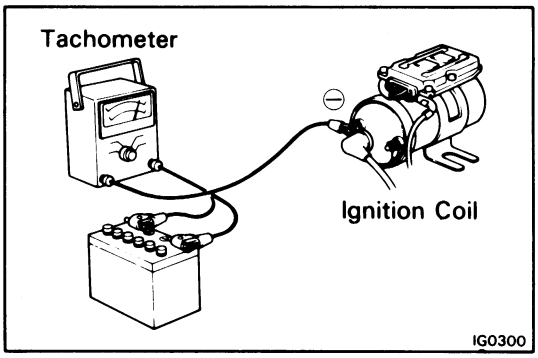
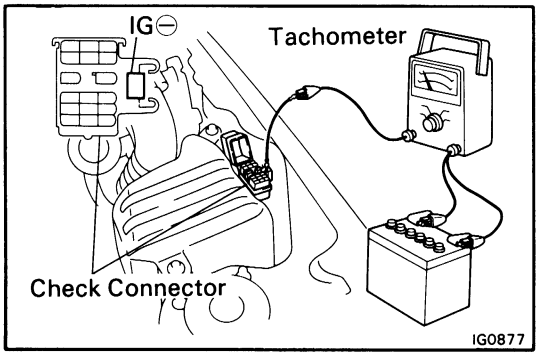
IGNITION SYSTEM





PRECAUTIONS

1. **Do not keep the ignition switch on for more than 10 minutes if the engine will not start.**
2. **There are two methods of connecting the tachometer:**
   - **To the ignition coil —**
     Connect the positive (+) terminal to the ignition coil negative (−) terminal.
   - **To the check connector —**
     Connect the tachometer test probe to the check connector terminal IG ⊖.
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 ignition coil terminals to touch ground as it could result in damage to the igniter and/or ignition coil.**
5. **Do not disconnect the battery when the engine is running.**
6. **Make sure that the igniter is properly grounded to the body.**

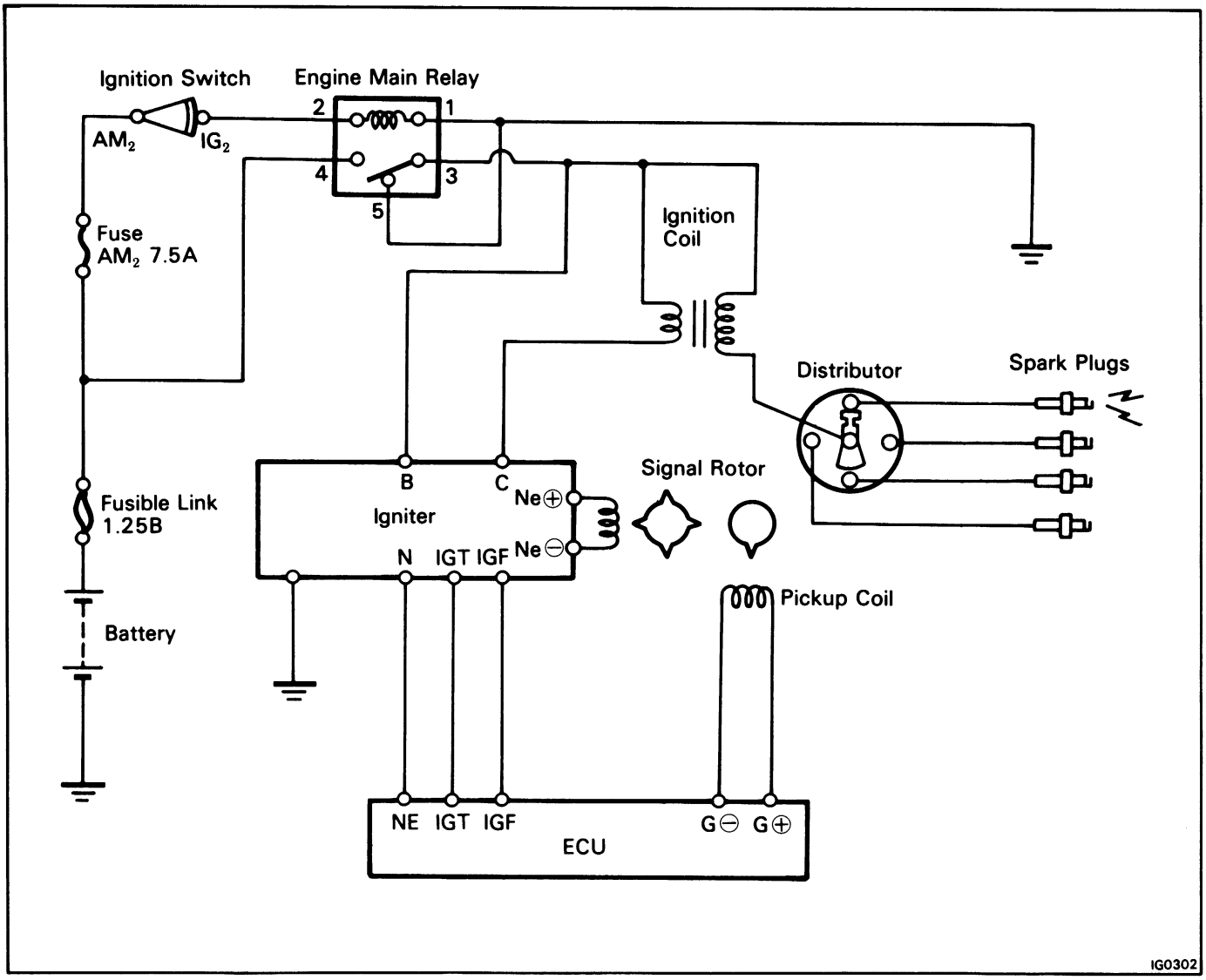
TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Engine will not start/ hard to start (cranks ok)	Incorrect ignition timing	Reset timing	IG-10
	Ignition coil faulty	Inspect coil	IG-7
	Igniter faulty	Inspect igniter	IG-4
	Distributor	Inspect distributor	IG-7
	High tension cord faulty	Inspect high-tension cords	IG-5
	Spark plugs faulty	Inspect plugs	IG-5
	Ignition wiring disconnected or broken	Inspect wiring	
Rough idle or stalls	Spark plugs faulty	Inspect plugs	IG-5
	Ignition wiring faulty	Inspect wiring	
	Incorrect ignition timing	Reset timing	IG-10
	Ignition coil faulty	Inspect coil	IG-7
	Igniter faulty	Inspect igniter	IG-4
	Distributor	Inspect distributor	IG-7
	High tension cord faulty	Inspect high-tension cords	IG-5
Engine hesitates/ poor acceleration	Spark plugs faulty	Inspect plugs	IG-5
	Ignition wiring faulty	Inspect wiring	
	Incorrect ignition timing	Reset timing	IG-10
Engine dieseling (runs after ignition switch is turned off)	Incorrect ignition timing	Reset timing	IG-10
Muffler explosion (after fire) all the time	Incorrect ignition timing	Reset timing	IG-10
Engine backfires	Incorrect ignition timing	Reset timing	IG-10
Poor fuel economy	Spark plugs faulty	Inspect plugs	IG-5
	Incorrect ignition timing	Reset timing	IG-10
Engine overheats	Incorrect ignition timing	Reset timing	IG-10

