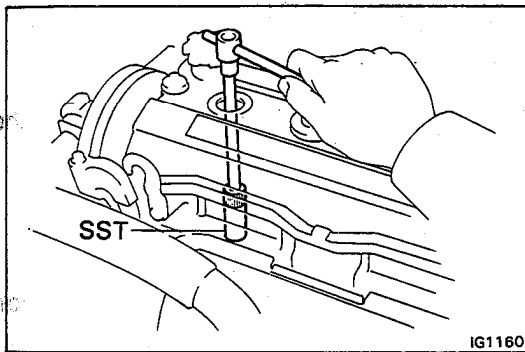
Using an ohmmeter, measure the resistance without disconnecting the IIA cap.

Maximum resistance: 25 k Ω per cord

If the resistance is greater than maximum, check the terminals. If necessary, replace the high-tension cord and/or IIA cap.

4. REINSTALL IIA CAP

5. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS



INSPECTION OF SPARK PLUGS

1. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS

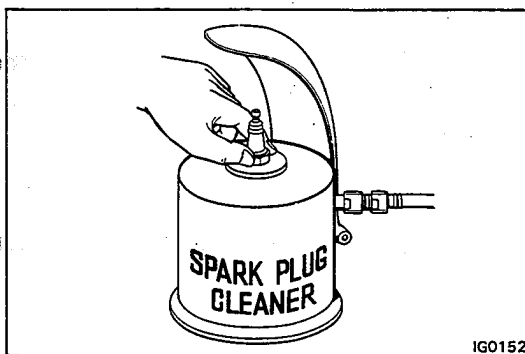
2. REMOVE SPARK PLUGS

Using SST, remove the spark plugs.

SST 09155-16100

3. CLEAN SPARK PLUGS

Using spark plug cleaner or wire brush, clean the spark plug.

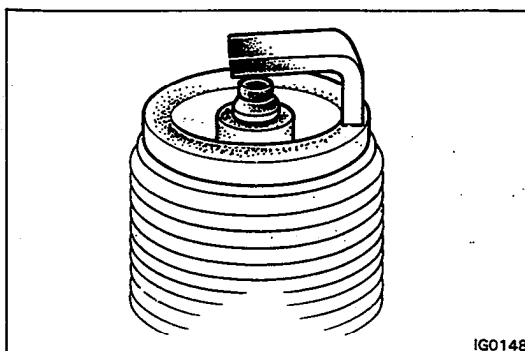


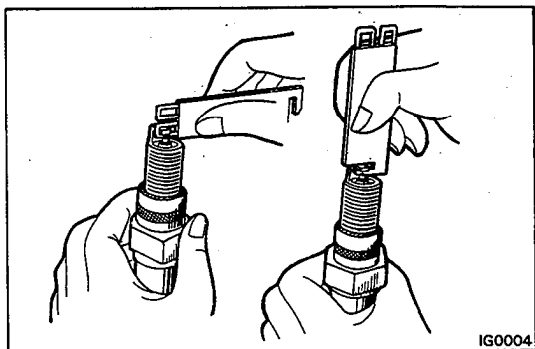
4. VISUALLY INSPECT SPARK PLUGS

Check the spark plug for electrode wear, thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug: ND Q16R-U
NGK BCPR5EY

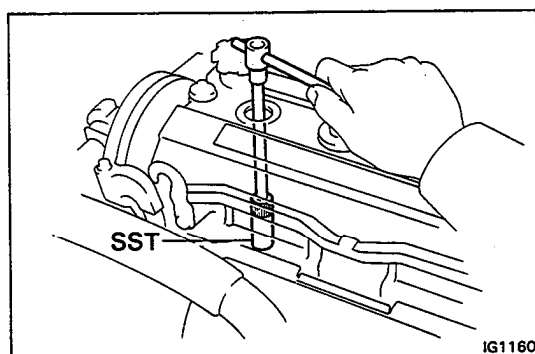




5. ADJUST ELECTRODE GAP

Carefully bend the outer electrode to obtain the correct electrode gap.

Correct electrode gap: 0.8 mm (0.031 in.)



6. INSTALL SPARK PLUGS

Using SST, install the spark plug.

SST 09155-16100

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

7. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS

INSPECTION OF IGNITION COIL

1. INSPECT PRIMARY COIL RESISTANCE

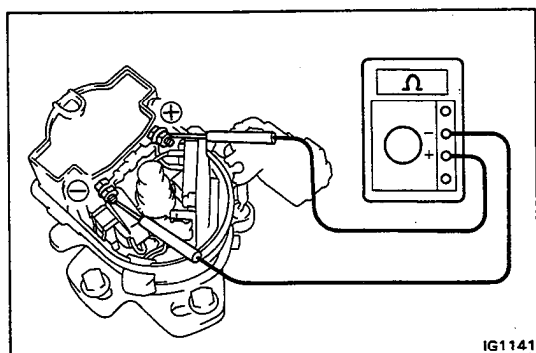
Using an ohmmeter, measure the resistance between the positive (+) and negative (-) terminal.

Primary coil resistance (Cold):

2WD 1.28 – 1.56 k Ω

4WD 0.38 – 0.46 k Ω

If the resistance is not as specified, replace the ignition coil.



2. INSPECT SECONDARY COIL RESISTANCE

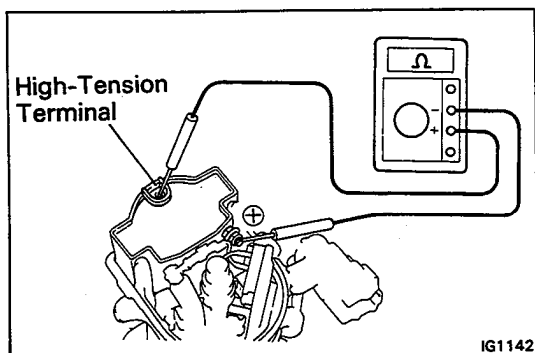
Using an ohmmeter, measure the resistance between the positive (+) terminal and high-tension terminal.

Secondary coil resistance: (Cold)

2WD 10.4 – 14.0 k Ω

4WD 7.7 – 10.3 k Ω

If the resistance is not as specified, replace the ignition coil.



