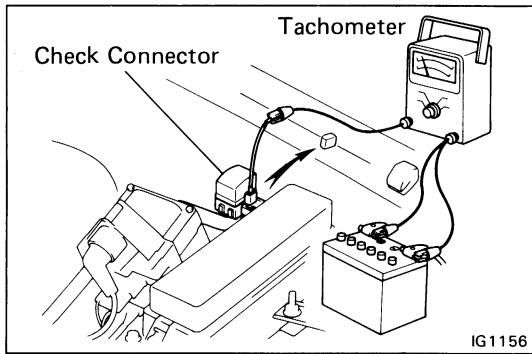


IGNITION SYSTEM

	Page
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TROUBLESHOOTING	IG-3
IGNITION SYSTEM CIRCUIT	IG-4
ON-VEHICLE INSPECTION (7M-GE)	IG-5
ON-VEHICLE INSPECTION (7M-GTE)	IG-10
DISTRIBUTOR (7M-GE)	IG-17
CAM POSITION SENSOR (7M-GTE)	IG-21

PRECAUTIONS

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

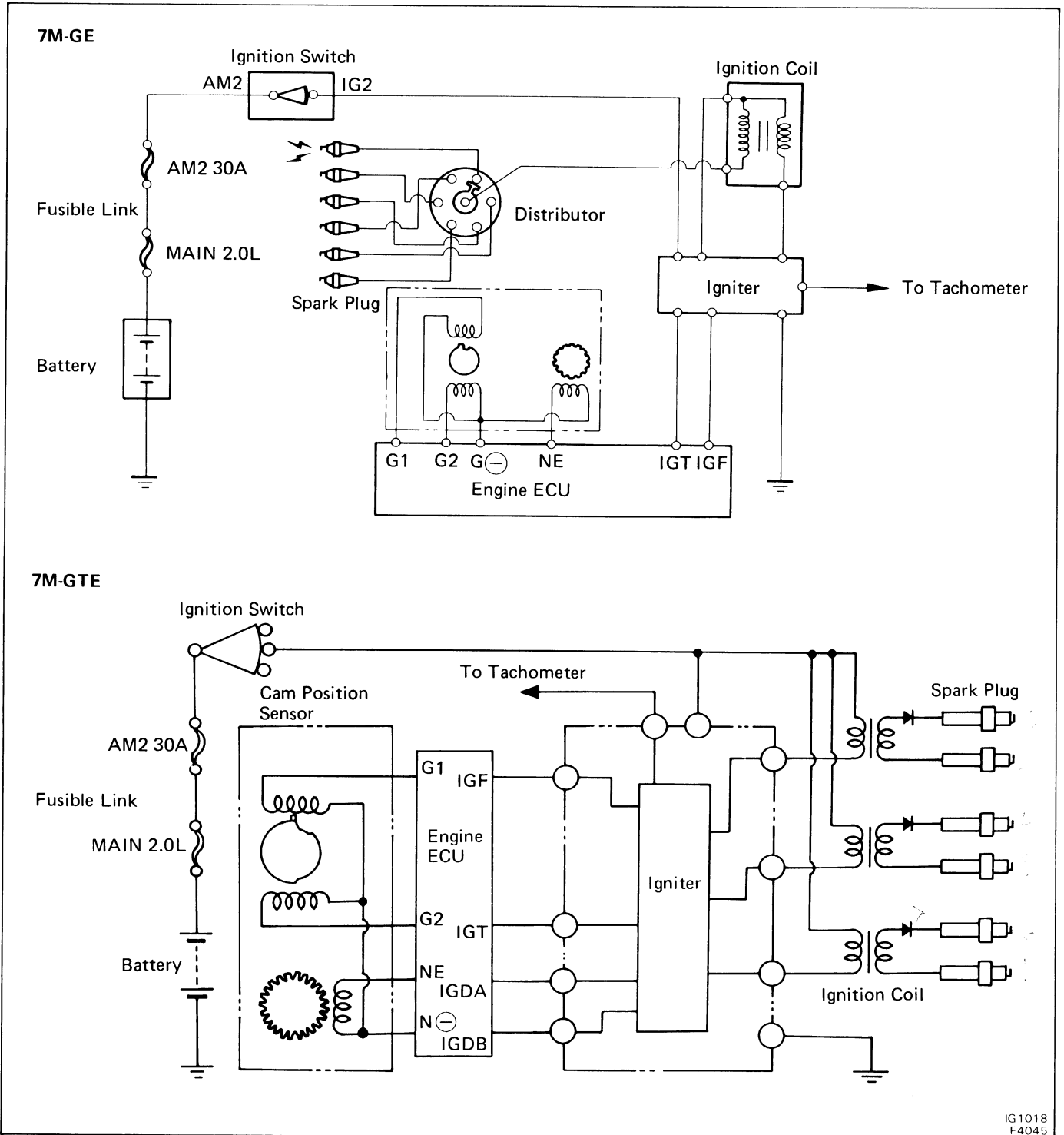


2. When a tachometer is connected to the system, connect the tachometer test probe to the check connector terminal IG \ominus .
3. As some tachometers are not compatible with this ignition system, we recommended that you confirm the compatibility of your unit before use.
4. NEVER allow the tachometer terminals to touch ground as it could result in damage to 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 causes	Remedy	Page
Engine will not start/ hard to start (cranks OK)	Incorrect ignition timing Ignition problems <ul style="list-style-type: none"> ● Ignition coil ● (7M-GTE) Igniter ● (7M-GE) Distributor (7M-GTE) Cam position sensor ● High-tension cords Ignition wiring disconnected or broken	Reset timing Inspect coil Inspect igniter Inspect distributor Inspect cam position sensor Inspect high-tension cords Inspect wiring	IG-20 IG-9 or 12 IG-15 IG-9 IG-16 IG-6 or 11
Rough idle or stalls	Spark plugs faulty Ignition wiring faulty Incorrect ignition timing Ignition problems <ul style="list-style-type: none"> ● Ignition coil ● (7M-GTE) Igniter ● (7M-GE) Distributor (7M-GTE) Cam position sensor ● High-tension cords 	Inspect plugs Inspect wiring Reset timing Inspect coil Inspect igniter Inspect distributor Inspect cam position sensor Inspect high-tension cords	IG-7 IG-20 IG-9 or 12 IG-15 IG-9 IG-16 IG-6 or 11
Engine hesitates/ poor acceleration	Spark plugs faulty Ignition wiring faulty Incorrect ignition timing	Inspect plugs Inspect wiring Reset timing	IG-7 IG-20
Muffler explosion (after fire) all the time	Incorrect ignition timing	Reset timing	IG-20
Engine backfires	Incorrect ignition timing	Reset timing	IG-20
Poor fuel economy	Spark plugs faulty Incorrect ignition timing	Inspect plugs Reset timing	IG-7 IG-20
Engine overheats	Incorrect ignition timing	Reset timing	IG-20

IGNITION SYSTEM CIRCUIT



IG1018
F4045

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, eng. temperature, etc.) the microcomputer (ECU) triggers the spark at precisely the right instant.

ON-VEHICLE INSPECTION (7M-GE)