ELECTRONIC SPARK ADVANCE (ESA)

The ECU is programmed with data for optimum ignition timing under any and all operating conditions. Using data provided by sensors which monitor various engine functions (rpm, intake air volume, engine temperature, etc.) the microcomputer (ECU) triggers the spark at precisely the right instant.

ESA SYSTEM CIRCUIT



ON-VEHICLE INSPECTION

SPARK TEST

CHECK THAT SPARK OCCURS

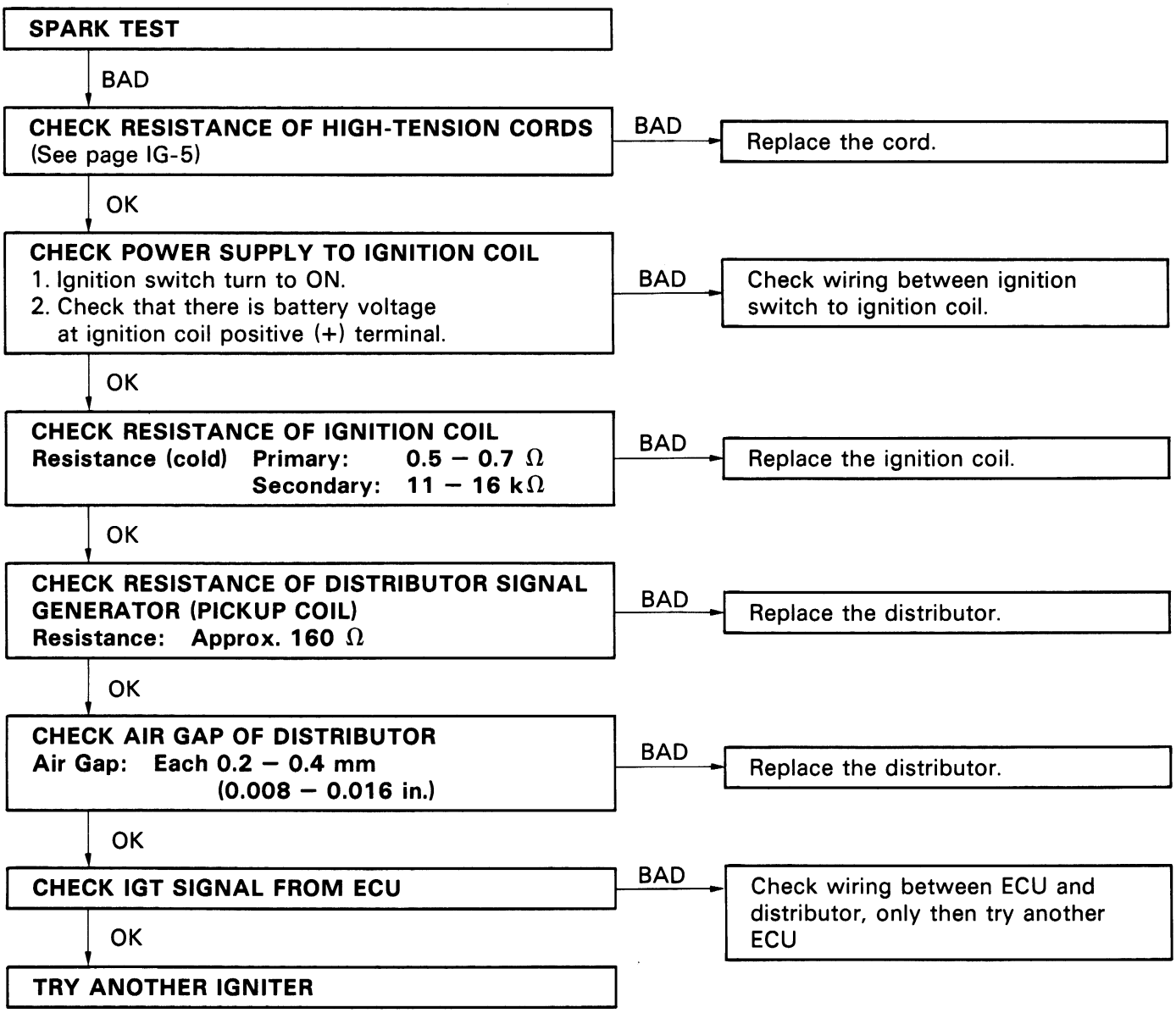
(a) Disconnect high-tension cords from the distributor.

