

IGNITION SYSTEM (1GR-FE)

ON-VEHICLE INSPECTION

1806J-02

NOTICE:

"Cold" and "Hot" in this section mean 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 IGNITION COIL ASSY AND SPARK TEST

- (a) Confirm DTCs.

NOTICE:

If DTC is present perform a troubleshooting in accordance with a procedure for that DTC.

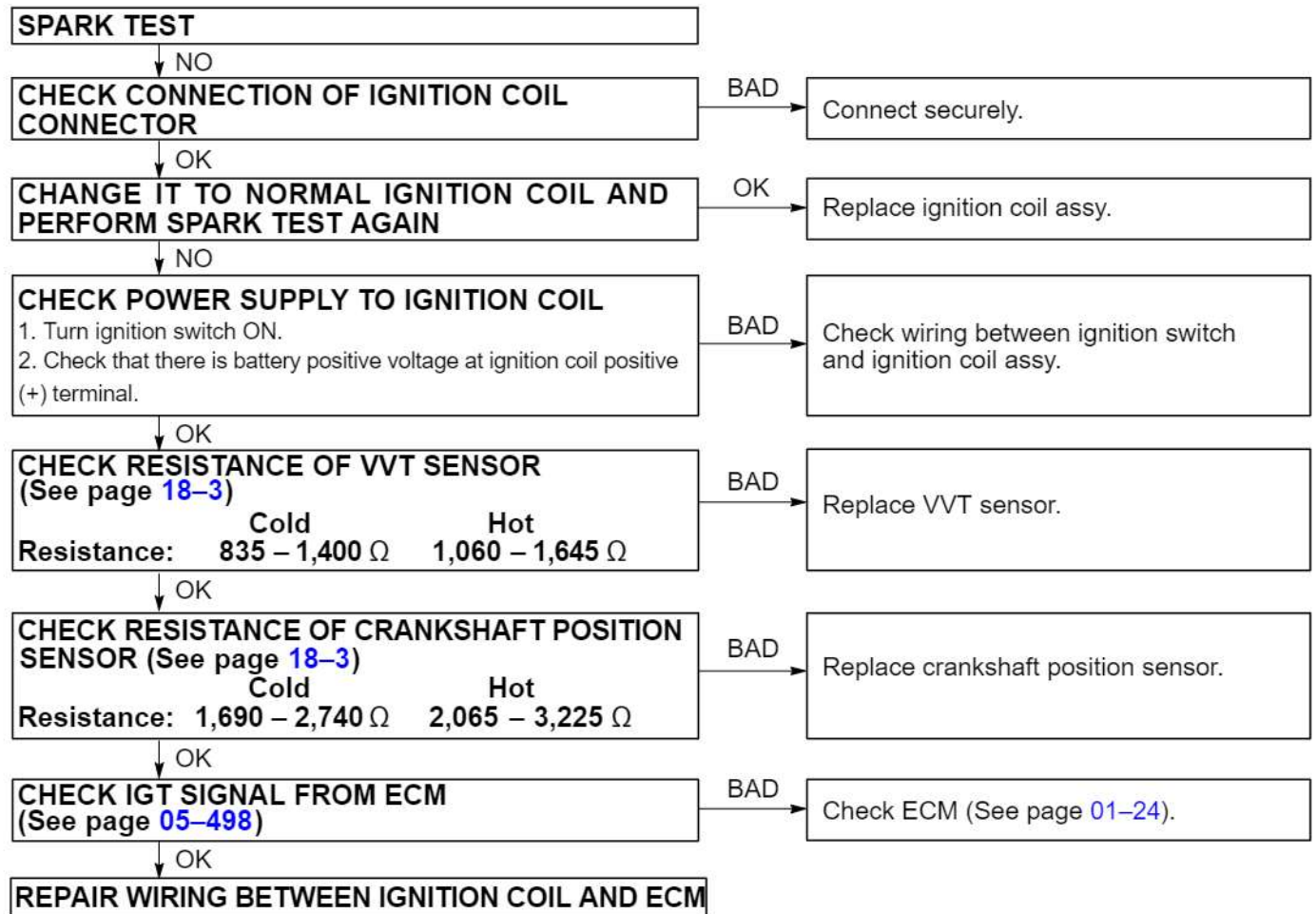
- (b) Check that spark occurs.

