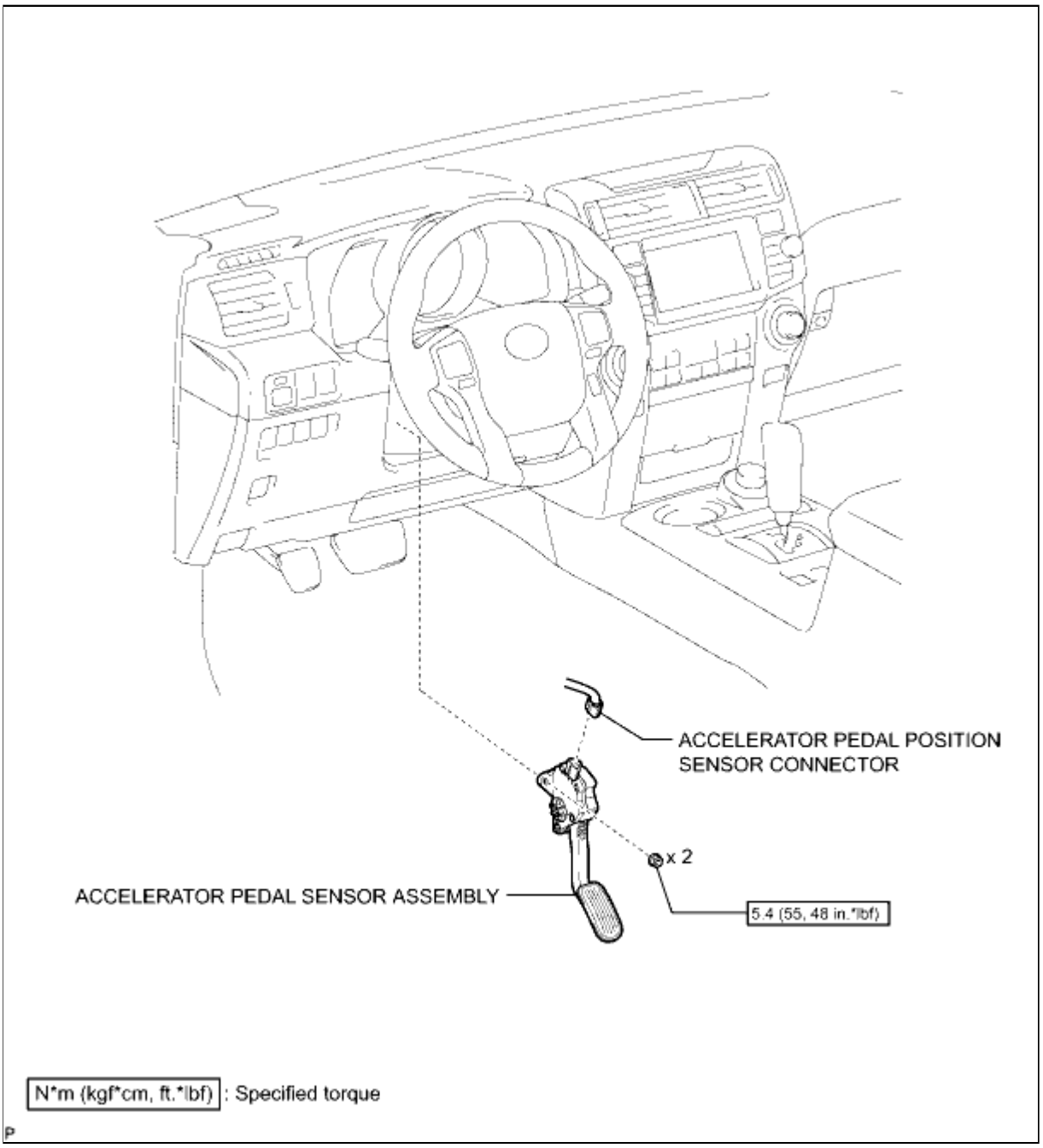
Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028B100EX
Title: 1GR-FE ENGINE CONTROL: ACCELERATOR PEDAL: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002PQW02NX
Title: 1GR-FE ENGINE CONTROL: ACCELERATOR PEDAL: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT ACCELERATOR PEDAL SENSOR ASSEMBLY

(a) Connect the Techstream to the DLC3.

(b) Turn the ignition switch to ON.

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / ETCS / Accel Sensor Out No. 1 and Accel Sensor Out No. 2.

(e) Read the value displayed on the Techstream.

Standard Voltage:

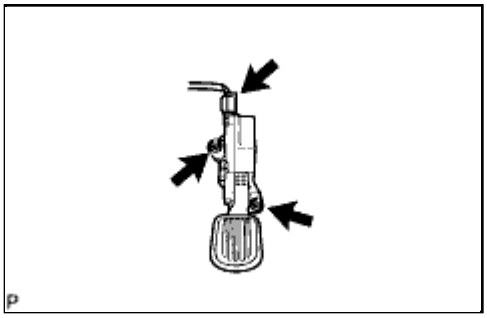
ACCELERATOR PEDAL OPERATION	ACCEL SENSOR OUT NO. 1	ACCEL SENSOR OUT NO. 2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

If the result is not as specified, check the accelerator pedal, wire harness and ECM.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028B200EX
Title: 1GR-FE ENGINE CONTROL: ACCELERATOR PEDAL: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE ACCELERATOR PEDAL SENSOR ASSEMBLY



(a) Disconnect the accelerator pedal position sensor connector.

(b) Remove the 2 nuts and accelerator pedal sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028B000EX
Title: 1GR-FE ENGINE CONTROL: ACCELERATOR PEDAL: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL ACCELERATOR PEDAL SENSOR ASSEMBLY

NOTICE:

- Avoid physical shocks to the accelerator pedal sensor assembly.
- Do not disassemble the accelerator pedal sensor assembly.

(a) Install the accelerator pedal sensor with the 2 nuts.

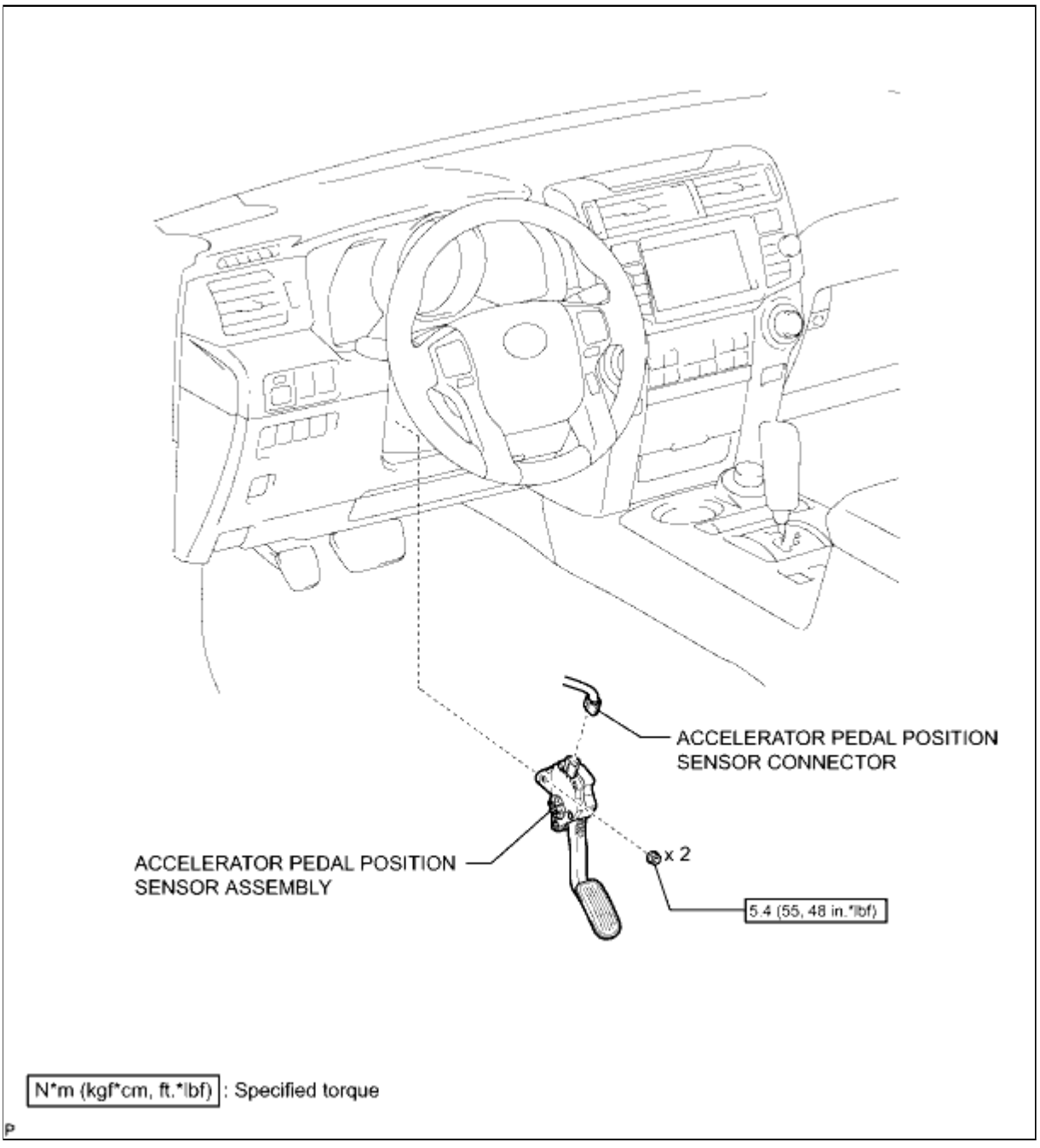
Torque: 5.4 N·m (55 kgf·cm, 48in·lbf)

(b) Connect the accelerator pedal position sensor connector.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028B100IX
Title: 2TR-FE ENGINE CONTROL: ACCELERATOR PEDAL: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002PQW02WX
Title: 2TR-FE ENGINE CONTROL: ACCELERATOR PEDAL: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT ACCELERATOR PEDAL POSITION SENSOR ASSEMBLY

(a) Connect the Techstream to the DLC3.

(b) Turn the ignition switch to ON.

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / ETCS / Accel Sensor Out No. 1 and Accel Sensor Out No. 2.

(e) Read the value displayed on the Techstream.

Standard Voltage:

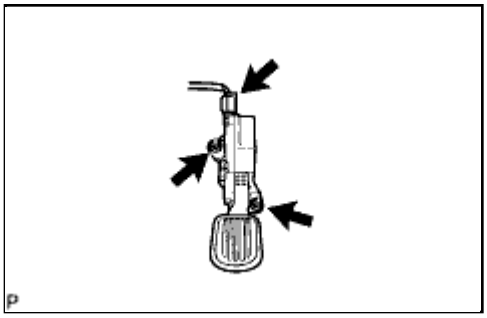
ACCELERATOR PEDAL OPERATION	ACCEL SENSOR OUT NO. 1	ACCEL SENSOR OUT NO. 2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

If the result is not as specified, check the wire harness and connector. If the wire harness and connector are normal, replace the accelerator pedal position sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028B200IX
Title: 2TR-FE ENGINE CONTROL: ACCELERATOR PEDAL: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE ACCELERATOR PEDAL POSITION SENSOR ASSEMBLY



(a) Disconnect the accelerator pedal position sensor connector.

(b) Remove the 2 nuts and accelerator pedal position sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028B000IX
Title: 2TR-FE ENGINE CONTROL: ACCELERATOR PEDAL: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL ACCELERATOR PEDAL POSITION SENSOR ASSEMBLY

NOTICE:

- Avoid physical shocks to the accelerator pedal position sensor assembly.
- Do not disassemble the accelerator pedal position sensor assembly.

(a) Install the accelerator pedal position sensor with the 2 nuts.

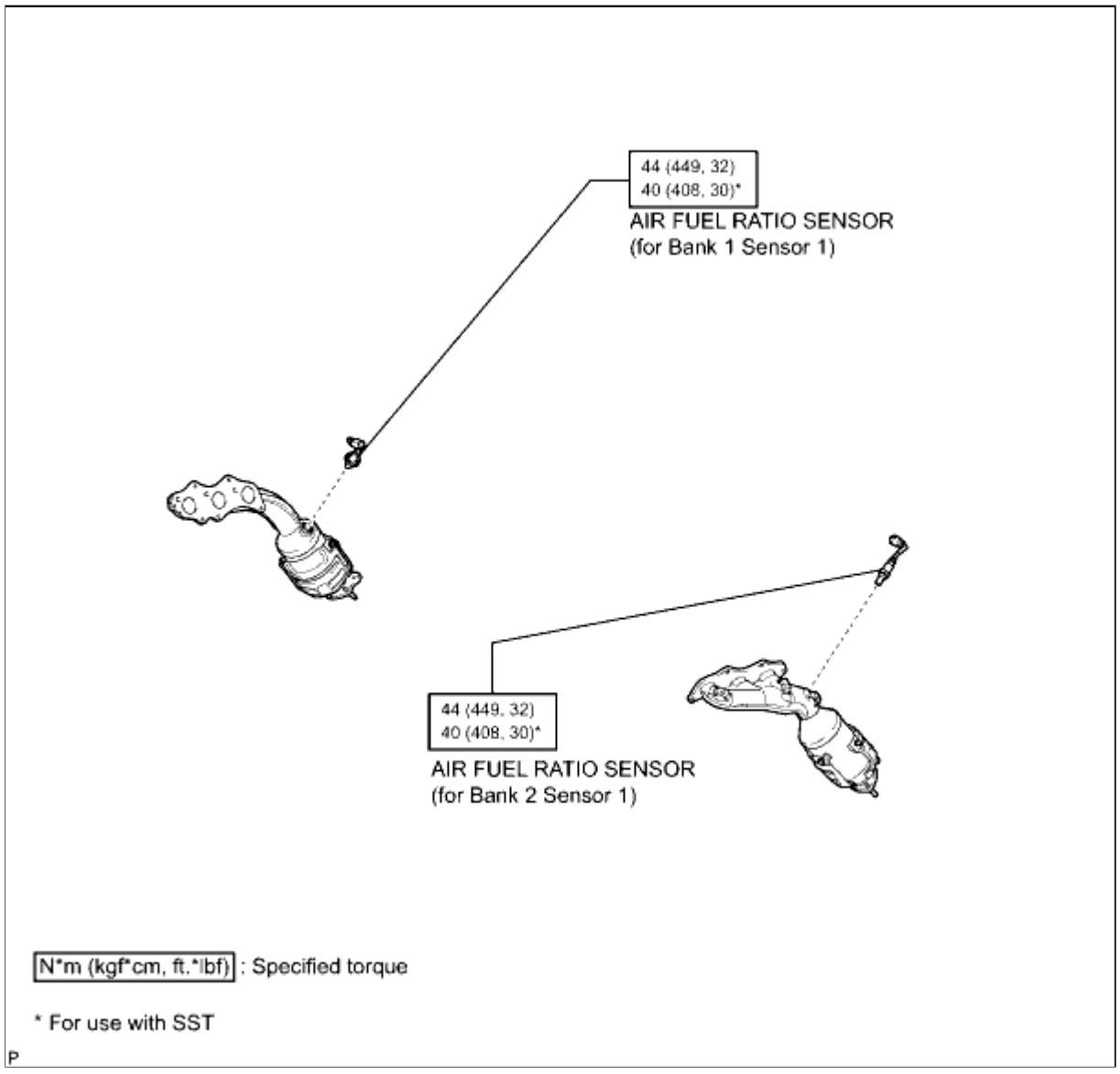
Torque: 5.4 N·m (55 kgf·cm, 48in·lbf)

(b) Connect the accelerator pedal position sensor connector.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002W9P007X
Title: 1GR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



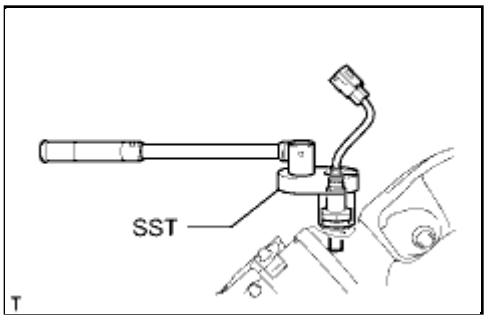
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002W9Q007X
Title: 1GR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY

(a) Remove the exhaust manifold INFO .

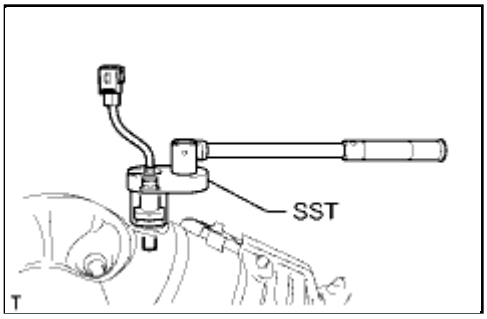
2. REMOVE AIR FUEL RATIO SENSOR (for Bank 1 Sensor 1)



(a) Using SST, remove the sensor.

SST: 09224-00010

3. REMOVE AIR FUEL RATIO SENSOR (for Bank 2 Sensor 1)



(a) Using SST, remove the sensor.

SST: 09224-00010

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002RV200WX
Title: 1GR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT AIR FUEL RATIO SENSOR

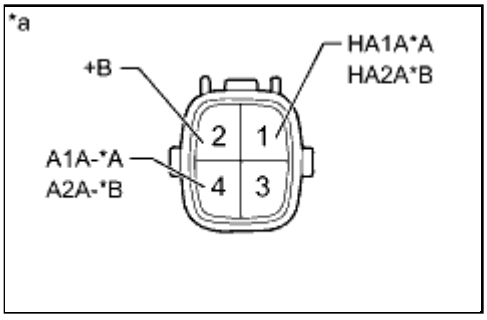
(a) Measure the heater resistance according to the value(s) in the table below.

Standard Resistance (for Bank 1):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (HA1A) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HA1A) - 4 (A1A-)	Always	10 kΩ or higher

Standard Resistance (for Bank 2):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (HA2A) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HA2A) - 4 (A2A-)	Always	10 kΩ or higher



Text in Illustration

*A	for Bank 1
*B	for Bank 2
*a	Component without harness connected (Air Fuel Ratio Sensor)

If the result is not as specified, replace the air fuel ratio sensor.

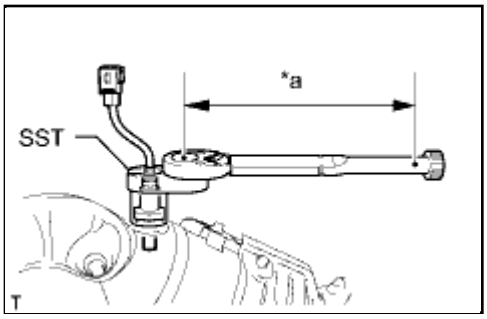
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002W9O007X
Title: 1GR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL AIR FUEL RATIO SENSOR (for Bank 2 Sensor 1)

(a) Using SST, install the sensor.

SST: 09224-00010
without SST - Torque: 44 N·m (449 kgf·cm, 32ft·lbf)
with SST - Torque: 40 N·m (408 kgf·cm, 30ft·lbf)



Text in Illustration

*a	Fulcrum Length

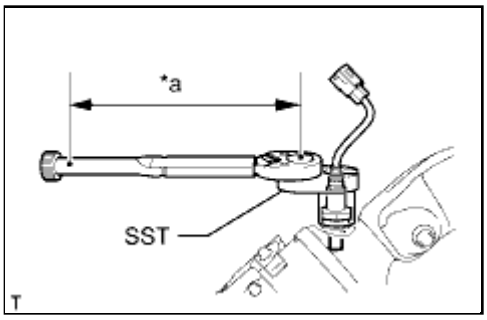
HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.8 in.). When using a torque wrench with a fulcrum length that is not 30 cm (11.8 in.), calculate the torque specification for the torque wrench and SST based on the "without SST" torque specification INFO .
- Make sure SST and the wrench are connected in a straight line.

2. INSTALL AIR FUEL RATIO SENSOR (for Bank 1 Sensor 1)

(a) Using SST, install the sensor.

SST: 09224-00010
without SST - Torque: 44 N·m (449 kgf·cm, 32ft·lbf)
with SST - Torque: 40 N·m (408 kgf·cm, 30ft·lbf)



Text in Illustration

*a	Fulcrum Length

HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.8 in.). When using a torque wrench with a fulcrum length that is not 30 cm (11.8 in.), calculate the torque specification

for the torque wrench and SST based on the "without SST" torque specification INFO .

- Make sure SST and the wrench are connected in a straight line.

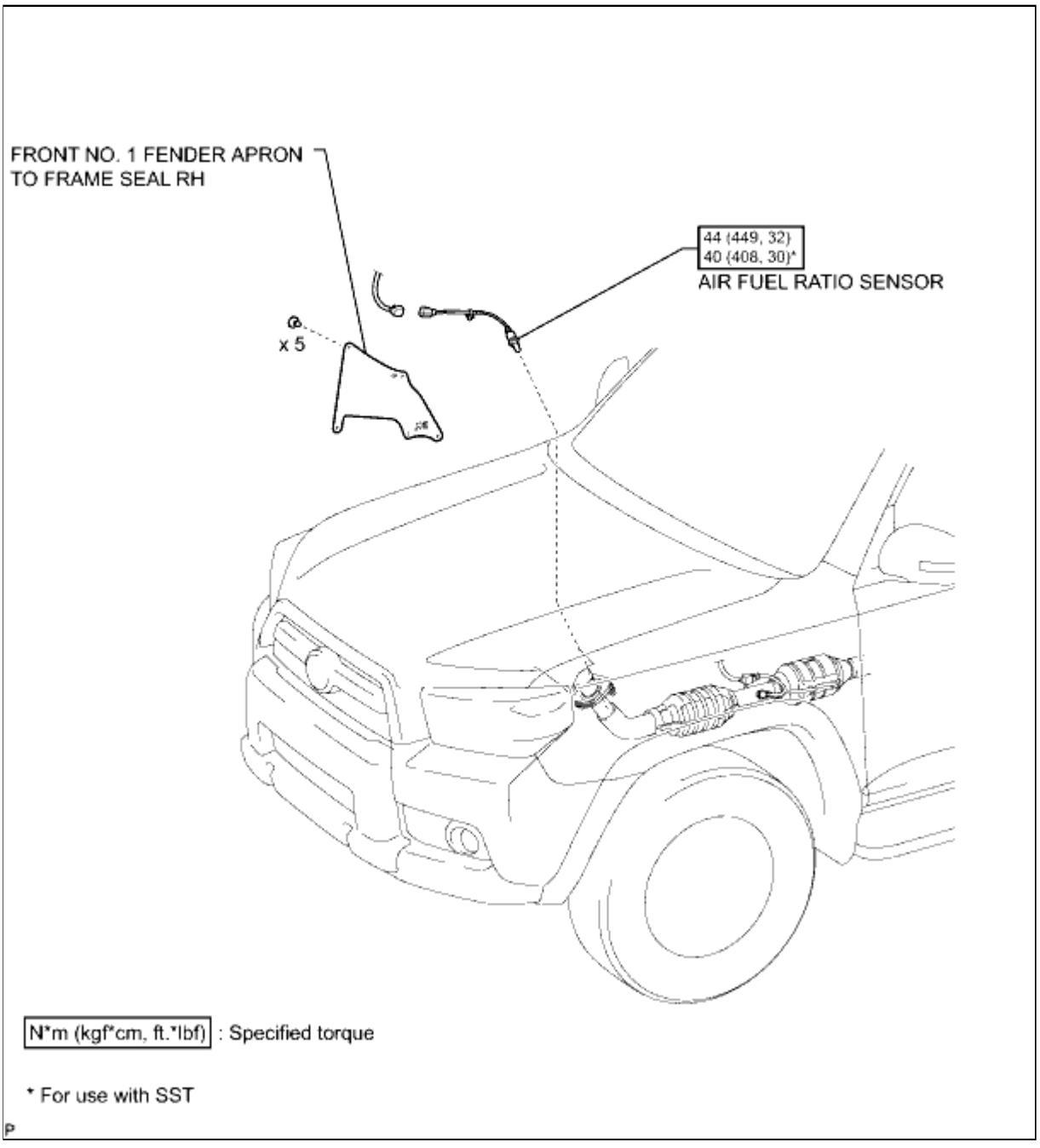
3. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY

(a) Install the exhaust manifold INFO .

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FQ002X
Title: 2TR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION

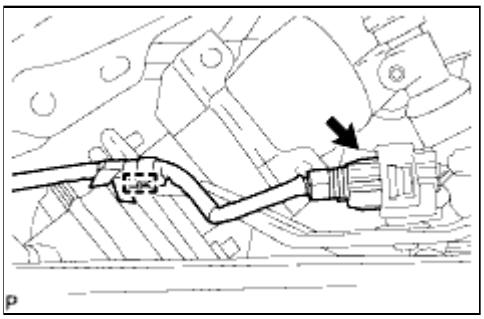


Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000001759008X
Title: 2TR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

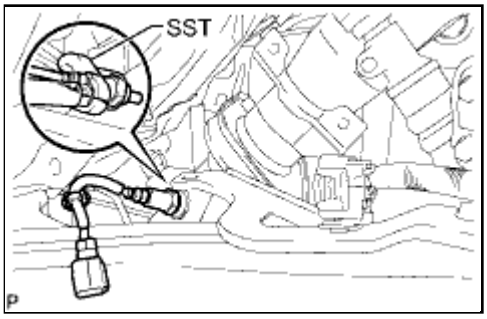
1. REMOVE FRONT NO. 1 FENDER APRON TO FRAME SEAL RH INFO

2. REMOVE AIR FUEL RATIO SENSOR



(a) Disconnect the air fuel ratio sensor connector.

(b) Detach the wire harness clamp.



(c) Using SST, remove the air fuel ratio sensor.

SST: 09224-00010

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000001758008X
Title: 2TR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: INSPECTION (2010 4Runner)		

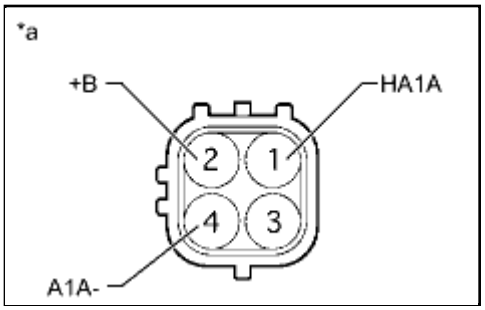
INSPECTION

1. INSPECT AIR FUEL RATIO SENSOR

(a) Check the resistance.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (HA1A) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HA1A) - 4 (A1A-)	Always	10 kΩ or higher

Text in Illustration

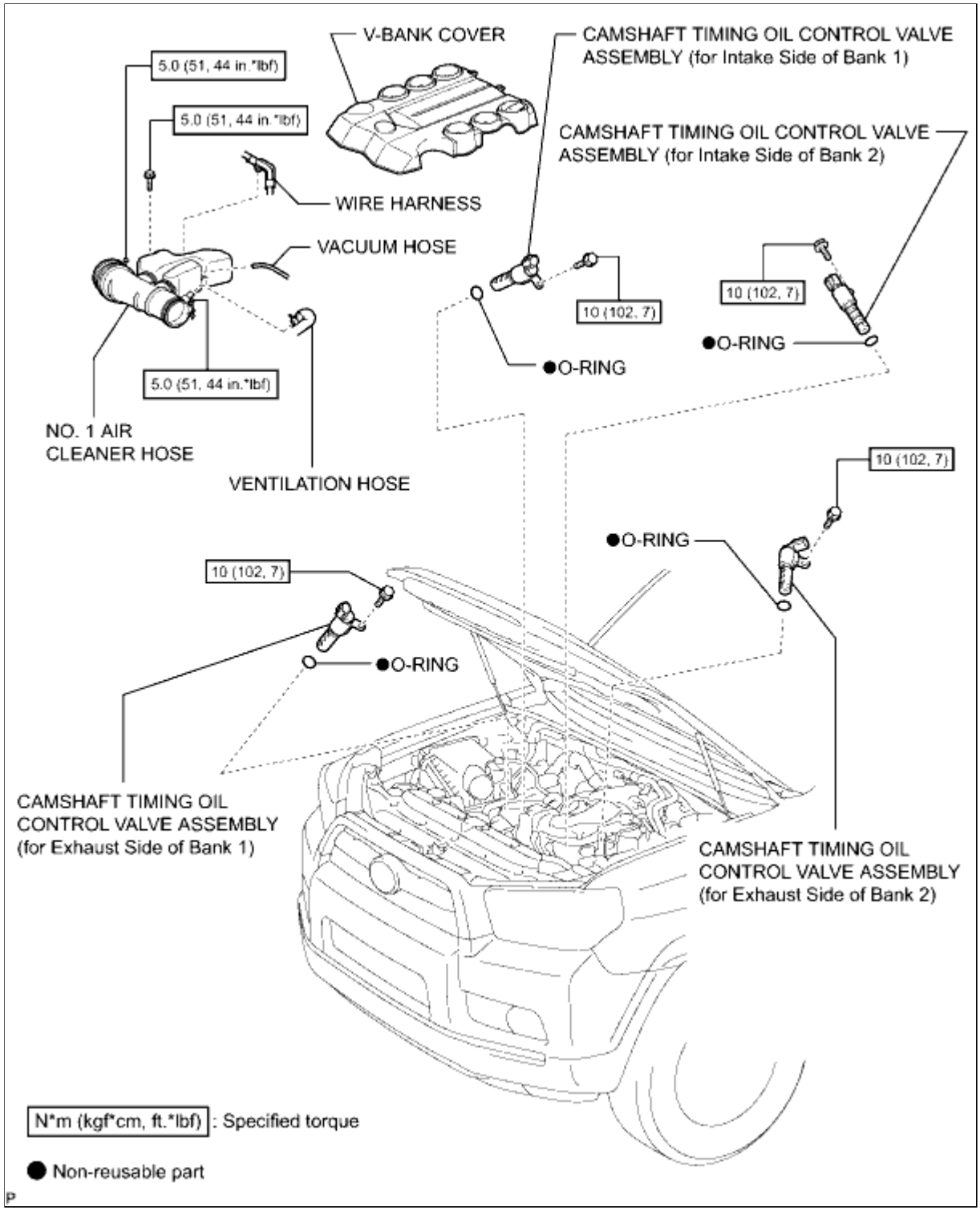
*a	Component without harness connected (Air Fuel Ratio Sensor)

If the result is not as specified, replace the air fuel ratio sensor.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002WAM009X
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



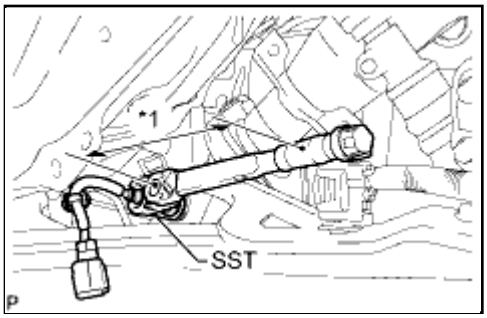
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000001757008X
Title: 2TR-FE ENGINE CONTROL: AIR FUEL RATIO SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL AIR FUEL RATIO SENSOR

(a) Using SST, install the air fuel ratio sensor.

SST: 09224-00010
without SST - Torque: 44 N·m (449 kgf·cm, 32ft·lbf)
with SST - Torque: 40 N·m (408 kgf·cm, 30ft·lbf)



Text in Illustration

*1	Fulcrum Length

HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.8 in.). If using a torque wrench with a length that is not 30 cm (11.8 in.), calculate the torque specification for the torque wrench and SST based on the "without SST" torque specification INFO .
- Make sure SST and the wrench are connected in a straight line.

(b) Attach the wire harness clamp.

(c) Connect the air fuel ratio sensor connector.

2. INSPECT FOR EXHAUST GAS LEAK INFO

3. INSTALL FRONT NO. 1 FENDER APRON TO FRAME SEAL RH INFO

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000017U401DX
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Connect the Techstream to the DLC3.

(b) Start the engine.

(c) Turn the Techstream on.

(d) Inspect the oil control valve (for intake camshaft).

(1) Enter the following menus: Powertrain / Engine / Active Test / Control the VVT System (Bank 1).

(2) Operate the oil control valve using the Techstream, and then check the engine speed.

OK:

CONTROL RANGE	SPECIFIED CONDITION
OFF	Normal engine speed
ON	Rough idle or engine stalls soon after oil control valve switched from OFF to ON

If the operation is not as specified, check the oil control valve, wire harness and ECM.

(3) Enter the following menus: Powertrain / Engine / Active Test / Control the VVT System (Bank 2).

(4) Operate the oil control valve using the Techstream, and then check the engine speed.

OK:

CONTROL RANGE	SPECIFIED CONDITION
OFF	Normal engine speed
ON	Rough idle or engine stalls soon after oil control valve switched from OFF to ON

If the operation is not as specified, check the oil control valve, wire harness and ECM.

(e) Inspect the oil control valve (for exhaust camshaft).

(1) Enter the following menus: Powertrain / Engine / Active Test / Control the VVT Exhaust Linear (Bank 1).

(2) Operate the oil control valve using the Techstream, and then check the engine speed.

OK:

CONTROL RANGE	SPECIFIED CONDITION
-100%	Normal engine speed

CONTROL RANGE	SPECIFIED CONDITION
100%	Rough idle or engine stalls soon after oil control valve switched to 100%

If the operation is not as specified, check the oil control valve, wire harness and ECM.