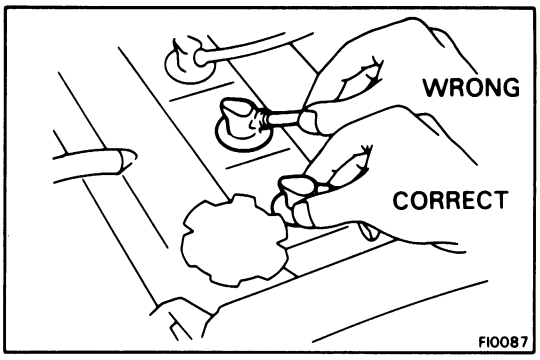
(b) Hold the end about 12.7 mm (0.500 in.) from body of car.

(c) See if spark occurs while engine is being cranked.

NOTE: 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.

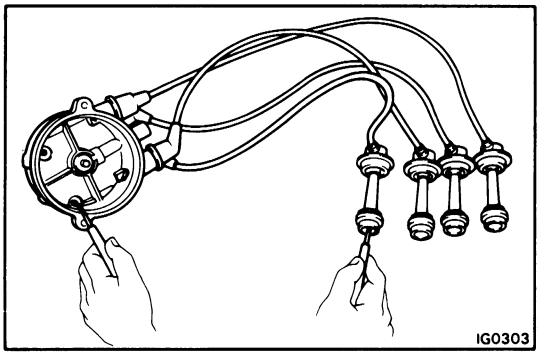




INSPECTION OF HIGH-TENSION CORD

1. CAREFULLY REMOVE HIGH-TENSION CORDS BY THEIR RUBBER BOOTS

CAUTION: DO NOT pull on the cords or bend the wires. The conductor inside may be damaged.



2. INSPECT RESISTANCE OF HIGH-TENSION CORD AND DISTRIBUTOR CAP

Using an ohmmeter, check that the resistance does not exceed the maximum.

Maximum resistance: 25 kΩ/cord

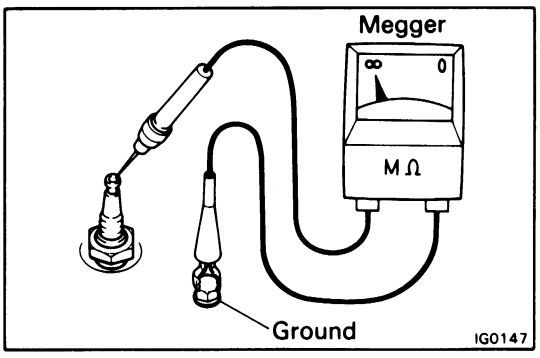
If more than maximum, check the terminals, and replace the high-tension cord and/or distributor cap as required.

INSPECTION OF SPARK PLUG

(Platinum Tipped Spark Plug)

CAUTION:

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

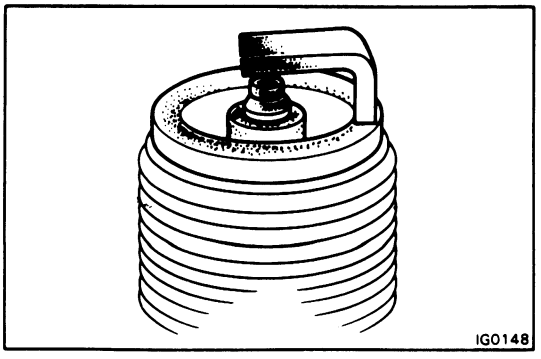


1. INSPECT ELECTRODE

(a) If using a megger (insulation resistance meter): Measure the insulation resistance.

