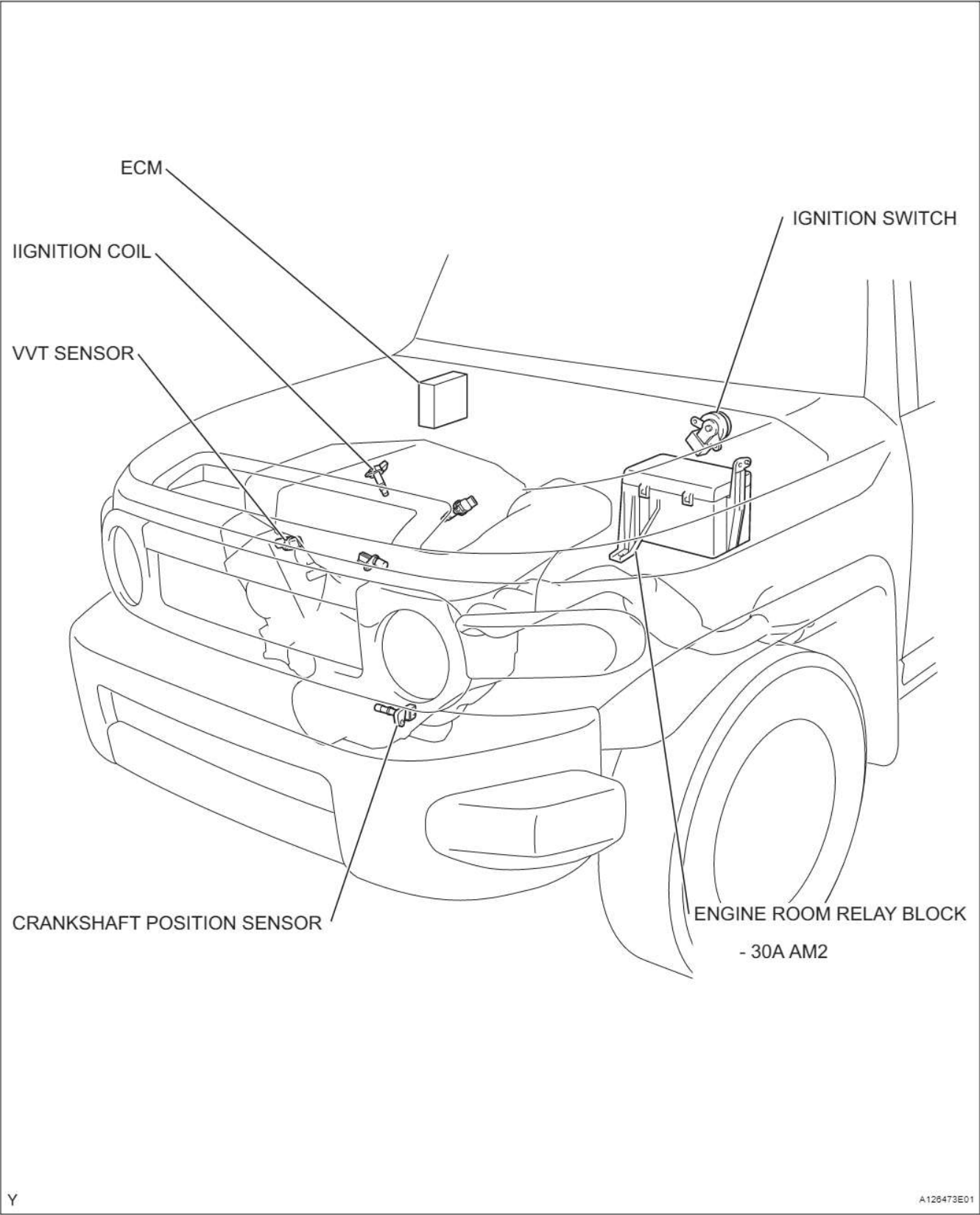


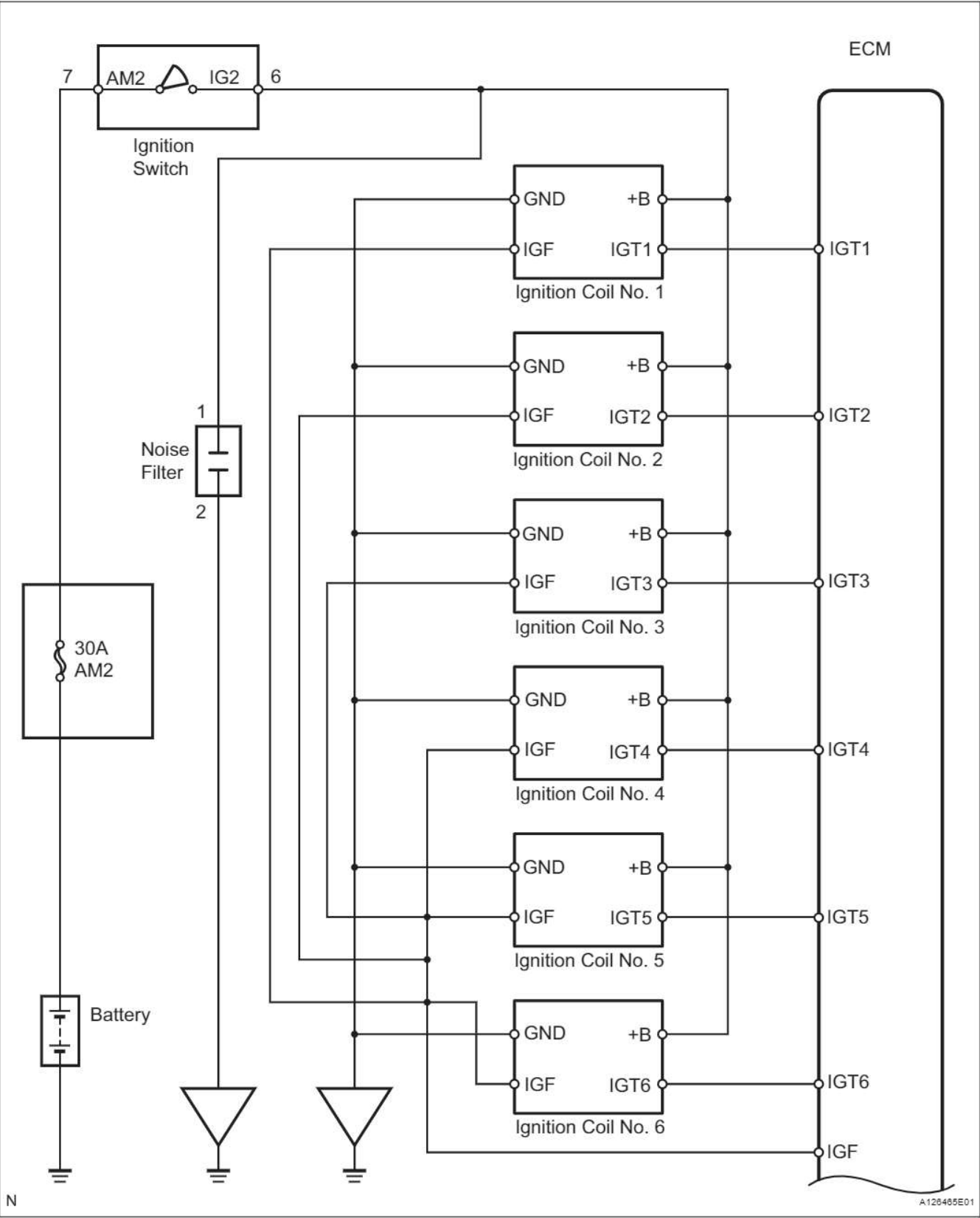
IGNITION SYSTEM
PARTS LOCATION



IG-2