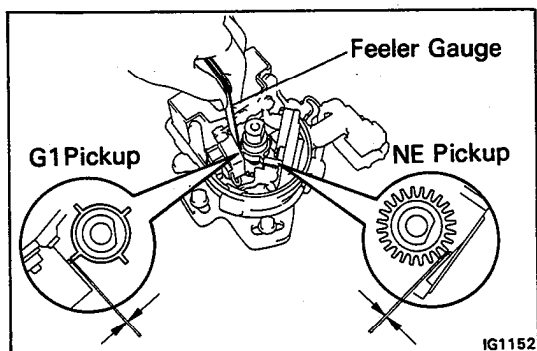
DISTRIBUTOR

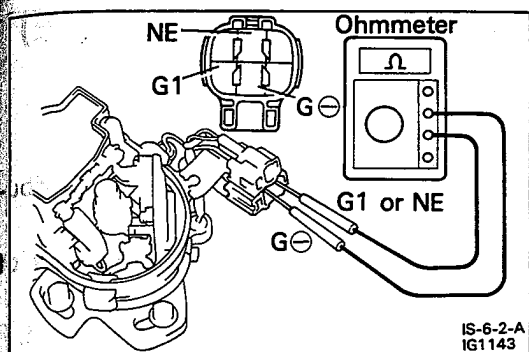
1. INSPECT AIR GAP

Using a feeler gauge, measure the gap between the signal rotor and pickup coil projection.

Air gap: 0.2 mm (0.008 in.) or more

If the air gap is not as specified, replace the IIA housing.





2. INSPECT SIGNAL GENERATOR (PICK UP COIL) RESISTANCE

Using an ohmmeter, measure the resistance between the terminals (G1 and G⁻, NE and G⁻).

Pickup coil resistance (Cold): 140 – 180 Ω

If the resistance is not as specified, replace the IIA housing.

INSPECTION OF IGNITER

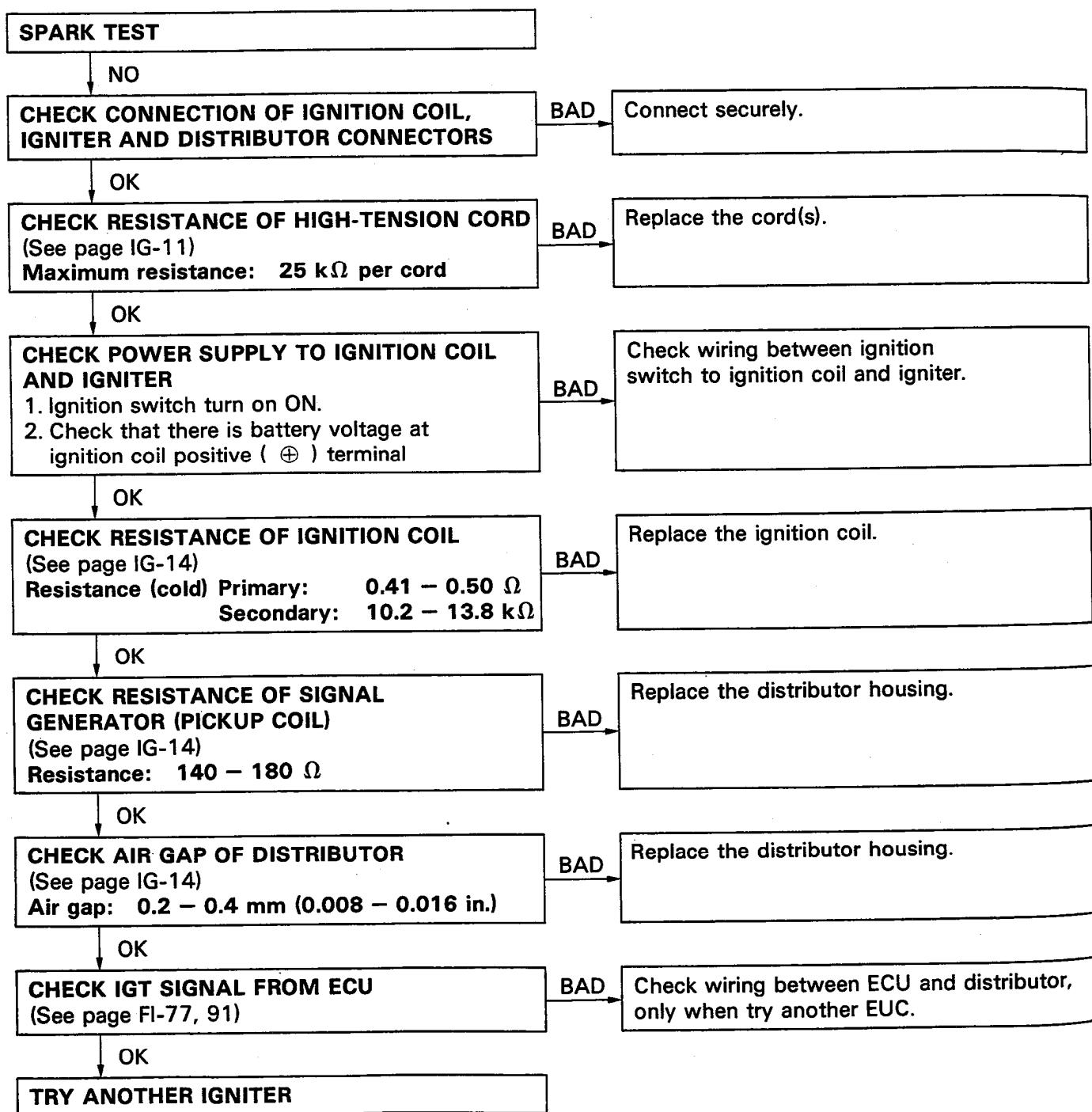
(See procedure Spark Test on page IG-6)

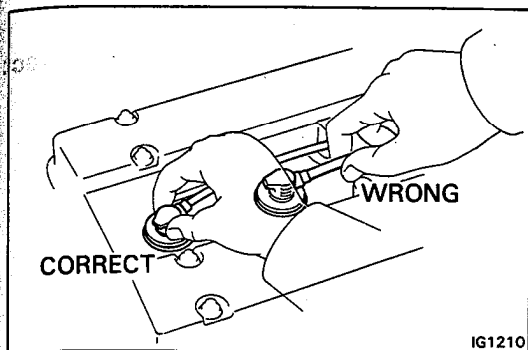
ON-VEHICLE INSPECTION (4A-GE)**SPARK TEST****CHECK THAT SPARK OCCURS**

- Disconnect the high-tension cord from the distributor.
- Hold the end about 12.5 mm (1/2") from body of car.
- See if spark occurs while engine is being cranked.