- (1) Remove the ignition coils.
- (2) Using a 16mm (0.63 in) plug wrench, remove the spark plugs.
- (3) Install the spark plugs to each ignition coil, and connect the ignition coil connectors.
- (4) Disconnect the 6 injector connectors.
- (5) Ground the spark plugs.
- (6) Check if spark occurs while engine is being cranked.

NOTICE:

- Be sure to ground the spark plug when checking.
- Replace the ignition coil when it is given impact.
- Do not crank the engine for more than 2 seconds.

If the spark does not occur, do the test as follow.



- (c) Using a 16 mm (0.63 in.) plug wrench, install the spark plugs.
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)
- (d) Install the ignition coils.
Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

INSPECTION

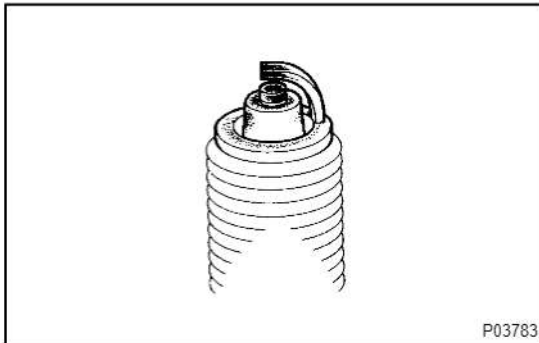


1. INSPECT SPARK PLUG

- (a) Clean the spark plugs.

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

Duration: 20 seconds or less

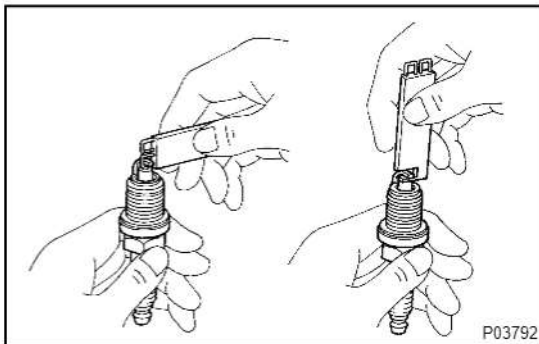


- (b) Check the spark plug for any damage on its thread and insulator.

If there is damage, replace the spark plug.

Recommended spark plug:

NGK made	LFR6C-11
DENSO made	K20HR-U11



- (c) Adjust electrode gap.

Electrode gap: 1.0 – 1.1 mm (0.039 – 0.043 in.)

Maximum electrode gap: 1.46 mm (0.057 in.)

2. INSPECT VVT SENSOR

- (a) Using an ohmmeter, measure the resistance between terminals.

RESISTANCE:

835 – 1400 Ω at cold

1060 – 1645 Ω at hot

NOTICE:

"Cold" and "Hot" mean 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).

3. INSPECT CRANKSHAFT POSITION SENSOR

- (a) Using an ohmmeter, measure the resistance between terminals.

RESISTANCE:

1630 – 2740 Ω at cold

2065 – 3225 Ω at hot

NOTICE:

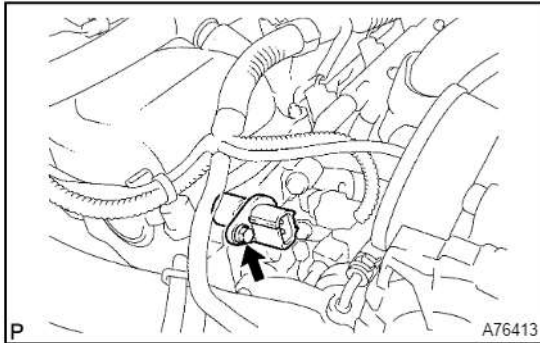
"Cold" and "Hot" mean the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

VVT SENSOR (1GR-FE)

REPLACEMENT

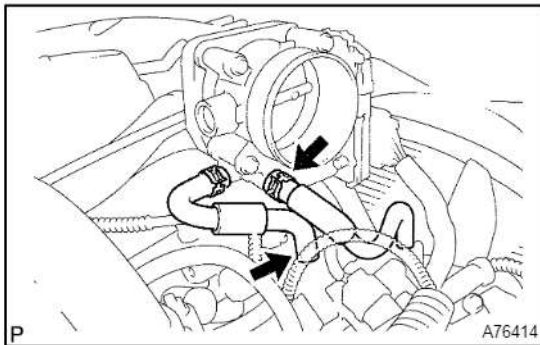
18061-02

1. DRAIN ENGINE COOLANT (See page 16-5)
2. REMOVE V-BANK COVER (See page 10-7)
3. DISCONNECT VENTILATION HOSE NO.2 (See page 10-7)
4. REMOVE AIR CLEANER ASSY (See page 10-7)