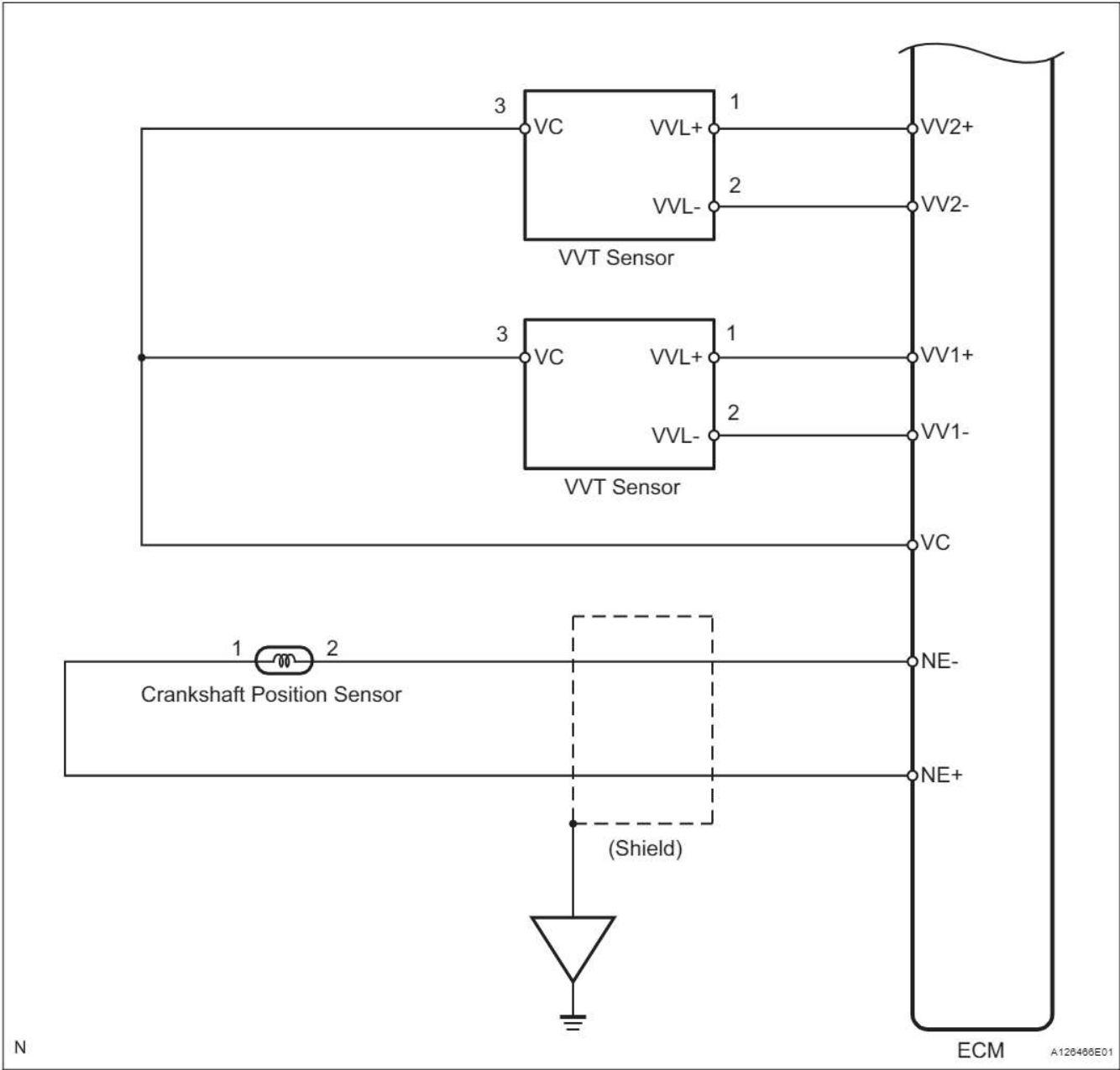
1GR-FE IGNITION – IGNITION SYSTEM

SYSTEM DIAGRAM



1GR-FE IGNITION – IGNITION SYSTEM

IG-3



IG

ON-VEHICLE INSPECTION

1. CHECK IGNITION COIL ASSEMBLY AND PERFORM SPARK TEST

- (a) Check for DTCs.