HINT: To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 1 – 2 seconds at time.

If the spark does not occurs, perform the test as follows:



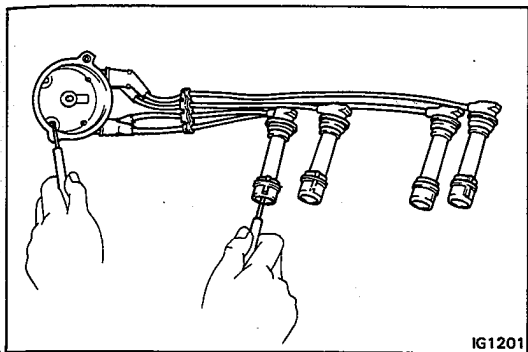


IG1210

INSPECTION OF HIGH-TENSION CORDS

1. REMOVE PLUG CORD COVER
2. CAREFULLY REMOVE HIGH-TENSION CORDS BY THEIR RUBBER BOOTS FROM SPARK PLUGS

NOTICE: Pulling on or bending the cords may damage the conductor inside.



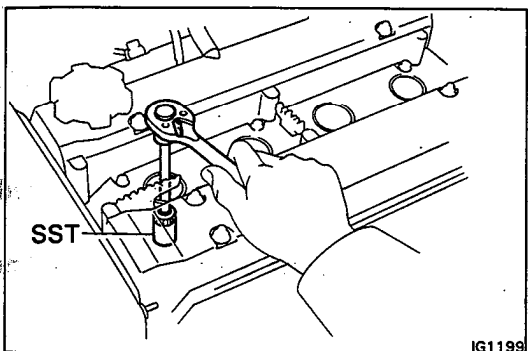
IG1201

3. INSPECT HIGH-TENSION CORD RESISTANCE

Using an ohmmeter, measure the resistance without disconnecting the distributor cap.

Maximum resistance: 25 k Ω per cord

If the resistance is greater than maximum, check the terminals. If necessary, replace the high-tension cord and/or distributor cap.



IG1199

INSPECTION OF SPARK PLUG (Conventional Tipped Type)

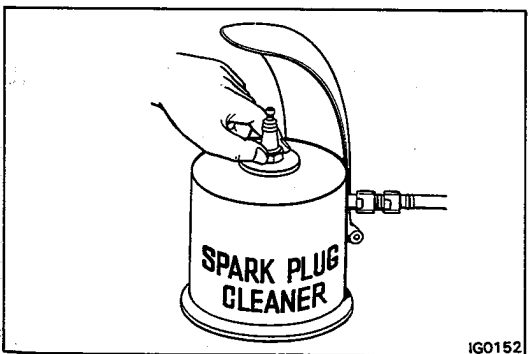
1. REMOVE PLUG CORD COVER
2. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS
3. REMOVE SPARK PLUGS

Using SST, remove the spark plug.

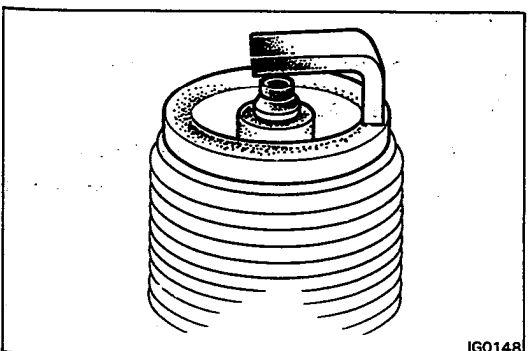
SST 09155-16100

4. CLEAN SPARK PLUGS

Using a spark plug cleaner or wire brush, clean the spark plug.



IG0152



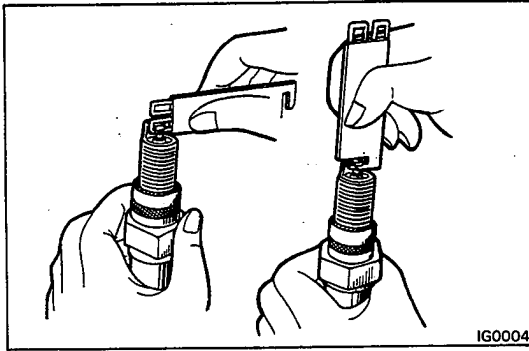
IG0148

5. VISUALLY INSPECT SPARK PLUGS

Check the spark plug for electrode wear, thread damage and insulator damage.

If abnormal, replace the spark plug.

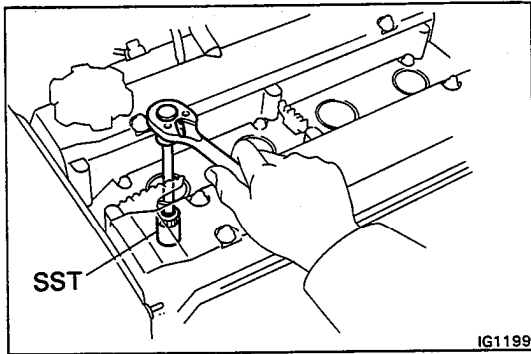
Recommended spark plug: ND K20R-U
NGK BKR6EYA



6. ADJUST ELECTRODE GAP

Carefully bent the outer electrode to obtain the correct electrode gap.

Correct electrode gap: 0.8 mm (0.31 in.)



7. INSTALL SPARK PLUGS

Using SST, install the spark plug.

SST 09155-16100

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

8. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS

9. INSTALL PLUG CORD COVER

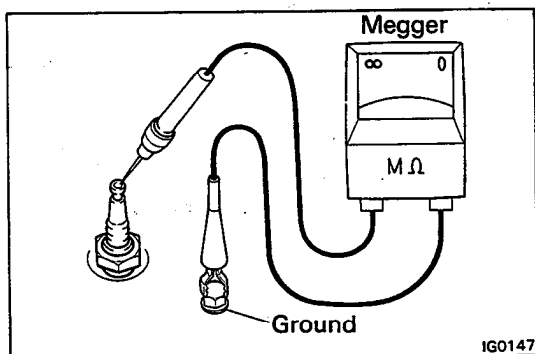
INSPECTION OF SPARK PLUGS (Platinum Tipped Type)

NOTICE:

- Never use a wire brush for cleaning.
- Never attempt to adjust the electrode gap on used spark plug.
- Spark plug should be replaced every 100,000 km (60,000 miles).