(3) Enter the following menus: Powertrain / Engine / Active Test / Control the VVT Exhaust Linear (Bank 2).

(4) Operate the oil control valve using the Techstream, and then check the engine speed.

OK:

CONTROL RANGE	SPECIFIED CONDITION
-100%	Normal engine speed
100%	Rough idle or engine stalls soon after oil control valve switched to 100%

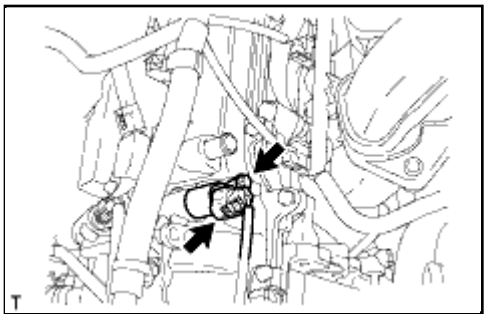
If the operation is not as specified, check the oil control valve, wire harness and ECM.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000PWP02YX
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE V-BANK COVER INFO

2. REMOVE NO. 1 AIR CLEANER HOSE INFO

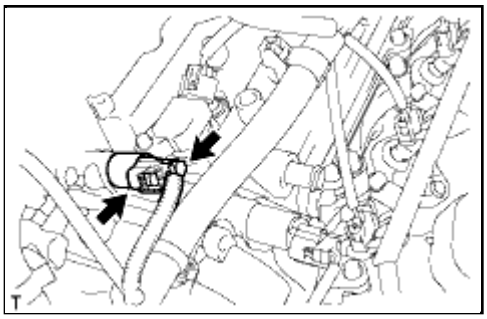


3. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Intake Side of Bank 1)

(a) Disconnect the oil control valve connector.

(b) Remove the bolt and oil control valve.

(c) Remove the O-ring from the oil control valve.

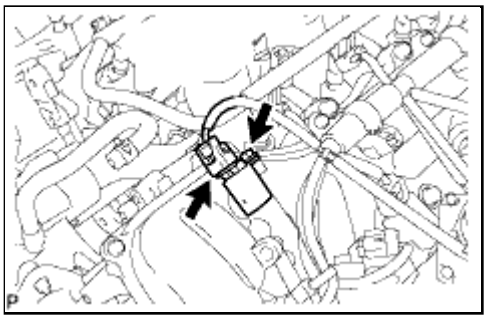


4. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Exhaust Side of Bank 1)

(a) Disconnect the oil control valve connector.

(b) Remove the bolt and oil control valve.

(c) Remove the O-ring from the oil control valve.



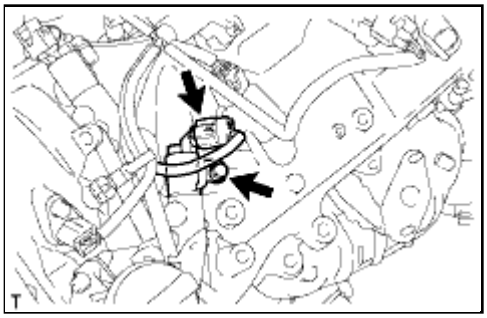
5. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Intake Side of Bank 2)

(a) Disconnect the oil control valve connector.

(b) Remove the bolt and oil control valve.

(c) Remove the O-ring from the oil control valve.

6. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Exhaust Side of Bank 2)



(a) Disconnect the oil control valve connector.

(b) Remove the bolt and oil control valve.

(c) Remove the O-ring from the oil control valve.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000Q74021X
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

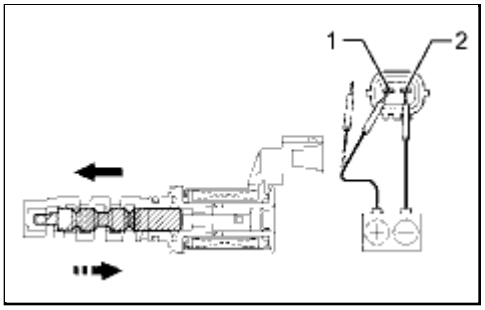
Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	20°C (68°F)	6.9 to 7.9 Ω

If the result is not as specified, replace the camshaft timing oil control valve.

(b) Connect the positive (+) lead of the battery to terminal 1 and the negative (-) lead to terminal 2 and check the movement of the valve.

OK:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	Battery positive (+) voltage is applied	Valve moves in direction of left arrow shown in illustration
	Battery positive (+) voltage is cut off	Valve moves in direction of right arrow shown in illustration

If the result is not as specified, replace the camshaft timing oil control valve.

If the valve cannot return properly because of foreign matter, a small pressure leak in the advanced direction may occur and a DTC may be stored.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000PWN02YX
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Exhaust Side of Bank 2)

(a) Apply a light coat of engine oil to a new O-ring and install it to the oil control valve.

(b) Install the oil control valve with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

NOTICE:

- Do not allow foreign matter to contact the oil seal face of the oil control valve (surface which contacts the cylinder head).
- Be careful that the O-ring is not cracked when installing the oil control valve.

(c) Connect the camshaft timing oil control valve connector.

2. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Intake Side of Bank 2)

(a) Apply a light coat of engine oil to a new O-ring and install it to the oil control valve.

(b) Install the oil control valve with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

NOTICE:

- Do not allow foreign matter to contact the oil seal face of the oil control valve (surface which contacts the cylinder head).
- Be careful that the O-ring is not cracked when installing the oil control valve.

(c) Connect the oil control valve connector.

3. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Exhaust Side of Bank 1)

(a) Apply a light coat of engine oil to a new O-ring and install it to the oil control valve.

(b) Install the oil control valve with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

NOTICE:

- Do not allow foreign matter to contact the oil seal face of the oil control valve (surface which contacts the cylinder head).
- Be careful that the O-ring is not cracked when installing the oil control valve.

(c) Connect the oil control valve connector.

4. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Intake Side of Bank 1)

(a) Apply a light coat of engine oil to a new O-ring and install it to the oil control valve.

(b) Install the oil control valve with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

NOTICE:

- Do not allow foreign matter to contact the oil seal face of the oil control valve (surface which contacts the cylinder head).
- Be careful that the O-ring is not cracked when installing the oil control valve.

(c) Connect the oil control valve connector.

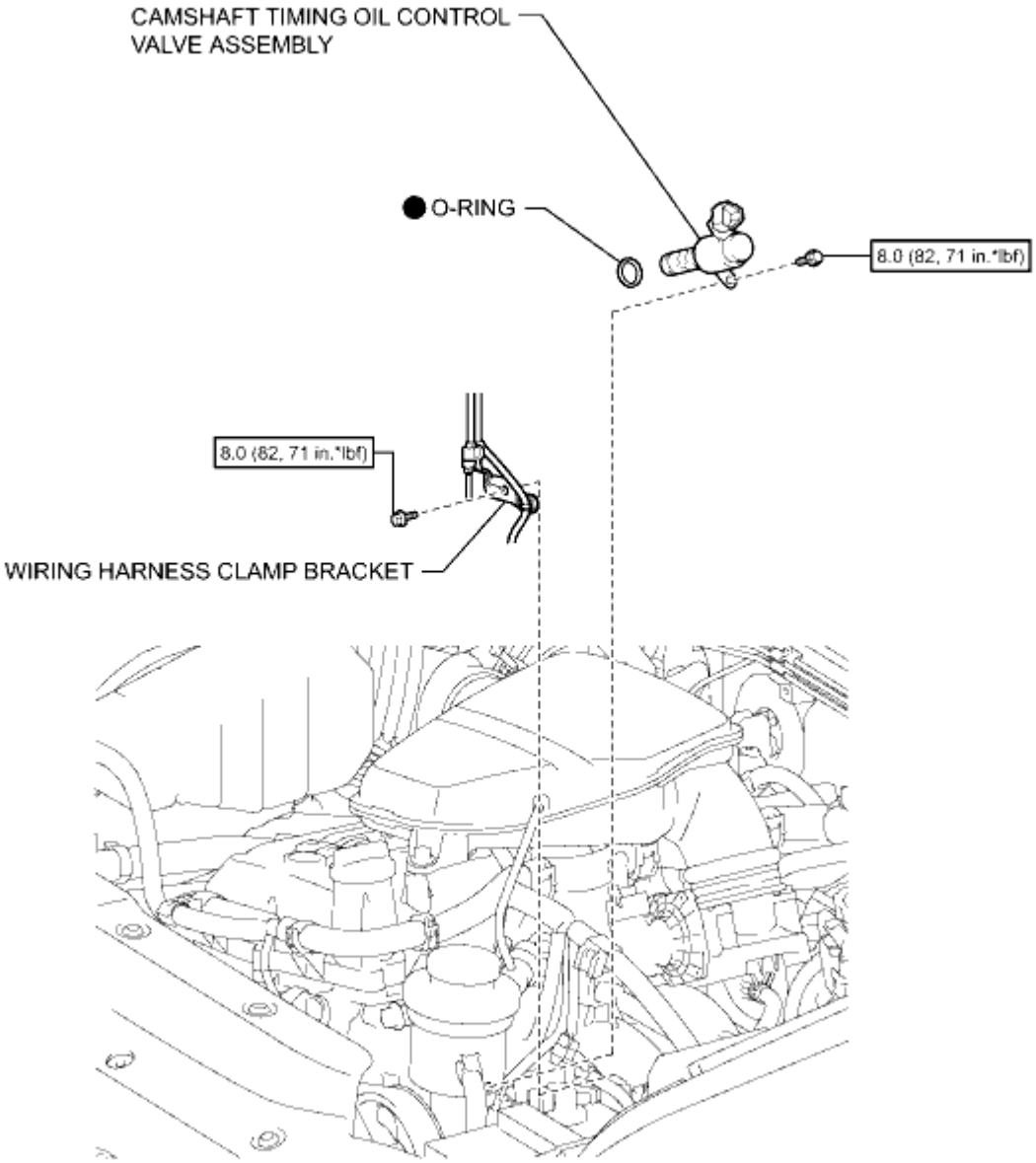
5. INSTALL NO. 1 AIR CLEANER HOSE INFO

6. INSTALL V-BANK COVER INFO

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FG002X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

T

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000013JV005X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Connect the Techstream to the DLC3.

(b) Start the engine.

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(e) Check the engine speed when the camshaft timing oil control valve is operated using the Techstream when the engine coolant temperature is 50°C (122°F) or less.

OK:

TESTER OPERATION	SPECIFIED CONDITION
Camshaft timing oil control valve OFF	Normal engine speed
Camshaft timing oil control valve ON	Engine idles roughly or stalls soon after camshaft timing oil control valve switched from OFF to ON

HINT:

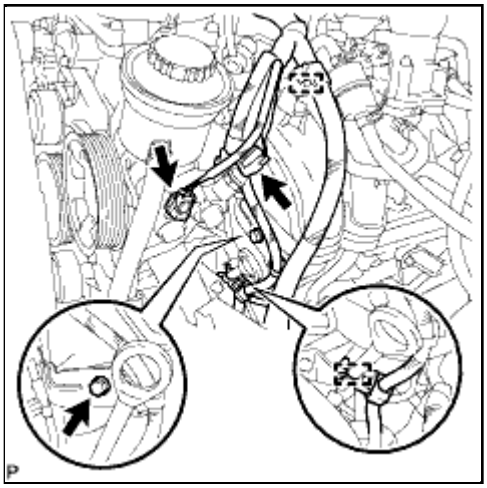
- When performing the Active Test, make sure the air conditioning is on.
- Make sure the engine coolant temperature when the engine is started is 30°C (86°F) or less.

If the result is not as specified, check the camshaft timing oil control valve, wiring and ECM.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000111G005X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: REMOVAL (2010 4Runner)		

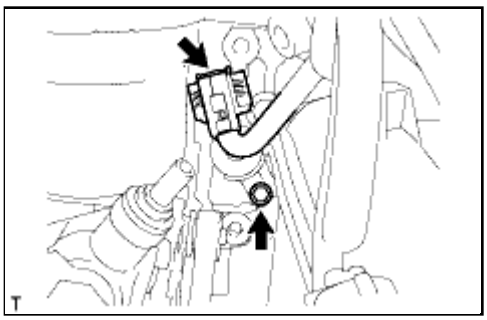
REMOVAL

1. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



(a) Detach the 2 clamps and disconnect the 2 connectors.

(b) Remove the bolt and disconnect the wiring harness clamp bracket.



(c) Disconnect the camshaft timing oil control valve connector.

(d) Remove the bolt and camshaft timing oil control valve.

(e) Remove the O-ring from the camshaft timing oil control valve.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000Q74029X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

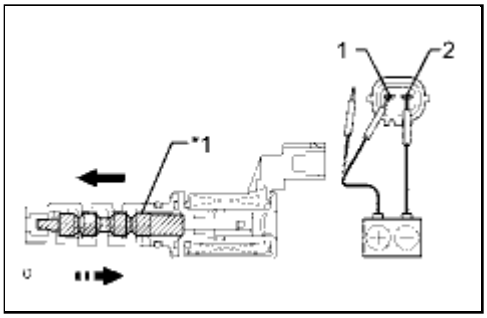
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	20°C (68°F)	6.9 to 7.9 Ω

If the result is not as specified, replace the camshaft timing oil control valve assembly.

(b) Connect the positive (+) lead of the battery to terminal 1 and negative (-) lead to terminal 2 and check the movement of the spool valve.

OK:

CONDITION	SPECIFIED CONDITION
Battery positive (+) voltage is applied	Valve moves in left arrow direction shown in illustration
Battery positive (+) voltage is cut off	Valve moves in right arrow direction shown in illustration



Text in Illustration

*1	Spool Valve

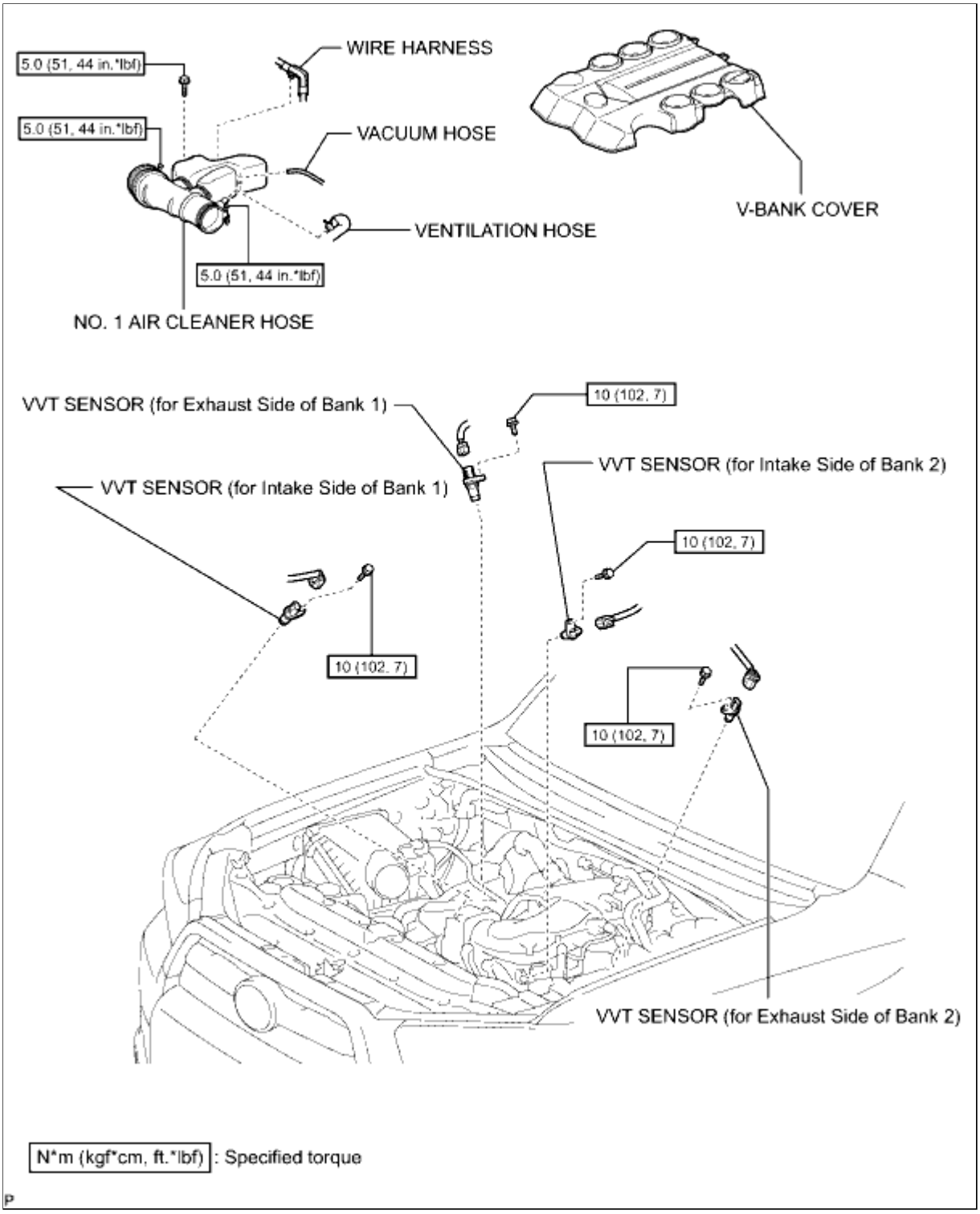
If the result is not as specified, replace the oil control valve assembly.

If the valve cannot return properly because of foreign matter, a small pressure leak in the advanced direction may occur and a DTC may be stored.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AL00EX
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT POSITION SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

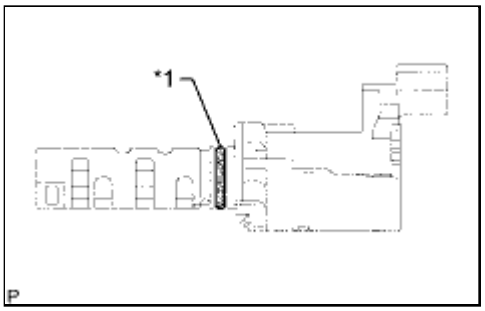
ILLUSTRATION



Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000111E005X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT OIL CONTROL VALVE: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



(a) Install a new O-ring to the oil control valve.

Text in Illustration

*1	New O-Ring

(b) Apply a light coat of engine oil to the O-ring.

(c) Install the camshaft timing oil control valve with the bolt.

Torque: 8.0 N·m (82 kgf·cm, 71in·lbf)

(d) Connect the camshaft timing oil control valve connector.

(e) Connect the wiring harness clamp bracket with the bolt.

Torque: 8.0 N·m (82 kgf·cm, 71in·lbf)

(f) Attach the 2 clamps and connect the 2 connectors.

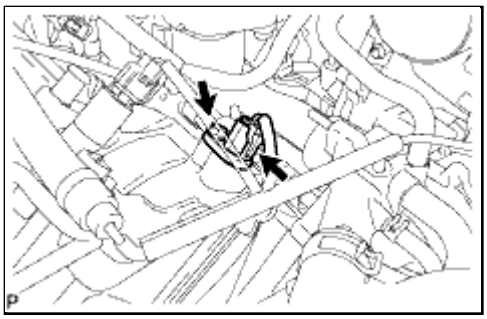
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AM00EX
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT POSITION SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE V-BANK COVER INFO

2. REMOVE NO. 1 AIR CLEANER HOSE INFO

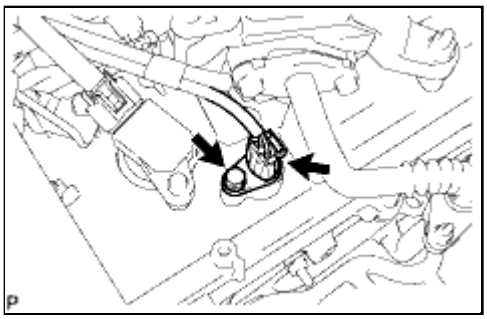
3. REMOVE VVT SENSOR (for Intake Side of Bank 1)



(a) Disconnect the sensor connector.

(b) Remove the bolt and sensor.

4. REMOVE VVT SENSOR (for Exhaust Side of Bank 1)

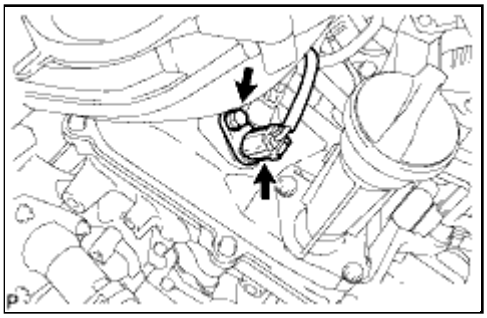


(a) Disconnect the sensor connector.

(b) Remove the bolt and sensor.

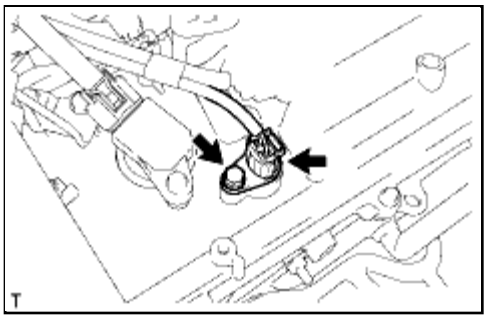
5. REMOVE VVT SENSOR (for Intake Side of Bank 2)

(a) Disconnect the sensor connector.



(b) Remove the bolt and sensor.

6. REMOVE VVT SENSOR (for Exhaust Side of Bank 2)



(a) Disconnect the sensor connector.

(b) Remove the bolt and sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AK00EX
Title: 1GR-FE ENGINE CONTROL: CAMSHAFT POSITION SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL VVT SENSOR (for Exhaust Side of Bank 2)

(a) Apply a light coat of engine oil to the O-ring of the VVT sensor.

NOTICE:

- When reusing the sensor, inspect the O-ring.
- If the O-ring has scratches or cuts, replace the sensor.

(b) Install the VVT sensor with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(c) Connect the sensor connector.

2. INSTALL VVT SENSOR (for Intake Side of Bank 2)

(a) Apply a light coat of engine oil to the O-ring of the sensor.

NOTICE:

- When reusing the sensor, inspect the O-ring.
- If the O-ring has scratches or cuts, replace the sensor.

(b) Install the sensor with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(c) Connect the sensor connector.

3. INSTALL VVT SENSOR (for Exhaust Side of Bank 1)

(a) Apply a light coat of engine oil to the O-ring of the sensor.

NOTICE:

- When reusing the sensor, inspect the O-ring.
- If the O-ring has scratches or cuts, replace the sensor.

(b) Install the sensor with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(c) Connect the sensor connector.

4. INSTALL VVT SENSOR (for Intake Side of Bank 1)

(a) Apply a light coat of engine oil to the O-ring of the sensor.

NOTICE:

- When reusing the sensor, inspect the O-ring.
- If the O-ring has scratches or cuts, replace the sensor.

(b) Install the sensor with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(c) Connect the sensor connector.

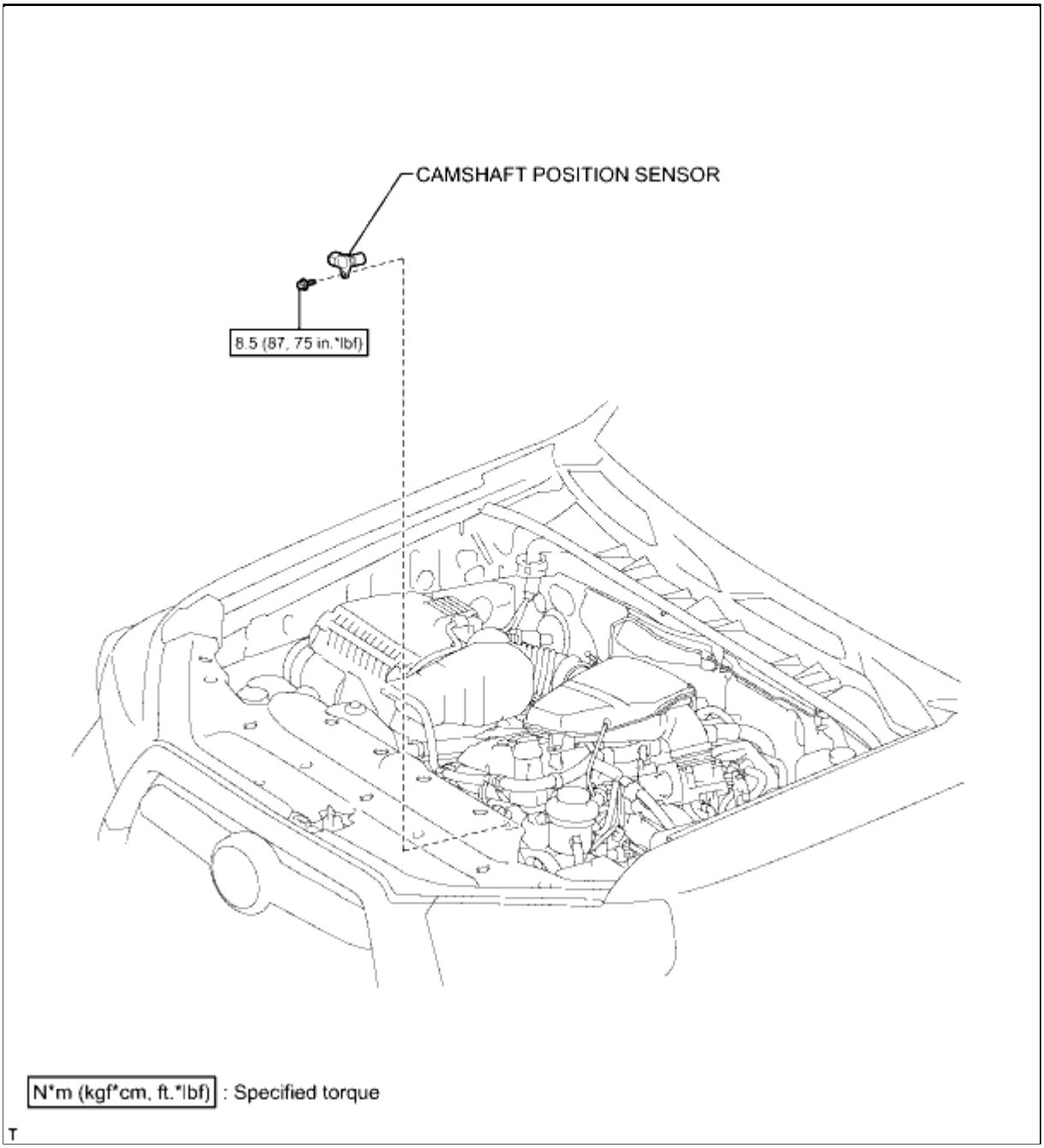
5. INSTALL NO. 1 AIR CLEANER HOSE INFO

6. INSTALL V-BANK COVER INFO

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FL002X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT POSITION SENSOR: COMPONENTS (2010 4Runner)		

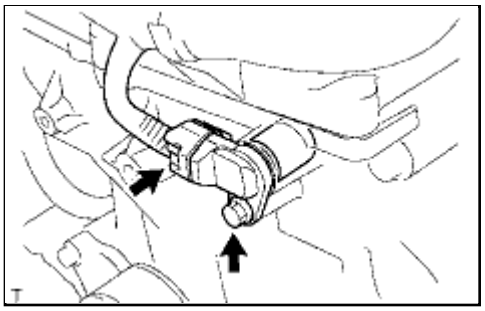
COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000017EC008X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT POSITION SENSOR: REMOVAL (2010 4Runner)		

REMOVAL



1. REMOVE CAMSHAFT POSITION SENSOR

(a) Disconnect the camshaft position sensor connector.

(b) Remove the bolt and camshaft position sensor.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000017EB008X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT POSITION SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT CAMSHAFT POSITION SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (G+) - 2 (G-)	Cold	835 to 1400 Ω
	Hot	1060 to 1645 Ω

NOTICE:

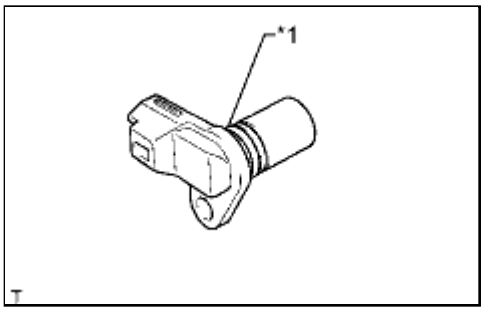
In the above, the terms "Cold" and "Hot" refer to the temperature of the sensor. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

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

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000017EA008X
Title: 2TR-FE ENGINE CONTROL: CAMSHAFT POSITION SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL CAMSHAFT POSITION SENSOR



(a) Apply a light coat of engine oil to the O-ring of the camshaft position sensor.

Text in Illustration

*1	O-Ring

(b) Install the camshaft position sensor with the bolt.

Torque: 8.5 N·m (87 kgf·cm, 75in·lbf)

NOTICE:

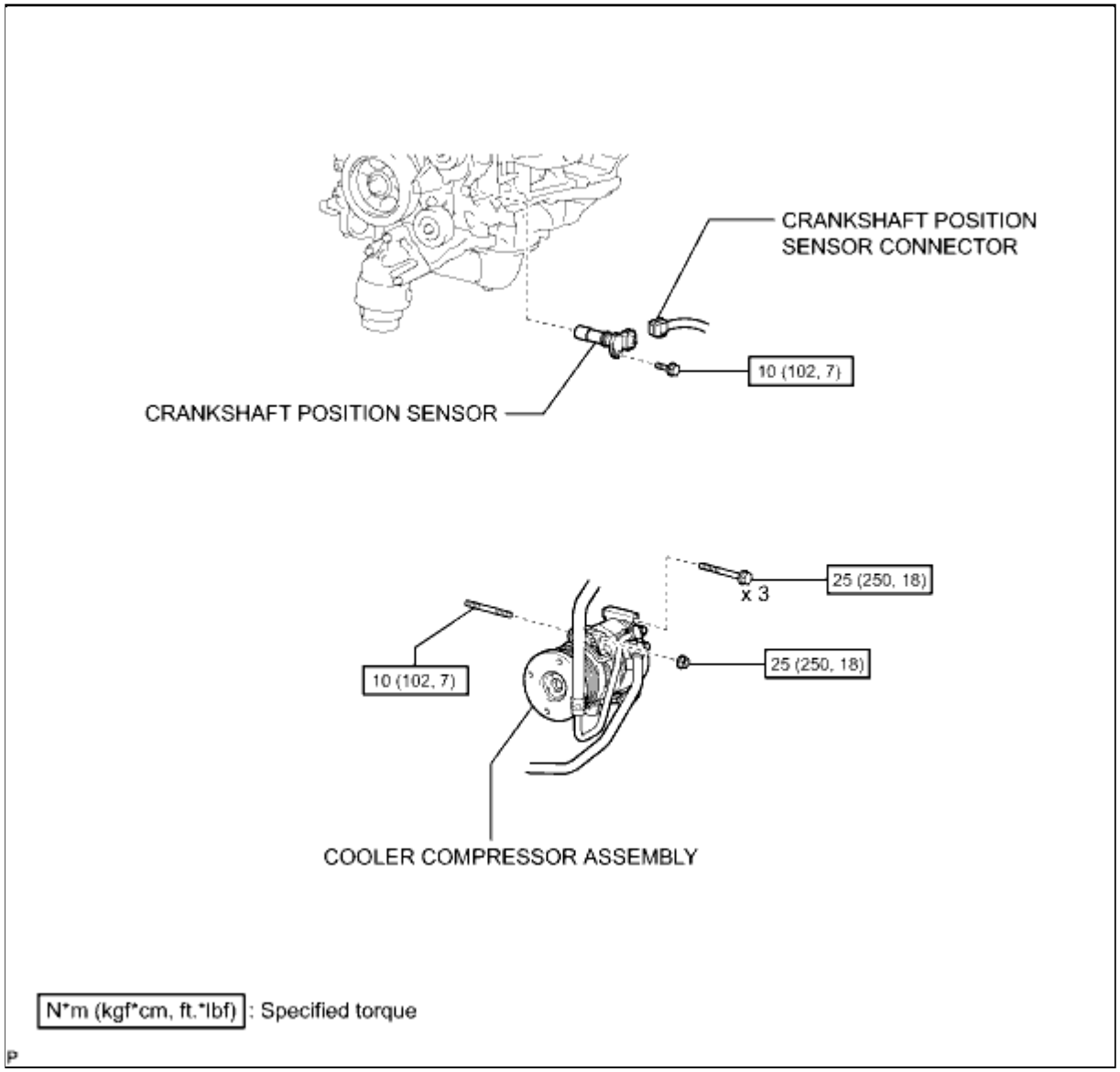
Make sure that the O-ring is not cracked or jammed when installing it.

(c) Connect the camshaft position sensor connector.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AQ00EX
Title: 1GR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AR00EX
Title: 1GR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE GENERATOR ASSEMBLY

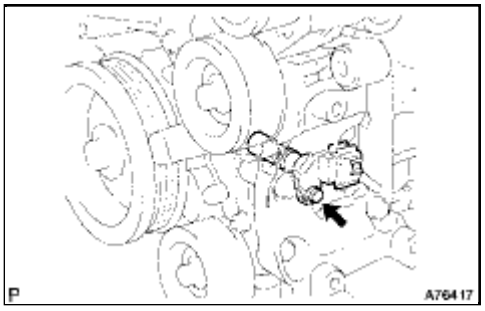
(a) Remove the generator INFO .

