

IGNITION SYSTEM

ON-VEHICLE INSPECTION

IG00B-01

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

1. INSPECT SPARK TEST

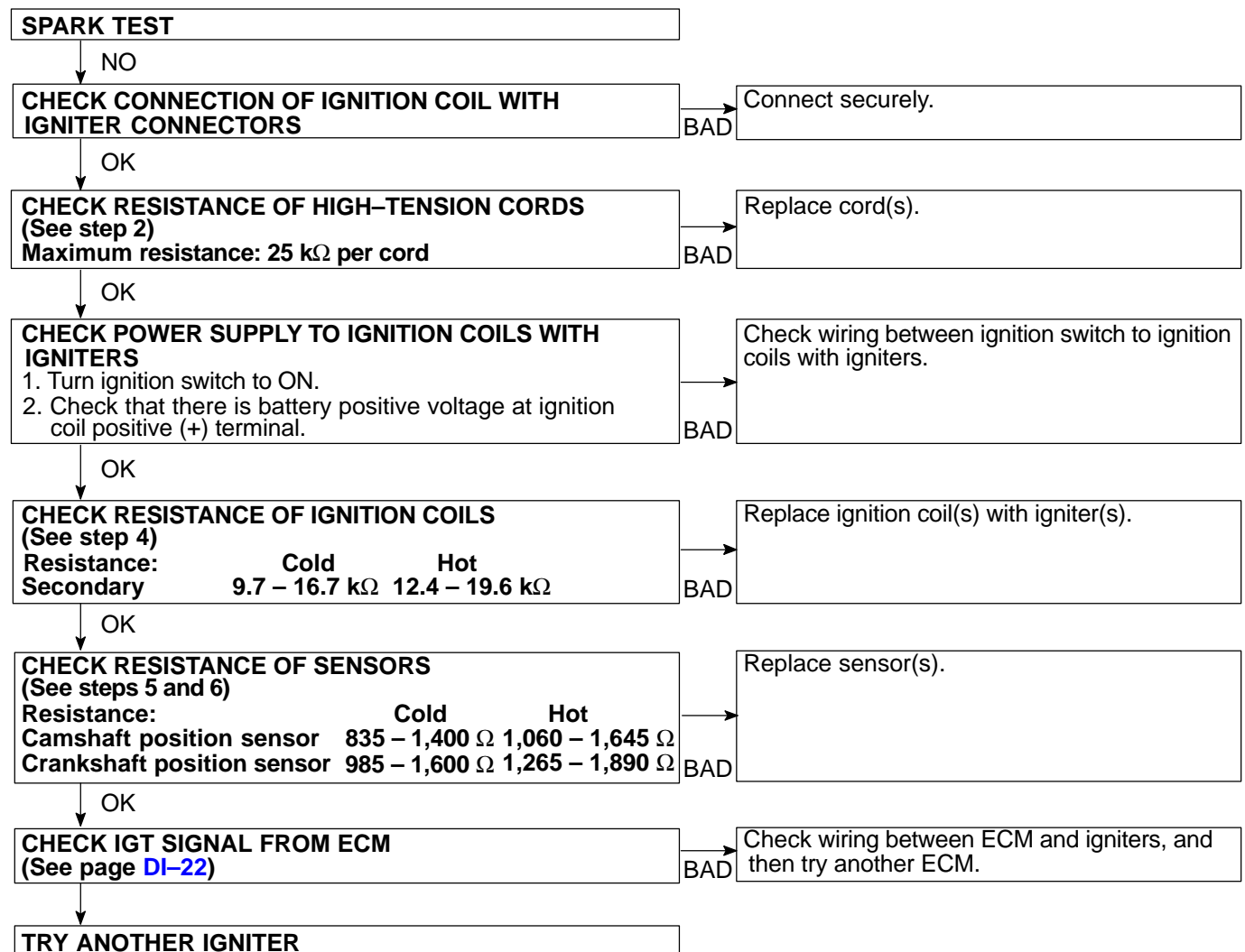
Check that the spark occurs.

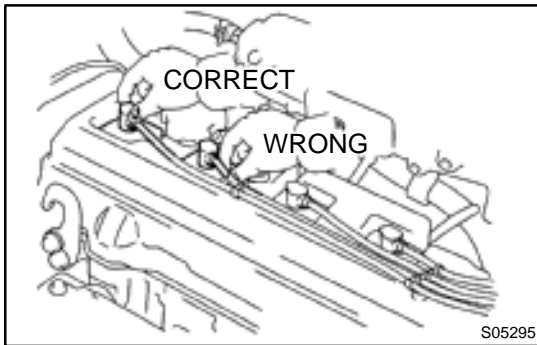
- (1) Disconnect the high-tension cord from the spark plug.
- (2) Remove the spark plug.
- (3) Install the spark plug to the high-tension cord.
- (4) Ground the spark plug.
- (5) See if spark occurs while engine is being cranked.

NOTICE:

To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 5 – 10 seconds at time.

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



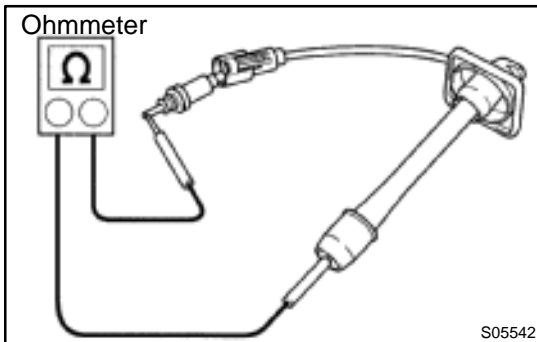


2. INSPECT HIGH-TENSION CORDS

- (a) Remove the high-tension cords.
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.



- (b) Using an ohmmeter, measure the high-tension cord resistance.

Maximum resistance: 25 k Ω per cord

If the resistance is greater than maximum, check the terminals.
If necessary, replace the high-tension cord.

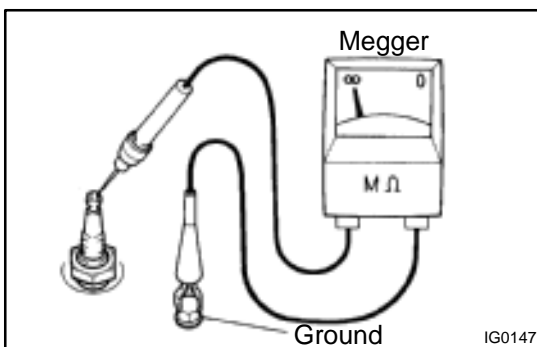
- (c) Reinstall the high-tension cords.

3. INSPECT SPARK PLUGS

NOTICE:

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

- (a) Disconnect the high-tension cords from the spark plugs.



- (b) Inspect the electrode.

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

Standard correct insulation resistance:

10 M Ω or more

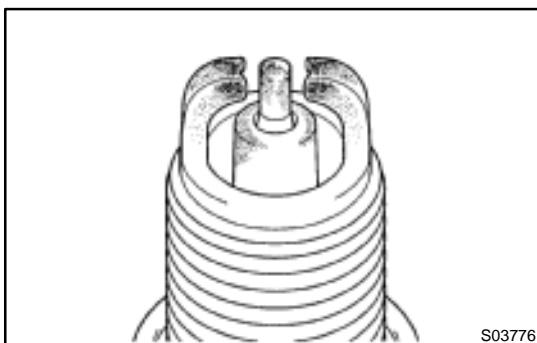
If the resistance is less than specified, proceed to step (d).

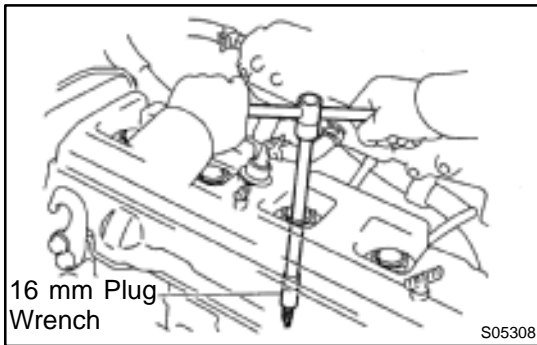
HINT:

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 5 times.
- ◆ Remove the spark plug. (See step (c))
- ◆ Visually check the spark plug.
If the electrode is dry ... OK
If the electrode is wet ... Proceed to step (d)
- ◆ Reinstall the spark plug. (See step (g))





- (c) Using a 16 mm plug wrench, remove the 4 spark plugs.
- (d) Visually check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	PK20TR11
NGK made	BKR6EKP11



- (e) Inspect the electrode gaps.