1. REMOVE PLUG CORD COVER

2. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS



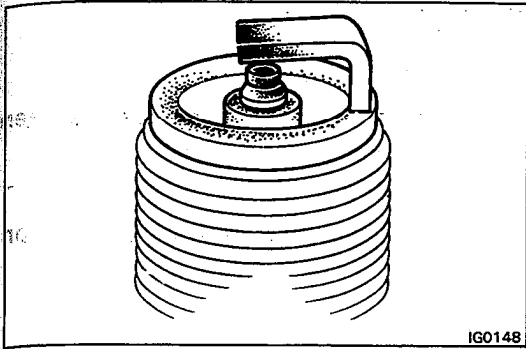
3. INSPECT ELECTRODE

A. If using a megger (insulation resistance meter):

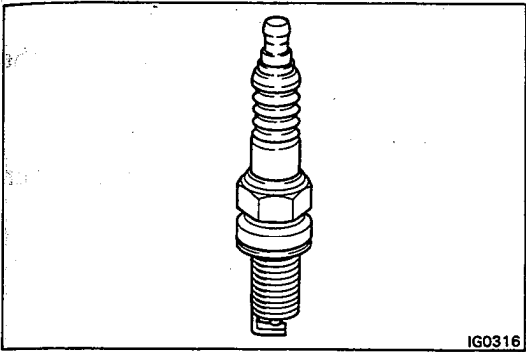
Measure the insulation resistance.

Correct insulation resistance: 10 MΩ or more

If the resistance is less than specification, clean the spark plug.

**B. If not using a megger:**

- (a) Quickly race the engine to 4,000 rpm five times.
- (b) Remove the spark plug.
(See step 3 on page IG-11)
- (c) Visually check the spark plug.
If the electrode is dry Okey
If the electrode is wet Proceed to step 5

**4. REMOVE SPARK PLUGS**

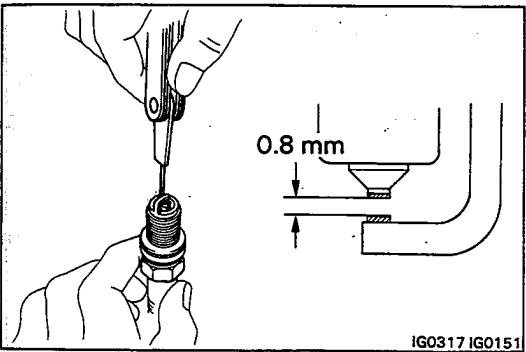
(See step 3 on page IG-11)

5. VISUALLY INSPECT SPARK PLUGS

Check the spark plug for thread or insulation damage.

If abnormal, replace the spark plug.

Recommended spark plug: ND PK20R8
NGK BKR6EP8

**6. INSPECT ELECTRODE GAP**

Maximum electrode gap: 1.0 mm (0.039 in.)

If the gap is greater than maximum, replace the spark plug.

Correct electrode gap of new spark plug:
0.8 mm (0.031 in.)

If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip.

**7. CLEAN SPARK PLUGS**

If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.

Air pressure: Below 6 kg/cm² (85 psi, 588 kPa)

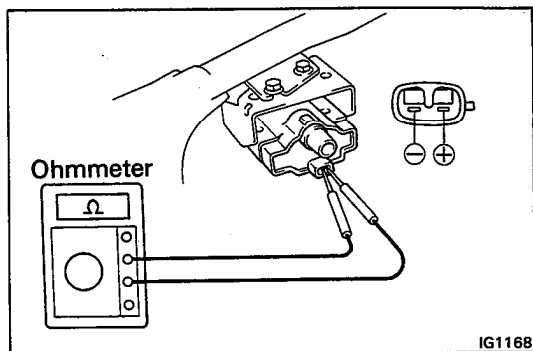
Duration: 20 seconds or less

HINT: If there are traces of oil, remove it with gasoline before using the spark plug cleaner.

8. INSTALL SPARK PLUGS (See step 7 on page IG-12)

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

9. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS**10. INSTALL PLUG CORD COVER**



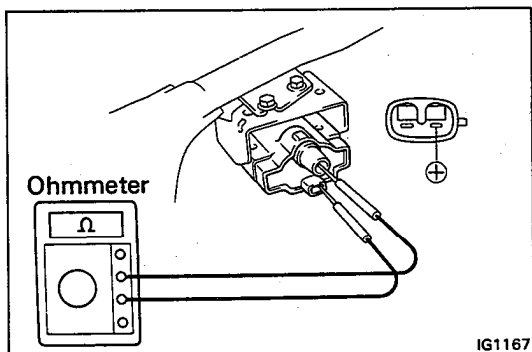
INSPECTION OF IGNITION COIL

1. INSPECT PRIMARY COIL RESISTANCE

Using an ohmmeter, measure the resistance between positive (⊕) and negative (⊖) terminals.

Primary coil resistance (Cold): 0.41 – 0.50 Ω

If the resistance is not as specified, replace the ignition coil.



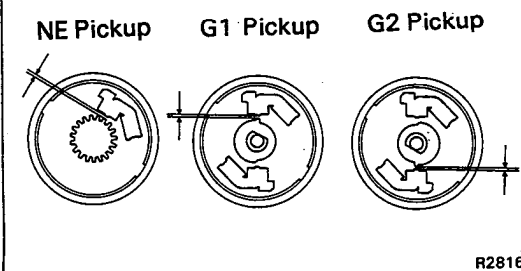
2. INSPECT SECONDARY COIL RESISTANCE

Using an ohmmeter, measure the resistance between the positive (⊕) and high-tension terminals.

