

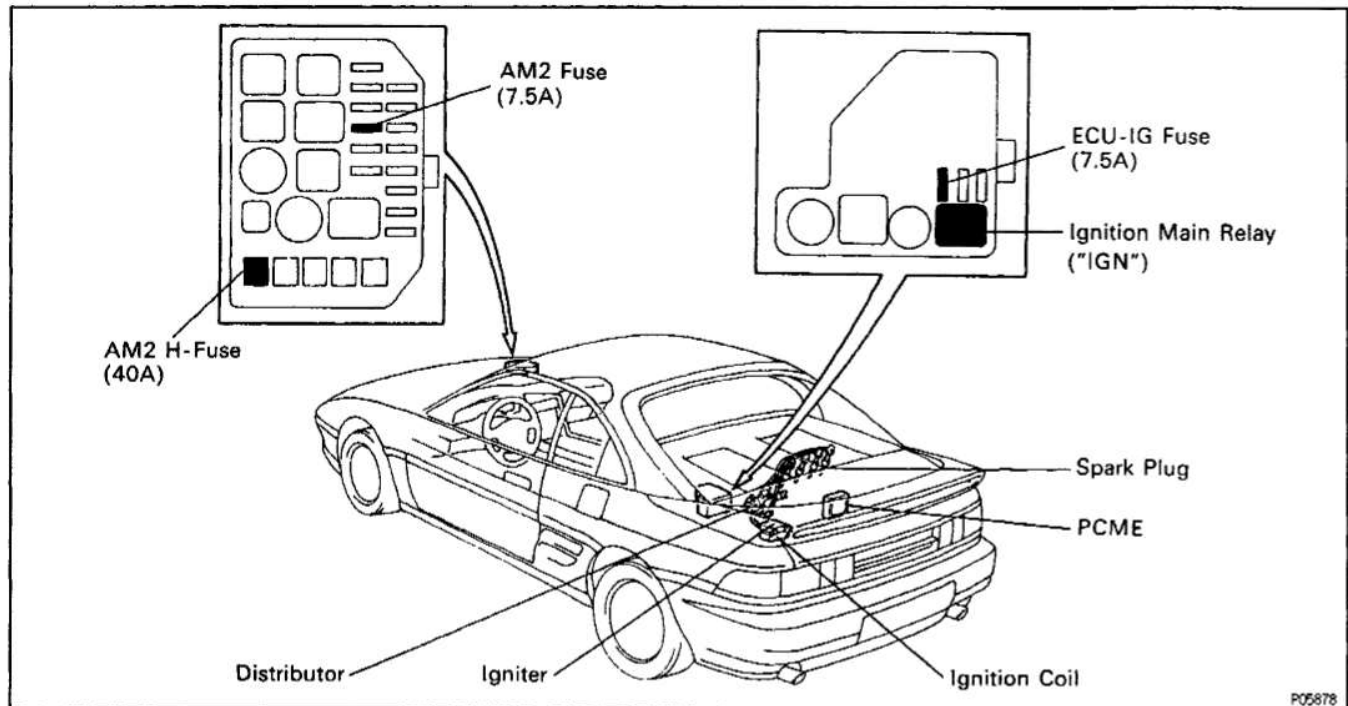
IGNITION SYSTEM

IG-2

IGNITION SYSTEM - (3S-GTE)

(3S-GTE)**DESCRIPTION**

The PCME 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 (PCME) triggers the spark at precisely the right instant.



The PCME monitors the engine condition by signals from each sensor, calculates the ignition timing and sends an ignition signal to the igniter. High voltage from the ignition is distributed to each spark plug in the appropriate order to generate a spark between the electrodes, which ignites the air-fuel mixture.

IGNITER

The igniter temporarily interrupts the primary current with the ignition signal (IGT signal) from the PCME and generates sparks at the spark plug. Also, as a fail-safe measure, when ignition occurs an ignition confirmation signal (IGF signal) is sent to the PCME.

IGNITION COIL

The ignition coil uses a closed core coil with the primary coil wrapped around the core and the secondary coil wrapped around the primary coil. This allows the generation of a high voltage sufficient to cause a spark to jump across the spark plug gap.

DISTRIBUTOR

This correctly distributes high voltage to the spark plug of each cylinder in the specified ignition order.

PICKUP COILS

The NE coil detects the crank angle, and the G1 and G2 coils detect the cam angle.

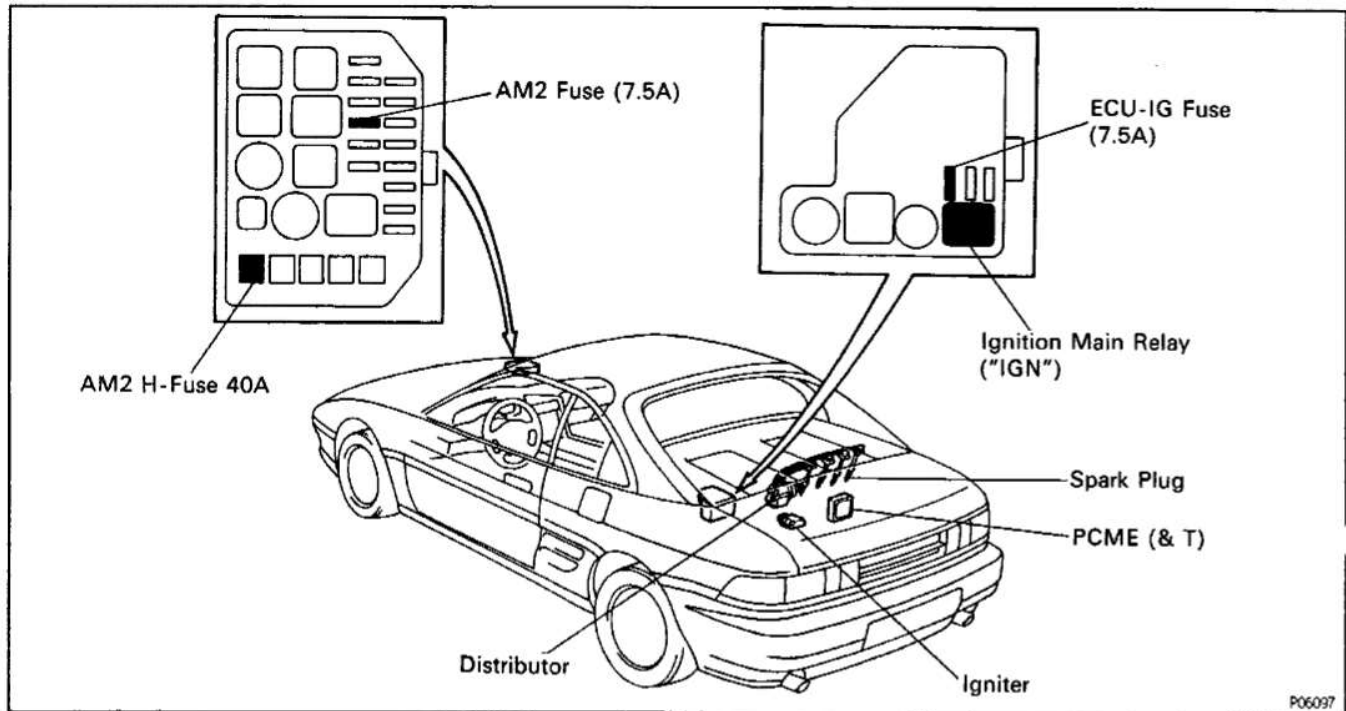
IG-22

IGNITION SYSTEM - (5S-FE)

(5S-FE)**DESCRIPTION**

The PCME (& T) 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 (PCME (& T)) triggers the spark at precisely the right instant.



The PCME (& T) monitors the engine condition by signals from each sensor, calculates the ignition timing and sends an ignition signal to the igniter. High voltage from the ignition is distributed to each spark plug in the appropriate order to generate a spark between the electrodes, which ignites the air-fuel mixture.

IGNITER

The igniter temporarily interrupts the primary current with the ignition signal (IGT signal) from the PCM (& T) and generates sparks at the spark plug. Also, as a fail-safe measure, when ignition occurs an ignition confirmation signal (IGF signal) is sent to the PCME (& T).

IGNITION COIL

The ignition coil uses a closed core coil with the primary coil wrapped around the core and the secondary coil wrapped around the primary coil. This allows the generation of a high voltage sufficient to cause a spark to jump across the spark plug gap.

DISTRIBUTOR

This correctly distributes high voltage to the spark plug of each cylinder in the specified ignition order.

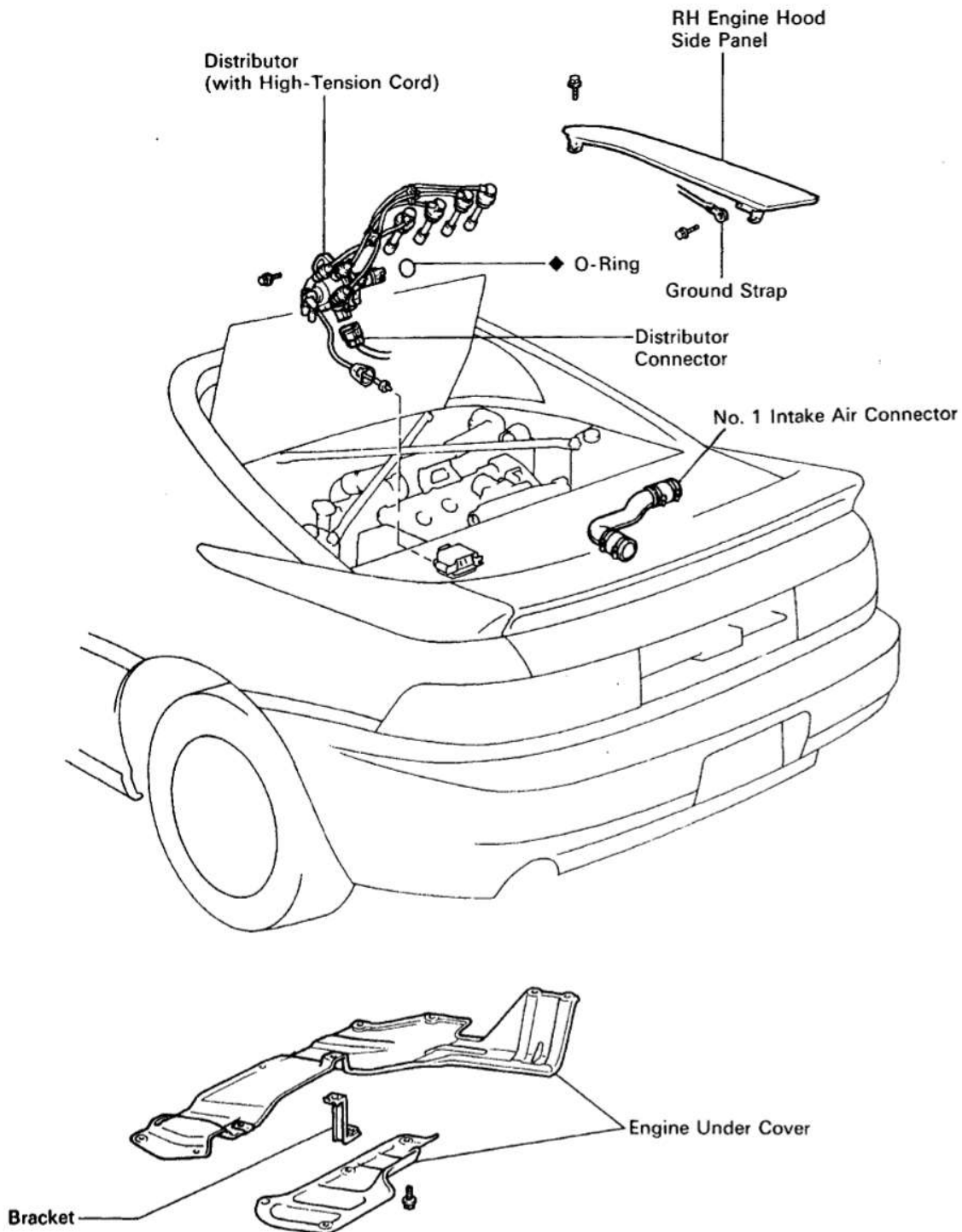
PICKUP COILS

The NE coil detects the crank angle, and the G coil detects the cam angle.

DISTRIBUTOR

COMPONENTS FOR REMOVAL AND INSTALLATION

IG01K-02



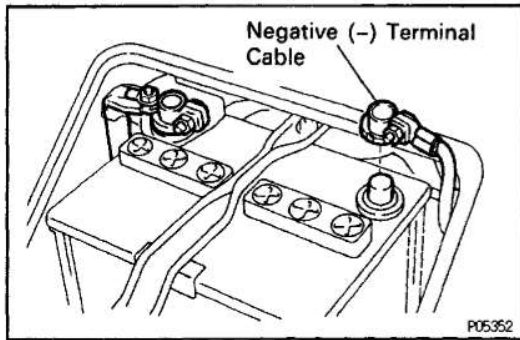
◆ **Non-reusable part**

P05879

IG-14

IGNITION SYSTEM - (3S - GTE)

K003M-01



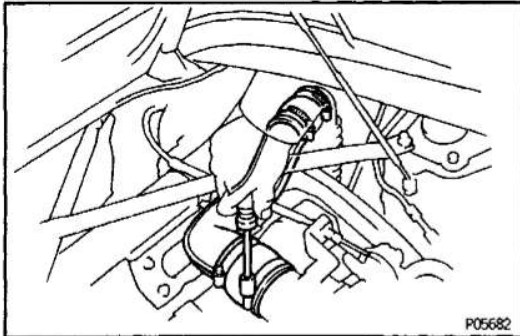
DISTRIBUTOR REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE N0.1 INTAKE AIR CONNECTOR