Maximum electrode gap for used spark plug:

1.3 mm (0.051 in.)

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

Correct electrode gap for 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.

- (f) Clean the 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:

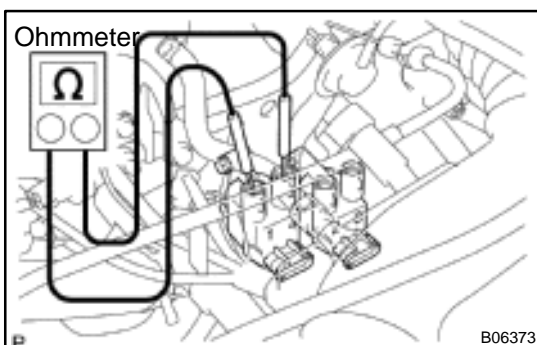
If there are traces of oil, remove it with gasoline before using the spark plug cleaner.



- (g) Using a 16 mm plug wrench, install the 4 spark plugs.

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

- (h) Reconnect the high-tension cords from the spark plugs.



4. INSPECT IGNITION COILS WITH IGNITERS

- (a) Disconnect the high-tension cords from the ignition coils.
- (b) Inspect the secondary coil resistance.

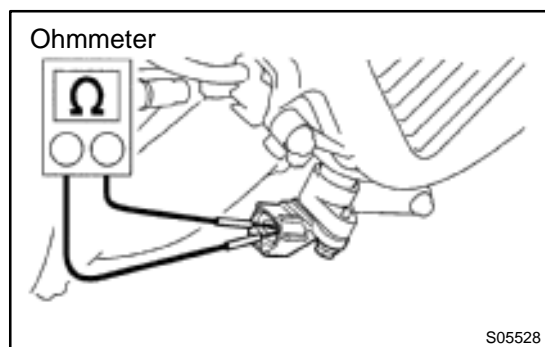
Using an ohmmeter, measure the resistance between the high-tension terminals.

Secondary coil resistance:

Cold	9.7 – 16.7 kΩ
Hot	12.4 – 19.6 kΩ

If the resistance is not as specified, replace the ignition coil.
(See page IG-6)

- (c) Reconnect the high-tension cords to the ignition coils.
- (d) Inspect the igniters. (See procedure spark test)



5. INSPECT CAMSHAFT POSITION SENSOR

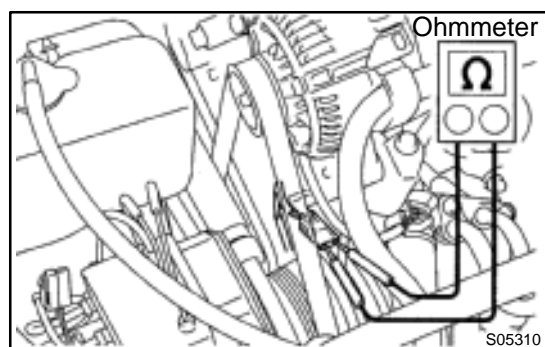
- (a) Disconnect the camshaft position sensor connector.
- (b) Using an ohmmeter, measure the resistance between terminals.

Resistance:

Cold	835 – 1,400 Ω
Hot	1,060 – 1,645 Ω

If the resistance is not as specified, replace the sensor. (See page IG-9)

- (c) Reconnect the camshaft position sensor connector.



6. INSPECT CRANKSHAFT POSITION SENSOR

- (a) Disconnect the crankshaft position sensor connector.
- (b) Using an ohmmeter, measure the resistance between terminals.

Resistance:

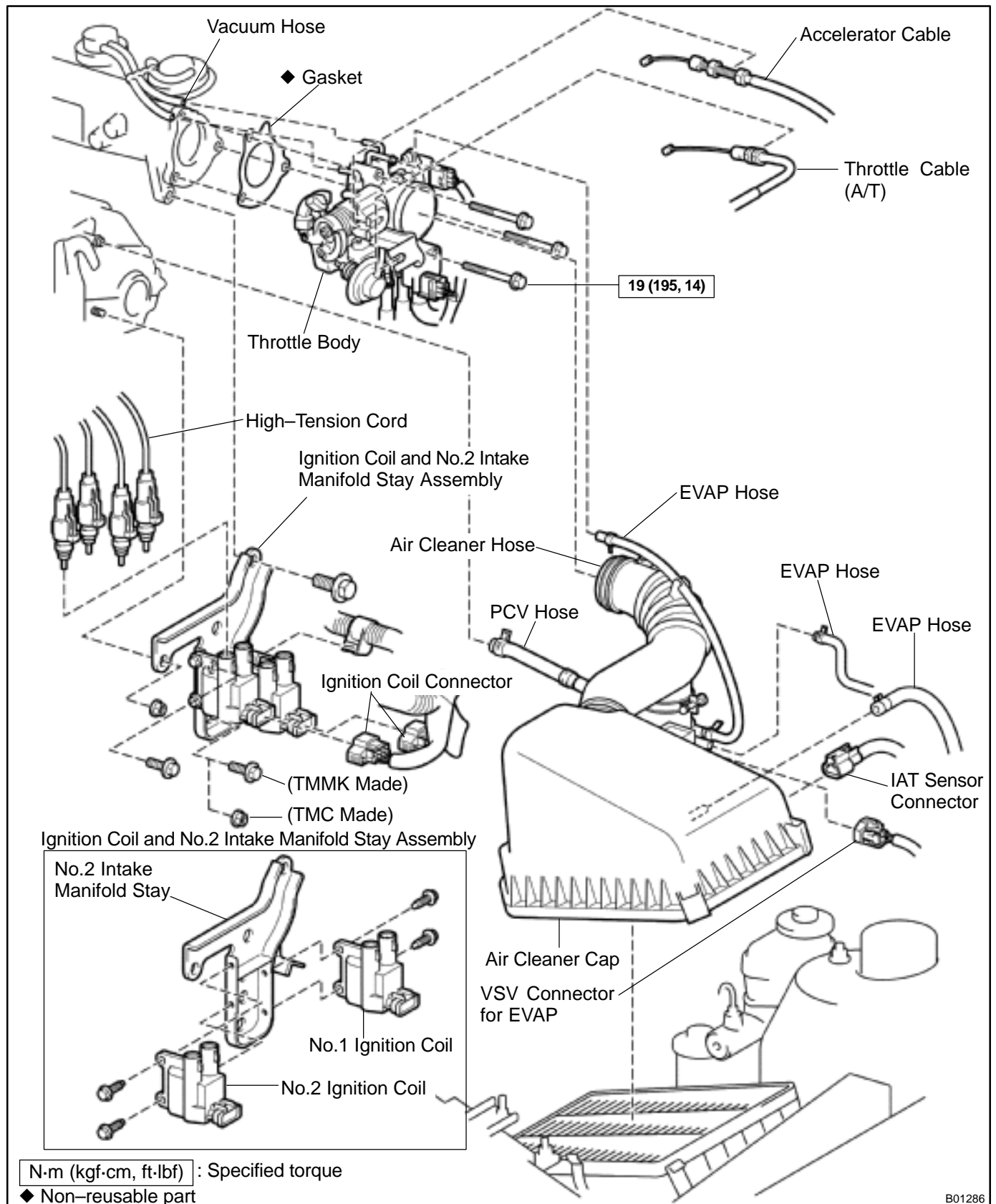
Cold	985 – 1,600 Ω
Hot	1,265 – 1,890 Ω

If the resistance is not as specified, replace the sensor. (See page IG-12)

- (c) Reconnect the crankshaft position sensor connector.

IGNITION COIL COMPONENTS

IG041-03



REPLACEMENT

1. **DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLD (See page SF-32)**

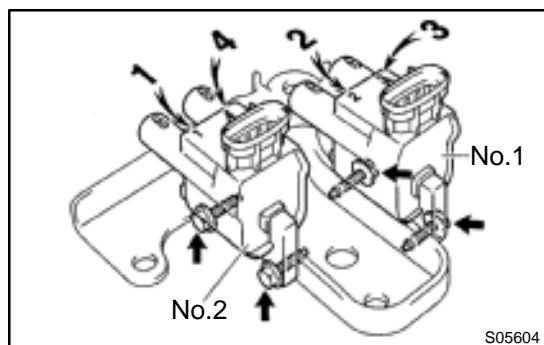


2. **REMOVE IGNITION COILS AND NO.2 INTAKE MANIFOLD STAY ASSEMBLY**

- (a) Disconnect the 2 ignition coil connectors.
- (b) Disconnect the wire clamp from the manifold stay.
- (c) TMC Made:
Remove the 2 nuts, 2 bolts, 2 ignition coils and manifold stay assembly.
- (d) TMMK Made:
Remove the nut, 3 bolts, 2 ignition coils and manifold stay assembly.