Secondary coil resistance (Cold): 10.2 – 13.8 kΩ

If the resistance is not as specified, replace the ignition coil.

w/o Air Flow Meter



INSPECTION OF DISTRIBUTOR

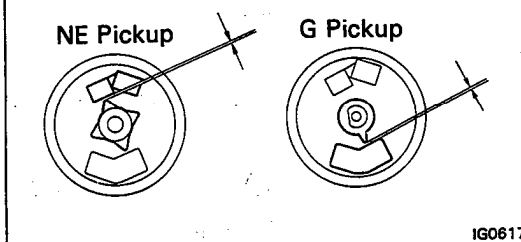
1. INSPECT AIR GAP

Using a feeler gauge, measure the gap between the signal rotor and pickup coil projection.

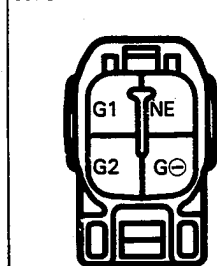
Air gap: 0.2 – 0.4 mm (0.008 – 0.016 in.)

If the air gap is not as specified, replace the distributor housing.

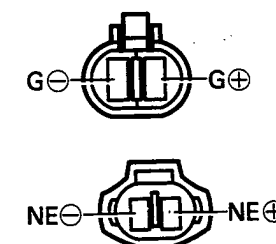
w/ Air Flow Meter



w/o Air Flow Meter



w/ Air Flow Meter



2. INSPECT SIGNAL GENERATOR (PICKUP COIL) RESISTANCE

Using an ohmmeter, measure the resistance between the terminals. (w/o Air Flow Meter: G1 to G ⊖, G2 to G ⊖, NE to G ⊖) (w/ Air Flow Meter: G ⊕ to G ⊖, NE ⊕ to NE ⊖)

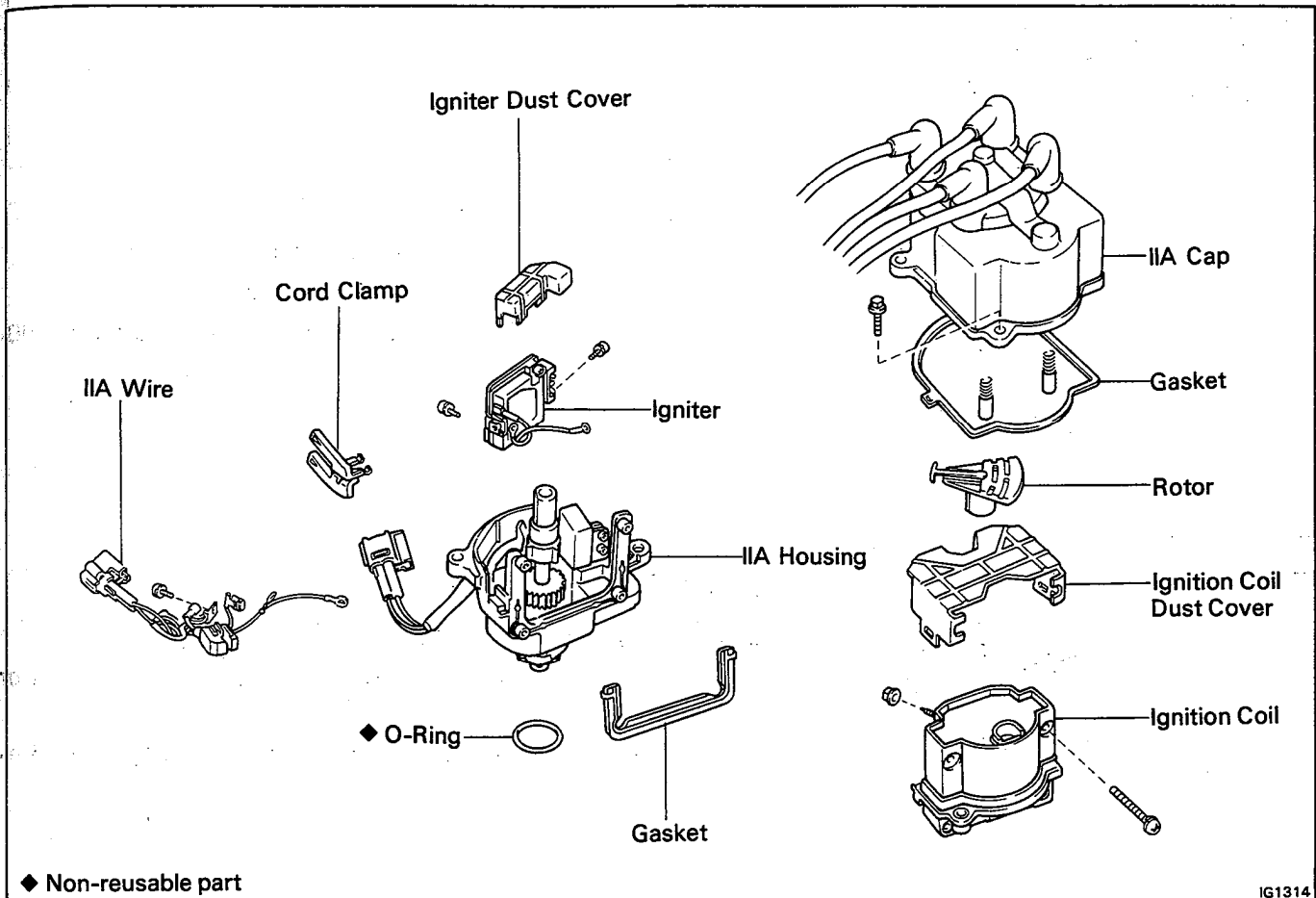
Pickup coil resistance: 140 – 180 Ω

If the resistance is not as specified, replace the distributor housing.