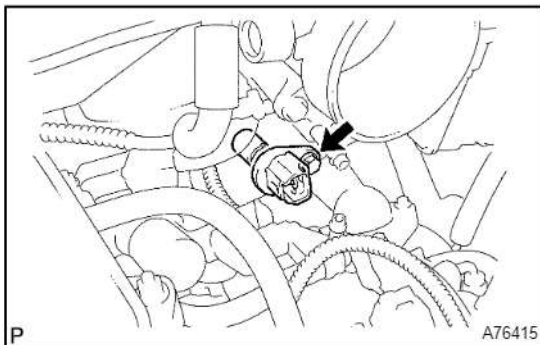


5. REMOVE VVT SENSOR

- (a) RH bank side VVT sensor.
 - (1) Disconnect the VVT sensor connector.
 - (2) Remove the bolt and VVT sensor.



- (b) LH bank side VVT sensor.
 - (1) Disconnect the water by-pass hoses No. 4 and No. 5.
 - (2) Disconnect the VVT sensor connector.



- (3) Remove the bolt and VVT sensor.

6. INSTALL VVT SENSOR

- (a) LH bank side VVT sensor.
 - (1) Apply a light coat of engine oil to an O-ring of the VVT sensor.
 - (2) Install the VVT sensor with the bolt.

Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)

 - (3) Connect the VVT sensor connector.
 - (4) Connect the water by-pass hose No. 4 and No. 5.

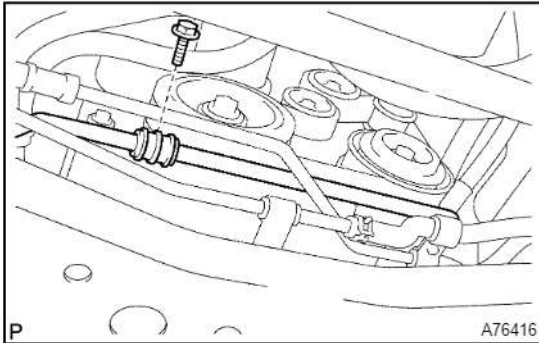
- (b) RH bank side VVT sensor.
 - (1) Apply a light coat of engine oil to an O-ring of the VVT sensor.
 - (2) Install the VVT sensor with the bolt.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
 - (3) Connect the VVT sensor connector.
- 7. **INSTALL AIR CLEANER ASSY (See page 10-7)**
- 8. **CONNECT VENTILATION HOSE NO.2**
- 9. **ADD ENGINE COOLANT (See page 16-5)**
- 10. **CHECK FOR ENGINE COOLANT LEAKS (See page 16-1)**
- 11. **INSTALL V-BANK COVER**
 - (a) Install the V-bank cover with the 2 nuts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

CRANKSHAFT POSITION SENSOR (1GR-FE)

REPLACEMENT

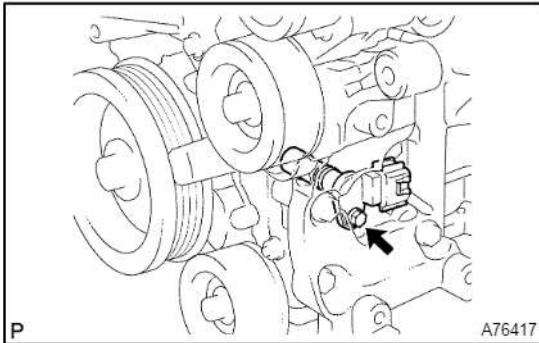
1806H-02

1. REMOVE GENERATOR ASSY (See page 19-26)
2. REMOVE ENGINE UNDER COVER ASSY REAR
 - (a) Remove the 4 bolts and engine under cover assy rear.