Correct insulation resistance: More than 10 MΩ

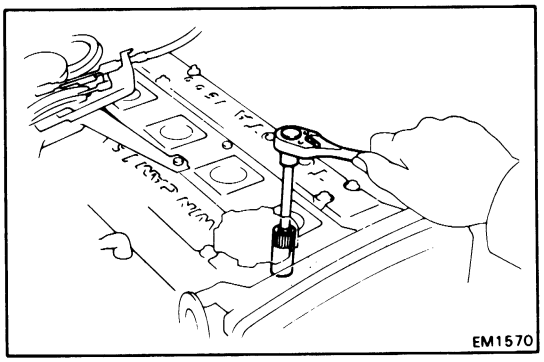
If less than 10 MΩ, proceed to step 2.



(b) If not using a megger:

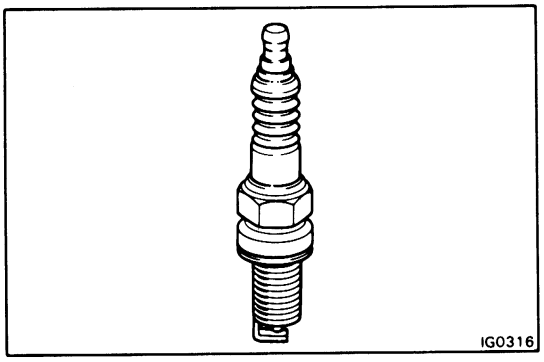
Quickly race the engine to 4,000 rpm five times.
Visually inspect the spark plugs.

If the electrode is dry ..... Okay
If the electrode is wet ..... Proceed to step 2.



2. REMOVE SPARK PLUGS

Using a plug wrench (16 mm), remove the spark plugs.



3. VISUALLY INSPECT SPARK PLUGS

Inspect the spark plugs for thread or insulator damage. If defective, replace the plug.

Recommended spark plugs:

4A-GE

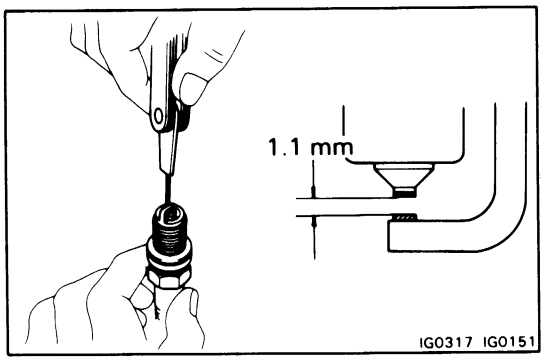
ND PQ16R

NGK BCPR5EP11

4A-GZE

ND PQ20R

NGK BCPR6EP11



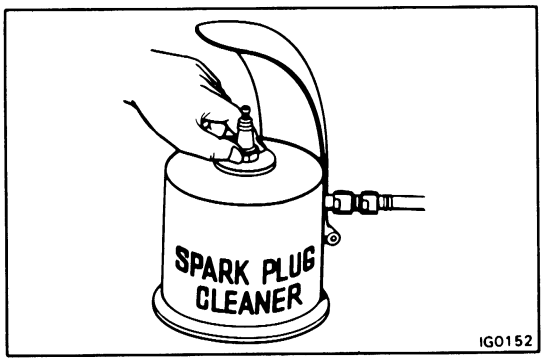
4. INSPECT ELECTRODE GAP

Maximum limit: 1.3 mm (0.051 in.)

If not, replace the plug.

Correct electrode gap of new plug:
1.1 mm (0.043 in.)

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

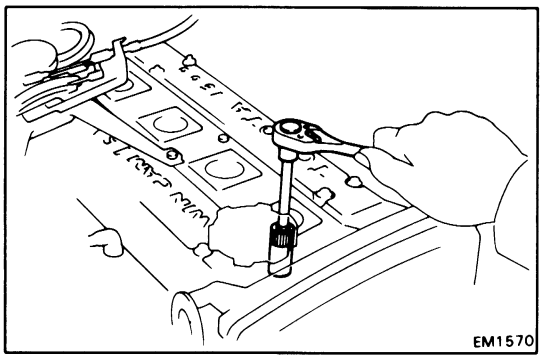


5. CLEAN SPARK PLUGS

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

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



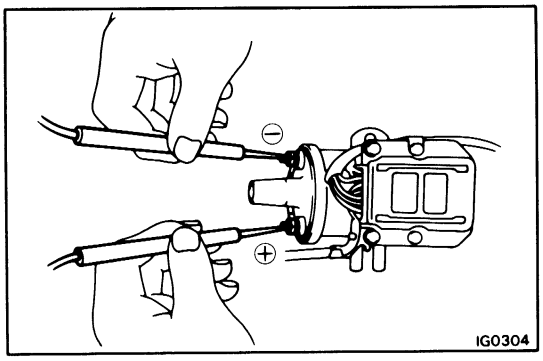
6. INSTALL SPARK PLUGS

Using a plug wrench (16 mm), install and torque the spark plugs.