3. **REMOVE IGNITION COILS FROM NO.2 INTAKE MANIFOLD STAY**

Remove the 2 bolts and ignition coil. Remove the 2 ignition coils.



4. **REINSTALL IGNITION COILS TO NO.2 INTAKE MANIFOLD STAY**

Install the ignition coil with the 2 bolts. Install the 2 ignition coils.

Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

NOTICE:

The installation positions of the ignition coils are different for No.1 and No.2.

5. **REINSTALL IGNITION COILS AND NO.2 INTAKE MANIFOLD STAY ASSEMBLY**

- (a) TMC Made:
Install the 2 ignition coils and manifold stay assembly with the 2 nuts and 2 bolts.
- (b) TMMK Made:
Install the 2 ignition coils and manifold stay assembly with the nut and 3 bolts.

Torque:

21 N·m (214 kgf·cm, 15 ft·lbf) for 12 mm head

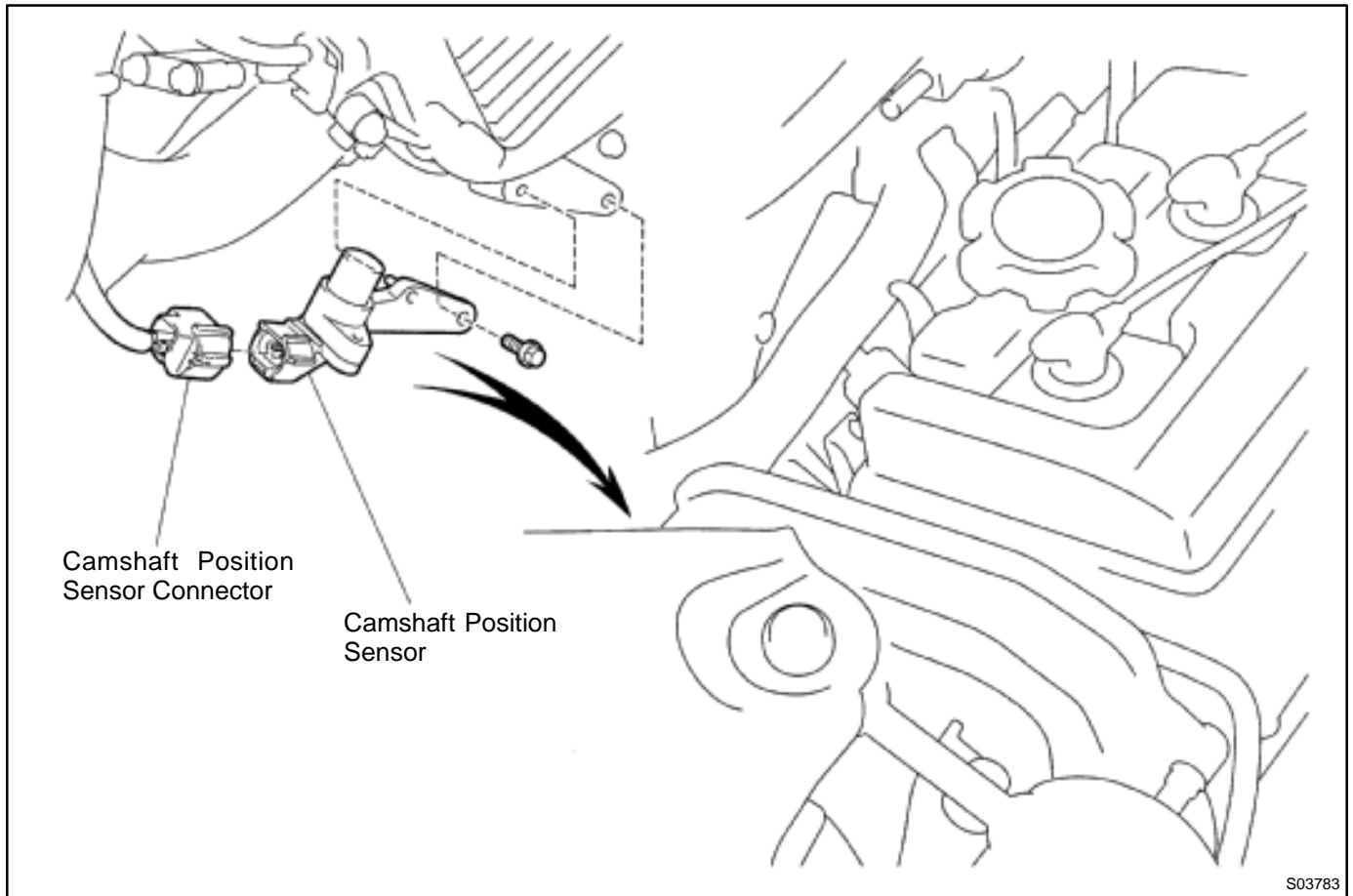
42 N·m (428 kgf·cm, 31 ft·lbf) for 14 mm head

- (c) Install the wire clamp to the manifold stay.
- (d) Connect the 2 ignition coil connectors.

6. REINSTALL THROTTLE BODY (See page SF-34)

CAMSHAFT POSITION SENSOR COMPONENTS

IG044-03



REPLACEMENT

1. REMOVE CAMSHAFT POSITION SENSOR

- (a) Disconnect the sensor connector.
- (b) Remove the bolt and sensor.

2. REINSTALL CAMSHAFT POSITION SENSOR

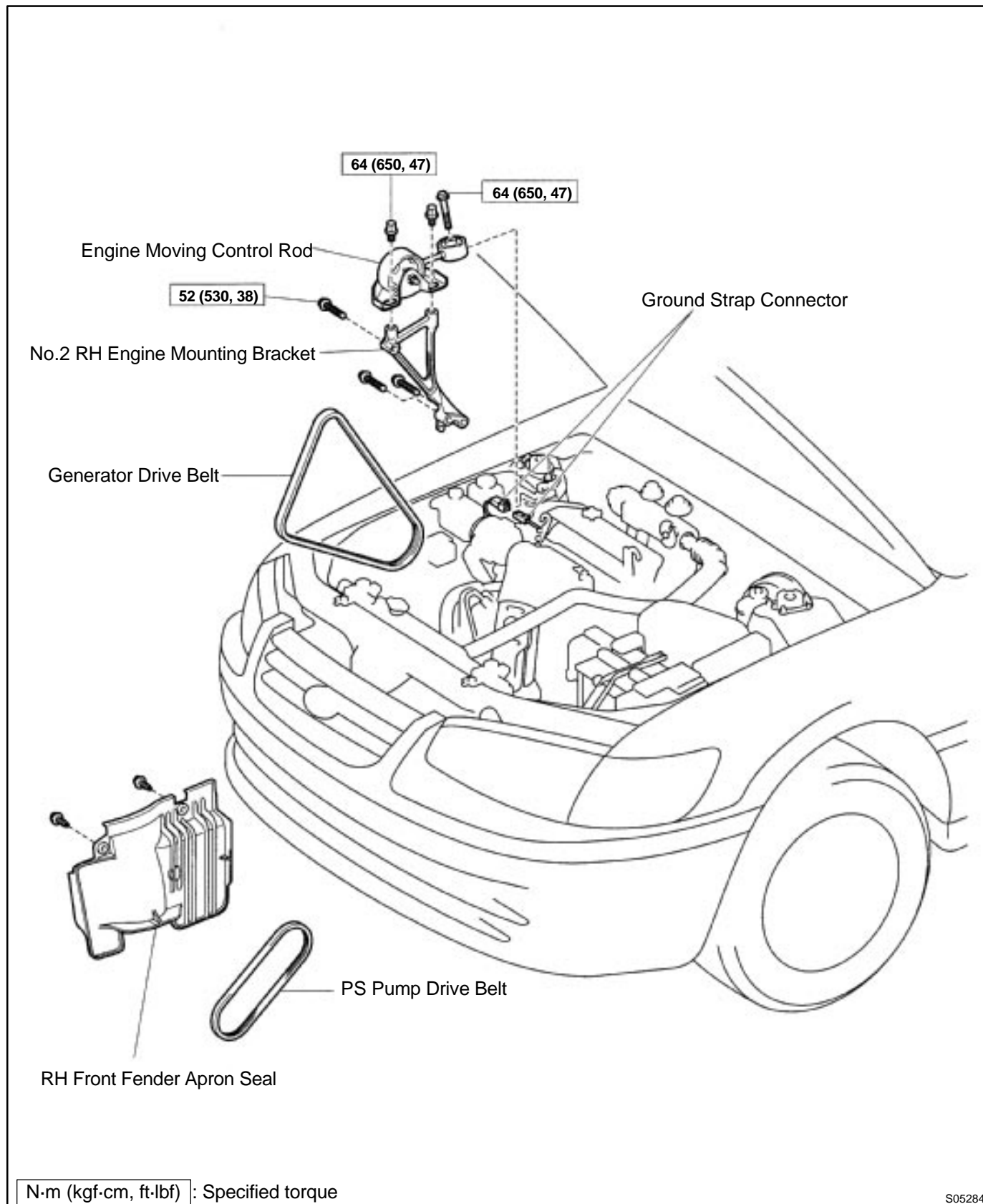
- (a) Install the sensor with the bolt.

