

2009 Toyota Highlander Limited

2009 ENGINE Cooling (1AR-FE) - Highlander

2009 ENGINE**Cooling (1AR-FE) - Highlander****COOLING SYSTEM****ON-VEHICLE INSPECTION****1. INSPECT FOR COOLANT LEAK**

CAUTION: Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

NOTE: Before performing each inspection, turn the A/C switch off.

- Fill the radiator with coolant and attach a radiator cap tester.
- Warm up the engine.
- Using the radiator cap tester, increase the pressure inside the radiator to 118 kPa (1.2 kgf/cm², 17 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator and water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

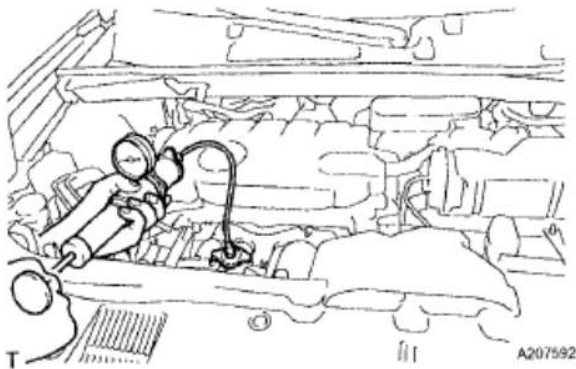


Fig. 1: Applying Pressure Into Radiator

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSPECT ENGINE COOLANT LEVEL IN RESERVOIR

- Check that the engine coolant level is between the LOW and FULL lines when the engine is cold. If the engine coolant level is low, check for leaks and add "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite and non-borate coolant with long-life hybrid organic acid technology to the FULL line.

NOTE: Do not substitute plain water for engine coolant.

2009 Toyota Highlander Limited**2009 ENGINE Cooling (1AR-FE) - Highlander****3. INSPECT ENGINE COOLANT QUALITY**

- a. Remove the radiator cap.

CAUTION: Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

- b. Check if there are any excessive deposits of rust or scales around the radiator cap and radiator filler hole. Also, the coolant should be free of oil.

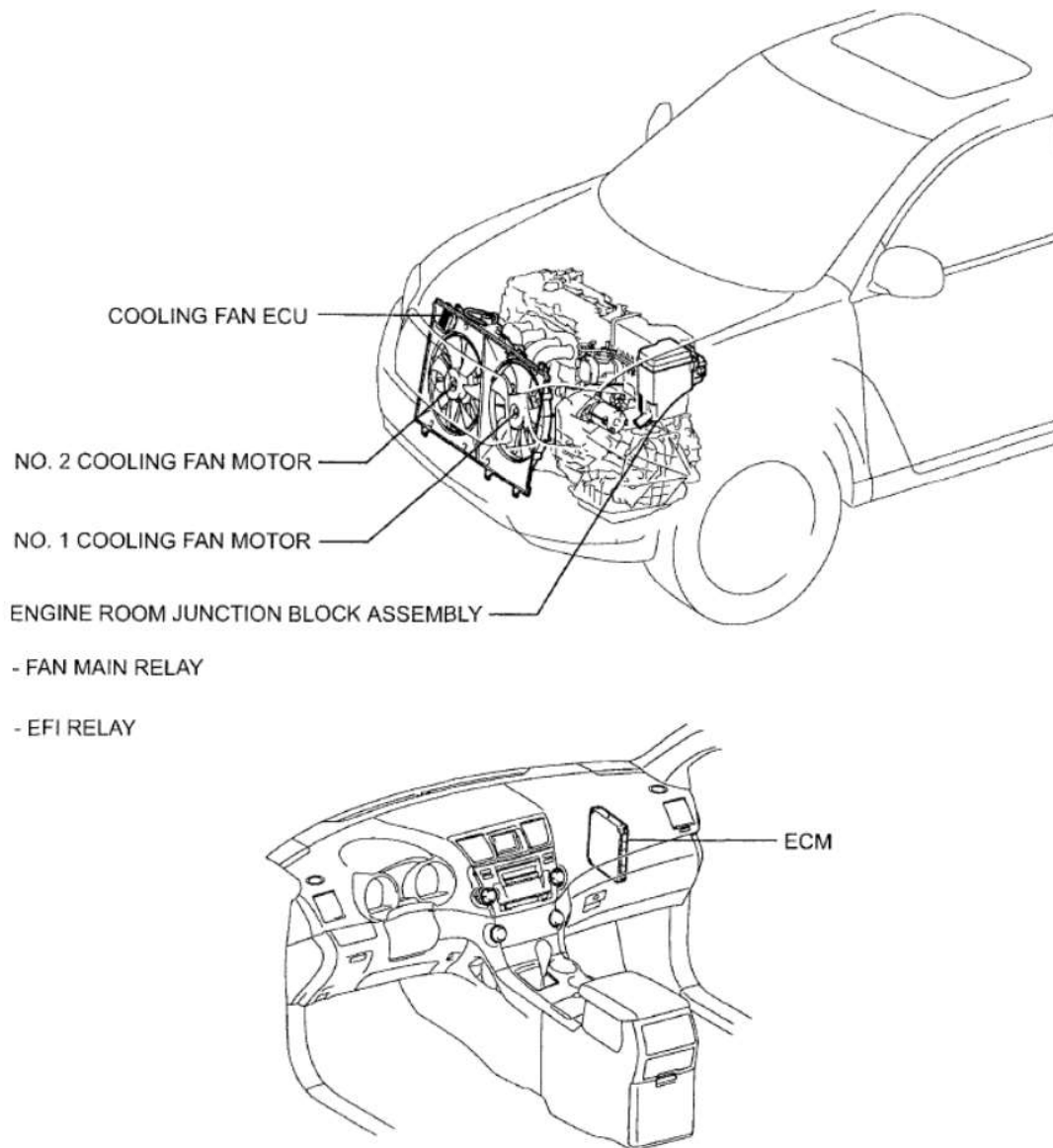
If excessively dirty, clean the coolant passage and replace the coolant.