2. REMOVE COOLER COMPRESSOR ASSEMBLY

(a) Remove the cooler compressor INFO .

3. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY INFO

4. REMOVE CRANKSHAFT POSITION SENSOR



(a) Disconnect the sensor connector.

(b) Remove the bolt and sensor.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AP00EX
Title: 1GR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT CRANKSHAFT POSITION SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	Cold	1630 to 2740 Ω
	Hot	2065 to 3225 Ω

NOTICE:

In the table above, the terms "Cold" and "Hot" refer to the temperature of the sensor. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

If the result is not as specified, replace the sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AO00EX
Title: 1GR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL CRANKSHAFT POSITION SENSOR

(a) Apply a light coat of engine oil to the O-ring of the sensor.

NOTICE:

- When reusing the sensor, inspect the O-ring.
- If the O-ring has scratches or cuts, replace the sensor.

(b) Install the sensor with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(c) Connect the sensor connector.

2. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY INFO

3. INSTALL COOLER COMPRESSOR ASSEMBLY

(a) Install the cooler compressor INFO .

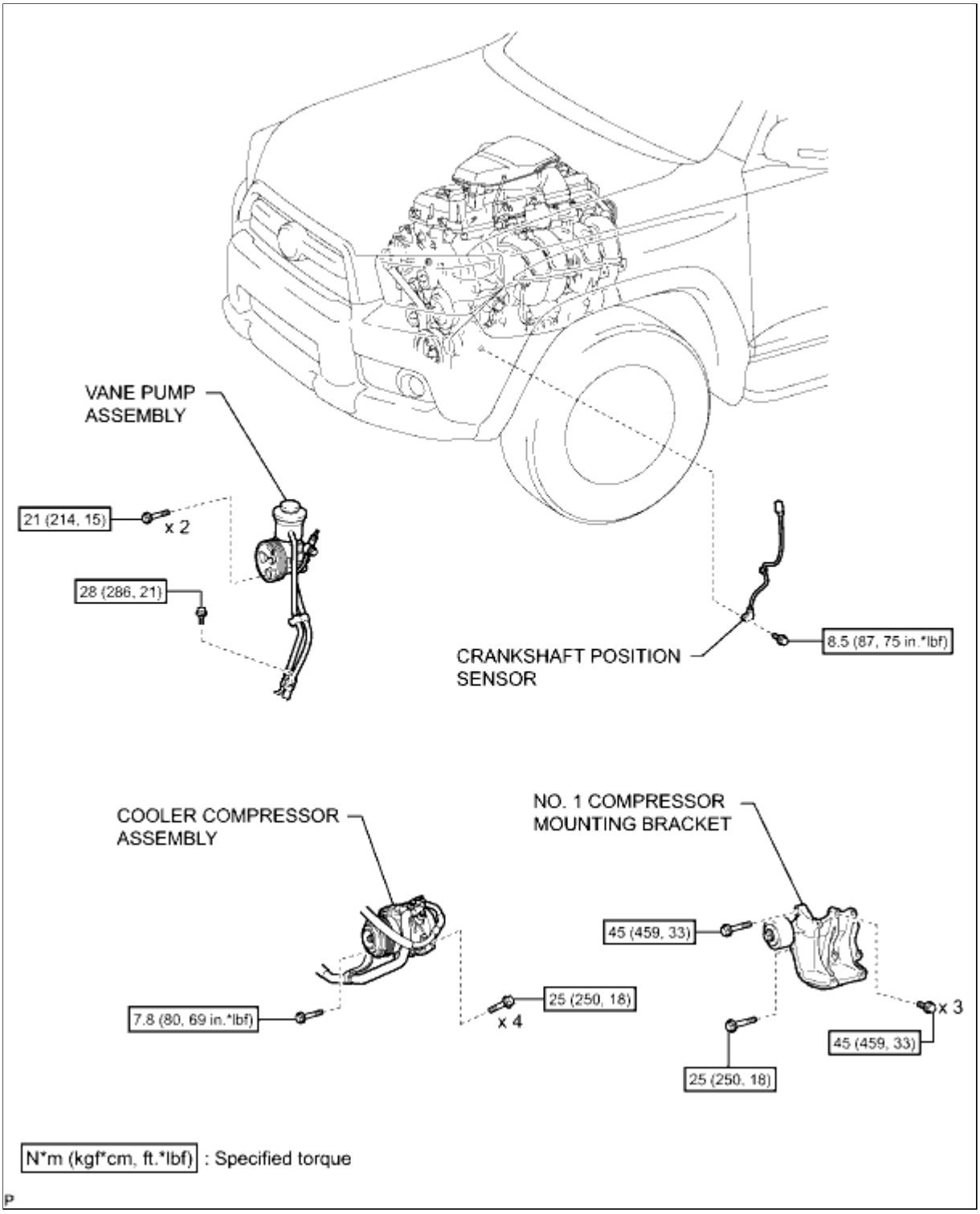
4. INSTALL GENERATOR ASSEMBLY

(a) Install the generator INFO .

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FM002X
Title: 2TR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



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Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000017E9008X
Title: 2TR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE FAN SHROUD

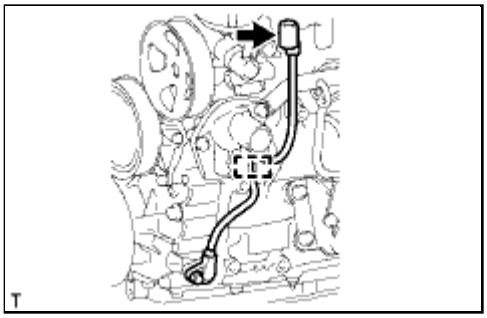
(a) Remove the fan shroud INFO .

2. DISCONNECT VANE PUMP ASSEMBLY INFO

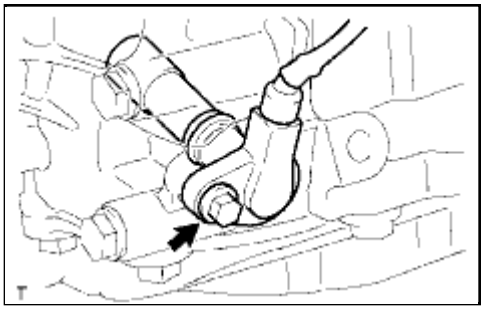
3. DISCONNECT COOLER COMPRESSOR ASSEMBLY INFO

4. REMOVE NO. 1 COMPRESSOR MOUNTING BRACKET INFO

5. REMOVE CRANKSHAFT POSITION SENSOR



(a) Disconnect the crankshaft position sensor connector and detach the wire harness clamp.

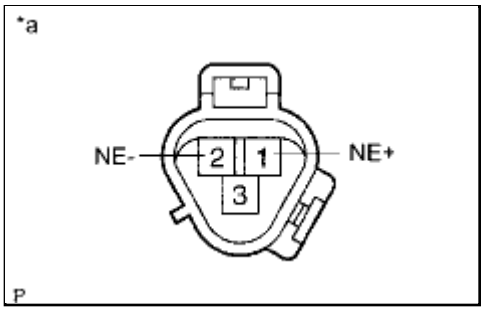


(b) Remove the bolt and crankshaft position sensor.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000017E8008X
Title: 2TR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT CRANKSHAFT POSITION SENSOR



(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (NE+) - 2 (NE-)	Cold	1630 to 2740 Ω
	Hot	2065 to 3225 Ω

Text in Illustration

*a	Component without harness connected (Crankshaft Position Sensor)

NOTICE:

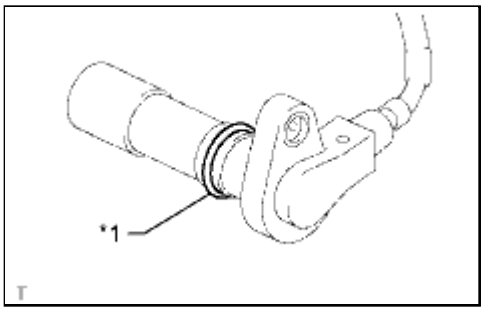
In the chart above, the terms "Cold" and "Hot" refer to the temperature of the sensor. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

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

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000017E7008X
Title: 2TR-FE ENGINE CONTROL: CRANKSHAFT POSITION SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL CRANKSHAFT POSITION SENSOR



(a) Apply a light coat of engine oil to the O-ring of the crankshaft position sensor.

Text in Illustration

*1	O-Ring

(b) Install the crankshaft position sensor with the bolt.

Torque: 8.5 N·m (87 kgf·cm, 75in·lbf)

NOTICE:

Make sure that the O-ring is not cracked or jammed when installing it.

(c) Connect the crankshaft position sensor connector and attach the wire harness clamp.

2. INSTALL NO. 1 COMPRESSOR MOUNTING BRACKET INFO

3. CONNECT COOLER COMPRESSOR ASSEMBLY INFO

4. CONNECT VANE PUMP ASSEMBLY INFO

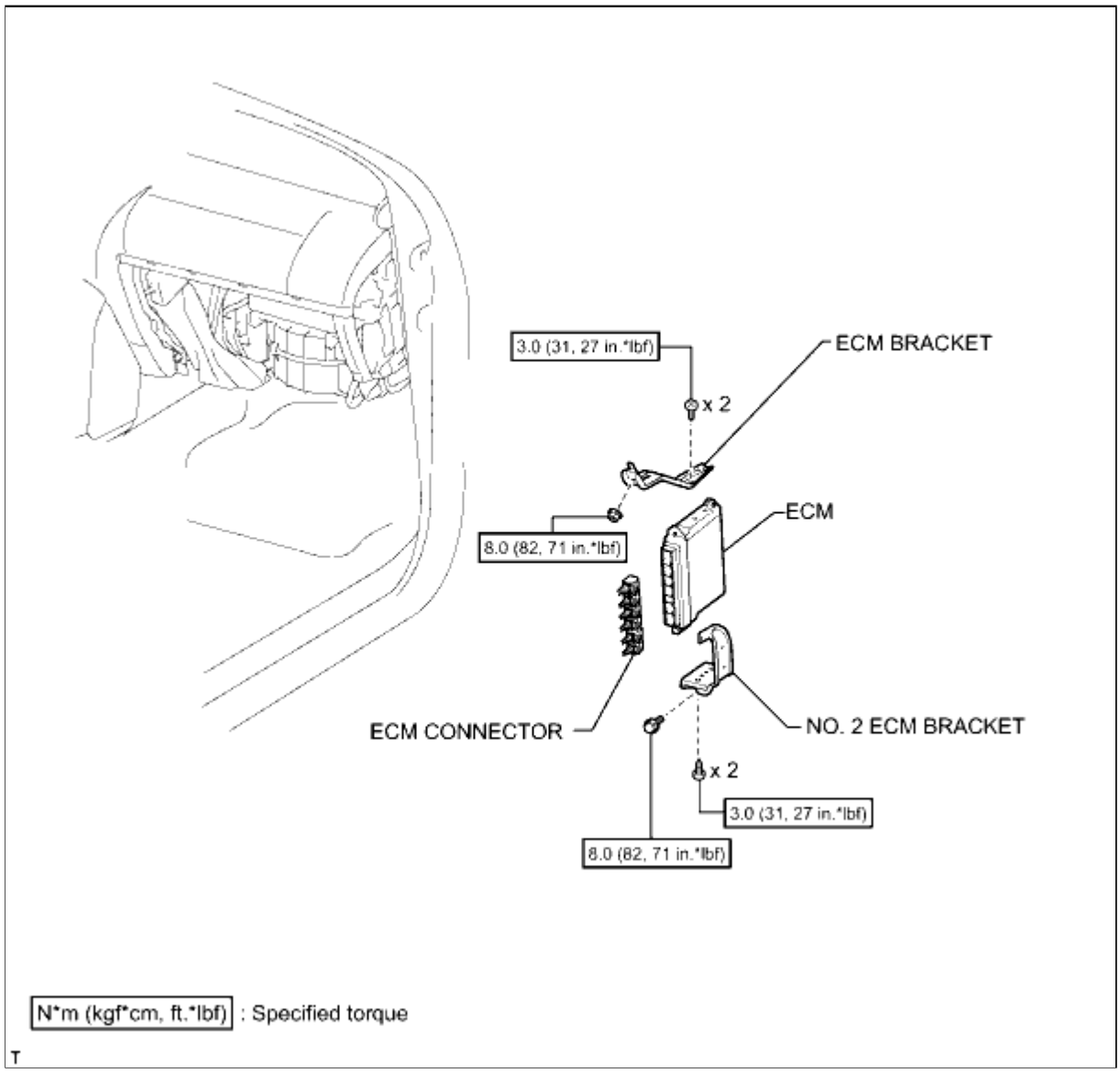
5. INSTALL FAN SHROUD

(a) Install the fan shroud INFO .

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000328X00WX
Title: 1GR-FE ENGINE CONTROL: ECM: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION

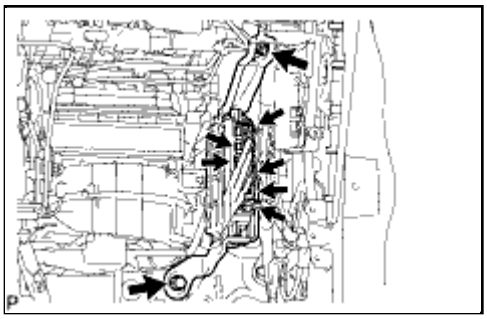


Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000329200WX
Title: 1GR-FE ENGINE CONTROL: ECM: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY

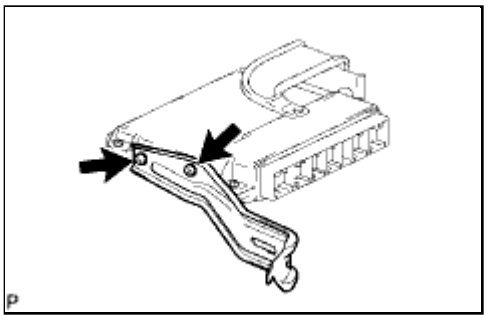
(a) Remove the lower instrument panel INFO .



2. REMOVE ECM

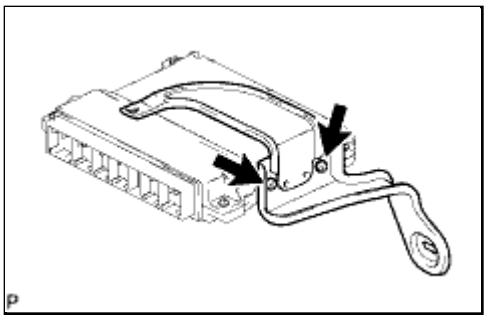
(a) Disconnect the 6 connectors.

(b) Remove the bolt, nut and ECM.



3. REMOVE ECM BRACKET

(a) Remove the 2 screws and ECM bracket.



4. REMOVE NO. 2 ECM BRACKET

(a) Remove the 2 screws and No. 2 ECM bracket.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000329100WX
Title: 1GR-FE ENGINE CONTROL: ECM: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL NO. 2 ECM BRACKET

(a) Install the No. 2 ECM bracket with the 2 screws.

Torque: 3.0 N·m (31 kgf·cm, 27in·lbf)

2. INSTALL ECM BRACKET

(a) Install the bracket with the 2 screws.

Torque: 3.0 N·m (31 kgf·cm, 27in·lbf)

3. INSTALL ECM

(a) Install the ECM with the bolt and nut.

Torque: 8.0 N·m (82 kgf·cm, 71in·lbf)

(b) Connect the 6 connectors.

4. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY

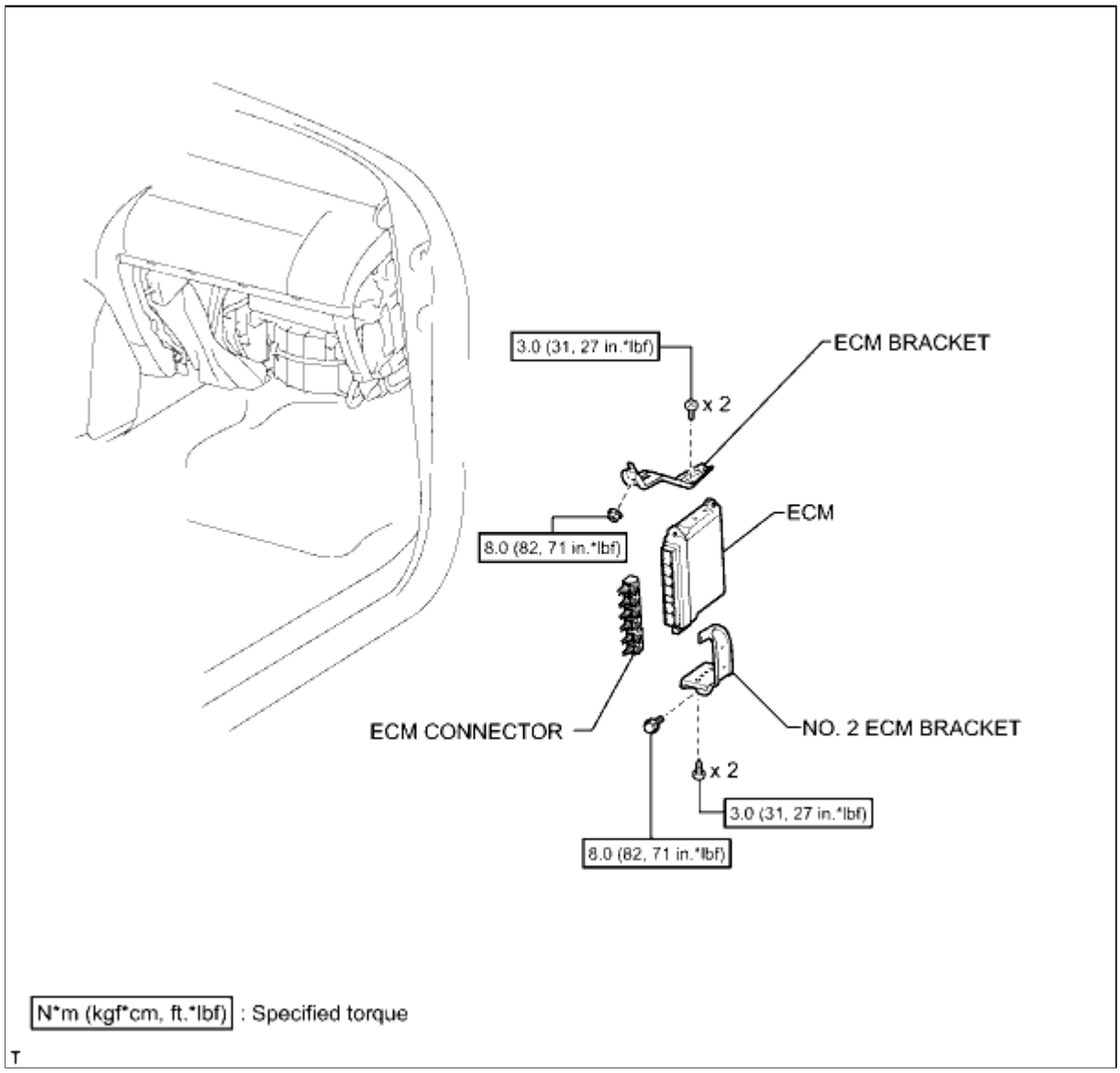
(a) Install the lower instrument panel INFO .

5. PERFORM INITIALIZATION INFO

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000328X012X
Title: 2TR-FE ENGINE CONTROL: ECM: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION

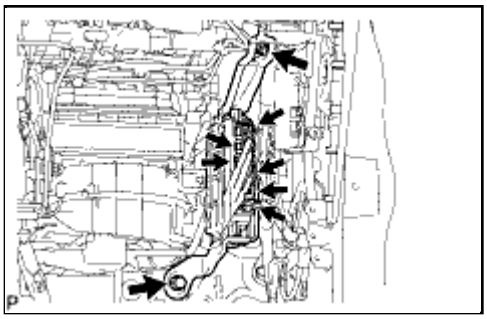


Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003292011X
Title: 2TR-FE ENGINE CONTROL: ECM: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY

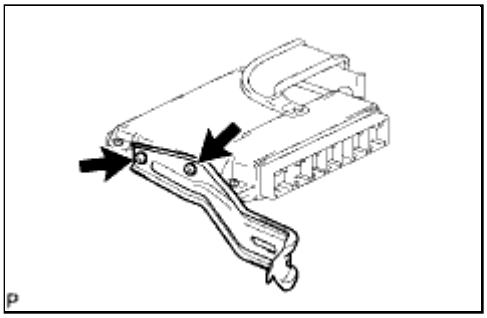
(a) Remove the lower instrument panel INFO .



2. REMOVE ECM

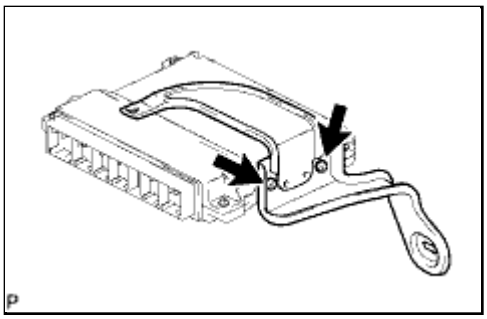
(a) Disconnect the 6 connectors.

(b) Remove the bolt, nut and ECM.



3. REMOVE ECM BRACKET

(a) Remove the 2 screws and ECM bracket.



4. REMOVE NO. 2 ECM BRACKET

(a) Remove the 2 screws and No. 2 ECM bracket.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003291011X
Title: 2TR-FE ENGINE CONTROL: ECM: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL NO. 2 ECM BRACKET

(a) Install the No. 2 ECM bracket with the 2 screws.

Torque: 3.0 N·m (31 kgf·cm, 27in·lbf)

2. INSTALL ECM BRACKET

(a) Install the bracket with the 2 screws.

Torque: 3.0 N·m (31 kgf·cm, 27in·lbf)

3. INSTALL ECM

(a) Install the ECM with the bolt and nut.

Torque: 8.0 N·m (82 kgf·cm, 71in·lbf)

(b) Connect the 6 connectors.

4. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY

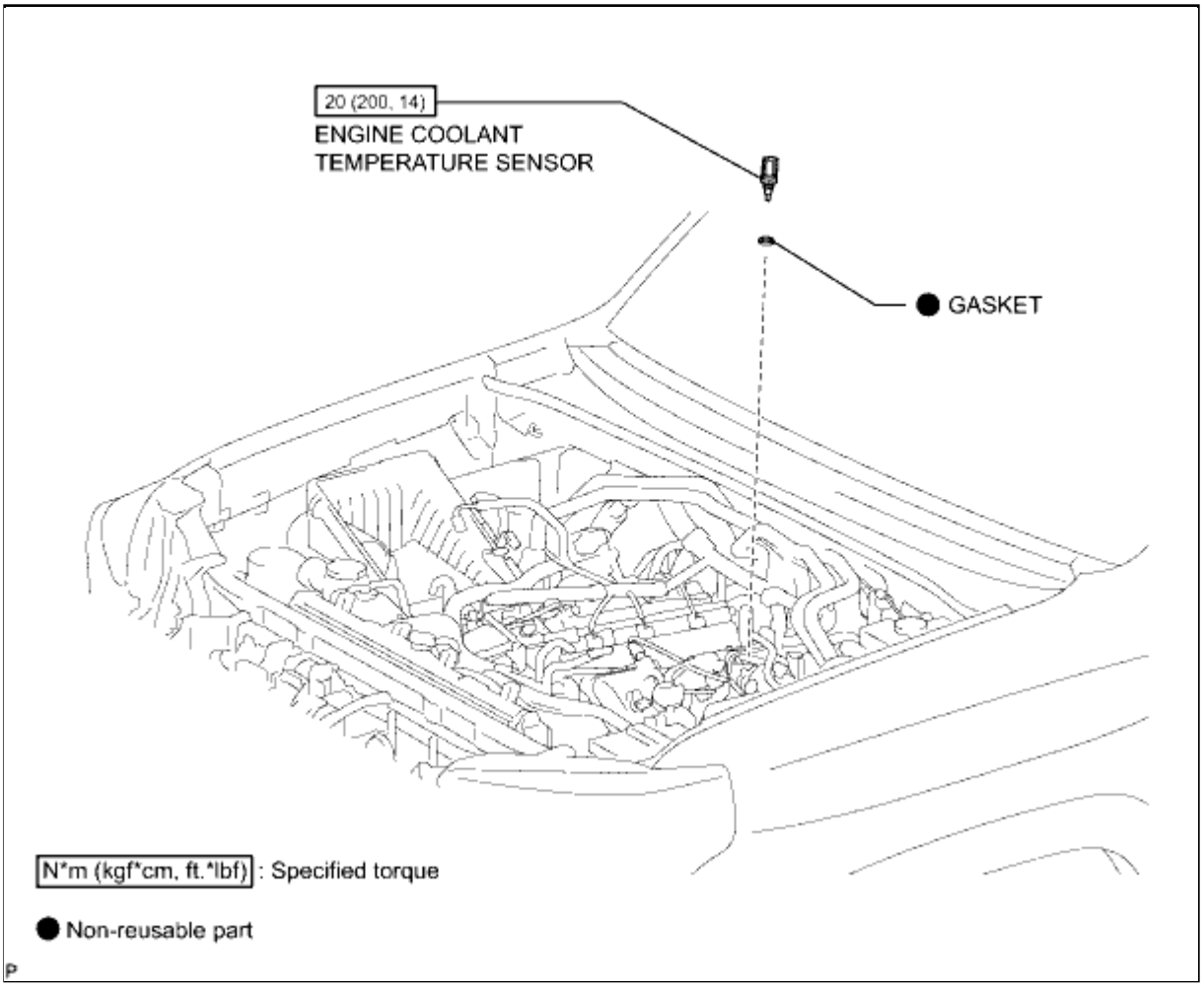
(a) Install the lower instrument panel INFO .

5. PERFORM INITIALIZATION INFO

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002WAP009X
Title: 1GR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION

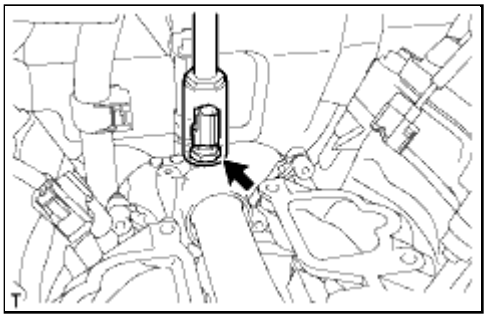


Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000PWT02AX
Title: 1GR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE INTAKE MANIFOLD

(a) Remove the intake manifold INFO .



2. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

(a) Disconnect the sensor connector.

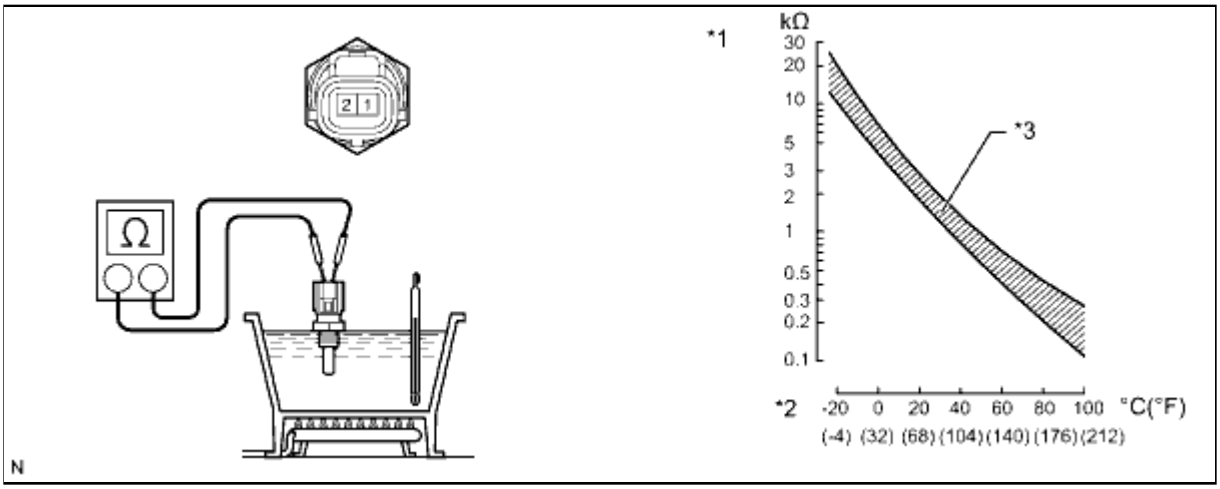
(b) Using a 19 mm deep socket wrench, remove the sensor.

(c) Remove the gasket from the sensor.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000018I600OX
Title: 1GR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT ENGINE COOLANT TEMPERATURE SENSOR



Text in Illustration

*1	Resistance	*2	Temperature
*3	Acceptable	-	-

(a) Partially immerse the sensor in water and warm up the water.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	Approx. 20°C (68°F)	2.32 to 2.59 kΩ
	Approx. 80°C (176°F)	0.310 to 0.326 kΩ

If the result is not as specified, replace the sensor.

NOTICE:

When checking the sensor in water, keep the terminals dry. After the check, wipe the sensor dry.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000PWQ02BX
Title: 1GR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR

(a) Install a new gasket to the sensor.

(b) Using a 19 mm deep socket wrench, install the sensor.

Torque: 20 N·m (200 kgf·cm, 14ft·lbf)

(c) Connect the sensor connector.

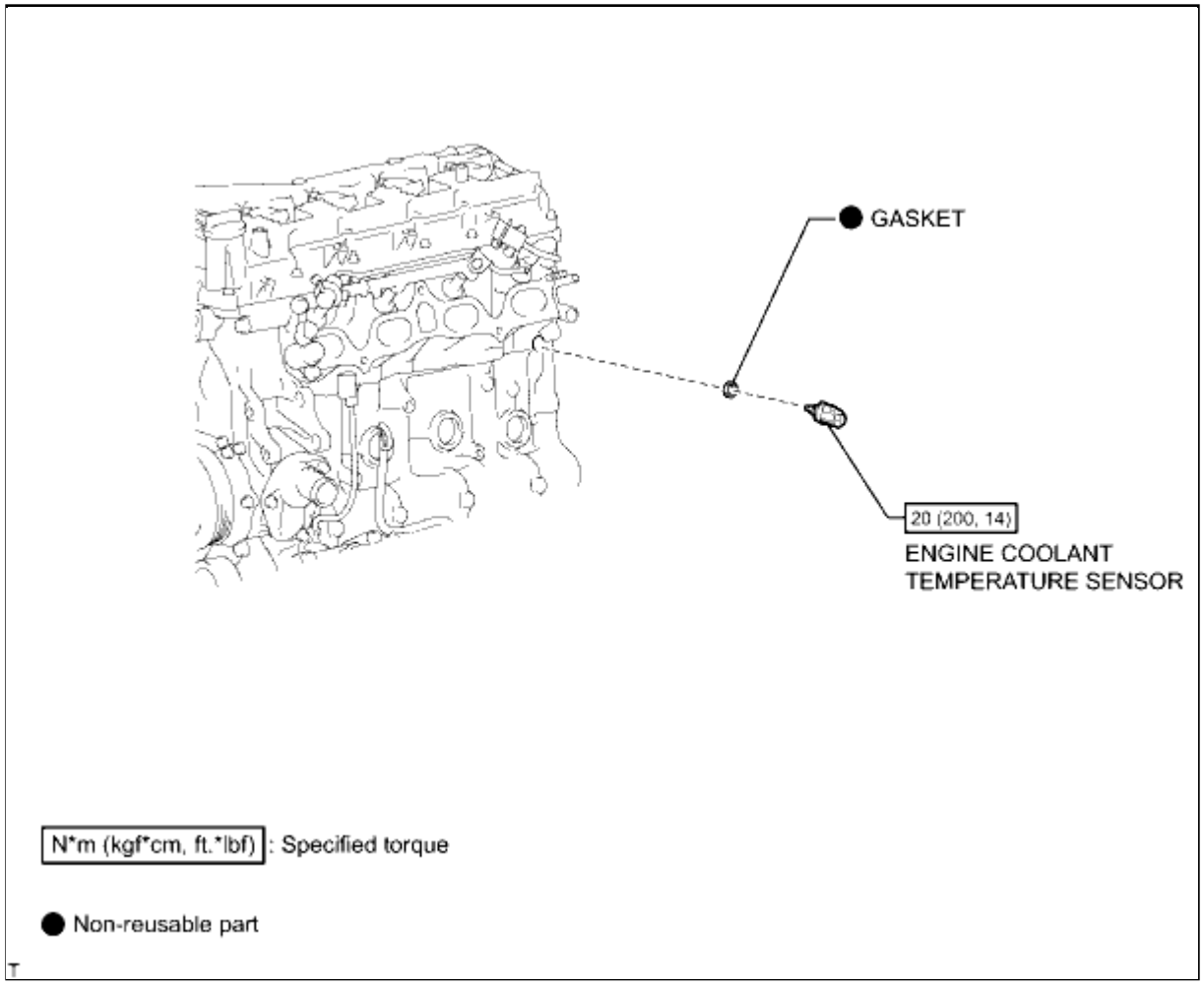
2. INSTALL INTAKE MANIFOLD

(a) Install the intake manifold INFO .