SPARK TEST

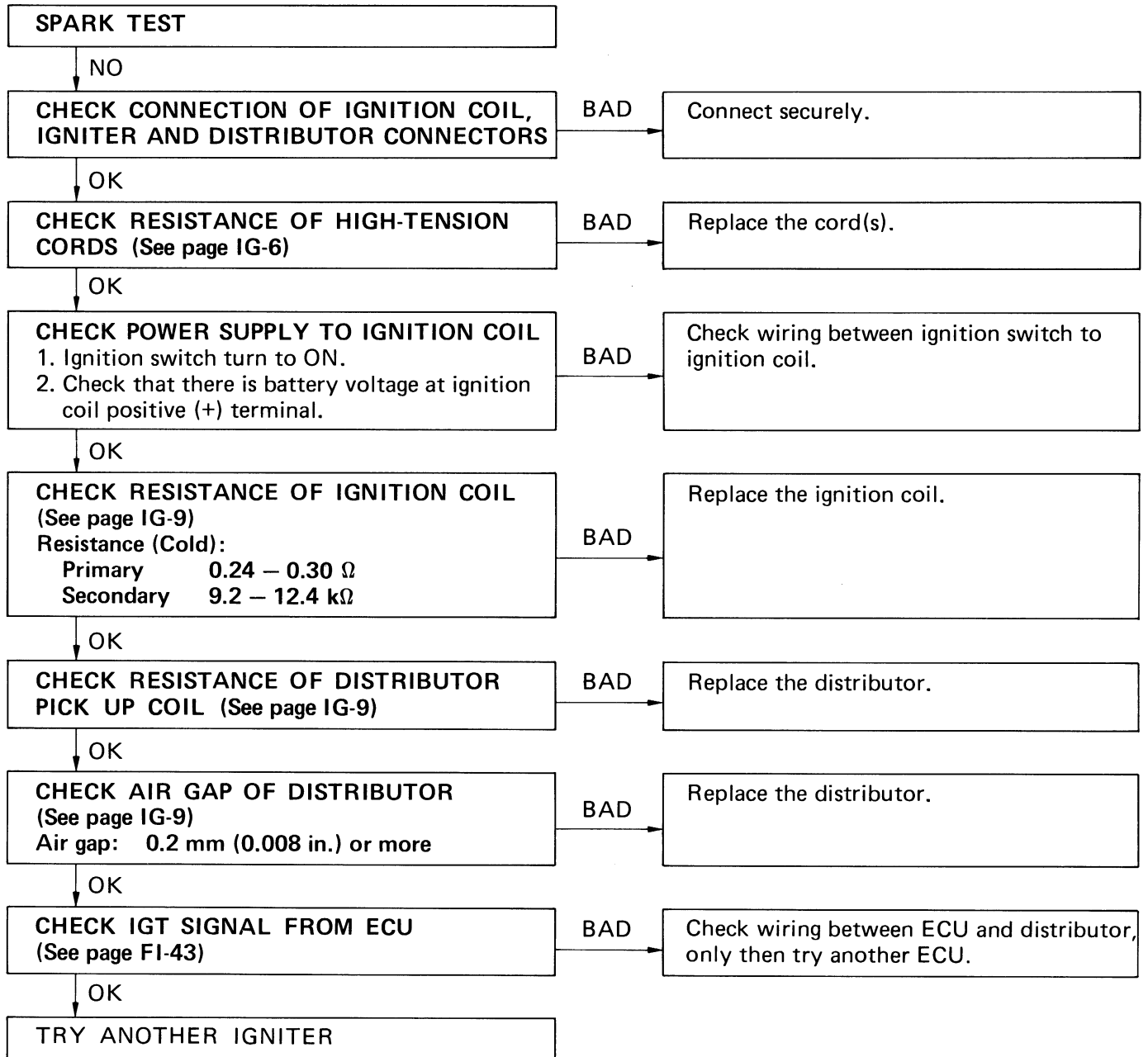
1-5-3-6-2-4

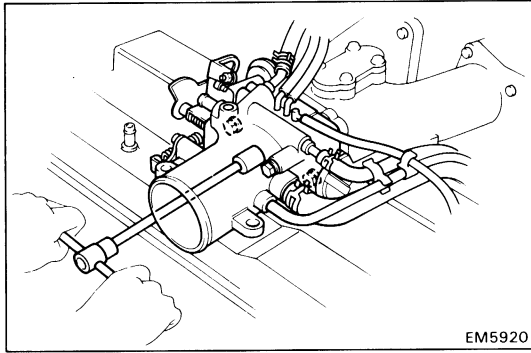
CHECK THAT SPARK OCCURS

- (a) Disconnect high-tension cord from the distributor.
- (b) Hold the end approx. 12.5 mm (0.50 in.) from body of vehicle.
- (c) 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 a time.

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

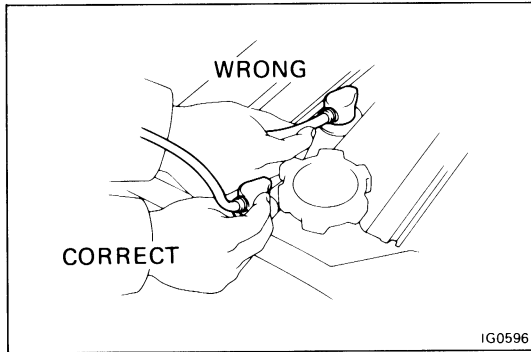




INSPECTION OF HIGH-TENSION CORDS

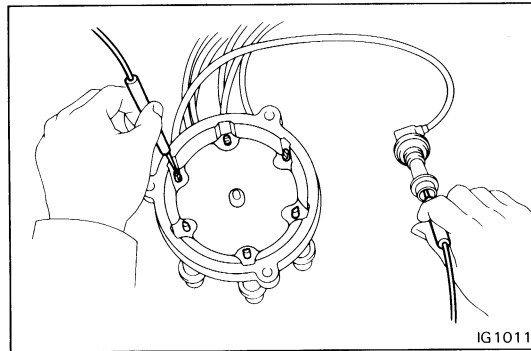
1. REMOVE HIGH-TENSION CORDS

- (a) Disconnect the throttle body.
 - Disconnect the air cleaner hose.
 - Remove the throttle body bracket(s).
 - Disconnect the accelerator connecting rod.
 - Disconnect the PCV hose.
 - Remove the four bolts and pick up the throttle body.



- (b) Carefully remove the high-tension cords by their rubber boots from the spark plugs.

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



2. INSPECT HIGH-TENSION CORD RESISTANCE

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

Maximum resistance: 25 k Ω per cord

If resistance exceeds maximum, check the terminals.

If necessary, replace the high-tension cord and/or distributor cap.

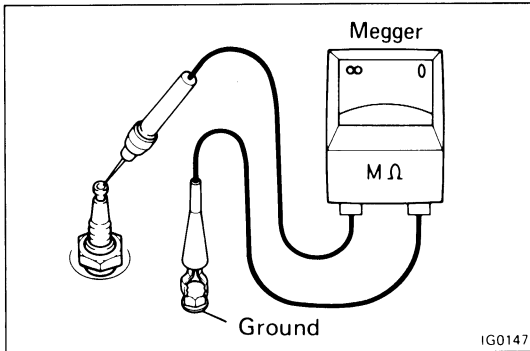
3. INSTALL HIGH-TENSION CORDS

- (a) Install high-tension cords.
- (b) Install the throttle body.
 - Install the throttle body with the four bolts.
 - Connect the PCV hose.
 - Connect the accelerator connecting rod.
 - Install the throttle body bracket(s).
 - Connect the air cleaner hose.

INSPECTION OF SPARK PLUGS

NOTICE:

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



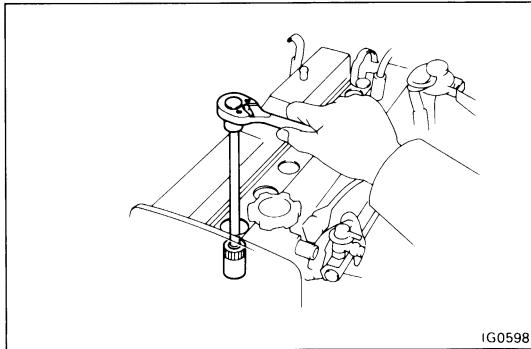
1. INSPECT ELECTRODE

If using a megger (insulation resistance meter):

- Remove the high-tension cords. (See page IG-6)
- Measure the insulation resistance.

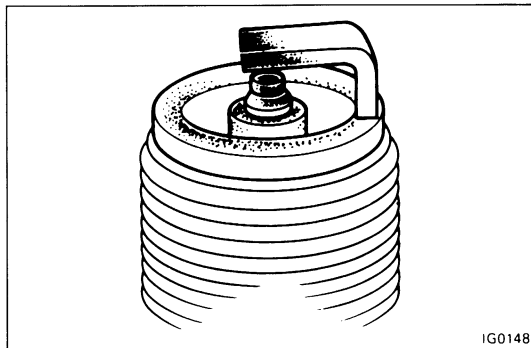
Correct insulation resistance: More than 10 MΩ

If less than 10 MΩ, proceed to step 2.



If not using a megger:

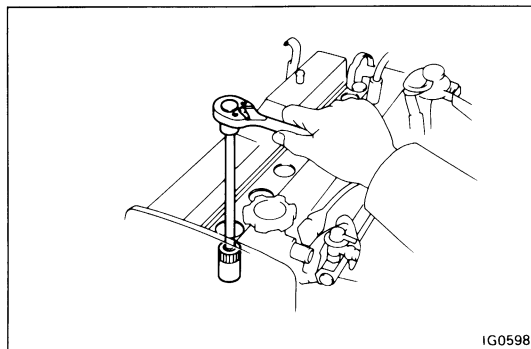
- Quickly race the engine to 4,000 rpm five times.
- Remove the spark plugs. (See procedure below)



(c) Visually inspect the spark plugs.

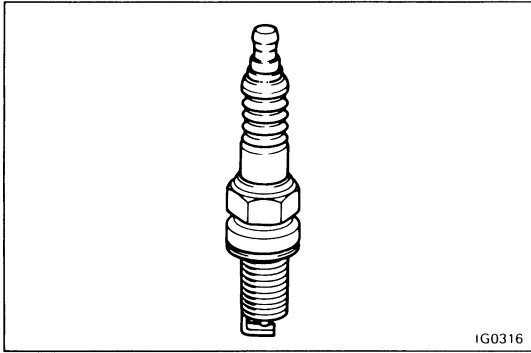
If the electrode is dry.....Okay

If the electrode is wet.....Proceed to step 3



2. REMOVE SPARK PLUGS

- Remove the high-tension cords. (See page IG-6)
- Using a plug wrench(16 mm), remove the spark plugs.



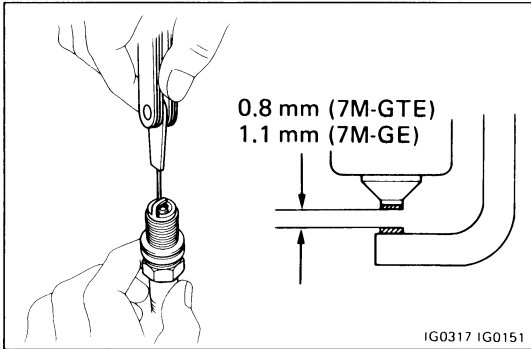
IG0316

3. VISUALLY INSPECT SPARK PLUGS

Check the spark plug for thread or insulator damage.
If abnormal, replace the plug.

Recommended spark plugs:

7M-GE	ND	PQ16R
	NGK	BCPR5EP11
7M-GTE	ND	PQ20R-P8
	NGK	BCPR6EP-N8



IG0317 IG0151

4. INSPECT ELECTRODE GAP

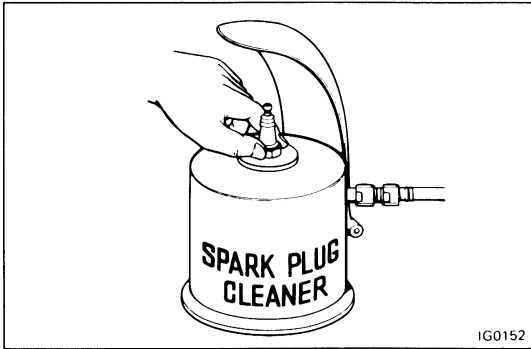
Maximum electrode gap: 7M-GE 1.3 mm (0.051 in.)
7M-GTE 1.0 mm (0.039 in.)

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

Correct electrode gap of new plug:

7M-GE	1.1 mm (0.043 in.)
7M-GTE	0.8 mm (0.031 in.)