- c. Install the radiator cap.

COOLING FAN SYSTEM**PARTS LOCATION**

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Fig. 2: Identifying Cooling Fan System Parts Location
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

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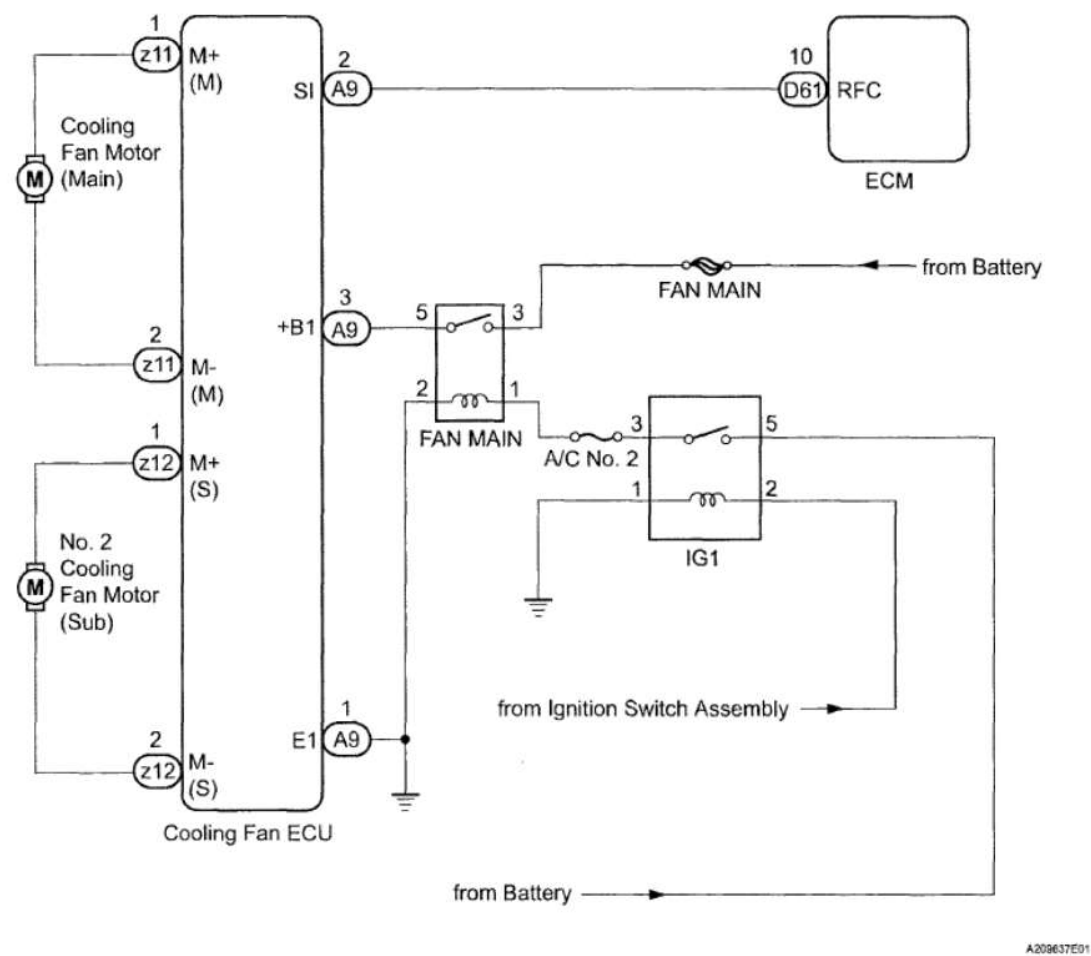