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FO002X
Title: 2TR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000111M005X
Title: 2TR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: REMOVAL (2010 4Runner)		

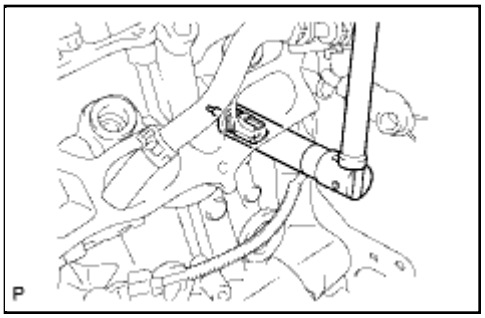
REMOVAL

1. REMOVE INTAKE MANIFOLD

(a) Remove the intake manifold INFO .

2. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

(a) Disconnect the engine coolant temperature sensor connector.



(b) Using a 19 mm deep socket wrench, remove the engine coolant temperature sensor and gasket.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000013Y2007X
Title: 2TR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: INSPECTION (2010 4Runner)		

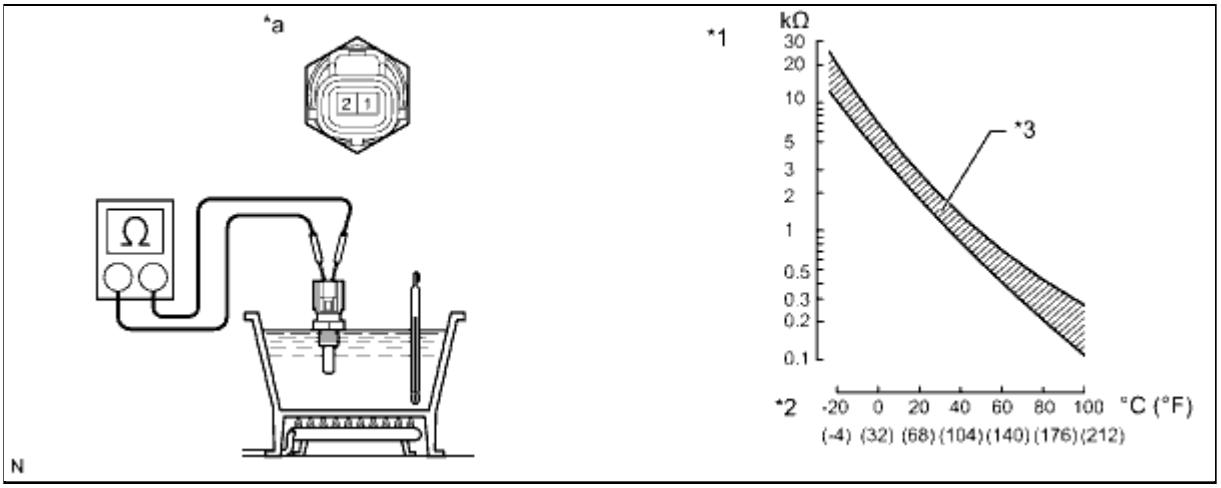
INSPECTION

1. INSPECT ENGINE COOLANT TEMPERATURE SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (E2) - 2 (THW)	20°C (68°F)	2.32 to 2.59 kΩ
	80°C (176°F)	0.310 to 0.326 kΩ



Text in Illustration

*1	Resistance	*2	Temperature
*3	Acceptable	-	-
*a	Component without harness connected (Engine Coolant Temperature Sensor)	-	-

NOTICE:

If checking the engine coolant temperature sensor in water, be careful not to allow water to contact the terminals. After checking, clean off any water on the engine coolant temperature sensor.

If the result is not as specified, replace the engine coolant temperature sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000111K005X
Title: 2TR-FE ENGINE CONTROL: ENGINE COOLANT TEMPERATURE SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR

(a) Install a new gasket to the engine coolant temperature sensor.

(b) Using a 19 mm deep socket wrench, install the engine coolant temperature sensor.

Torque: 20 N·m (200 kgf·cm, 14ft·lbf)

(c) Connect the engine coolant temperature sensor connector.

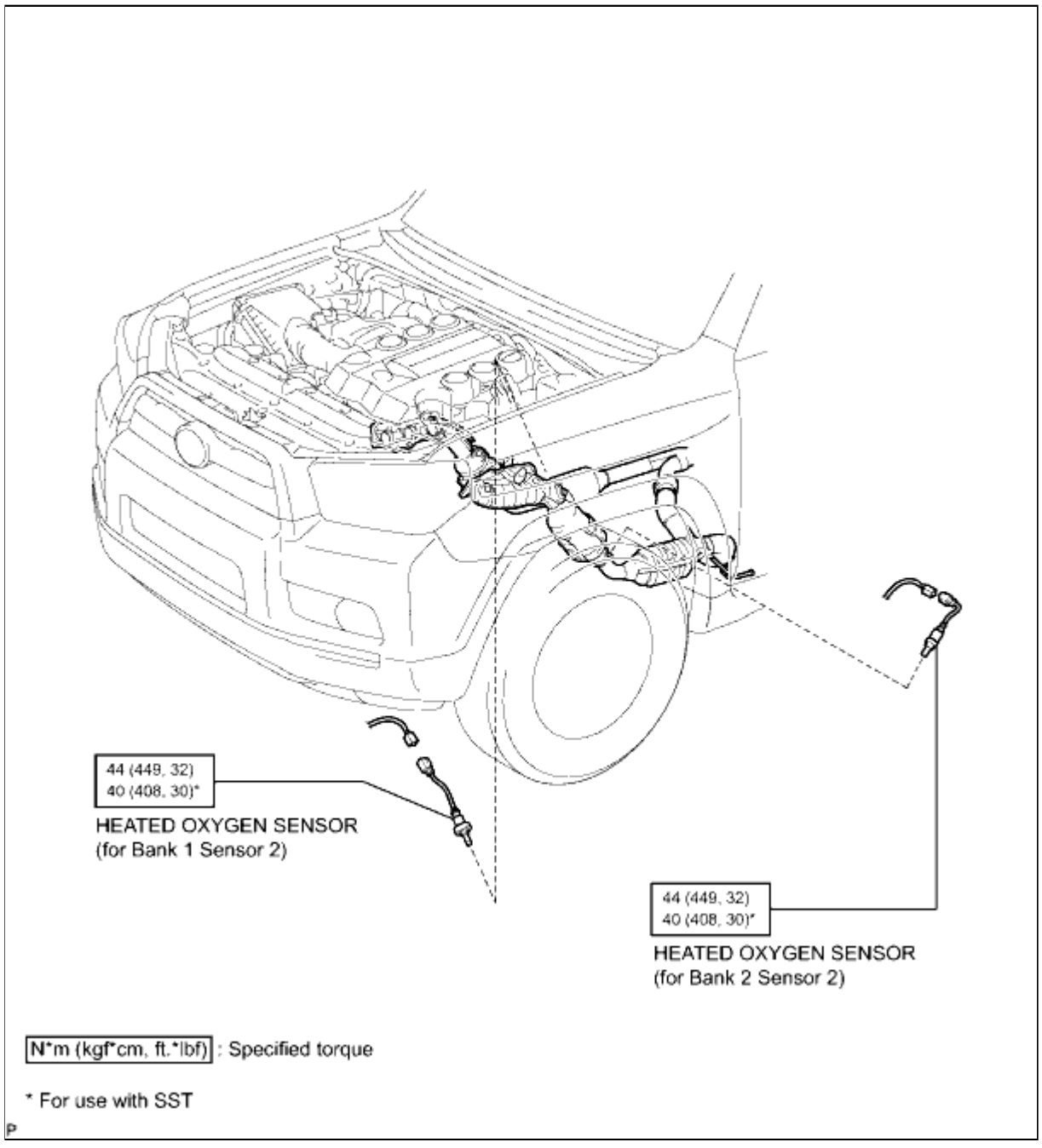
2. INSTALL INTAKE MANIFOLD

(a) Install the intake manifold INFO .

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002W9M007X
Title: 1GR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION

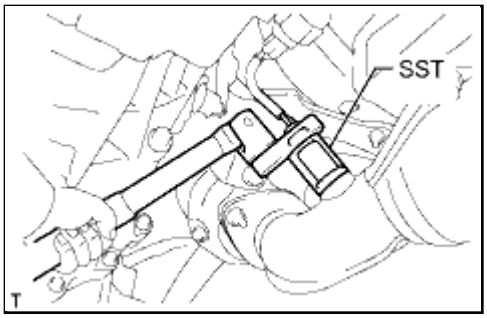


Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002W9N007X
Title: 1GR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE HEATED OXYGEN SENSOR (for Bank 1 Sensor 2)

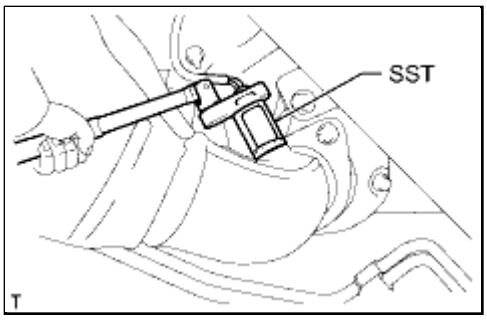
(a) Disconnect the sensor connector.



(b) Using SST, remove the sensor.

SST: 09224-00010

2. REMOVE HEATED OXYGEN SENSOR (for Bank 2 Sensor 2)



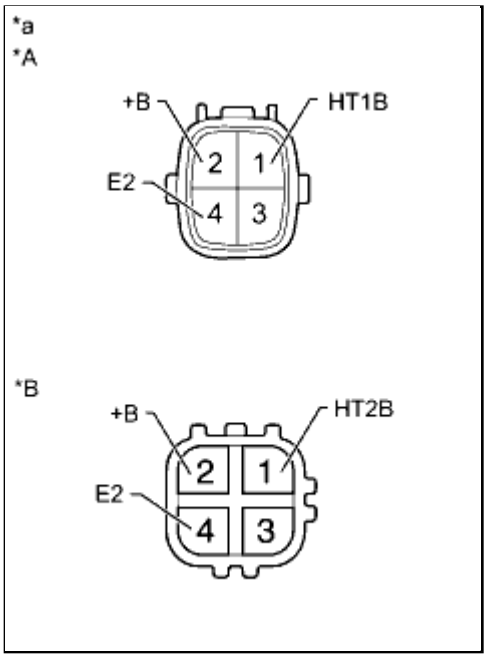
(a) Using SST, remove the sensor.

SST: 09224-00010

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002RV600QX
Title: 1GR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT HEATED OXYGEN SENSOR



(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance (for Bank 1):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (HT1B) - 2 (+B)	20°C (68°F)	11 to 16 Ω
1 (HT1B) - 4 (E2)	Always	10 kΩ or higher

Standard Resistance (for Bank 2):

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (HT2B) - 2 (+B)	20°C (68°F)	11 to 16 Ω
1 (HT2B) - 4 (E2)	Always	10 kΩ or higher

Text in Illustration

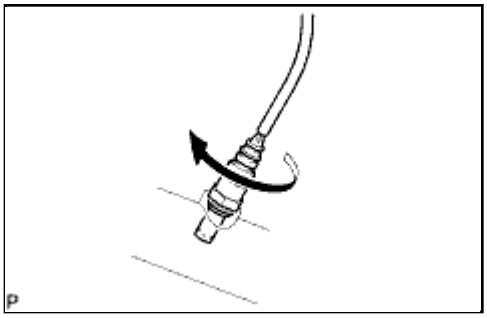
*A	for Bank 1
*B	for Bank 2
*a	Component without harness connected (Heated Oxygen Sensor)

If the result is not as specified, replace the heated oxygen sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002W9L007X
Title: 1GR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

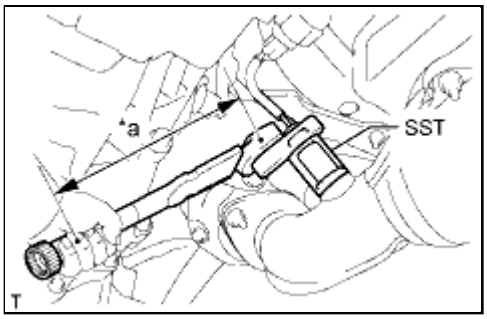
1. INSTALL HEATED OXYGEN SENSOR (for Bank 1 Sensor 2)



(a) Temporarily install the sensor to the exhaust pipe by hand.

(b) Using SST, tighten the sensor.

SST: 09224-00010
without SST - Torque: 44 N·m (449 kgf·cm, 32ft·lbf)
with SST - Torque: 40 N·m (408 kgf·cm, 30ft·lbf)



Text in Illustration

*1	Fulcrum Length

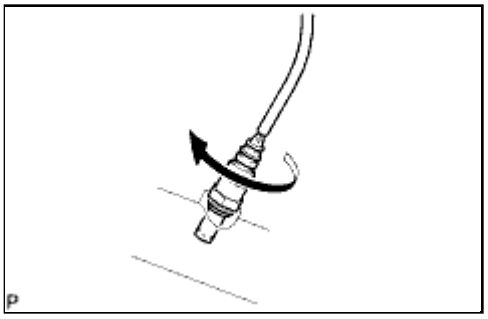
HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.8 in.). When using a torque wrench with a fulcrum length that is not 30 cm (11.8 in.), calculate the torque specification for the torque wrench and SST based on the "without SST" torque specification INFO .
- Make sure SST and the wrench are connected in a straight line.

(c) Connect the sensor connector.

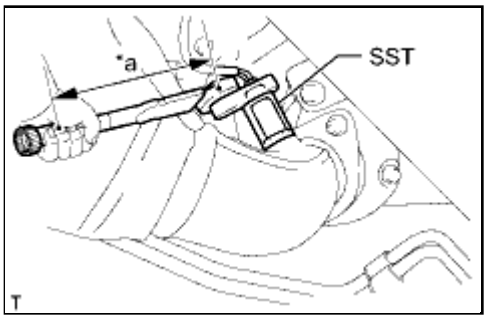
2. INSTALL HEATED OXYGEN SENSOR (for Bank 2 Sensor 2)

(a) Temporarily install the sensor to the exhaust pipe by hand.



(b) Using SST, tighten the sensor.

SST: 09224-00010
without SST - Torque: 44 N·m (449 kgf·cm, 32ft·lbf)
with SST - Torque: 40 N·m (408 kgf·cm, 30ft·lbf)



Text in Illustration

*1	Fulcrum Length

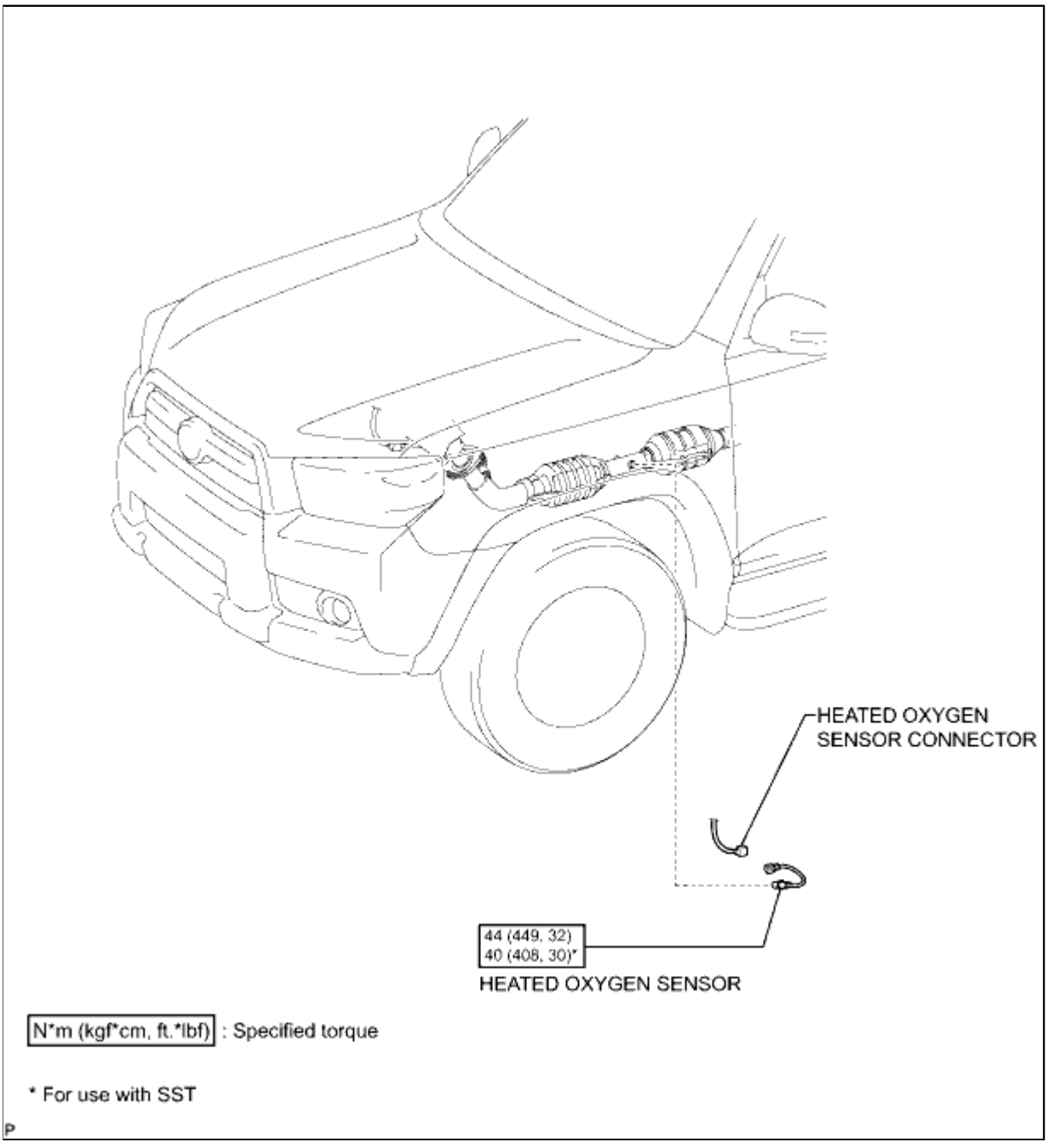
HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.8 in.). When using a torque wrench with a fulcrum length that is not 30 cm (11.8 in.), calculate the torque specification for the torque wrench and SST based on the "without SST" torque specification INFO .
- Make sure SST and the wrench are connected in a straight line.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FR002X
Title: 2TR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

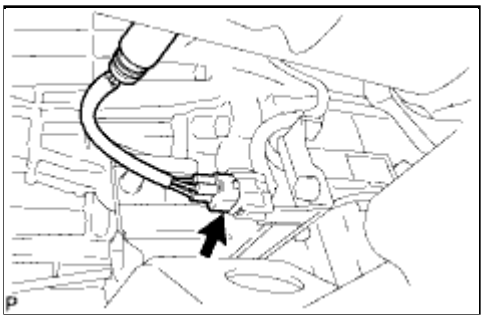
ILLUSTRATION



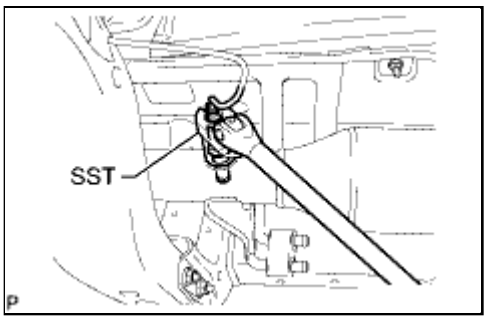
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000175F008X
Title: 2TR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE HEATED OXYGEN SENSOR



(a) Disconnect the heated oxygen sensor connector.



(b) Using SST, remove the heated oxygen sensor.

SST: 09224-00010

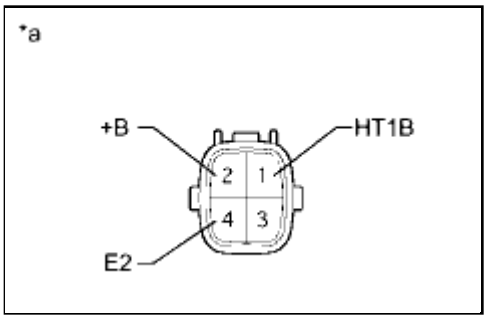
Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000175E008X
Title: 2TR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT HEATED OXYGEN SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (HT1B) - 2 (+B)	20°C (68°F)	11 to 16 Ω
1 (HT1B) - 4 (E2)	Always	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (Heated Oxygen Sensor)

If the result is not as specified, replace the heated oxygen sensor.

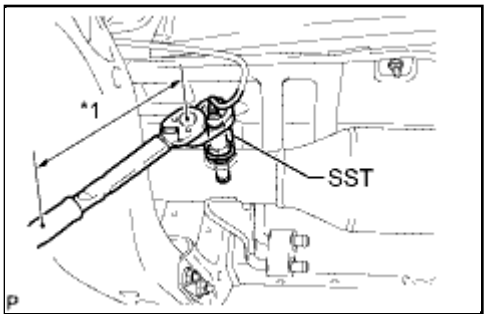
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000175D008X
Title: 2TR-FE ENGINE CONTROL: HEATED OXYGEN SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL HEATED OXYGEN SENSOR

(a) Using SST, install the heated oxygen sensor.

SST: 09224-00010
without SST - Torque: 44 N·m (449 kgf·cm, 32ft·lbf)
with SST - Torque: 40 N·m (408 kgf·cm, 30ft·lbf)



Text in Illustration

*1	Fulcrum Length

HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.8 in.). If using a torque wrench with a length that is not 30 cm (11.8 in.), calculate the torque specification for the torque wrench and SST based on the "without SST" torque specification INFO .
- Make sure SST and the wrench are connected in a straight line.

(b) Attach the wire harness clamp.

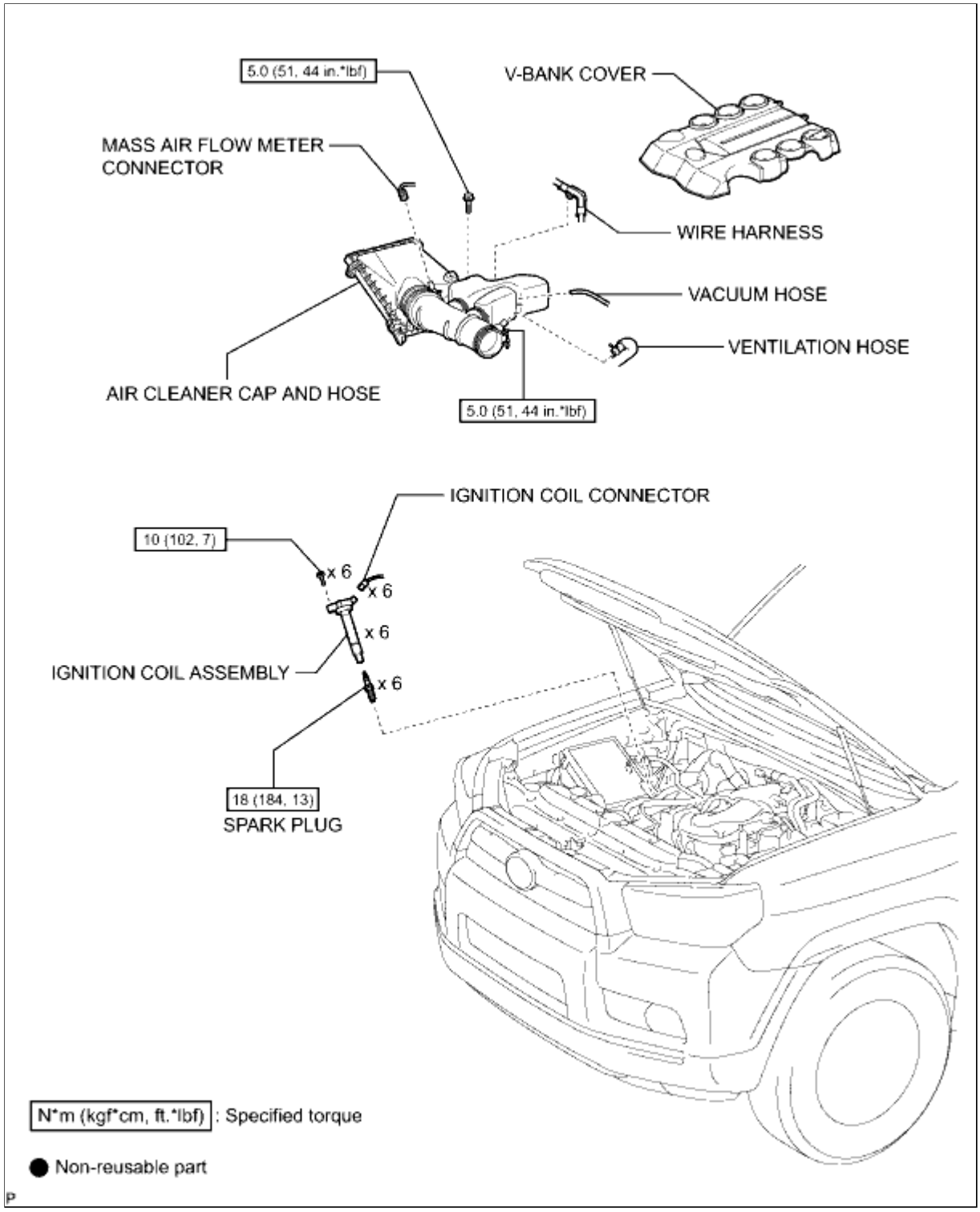
(c) Connect the oxygen sensor connector.

2. INSPECT FOR EXHAUST GAS LEAK INFO

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002I2X00AX
Title: 1GR-FE ENGINE CONTROL: IGNITION COIL AND SPARK PLUG: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION

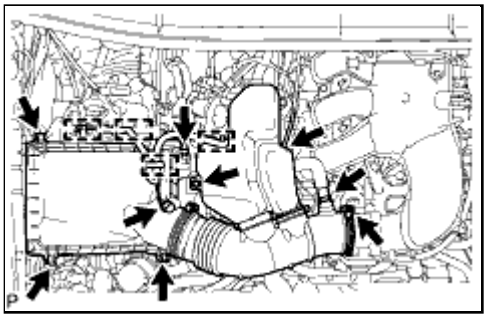


Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002I2Y010X
Title: 1GR-FE ENGINE CONTROL: IGNITION COIL AND SPARK PLUG: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE V-BANK COVER INFO

2. REMOVE AIR CLEANER CAP AND HOSE



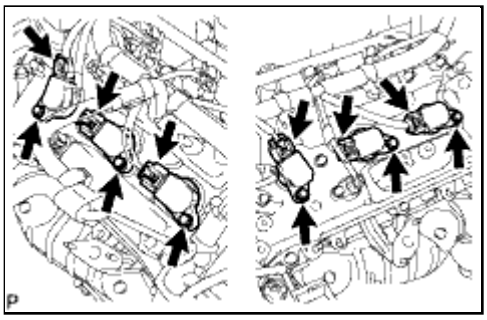
(a) Remove the air cleaner cap and hose.

(1) Disconnect the mass air flow meter connector, vacuum hose and ventilation hose and detach the 4 clamps.

(2) Loosen the clamp.

(3) Unfasten the 4 hook clamps, and then remove the bolt and air cleaner cap and hose.

3. REMOVE IGNITION COIL ASSEMBLY



(a) Disconnect the 6 ignition coil connectors.

(b) Remove the 6 bolts and 6 ignition coils.

4. REMOVE SPARK PLUG

(a) Remove the 6 spark plugs.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002I2W010X
Title: 1GR-FE ENGINE CONTROL: IGNITION COIL AND SPARK PLUG: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL SPARK PLUG

(a) Install the 6 spark plugs.

Torque: 18 N·m (184 kgf·cm, 13ft·lbf)

2. INSTALL IGNITION COIL ASSEMBLY

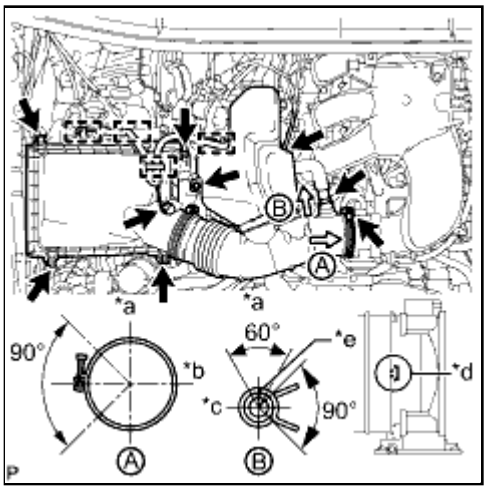
(a) Install the 6 ignition coils with the 6 bolts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(b) Connect the 6 ignition coil connectors.

3. INSTALL AIR CLEANER CAP AND HOSE

(a) Install the air cleaner cap and hose.



Text in Illustration

*a	Top
*b	Front
*c	RH
*d	Align cutout portion of hose with protrusion of throttle
*e	Paint Mark

(1) Install the air cleaner cap and hose with the bolt and fasten the 4 hook clamps.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

(2) Tighten the clamp.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

(3) Attach the 4 clamps and connect the ventilation hose, vacuum hose and mass air flow meter connector.

HINT:

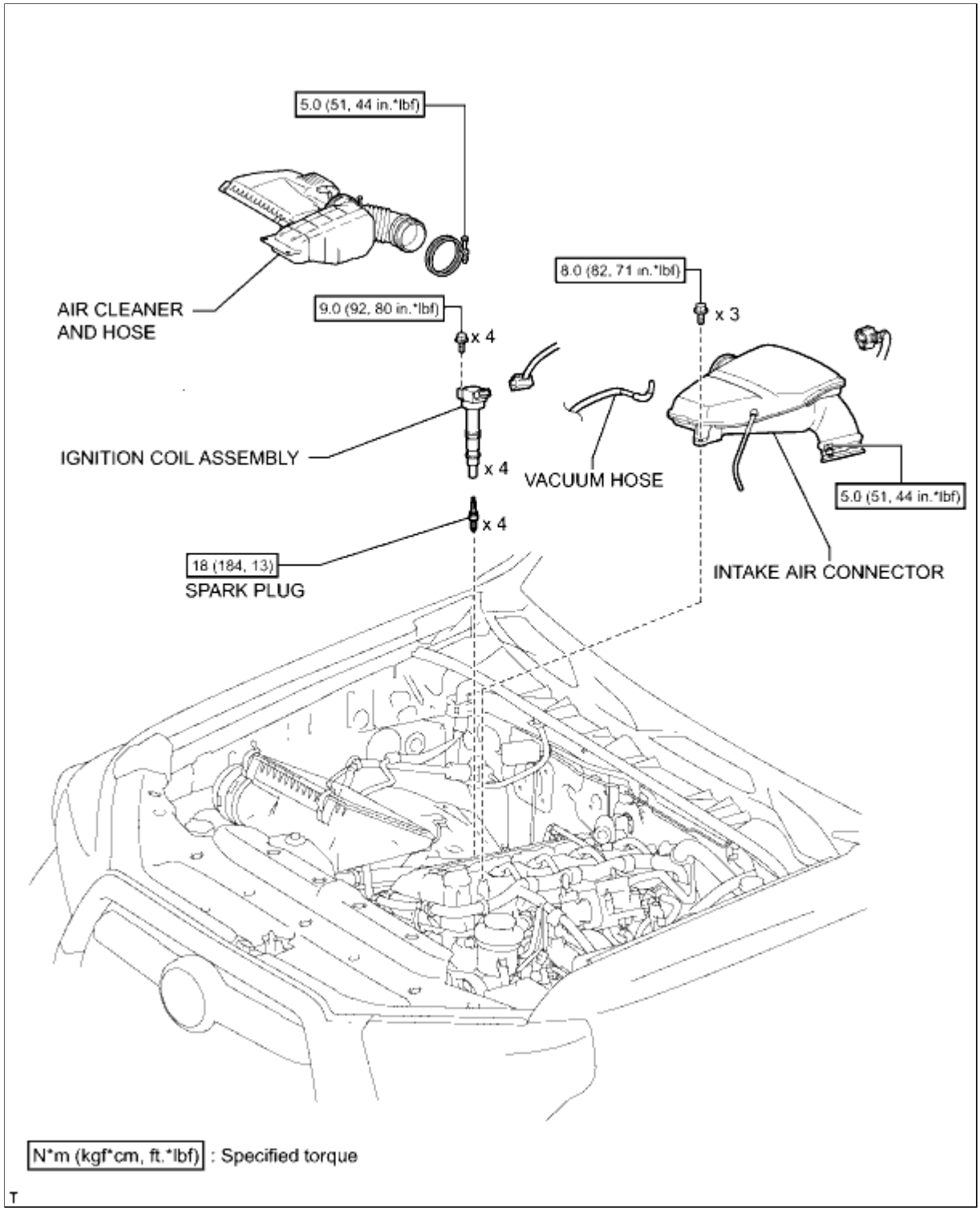
The direction of the hose clamp is indicated in the illustration.