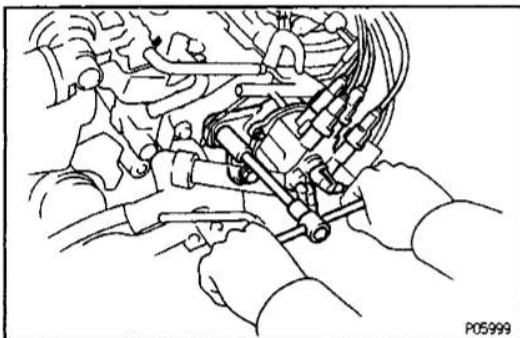


3. DISCONNECT DISTRIBUTOR CONNECTOR

4. DISCONNECT HIGH-TENSION CORD FROM IGNITION COIL

5. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS

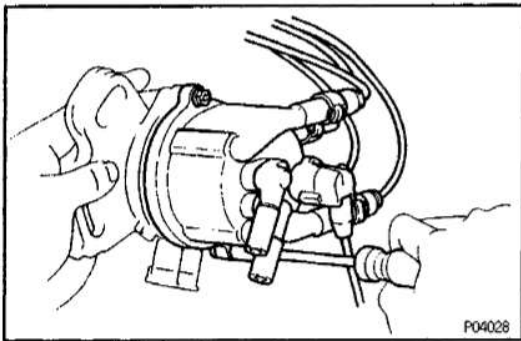
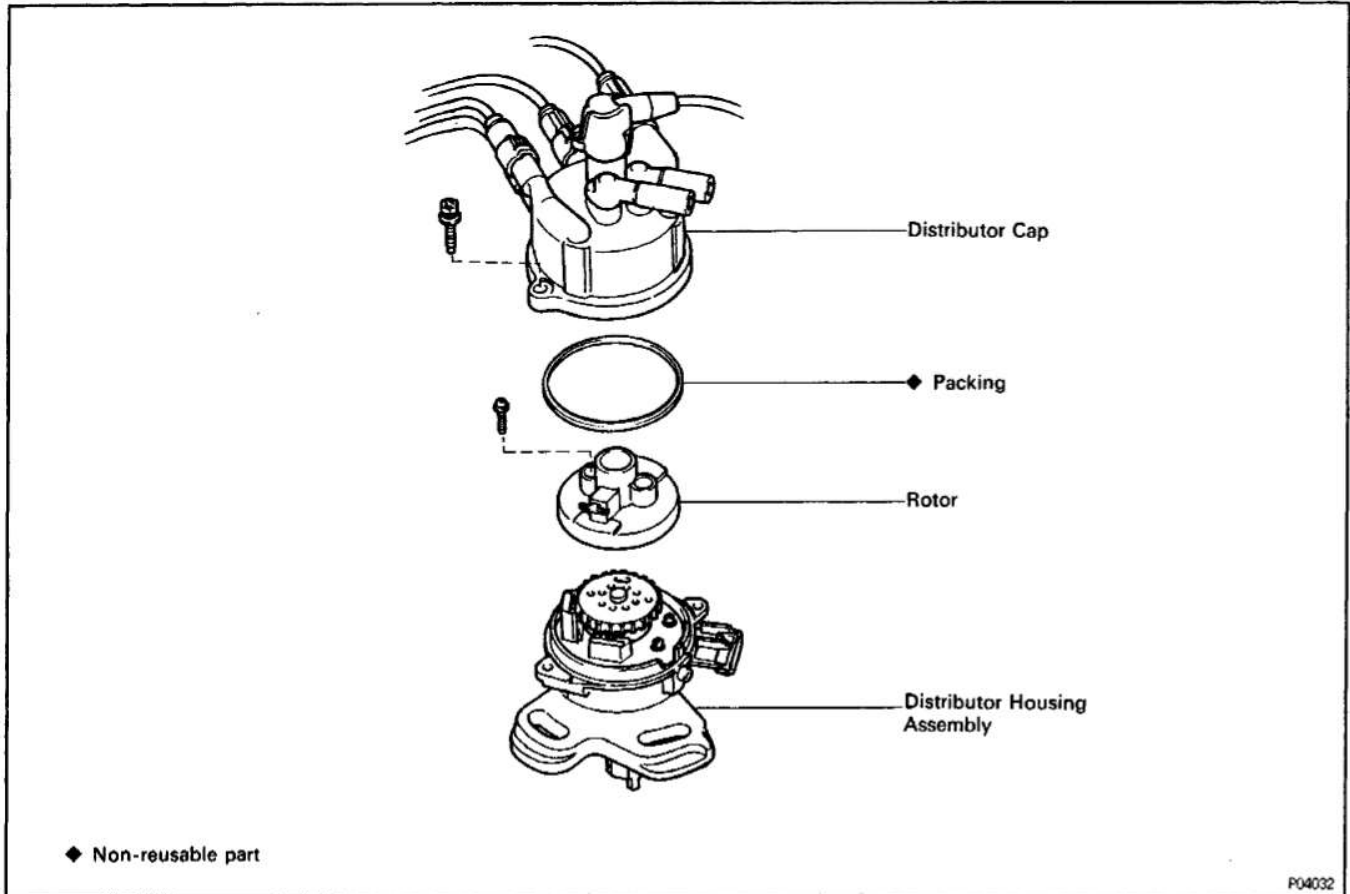
- (a) Disconnect the high-tension cords from the cord clamps.
- (b) Disconnect the four high-tension cords from the spark plugs.



6. REMOVE DISTRIBUTOR

- (a) Remove the two mounting bolts, and pull out the distributor.
- (b) Remove the O-ring from the distributor housing.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

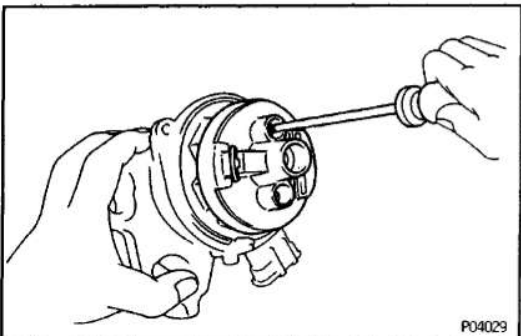


DISTRIBUTOR DISASSEMBLY

(See Components for Disassembly and Assembly)

1. REMOVE DISTRIBUTOR CAP

Remove the two bolts, distributor cap and packing.



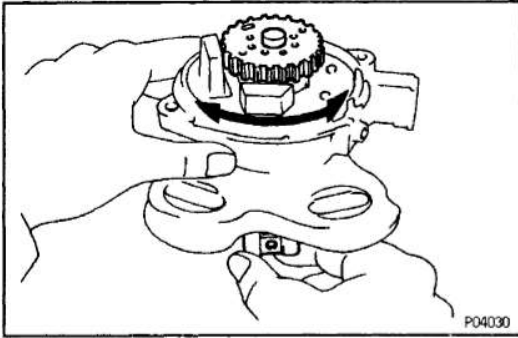
2. REMOVE ROTOR

Remove the two screws and rotor.

IG-16

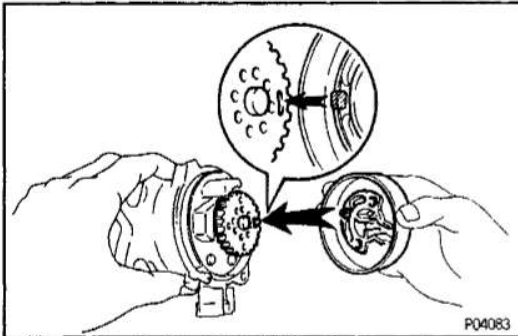
IGNITION SYSTEM – GTE- IGNITION SYSTEM-(3S)

10013-02

**DISTRIBUTOR INSPECTION****INSPECT SHAFT**

Turn the shaft and check that it is not rough or worn. If it feels rough or worn, replace the distributor housing assembly.

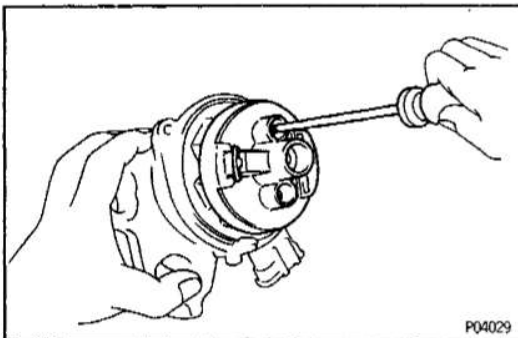
1001M-03

**DISTRIBUTOR ASSEMBLY**

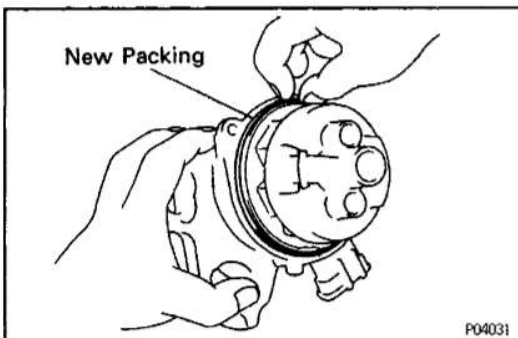
(See Components for Disassembly and Assembly)

1. INSTALL ROTOR

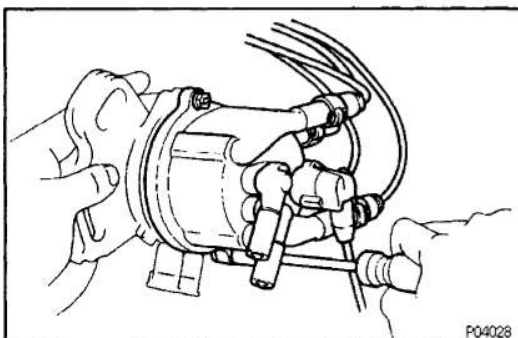
- (a) Align the hollow of the signal rotor with the protrusion of the rotor.



- (b) Install the rotor with the two screws.

**2. INSTALL DISTRIBUTOR CAP**

- (a) Install a new packing to the distributor housing.



- (b) Install the distributor cap with the two bolts.

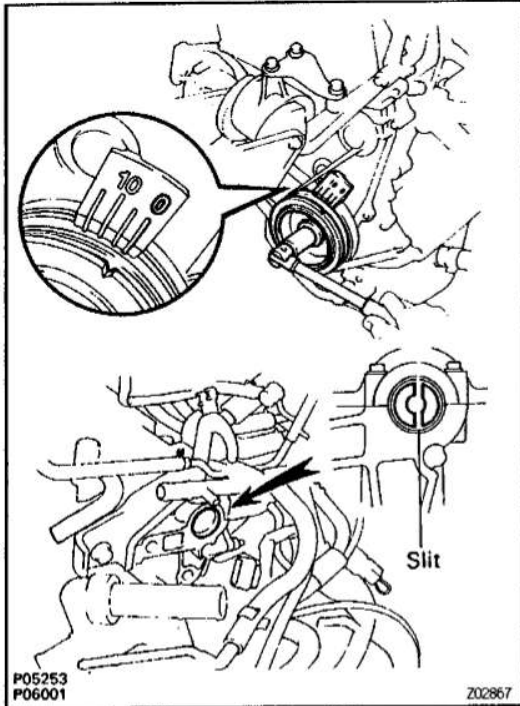
DISTRIBUTOR INSTALLATION

(See Components for Removal and Installation)

1. REMOVE ENGINE UNDER COVERS
2. REMOVE RH ENGINE HOOD SIDE PANEL

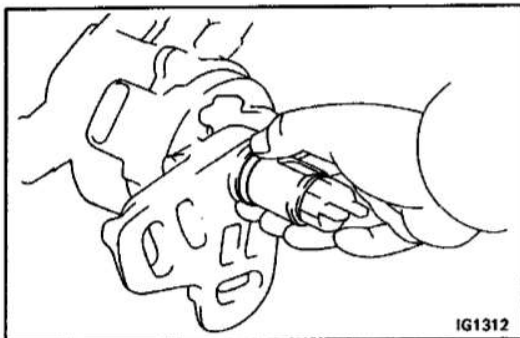
3. SET NO.1 CYLINDER TO TDC/COMPRESSION

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

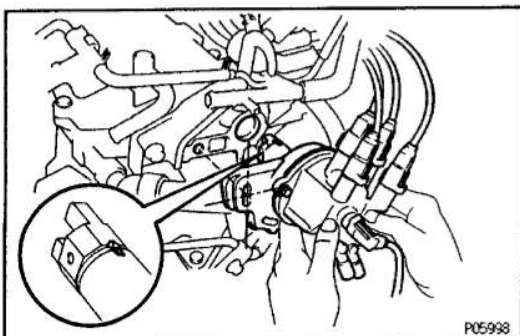


4. INSTALL DISTRIBUTOR

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

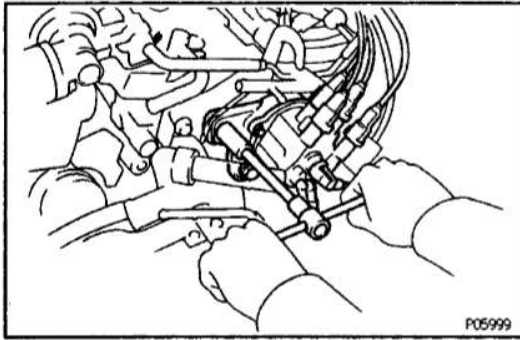


- (c) Align the cutout portion of the coupling with the groove of the housing.
- (d) Insert the distributor, aligning the center of the flange with that of the bolt hole on the cylinder head.



IG-18

IGNITION SYSTEM - (3S-GTE)



(e) Lightly tighten the two mounting bolts.

5. CONNECT HIGH-TENSION CORDS TO SPARK PLUGS

(a) Connect the four high-tension cords to the spark plugs.

Firing order:

1-3-4-2

(b) Install the four high - tension cords to the cord clamps.

6. CONNECT HIGH-TENSION CORD TO IGNITION COIL

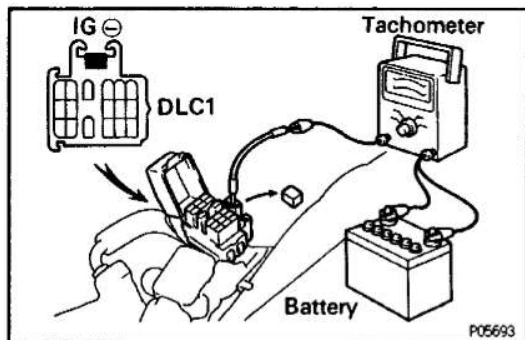
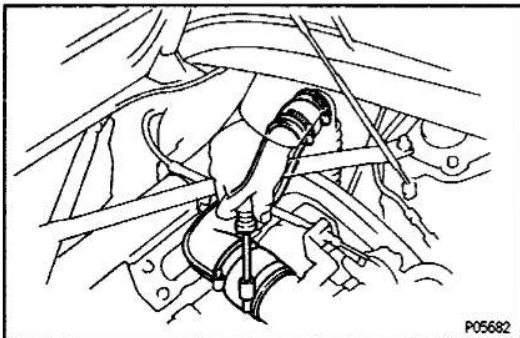
7. CONNECT DISTRIBUTOR CONNECTOR

8. INSTALL NO.1 INTAKE AIR CONNECTOR

9. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

10. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



11. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE

Connect the test probe of a tachometer to terminal IG (-) of the data link connector 1.

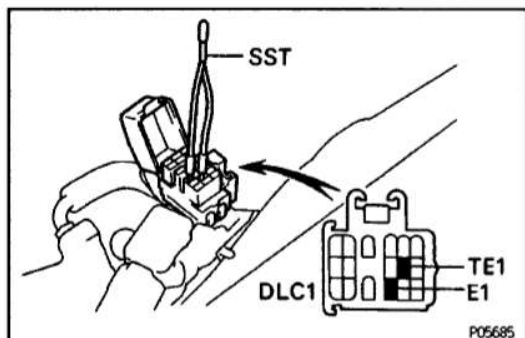
NOTICE:

- Never allow the tachometer terminal to touch ground as it could result in damage to the ignite 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.

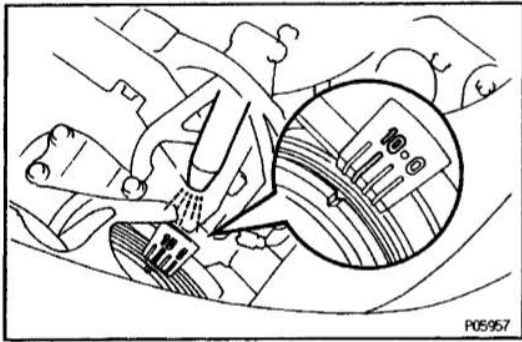
12. ADJUST IGNITION TIMING

(a) Using SST, connect terminals TE1 and E1 of the data link connector 1.

SST 09843-18020



IGNITION SYSTEM - (3S - GTE)

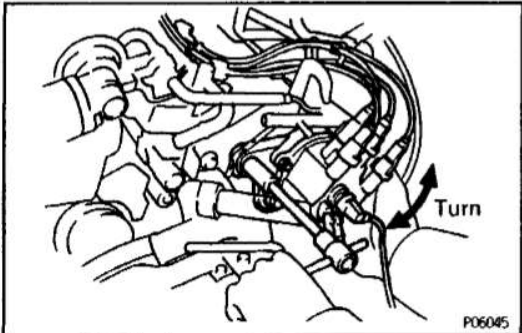


(b) Using a timing light, check the ignition timing.

Ignition timing:

10° BTDC @ idle

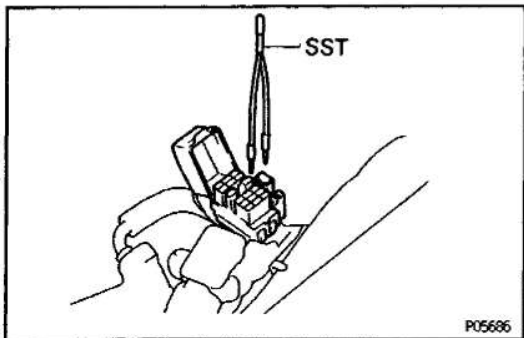
(Transmission in neutral position)



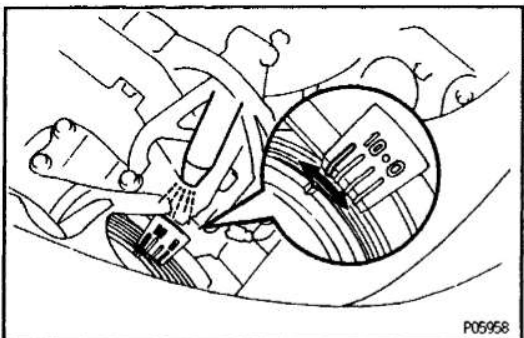
(c) Loosen the two mounting bolts, and adjust by turning the distributor.

(d) Tighten the mounting bolts, and recheck the ignition timing.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



(e) Remove the SST from the data link connector 1.
SST 09843-18020



13. FURTHER CHECK IGNITION TIMING

Ignition timing:

12 – 21° BTDC @ idle

(Transmission in neutral position)

HINT: The timing mark moves in a range between 12° and 21°.

14. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE

15. REINSTALL RH ENGINE HOOD SIDE PANEL

16. REINSTALL ENGINE UNDER COVERS

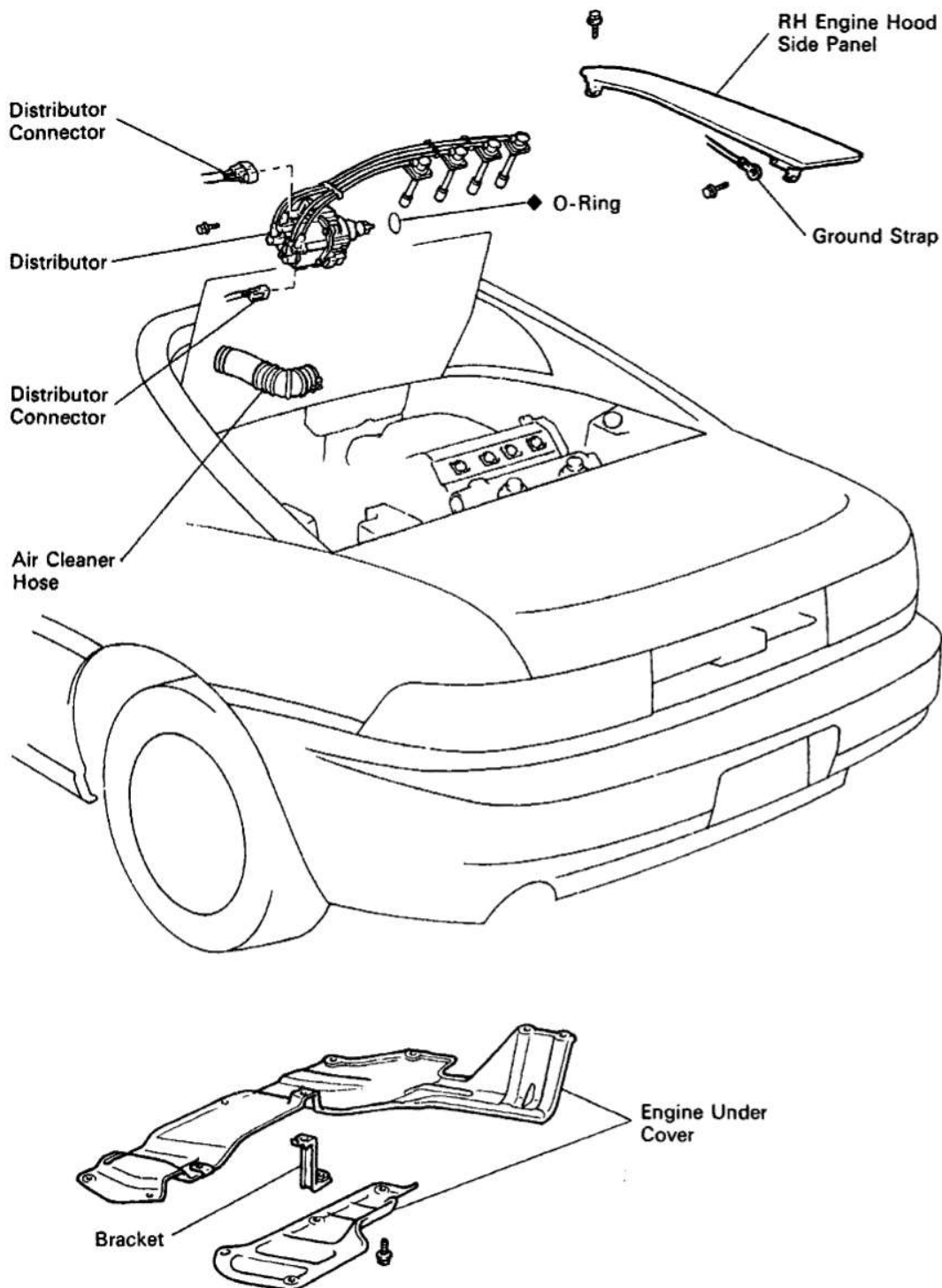
IG-32

IGNITION SYSTEM - (5S-FE)

DISTRIBUTOR

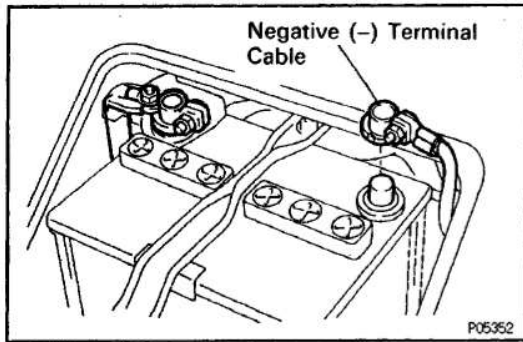
COMPONENTS FOR REMOVAL AND INSTALLATION

K0011-02



◆ Non-reusable part

P06020

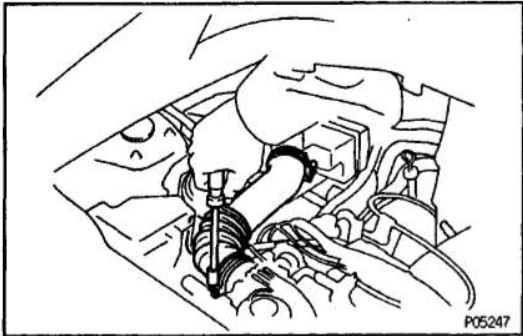


DISTRIBUTOR REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

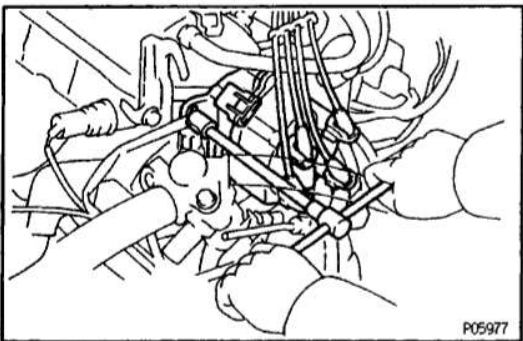


2. REMOVE AIR CLEANER HOSE

3. DISCONNECT DISTRIBUTOR CONNECTORS

4. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS

- (a) Disconnect the four high-tension cords from the spark plugs.
- (b) Disconnect the high-tension cords from the clamp on the cylinder head cover.



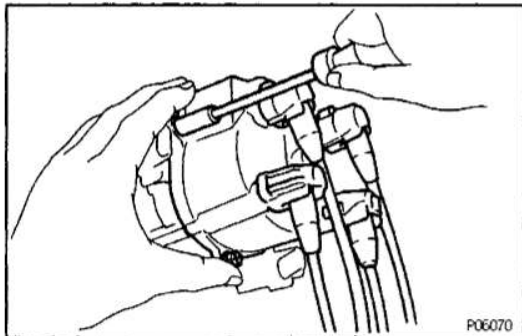
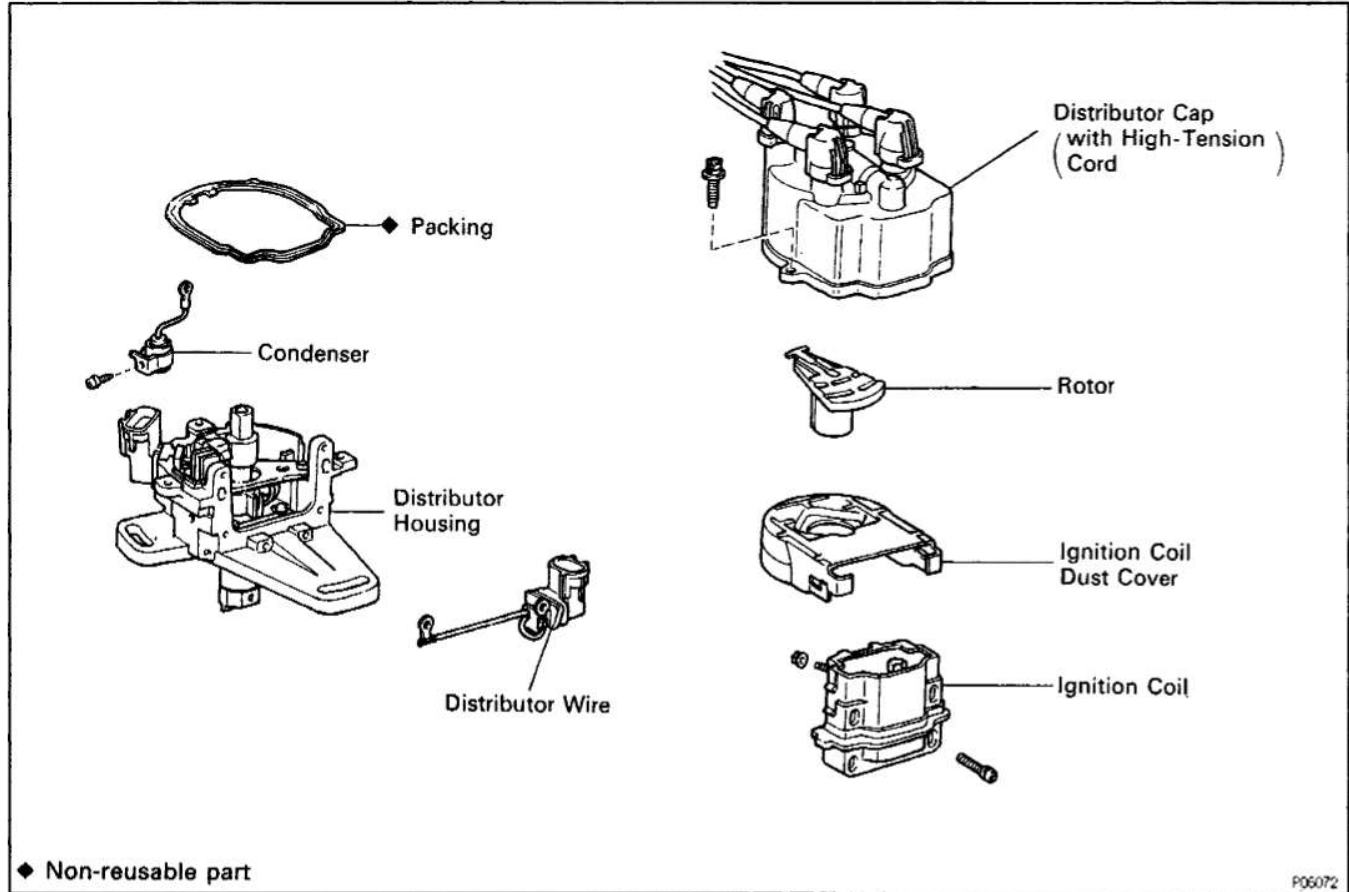
5. REMOVE DISTRIBUTOR WITH HIGH-TENSION CORDS

- (a) Remove the two mounting bolts, and pull out the distributor.
- (b) Remove the O-ring from the distributor housing.

IG-34

IGNITION SYSTEM - (5S-FE)

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

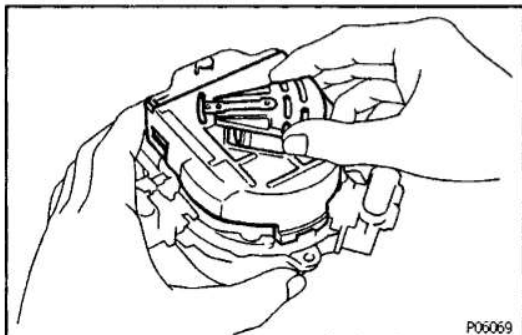


DISTRIBUTOR DISASSEMBLY

(See Components for Disassembly and Assembly)

1. REMOVE DISTRIBUTOR CAP

Remove the three bolts and distributor cap.



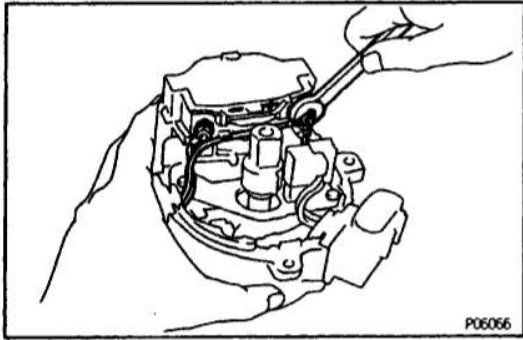
2. REMOVE ROTOR

3. REMOVE IGNITION COIL DUST COVER

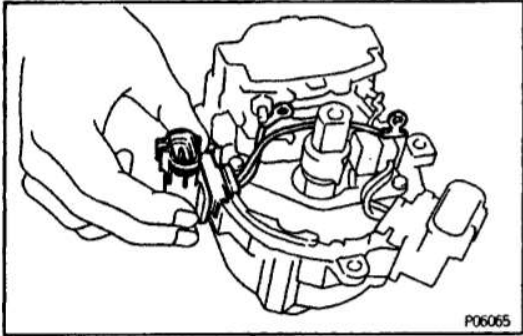
(a) Remove the dust cover.

(b) Remove the packing.

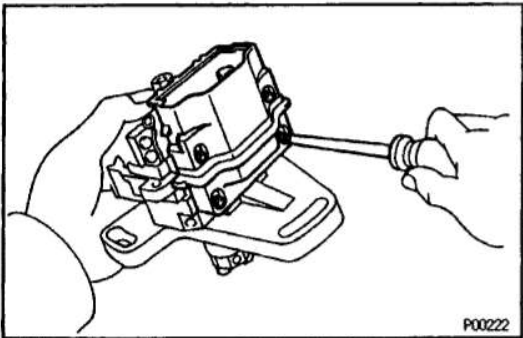
IGNITION SYSTEM - (5S-FE)

**4. REMOVE DISTRIBUTOR WIRE**

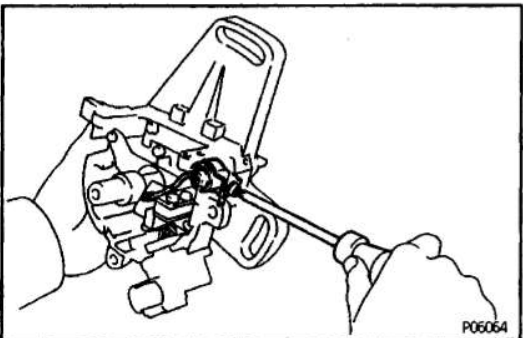
- (a) Remove the two nuts, and disconnect the three wires from the ignition coil terminals.



- (b) Remove the distributor wire from the distributor housing.

**5. REMOVE IGNITION COIL**

Remove the four screws and ignition coil.

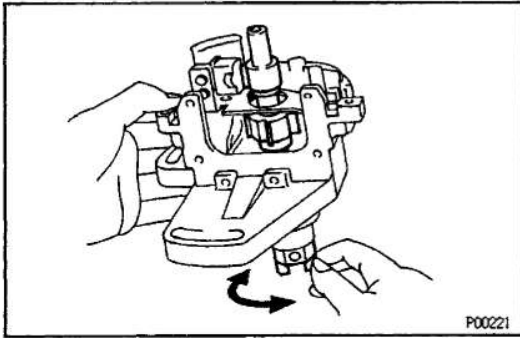
**6. REMOVE CONDENSER**

Remove the screw and condenser.

IG-36

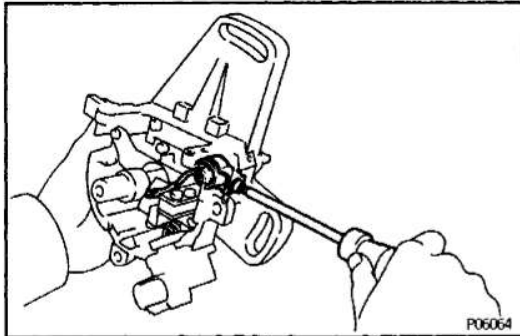
IGNITION SYSTEM - (5S-FE)

10013-03

**DISTRIBUTOR INSPECTION****INSPECT SHAFT**

Turn the shaft and check that it is not rough or worn. If it feels rough or worn, replace the distributor housing assembly.