Fig. 3: Cooling Fan System - System Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Cooling Fan System

PROBLEM SYMPTOMS CHART

Symptom	Suspected Area	Refer to
	Engine coolant temperature sensor	<u>INSPECTION</u>
	Cooling fan motor	<u>ON-VEHICLE INSPECTION</u>

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Cooling fans do not operate	No. 2 Cooling fan motor	<u>ON-VEHICLE INSPECTION</u>
	Cooling fan relay (FAN MAIN)	<u>COOLING FAN RELAY</u>
	Cooling fan circuit	<u>COOLING FAN CIRCUIT</u>
	ECM	<u>REMOVAL</u>
Cooling fans do not stop (continue to operate)	Engine coolant temperature sensor	<u>INSPECTION</u>
	Cooling fan circuit	<u>COOLING FAN CIRCUIT</u>
	Cooling fan ECU	<u>COOLING FAN ECU</u>
	ECM	<u>REMOVAL</u>
Cooling fan speed does not change	Cooling fan circuit	<u>COOLING FAN CIRCUIT</u>
	ECM	<u>REMOVAL</u>

ON-VEHICLE INSPECTION**1. CHECK COOLING FAN SYSTEM**

- a. Check the input signal and output current.

HINT:

Be sure to perform the inspection with an engine coolant temperature of less than 92°C (198°F).

1. Connect the 400 A probe of an ammeter to the cooling fan motor (M+), and then the No. 2 cooling fan motor (S+) on the wire harness side.
2. Connect the Techstream to the DLC3.
3. Using the oscilloscope, check the waveform between terminals D61-10 (RFC) and B49-6 (E1) of the ECM.

HINT:

Enter the following menus: Powertrain/Engine/Active Test/Control the Electric Cooling Fan.