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

INSPECTION OF IGNITION COIL

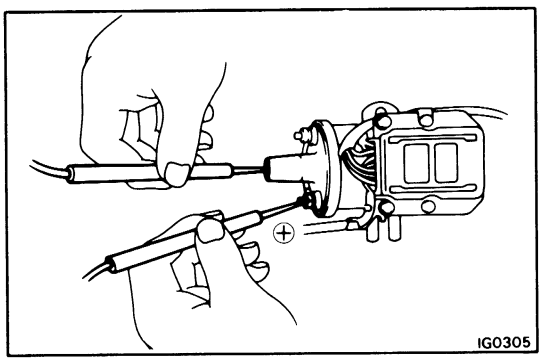
1. **DISCONNECT HIGH-TENSION CORDS FROM IGNITION COIL**



2. **INSPECT PRIMARY COIL RESISTANCE**

Using an ohmmeter, measure the resistance between the positive (+) and negative (−) terminals.

Primary coil resistance (cold): 0.5 — 0.7 Ω

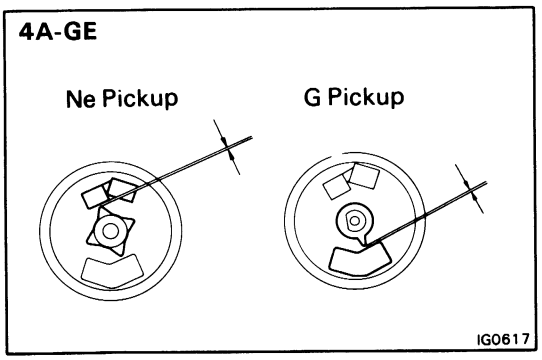


3. **INSPECT SECONDARY COIL RESISTANCE**

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

Secondary coil resistance (cold): 11 — 16 kΩ

INSPECTION OF DISTRIBUTOR

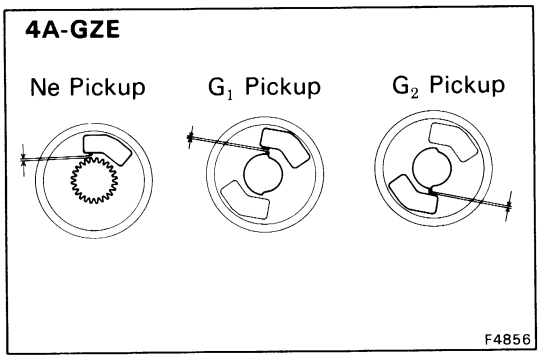


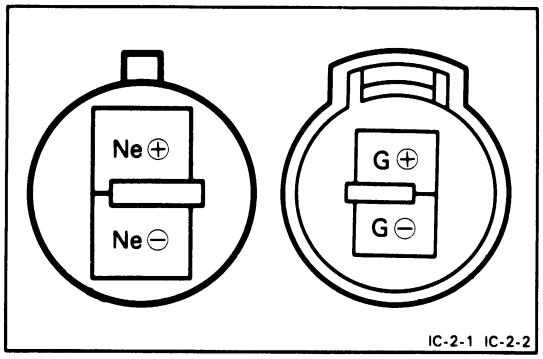
1. **INSPECT AIR GAPS**

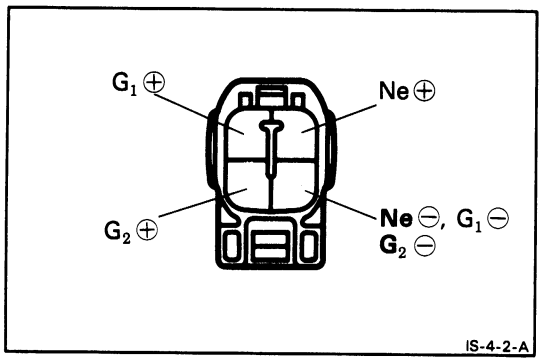
Using a feeler gauge, measure the gap between the signal rotor and pickup coil projection.

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

If the gap is not within specification, replace the distributor.







2. CHECK SIGNAL GENERATOR

Using an ohmmeter, check resistance of the two signal generators.