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



IG0152

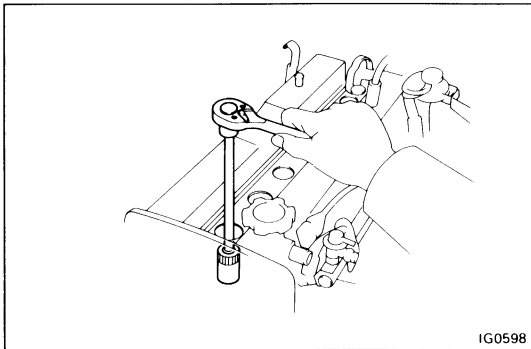
5. CLEAN SPARK PLUGS

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

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



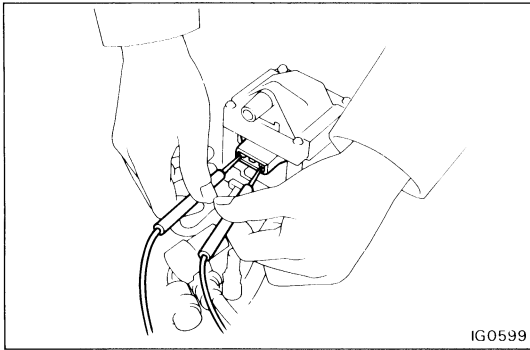
IG0598

6. INSTALL SPARK PLUGS

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

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

(b) Install the high-tension cords.



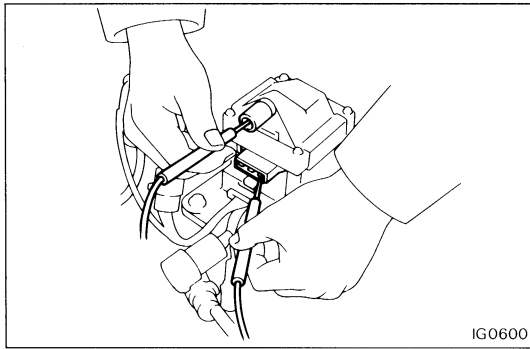
INSPECTION OF IGNITION COIL

1. DISCONNECT HIGH-TENSION CORD

2. INSPECT PRIMARY COIL RESISTANCE

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

Primary coil resistance (cold): 0.24 – 0.30 Ω

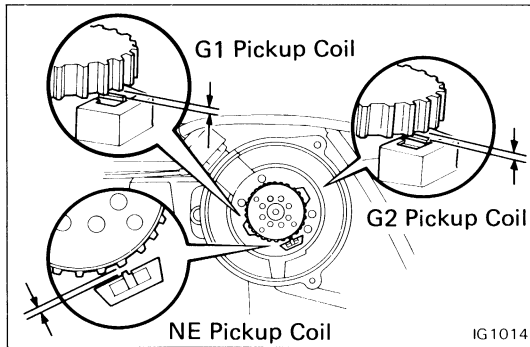


3. INSPECT SECONDARY COIL RESISTANCE

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

Secondary coil resistance (cold): 9.2 – 12.4 k Ω

4. RECONNECT HIGH-TENSION CORD



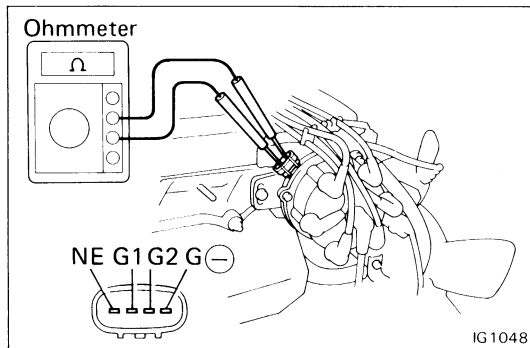
INSPECTION OF DISTRIBUTOR

1. INSPECT AIR GAPS

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

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

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



2. INSPECT PICKUP COILS

Using an ohmmeter, check resistance of the pickup coil.

G1 pickup coil resistance:

G1 – G \ominus 140 – 180 Ω

G2 pickup coil resistance:

G2 – G \ominus 140 – 180 Ω

NE pickup coil resistance:

NE – G \ominus 180 – 220 Ω

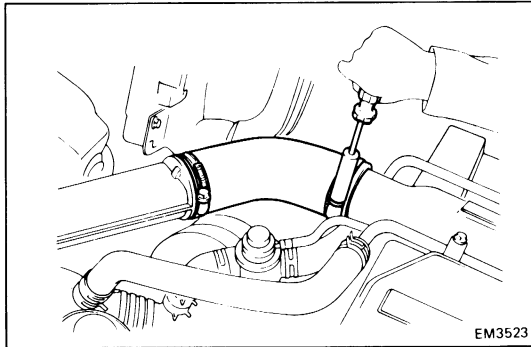
If the resistance is not as specified, replace the distributor.

INSPECTION OF IGNITER

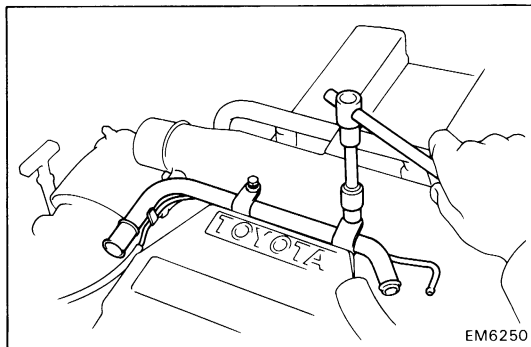
(See procedure Spark Test on page IG-5)

ON-VEHICLE INSPECTION (7M-GTE)**SPARK TEST**

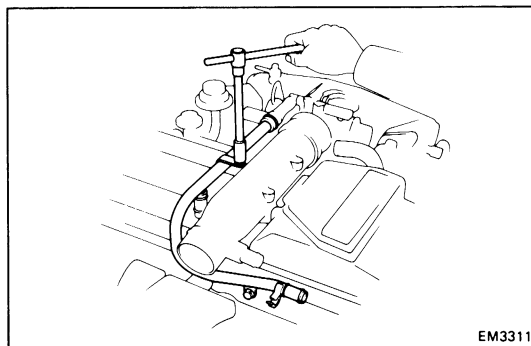
HINT: Perform this test to check that voltage is coming from the ignition coil to the spark plug.

**1. DISCONNECT NO. 1 AIR CLEANER HOSE****2. DISCONNECT FOLLOWING CABLES:**

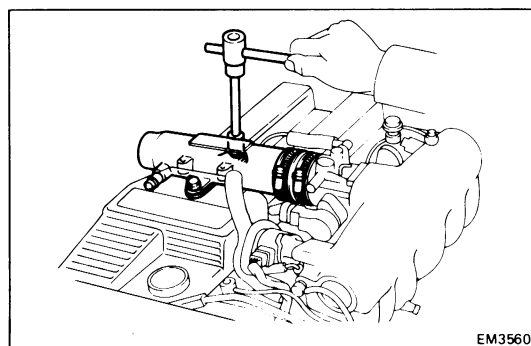
- (a) Cruise control cable
- (b) Accelerator cable
- (c) (A/T)
Throttle cable

**3. REMOVE ISC PIPE**

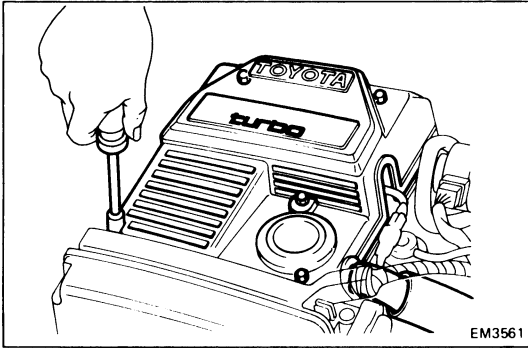
- (a) Disconnect the six hoses from the ISC pipe.
- (b) Remove the two bolts and ISC pipe.

**4. REMOVE PCV PIPE WITH HOSES**

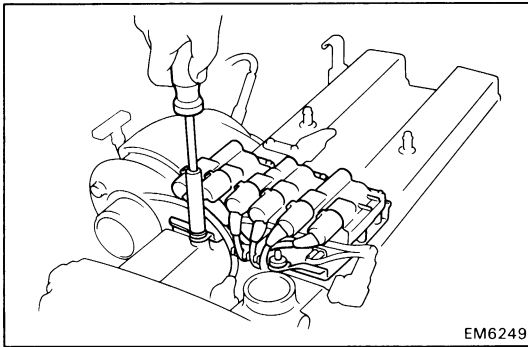
- (a) Remove the oxygen sensor wire from the two clamps.
- (b) Disconnect the No. 4 PCV hose from the PCV pipe.
- (c) Remove the two bolts.
- (d) Disconnect the PCV pipe with hoses from the cylinder head covers and throttle body.

**5. REMOVE INTAKE AIR CONNECTOR**

- (a) Disconnect the air valve hose from the intake air connector.
- (b) Loosen the clamp and remove the two bolts.
- (c) Remove the intake air connector.

**6. REMOVE IGNITION COIL COVER**

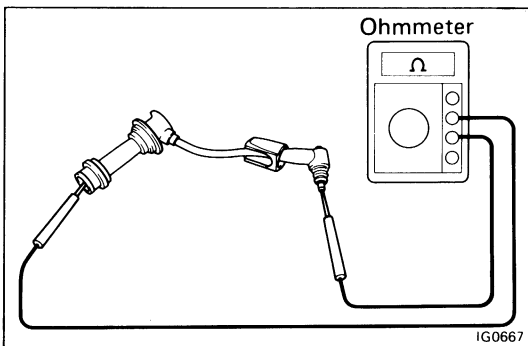
- (a) Remove the oil filler cap.
- (b) Remove the five nuts and ignition coil cover.

**7. REMOVE IGNITION COIL WITH BRACKET**

- (a) Remove the nut.
- (b) Disconnect the No.1 and No.2 high-tension cords from the ignition coil and clamp.
- (c) Remove the ignition coil with bracket and high-tension cords.
- (d) Remove the No.1 and No.2 high-tension cords from spark plugs.

8. REMOVE SPARK PLUGS**9. PERFORM SPARK TEST**

- (a) Install the oil filler cap.
- (b) Install the spark plugs to each high-tension cord.
- (c) Ground the spark plug.
- (d) Disconnect the solenoid resistor and cold start injector connector.
- (e) See if a spark occurs while engine is being cranked.