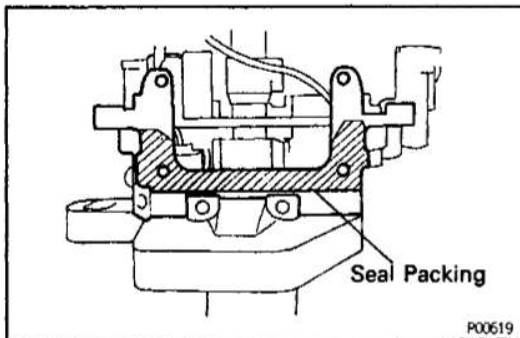
1000X-01

**DISTRIBUTOR ASSEMBLY**

(See Components for Disassembly and Assembly)

1. INSTALL CONDENSER

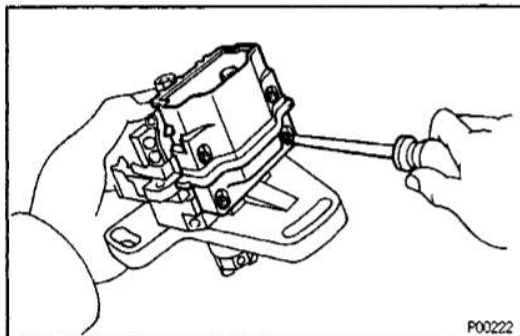
Install the condenser with the screw.

**2. INSTALL IGNITION COIL**

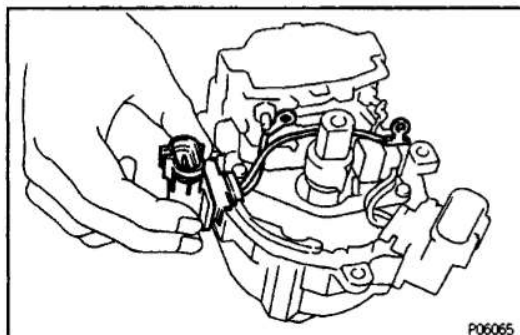
- (a) Remove any old packing (FIPG) material.
- (b) Apply seal packing to the ignition coil installing surface of the housing as shown in the illustration.

Seal packing:

Part No. 08826-00080 or equivalent

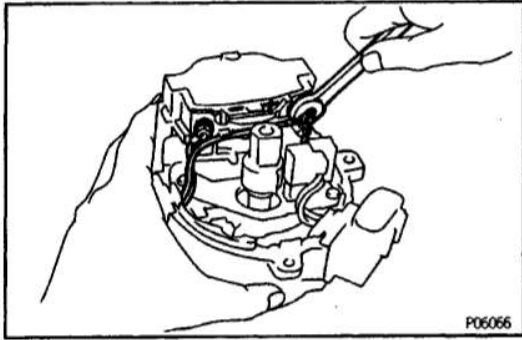


- (c) Install the ignition coil with the four screws.

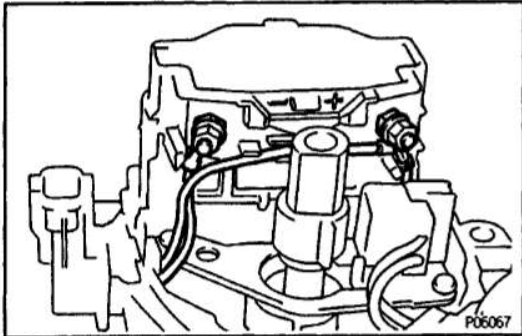
**3. INSTALL DISTRIBUTOR WIRE**

- (a) Install the grommet of the wire to the distributor housing.

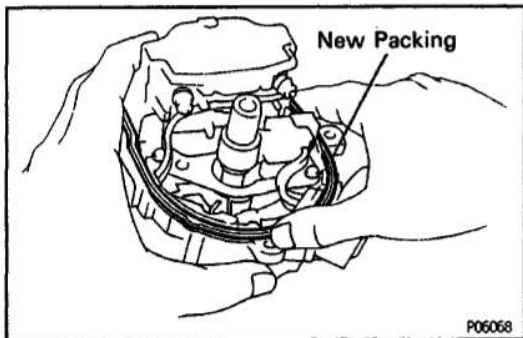
IGNITION SYSTEM – (5S-FE)



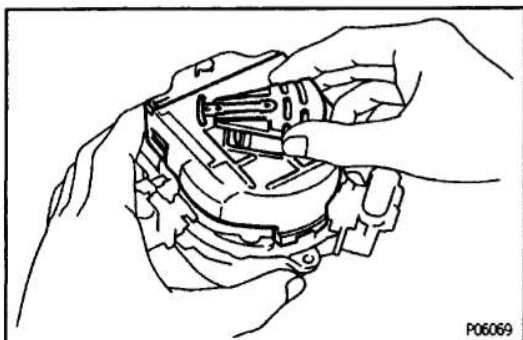
- (b) Connect the three wires to the ignition coil terminals with the two nuts.

**NOTICE:**

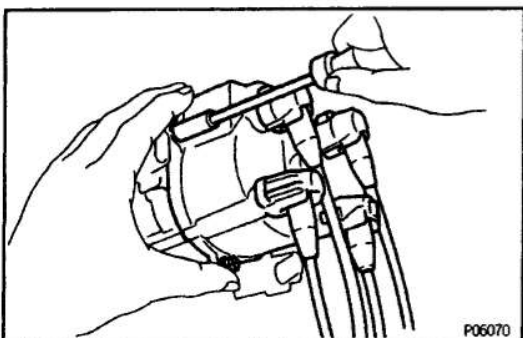
- When connecting the wires to the ignition coil, insert both properly into their grooves found on the side of the ignition coil.
- Be sure the wires do not contact with signal rotor or distributor housing.

**4. INSTALL IGNITION COIL DUST COVER**

- (a) Install a new packing to the distributor housing.



- (b) Install the dust cover.

5. INSTALL ROTOR**6. INSTALL DISTRIBUTOR CAP AND HIGH –TENSION CORDS**

Install the distributor cap with the three bolts.

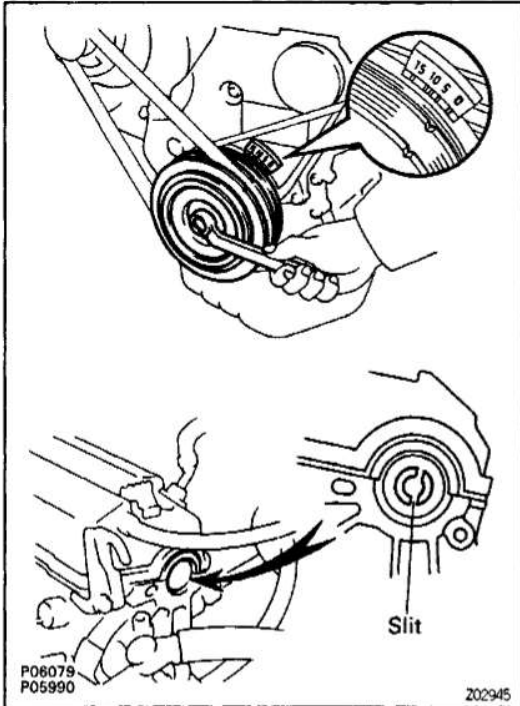
DISTRIBUTOR INSTALLATION

(See Components for Removal and Installation)

1. REMOVE ENGINE UNDER COVERS
2. REMOVE RH ENGINE HOOD SIDE PANEL

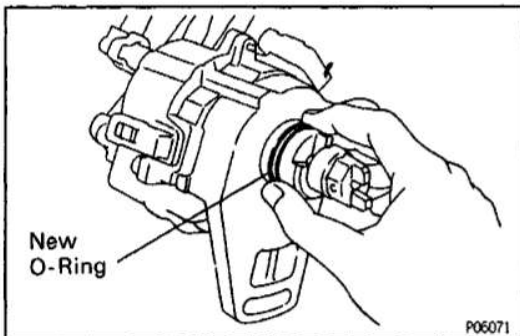
3. SET NO.1 CYLINDER TO TDC/COMPRESSION

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

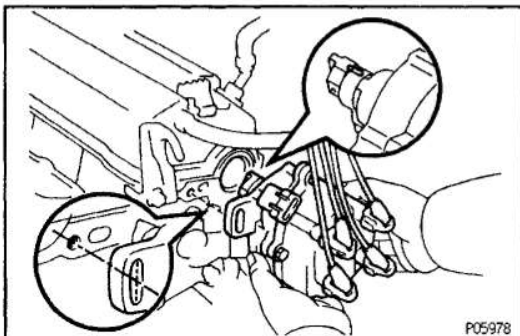


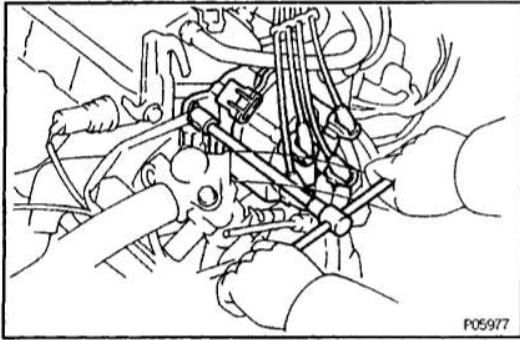
4. INSTALL DISTRIBUTOR

- (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 portion of the coupling 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 two mounting bolts.

5. CONNECT HIGH-TENSION CORDS TO SPARK PLUGS

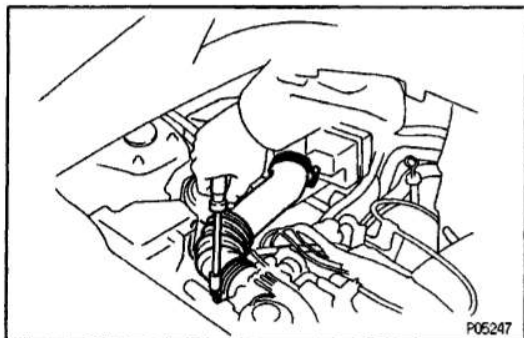
(a) Connect the four high-tension cords to the spark: plugs.

Firing order:

1 - 3 - 4 - 2

(b) Connect the high-tension cords to the clamp on the cylinder head cover.

6. CONNECT DISTRIBUTOR CONNECTORS

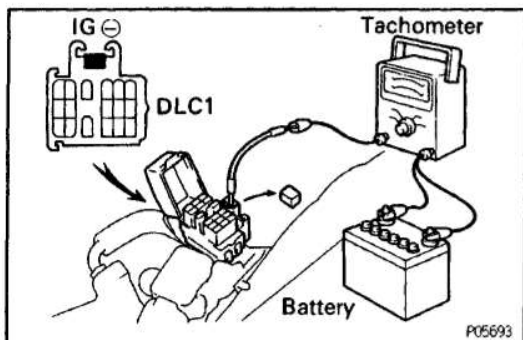


7. INSTALL AIR CLEANER HOSE

8. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

9. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



10. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE

Connect the test probe of a tachometer to terminal IG (-) of the check connector.

NOTICE:

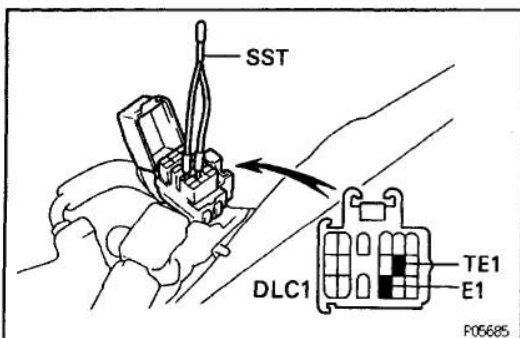
- Never allow the tachometer terminal to touch ground as it could result in damage to the igniter and/or ignition coil.
- As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your unit before use.

11. ADJUST IGNITION TIMING

(a) Using SST, connect terminals TE 1 and E 1 of the data link connector 1.

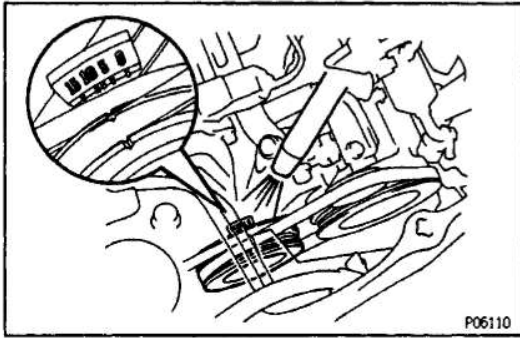
SST 09843-18020

HINT: After engine rpm is kept at 1,000 - 1,300 rpm for 5 seconds, check that it returns to idle speed.



IG-40

IGNITION SYSTEM - (5S-FE)

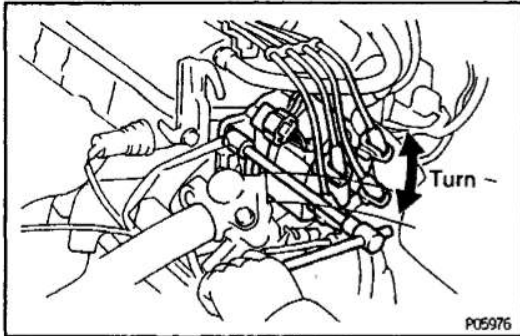


(b) Using a timing light, check the ignition timing.

Ignition timing:

10° BTDC @ idle

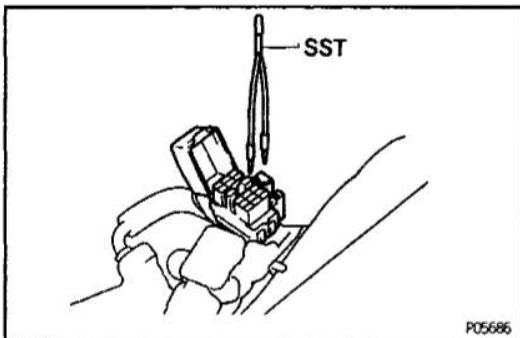
(Transmission in neutral position)



(c) Loosen the two mounting bolts, and adjust by turning the distributor.

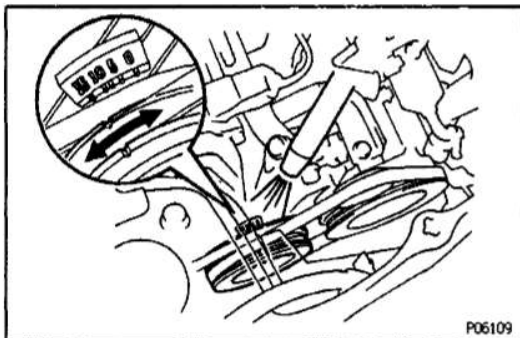
(d) Tighten the mounting bolts, and recheck the ignition timing.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)



(e) Remove the SST from the data link connector 1.

SST 09843-18020



12. FURTHER CHECK IGNITION TIMING

Ignition timing:

13 – 22° BTDC @ idle

(Transmission in neutral position)

HINT: The timing mark moves in a range between 13° and 22°.

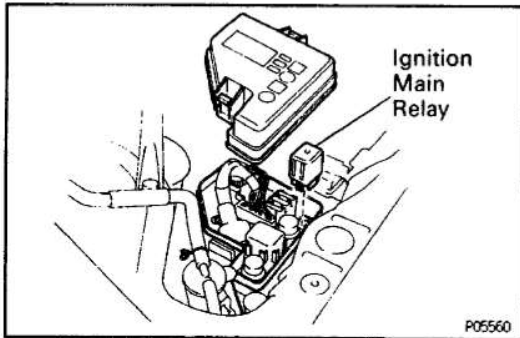
13. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE

14. REINSTALL RH ENGINE HOOD SIDE PANEL

15. REINSTALL ENGINE UNDER COVERS

IG-20

IGNITION SYSTEM - (3S-GTE)

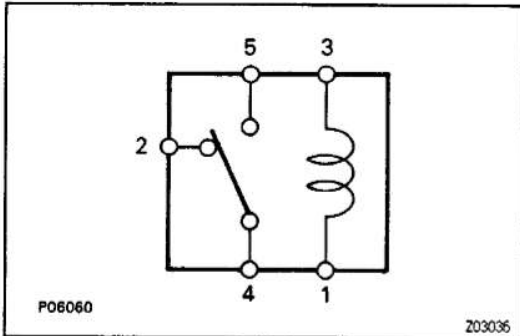


IGNITION MAIN RELAY

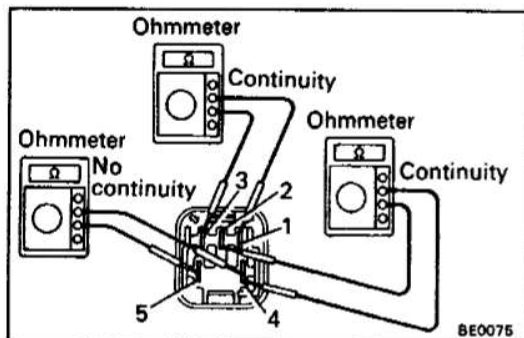
IGNITION MAIN RELAY ("IGN") INSPECTION

IG080-01

1. REMOVE IGNITION MAIN RELAY



2. INSPECT IGNITION MAIN RELAY



A. Inspect relay continuity

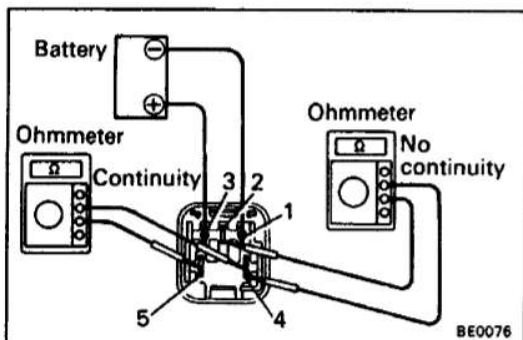
- Using an ohmmeter, check that there is continuity between terminals 1 and 3.
- Check that there is continuity between terminals 2 and 4.
- Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.