Torque: 9.5 N·m (97 kgf·cm, 84 in.-lbf)

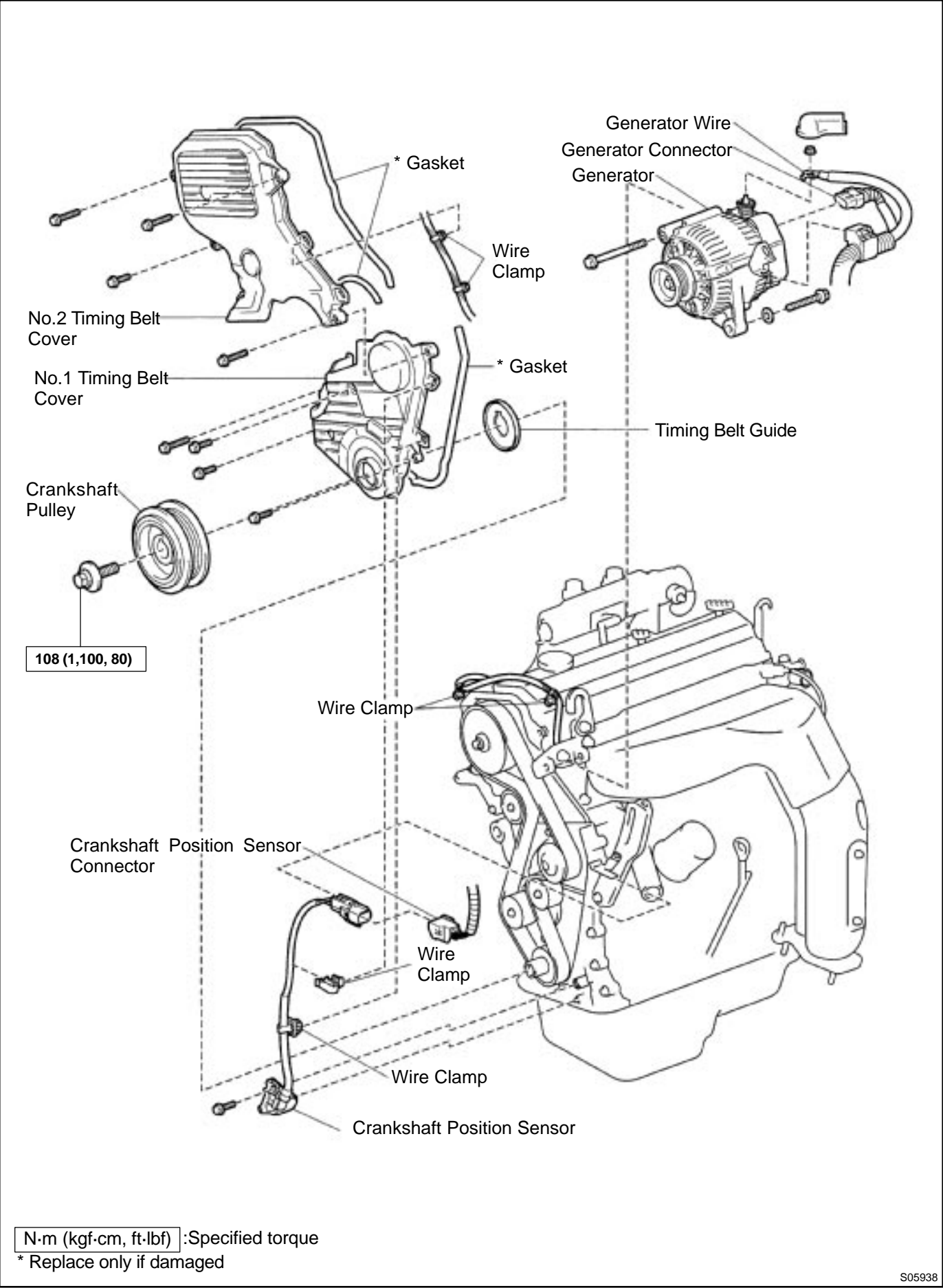
- (b) Connect the sensor connector.