INSPECTION OF IGNITER

(See procedure of Spark Test on page IG-10)

INTEGRATED IGNITION ASSEMBLY (IIA) (4A-FE) COMPONENTS

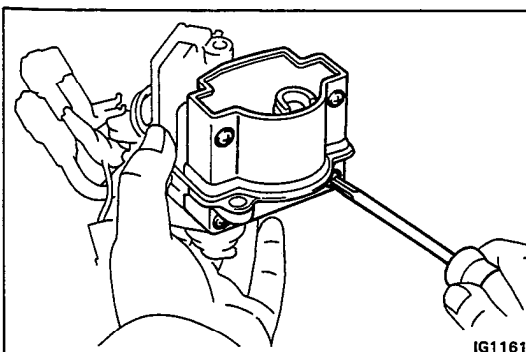


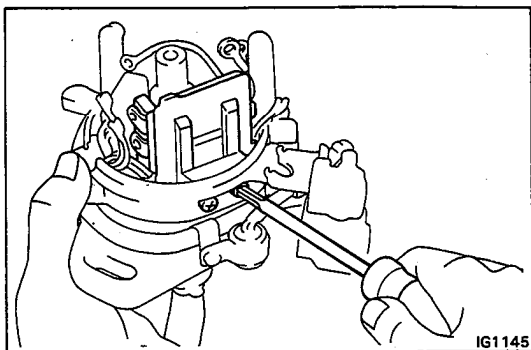
DISASSEMBLY OF IIA

1. REMOVE DISTRIBUTOR CAP, GASKET AND ROTOR
2. REMOVE IGNITION COIL DUST COVER
3. REMOVE IGNITER DUST COVER

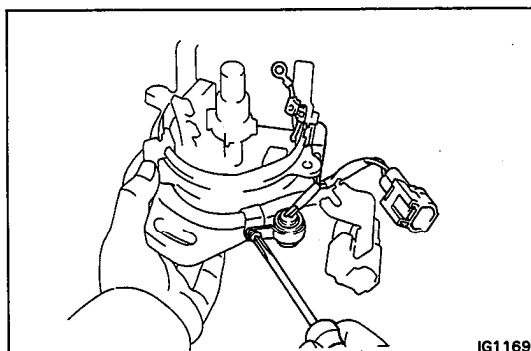
4. REMOVE IGNITION COIL

- (a) Remove the two nuts and disconnect the three wires from the ignition coil terminals.
- (b) Remove the four screws, ignition coil and gasket.

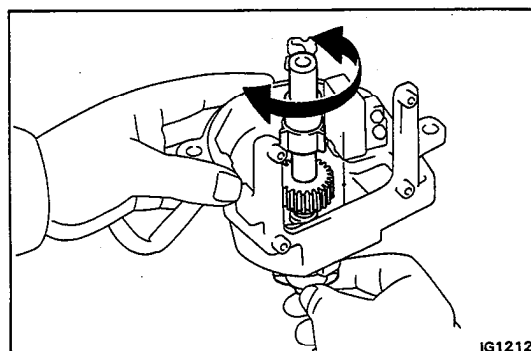


**5. REMOVE IGNITER**

- (a) Remove the two nuts, and disconnect the three wires from the igniter terminals.
- (b) Remove the two screws and igniter.

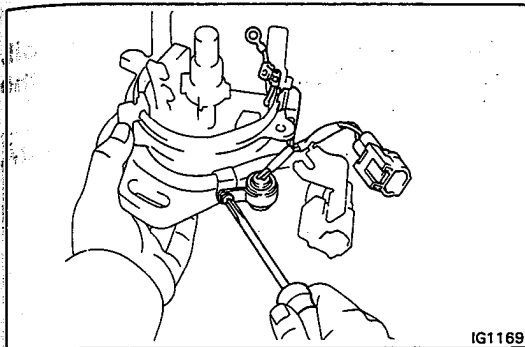
**6. REMOVE IIA WIRE**

- (a) Disconnect the connector from the cord clamp.
- (b) Remove the screw and condenser.
- (c) Remove the grommet of the wire from the housing.

**INSPECTION OF IIA****INSPECT GOVERNOR SHAFT**

Turn the governor shaft and check that it is not rough or worn.

If it feels rough or worn, replace the IIA housing assembly.

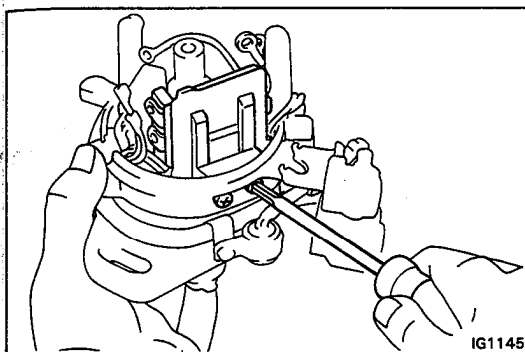


ASSEMBLY OF IIA

(See page IG-15)

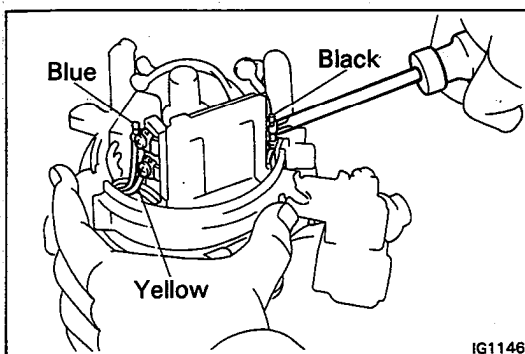
1. INSTALL IIA WIRE

- (a) Fit the wire grommet to the IIA housing.
- (b) Install the IIA wire with the screw.
- (c) Install the connector to the cord clamp.

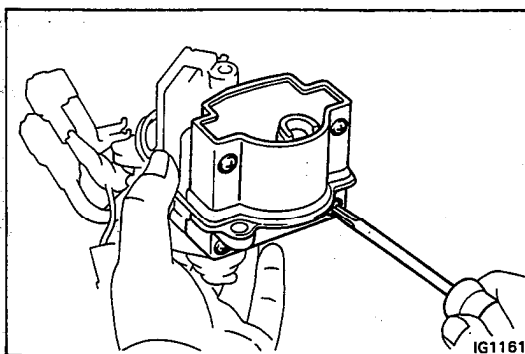


2. INSTALL IGNITER

- (a) Install the igniter with the two screws.

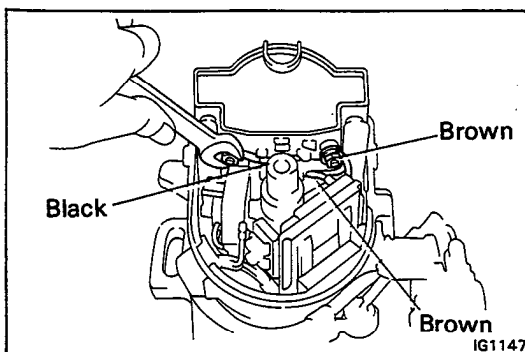


- (b) Connect the three wires to the igniter terminals with the three screws.