3. SEPARATE COOLER COMPRESSOR ASSY

- (a) Remove the bolt and separate the suction hose sub-assy.
- (b) Disconnect the cooler compressor assy connector.
- (c) Remove the 4 bolts, and separate cooler compressor assy from the V-ribbed belt tensioner assy.



4. REMOVE CRANKSHAFT POSITION SENSOR

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

5. INSTALL CRANKSHAFT POSITION SENSOR

- (a) Apply a light coat of engine oil to an O-ring of the crankshaft position sensor.
- (b) Install the crankshaft position sensor with the bolt.
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)
- (c) Connect the crankshaft position sensor connector.

6. INSTALL COOLER COMPRESSOR ASSY

- (a) Install the cooler compressor assy with the 4 bolts.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)
- (b) Connect the cooler compressor assy connector.
- (c) Install the suction hose sub-assy with the bolt.
Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)

7. INSTALL ENGINE UNDER COVER ASSY REAR

- (a) Install the engine under cover assy rear with the 4 bolts.
Torque: 29 N·m (296 kgf·cm, 21 ft·lbf)

8. INSTALL GENERATOR ASSY (See page 19-26)

IGNITION SYSTEM (2UZ-FE)

ON-VEHICLE INSPECTION

18057-03

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 IGNITION COIL ASSY AND SPARK TEST

(a) Confirm DTC.

NOTICE:

If DTC is indicated, carry out troubleshooting in accordance with the procedure on the following DTC.

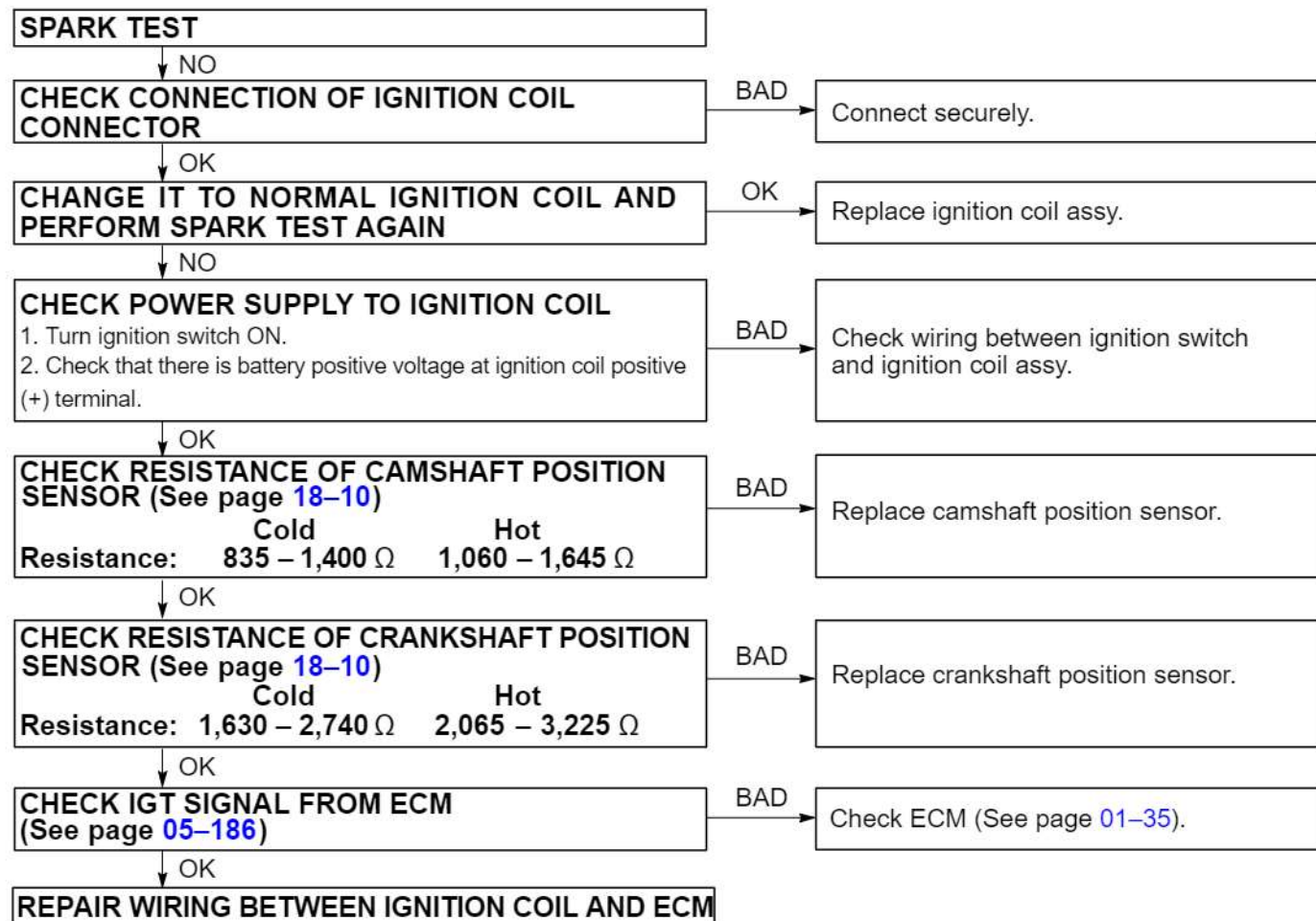
(b) Check that the spark occurs.