NOTICE:

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

- (b) Check that sparks occur.
- (1) Remove the ignition coils.
 - (2) Using a 16 mm plug wrench, remove the spark plugs.
 - (3) Install the spark plugs onto the ignition coils, and connect the ignition coil connectors.
 - (4) Disconnect the 6 injector connectors.
 - (5) Ground the spark plugs.
 - (6) Check that sparks occur at each spark plug while the engine is being cranked.

NOTICE:

- **Be sure to ground the spark plugs when checking.**
- **Replace any ignition coils that have been subjected to any physical impact.**
- **Do not crank the engine for more than 2 seconds.**

If sparks do not occur, perform the following test:

- (c) Spark test flow chart.
- (1) Check that the wire harness side connector of ignition coil with igniter is securely connected.

Result

Result	Proceed to
NG	Connect securely.
OK	Go to next step.

- (2) Perform the spark test on each ignition coil with igniter.
1. Replace the ignition coil with igniter with a functioning one.
 2. Perform the spark test again.

Result

Result	Proceed to
OK	Replace ignition coil with igniter.
NG	Go to next step.

- (3) Check that the power is supplied to the ignition coil.
1. Turn the ignition switch ON.
 2. Check that the positive (+) battery voltage is applied to the positive (+) terminal of the ignition coil.

1GR-FE IGNITION – IGNITION SYSTEM

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Result

Result	Proceed to
NG	Check wiring between ignition switch and ignition coil assembly.
OK	Go to next step.

- (4) Measure the output voltage of the VVT sensor.
1. Inspect the VVT sensor in accordance with the procedure (See page ES-192).

Result

Result	Proceed to
NG	Replace VVT sensor
OK	Go to next step.

- (5) Check the resistance in crankshaft position sensor.

Standard resistance

Standard condition	Specified condition
at 20°C (68°F)	1,850 to 2,450 Ω

Result

Result	Proceed to
NG	Replace the crankshaft position sensor.
OK	Go to next step.

- (6) Check the IGT signal from the ECM.

Result

Result	Proceed to
NG	Check ECM
OK	Repair wiring between ignition coil and ECM.

- (d) Using a 16 mm plug wrench, install the spark plugs.
(e) Install the ignition coils.

2. INSPECT SPARK PLUG**NOTICE:**

Do not use a wire brush for cleaning.

- (a) Check the electrode.

- (1) Using a megaohmmeter, measure the insulation resistance.

Standard resistance:

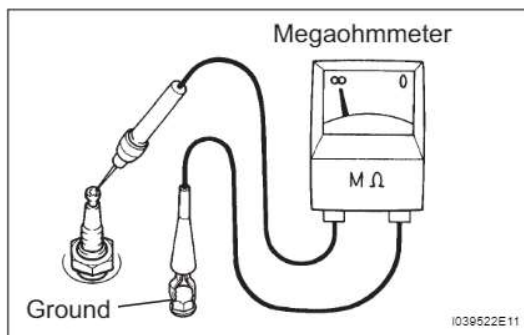
10 MΩ or more

HINT:

- If the result is not as specified, clean the spark plug with a spark plug cleaner and measure the resistance again.
- If a megaohmmeter is not available, perform the following simple inspection instead.

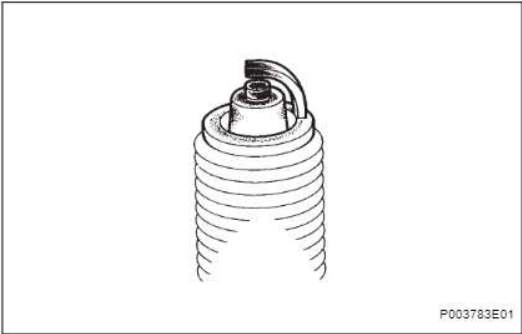
- (b) Alternative inspection method.