B. Inspect relay operation

- Apply battery voltage across terminals 1 and 3.
- Using an ohmmeter, check that there is continuity between the 2 and 4.
- Check that there is continuity between terminals 4 and 5.

If operation is not as specified, replace the relay.



3. REINSTALL IGNITION MAIN RELAY

IGNITION MAIN RELAY

(See 3S-GTE Engine)

BT014-00

SERVICE SPECIFICATIONS

M0018-02

SERVICE DATA

Ignition timing	w/ Terminals TE1 and E1 connected	10° BTDC @ idle
Firing order	—	1 - 3 - 4 - 2
High-tension cord	Resistance (Maximum)	25 kΩ per cord
Spark plug	Recommended spark plug ND	PK20R11
	Recommended spark plug NGK	BKR6EP-11
	Correct electrode gap	1.1 mm (0.043 in.)
	Maximum electrode gap of used plug	1.3 mm (0.051 in.)
Ignition coil	Primary coil resistance (Cold)	0.36 - 0.55 Ω
	Primary coil resistance (Hot)	0.45 - 0.65 Ω
	Secondary coil resistance (Cold)	9.0 - 15.4 k Ω
	Secondary coil resistance (Hot)	11.4 - 18.1 k Ω
Distributor	Air gap	0.2 - 0.4 mm (0.008 - 0.016 in.)
	Signal generator (pickup coil) resistance (Cold)	
	G(+) - G(-)	185 - 275 Ω
	NE(+) - NE(-)	370 - 550 Ω
	Signal generator (pickup coil) resistance (Hot)	
	G(+) - G(-)	240 - 325 Ω
	NE(+) - NE(-)	475 - 650 Ω

M0017-01

TORQUE SPECIFICATIONS

Part tightened	N-m	kgf-cm	ft-lbf
Spark plug x Cylinder head	18	180	13
Distributor x Cylinder head	19	195	14

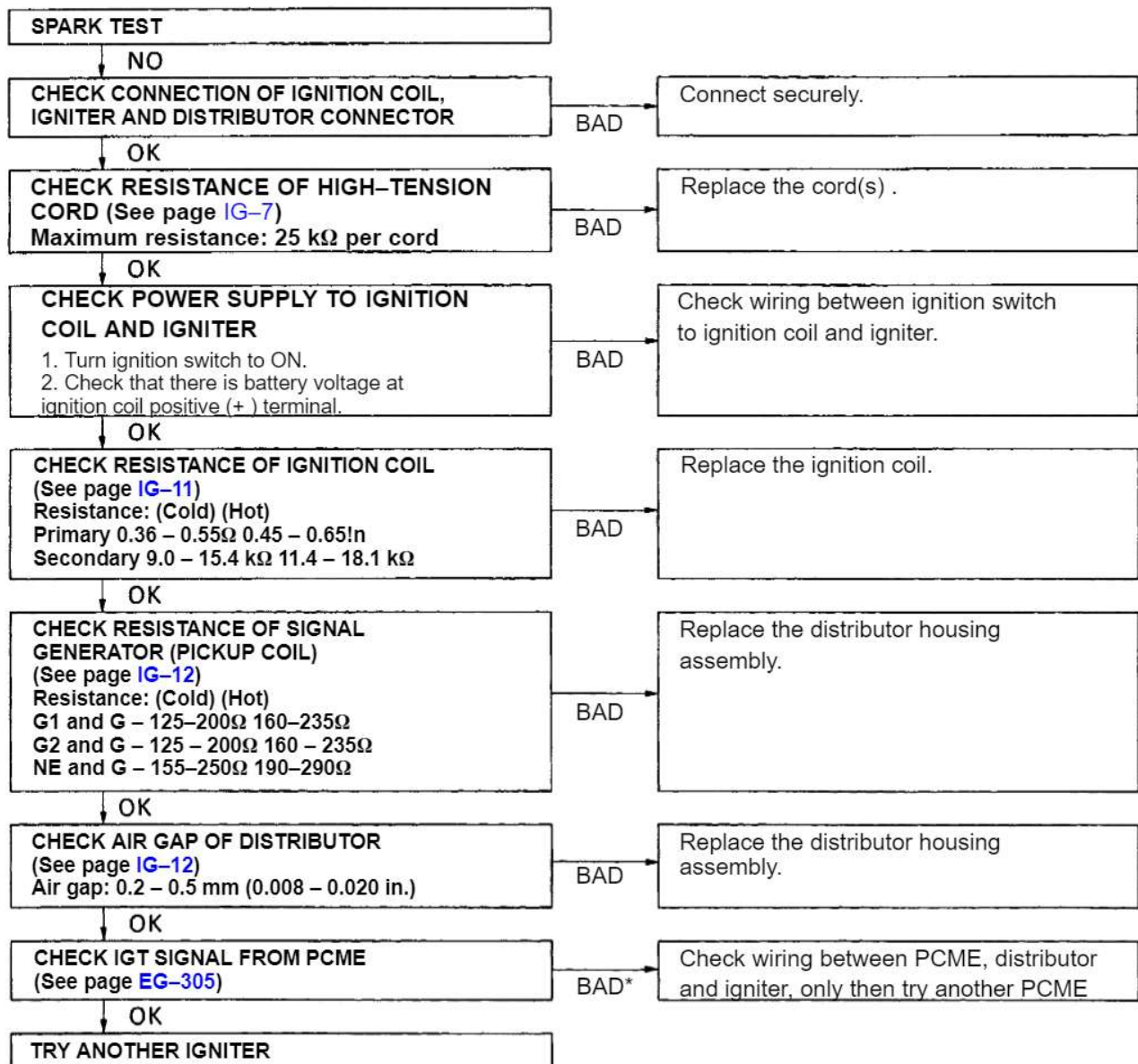
ON-VEHICLE INSPECTION

1001R-03

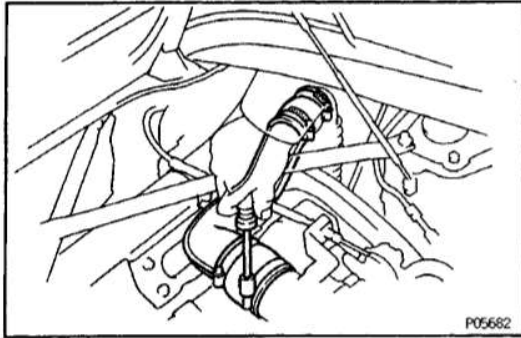
SPARK TEST

CHECK THAT SPARK OCCURS

- Disconnect the high-tension cord (from the ignition coil) from the distributor cap.
- Hold the end approx. 12.5 mm (0.50 in.) from the body ground.
- 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 occur, perform the test as follows:

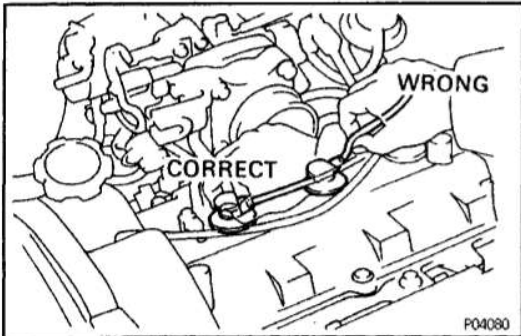


VX/996



HIGH-TENSION CORDS INSPECTION

1. REMOVE N0.1 INTAKE AIR CONNECTOR

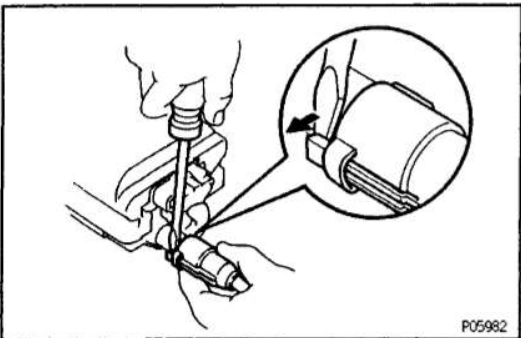


2. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS

Disconnect the high – tension cords at the rubber boot.

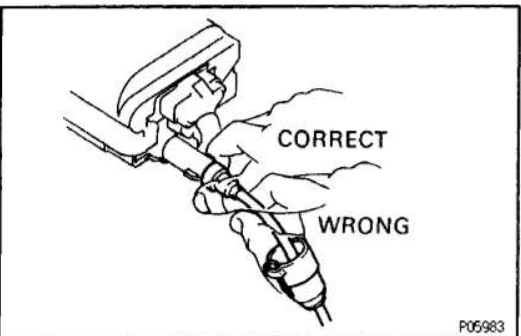
Do not pull on the high-tension cords.

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



3. DISCONNECT HIGH-TENSION CORDS FROM IGNITION COIL

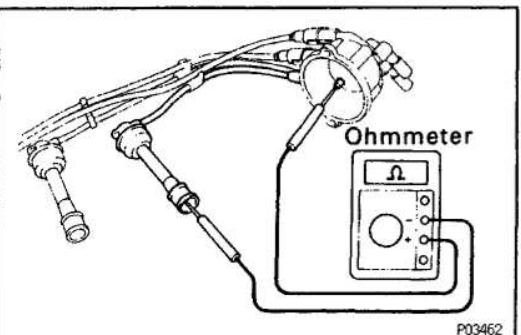
(a) Using a screwdriver, lift up the lock claw and disconnect the holder from the ignition coil.



(b) Disconnect the high-tension cord at the grommet.
Do not pull on the cord.

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

4. REMOVE DISTRIBUTOR CAP WITHOUT DISCONNECTING HIGH-TENSION CORDS



5. INSPECT HIGH-TENSION CORD RESISTANCE

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

Maximum resistance:

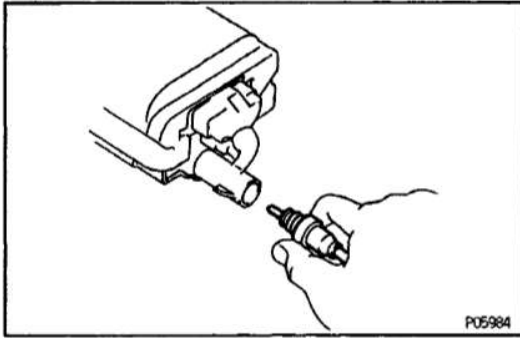
25 k Ω per cord

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

6. REINSTALL DISTRIBUTOR CAP

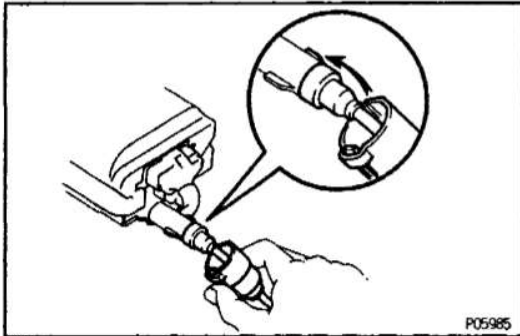
IG-8

IGNITION SYSTEM – (3S-GTE)

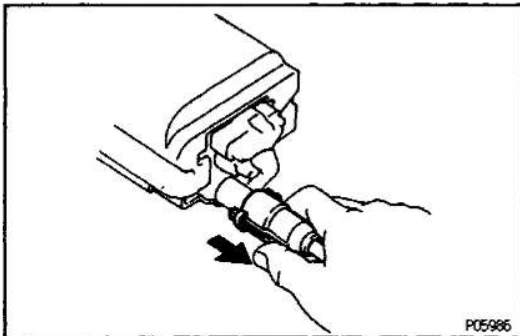


7. RECONNECT HIGH-TENSION CORDS TO IGNITION COIL

- (a) Insert the grommet portion into the terminal hole of the ignition coil.

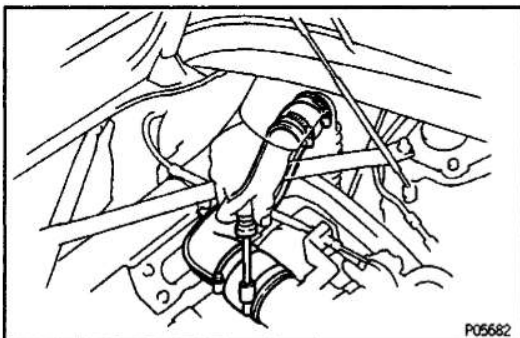


- (b) Align the spline of the ignition coil with the spline of the holder, and slide on the holder.



- (c) Check that the lock claw of the holder is engaged by lightly pulling the holder.

8. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS



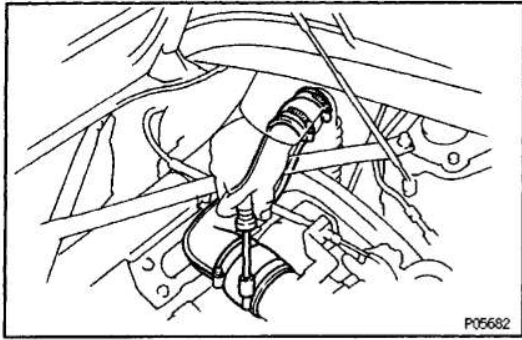
9. REINSTALL NO.1 INTAKE AIR CONNECTOR

SPARK PLUGS INSPECTION

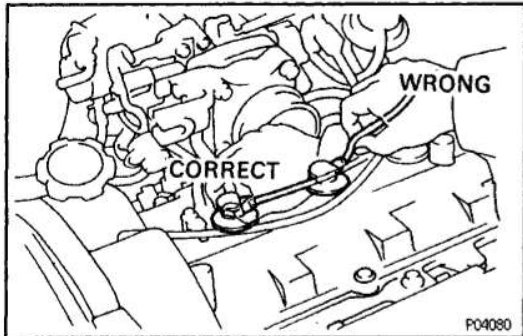
1000K-01

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 NO.1 INTAKE AIR CONNECTOR

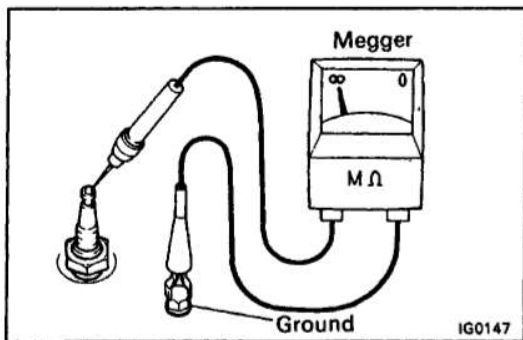


2. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS

Disconnect the high - tension cords at the rubber boot.

Do not pull on the cords.

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



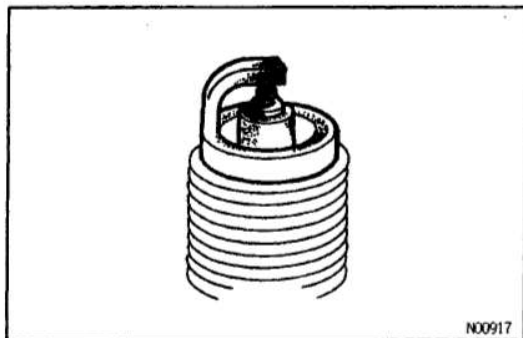
3. INSPECT ELECTRODE

Using a megger (insulation resistance meter), measure the insulation resistance.

Standard correct insulation resistance:
10 MΩ or more

If the resistance is less than specified, proceed to step 4.