CRANKSHAFT POSITION SENSOR COMPONENTS

IG047-03

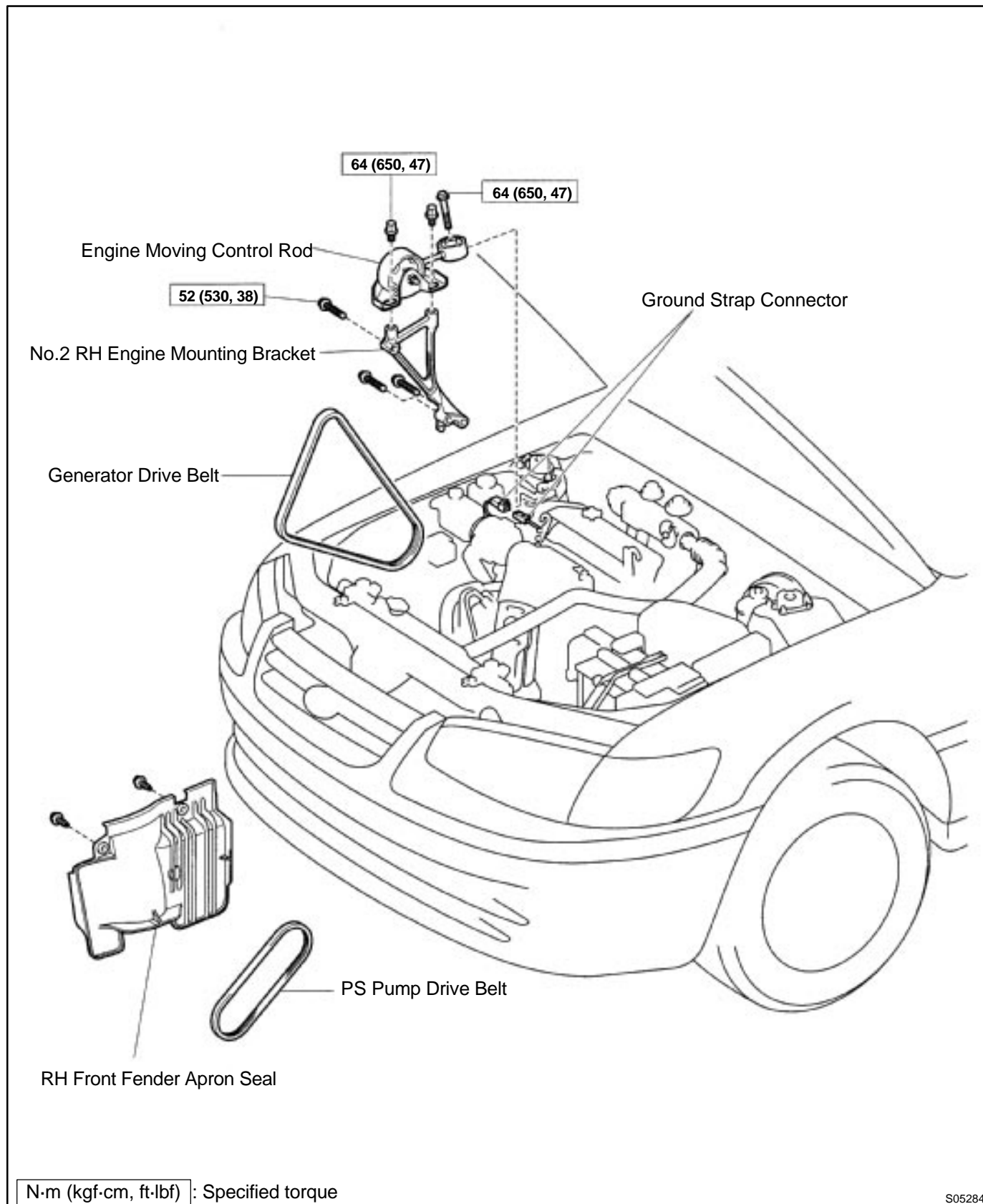


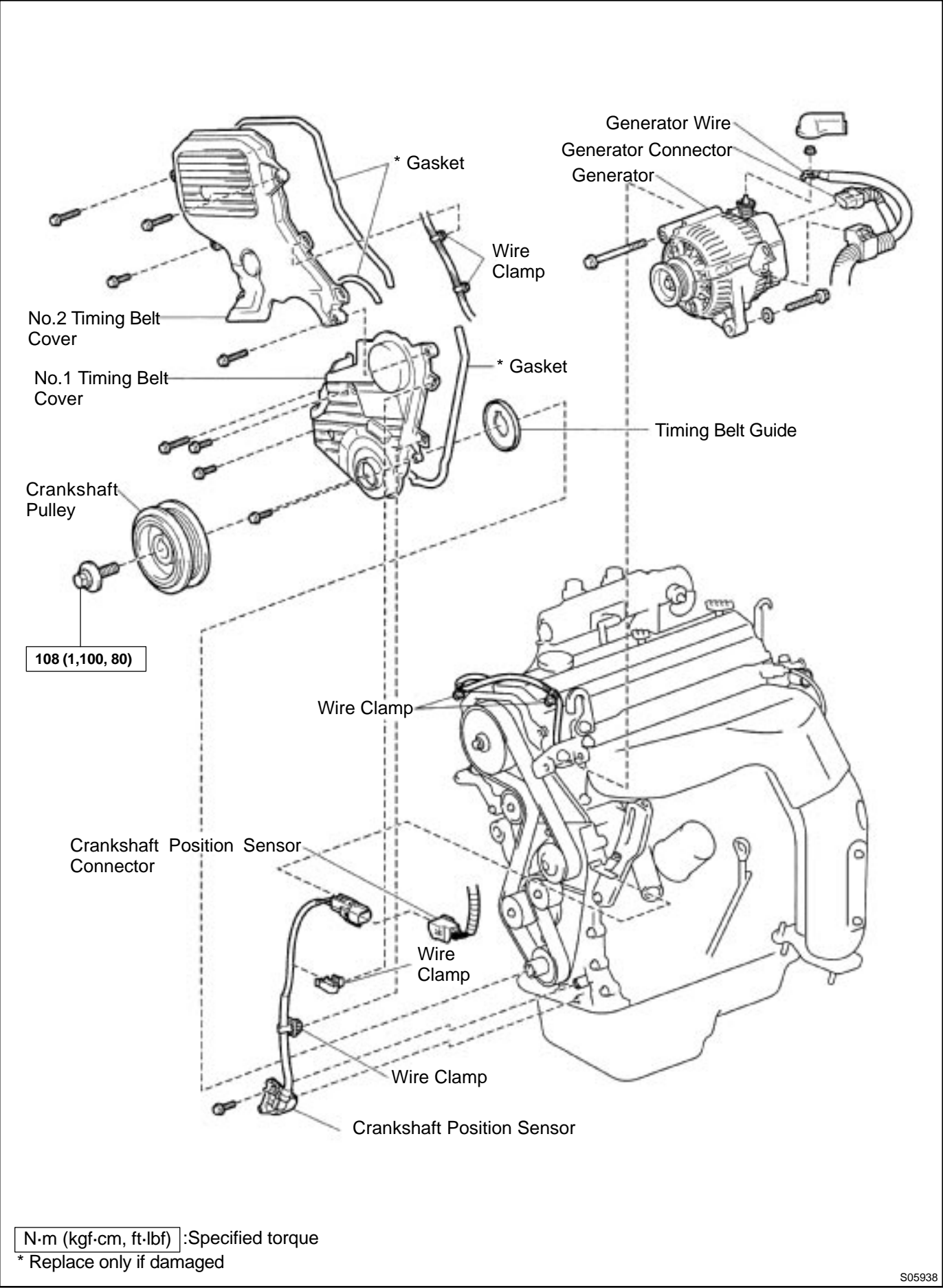
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CRANKSHAFT POSITION SENSOR COMPONENTS

IG047-03





IGNITION SYSTEM

ON-VEHICLE INSPECTION

IG0DF-01

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

1. INSPECT IGNITER AND SPARK TEST

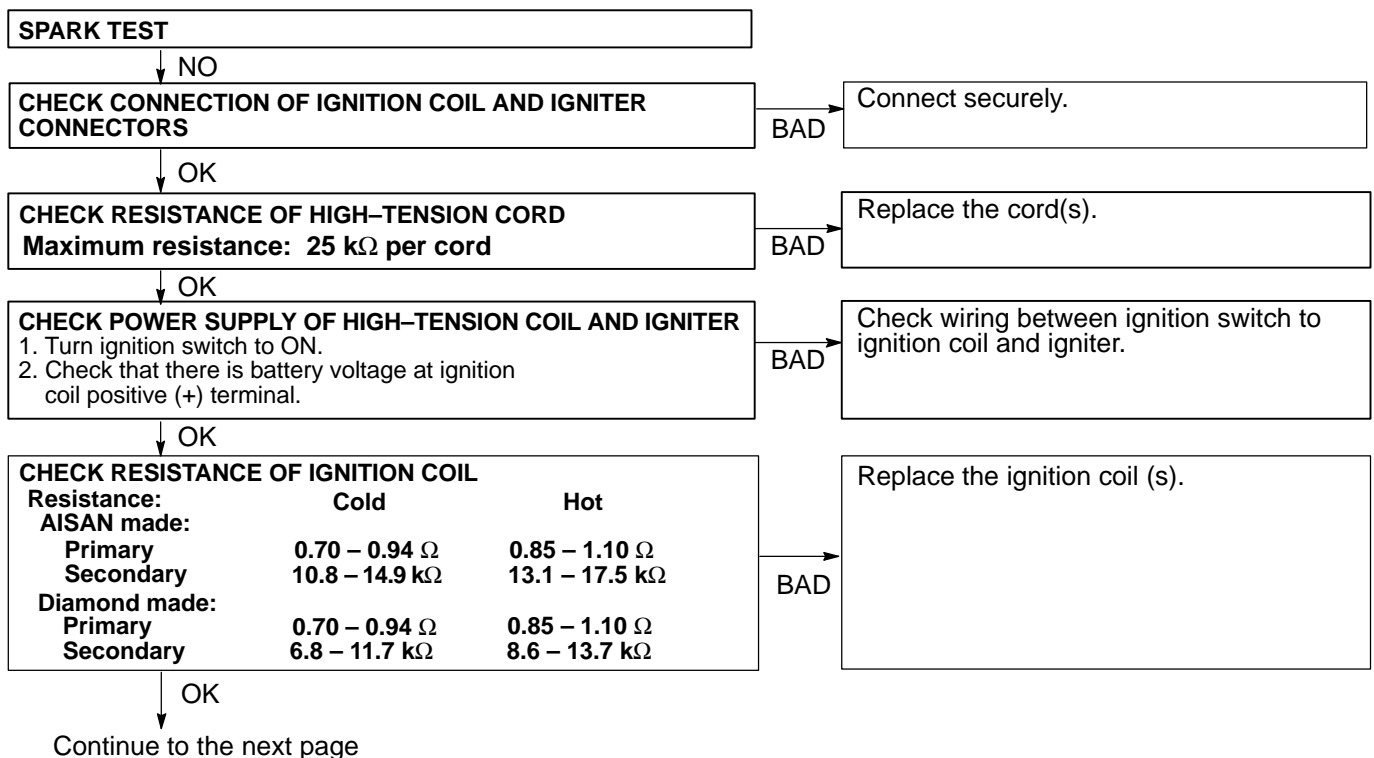
Check that the spark occurs.