**INSPECTION OF HIGH-TENSION CORDS**

Using an ohmmeter, measure the resistance.

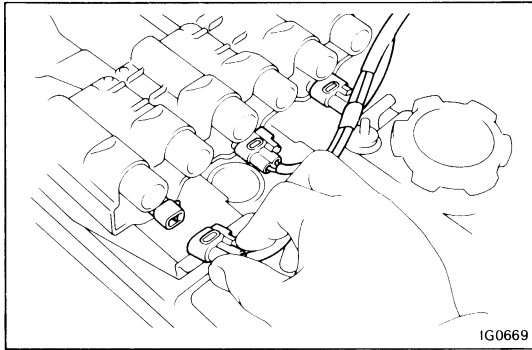
Maximum resistance: 25 k Ω per cord

If resistance exceeds maximum, check the terminals.

If necessary, replace the high-tension cord.

INSPECTION OF SPARK PLUGS

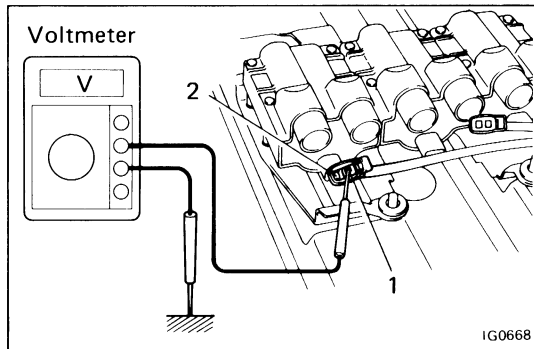
(See pages IG-7,8)



INSPECTION OF IGNITION COIL

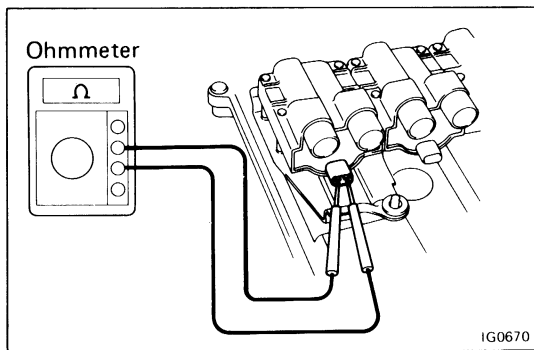
1. INSPECT POWER SOURCE LINE

- Disconnect the high-tension cord from the ignition coil.
- Disconnect the ignition coil connectors.
- Turn the ignition switch ON.



- Using a voltmeter, measure the voltage between terminal 1 and body ground.

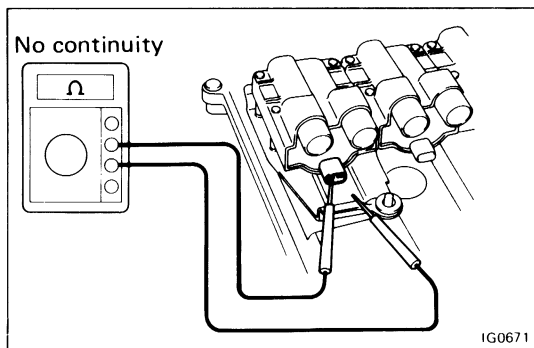
Voltage: Approx. 12V



2. INSPECT PRIMARY COIL RESISTANCE

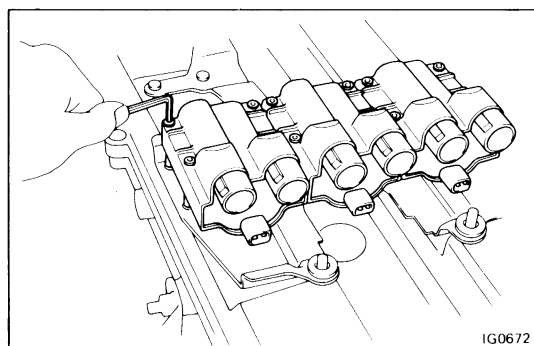
Using an ohmmeter, measure the resistance between the positive (+) and negative (−) terminals.

Primary coil resistance (cold): 0.3 – 0.5 Ω



3. INSPECT IGNITION COIL GROUND

Using an ohmmeter, check that there is no continuity between the ignition coil terminal and body ground.

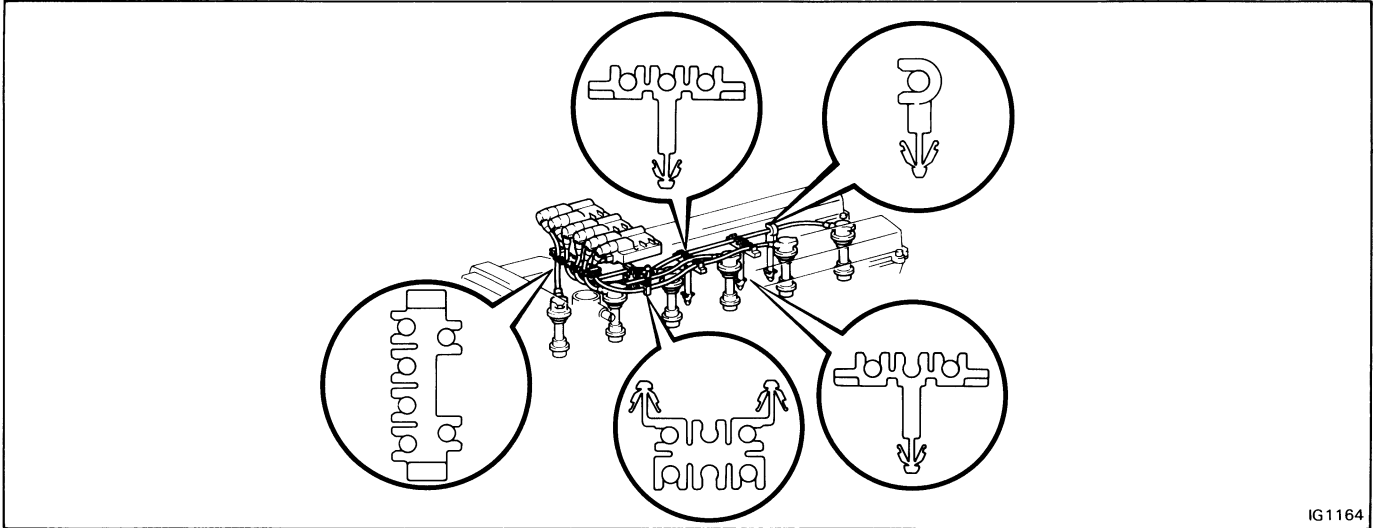


4. IF NECESSARY, REPLACE IGNITION COIL

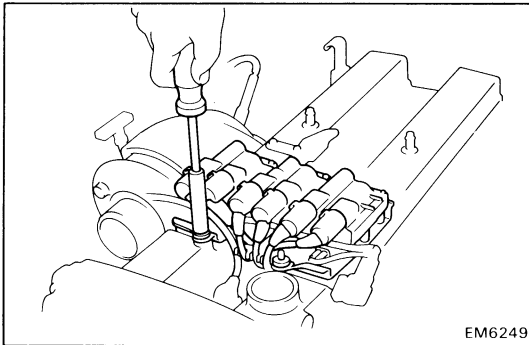
Using a hexagon wrench 3 mm (0.12 in.), replace the ignition coil.

5. INSTALL IGNITION COIL WITH BRACKET

- (a) Connect the ignition coil connector.
- (b) Install the high-tension cords as shown in the illustration; No.5 and No.6, No.3 and No.4, and No.1 and No.2.



IG1164

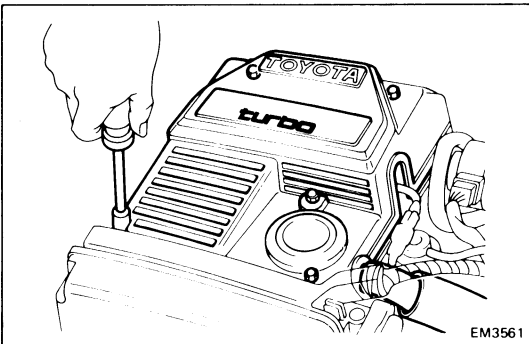


EM6249

- (c) Install and torque the nut.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

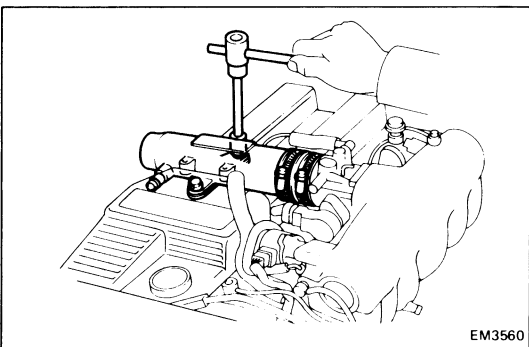
HINT: Do not over tighten the nut.



EM3561

6. INSTALL IGNITION COIL COVER

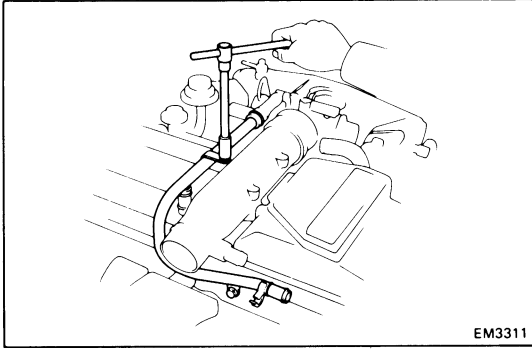
- (a) Remove the oil filler cap.
- (b) Install the ignition coil cover with the five nuts.
- (c) Install the oil filler cap.



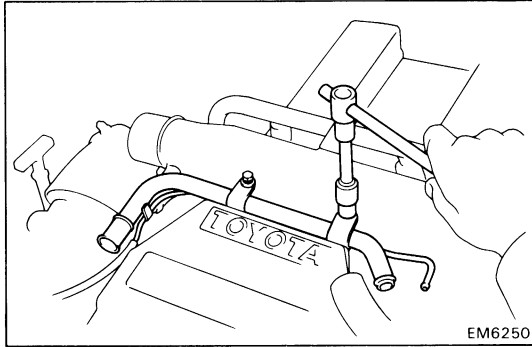
EM3560

7. INSTALL INTAKE AIR CONNECTOR

- (a) Install the intake air connector.
- (b) Install and tighten the two bolts.
- (c) Tighten the clamp.
- (d) Connect the air valve hose.