4. INSTALL V-BANK COVER INFO

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FN002X
Title: 2TR-FE ENGINE CONTROL: IGNITION COIL AND SPARK PLUG: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



T

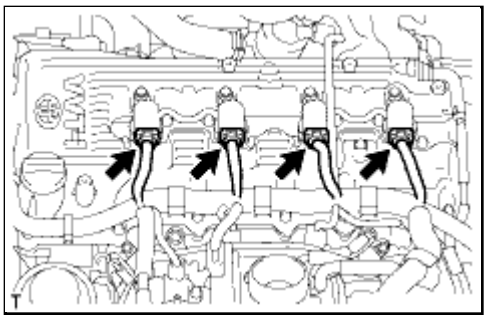
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045AB003X
Title: 2TR-FE ENGINE CONTROL: IGNITION COIL AND SPARK PLUG: REMOVAL (2010 4Runner)		

REMOVAL

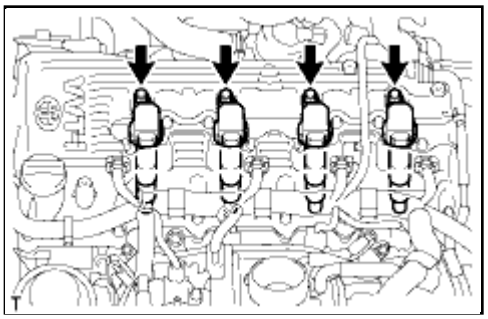
1. REMOVE AIR CLEANER AND HOSE INFO

2. REMOVE INTAKE AIR CONNECTOR INFO

3. REMOVE IGNITION COIL ASSEMBLY

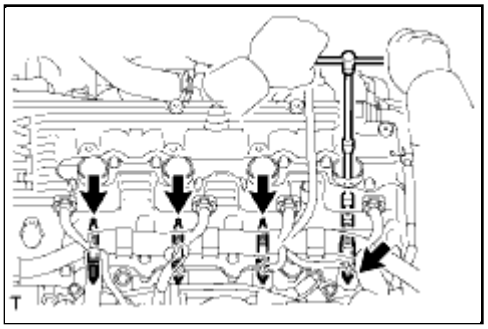


(a) Disconnect the 4 ignition coil connectors.



(b) Remove the 4 bolts and 4 ignition coils.

4. REMOVE SPARK PLUG



(a) Using a 16 mm spark plug wrench, remove the 4 spark plugs.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045A9003X
Title: 2TR-FE ENGINE CONTROL: IGNITION COIL AND SPARK PLUG: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL SPARK PLUG

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

Torque: 18 N·m (184 kgf·cm, 13ft·lbf)

2. INSTALL IGNITION COIL ASSEMBLY

(a) Install the 4 ignition coils with the 4 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

(b) Connect the 4 ignition coil connectors.

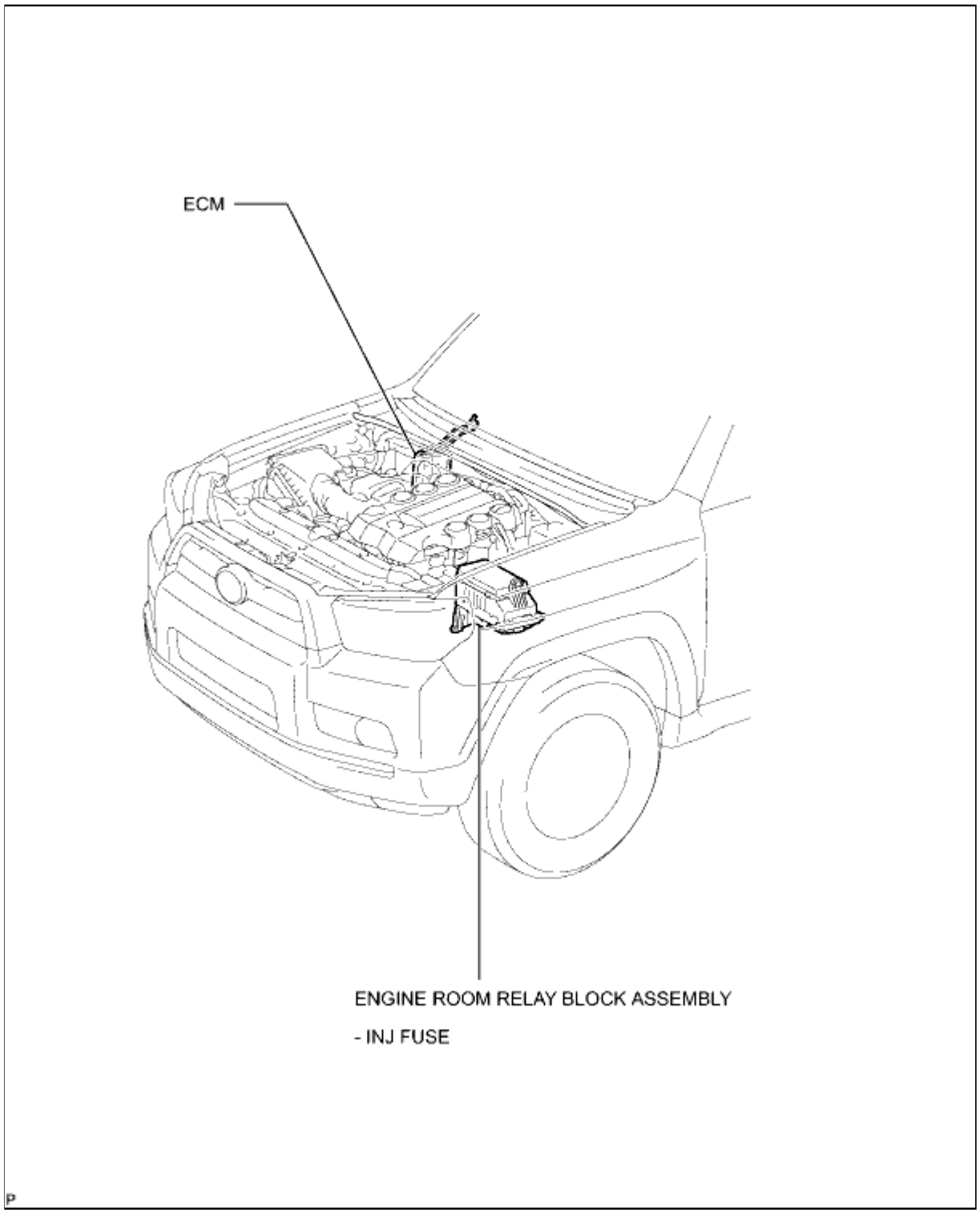
3. INSTALL INTAKE AIR CONNECTOR INFO

4. INSTALL AIR CLEANER AND HOSE INFO

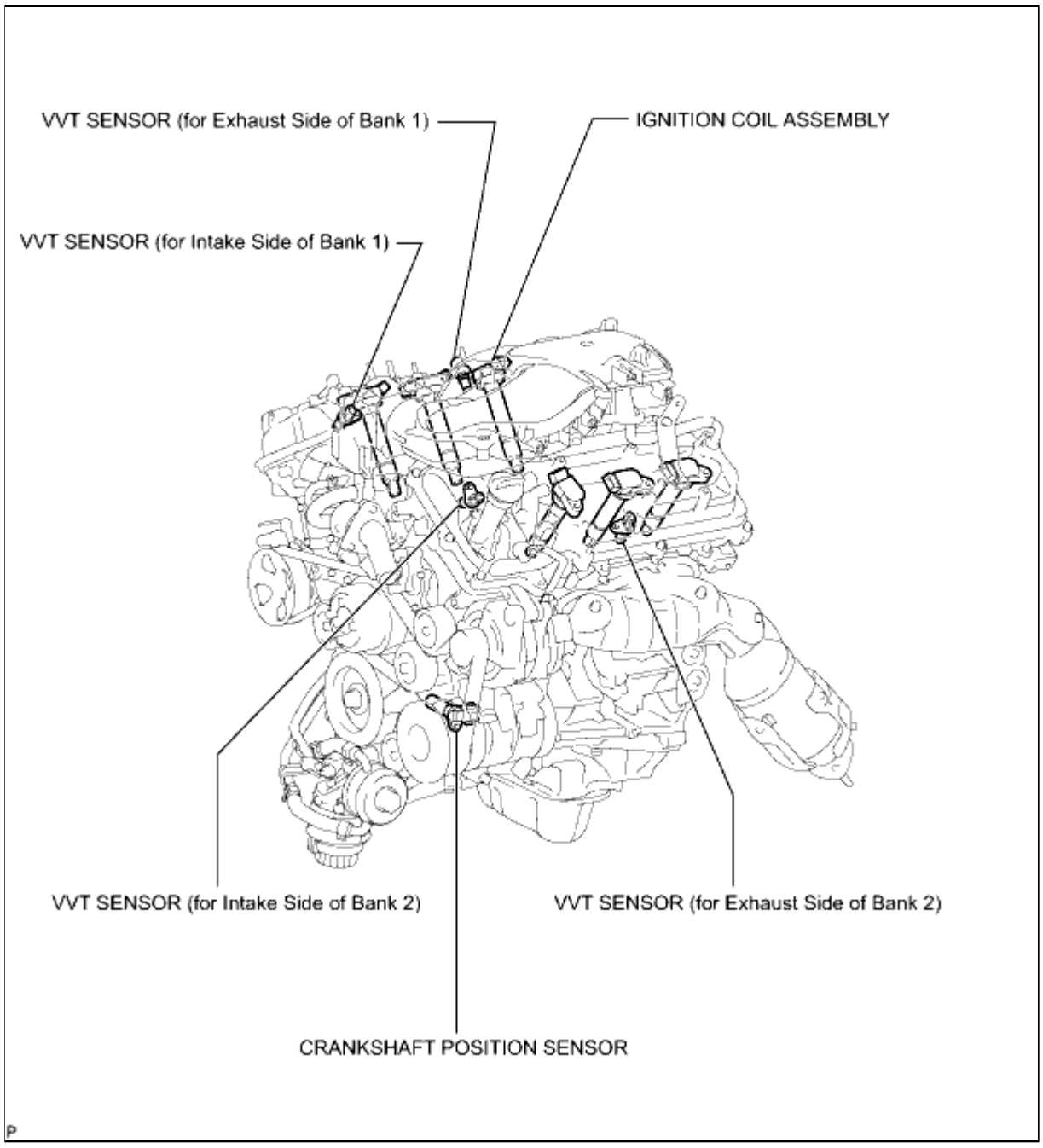
Last Modified: 5-10-2010	6.4 R	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000146B014X
Title: 1GR-FE ENGINE CONTROL: IGNITION SYSTEM: PARTS LOCATION (2010 4Runner)		

PARTS LOCATION

ILLUSTRATION

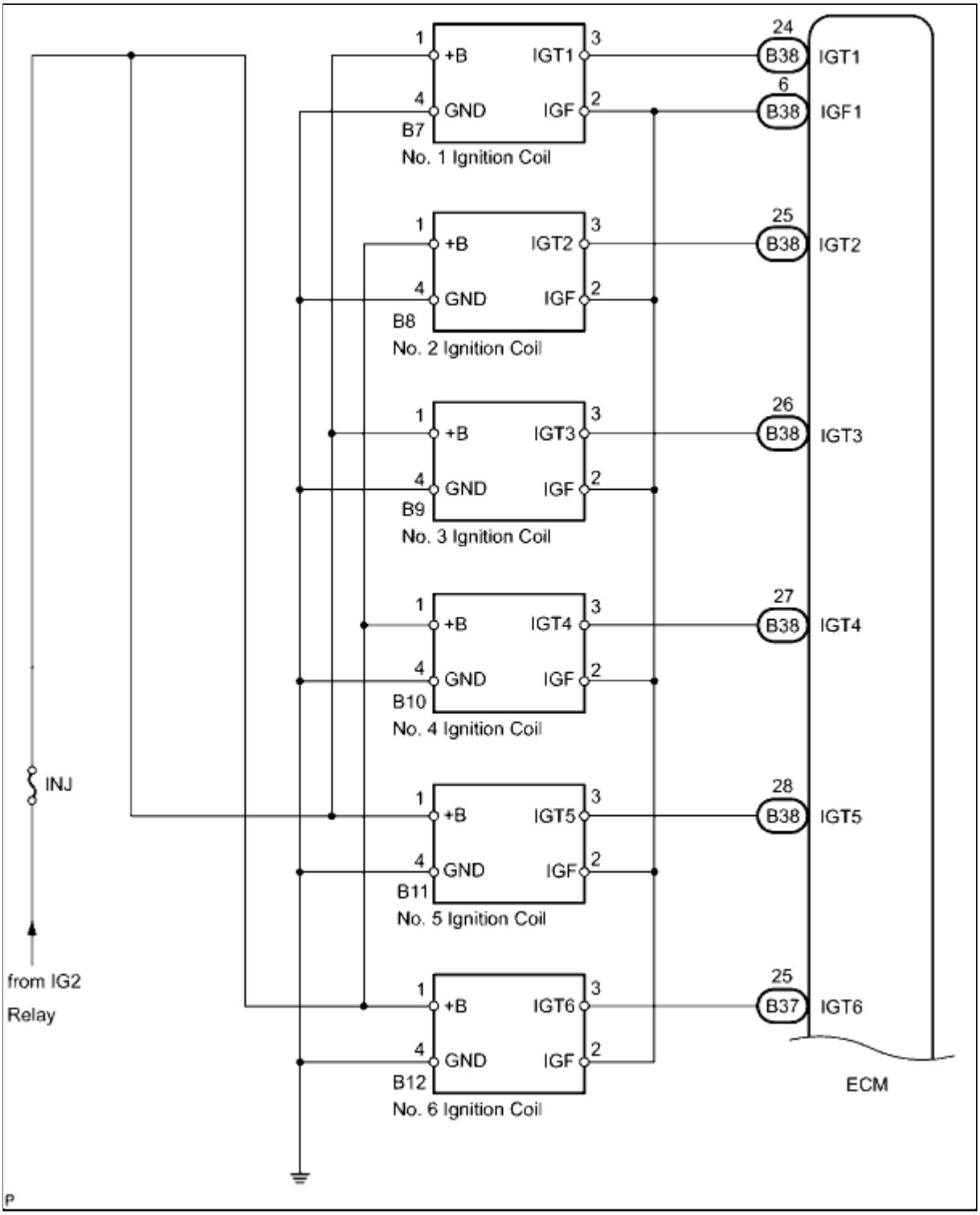


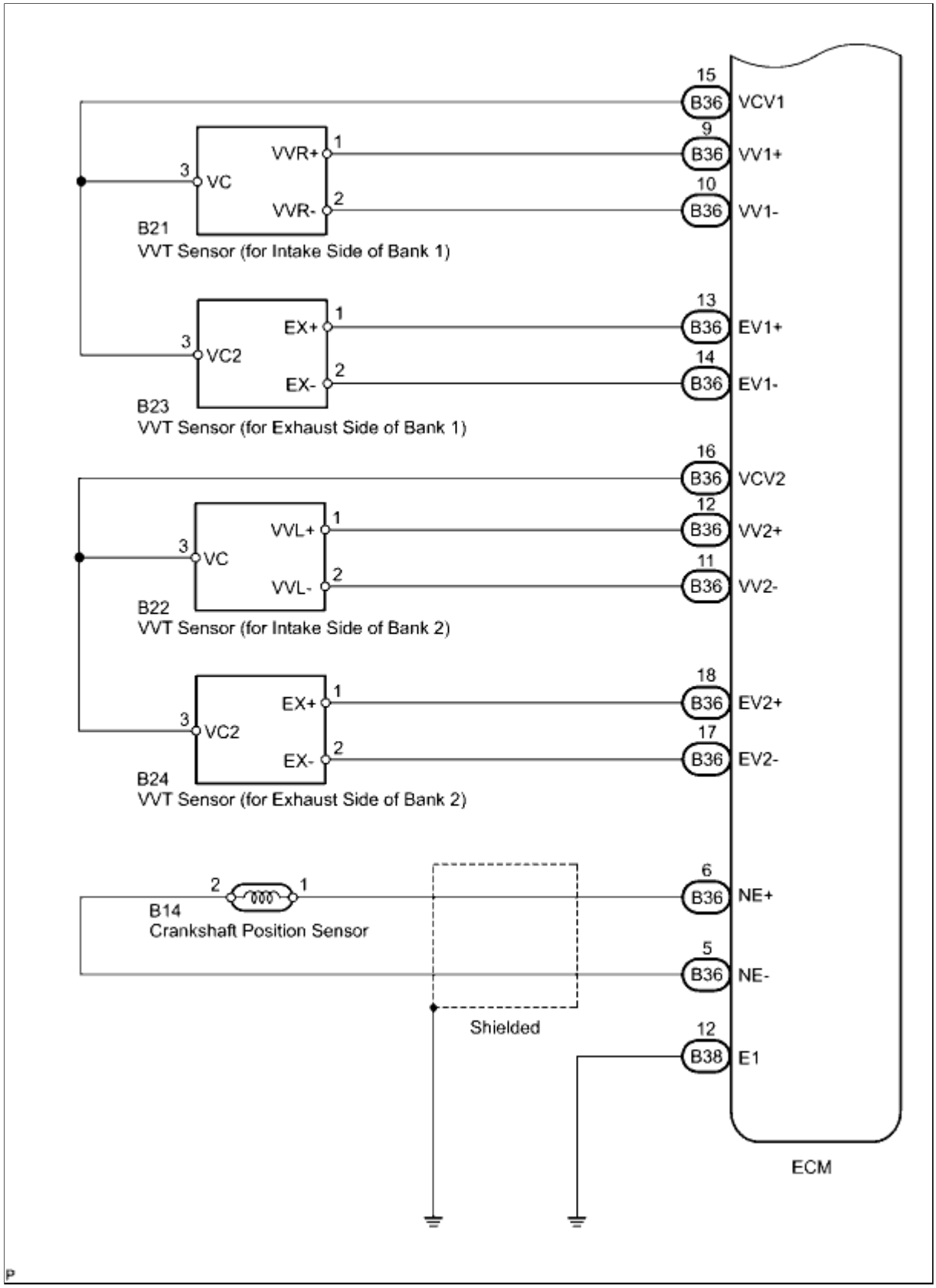
ILLUSTRATION



Last Modified: 5-10-2010	6.4 U	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM00000146D00FX
Title: 1GR-FE ENGINE CONTROL: IGNITION SYSTEM: SYSTEM DIAGRAM (2010 4Runner)		

SYSTEM DIAGRAM





Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000SM6031X
Title: 1GR-FE ENGINE CONTROL: IGNITION SYSTEM: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. PERFORM SPARK TEST

(a) Check for DTCs INFO.

NOTICE:

If any DTC is output, perform the troubleshooting procedures for that DTC.

(b) Check if sparks occur.

(1) Remove the 6 spark plugs INFO.

(2) Install the spark plug to the ignition coil and connect the ignition coil connector.

(3) Remove the engine room relay block cover.

(4) Remove the circuit opening relay (C/OPN) from the engine room relay block.

(5) Ground the spark plug.

(6) Visually check that sparks occur while the engine is being cranked.

NOTICE:

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

(c) Check that the wire harness side connector of the ignition coil with igniter is securely connected.

Result

RESULT	PROCEED TO
NG	Connect securely
OK	Go to next step

(d) Perform a spark test on each ignition coil with igniter.

(1) If there is a cylinder where sparks do not occur, replace its ignition coil with the ignition coil of a cylinder where sparks occur normally.

(2) Crank the engine and visually check that sparks occur at the cylinder with the normally operating ignition coil.

Result

RESULT	PROCEED TO
OK	Replace ignition coil with igniter
NG	Go to next step

(e) Inspect the spark plug.

(1) Replace the spark plug with a normal one.

(2) Perform spark test again.

Result

RESULT	PROCEED TO
OK	Replace spark plug
NG	Go to next step

(f) Check power supply to ignition coil with igniter.

(1) Turn the ignition switch to ON.

(2) Check that there is battery voltage at the ignition coil positive (+) terminal.

Result

RESULT	PROCEED TO
NG	Check wiring between engine switch and ignition coil with igniter
OK	Go to next step

(g) Check the VVT sensor for intake side INFO and VVT sensor for exhaust side INFO .

(h) Check the crankshaft position sensor INFO .

(i) Install the 6 spark plugs INFO .

(j) Install the circuit opening relay.

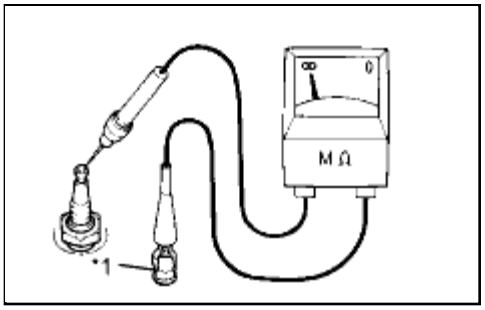
(k) Install the engine room relay block cover.

2. INSPECT SPARK PLUG

(a) Check the electrode.

(1) Using a megohmmeter, measure the insulation resistance.

Standard Insulation Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Spark plug (terminal part) - Body ground	Always	10 MΩ or higher

Text in Illustration

*1	Body Ground

If a megohmmeter is not available, perform the following simple inspection.

(b) Alternative inspection method:

(1) Quickly accelerate the engine to 4000 rpm 5 times.

(2) Remove the spark plug.

(3) Visually check the spark plug.

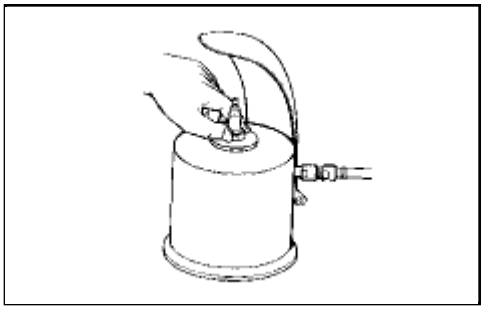
If the electrode is dry, the spark plug is functioning properly. If the electrode is damp, proceed to the next step.

(c) Check the spark plug for any damage on its threads and insulator.

If there is damage, replace the spark plug. If not, reinstall the spark plug.

Recommended Spark Plug:

MANUFACTURER	PRODUCT
DENSO made	SK20HR11



(d) Clean the spark plugs.

(e) Check the spark plug electrode gap.

Maximum electrode gap for used spark plug:
1.3 mm (0.0512 in.)

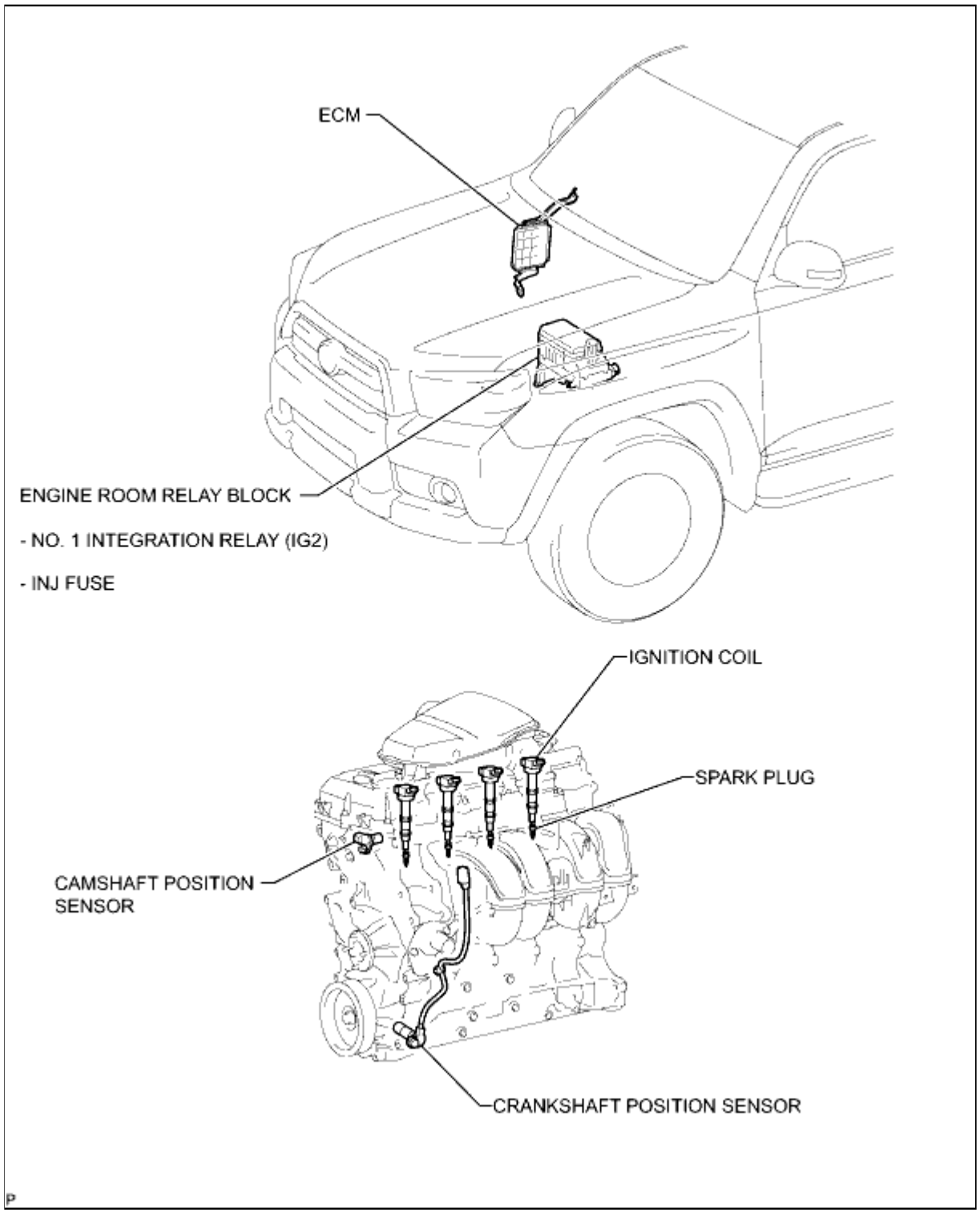
If the gap is more than the maximum, replace the spark plug.

Electrode gap for new spark plug:
1.0 to 1.1 mm (0.0394 to 0.0433 in.)

Last Modified: 5-10-2010	6.4 R	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VX800RX
Title: 2TR-FE ENGINE CONTROL: IGNITION SYSTEM: PARTS LOCATION (2010 4Runner)		

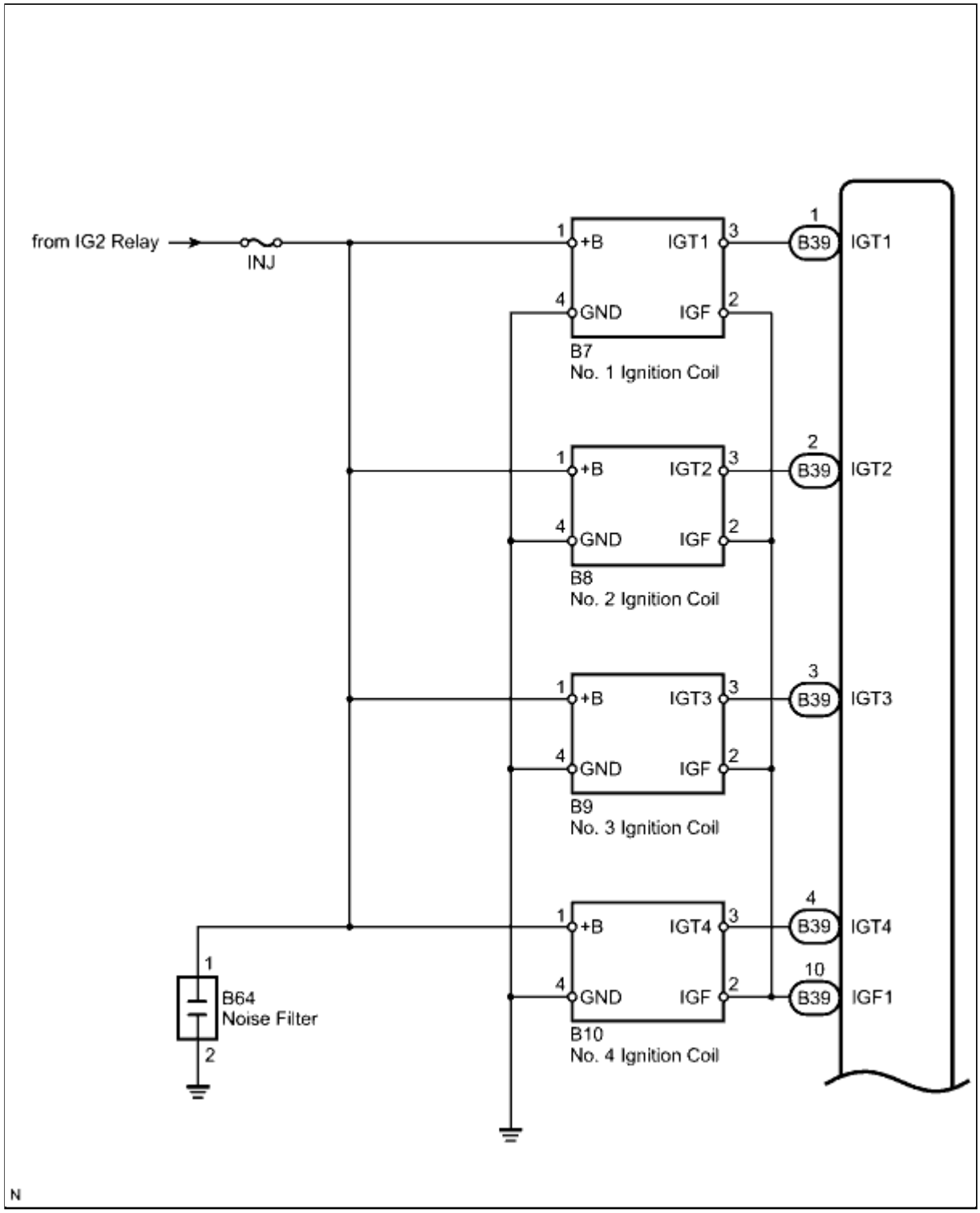
PARTS LOCATION

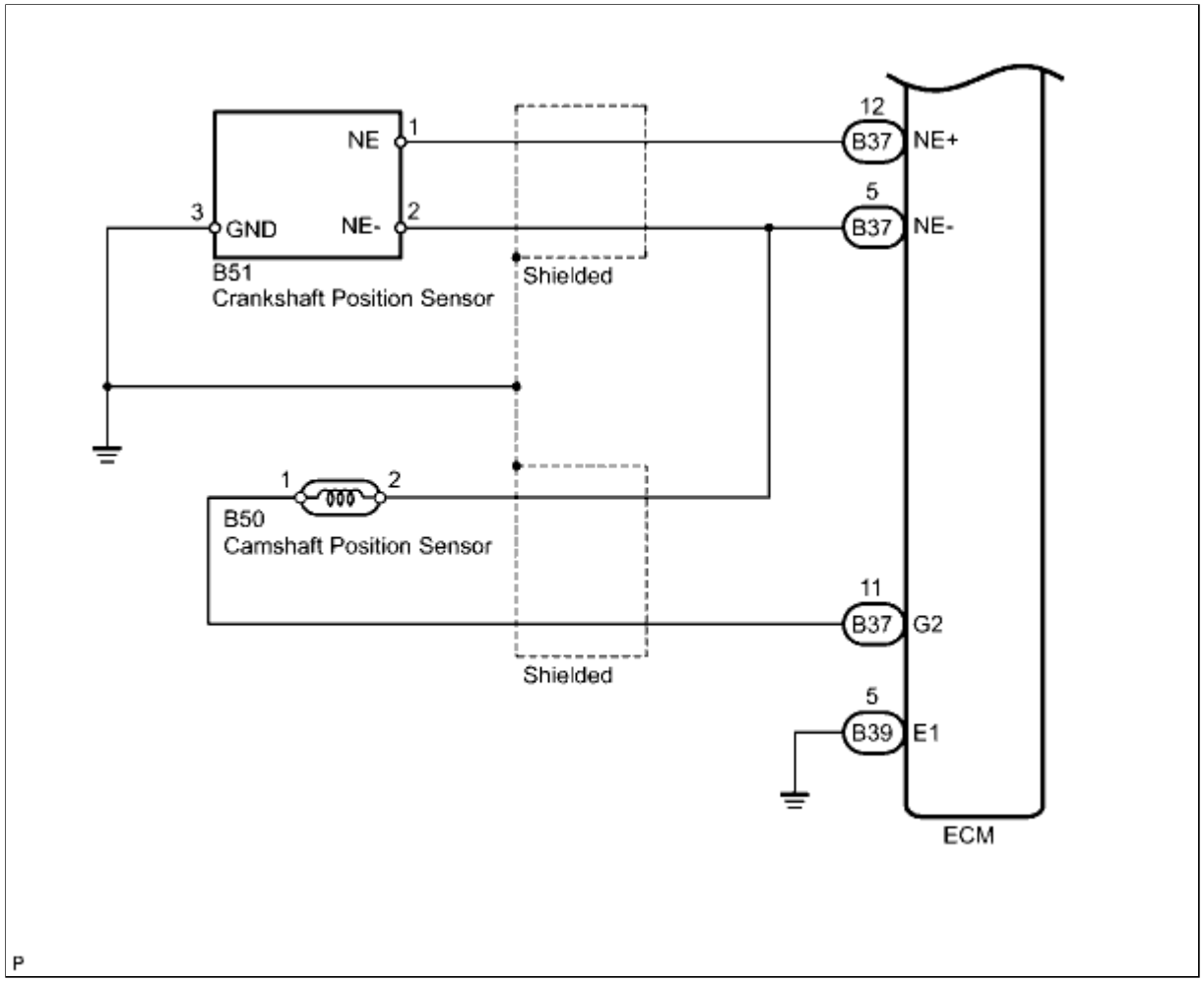
ILLUSTRATION



Last Modified: 5-10-2010	6.4 U	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000SM500RX
Title: 2TR-FE ENGINE CONTROL: IGNITION SYSTEM: SYSTEM DIAGRAM (2010 4Runner)		

SYSTEM DIAGRAM





Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000SM6039X
Title: 2TR-FE ENGINE CONTROL: IGNITION SYSTEM: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. PERFORM IGNITION COIL AND SPARK TEST

(a) Check for DTCs INFO .