- (1) Remove the ignition coil.
- (2) Remove the spark plug.
- (3) Install the spark plug to the ignition coil, and connect the ignition coil connector.
- (4) Ground the spark plug.
- (5) Check if spark occurs while engine is being cranked.

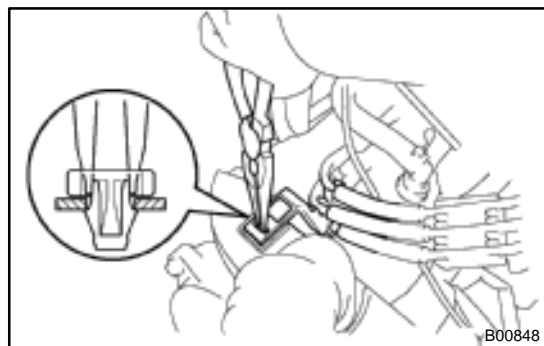
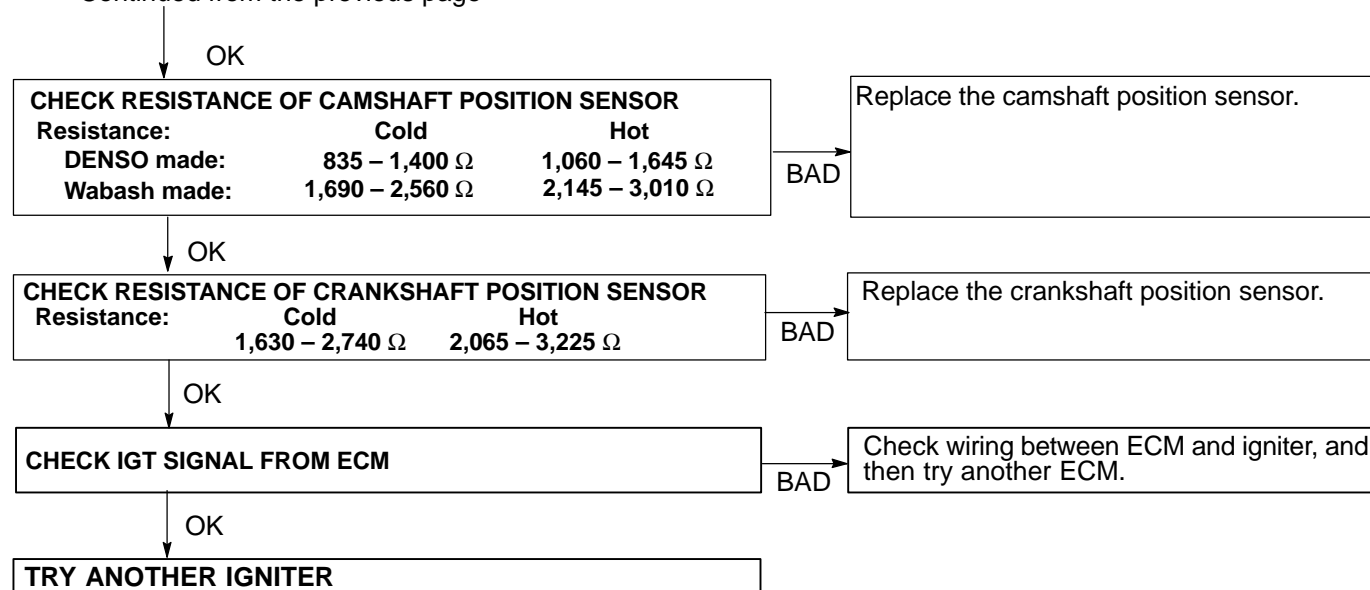
NOTICE:

To prevent excess fuel being injected from the injectors during this test, do not crank the engine for more 5 – 10 seconds at a time.

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

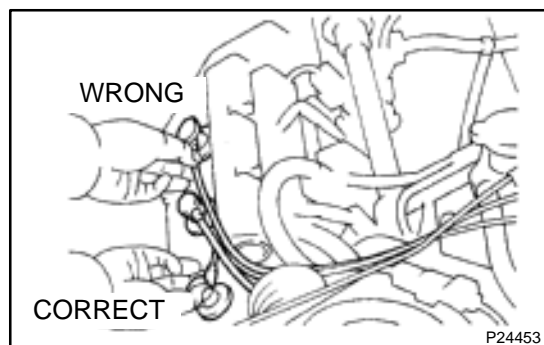


Continued from the previous page



2. INSPECT HIGH-TENSION CORDS

- (a) Remove the V-bank cover.
- (b) Disconnect the high-tension cords from the spark plugs.
 - (1) Using needle-nose pliers, disconnect the cord clamp from the engine wire protector.

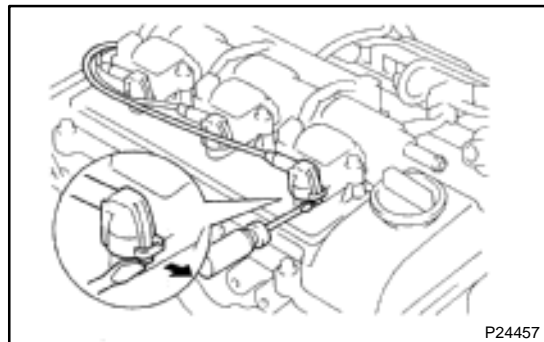


- (2) Disconnect the high-tension cords from the spark plugs.

NOTICE:

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

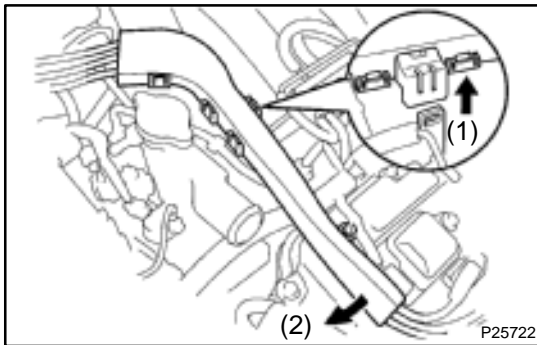
- (3) Disconnect the high-tension cords from the clamp.



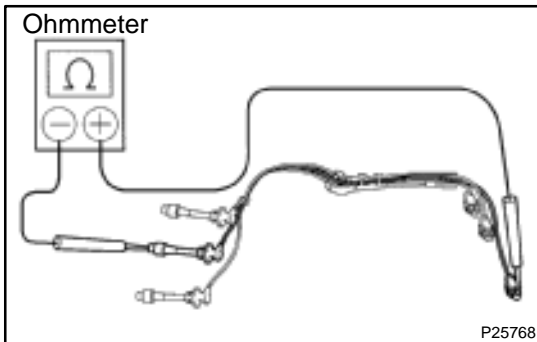
- (c) Disconnect the high-tension cords from the ignition coils.
 - (1) Using a screwdriver, lift up the lock claw and disconnect the holder from the ignition coils.
 - (2) Disconnect the high-tension cord at the grommet.

NOTICE:

- ◆ Pulling on or bending the cords may damage the conductor inside.
- ◆ Do not wipe any of the oil from the grommet after the high-tension cord is disconnected.