"G" signal generator resistance (cold):

4A-GE	**G⊕ – G⊖**	**140 – 180 Ω**
4A-GZE	**G_1⊕ – G_1⊖**	**140 – 180 Ω**
	G_2⊕ – G_2⊖	**140 – 180 Ω**

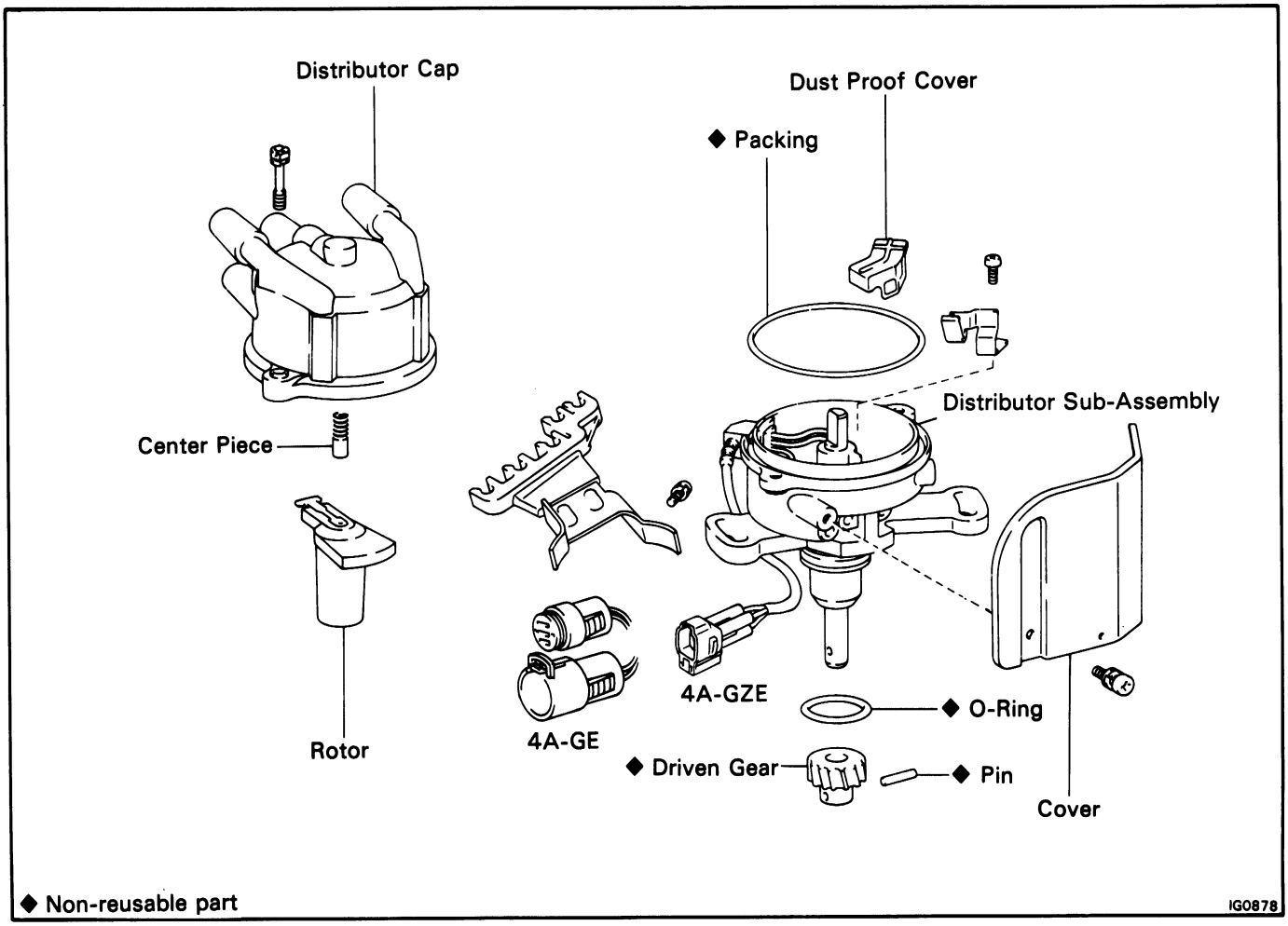
"Ne" signal generator resistance (cold):

Ne⊕ – Ne⊖	**140 – 180 Ω**

If the resistance is not correct, replace the distributor.