- (1) Quickly accelerate the engine to 4,000 rpm 5 times.
(2) Remove the spark plug.



IG-6

1GR-FE IGNITION – IGNITION SYSTEM

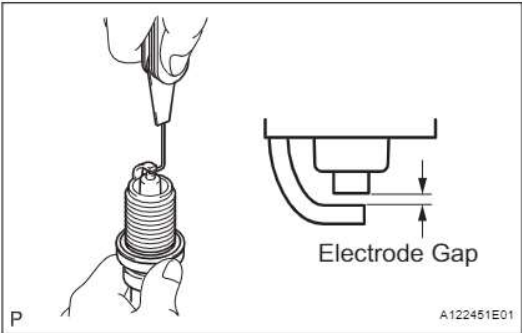


- (3) Visually check the spark plug.
If the electrode is dry, the spark plug is functioning properly. If the electrode is damp, proceed to the next step.

- (c) Check the spark plug for any damage to its thread and insulator.
If there is damage, replace the spark plug.

Recommended spark plug

Manufacturer	Product
DENSO	K20HR-U11
NGK	LFR6C11



- (d) Check the spark plug electrode gap.

Maximum electrode gap for used spark plug

Product	Electrode gap
K20HR-U11	1.1 mm (0.043 in.)
LFR6C11	1.1 mm (0.043 in.)

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

Electrode gap for new spark plug

Product	Electrode gap
K20HR-U11	1.0 to 1.1 mm (0.039 to 0.043 in.)
LFR6C11	1.0 to 1.1 mm (0.039 to 0.043 in.)

- (e) Clean the spark plug.
If the electrode has traces of wet carbon, clean the electrode with a spark plug cleaner and then dry it.

Air pressure:

Below 588 kPa (6 kg/cm², 85 psi)

Duration:

20 seconds or less

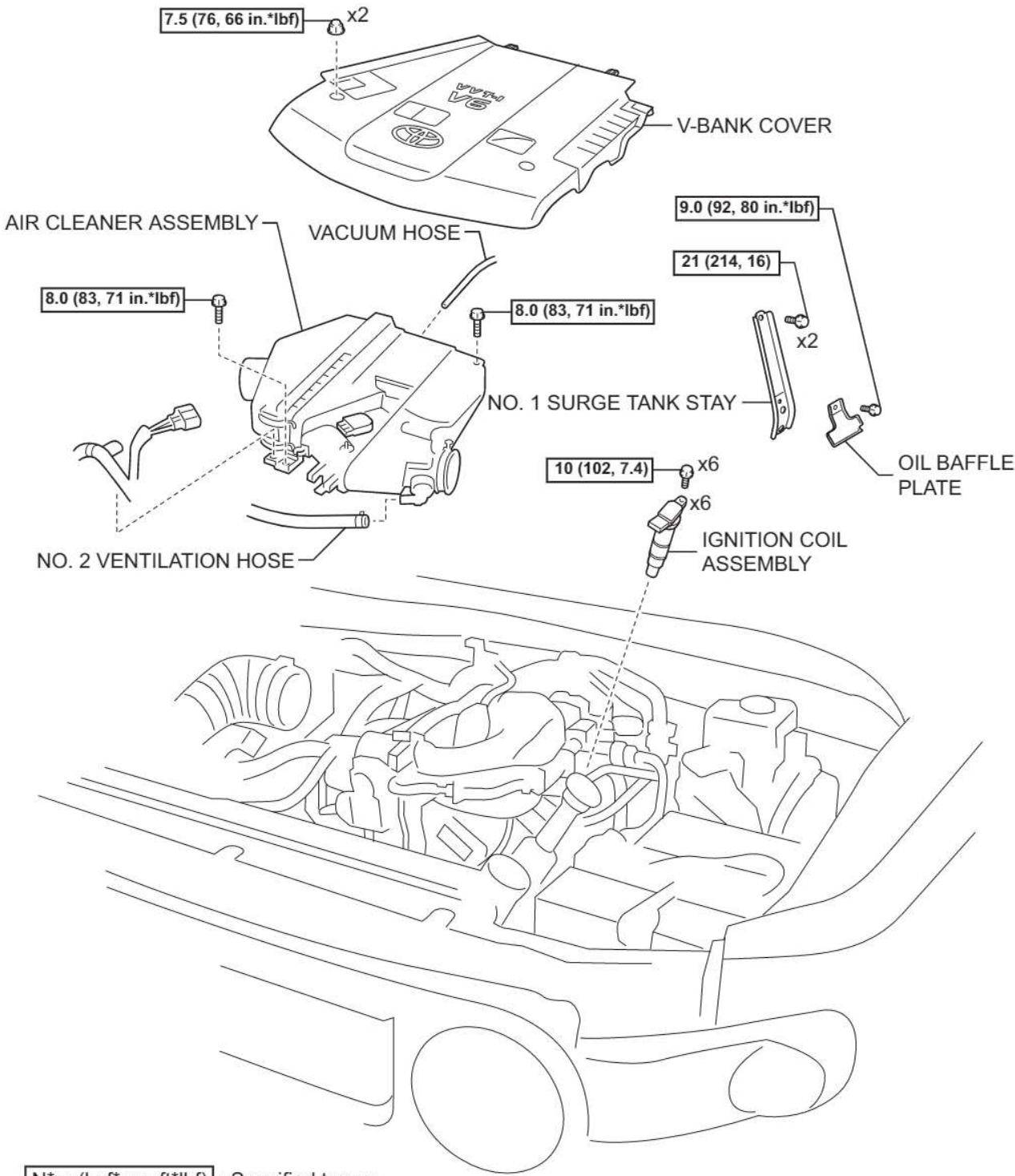
HINT:

Only use the spark plug cleaner when the electrode is free of oil. If the electrode has traces of oil, use gasoline to clean off the oil before using the spark plug cleaner.



IG

IGNITION COIL
COMPONENTS



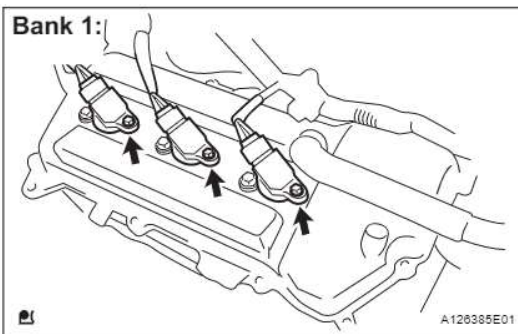
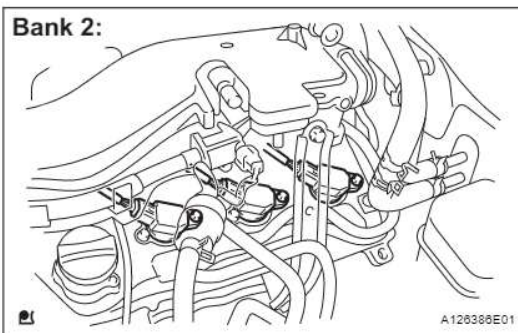
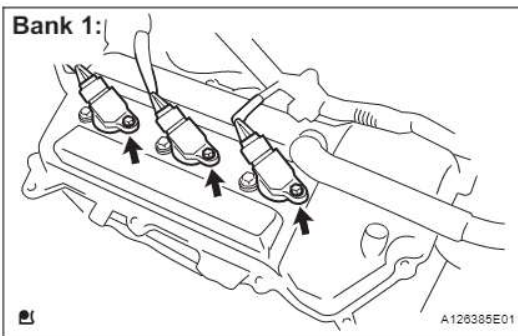
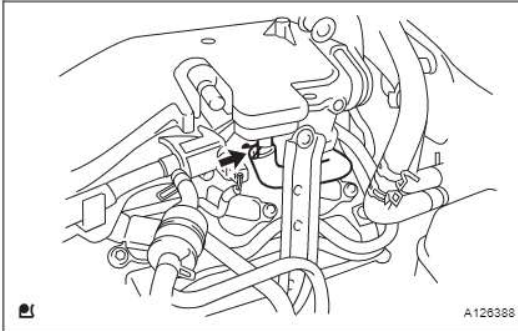
IG