HINT: If a megger is not available, the following simple method of inspection provides fairly accurate results.

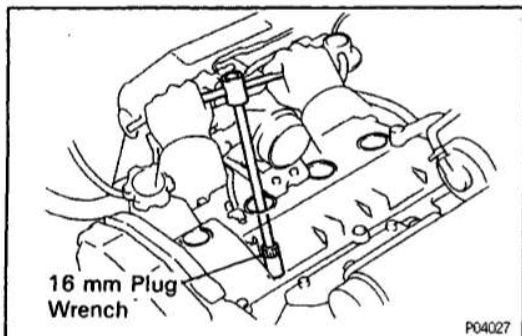


(Simple Method)

- (a) Quickly race the engine to 4,000 rpm five times.
- (b) Remove the spark plug. (See step 4)
- (c) Visually check the spark plug.
 - If the electrode is dry ... Okey
 - If the electrode is wet ... Proceed to step 5
- (d) Reinstall the spark plug. (See step 8)

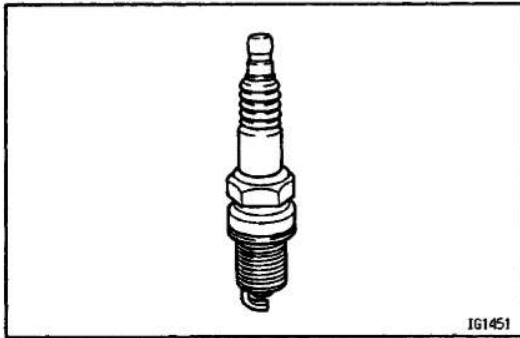
4. REMOVE SPARK PLUGS

Using a 16 mm plug wrench, remove the spark plug.



IG-10

IGNITION SYSTEM - (3S - GTE)

**5. VISUALLY INSPECT SPARK PLUGS**

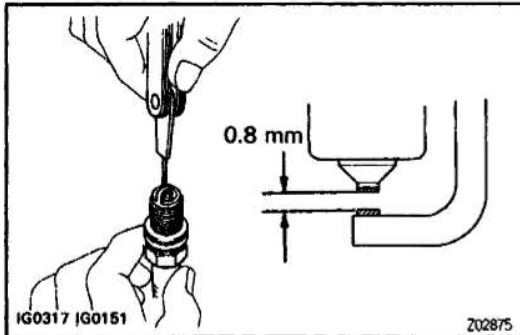
Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

PK20R8 for ND

BKR6EP8 for NGK

**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.)

NOTICE: If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on the used plug.

7. CLEAN SPARK PLUGS

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

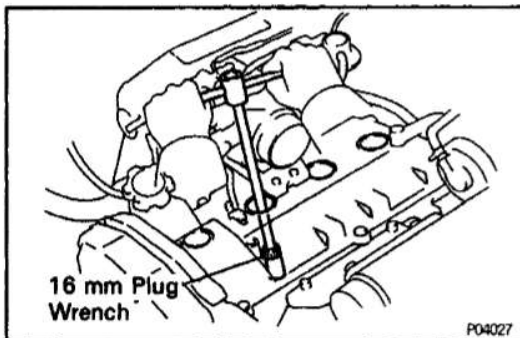
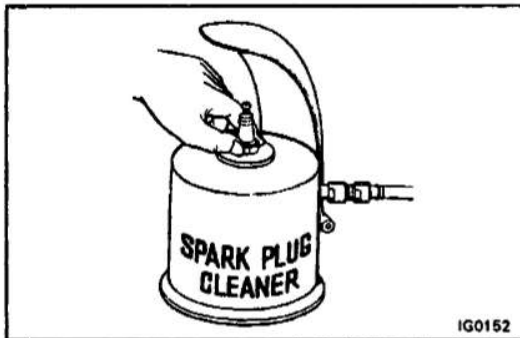
Air pressure:

Below 588 kPa (6 kgf/cm², 85 psi)

Duration:

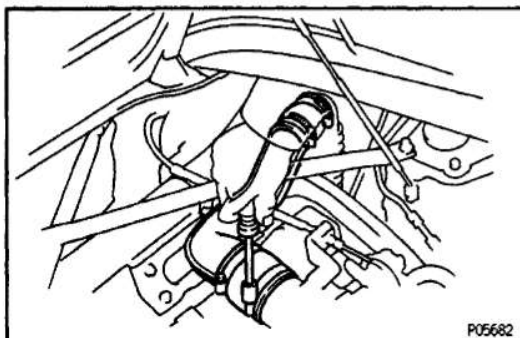
20 seconds or less

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

**8. REINSTALL SPARK PLUGS**

Using a 16 mm plug wrench, install the spark plug.

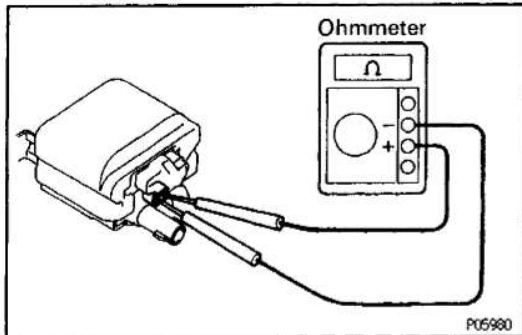
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

9. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS**10. REINSTALL N0.1 INTAKE AIR CONNECTOR**

IGNITION COIL INSPECTION

NOTICE: "Cold" and "Hot" in the following sentences express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (104°F) and "Hot" is from 50°C (104°F) to 100°C (212°F).

1. DISCONNECT IGNITION COIL CONNECTOR
2. DISCONNECT HIGH-TENSION CORD FROM IGNITION COIL



3. INSPECT PRIMARY COIL RESISTANCE

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

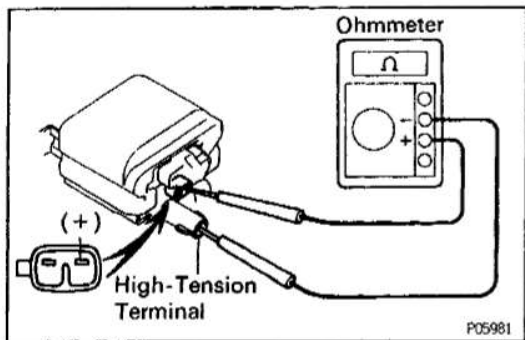
Primary coil resistance (Cold):

$0.36-0.55\Omega$

Primary coil resistance (Hot):

$0.45 - 0.65\Omega$

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



4. INSPECT SECONDARY COIL RESISTANCE

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

Secondary coil resistance (Cold):

$9.0 - 15.4\text{ k}\Omega$

Secondary coil resistance (Hot):

$11.4 - 18.1\text{ k}\Omega$

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

5. RECONNECT HIGH-TENSION CORD TO IGNITION COIL
6. RECONNECT IGNITION COIL CONNECTOR

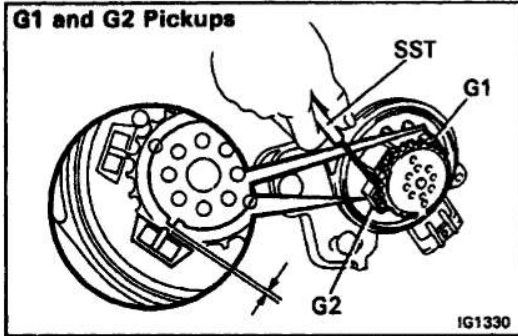
DISTRIBUTOR INSPECTION

NOTICE: "Cold" and "Hot" in the following sentences express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (104°F) and "Hot" is from 50°C (104°F) to 100°C (212°F).

1. DISCONNECT DISTRIBUTOR CONNECTOR
2. REMOVE DISTRIBUTOR CAP
3. REMOVE ROTOR

IG-12

IGNITION SYSTEM - (3S-GTE)

G1 and G2 Pickups**4. INSPECT AIR GAP**

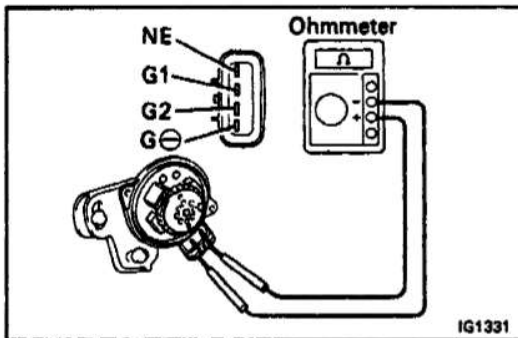
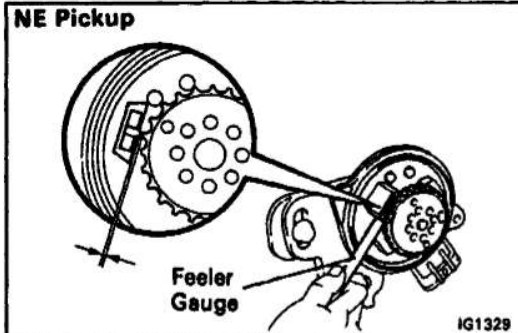
Using SST (G1 and G2 pickups) and a feeler gauge (NE pickup), measure the air gap between the signal rotor and pickup coil projection.

SST 09240-00020 for G1 and G2 pickups

Air gap:

0.2 – 0.5 mm (0.008 – 0.020 in.)

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

NE Pickup**5. INSPECT SIGNAL GENERATOR (PICKUP COIL) RESISTANCE**

Using an ohmmeter, measure the resistance between terminals.

Pickup coil resistance (Cold):

G1 and G (–)

125–200 Ω

G2 and G (–)

125–200 Ω

NE and G (–)

155–250 Ω

Pickup coil resistance (Hot):

G1 end G (–)

160–235 Ω

G2 and G (–)

160–235 Ω

NE and G (–)

190–290 Ω

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

6. REINSTALL ROTOR**7. REINSTALL DISTRIBUTOR CAP****8. RECONNECT DISTRIBUTOR CONNECTOR****IGNITER INSPECTION**

(See procedure Spark Test)

IG018-08

ON-VEHICLE INSPECTION

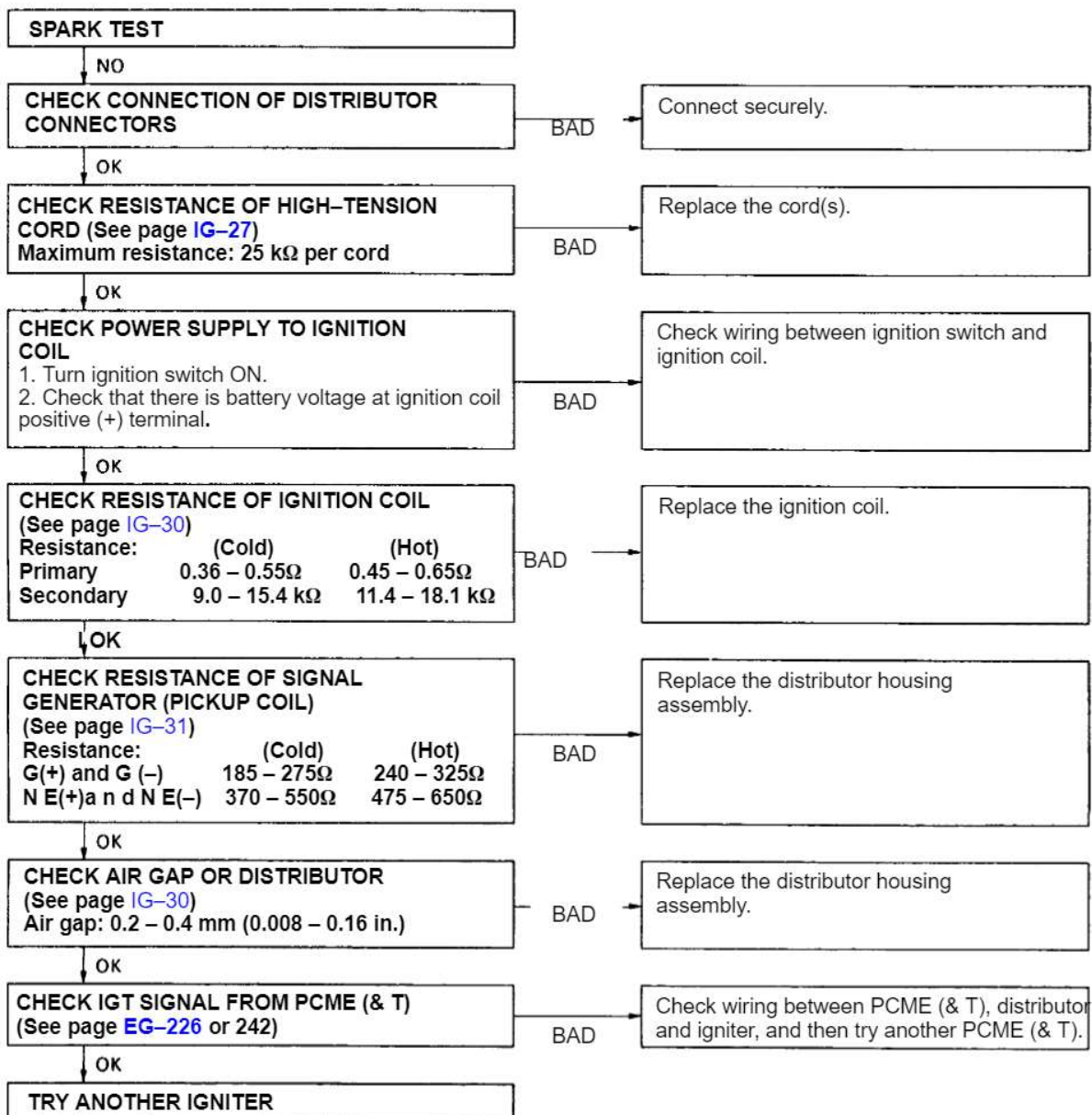
SPARK TEST

K0055-01

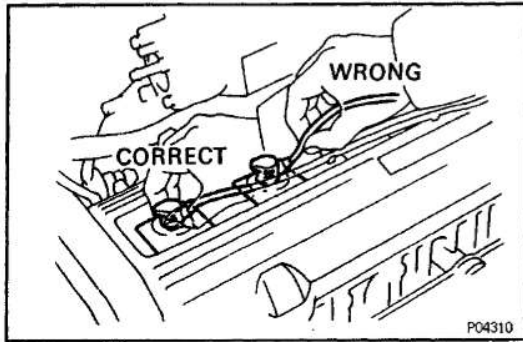
CHECK THAT SPARK OCCURS

- Disconnect the high-tension cords from the spark plugs.
- Remove the spark plugs.
- Install the spark plugs to the each high-tension cord.
- Ground the spark plug.
- 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:



V01053



HIGH-TENSION CORDS INSPECTION

IG007-01

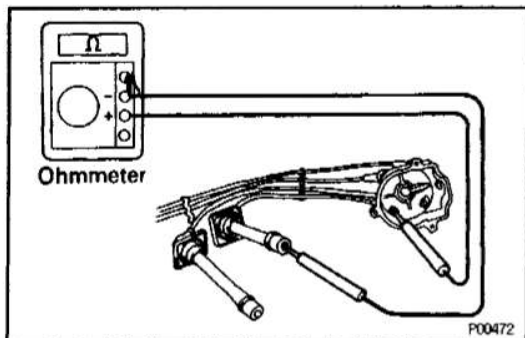
1. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS

Disconnect the high – tension cords at the rubber boot.

Do not pull on the cords.

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

2. REMOVE DISTRIBUTOR CAP WITHOUT DISCONNECTING HIGH-TENSION CORDS



3. INSPECT HIGH –TENSION CORD RESISTANCE

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

Maximum resistance:

25 kΩ per cord

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

4. REINSTALL DISTRIBUTOR CAP

5. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS

SPARK PLUGS INSPECTION

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. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS

2. INSPECT ELECTRODE

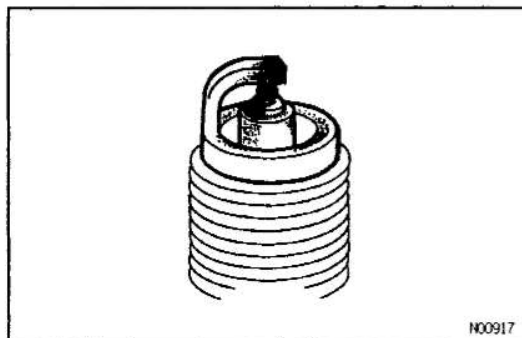
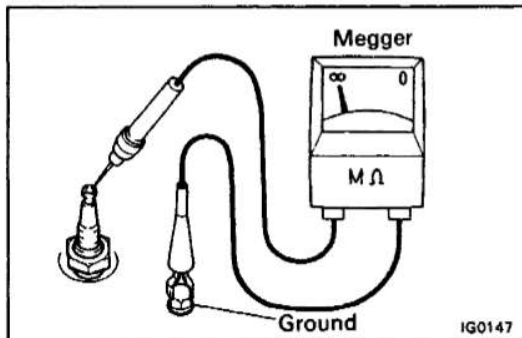
Using a megger (insulation resistance meter), measure the insulation resistance.