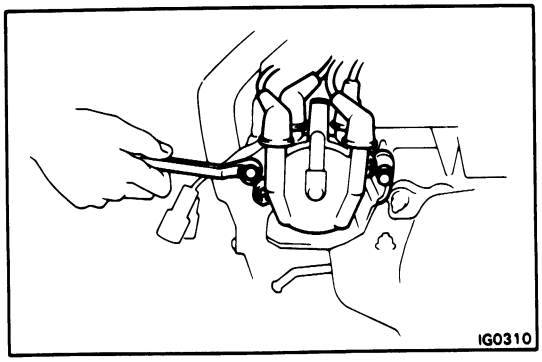
DISTRIBUTOR

COMPONENTS

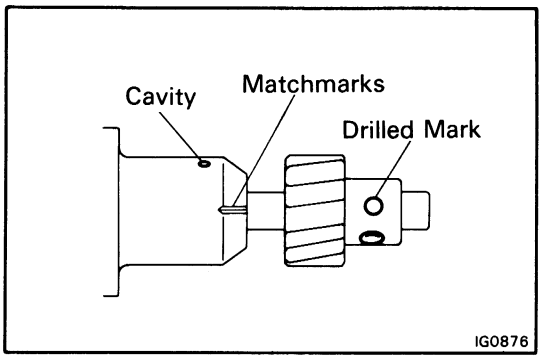


REMOVAL OF DISTRIBUTOR

1. DISCONNECT HIGH-TENSION CORDS FROM CYLINDER HEAD AND IGNITION COIL
2. DISCONNECT DISTRIBUTOR CONNECTORS



3. REMOVE DISTRIBUTOR SET BOLTS
4. PULL OUT DISTRIBUTOR FROM CYLINDER HEAD
5. REMOVE O-RING



REPLACEMENT OF DISTRIBUTOR DRIVEN GEAR

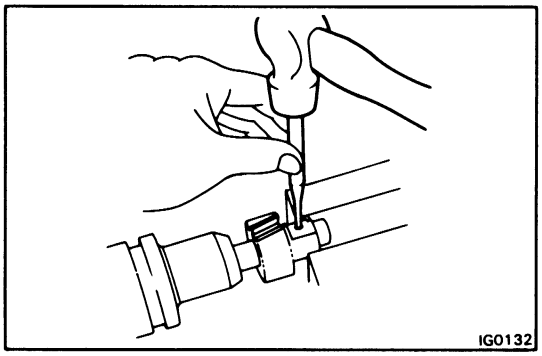
1. GRIND DRIVEN GEAR AND PIN

(a) Align the drilled mark on the driven gear with the cavity of the housing.

(b) Place matchmarks on the housing and distributor shaft.

(c) Using a grinding wheel, grind the gear and pin.

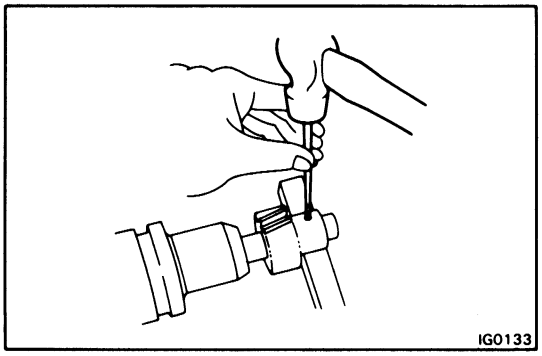
CAUTION: Be careful not to damage the shaft.



2. REMOVE PIN AND DRIVE GEAR

(a) Using a punch and hammer, drive out the pin.

(b) Remove the driven gear and discard it.



3. INSTALL NEW DRIVE GEAR AND PIN

(a) Align the matchmarks on the housing and distributor shaft.

(b) Align the drilled mark on the new driven gear with the cavity of the housing.

(c) Using a hammer, install a new pin.

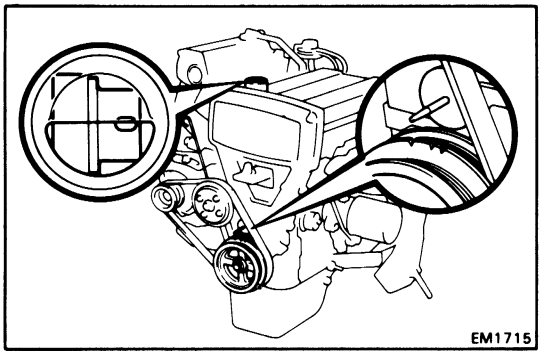
INSTALLATION OF DISTRIBUTOR

1. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with the "O" mark on the No. 1 timing belt cover.

(b) Remove the oil filler cap and check that you can see the cavity in the camshaft.

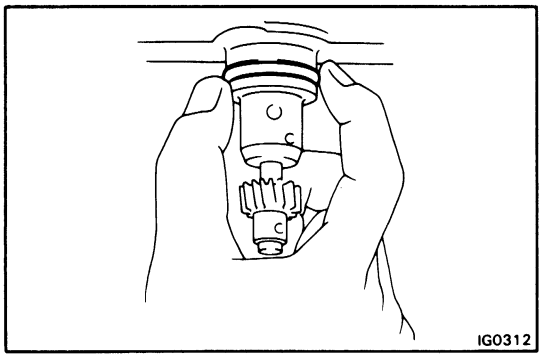
If necessary, turn the crankshaft pulley one complete revolution.

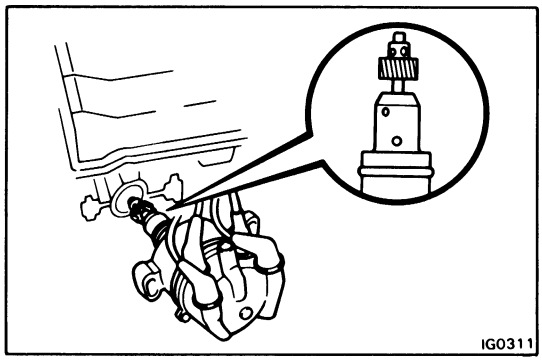


2. INSTALL DISTRIBUTOR

(a) Install a new O-ring to the distributor.