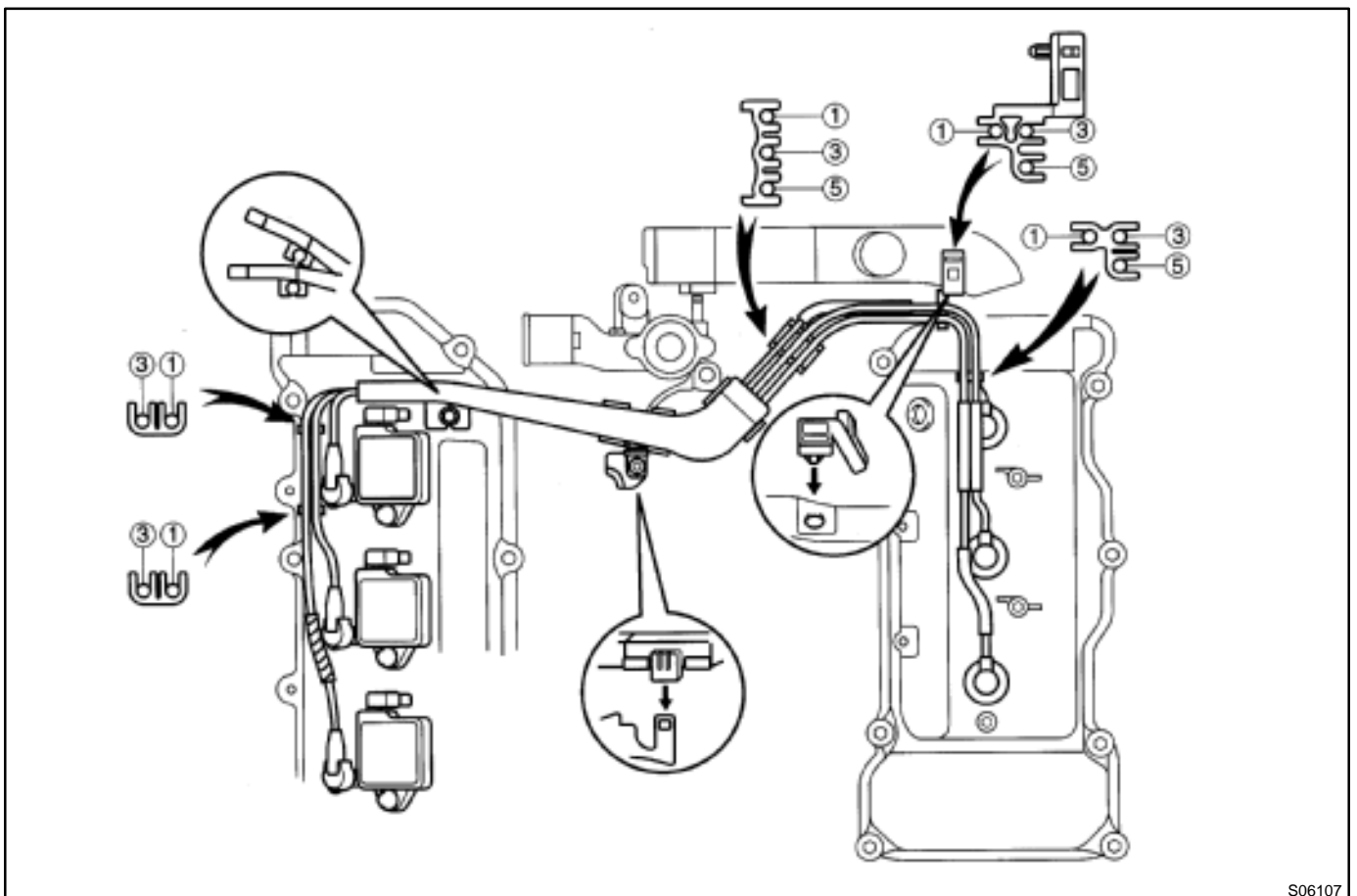


- (d) Remove the high-tension cords set.
- (1) Disconnect the clamp from the emission control valve set.
 - (2) Remove the high-tension cords set in indicated direction.

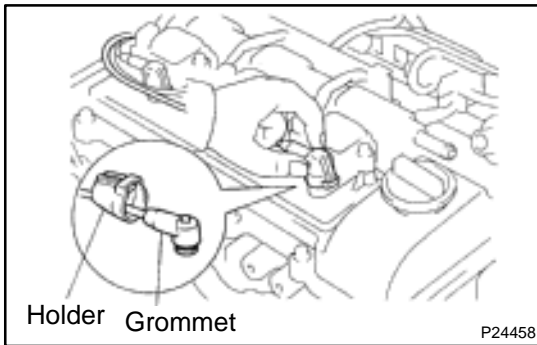


- (e) Using an ohmmeter, measure the resistance.
Maximum resistance: 25 kΩ per cord
 If the resistance is greater than maximum, check the terminals.
 If necessary, replace the high-tension cord.

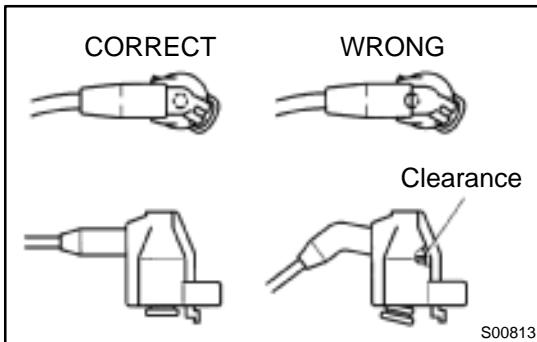
- (f) Install the high-tension cords set.



S06107



- (g) Connect the high-tension cords to the ignition coils.
- (1) Assemble the holder and grommet.
 - (2) Align the spline of the ignition coil with the spline of the holder, and push in the cord.

**NOTICE:**

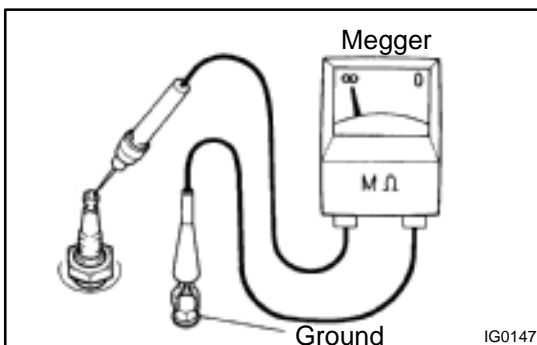
Check that the holder is correctly installed to the grommet and ignition coil as shown in the illustration.

- (3) Check that the lock claw of the holder is engaged by lightly pulling the holder.
- (h) Connect the high-tension cords to the spark plugs.
- (i) Install the V-bank cover.

3. INSPECT SPARK PLUGS**NOTICE:**

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

- (a) Remove the high-tension cords set. (See step 2)
- (b) Remove the ignition coils.



- (c) Inspect the electrode.
Using a megger (insulation resistance meter), measure the insulation resistance.

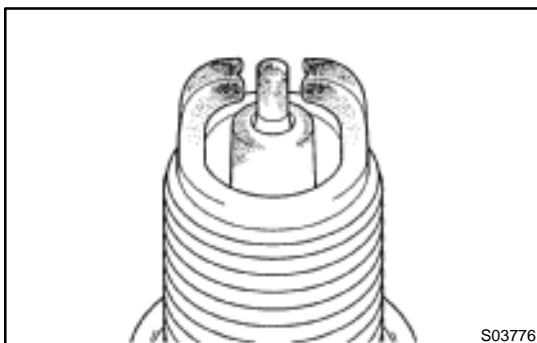
Standard correct insulation resistance:

10 MΩ or more

If the resistance is less than specified, proceed to step (e).

HINT:

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

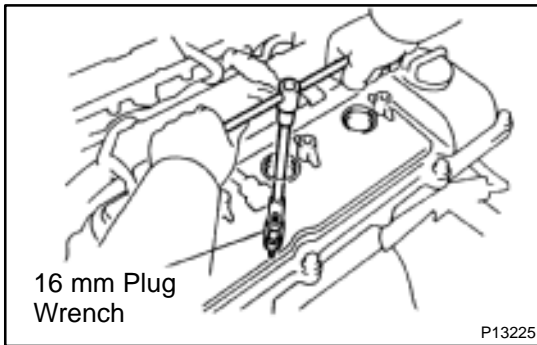


- (d) Simple Method:
 - (1) Quickly race the engine to 4,000 rpm 5 times.
 - (2) Remove the spark plug. (See step (e))
 - (3) Visually check the spark plug.

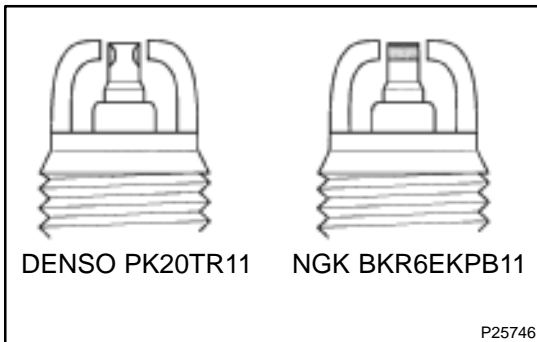
If the electrode is dry ... OK

If the electrode is wet ... Proceed to step (f)

- (4) Install the spark plug. (See step (i))



- (e) Using a 16 mm plug wrench, remove the 6 spark plugs from the RH and LH cylinder heads.

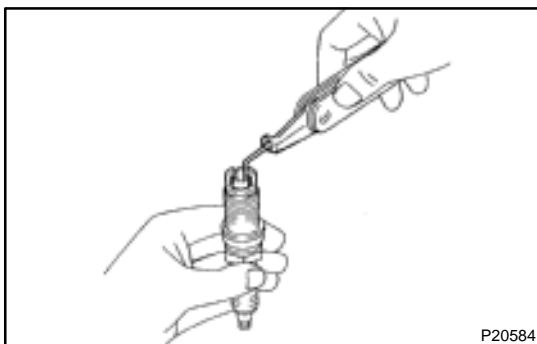


- (f) Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	PK20TR11
NGK made	BKR6EKP11



- (g) Inspect the electrode gaps.