NOTICE:

If a DTC is output, perform the troubleshooting procedures for that DTC.

(b) Check if sparks occur.

(1) Remove the ignition coils and spark plugs INFO .

(2) Install the spark plug to the ignition coil and connect the ignition coil connector.

(3) Disconnect the 4 injector connectors.

(4) Ground the spark plug.

(5) Visually check that sparks occur while the engine is being cranked.

NOTICE:

- Be sure to ground the spark plug when checking.
- If the ignition coil has been struck or dropped, replace it.
- Do not crank the engine for more than 2 seconds.

(c) Spark test procedure.

(1) Check that the wire harness side connector of the ignition coil with igniter is securely connected.

Result

RESULT	PROCEDURE
NG	Connect securely
OK	Go to next step

(2) Perform a spark test on each ignition coil with igniter.

1. Replace the ignition coil with igniter with a normal one.
2. Perform a spark test again.

Result

RESULT	PROCEDURE
NG	Replace ignition coil with igniter
OK	Go to next step

(3) Check the spark plug.

Result

RESULT	PROCEDURE
NG	Replace spark plug
OK	Go to next step

(4) Check the power supply to the ignition coil with igniter.

1. Turn the ignition switch to ON.
2. Check that there is battery voltage at the ignition coil positive (+) terminal.

Result

RESULT	PROCEDURE
NG	Check wiring between ignition switch and ignition coil with igniter
OK	Go to next step

(5) Check the camshaft position sensor INFO.

(6) Check the crankshaft position sensor INFO.

(d) Connect the 4 injector connectors.

(e) Install the 4 ignition coils and 4 spark plugs INFO.

2. INSPECT SPARK PLUG

NOTICE:

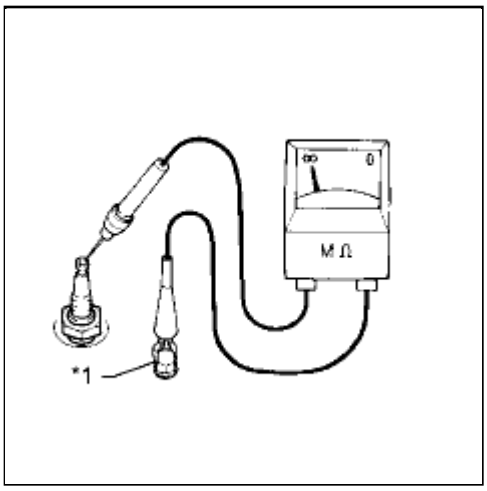
- Do not use a wire brush for cleaning.
- Do not attempt to adjust the electrode gap of a used spark plug.

(a) Check the electrode.

(1) Using a megohmmeter, measure the insulation resistance.

Standard Insulation Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Spark plug (Terminal) - Body ground	Always	10 MΩ or higher



Text in Illustration

*1	Ground

HINT:

If a megohmmeter is not available, perform the following simple inspection.

(b) Alternative inspection method:

(1) Quickly accelerate the engine to 4000 rpm 5 times.

(2) Remove the spark plug.

(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. If not, reinstall the spark plug.

Recommended Spark Plug:

MANUFACTURER	SPARK PLUG TYPE
DENSO	SK20HR11
NGK	ILFR6C11

(d) Check the spark plug electrode gap.

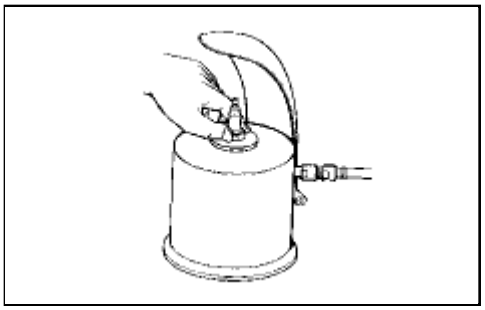
Maximum electrode gap for used spark plug:
1.3 mm (0.0512 in.)

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

Electrode gap for new spark plug:
1.0 to 1.1 mm (0.0394 to 0.0433 in.)

NOTICE:

When 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 of a used plug.



(e) Clean the spark plugs.

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

Air pressure:
588 kPa (6.0 kgf/cm^2, 85 psi)
Duration:
20 seconds or less

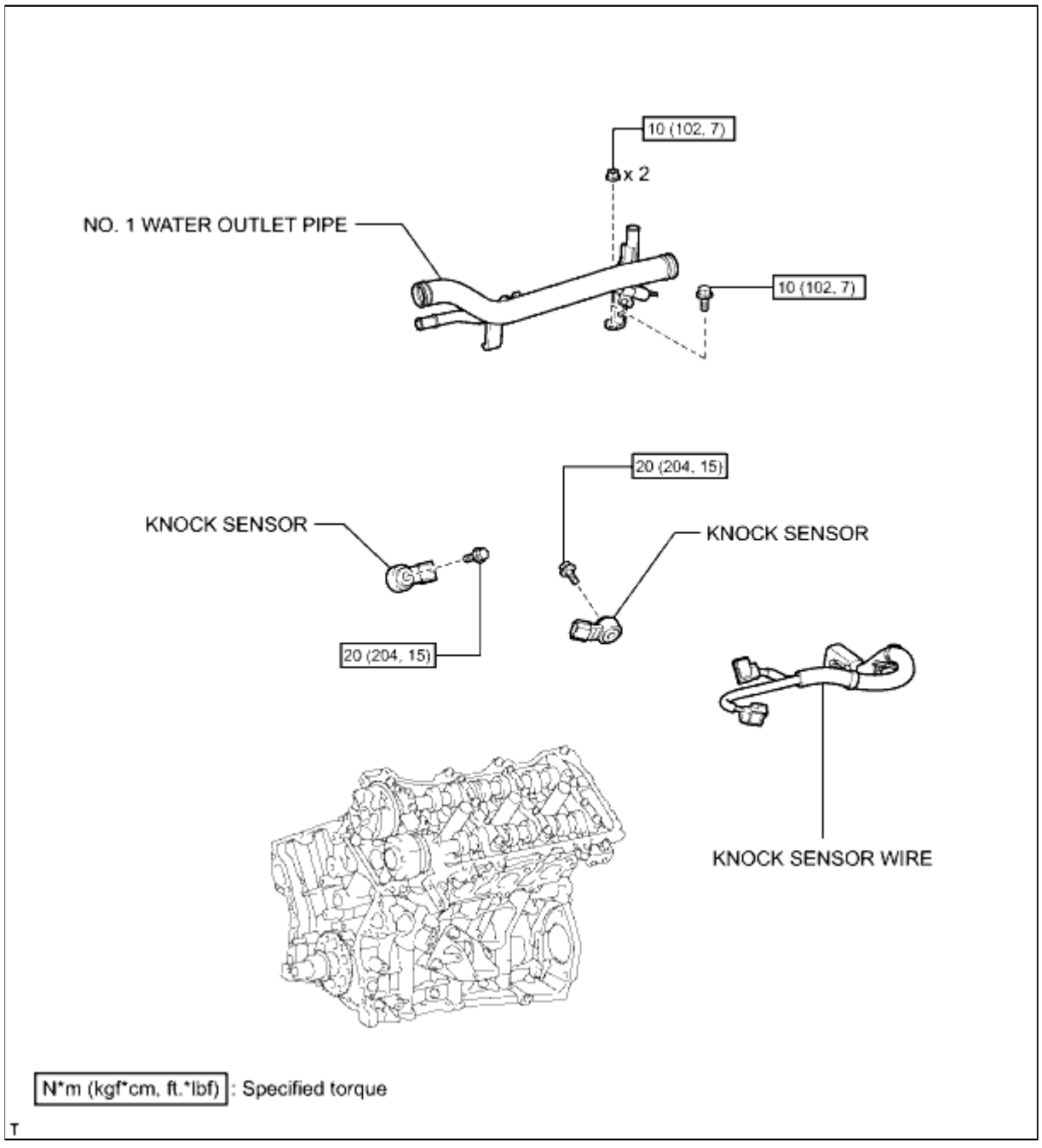
HINT:

Only use a 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.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AV00EX
Title: 1GR-FE ENGINE CONTROL: KNOCK SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



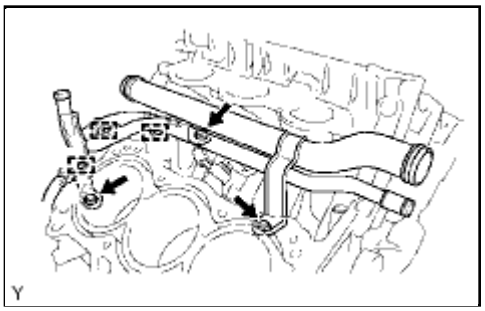
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AW00EX
Title: 1GR-FE ENGINE CONTROL: KNOCK SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE CYLINDER HEAD SUB-ASSEMBLY (for Bank 1)

(a) Remove the cylinder head INFO .

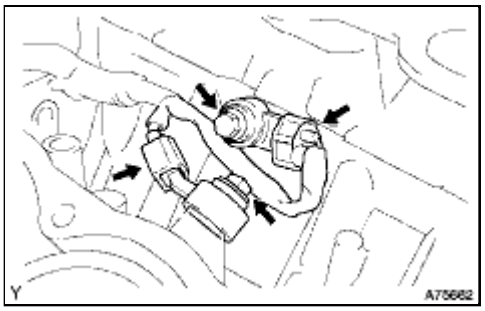
2. REMOVE NO. 1 WATER OUTLET PIPE



(a) Detach the 3 wire harness clamps.

(b) Remove the 2 nuts, bolt and water outlet pipe.

3. REMOVE KNOCK SENSOR



(a) Disconnect the 2 sensor connectors.

(b) Remove the 2 bolts and 2 sensors.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AU00EX
Title: 1GR-FE ENGINE CONTROL: KNOCK SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT KNOCK SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

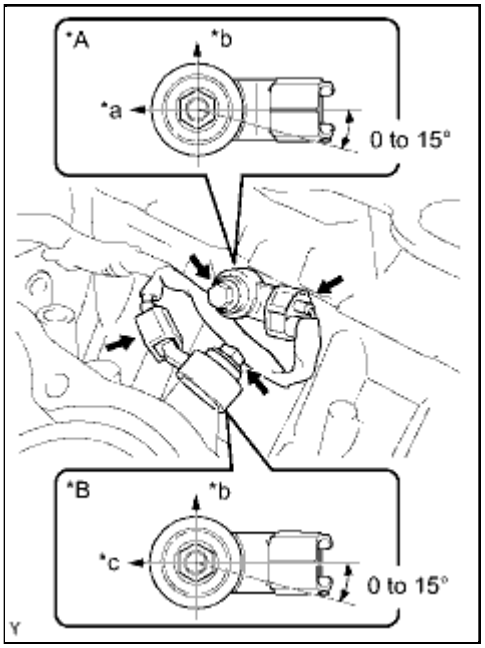
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - 2	20°C (68°F)	120 to 280 kΩ

If the result is not as specified, replace the knock sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000028AT00EX
Title: 1GR-FE ENGINE CONTROL: KNOCK SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL KNOCK SENSOR



(a) Install the 2 sensors with the 2 bolts as shown in the illustration.

Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

Text in Illustration

*A	for Bank 2
*B	for Bank 1
*a	Engine Rear
*b	Top
*c	Engine Front

(b) Connect the 2 sensor connectors.

2. INSTALL NO. 1 WATER OUTLET PIPE

(a) Install the water outlet pipe with the 2 nuts and bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(b) Attach the 3 wire harness clamps.

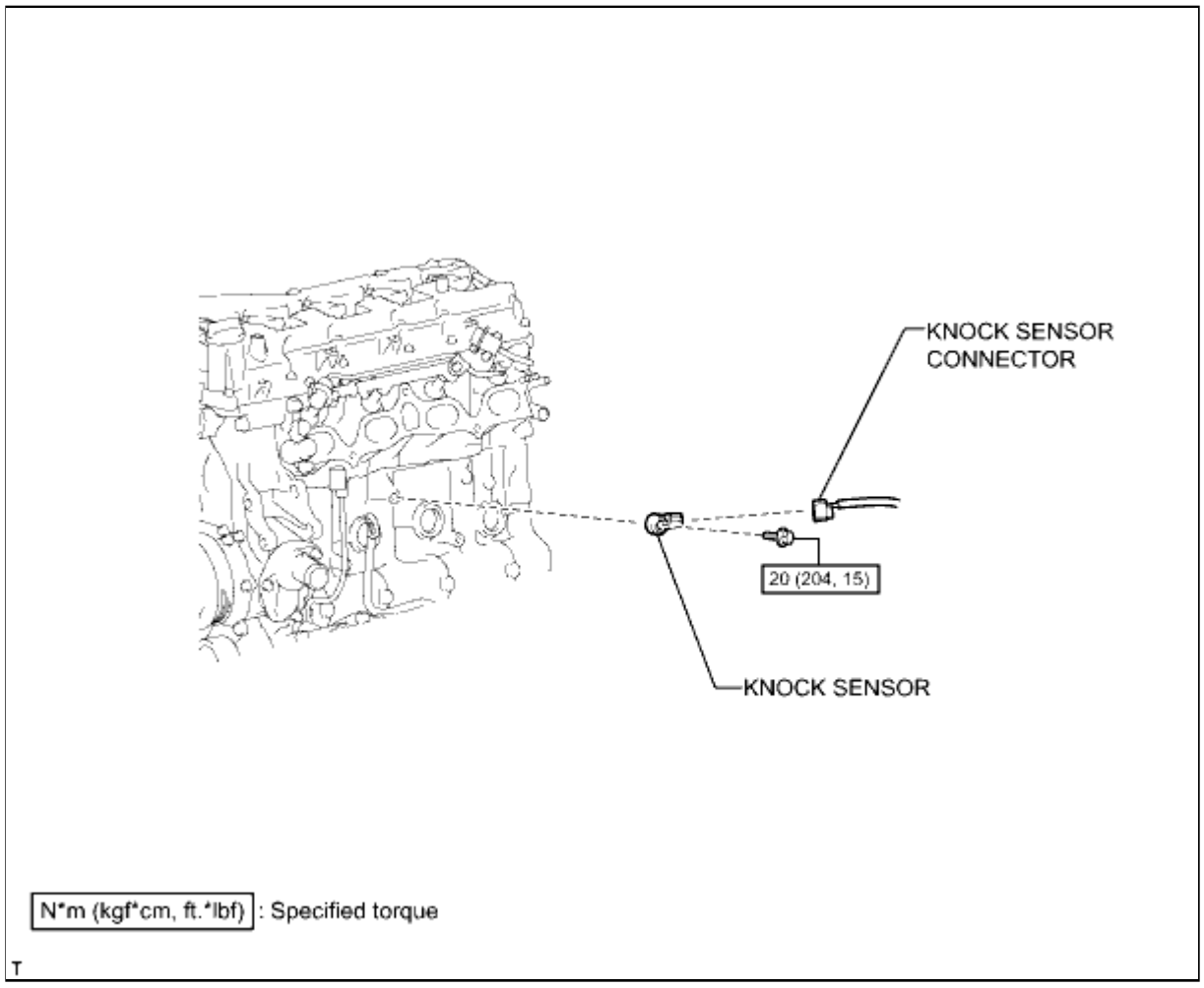
3. INSTALL CYLINDER HEAD SUB-ASSEMBLY (for Bank 1)

(a) Install the cylinder head INFO .

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FP002X
Title: 2TR-FE ENGINE CONTROL: KNOCK SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION

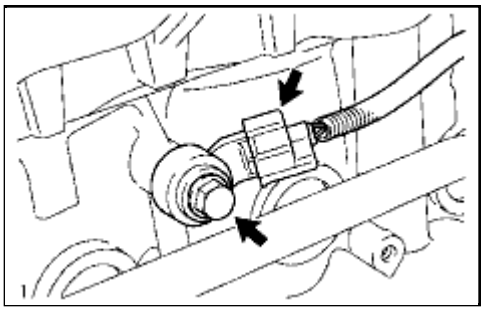


Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VWH013X
Title: 2TR-FE ENGINE CONTROL: KNOCK SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE INTAKE MANIFOLD

(a) Remove the intake manifold INFO .



2. REMOVE KNOCK SENSOR

(a) Disconnect the knock sensor connector.

(b) Remove the bolt and knock sensor.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VWF00YX
Title: 2TR-FE ENGINE CONTROL: KNOCK SENSOR: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT KNOCK SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (Ground) - 2 (Output)	20°C (68°F)	120 to 280 kΩ

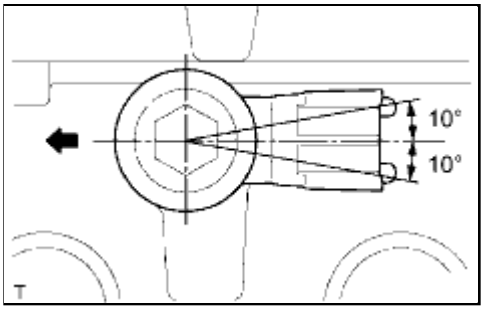
If the result is not as specified, replace the knock sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VWE014X
Title: 2TR-FE ENGINE CONTROL: KNOCK SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL KNOCK SENSOR

(a) Install the knock sensor with the bolt.



Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

Text in Illustration

➡	Front

NOTICE:

Make sure that the knock sensor is at the correct angle when installing it.

(b) Connect the knock sensor connector.

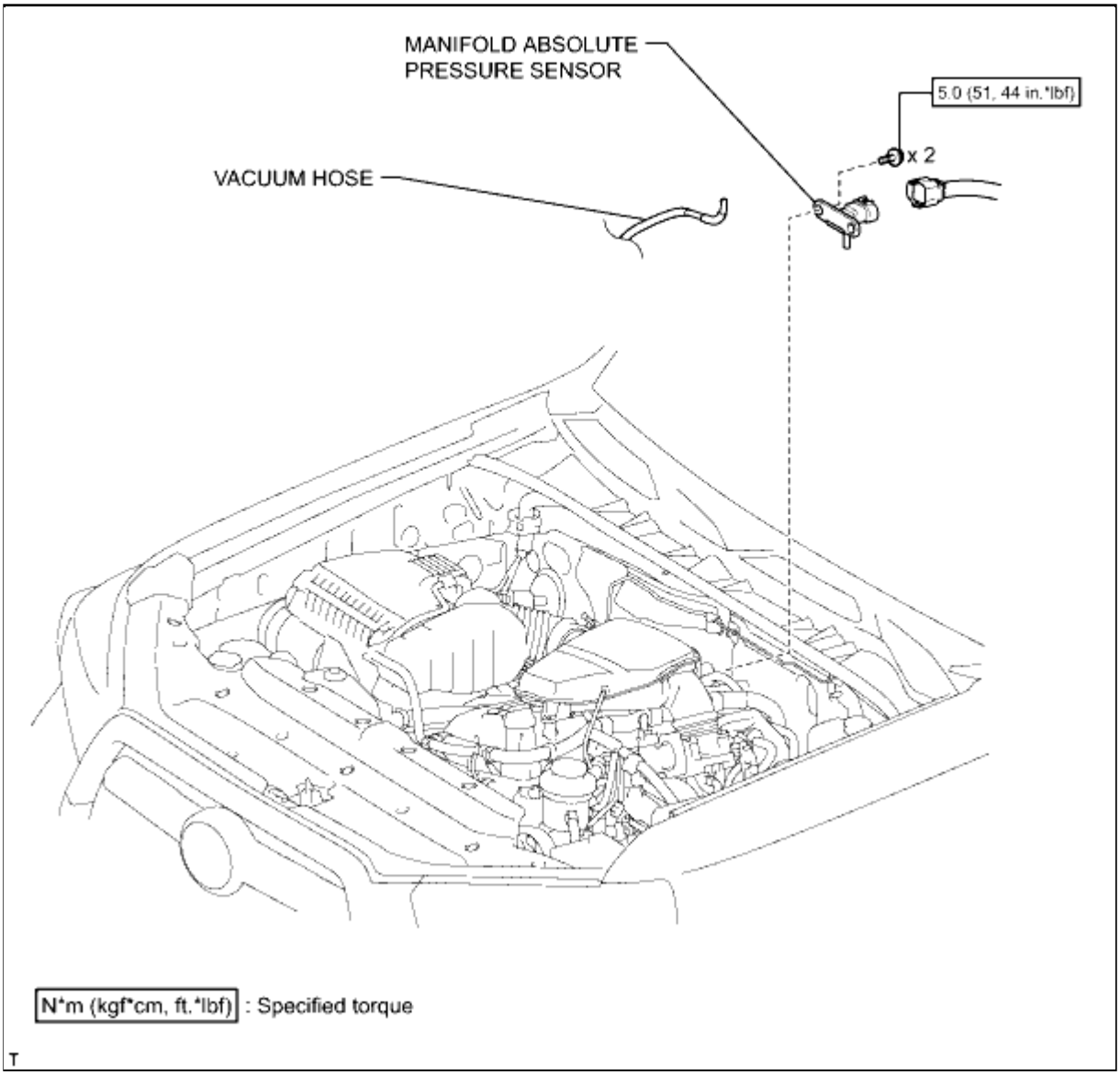
2. INSTALL INTAKE MANIFOLD

(a) Install the intake manifold INFO .

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000004AP6000X
Title: 2TR-FE ENGINE CONTROL: MANIFOLD ABSOLUTE PRESSURE SENSOR: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000004AC8001X
Title: 2TR-FE ENGINE CONTROL: MANIFOLD ABSOLUTE PRESSURE SENSOR: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT MANIFOLD ABSOLUTE PRESSURE SENSOR

(a) Inspect the power source voltage.

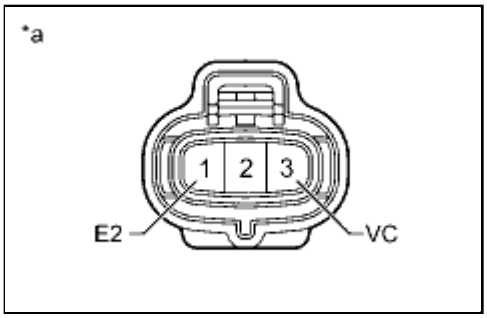
(1) Disconnect the manifold absolute pressure sensor connector.

(2) Turn the ignition switch to ON.

(3) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
3 (VC) - 1 (E2)	Ignition switch ON	4.5 to 5.5 V



Text in Illustration

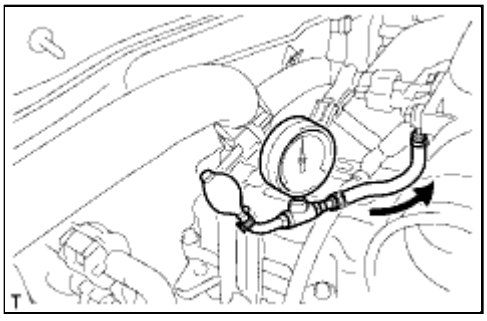
*a	Front view of wire harness connector (to Manifold Absolute Pressure Sensor)

If the result is not as specified, inspect the wire harness and ECM.

(4) Turn the ignition switch off.

(5) Connect the manifold absolute pressure sensor connector.

(b) Check the pressure.



(1) Connect a pressure gauge to the manifold absolute pressure sensor as shown in the illustration.

(2) Connect the Techstream to the DLC3.

(3) Turn the ignition switch to ON and turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Data List / Air Pump Pressure (absolute).

(5) Check that the pressure displayed on the Techstream fluctuates when applying pressure to the pressure sensor with the pressure gauge.

OK:

Pressure fluctuates in response to pressure applied with pressure gauge.

HINT:

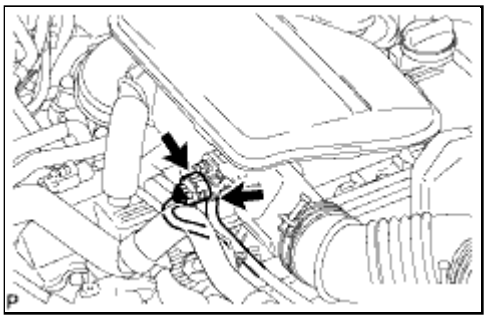
The Techstream displays the air pump pressure (Air Pump Pressure (absolute)) as absolute pressure.

If the result is not as specified, replace the manifold absolute pressure sensor.

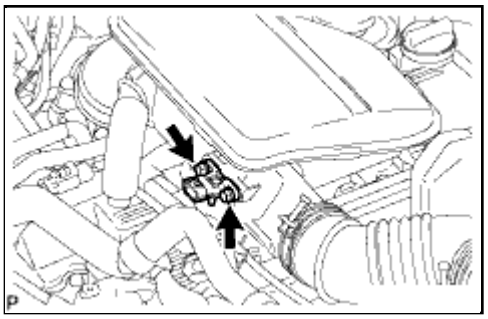
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000004AC7001X
Title: 2TR-FE ENGINE CONTROL: MANIFOLD ABSOLUTE PRESSURE SENSOR: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE MANIFOLD ABSOLUTE PRESSURE SENSOR



(a) Disconnect the connector and vacuum hose.



(b) Remove the 2 bolts and manifold absolute pressure sensor.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000004AC5001X
Title: 2TR-FE ENGINE CONTROL: MANIFOLD ABSOLUTE PRESSURE SENSOR: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL MANIFOLD ABSOLUTE PRESSURE SENSOR

(a) Install the manifold absolute pressure sensor with the 2 bolts.

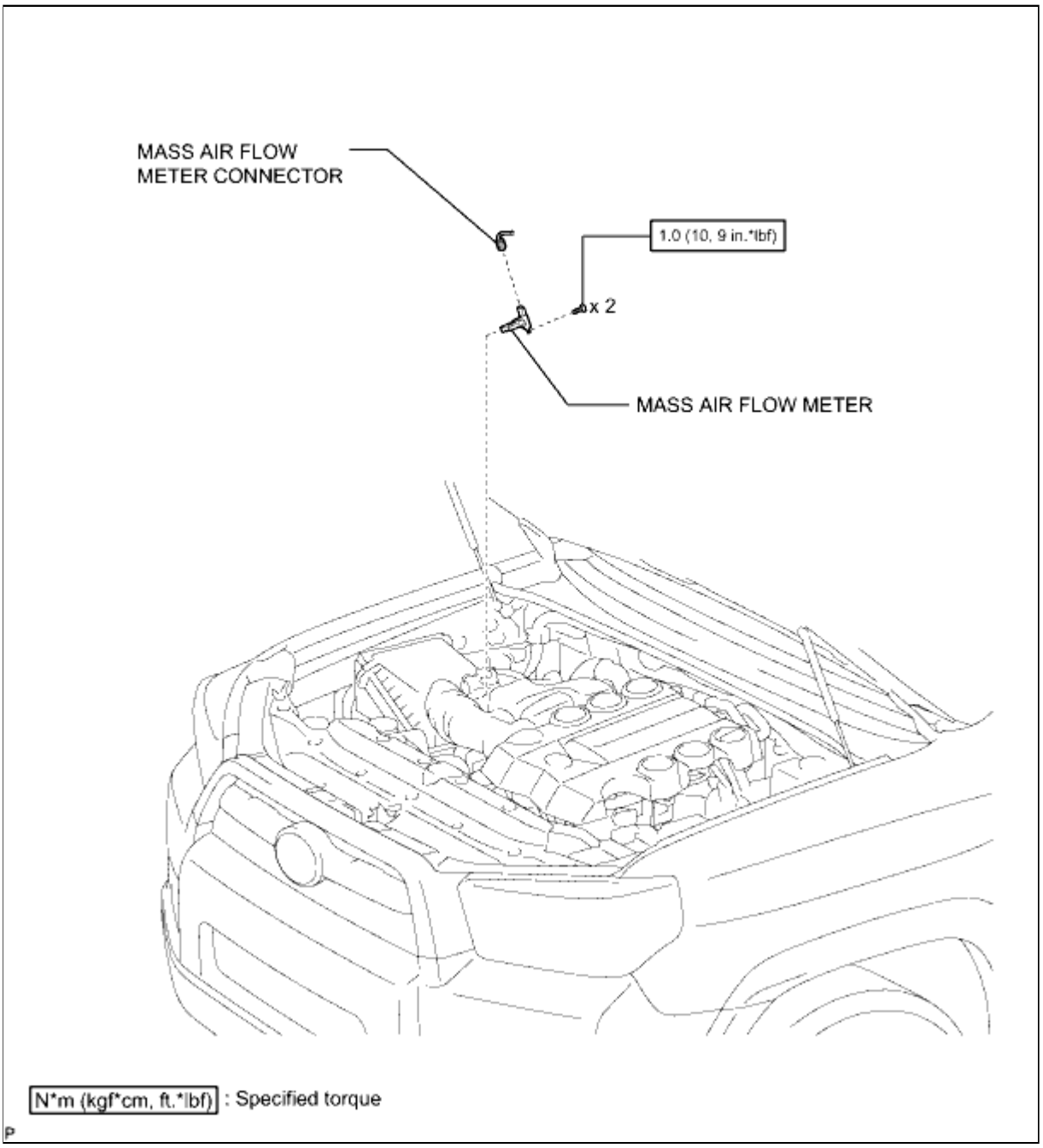
Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

(b) Connect the vacuum hose and connector.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002WAI009X
Title: 1GR-FE ENGINE CONTROL: MASS AIR FLOW METER: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002PPR00ZX
Title: 1GR-FE ENGINE CONTROL: MASS AIR FLOW METER: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

NOTICE:

- Perform the MAF meter inspection according to the procedures below.
- Only replace the MAF meter when the MAF value in the Data List (with the engine stopped) is not within the normal operating range or there is foreign matter on the MAF meter platinum hot wire (heater).

1. INSPECT MASS AIR FLOW METER

(a) Read the value using the Techstream.

NOTICE:

- Perform the inspection with the vehicle indoors and on a level surface.
- Perform the inspection of the MAF meter while it is installed to the air cleaner case (installed to the vehicle).
- During the test, do not use the exhaust air duct to apply suction to the exhaust pipe.

(1) Turn the ignition switch to ON.

(2) Turn the Techstream on.

(3) Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / MAF.

(4) Wait 30 seconds and read the value on the Techstream.

Standard:

ITEM	CONDITION	SPECIFIED CONDITION
MAF	• Engine not running • 30 seconds after ignition switch is turned ON	Less than 0.87 g/sec.

If the result is not as specified, replace the mass air flow meter.

If the result is within the specified range, inspect the mass air flow meter 

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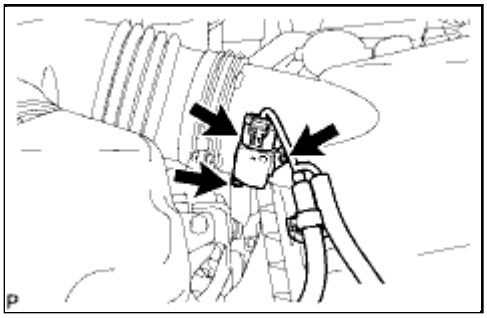
Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VW6019X
Title: 1GR-FE ENGINE CONTROL: MASS AIR FLOW METER: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE MASS AIR FLOW METER



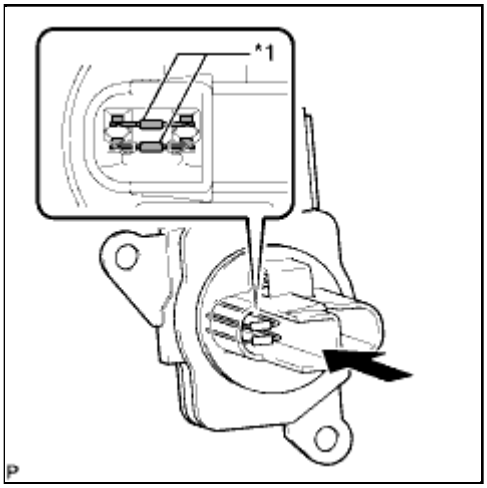
(a) Disconnect the mass air flow meter connector.

(b) Remove the 2 screws and mass air flow meter.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002S6O00TX
Title: 1GR-FE ENGINE CONTROL: MASS AIR FLOW METER: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT MASS AIR FLOW METER



(a) Perform a visual check for any foreign matter on the platinum hot wire (heater) of the mass air flow meter in the areas shown in the illustration.

OK:

There is no foreign matter.

Text in Illustration

*1	Platinum Hot Wire (Heater)

If the result is not as specified, replace the mass air flow meter.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VW301AX
Title: 1GR-FE ENGINE CONTROL: MASS AIR FLOW METER: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL MASS AIR FLOW METER

(a) Install the mass air flow meter with the 2 screws.