**8. INSTALL PCV PIPE WITH HOSES**

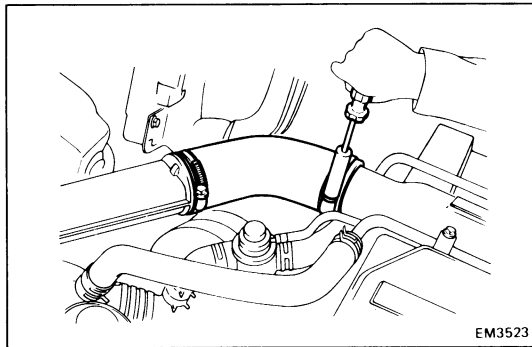
- (a) Install the PCV pipe with hoses to throttle body and cylinder head covers.
- (b) Install and tighten the two bolts.
- (c) Connect the No.4 PCV hose.
- (d) Install the oxygen sensor wire to the two PCV pipe clamps.

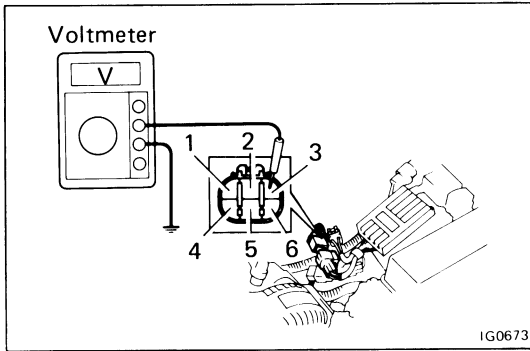
**9. INSTALL ISC PIPE**

- (a) Install the ISC pipe with the two bolts.
- (b) Connect the six hoses to ISC pipe.

10. CONNECT FOLLOWING CABLES:

- (a) (A/T)
Throttle cable
- (b) Accelerator cable
- (c) Cruise control cable

**11. CONNECT NO.1 AIR CLEANER HOSE**



INSPECTION OF IGNITER

1. CHECK POWER SOURCE LINE VOLTAGE

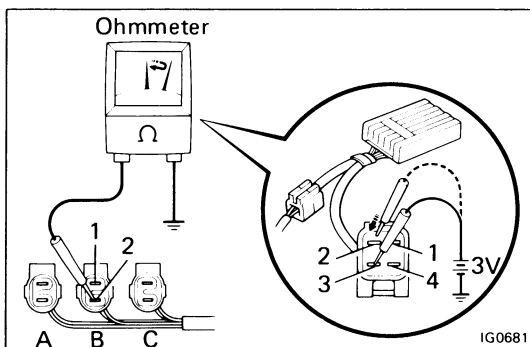
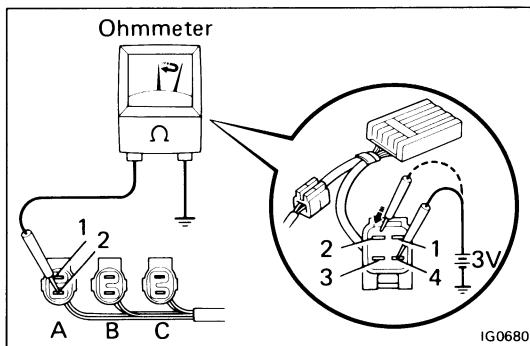
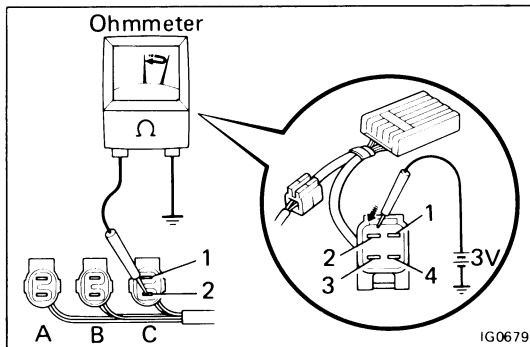
- (a) Disconnect the connector 6-P.
- (b) Turn the ignition switch ON.
- (c) Using a voltmeter, connect the positive (+) probe to terminal 3 of the harness side and negative (-) probe to body ground.

Voltage: Approx. 12 V

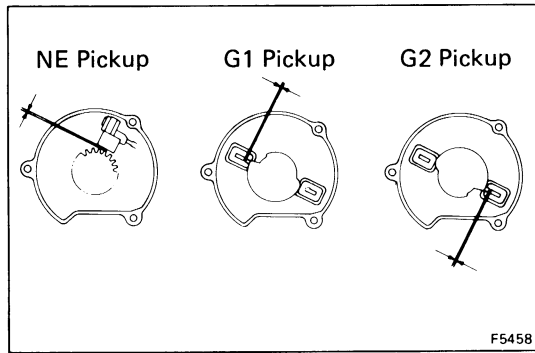
- (d) Connect the connector 6-P.

2. CHECK POWER TRANSISTOR IN IGNITER

- (a) Disconnect the connector 4-P.
 - (b) Disconnect each ignition coil from its connector.
 - (c) Turn the ignition switch ON.
 - (d) Using an ohmmeter, connect terminal 2 of ignition coil C and body ground.
 - (e) Using a 3V dry cell battery, apply voltage to terminal 2 of connector 4-P.
- As voltage is applied, check that there is momentary continuity.



- (f) Using an ohmmeter, connect terminal 2 of ignition coil A and body ground.
- (g) Using a 3V dry cell battery, apply voltage to terminal 4 of the 4-P connector.
- (h) With terminal 4 connected apply voltage to terminal 2 of connector 4-P. As you apply voltage, check that there is momentary continuity.
- (i) Using an ohmmeter, connect terminal 2 of ignition coil B and body ground.
- (j) Using a 3V dry cell battery, apply voltage to terminal 3 of the 4-P connector.
- (k) With terminal 3 connected apply voltage to terminal 2 of connector 4-P. As you apply voltage, check that there is momentary continuity.



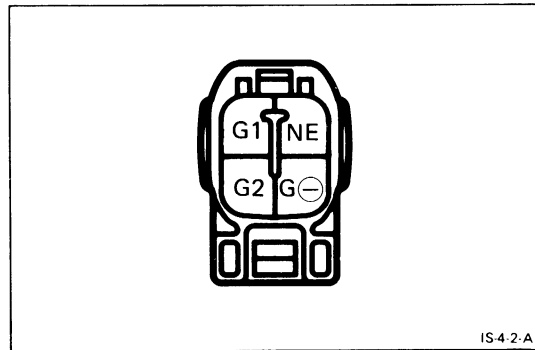
INSPECTION OF CAM POSITION SENSOR

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 cam position sensor.



2. INSPECT PICKUP COILS

Using an ohmmeter, check resistance of the pickup coil.

G1 pickup coil resistance:

G1 — G⁻ 140 — 180 Ω

G2 pickup coil resistance:

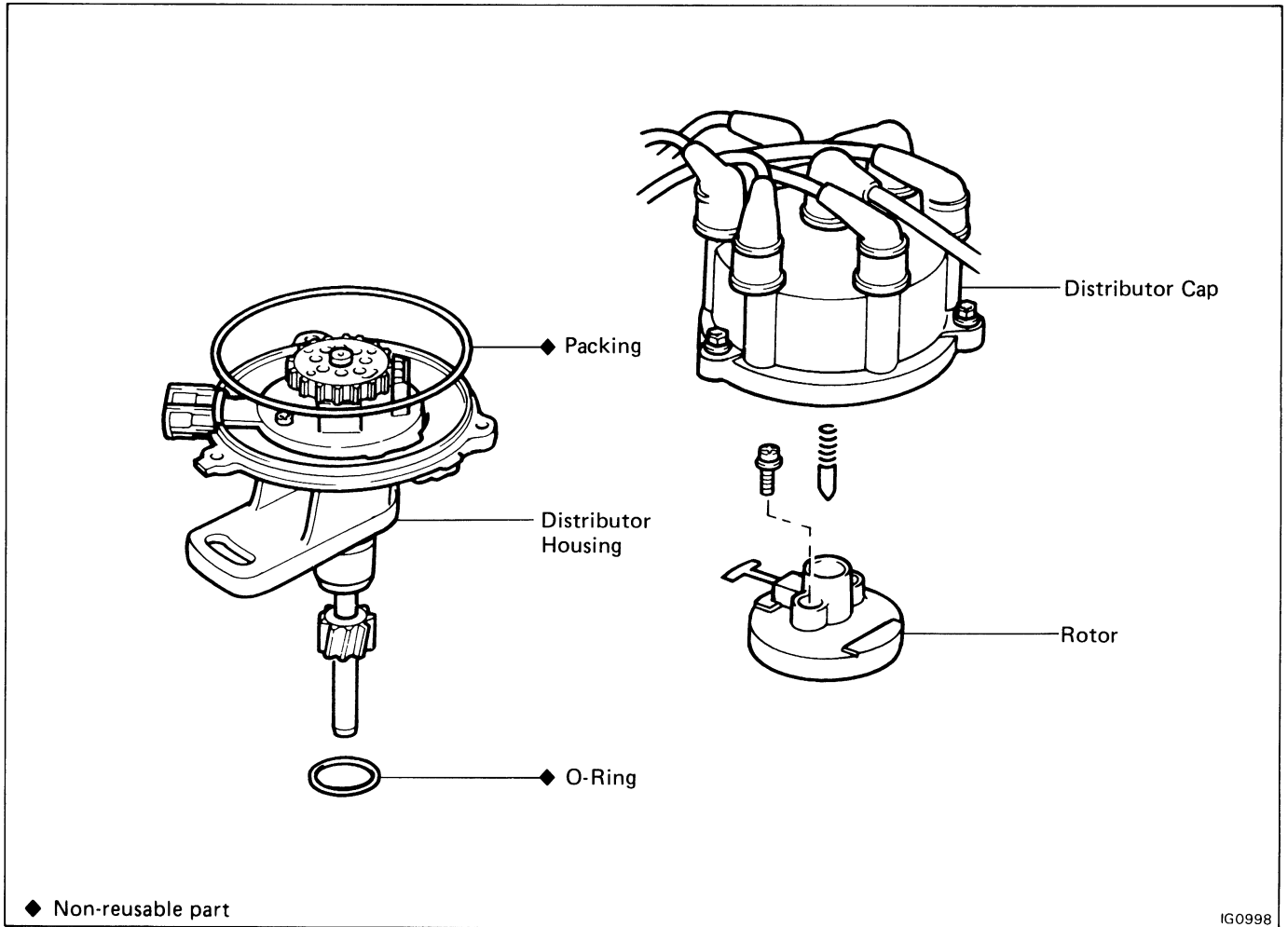
G2 — G⁻ 140 — 180 Ω

NE pickup coil resistance:

NE — G⁻ 140 — 180 Ω

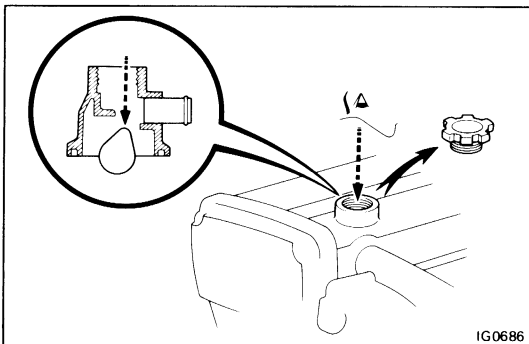
If the resistance is not within specification, replace the cam position sensor.

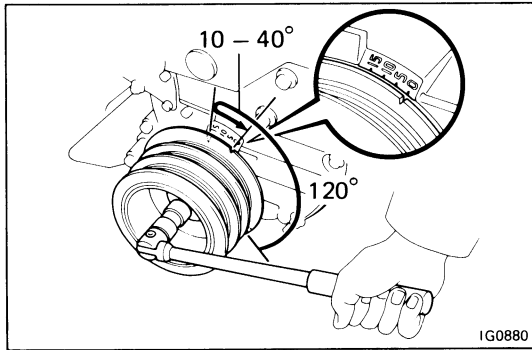
DISTRIBUTOR (7M-GE) COMPONENTS



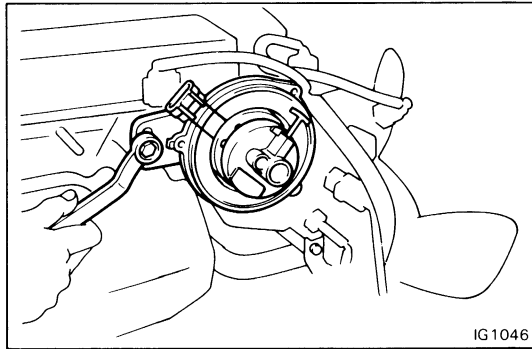
REMOVAL OF DISTRIBUTOR

1. DISCONNECT HIGH-TENSION CORDS FROM DISTRIBUTOR CAP
2. DISCONNECT DISTRIBUTOR CONNECTOR
3. REMOVE DISTRIBUTOR CAP AND PACKING
4. SET NO.1 CYLINDER TO TDC/COMPRESSION
 - (a) Remove the oil filler cap.
 - (b) Look through oil filler hole and turn the crankshaft clockwise until the cam nose can be seen.



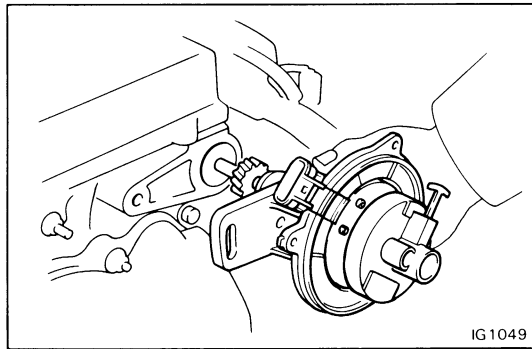


- (c) Turn the crankshaft counterclockwise approximately 120°.
- (d) Turn the crankshaft again approximately 10° to 40° clockwise so that the timing belt cover TDC mark and the crankshaft pulley TDC mark are aligned.

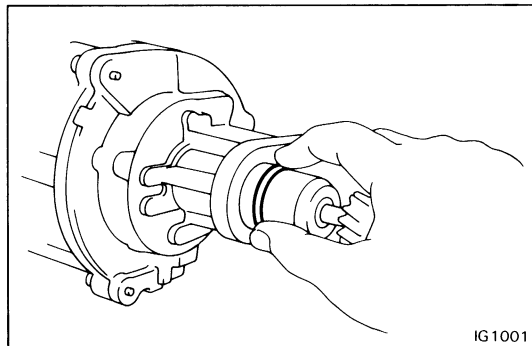


5. REMOVE DISTRIBUTOR

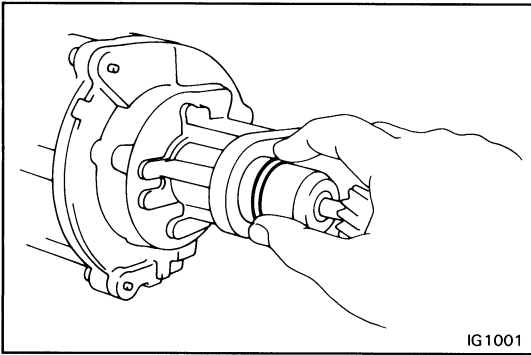
- (a) Remove the hold-down bolt.



- (b) Pull out the distributor from the cylinder head.



6. REMOVE O-RING



INSTALLATION OF DISTRIBUTOR

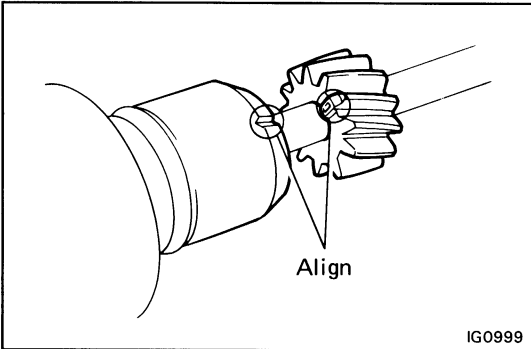
1. CHECK NO.1 CYLINDER TO TDC/COMPRESSION
(See page IG-17)

2. INSTALL DISTRIBUTOR

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

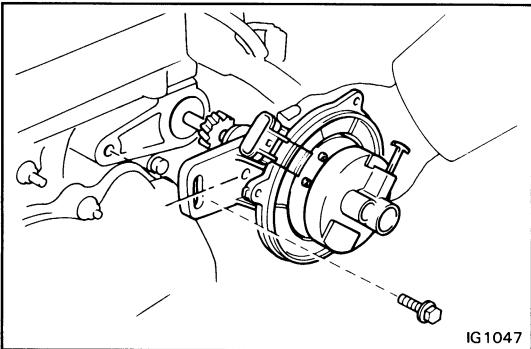
HINT: Always use a new O-ring when installing the distributor.

(b) Align the groove of the distributor housing with the protrusion on the driven gear.



(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 bolt.



3. INSTALL DISTRIBUTOR CAP

4. CONNECT DISTRIBUTOR CONNECTOR

5. CONNECT HIGH-TENSION CORDS TO DISTRIBUTOR CAP

6. WARM UP ENGINE

Allow the engine to normal operating temperature.

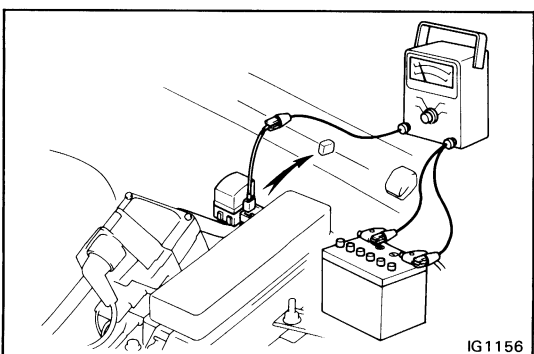
7. CONNECT TACHOMETER TO ENGINE

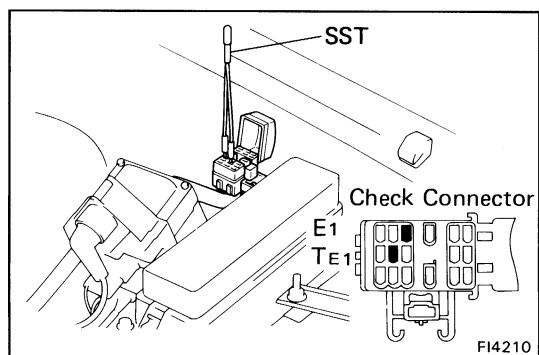
Connect the tachometer test probe to the check connector terminal IG \ominus .

NOTICE:

- NEVER allow the tachometer terminals 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 recommend that you confirm the compatibility of your unit before use.

HINT (7M-GTE): Connect the timing light pickup to the No.6 cylinder high-tension cord.





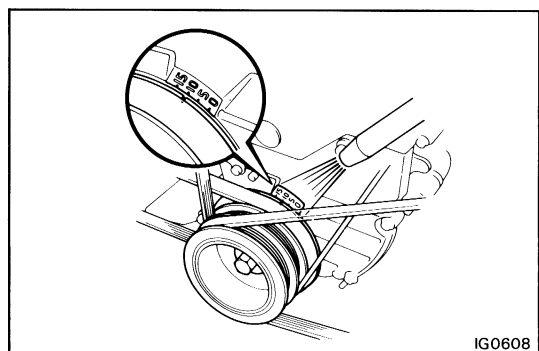
8. ADJUST IGNITION TIMING

- (a) Using SST, connect terminals T_{E1} and E_1 of the check connector.

SST 09843-18020

- (b) Check the idle speed.