Standard correct insulation resistance:

10 MΩ or more

If the resistance is less than specified, proceed to step 3.

HINT: If a megger is not available, the following simple method of inspection provides fairly accurate results.

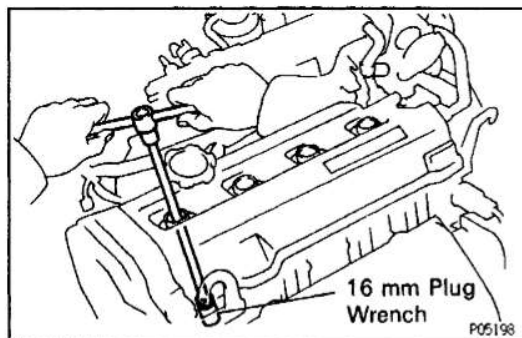


(Simple Method)

- Quickly race the engine to 4,000 rpm five times.
- Remove the spark plug. (See step 3)
- Visually check the spark plug.
 - If the electrode is dry ... Okay
 - If the electrode is wet ... Proceed to step 4
- Reinstall the spark plug. (See step 7)

3. REMOVE SPARK PLUGS

Using a 16 mm plug wrench, remove the spark plug.



4. VISUALLY INSPECT SPARK PLUGS

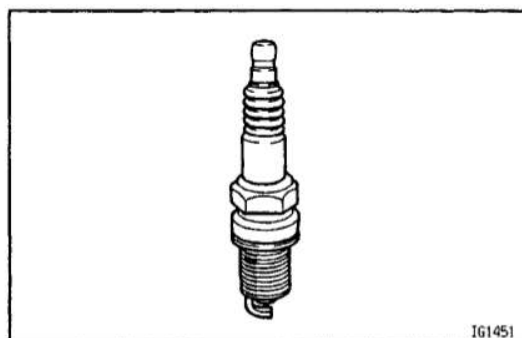
Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

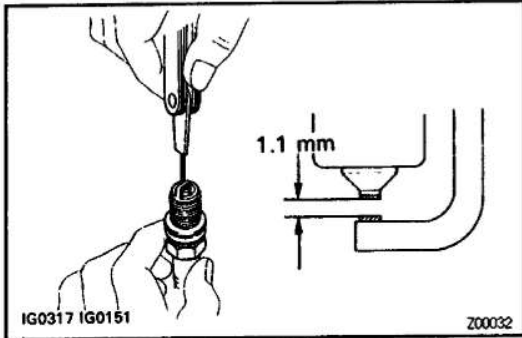
Recommended spark plug:

ND PK20R11

NGK BKR6EP-11



IGNITION SYSTEM - (5S-FE)

**5. INSPECT ELECTRODE GAP**

Maximum electrode gap:

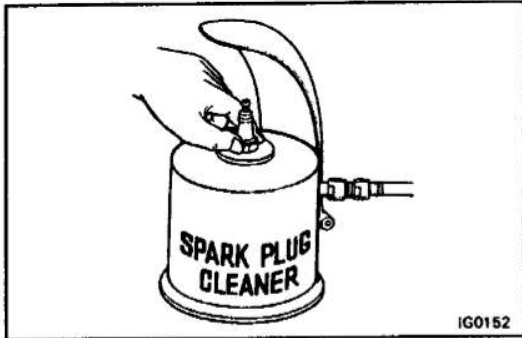
1.3 mm (0.051 in.)

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

Correct electrode gap of new spark plug:

1.1 mm (0.043 in.)

NOTICE: If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on the used plug.

**6. CLEAN SPARK PLUGS**

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

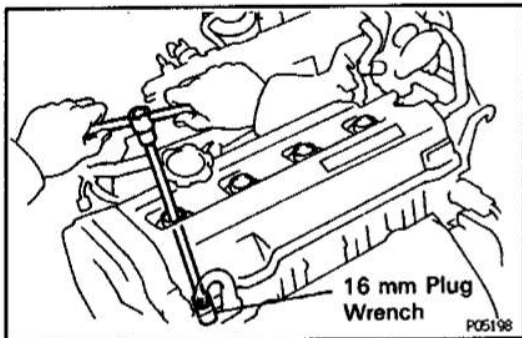
Air pressure:

Below 588 kPa (6 kgf/cm², 85 psi)

Duration:

20 seconds or less

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

**7. INSTALL SPARK PLUGS**

Using a 16 mm plug wrench, install the spark plug.

Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

8. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS

DISTRIBUTOR INSPECTION

NOTICE: "Cold" and "Hot" in the following sentences express the temperature of the coils themselves. 'Cold' is from -10°C (14°F) to 50°C (104°F) and 'Hot' is from 50°C (104°F) to 100°C (212°F).

1. DISCONNECT DISTRIBUTOR CONNECTORS
2. REMOVE DISTRIBUTOR CAP
3. REMOVE ROTOR
4. REMOVE IGNITION COIL DUST COVER

Ignition Coil

5. INSPECT PRIMARY COIL RESISTANCE

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

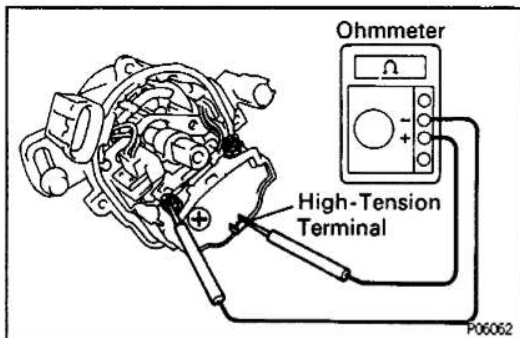
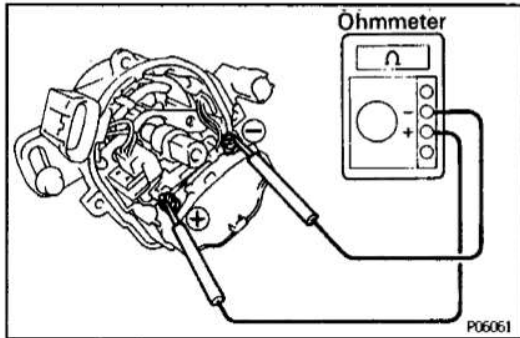
Primary coil resistance (Cold):

0.36–0.55 Ω

Primary coil resistance (Hot):

0.45 – 0.65 Ω

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



6. INSPECT SECONDARY COIL RESISTANCE

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

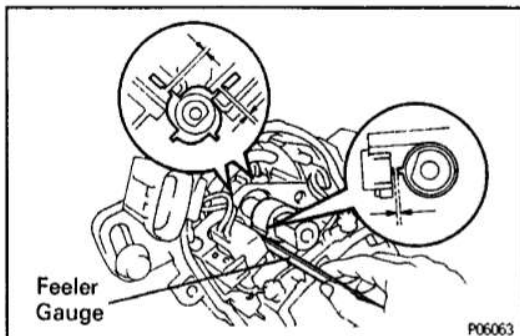
Secondary coil resistance (Cold):

9.0 – 15.4 k Ω

Secondary coil resistance (Hot):

11.4 – 18.1 k Ω

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



Distributor

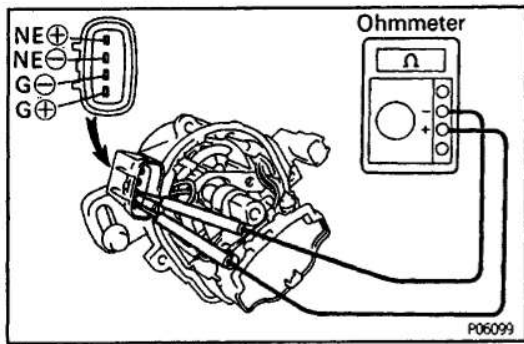
7. INSPECT AIR GAP

Using a feeler gauge, measure the air 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 assembly.



8. INSPECT SIGNAL GENERATOR (PICKUP COIL) RESISTANCE

Using an ohmmeter, measure the resistance between the terminals.

Pickup coil resistance (Cold):

G(+) and G(-)

185-275 Ω

NE(+) and NE (-)

370-550 Ω

Pickup coil resistance (Hot):

G(+) and G(-)

240-325 Ω

NE(+) and G(-)

475-650 Ω

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

9. REINSTALL IGNITION COIL DUST COVER

10. REINSTALL ROTOR

11. REINSTALL DISTRIBUTOR CAP

12. RECONNECT DISTRIBUTOR CONNECTORS

IG002-02

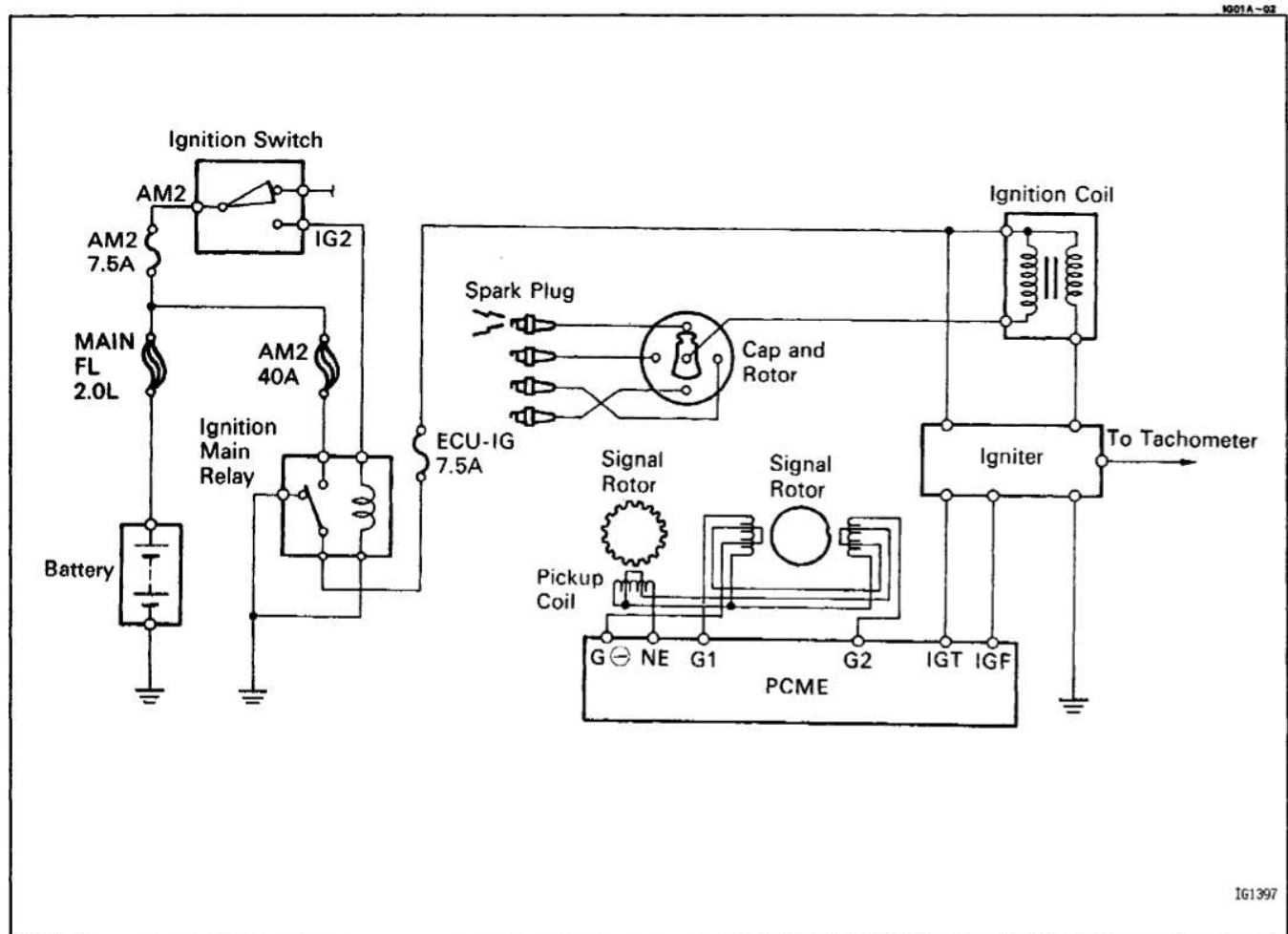
IGNITER INSPECTION

(See procedure Spark Plug)

IG-4

IGNITION SYSTEM - (3S - GTE)

SYSTEM CIRCUIT



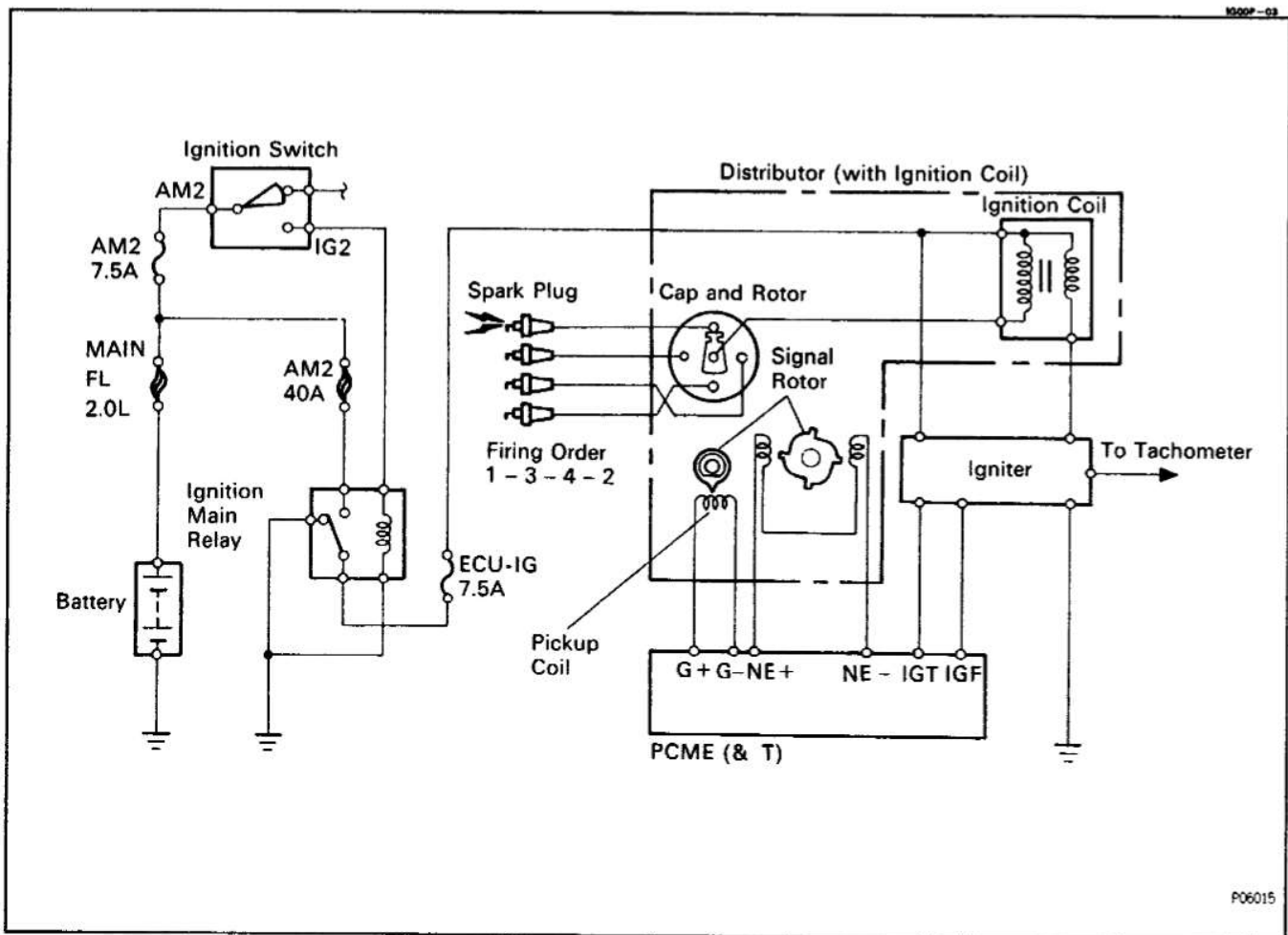
OPERATION

To maintain the most appropriate ignition timing, the PCME sends a control signal so that the igniter sends current to the ignition coil and the spark plugs produce a spark.