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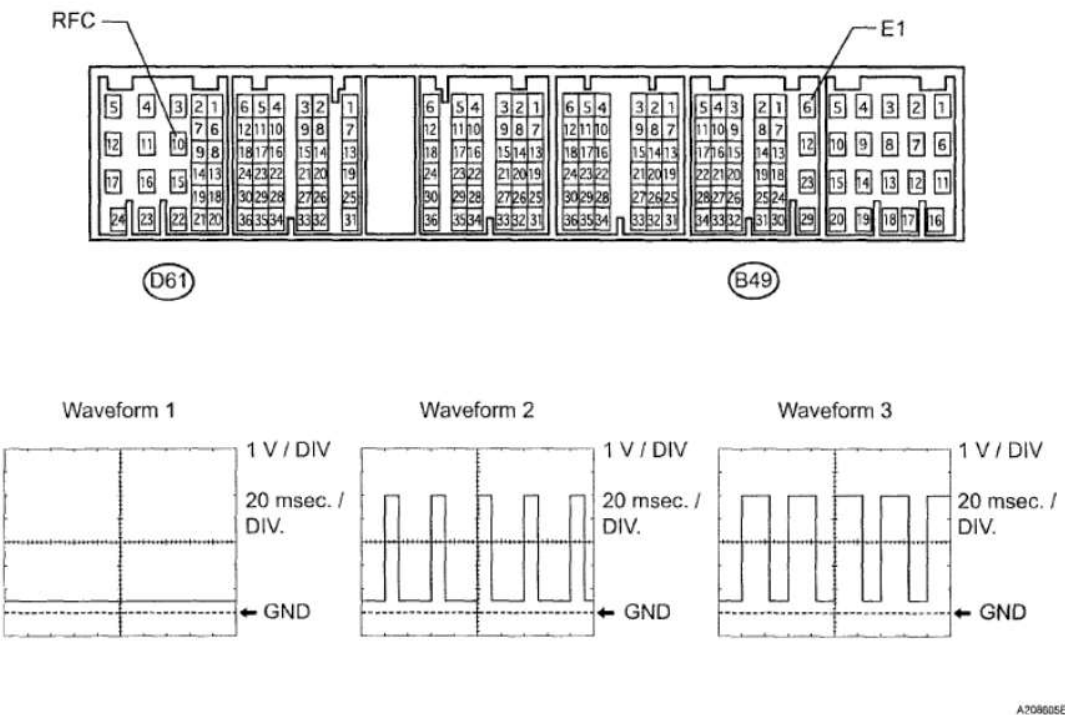


Fig. 4: Identifying ECM Connector Terminals And Waveform
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Waveform

WAVEFORM REFERENCE

Condition	Input Signal	Output Current
Engine stopped (Ignition switch ON)	Waveform 1 (Duty ratio 0%)	(Fans stop)
Engine idling (A/C OFF) (The coolant temperature is less than 95°C (203°F))	Waveform 1 (Duty ratio 0%)	(Fans stops)
Engine idling (A/C ON)	Waveform 2 (Duty ratio 30 to 70%)	(Fans operate) w/o Towing package 5.3 to 11.3 A for No. 1 cooling fan motor 5.3 to 11.3 A for No. 2 cooling fan motor w/Towing package 10.0 to 16.0 A for No. 1 cooling fan motor 10.0 to 16.0 A for No. 2 cooling fan motor
		(Fans operate) w/o Towing package 5.3 to 11.3 A for No. 1 cooling fan motor 5.3 to 11.3 A for No. 2 cooling fan motor

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Engine idling (Engine coolant temperature sensor connector disconnected)	Waveform 3 (Duty ratio 30 to 70%)	fan motor w/ Towing package 10.0 to 16.0 A for No. 1 cooling fan motor 10.0 to 16.0 A for No. 2 cooling fan motor
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- If the input signal is abnormal, there is a malfunction in the ECM or cooling fan ECU.
- If the output current is abnormal even when the input signal is normal, there is a malfunction in the cooling fan ECU, cooling fan motor or power source circuit.

COOLING FAN CIRCUIT**DESCRIPTION**

The ECM calculates an appropriate cooling fan speed based on the engine coolant temperature, air conditioning switch condition, refrigerant pressure, engine speed and vehicle speed, and sends the signals to the cooling fan ECU to regulate the cooling fans. The cooling fan ECU controls the cooling fan speed based on the duty ratio signal sent from the ECM. By basing its control on the operating conditions, the ECM can control the fan speed optimally using the cooling fan ECU, achieving both high cooling performance and quietness. The cooling fan speed is determined based on engine coolant temperature, air conditioner operating conditions, engine speed, and vehicle speed.

WIRING DIAGRAM

Refer to System Diagram (See **SYSTEM DIAGRAM**).

INSPECTION PROCEDURE

NOTE: Inspect the fuses for circuits related to this system before performing the following inspection procedure.

1. **PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN)**
 - a. Connect the Techstream to the DLC3.
 - b. Turn the ignition switch to ON.
 - c. Enter the following menus: Powertrain/Engine/Active Test/Control the Electric Cooling Fan.
 - d. Check the operation of the cooling fans while operating it using the Techstream.