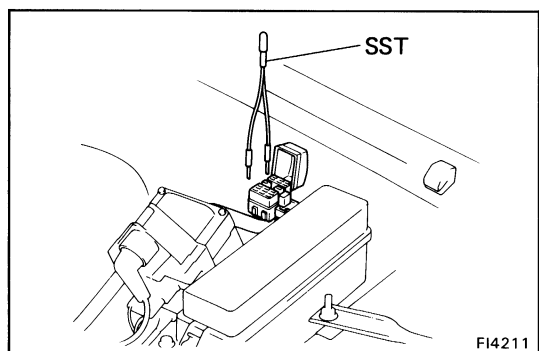
Idle speed: 7M-GE 700 rpm
7M-GTE 650 rpm



- (c) Using a timing light, slowly turn the distributor (7M-GE) or cam position sensor (7M-GTE) until the timing mark on the crankshaft pulley is aligned with the 10° mark. Tighten the distributor bolt and recheck the ignition timing.

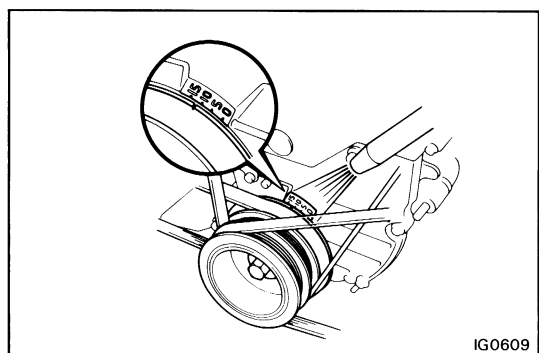
Ignition timing: 10° BTDC @ idle
[w/ Terminals T_{E1} and E_1 connected
and Transmission in "N" range]

Torque: 140 kg-cm (10 ft-lb, 14 N·m)



- (d) Remove SST.

SST 09843-18020



9. FURTHER CHECK IGNITION TIMING

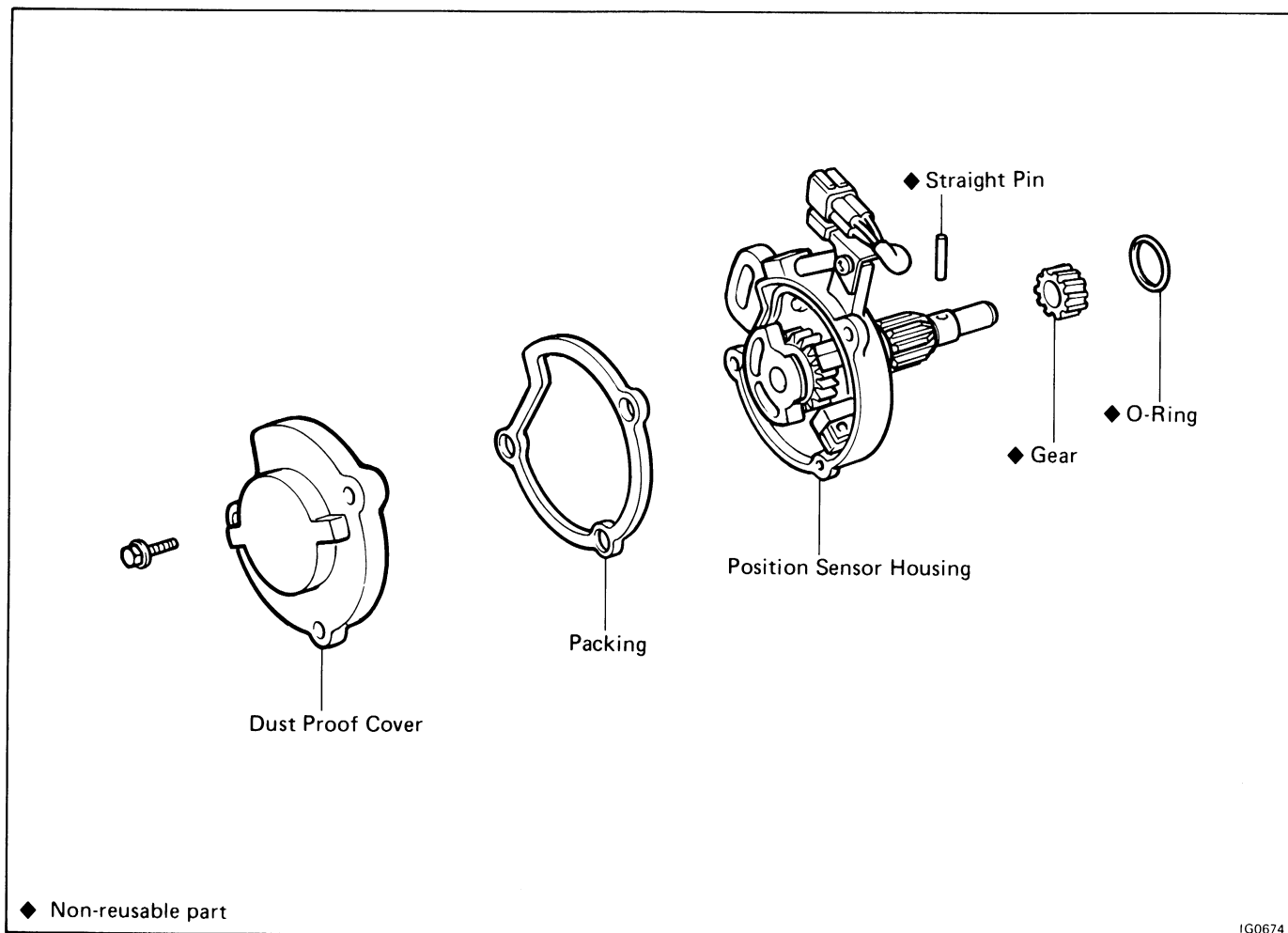
Check the ignition timing advance.

Ignition timing:

7M-GE 9 – 10° BTDC @ idle
7M-GTE More than 12° BTDC @ idle

10. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE

CAM POSITION SENSOR (7M-GTE) COMPONENTS

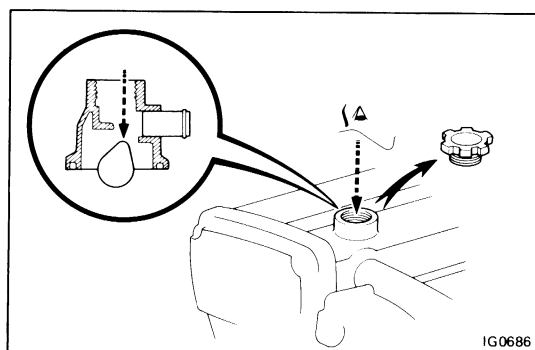


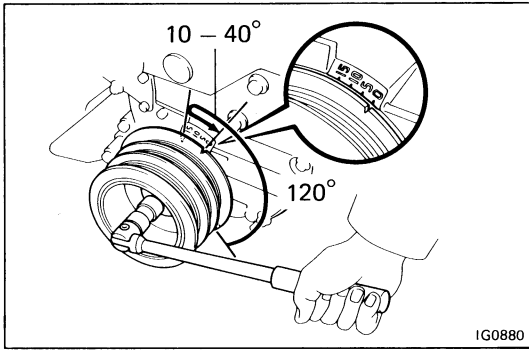
REMOVAL OF CAM POSITION SENSOR

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
2. DISCONNECT CAM POSITION SENSOR CONNECTOR

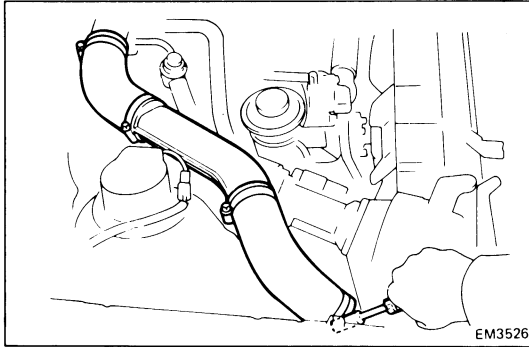
3. SET NO.1 CYLINDER TO TDC/COMPRESSION

- (a) Remove the oil filler cap.
- (b) Look through oil filler hole and turn the crankshaft clockwise until the cam nose can be seen.

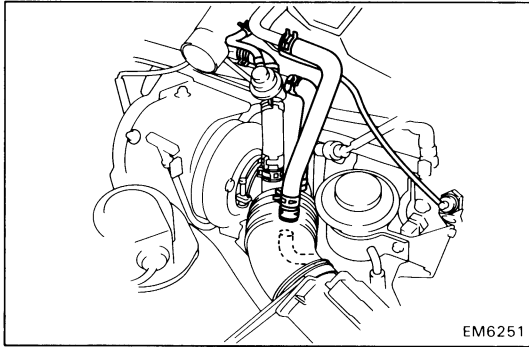




- (c) Turn the crankshaft counterclockwise approximately 120°.
- (d) Turn the crankshaft again approximately 10° to 40° clockwise so that the timing belt cover TDC mark and the crankshaft pulley TDC mark are aligned.

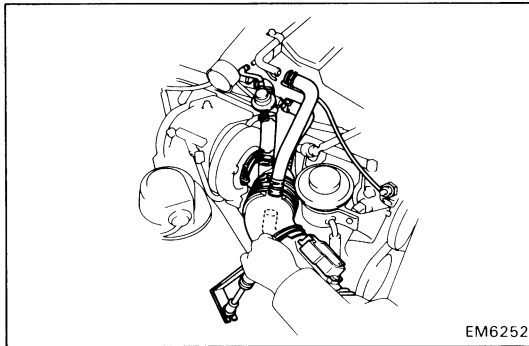


4. REMOVE NO. 4 AIR CLEANER PIPE WITH NO. 1 AND NO. 2 AIR CLEANER HOSES

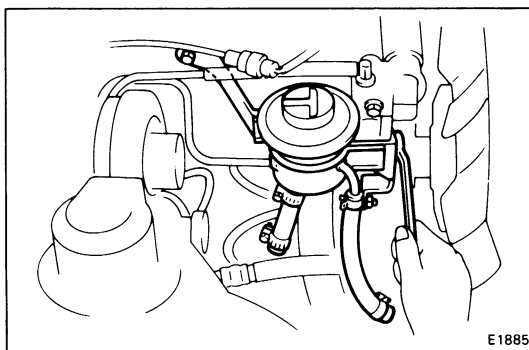


5. REMOVE NO. 7 AIR CLEANER HOSE WITH AIR FLOW METER AND AIR CLEANER CAP

- (a) Disconnect the three air hoses and PCV hose.
- (b) Disconnect the air flow meter connector.
- (c) Disconnect the PS idle up air hose.