IG-24

IGNITION SYSTEM - (5S-FE)

SYSTEM CIRCUIT

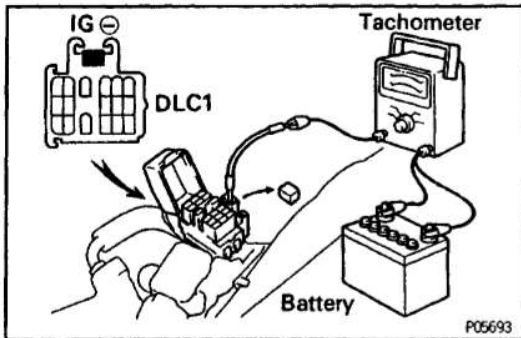


OPERATION

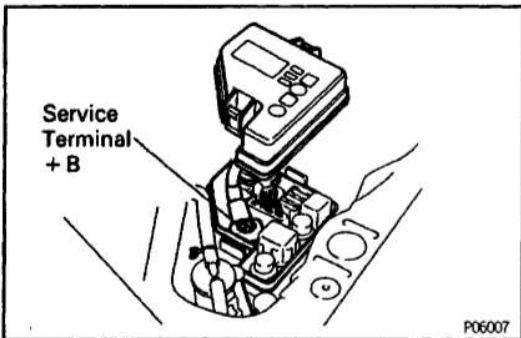
To maintain the most appropriate ignition timing, the PCME (& T) sends a control signal so that the igniter sends current to the ignition coil and the spark plugs produce a spark.

PRECAUTION

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



2. With a tachometer connected to the system, connect the test probe of the tachometer to terminal IG (-) of the data link connector 1.

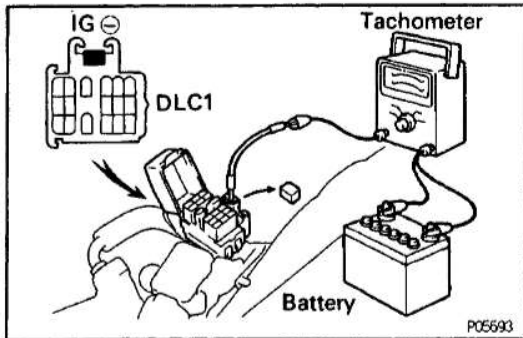


3. With a tachometer connected to the system, connect the power source probe of the tachometer to service terminal +B of the engine compartment relay box.

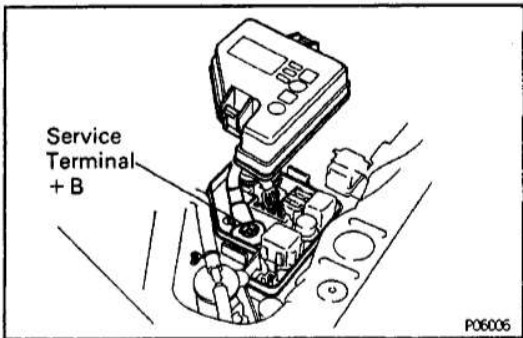
4. As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your before use.
5. Never allow the tachometer terminals to touch ground as it could result in damage to the igniter and/or ignition coil.
6. Do not disconnect the battery while the engine is running.
7. Check that the igniter is properly grounded to the body.

PRECAUTION

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



2. With a tachometer connected to the system, connect the test probe of the tachometer to terminal IG (-) of the data link connector 1.



3. With a tachometer connected to the system, connect the power source probe of the tachometer to service terminal +B of the engine compartment relay box.

4. As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your before use.
5. Never allow the tachometer terminals to touch ground as it could result in damage to the igniter and/or ignition coil.
6. Do not disconnect the battery while the engine is running.
7. Check that the igniter is properly grounded to the body.

IGNITION SYSTEM - (3S-GTE)

PREPARATION**SST (SPECIAL SERVICE TOOLS)**

1001C-01

	09240-00020 Wire Gauge Set	Air gap
	09843-18020 Diagnosis Check Wire	

RECOMMENDED TOOLS

1001D-01

	09082-00015 TOYOTA Electrical Tester	
	09200-00010 Engine Adjust Kit	

EQUIPMENT

1001E-01

Spark plug cleaner	
Tachometer	
Timing light	Ignition timing

PREPARATION

SST (SPECIAL SERVICE TOOLS)

IG00R-01

	09843-18020 Diagnosis Check Wire
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RECOMMENDED TOOLS

IG00S-01

	09062-00015 TOYOTA Electrical Tester
	09200-00010 Engine Adjust Kit

EQUIPMENT

IG00T-01

Megger insulation resistancemeter	Insulation resistance meter
Spark plug cleaner	
Tachometer	
Timing light	Ignition timing

SSM (SPECIAL SERVICE MATERIALS)

IG00U-01

0882-00080 Seal packing or equivalent	Ignition coil
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SERVICE SPECIFICATIONS

1001P-02

SERVICE DATA

Ignition timing	w/ Terminals TE1 and E1 connected	10° BTDC @ idle
Firing order	—	1 - 3 - 4 - 2
High-tension cord	Resistance (Maximum)	25 kΩ per cord
Spark plug	Recommended spark plug ND	PK20R8
	Recommended spark plug NGK	BKR6EP8
	Correct electrode gap	0.8 mm (0.031 in.)
	Maximum electrode gap of used plug	1.0 mm (0.039 in.)
Ignition coil	Primary coil resistance (Cold)	0.36 - 0.55 Ω
	Primary coil resistance (Hot)	0.45 - 0.65 Ω
	Secondary coil resistance (Cold)	9.0 - 15.4 kΩ
	Secondary coil resistance (Hot)	11.4 - 18.1 kΩ
Distributor	Air gap	0.2 - 0.5 mm (0.008 - 0.020 in.)
	Signal generator (pickup coil) resistance (Cold)	
	G1 - G(-)	125 - 200 Ω
	G2 - G(-)	125 - 200 Ω
	NE - G(-)	155 - 250 Ω
	Signal generator (pickup coil) resistance (Hot)	
	G1 - G(-)	160 - 235 Ω
	G2 - G(-)	160 - 235 Ω
	NE - G(-)	195 - 290 Ω

1001Q-02

TORQUE SPECIFICATIONS

Part tightened	N-m	kgf-cm	ft-lbf
Spark plug x Cylinder head	18	180	13
Distributor x Cylinder head	39	400	29

IGNITION MAIN RELAY

(See 3S-GTE Engine)

BT014-00

SERVICE SPECIFICATIONS

M0018-02

SERVICE DATA

Ignition timing	w/ Terminals TE1 and E1 connected	10° BTDC @ idle
Firing order	—	1 - 3 - 4 - 2
High-tension cord	Resistance (Maximum)	25 kΩ per cord
Spark plug	Recommended spark plug ND	PK20R11
	Recommended spark plug NGK	BKR6EP-11
	Correct electrode gap	1.1 mm (0.043 in.)
	Maximum electrode gap of used plug	1.3 mm (0.051 in.)
Ignition coil	Primary coil resistance (Cold)	0.36 - 0.55 Ω
	Primary coil resistance (Hot)	0.45 - 0.65 Ω
	Secondary coil resistance (Cold)	9.0 - 15.4 k Ω
	Secondary coil resistance (Hot)	11.4 - 18.1 k Ω
Distributor	Air gap	0.2 - 0.4 mm (0.008 - 0.016 in.)
	Signal generator (pickup coil) resistance (Cold)	
	G(+) - G(-)	185 - 275 Ω
	NE(+) - NE(-)	370 - 550 Ω
	Signal generator (pickup coil) resistance (Hot)	
	G(+) - G(-)	240 - 325 Ω
	NE(+) - NE(-)	475 - 650 Ω

M0017-01

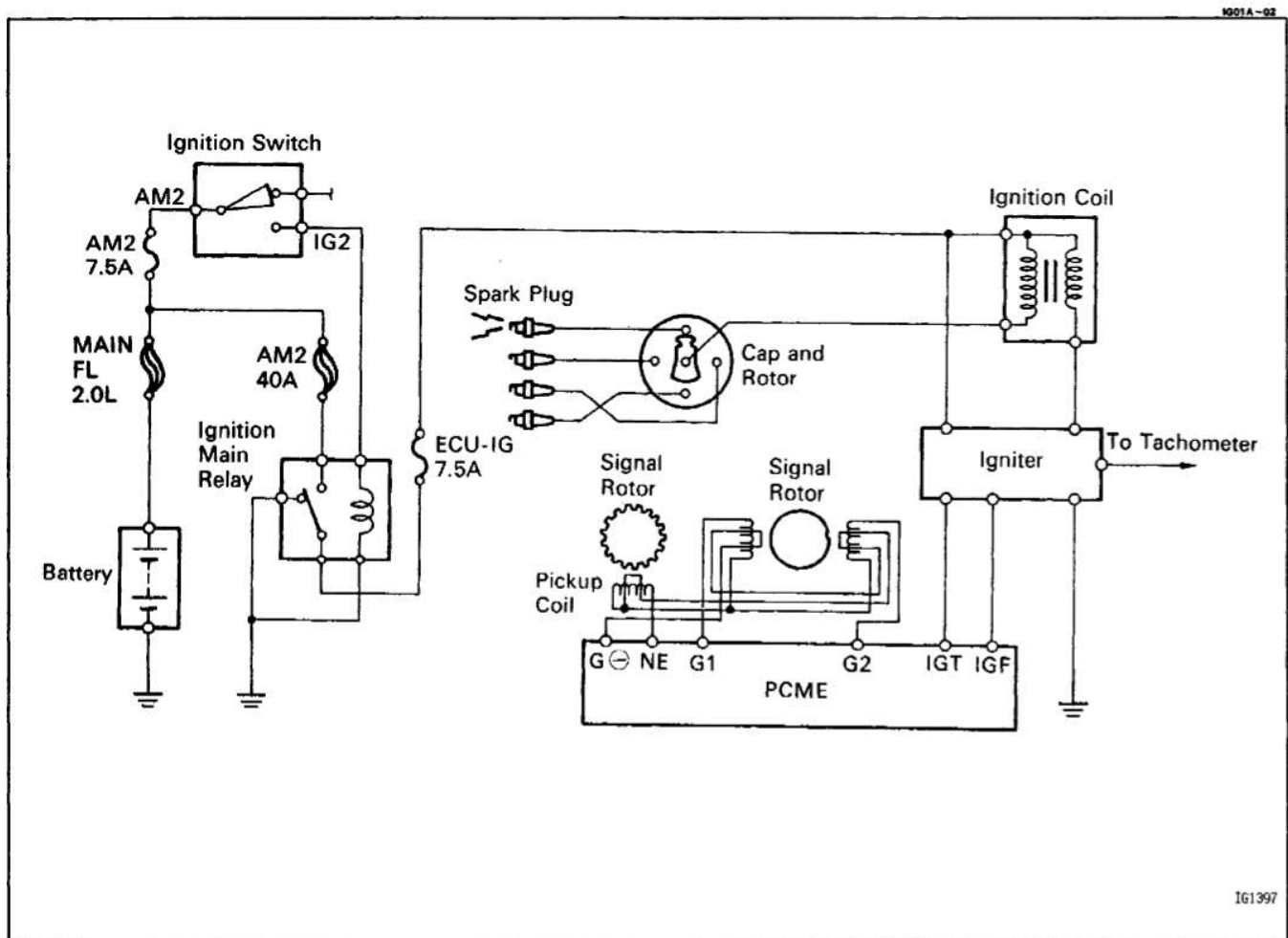
TORQUE SPECIFICATIONS

Part tightened	N-m	kgf-cm	ft-lbf
Spark plug x Cylinder head	18	180	13
Distributor x Cylinder head	19	195	14

IG-4

IGNITION SYSTEM - (3S - GTE)

SYSTEM CIRCUIT

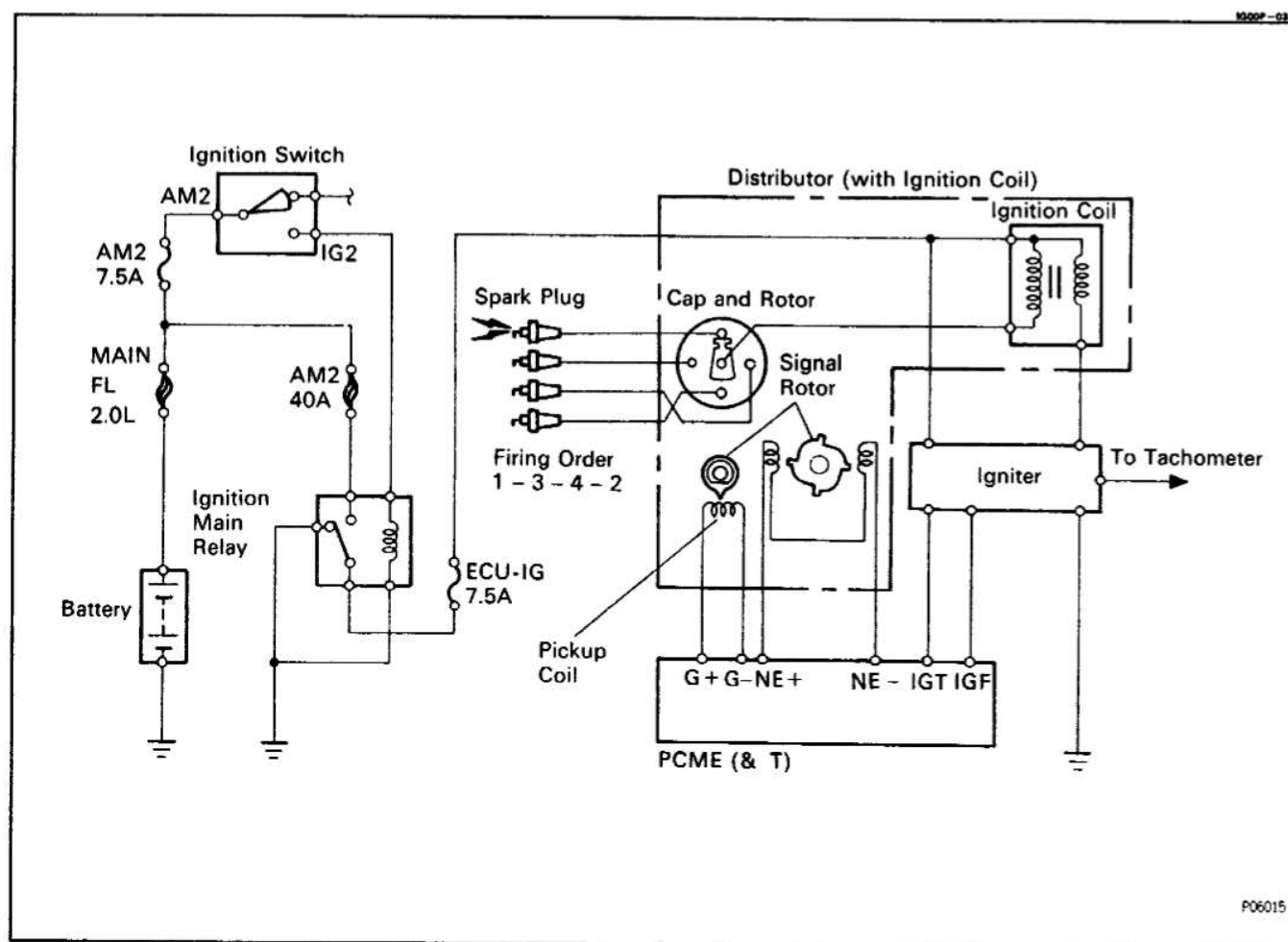


OPERATION

To maintain the most appropriate ignition timing, the PCME sends a control signal so that the igniter sends current to the ignition coil and the spark plugs produce a spark.

IGNITION SYSTEM — (5S-FE)

SYSTEM CIRCUIT



To maintain the most appropriate ignition timing, the PCME (& T) sends a control signal so that the igniter sends current to the ignition coil and the spark plugs produce a spark.