- (1) Remove the ignition coils.
- (2) Using a 16mm (0.63 in) plug wrench, remove the spark plugs.
- (3) Install the spark plugs to each ignition coils, and connect the ignition coil connectors.
- (4) Disconnect the 8 injector connectors.
- (5) Ground the spark plugs.
- (6) Check if spark occurs while engine is being cranked.

NOTICE:

- Be sure to ground the spark plug, when checking.
- Replace the ignition coil when it is given an impact.
- Do not crank the engine for more than 2 seconds.

If the spark does not occur, do the test as follow.



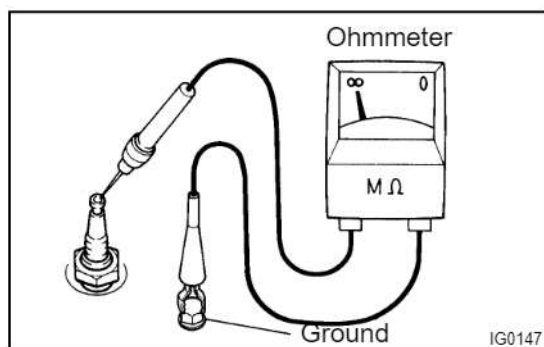
- (c) Using a 16 mm (0.63 in.) plug wrench, install the spark plugs.
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)
- (d) Install the ignition coils.
Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

INSPECTION

1. SPARK PLUG

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 200,000 km (12,000 miles).



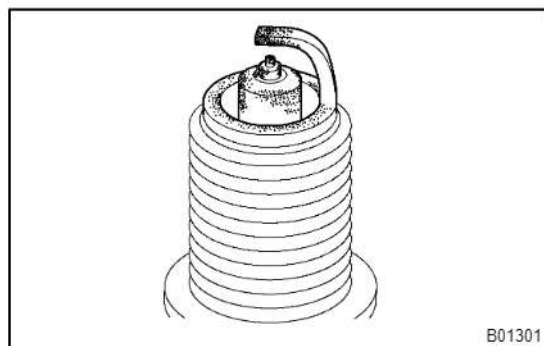
- (a) Check the electrode.
- (1) Using a ohmmeter, measure the insulation resistance.

Correct insulation resistance: 10 MΩ or more

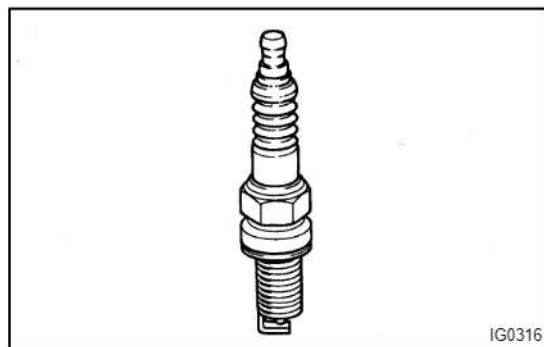
If the resistance is less than specified, proceed to step (d).

HINT:

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



- (b) Simple Method:
- (1) Quickly race the engine to 4,000 rpm 5 times.
 - (2) Remove the spark plug.
 - (3) Visually check the spark plug.
 - (4) If the electrode is dry...OK.
 - (5) If the electrode is wet...Proceed to step (C).
 - (6) Reinstall the spark plug.