Maximum electrode gap for used spark plug:

1.3 mm (0.051 in.)

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

Correct electrode gap for 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.



- (h) Clean the 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.

- (i) Using a 16 mm plug wrench, install the 6 spark plugs to the RH and LH cylinder heads.

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

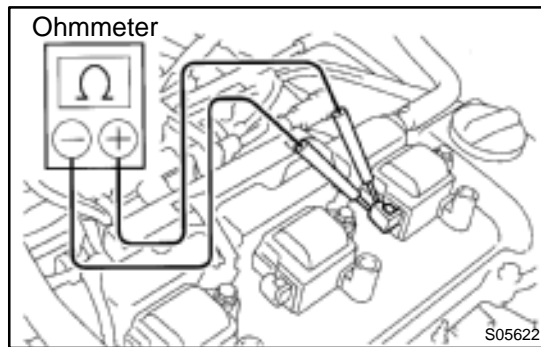
- (j) Install the ignition coils.

- (k) Install the high-tension cords set. (See step 2)

4. INSPECT IGNITION COILS

- (a) Disconnect the high-tension cords from the ignition coils.

- (b) Disconnect the ignition coil connectors.

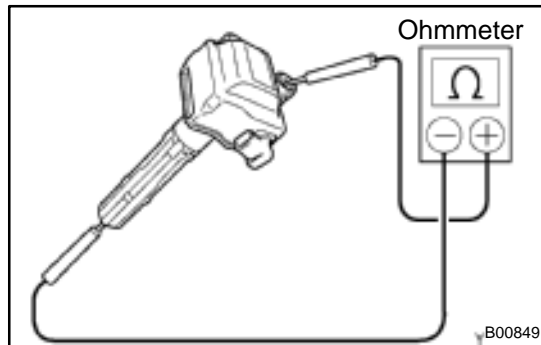


- (c) Using an ohmmeter, measure the primary coil resistance between the positive (+) and negative (–) terminals.

Primary coil resistance:

Cold	0.70 – 0.94 Ω
Hot	0.85 – 1.10 Ω

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



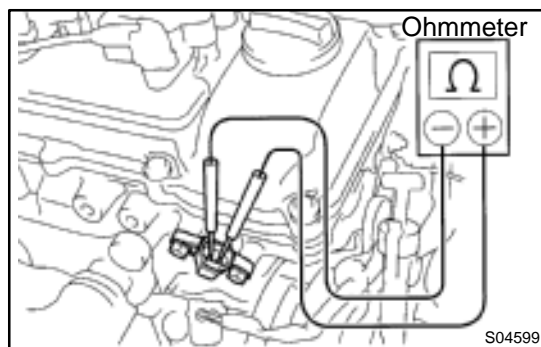
- (d) Using an ohmmeter, measure the secondary coil resistance between the positive (+) and high-tension terminal.

Secondary coil resistance:

AISAN made	Cold	10.8 – 14.9 kΩ
AISAN made	Hot	13.1 – 17.5 kΩ
Diamond made	Cold	6.8 – 11.7 kΩ
Diamond made	Hot	8.6 – 13.7 kΩ

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

- (e) Connect the ignition coil connectors.
(f) Connect the high-tension cords to the ignition coils.



5. INSPECT CAMSHAFT POSITION SENSOR

- (a) Disconnect the camshaft position sensor connector.
(b) Using an ohmmeter, measure the resistance between terminals.

Resistance:

DENSO made	Cold	835 – 1,400 Ω
DENSO made	Hot	1,060 – 1,645 Ω
Wabash made	Cold	1,690 – 2,560 Ω
Wabash made	Hot	2,145 – 3,010 Ω

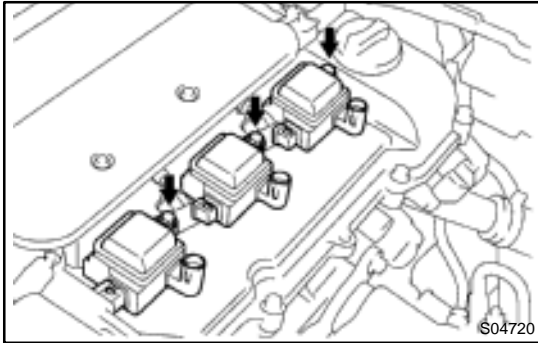
If the resistance is not as specified, replace the camshaft position sensor.

- (c) Connect the camshaft position sensor connector.

IGNITION COIL REMOVAL

IG02I-03

1. **DISCONNECT HIGH-TENSION CORDS FROM
IGNITION COILS (See page IG-1)**



2. **REMOVE IGNITION COILS**

- (a) Disconnect the 3 connectors from the ignition coil.
- (b) Remove the 3 bolts and 3 ignition coils from the LH cylinder head.

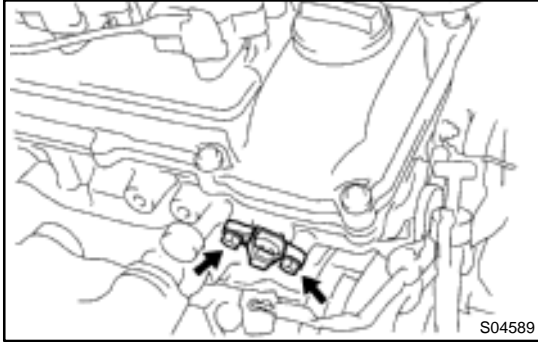
Torque: 8 N·m (80 kgf·cm, 69 in.-lbf)

HINT:

Arrange the ignition coils in correct order.

INSTALLATION

Installation is in the reverse order of removal. (See page IG-7)



CAMSHAFT POSITION SENSOR REMOVAL

IG02K-03

REMOVE CAMSHAFT POSITION SENSOR

- (a) Disconnect the camshaft position sensor connector.
- (b) Remove the 2 bolts and camshaft position sensor.

Torque: 8 N·m (80 kgf·cm, 69 in.-lbf)

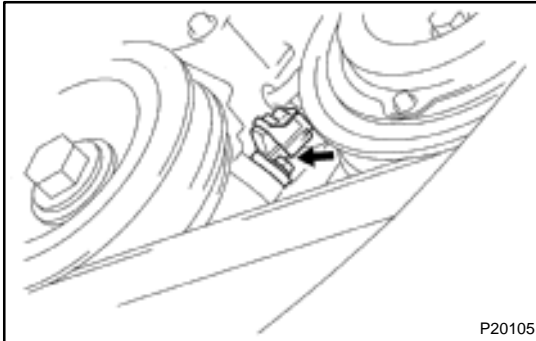
INSTALLATION

Installation is in the reverse order of removal. (See page IG-9)

CRANKSHAFT POSITION SENSOR REMOVAL

IG02M-03

1. REMOVE RH FENDER APRON SEAL

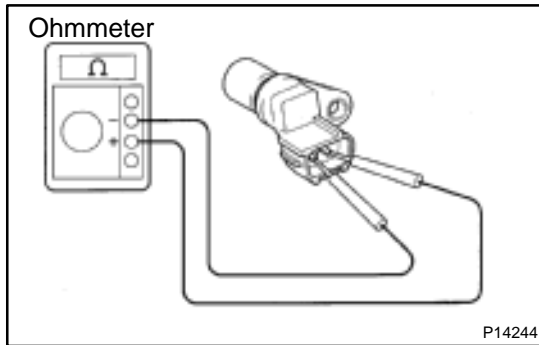


2. REMOVE CRANKSHAFT POSITION SENSOR

- (a) Remove the bolt and disconnect the crankshaft position sensor.

Torque: 8 N·m (80 kgf·cm, 69 in.-lbf)

- (b) Disconnect the crankshaft position sensor connector.



INSPECTION

NOTICE:

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INSPECT CRANKSHAFT POSITION SENSOR RESISTANCE

Using an ohmmeter, measure the resistance between terminals.

Resistance:

Cold	1,630 – 2,740 Ω
Hot	2,065 – 3,225 Ω

If the resistance is not as specified, replace the crankshaft position sensor.

INSTALLATION

Installation is in the reverse order of removal. (See page IG-11)