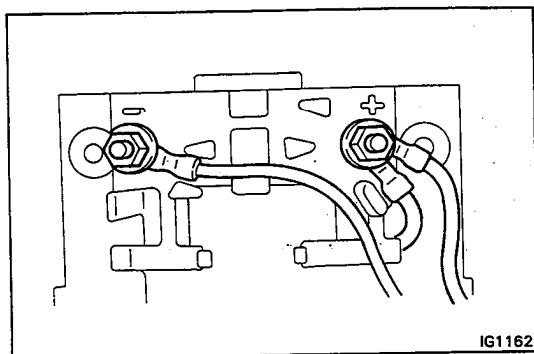


3. INSTALL IGNITION COIL

- (a) Install the gasket and ignition coil with the four screws.



- (b) Connect the three wires to the ignition coil terminals with the two nuts.

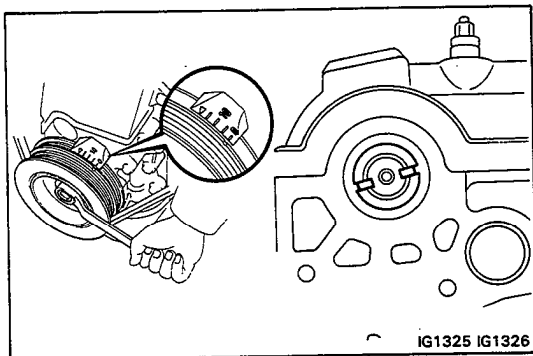
**NOTICE:**

- When connecting the wires to the ignition coil, insert both properly into their grooves found on the side of the ignition coil.
- Be sure wires do not contact with signal rotor or IIA housing.

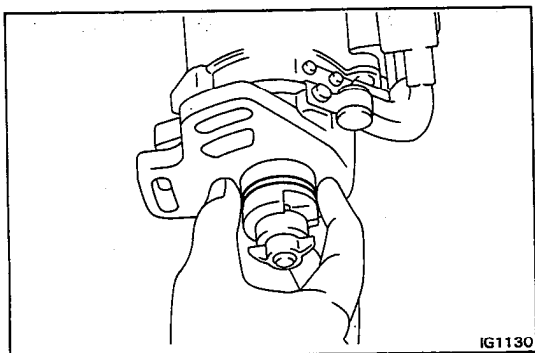
3. INSTALL IGNITION COIL DUST COVER
4. INSTALL ROTOR
5. INSTALL IIA CAP AND HIGH-TENSION CORDS

INSTALLATION OF IIA**1. SET NO.1 CYLINDER TO TDC/COMPRESSION**

Turn the crankshaft clockwise, and position the slit of the intake camshaft as shown in the figure.

**2. INSTALL IIA**

- (a) Install a new O-ring to the housing.
- (b) Apply a light coat of engine oil on the O-ring.



- (c) Align the cutout of the coupling with the line of the housing.
- (d) Insert the IIA, aligning the center of the flange with that of bolt hole on the cylinder head.
- (e) Lightly tighten the two hold-down bolts.

3. CONNECT HIGH-TENSION CORDS TO SPARK PLUGS

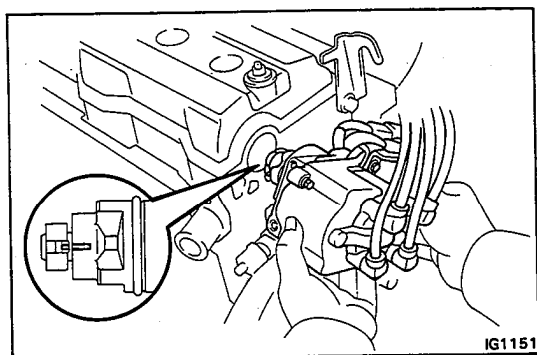
Firing order: 1 - 3 - 4 - 2

4. CONNECT IIA CONNECTORS**5. ADJUST IGNITION TIMING (See page EM-20)**

Ignition timing:

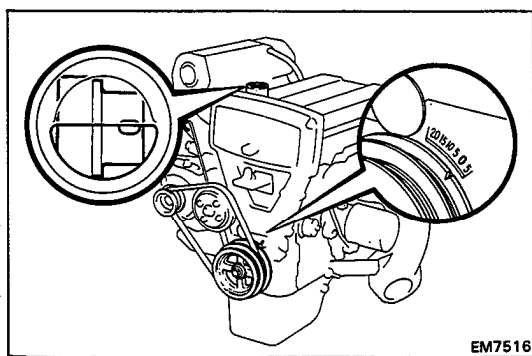
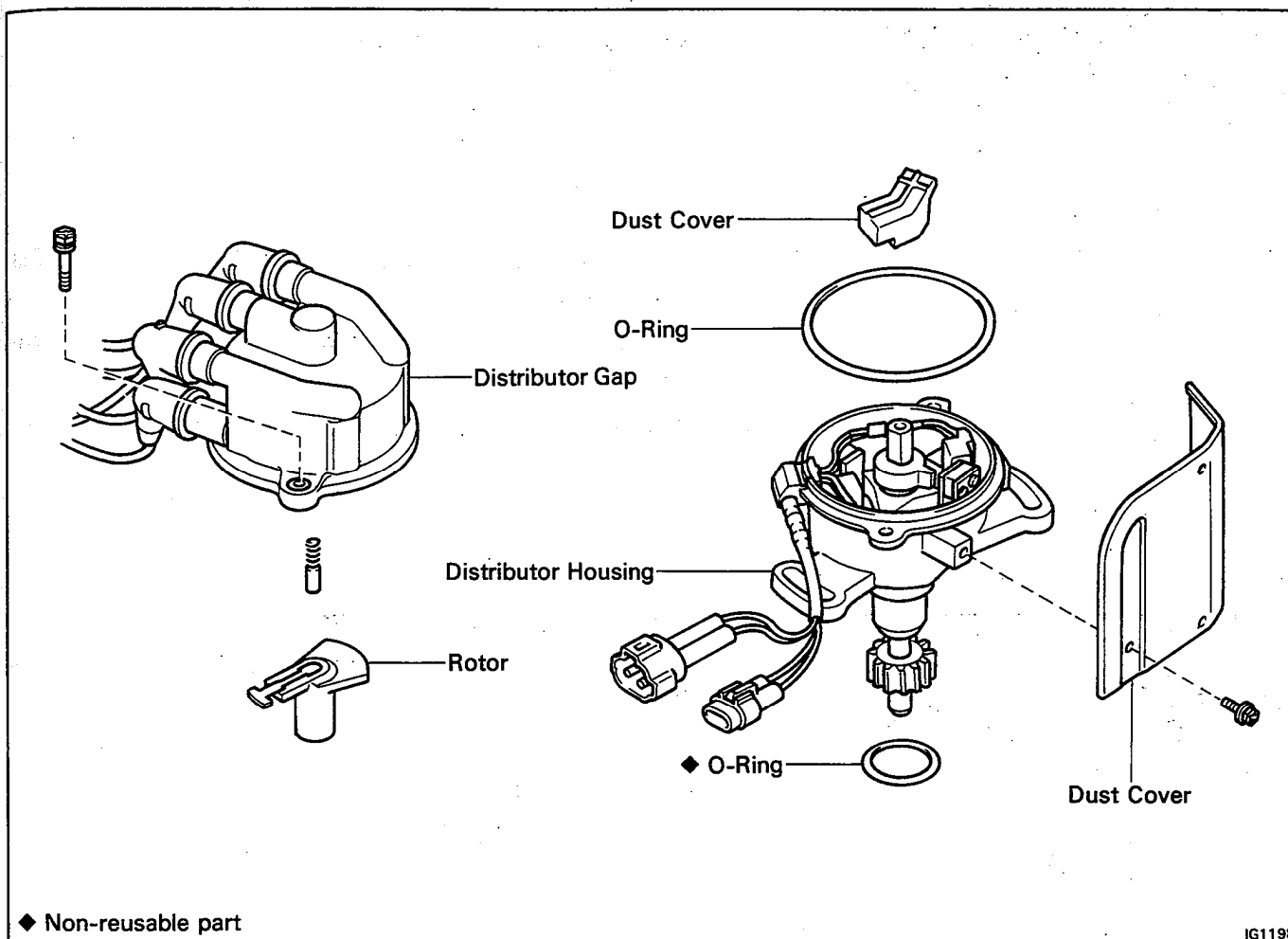
10° BTDC @ idle

(w/ Terminals TE1 and E1 connected)



DISTRIBUTOR (4A-GE)

COMPONENTS



INSTALLATION OF DISTRIBUTOR

1. SET NO.1 CYLINDER TO TDC/COMPRESSION

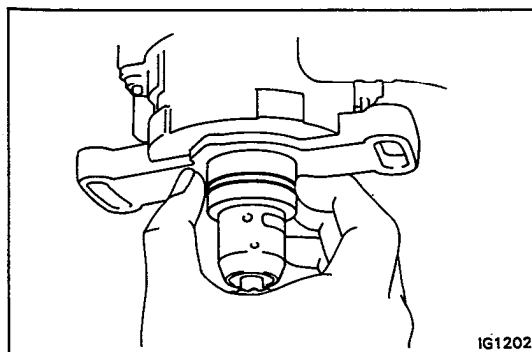
- Turn the crankshaft pulley, and align its groove with the "O" mark on the No.1 timing belt cover.
- Remove the oil filler cap, and check that you can see the cavity of the camshaft.

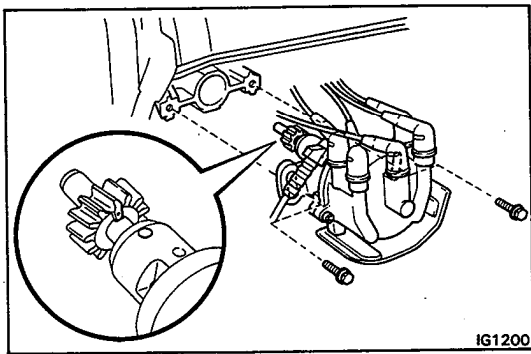
If necessary, turn the crankshaft pulley one complete revolution (360°).

2. INSTALL DISTRIBUTOR

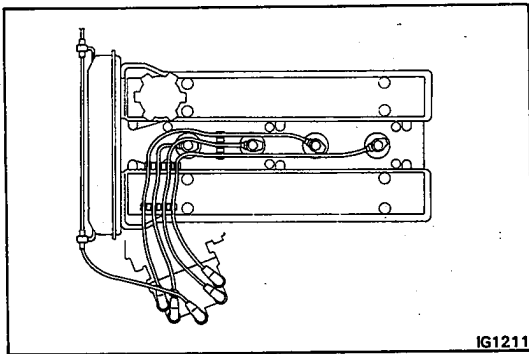
- Install a new O-ring to the housing.

HINT: Always use a new O-ring when installing the distributor.





- (c) Align the drilled mark of the driven gear with the groove of the housing.
- (d) Insert the distributor, aligning the center of the flange with that of the bolt hole on the cylinder head.
- (e) Lightly tighten the bolts.

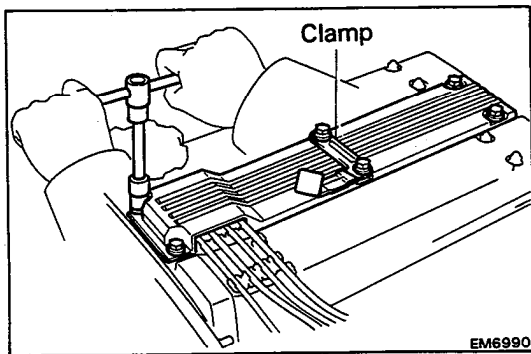


3. CONNECT HIGH-TENSION CORDS TO SPARK PLUGS

Firing order: 1 - 3 - 4 - 2

Connect the high-tension cords as shown in the illustration.

4. CONNECT DISTRIBUTOR CONNECTOR (S)



5. INSTALL PLUG CORD COVER

Install the plug cord cover and clamp (RHD M/T) with the bolts.

6. ADJUST IGNITION TIMING (See page EM-28)

Ignition timing:

10° BTDC @ idle

(w/ Terminals TE1 and E1 connected)