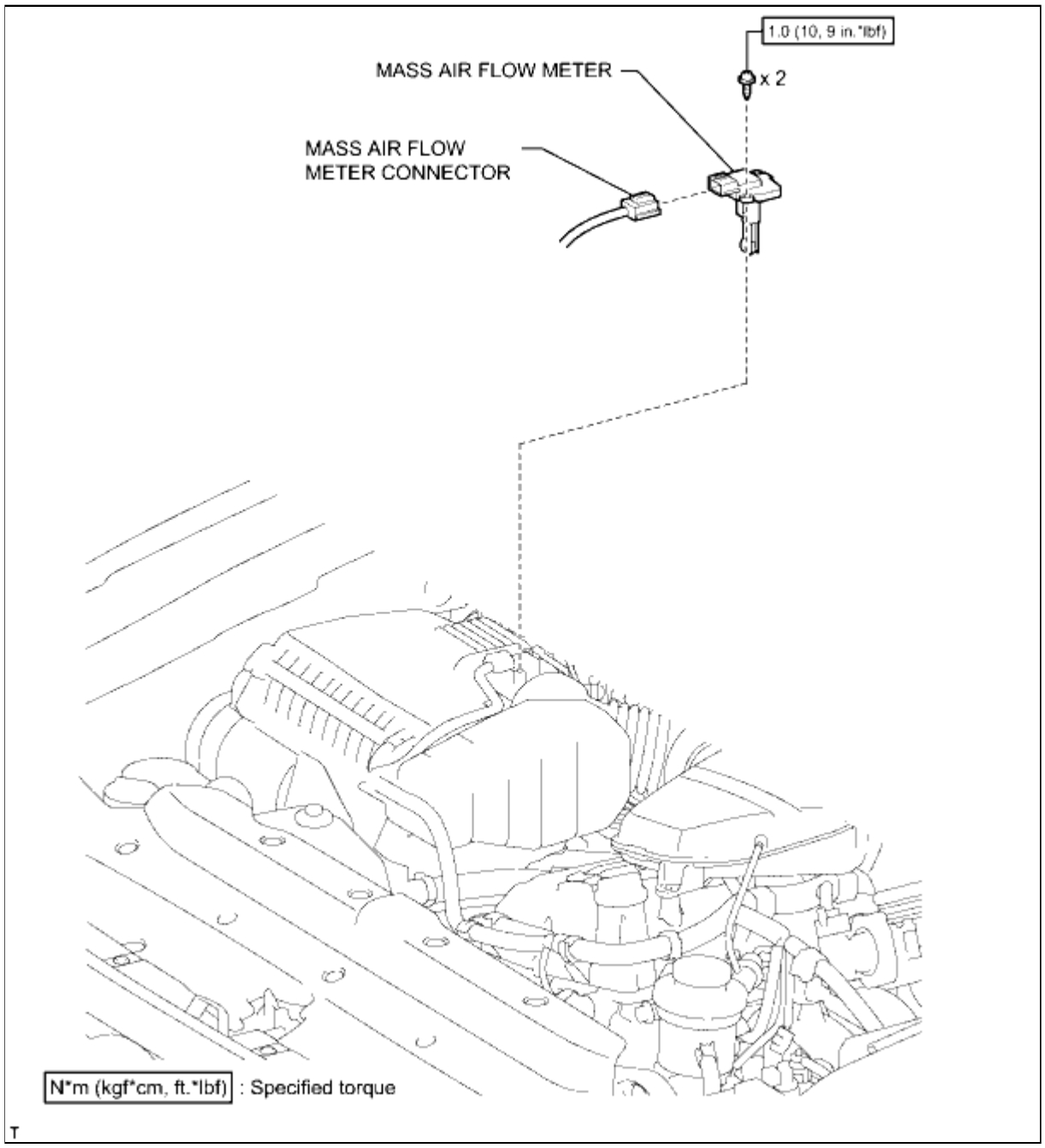
Torque: 1.0 N·m (10 kgf·cm, 9in·lbf)

(b) Connect the mass air flow meter connector.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FK002X
Title: 2TR-FE ENGINE CONTROL: MASS AIR FLOW METER: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000031C1009X
Title: 2TR-FE ENGINE CONTROL: MASS AIR FLOW METER: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. CHECK MASS AIR FLOW METER

(a) Check the mass air flow value.

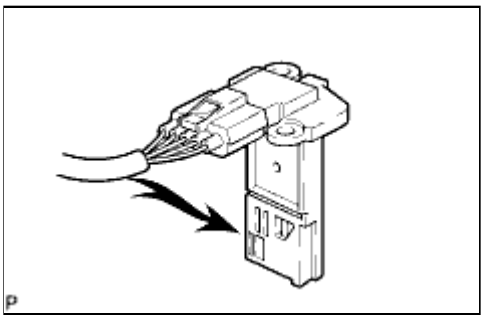
(1) Connect the Techstream to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine / Data List / All Data / MAF.

(5) Blow air into the mass air flow meter and check that the mass air flow meter value fluctuates.



Text in Illustration

➡	Air

If the result is not as specified, replace the mass air flow meter.

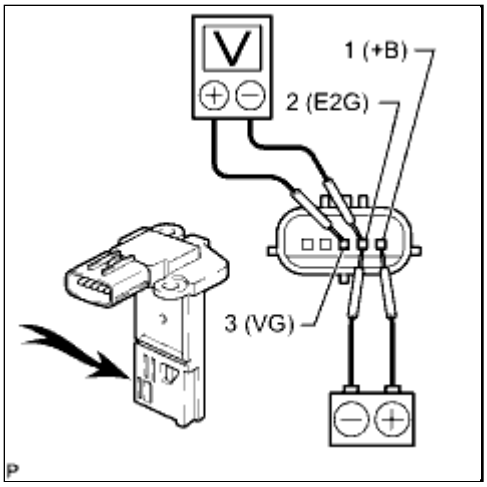
If the result is within the specified range, inspect the mass air flow meter INFO .

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000001L4A00PX
Title: 2TR-FE ENGINE CONTROL: MASS AIR FLOW METER: INSPECTION (2010 4Runner)		

INSPECTION

1. INSPECT MASS AIR FLOW METER

(a) Check the output voltage.



(1) Apply battery voltage across terminals 1 (+B) and 2 (E2G).

NOTICE:

While using the battery during inspection, do not bring the positive (+) and negative (-) tester probes too close to each other as a short circuit may occur.

(2) Using a voltmeter, connect the positive (+) tester probe to terminal 3 (VG) and the negative (-) tester probe to terminal 2 (E2G).

(3) Blow air into the mass air flow meter and check that the voltage fluctuates.

Text in Illustration

➡	Air

If the result is not as specified, replace the mass air flow meter.

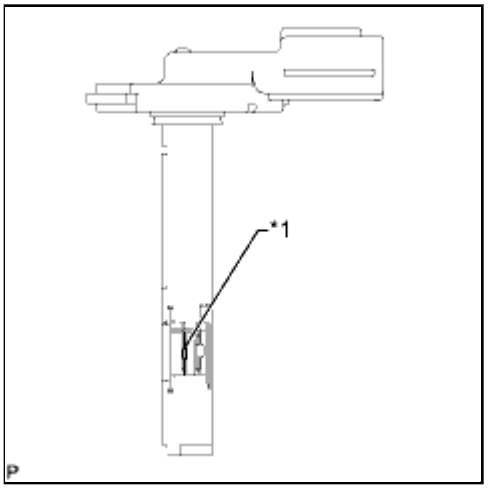
(b) Perform a visual check for any foreign matter on the platinum hot wire (heater) of the mass air flow meter shown in the illustration.

OK:

There is no foreign matter.

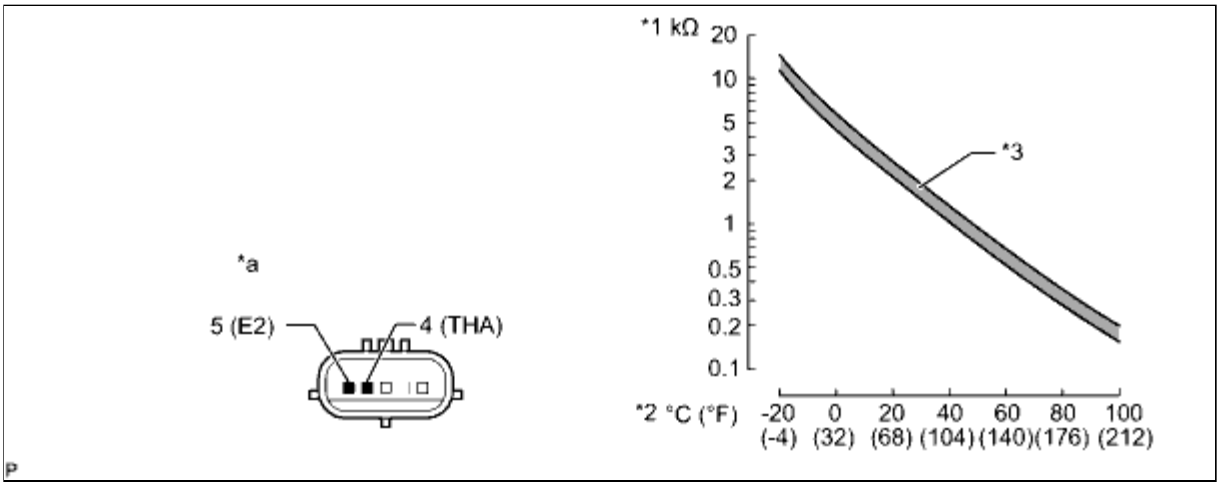
Text in Illustration

*1	Platinum Hot Wire (Heater)



If the result is not as specified, replace the mass air flow meter.

(c) Check the intake air temperature sensor.



Text in Illustration

*1	Resistance	*2	Temperature
*3	Acceptable	-	-
*a	Component without harness connected (Mass Air Flow Meter)	-	-

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

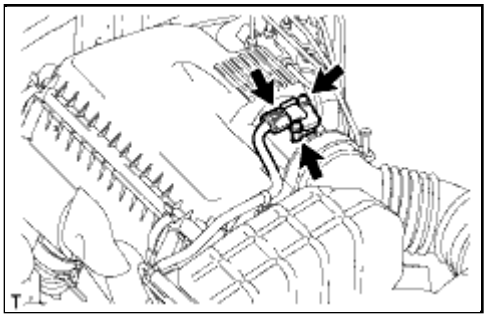
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
4 (THA) - 5 (E2)	-20°C (-4°F)	12.5 to 16.9 kΩ
	20°C (68°F)	2.19 to 2.67 kΩ
	60°C (140°F)	0.50 to 0.68 kΩ

If the result is not as specified, replace the mass air flow meter.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002VE2009X
Title: 2TR-FE ENGINE CONTROL: MASS AIR FLOW METER: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE MASS AIR FLOW METER



(a) Disconnect the mass air flow meter connector.

(b) Remove the 2 screws and mass air flow meter.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002VE0009X
Title: 2TR-FE ENGINE CONTROL: MASS AIR FLOW METER: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL MASS AIR FLOW METER

(a) Install the mass air flow meter with the 2 screws.

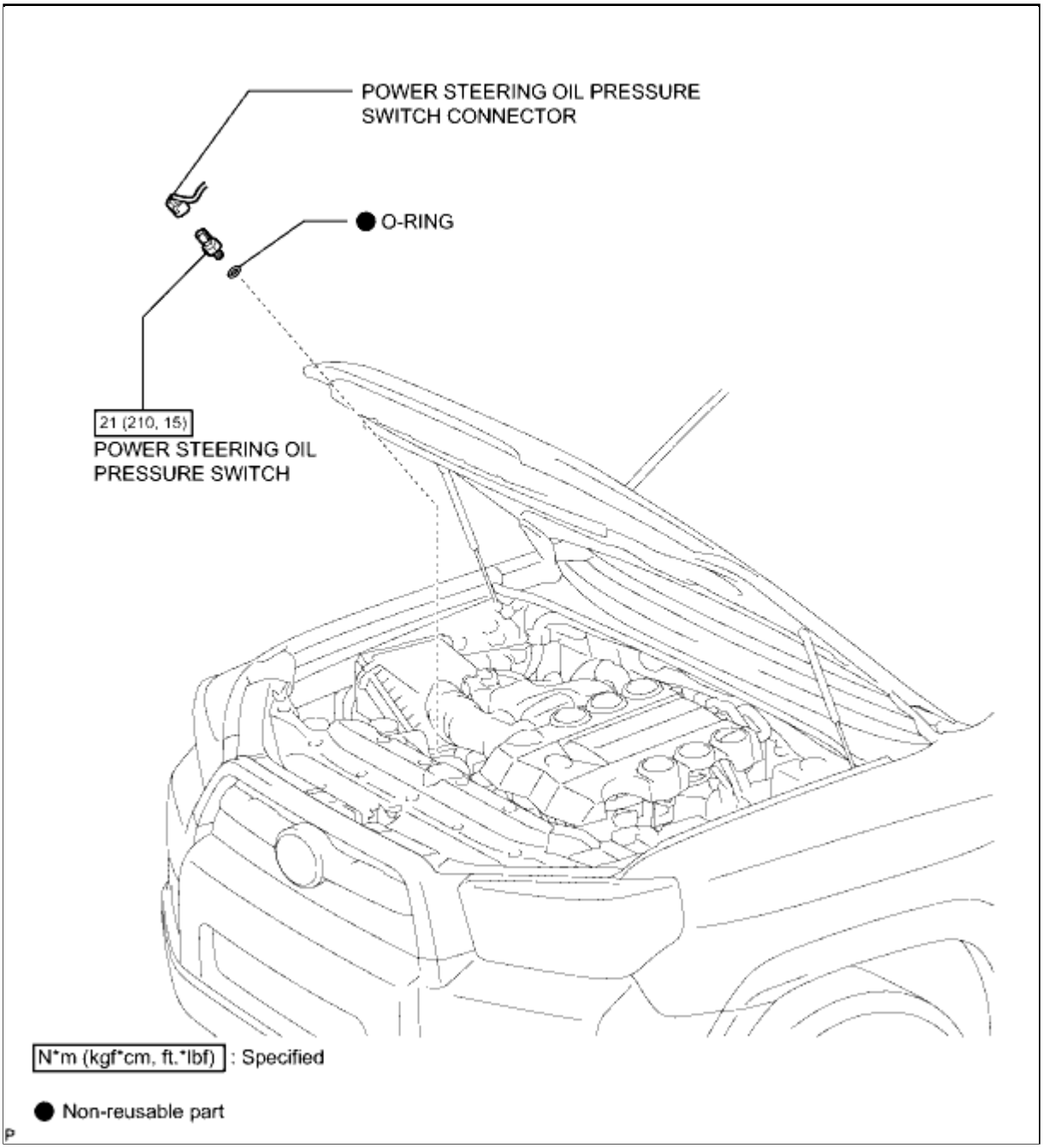
Torque: 1.0 N·m (10 kgf·cm, 9in·lbf)

(b) Connect the mass air flow meter connector.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BJ2006X
Title: 1GR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000031E100SX
Title: 1GR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT POWER STEERING OIL PRESSURE SWITCH

(a) Check the oil pressure switch.

(1) Connect the Techstream to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Data List / Power Steering Switch.

(5) Start the engine.

(6) Read the value displayed on the Techstream.

OK:

CONDITION	SPECIFIED CONDITION
Power steering operating	ON
Power steering not operating	OFF

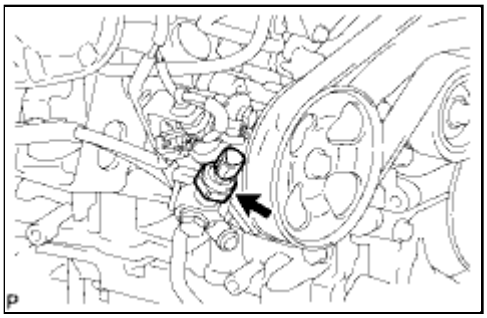
If the result is not as specified, check the wire harness and connector. If the wire harness and connector are normal, replace the power steering oil pressure switch.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BJ4006X
Title: 1GR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: REMOVAL (2010 4Runner)		

REMOVAL

1. DRAIN POWER STEERING FLUID

2. REMOVE POWER STEERING OIL PRESSURE SWITCH



(a) Disconnect the oil pressure switch connector.

(b) Using a 24 mm deep socket wrench, remove the oil pressure switch.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BJ3006X
Title: 1GR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL POWER STEERING OIL PRESSURE SWITCH

(a) Install a new O-ring to the oil pressure switch.

(b) Apply a light coat of engine oil to the O-ring of the oil pressure switch.

(c) Using a 24 mm deep socket wrench, install the oil pressure switch.

Torque: 21 N·m (210 kgf·cm, 15ft·lbf)

NOTICE:

- Do not allow foreign matter to contact the oil seal face of the power steering oil pressure switch (surface which contacts the pressure feed tube).
- Be careful not to damage the O-ring when installing the power steering oil pressure switch

(d) Connect the oil pressure switch connector.

2. ADD POWER STEERING FLUID

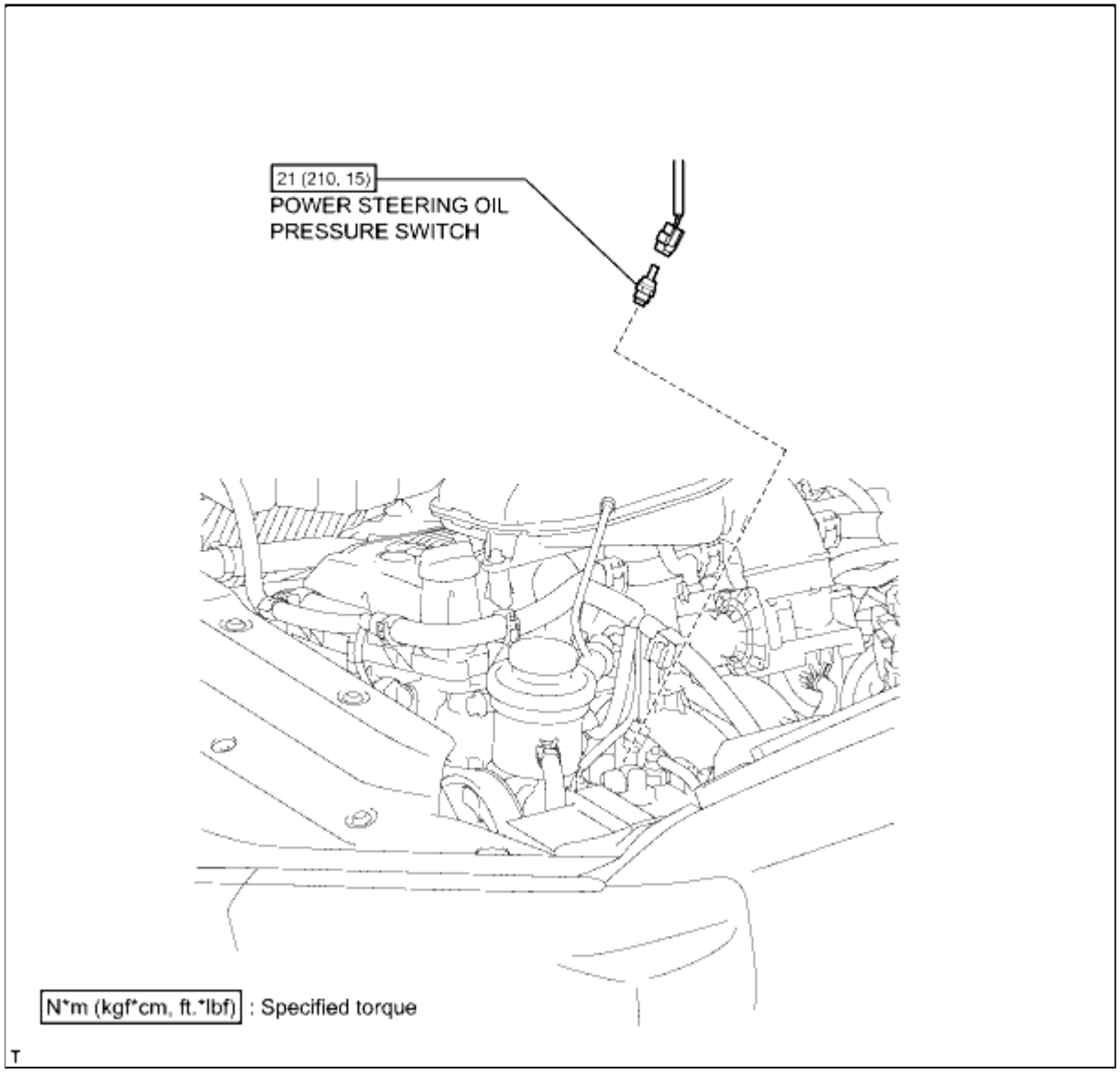
3. INSPECT FOR POWER STEERING FLUID LEAK

4. BLEED POWER STEERING FLUID

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BJ200BX
Title: 2TR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000031E100YX
Title: 2TR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT POWER STEERING OIL PRESSURE SWITCH

(a) Check the power steering oil pressure switch.

(1) Connect the Techstream to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Data List / Power Steering Signal.

(5) Start the engine.

(6) Read the value displayed on the Techstream.

OK:

CONDITION	SPECIFIED CONDITION
Power steering operating	ON
Power steering not operating	OFF

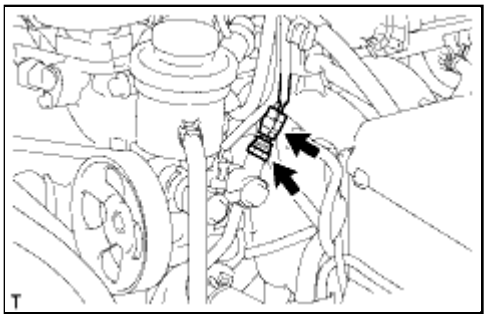
If the result is not as specified, check the wire harness and connector. If the wire harness and connector are normal, replace the power steering oil pressure switch.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BJ400BX
Title: 2TR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: REMOVAL (2010 4Runner)		

REMOVAL

1. DRAIN POWER STEERING FLUID

2. REMOVE POWER STEERING OIL PRESSURE SWITCH



(a) Disconnect the power steering oil pressure switch connector.

(b) Using a 19 mm deep socket wrench, remove the power steering oil pressure switch.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BJ300BX
Title: 2TR-FE ENGINE CONTROL: POWER STEERING OIL PRESSURE SWITCH: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL POWER STEERING OIL PRESSURE SWITCH

(a) Apply a light coat of engine oil to the O-ring of the power steering oil pressure switch.

(b) Using a 19 mm deep socket wrench, install the power steering oil pressure switch.

Torque: 21 N·m (210 kgf·cm, 15ft·lbf)

NOTICE:

- Do not allow foreign matter to contact the oil seal face of the power steering oil pressure switch (connecting surface with pressure feed tube).
- Be careful not to damage the O-ring when installing the power steering oil pressure switch.

(c) Connect the power steering oil pressure switch connector.

2. ADD POWER STEERING FLUID

3. BLEED AIR FROM POWER STEERING SYSTEM INFO

4. INSPECT FOR POWER STEERING FLUID LEAK

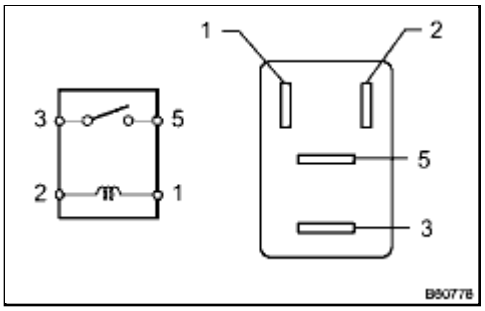
Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BLB00LX
Title: 1GR-FE ENGINE CONTROL: RELAY: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT CIRCUIT OPENING RELAY (C/OPN)

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
3 - 5	Battery voltage is not applied to terminals 1 and 2	10 kΩ or higher
	Battery voltage is applied to terminals 1 and 2	Below 1 Ω

If the result is not as specified, replace the circuit opening relay.

2. INSPECT NO. 1 INTEGRATION RELAY (IG2)

(a) Check the IG2 fuse.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
IG2 fuse	Always	Below 1 Ω

If the result is not as specified, replace the IG2 fuse.

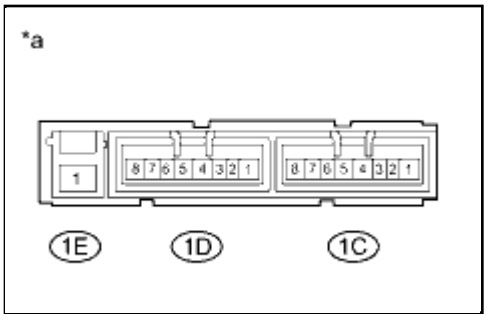
(b) Check the IG2 relay.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION

1E-1 - 1C-4	Battery voltage not applied to terminals 1C-1 and 1C-3	10 kΩ or higher
	Battery voltage applied to terminals 1C-1 and 1C-3	Below 1 Ω



Text in Illustration

*a	Component without harness connected (Integration Relay)

If the result is not as specified, replace the No. 1 integration relay.

3. INSPECT NO. 1 INTEGRATION RELAY (EFI)

(a) Check the EFI fuse.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

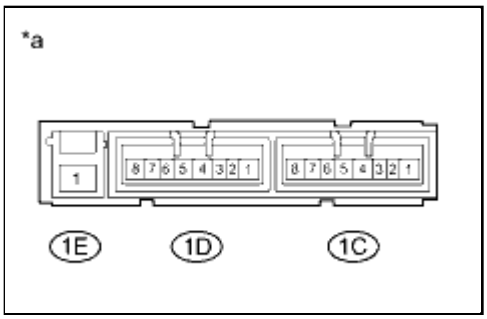
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
EFI fuse	Always	Below 1 Ω

If the result is not as specified, replace the EFI fuse.

(b) Check the EFI relay.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1E-1 - 1D-4	Battery voltage not applied to terminals 1D-2 and 1D-3	10 kΩ or higher
	Battery voltage applied to terminals 1D-2 and 1D-3	Below 1 Ω

Text in Illustration

*a	Component without harness connected (Integration Relay)

If the result is not as specified, replace the No. 1 integration relay.

4. INSPECT NO. 1 INTEGRATION RELAY (A/F)

(a) Check the A/F fuse.

(1) Measure the resistance according to the value(s) in the table below.

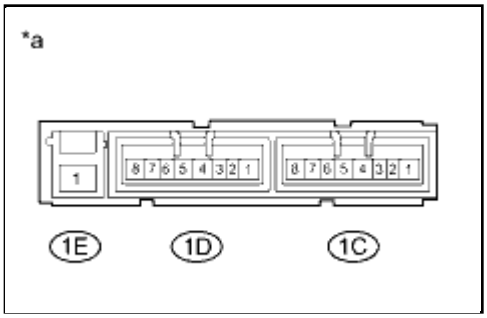
Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A/F fuse	Always	Below 1 Ω

If the result is not as specified, replace the A/F fuse.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1E-1 - 1D-8	Battery voltage not applied to terminals 1D-4 and 1D-7	10 kΩ or higher
	Battery voltage applied to terminals 1D-4 and 1D-7	Below 1 Ω

Text in Illustration

*a	Component without harness connected (Integration Relay)

If the result is not as specified, replace the No. 1 integration relay.

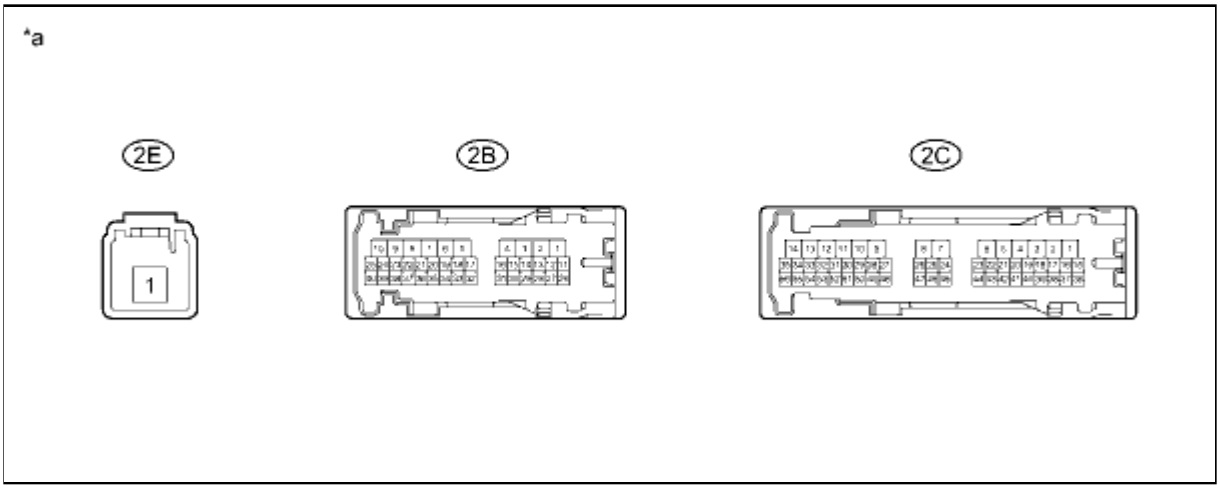
5. INSPECT MAIN BODY ECU (DRIVER SIDE JUNCTION BLOCK)

NOTICE:

The ACC relay and IG1 No. 1 relay are built into the main body ECU (driver side junction block).

(a) Inspect the ACC relay.

(1) Measure the resistance according to the value(s) in the table below.



Text in Illustration

*a	Component without harness connected (Main Body ECU)	-	-

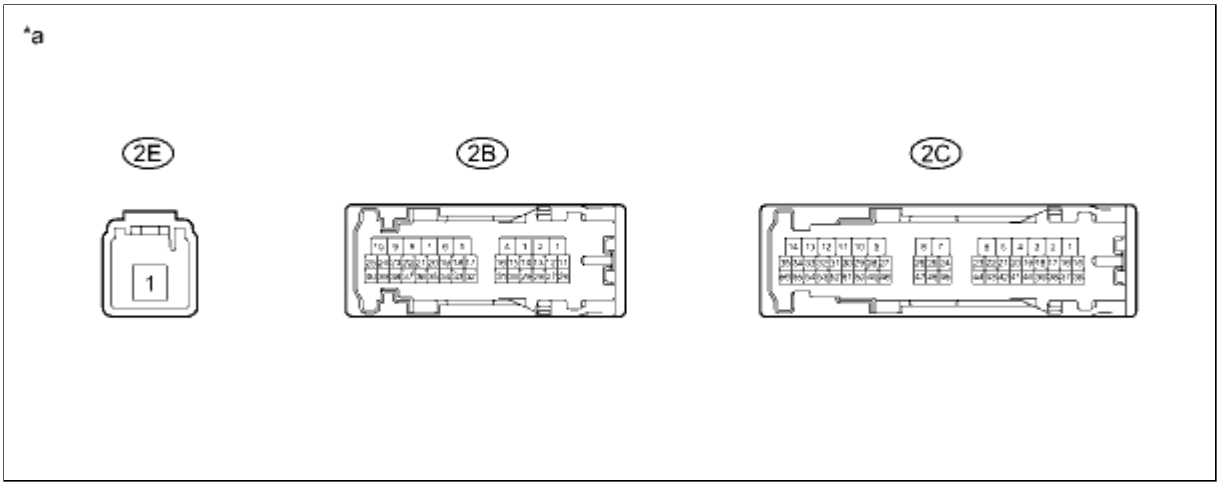
Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
2B-17 - 2E-1	Battery voltage not applied to terminals 2C-48 and 2B-4	10 kΩ or higher
	Battery voltage applied to terminals 2C-48 and 2B-4	Below 1 Ω

If the result is not as specified, replace the main body ECU.

(b) Inspect the IG1 No. 1 relay.

(1) Measure the resistance according to the value(s) in the table below.



Text in Illustration

*a	Component without harness connected (Main Body ECU)	-	-

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
2C-31 - 2E-1	Battery voltage not applied to terminals 2C-52 and 2B-4	10 kΩ or higher
	Battery voltage applied to terminals 2C-52 and 2B-4	Below 1 Ω

If the result is not as specified, replace the main body ECU.

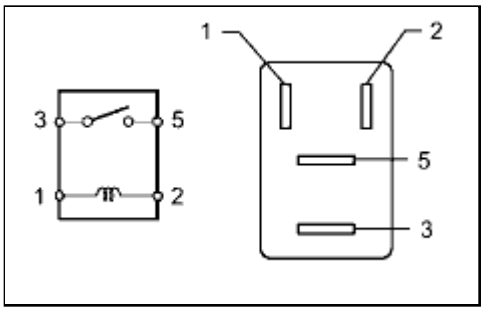
Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000003BLB00PX
Title: 2TR-FE ENGINE CONTROL: RELAY: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT CIRCUIT OPENING RELAY (C/OPN)

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
3 - 5	Battery voltage not applied to terminals 1 and 2	10 kΩ or higher
	Battery voltage applied to terminals 1 and 2	Below 1 Ω

If the result is not as specified, replace the circuit opening relay.

2. INSPECT NO. 1 INTEGRATION RELAY (IG2)

(a) Check the IG2 fuse.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
IG2 fuse	Always	Below 1 Ω

If the result is not as specified, replace the IG2 fuse.