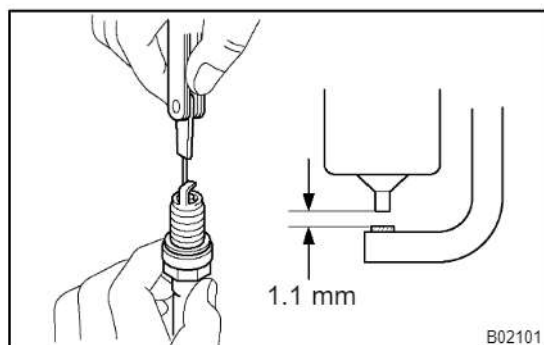


- (c) Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	SK20R11
NGK made	IFR6A11



- (d) Check the spark plug electrode gap.
- 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:**
1.0 – 1.1 mm (0.039 – 0.043 in.)



(e) 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: Blow 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.

2. CAMSHAFT POSITION SENSOR

(a) Using an ohmmeter, measure the resistance between terminals.

RESISTANCE:

at cold 835 – 1400 Ω

at hot 1060 – 1645 Ω

NOTICE:

"Cold" and "Hot" on the table 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).

3. CRANKSHAFT POSITION SENSOR

(a) Using an ohmmeter, measure the resistance between terminals.

RESISTANCE:

at cold 1630 – 2740 Ω

at hot 2065 – 3225 Ω

NOTICE:

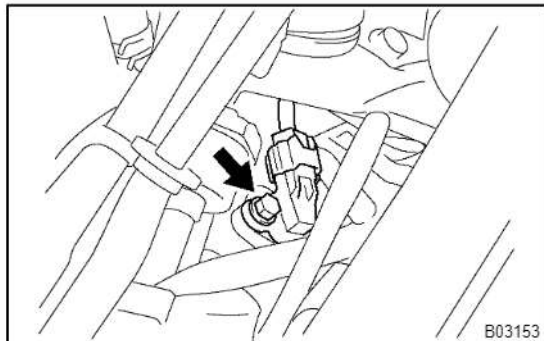
"Cold" and "Hot" on the table express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

CRANK POSITION SENSOR (2UZ-FE)

REPLACEMENT

1809E-03

1. REMOVE ENGINE UNDER COVER ASSY REAR



2. REMOVE CRANK POSITION SENSOR

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

3. INSTALL CRANK POSITION SENSOR

- (a) Install crank position sensor with bolt.
Torque: 6.5 N·m (65 kgf·cm, 58 in.·lbf)

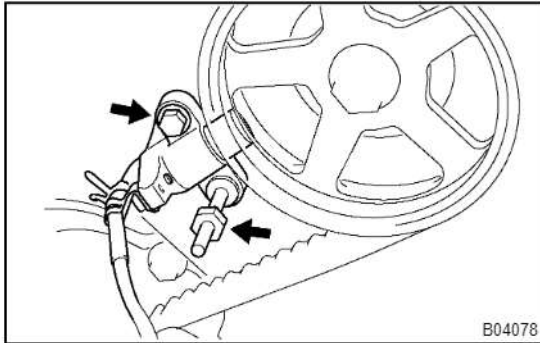
4. INSTALL ENGINE UNDER COVER ASSY REAR

CAM POSITION SENSOR ASSY (2UZ-FE)

1805F-03

REPLACEMENT

1. DRAIN ENGINE COOLANT (See page 16-17)
2. REMOVE FAN AND GENERATOR V BELT (See page 14-194)
3. REMOVE OIL COOLER PIPE (See page 14-296)
4. REMOVE TIMING BELT COVER SUB-ASSY N0.3 LH (See page 14-296)



5. REMOVE CAM POSITION SENSOR ASSY

- (a) Remove the bolt, stud bolt and cam position sensor.

6. INSTALL CAM POSITION SENSOR ASSY

- (a) Install the cam position sensor with bolt and stud bolt.
Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)
7. INSTALL TIMING BELT COVER SUB-ASSY N0.3 LH (See page 14-296)
8. INSTALL OIL COOLER PIPE (See page 14-296)
9. INSTALL FAN AND GENERATOR V BELT (See page 14-194)
10. REFILL ENGINE COOLANT (See page 16-17)
11. CHECK FOR ENGINE COOLANT LEAKS(See page 16-13)