IG-8

1GR-FE IGNITION – IGNITION COIL

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE V-BANK COVER (See page [ES-428](#))
3. REMOVE AIR CLEANER ASSEMBLY (See page [ES-429](#))
4. REMOVE OIL BAFFLE PLATE (See page [FU-11](#))
5. REMOVE NO. 1 SURGE TANK STAY (See page [FU-11](#))
6. DISCONNECT VENTILATION HOSE
 - (a) Disconnect the ventilation hose from the intake air surge tank.



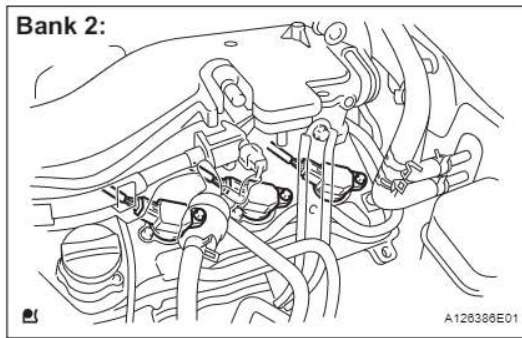
7. REMOVE IGNITION COIL ASSEMBLY

- (a) For Bank 1:
 - (1) Disconnect the 3 connectors.
 - (2) Remove the 3 bolts, then remove the 3 ignition coils.
- (b) For Bank 2:
 - (1) Disconnect the 3 connectors.
 - (2) Remove the 3 bolts, then remove the 3 ignition coils.

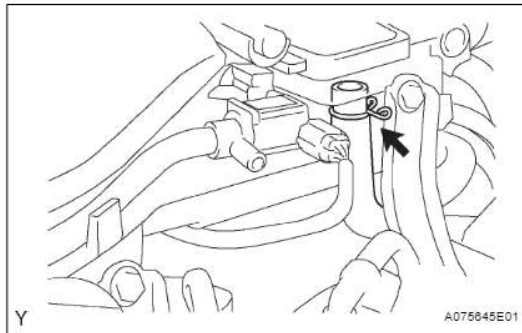
INSTALLATION

1. INSTALL IGNITION COIL ASSEMBLY

- (a) For Bank 1:
 - (1) Install the 3 ignition coils with the 3 bolts.
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf)
 - (2) Connect the 3 ignition coil connectors.

1GR-FE IGNITION – IGNITION COIL**IG-9**

- (b) For Bank 2:
- (1) Install the 3 ignition coils with the 3 bolts.
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf)
 - (2) Connect the 3 ignition coil connectors.



2. **CONNECT VENTILATION HOSE**
 - (a) Connect the ventilation hose to the intake air surge tank.
3. **INSTALL NO. 1 SURGE TANK STAY** (See page [FU-19](#))
4. **INSTALL OIL BAFFLE PLATE** (See page [FU-19](#))
5. **INSTALL AIR CLEANER ASSEMBLY** (See page [ES-431](#))
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)
7. **INSPECT IGNITION TIMING** (See page [EM-1](#))
8. **INSPECT ENGINE IDLING SPEED** (See page [EM-2](#))
9. **INSTALL V-BANK COVER** (See page [ES-431](#))

IG