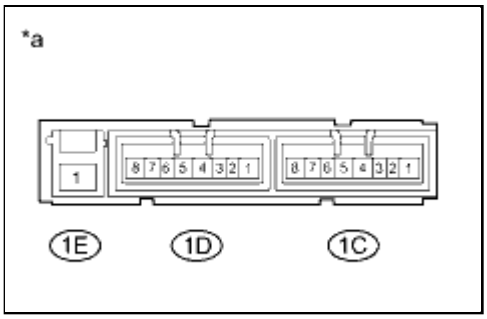
(b) Check the IG2 relay.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1E-1 - 1C-4	Battery voltage not	10 kΩ or higher

	applied to terminals 1C-1 and 1C-3	
	Battery voltage applied to terminals 1C-1 and 1C-3	Below 1 Ω



Text in Illustration

*a	Component without harness connected (Integration Relay)

If the result is not as specified, replace the No. 1 integration relay.

3. INSPECT NO. 1 INTEGRATION RELAY (EFI)

(a) Check the EFI fuse.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

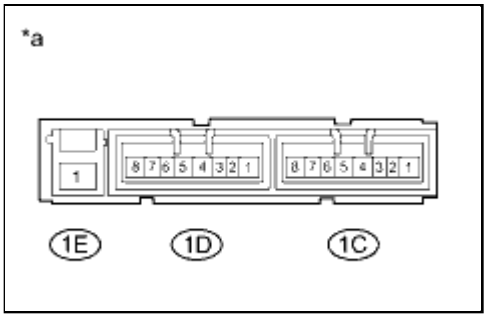
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
EFI fuse	Always	Below 1 Ω

If the result is not as specified, replace the EFI fuse.

(b) Check the EFI relay.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1E-1 - 1D-4	Battery voltage not applied to terminals 1D-2 and 1D-3	10 kΩ or higher
	Battery voltage applied to terminals 1D-2 and 1D-3	Below 1 Ω

Text in Illustration

*a	Component without harness connected (Integration Relay)

If the result is not as specified, replace the No. 1 integration relay.

4. INSPECT NO. 1 INTEGRATION RELAY (A/F)

(a) Check the A/F fuse.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

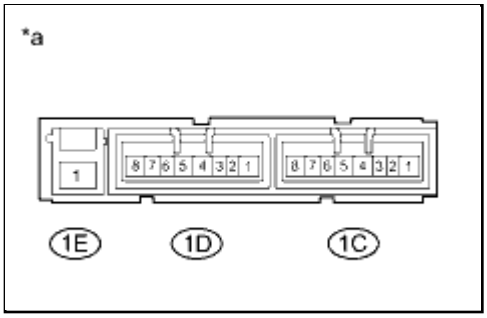
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A/F fuse	Always	Below 1 Ω

If the result is not as specified, replace the A/F fuse.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1E-1 - 1D-8	Battery voltage not applied to terminals 1D-4 and 1D-7	10 kΩ or higher
	Battery voltage applied to terminals 1D-4 and 1D-7	Below 1 Ω



Text in Illustration

*a	Component without harness connected (Integration Relay)

If the result is not as specified, replace the No. 1 integration relay.

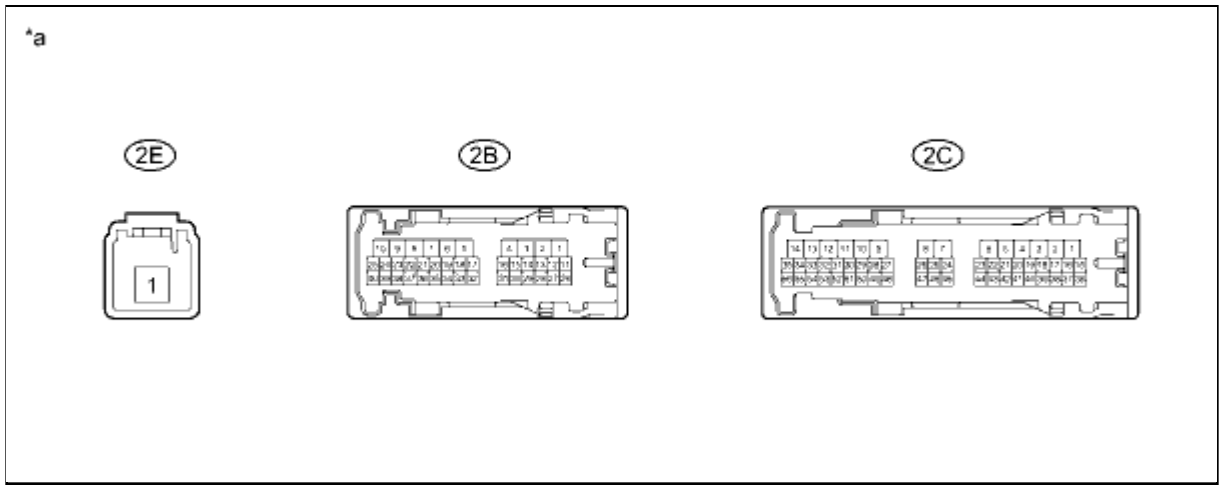
5. INSPECT MAIN BODY ECU (DRIVER SIDE JUNCTION BLOCK)

NOTICE:

The ACC relay and IG1 No. 1 relay are built into the main body ECU (driver side junction block).

(a) Inspect the ACC relay.

(1) Measure the resistance according to the value(s) in the table below.



Text in Illustration

*a	Component without harness connected (Main Body ECU)	-	-

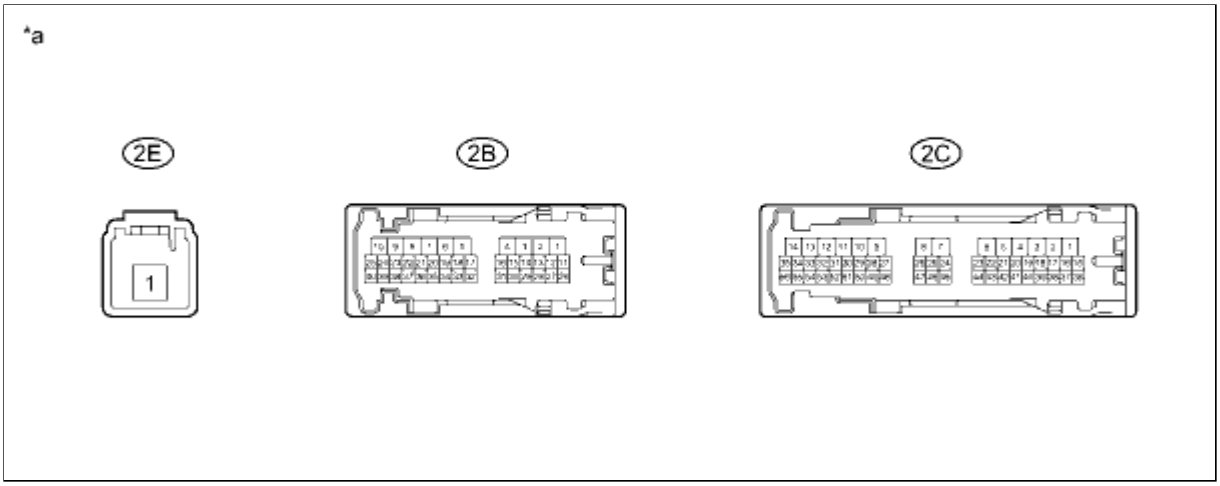
Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
2B-17 - 2E-1	Battery voltage not applied to terminals 2C-48 and 2B-4	10 kΩ or higher
	Battery voltage applied to terminals 2C-48 and 2B-4	Below 1 Ω

If the result is not as specified, replace the main body ECU.

(b) Inspect the IG1 No. 1 relay.

(1) Measure the resistance according to the value(s) in the table below.



Text in Illustration

*a	Component without harness connected (Main Body ECU)	-	-

Standard Resistance:

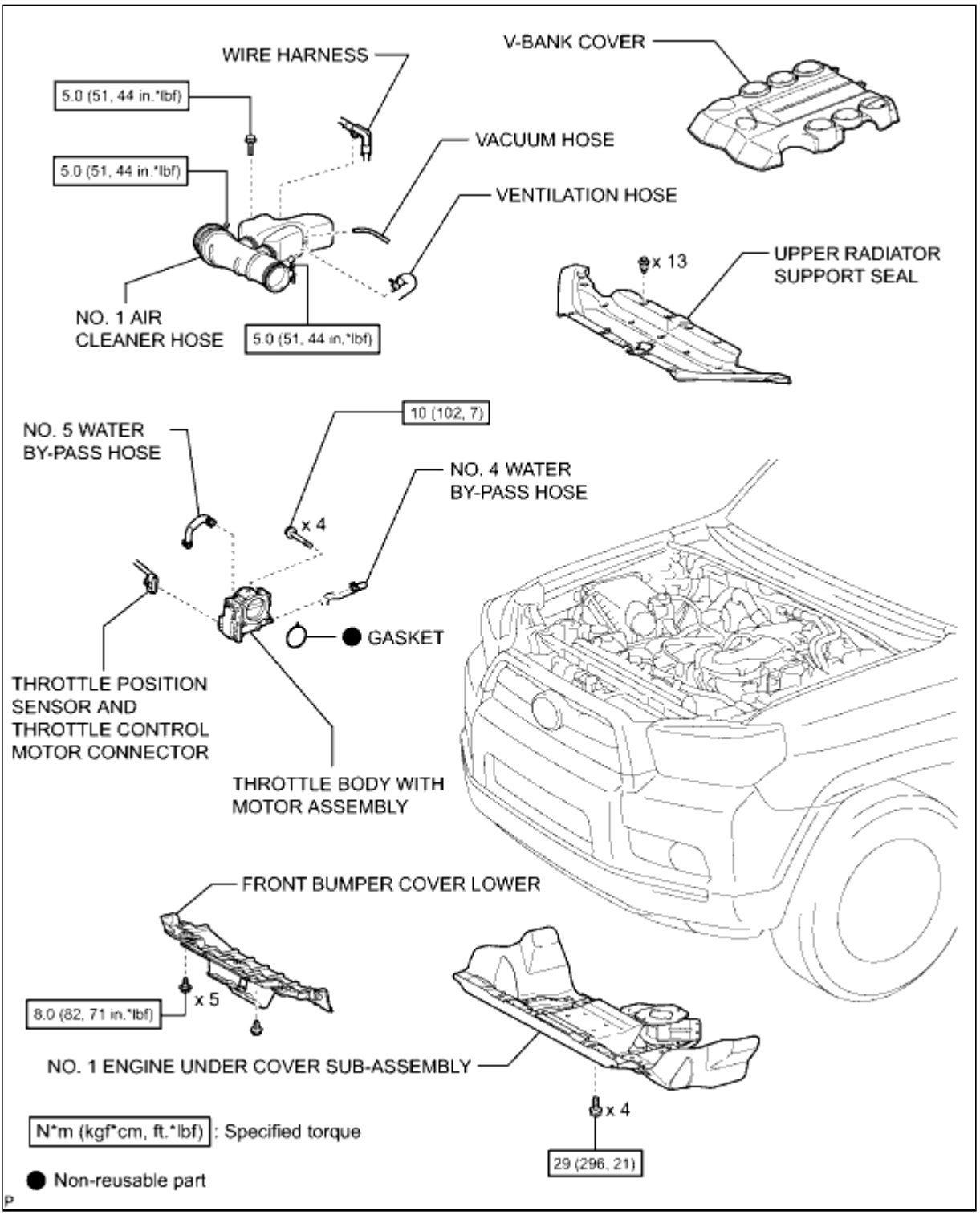
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
2C-31 - 2E-1	Battery voltage not applied to terminals 2C-52 and 2B-4	10 kΩ or higher
	Battery voltage applied to terminals 2C-52 and 2B-4	Below 1 Ω

If the result is not as specified, replace the main body ECU.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000Q0O01ZX
Title: 1GR-FE ENGINE CONTROL: THROTTLE BODY: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000002PQO01KX
Title: 1GR-FE ENGINE CONTROL: THROTTLE BODY: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. CHECK THROTTLE BODY WITH MOTOR ASSEMBLY

(a) Check the throttle control motor operating sounds.

(1) Turn the ignition switch to ON.

(2) When depressing the accelerator pedal, check the operating sound of the running motor. Make sure that no friction noises are emitted from the motor. If friction noise exists, replace the throttle body.

(b) Check the throttle position sensor.

(1) Connect the Techstream to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / Throttle Sensor Position.

(5) Depress the accelerator pedal. When the throttle valve is fully opened, check that the value of "Throttle Sensor Position" is within the specification.

Standard throttle valve opening percentage:

60% or more

HINT:

When checking the standard throttle valve opening percentage, the shift lever should be in N.

- If the percentage is less than 60%, replace the throttle body.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000Q0P02BX
Title: 1GR-FE ENGINE CONTROL: THROTTLE BODY: REMOVAL (2010 4Runner)		

REMOVAL

1. REMOVE UPPER RADIATOR SUPPORT SEAL INFO

2. REMOVE FRONT BUMPER COVER LOWER INFO

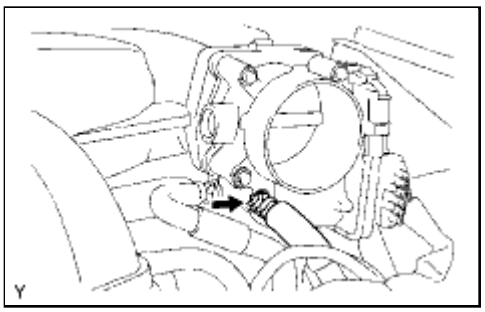
3. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY INFO

4. DRAIN ENGINE COOLANT INFO

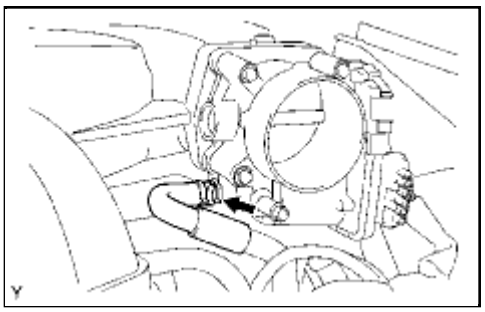
5. REMOVE V-BANK COVER INFO

6. REMOVE NO. 1 AIR CLEANER HOSE INFO

7. REMOVE THROTTLE BODY WITH MOTOR ASSEMBLY

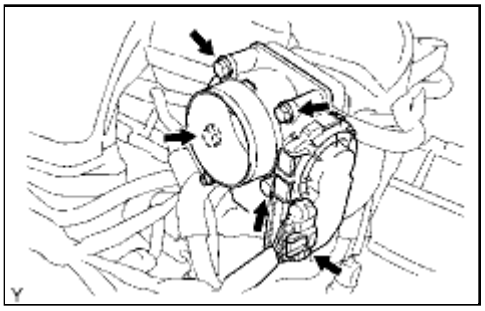


(a) Disconnect the No. 5 water by-pass hose.



(b) Disconnect the No. 4 water by-pass hose.

(c) Disconnect the throttle position sensor and throttle control motor connector.



(d) Remove the 4 bolts, throttle body with motor and gasket.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000Q0N01ZX
Title: 1GR-FE ENGINE CONTROL: THROTTLE BODY: INSPECTION (2010 4Runner)		

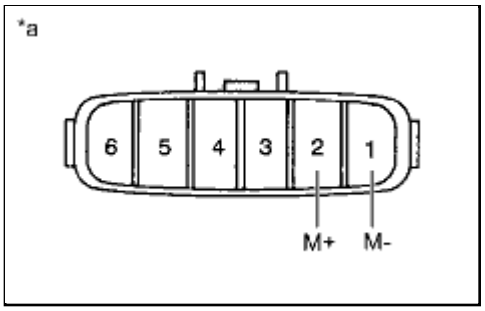
INSPECTION

1. INSPECT THROTTLE BODY WITH MOTOR ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
2 (M+) - 1 (M-)	20°C (68°F)	0.3 to 100 Ω



Text in Illustration

*a	Component without harness connected (Throttle Body with Motor)

If the result is not as specified, replace the throttle body with motor assembly.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000Q0M02BX
Title: 1GR-FE ENGINE CONTROL: THROTTLE BODY: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL THROTTLE BODY WITH MOTOR ASSEMBLY

(a) Install a new gasket and the throttle body with motor with the 4 bolts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(b) Connect the throttle position sensor and throttle control motor connector.

(c) Connect the No. 4 water by-pass hose.

(d) Connect the No. 5 water by-pass hose.

2. INSTALL NO. 1 AIR CLEANER HOSE INFO

3. ADD ENGINE COOLANT INFO

4. INSPECT FOR ENGINE COOLANT LEAK INFO

5. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY INFO

6. INSTALL FRONT BUMPER COVER LOWER INFO

7. INSTALL V-BANK COVER INFO

8. INSTALL UPPER RADIATOR SUPPORT SEAL INFO

9. PERFORM INITIALIZATION

NOTICE:

- Be sure to perform this procedure after reassembling the throttle body or removing and reinstalling any throttle body component.
- Perform the following procedure after replacing the ECM, throttle body or any throttle body components. The following procedure should also be performed if the throttle body is cleaned.
- Be sure to perform this procedure after replacing the ECM and reconnecting the battery cable.

(a) Disconnect the EFI and ETCS fuses at the same time. Wait at least 60 seconds, and then reconnect the fuses.

(b) Turn the ignition switch to ON without operating the accelerator pedal.

NOTICE:

If the accelerator pedal is operated, perform the above steps again.

(c) Connect the Techstream to the DLC3 and clear the DTCs INFO .

(d) Start the engine and check that the MIL is not illuminated and that the idle speed is within the specified range when the A/C is switched off after the engine is warmed up.

Standard idle speed:
690 to 790 rpm

NOTICE:

- Be sure to perform this step with all accessories off.

- Make sure that the shift lever is in neutral.

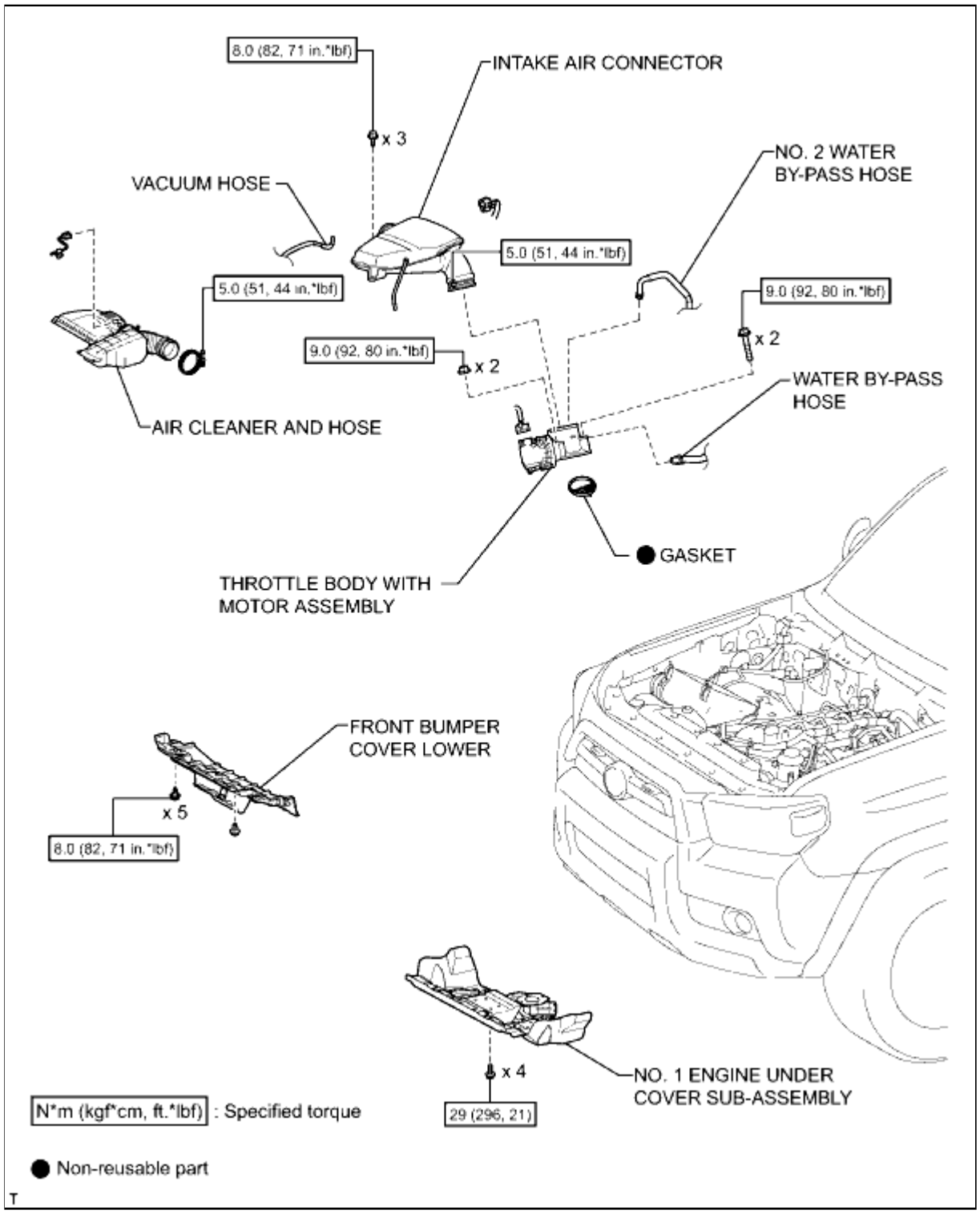
(e) Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / Throttle Sensor Position. Fully depress the accelerator pedal and check that the value is 60% or more.

(f) Perform a road test and confirm that there are no abnormalities.

Last Modified: 5-10-2010	6.4 K	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM0000045FI002X
Title: 2TR-FE ENGINE CONTROL: THROTTLE BODY: COMPONENTS (2010 4Runner)		

COMPONENTS

ILLUSTRATION



Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VWO015X
Title: 2TR-FE ENGINE CONTROL: THROTTLE BODY: REMOVAL (2010 4Runner)		

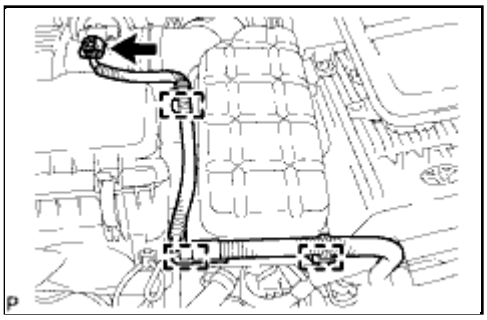
REMOVAL

1. REMOVE FRONT BUMPER COVER LOWER INFO

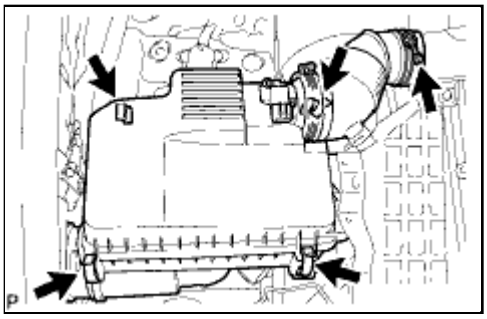
2. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY INFO

3. DRAIN ENGINE COOLANT INFO

4. REMOVE AIR CLEANER AND HOSE



(a) Detach the 3 clamps and disconnect the mass air flow meter connector.

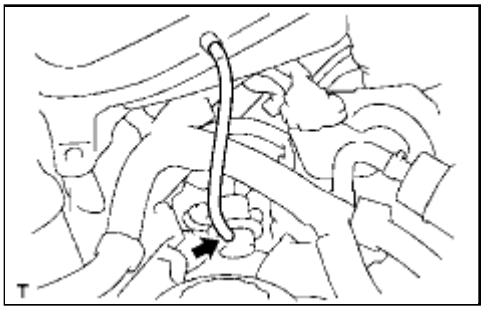


(b) Detach the 4 clamps.

(c) Loosen the hose clamp and remove the air cleaner and hose.

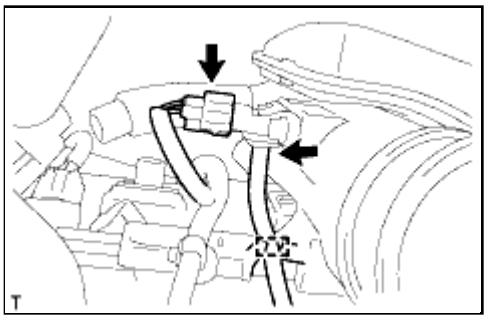
5. REMOVE INTAKE AIR CONNECTOR

(a) Disconnect the vacuum hose from the fuel pressure regulator.



(b) Disconnect the No. 2 ventilation hose.

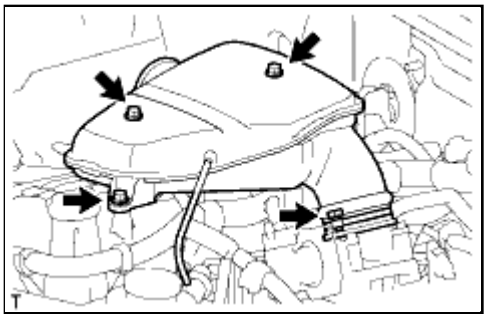
(c) Detach the wire harness clamp.



(d) Disconnect the connector.

(e) Disconnect the vacuum hose from the manifold absolute pressure sensor.

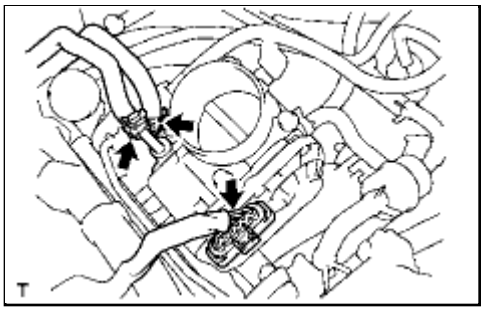
(f) Detach the vacuum hose.



(g) Loosen the hose clamp.

(h) Remove the 3 bolts and intake air connector.

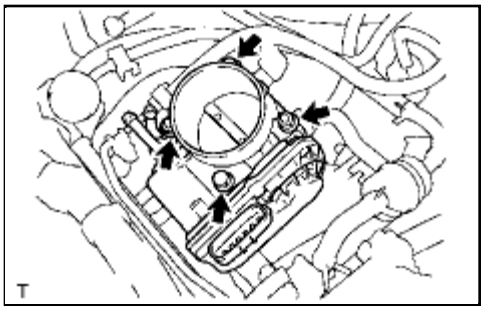
6. REMOVE THROTTLE BODY WITH MOTOR ASSEMBLY



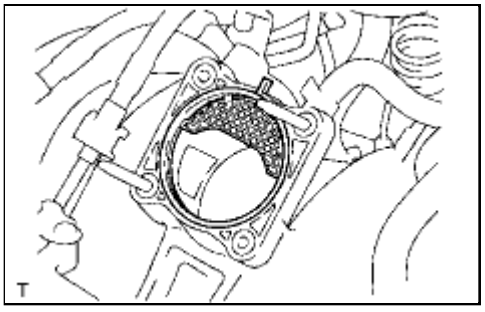
(a) Disconnect the water by-pass hose.

(b) Disconnect the No. 2 water by-pass hose.

(c) Disconnect the throttle position sensor and throttle control motor connector.



(d) Remove the 2 bolts, 2 nuts and throttle body with motor.



(e) Remove the gasket from the intake manifold.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VWP00YX
Title: 2TR-FE ENGINE CONTROL: THROTTLE BODY: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY WITH MOTOR ASSEMBLY

(a) Listen to the throttle control motor operating sounds.

(1) Turn the ignition switch to ON.

(2) When depressing the accelerator pedal, listen to the running sounds of the motor. Make sure no friction noises come from the motor.

If friction noises exist, check the throttle body with motor, wire harness and ECM.

(b) Inspect the throttle position sensor.

(1) Connect the Techstream to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Data List / All Date / Throttle Sensor Position.

(5) Depress the accelerator pedal. When the throttle valve is fully opened, check that the throttle position value is within the specified range.

Standard:
60% or more

NOTICE:

When checking the standard throttle valve opening percentage, make sure the transmission is in neutral.

If the result is not as specified, check the throttle body with motor, wire harness and ECM.

Last Modified: 5-10-2010	6.4 G	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VWM013X
Title: 2TR-FE ENGINE CONTROL: THROTTLE BODY: INSPECTION (2010 4Runner)		

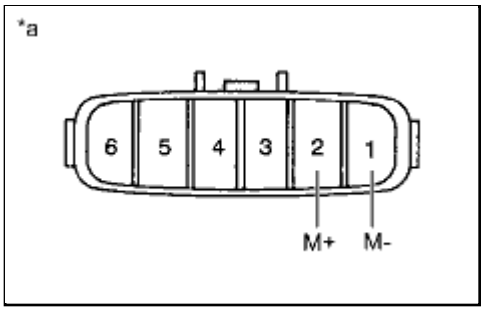
INSPECTION

1. INSPECT THROTTLE BODY WITH MOTOR ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (M-) - 2 (M+)	20°C (68°F)	0.3 to 100 Ω



Text in Illustration

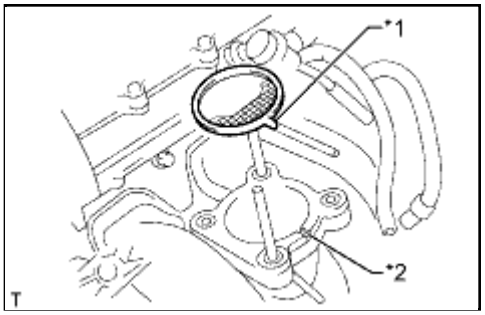
*a	Component without harness connected (Throttle Body with Motor)

If the result is not as specified, replace the throttle body with motor assembly.

Last Modified: 5-10-2010	6.4 A	**From:** 200908
Model Year: 2010	**Model:** 4Runner	**Doc ID:** RM000000VWL016X
Title: 2TR-FE ENGINE CONTROL: THROTTLE BODY: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL THROTTLE BODY WITH MOTOR ASSEMBLY



(a) Align the protrusion of a new gasket with the groove of the intake manifold.

Text in Illustration

*1	Protrusion
*2	Groove

(b) Install a new gasket to the intake manifold.

(c) Install the throttle body with motor with the 2 bolts and 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

(d) Connect the water by-pass hose.

(e) Connect the No. 2 water by-pass hose.

(f) Connect the throttle position sensor and throttle control motor connector.

2. INSTALL INTAKE AIR CONNECTOR

(a) Install the intake air connector with the 3 bolts.

Torque: 8.0 N·m (82 kgf·cm, 71in·lbf)

(b) Tighten the hose clamp.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

(c) Attach the vacuum hose.

(d) Connect the vacuum hose to the manifold absolute pressure sensor.

(e) Connect the connector.

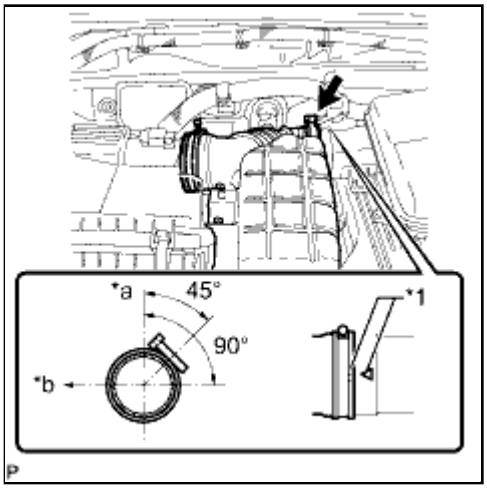
(f) Attach the wire harness clamp.

(g) Connect the No. 2 ventilation hose.

(h) Connect the vacuum hose to the fuel pressure regulator.

3. INSTALL AIR CLEANER AND HOSE

(a) Install the air cleaner and hose, align its matchmark with the matchmark of the air cleaner cap as shown in the illustration.



Text in Illustration

*1	Matchmark
*a	Upper Side
*b	Front

(b) Tighten the hose clamp.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

(c) Attach the 4 clamps.

(d) Attach the 3 clamps and connect the mass air flow meter connector.

4. ADD ENGINE COOLANT INFO

5. INSPECT FOR COOLANT LEAK INFO

6. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY INFO

7. INSTALL FRONT BUMPER COVER LOWER INFO

8. PERFORM INITIALIZATION

NOTICE:

- Be sure to perform this procedure after reassembling the throttle body assembly or removing and reinstalling any throttle body component.
- Perform the following procedure after replacing the ECM, throttle body assembly or any throttle body components. The following procedure should also be performed if the throttle body is cleaned.
- Be sure to perform this procedure after reconnecting the battery cable and after replacing the ECM.

(a) Disconnect the cable from the negative (-) battery terminal. Wait at least 60 seconds and reconnect the cable.

(b) Turn the ignition switch to ON without operating the accelerator pedal.

NOTICE:

If the accelerator pedal is operated, perform the above steps again.

(c) Connect the Techstream to the DLC3 and clear the DTCs INFO .

(d) Start the engine, and check that the MIL is not illuminated and that the idle speed is within the specified range when the A/C is switched off after the engine is warmed up.

Engine Idle Speed:

CONDITION	SPECIFIED CONDITION
A/C switched off	600 to 700 rpm

NOTICE:

- Be sure to perform this step with all accessories off.
- Make sure that the shift lever is in neutral.

(e) Enter the following menus: Powertrain / Engine and ECT / Data List / Throttle Sensor Position. Fully depress the accelerator pedal and check that the value is 60% or more.

(f) Perform a road test and confirm that there are no abnormalities.