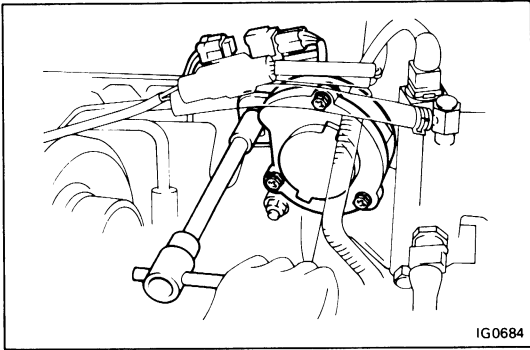


- (d) Loosen the clamps and remove the bolt.
- (e) Remove the No. 7 air cleaner hose with the air flow meter and air cleaner cap.



6. REMOVE PS RESERVOIR TANK

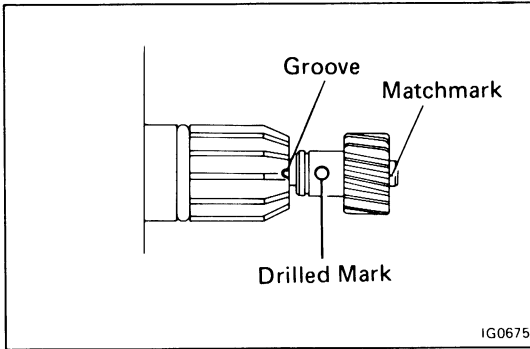
Remove the two bolts, nut and reservoir tank with bracket.

**7. REMOVE CAM POSITION SENSOR**

- (a) Remove the hold-down bolt.
- (b) Pull out the cam position sensor from the cylinder head.

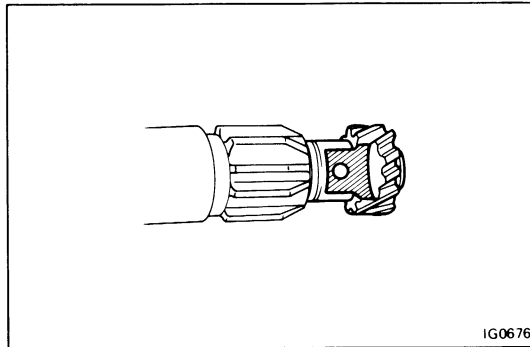
8. REMOVE O-RING**REPLACEMENT OF CAM POSITION SENSOR DRIVEN GEAR****1. GRIND DRIVEN GEAR AND PIN**

- (a) Align the drilled mark on the driven gear with the groove of the housing.
- (b) Place a matchmark on the cam position sensor shaft that aligns with the groove of the housing.

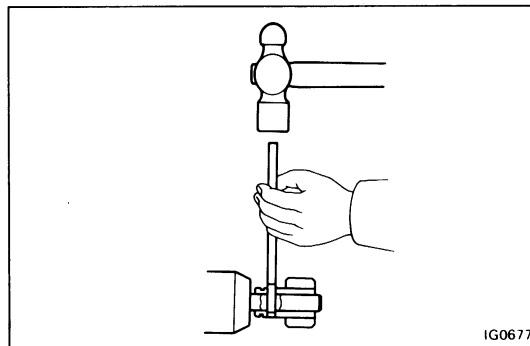


- (c) Using a grinding wheel, grind the gear and pin.

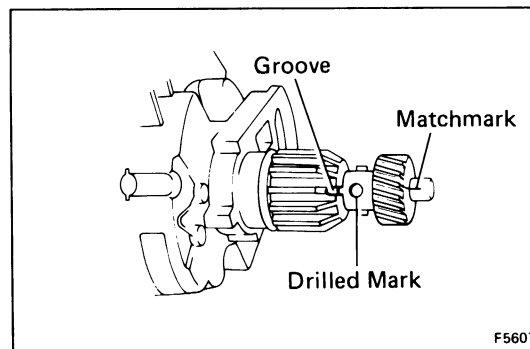
NOTICE: Be careful not to damage the shaft.

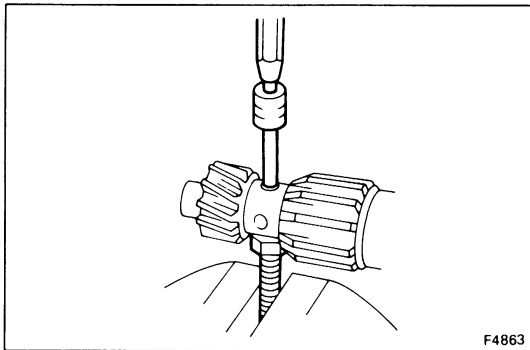
**2. REMOVE PIN AND DRIVEN GEAR**

- (a) Using a punch and hammer, drive out the pin.
- (b) Remove the driven gear and discard it.

**3. INSTALL NEW DRIVEN GEAR AND PIN**

- (a) Align the matchmark with the groove of the housing.
- (b) Align the drilled mark on the new driven gear with the groove of the housing.





- (c) Using a punch and hammer, peen both ends of the pin.

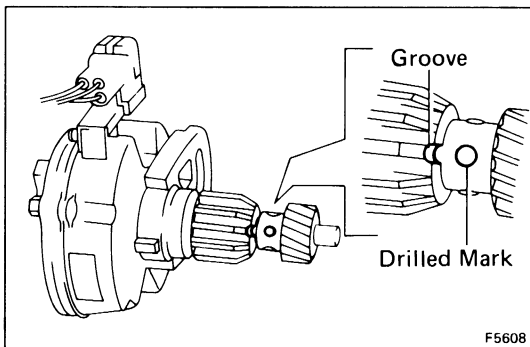
INSTALLATION OF CAM POSITION SENSOR

1. CHECK NO.1 CYLINDER TO TDC/COMPRESSION
(See page IG-21)

2. INSTALL CAM POSITION SENSOR

- (a) Install a new O-ring to the cam position sensor.

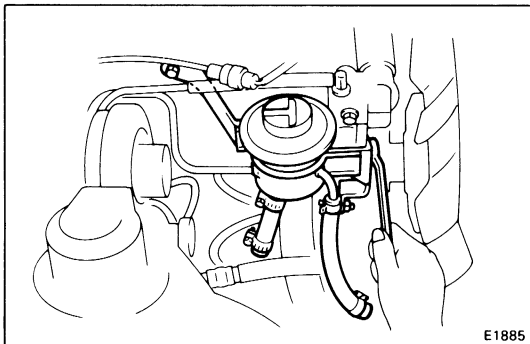
NOTE: Always use a new O-ring when installing the cam position sensor.



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

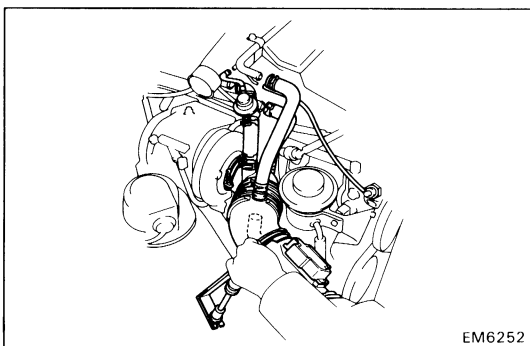
- (c) Insert the cam position sensor, aligning the center of the flange with that of the bolt hole on the cylinder head.

- (d) Lightly tighten the hold-down bolt.



3. INSTALL PS RESERVOIR TANK

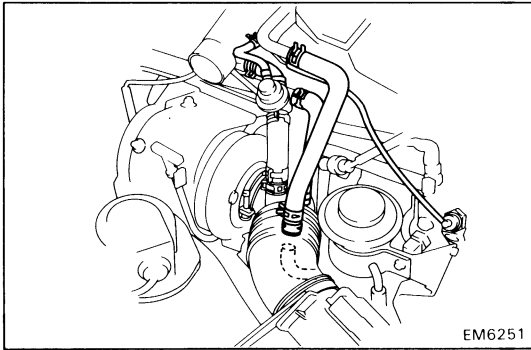
Install the PS reservoir tank with bracket with the two bolts and nut.



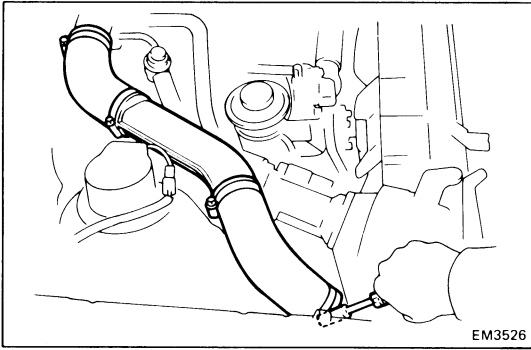
4. INSTALL NO.7 AIR CLEANER HOSE WITH AIR FLOW METER AND AIR CLEANER CAP

- (a) Install the No.7 air cleaner hose with the air flow meter and air cleaner cap.

- (b) Install the bolt and tighten the clamps.



- (c) Connect the PS idle up air hose.
- (d) Connect the air flow meter connector.
- (e) Connect the PCV hose and three air hoses.



5. **INSTALL NO.4 AIR CLEANER PIPE WITH NO.1 AND NO.2 AIR CLEANER HOSES**

6. **CONNECT CAM POSITION SENSOR CONNECTOR**

7. **WARM UP ENGINE**

Allow the engine to normal operating temperature.

8. **ADJUST IGNITION TIMING**

(See steps 7 to 10 on pages IG-19, 20)