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





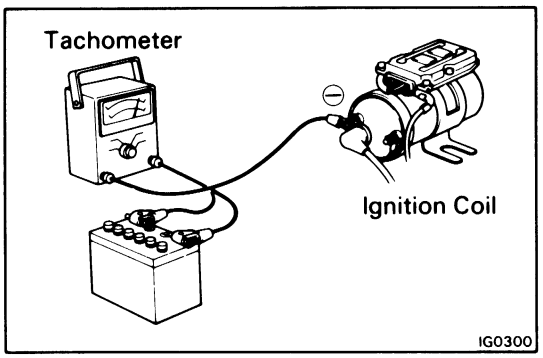
(b) Align the drilled mark on the driven gear with the cavity of the housing.

(c) Insert the distributor, aligning the center of the flange with that of the bolt hole on the cylinder head.

(d) Lightly tighten the hold-down bolts.

3. CONNECT DISTRIBUTOR CONNECTOR

4. CONNECT HIGH-TENSION CORDS TO CYLINDER HEAD AND IGNITION COIL



5. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE

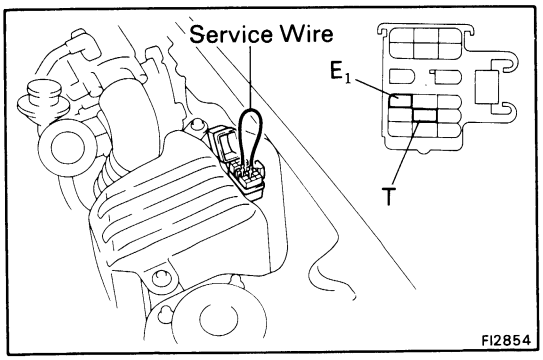
Connect the tachometer (+) terminal to the ignition coil (−) terminal.

CAUTION:

- **NEVER allow the ignition coil terminal to touch ground as it could result in damage to the igniter and/or ignition coil.**
- **As some tachometers are not compatible with this ignition system, we recommended that you confirm the compatibility of your unit before using.**

6. WARM UP ENGINE

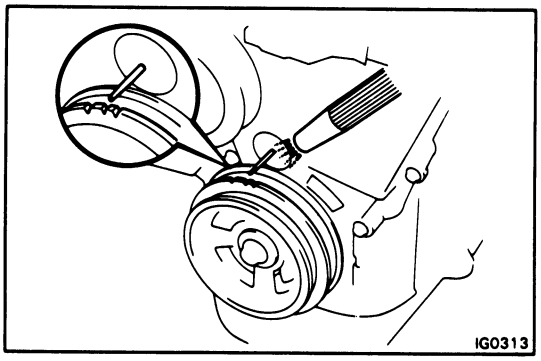
Allow the engine to reach normal operating temperature.



7. ADJUST IGNITION TIMING

(a) Short the terminals T and E_1 of the check connector.

NOTE: The service connector is located near the resonator (4A-GE) or intercooler (4A-GZE).

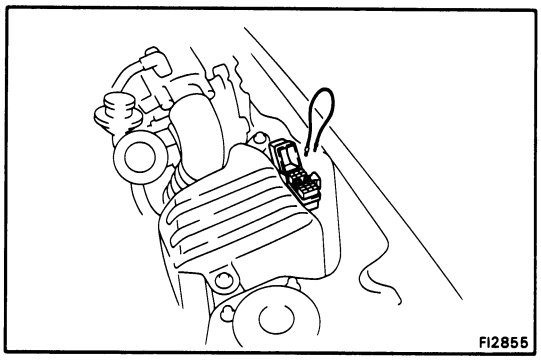


(b) Using a timing light, check the ignition timing.

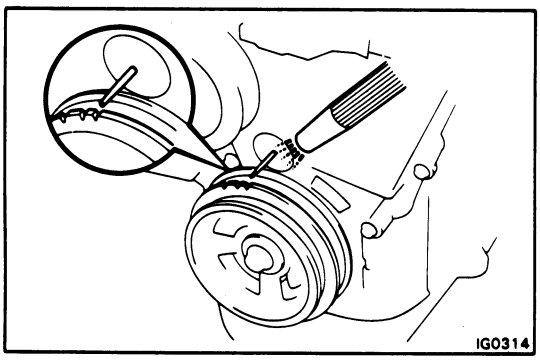
Ignition timing: 10° BTDC @ Idling
(w/short-circuited T-E_1,
Transmission in "N" position)

(c) If necessary, loosen the distributor bolt and turn the distributor to align the marks. Recheck the timing after tightening the distributor.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)



(d) Unshort the check connector.



8. FURTHER CHECK IGNITION TIMING

Ignition timing: (Transmission in "N" position)
M/T More than 16° BTDC @ Idling
A/T More than 12° BTDC @ Idling