OK

TECHSTREAM OPERATION CHART

Techstream Operation	Specified Condition
ON	Cooling fans operated
OFF	Cooling fans stopped

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Result

RESULT CHART

Result	Proceed to
OK	A
NG (Cooling fans do not operate)	B
NG (Cooling fans do not stop)	C

B: Go to step 2

C: Go to step 10

A: PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE
(See **SYSTEM DIAGRAM**)

2. INSPECT COOLING FAN MOTOR (COOLING FAN MOTOR AND NO. 2 COOLING FAN MOTOR)

- a. Disconnect the cooling fan motor and No. 2 cooling fan motor connectors.
- b. Connect a battery positive (+) lead to each terminal 2 of the cooling fan motor and No. 2 cooling fan motor connectors, and connect a battery negative (-) lead to each terminal 1 of the cooling fan motor and No. 2 cooling fan motor connectors.

OK:

The cooling fan motors operate.

Result

RESULT CHART

Result	Proceed to
OK	A
NG (Cooling fan motor)	B
NG (No. 2 Cooling fan motor)	C

- c. Reconnect the cooling fan motor connectors.

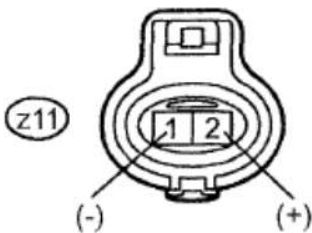
B: REPLACE COOLING FAN MOTOR (See ON-VEHICLE INSPECTION)

C: REPLACE NO. 2 COOLING FAN MOTOR (See ON-VEHICLE INSPECTION)

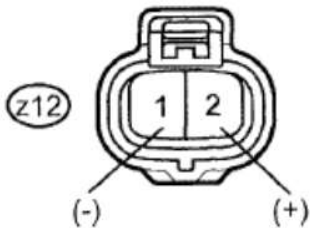
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Front view of wire harness connector:
(to Cooling Fan Motor)



Front view of wire harness connector:
(to No. 2 Cooling Fan Motor)



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Fig. 5: Identifying Cooling Fan Motor Connectors
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

A: Go to next step

3. **CHECK HARNESS AND CONNECTOR (COOLING FAN ECU POWER SOURCE)**
- a. Disconnect the cooling fan ECU connector.
 - b. Turn the ignition switch to ON.
 - c. Measure the voltage according to the value(s) in the table below.

Standard Voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A9-3 (+B1) - A9-1 (E1)	Ignition switch ON	11 to 14 V

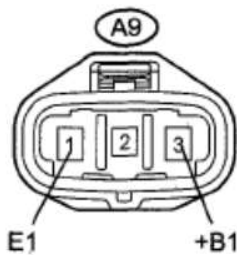
- d. Reconnect the cooling fan ECU connector.

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NG: Go to step 5

Front view of wire harness connector:
(to Cooling Fan ECU)



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Fig. 6: Identifying Cooling Fan ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. CHECK HARNESS AND CONNECTOR (ECM - COOLING FAN ECU)
- a. Disconnect the ECM connector.
 - b. Disconnect the cooling fan ECU connector.
 - c. Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short)

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D61-10 (RFC) or A9-2 (SI) - Body ground	Always	10 kohms or higher

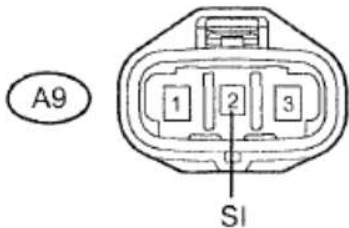
- d. Reconnect the cooling fan ECU connector.
- e. Reconnect the ECM connector.

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - COOLING FAN ECU)

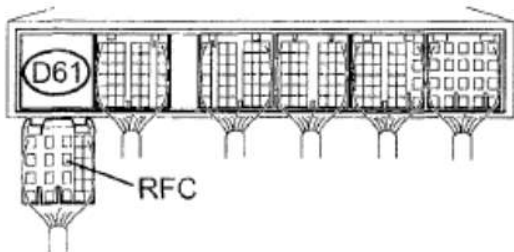
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Front view of wire harness connector:
(to Cooling Fan ECU)



Rear view of wire harness connector:
(to ECM)



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Fig. 7: Identifying Cooling Fan ECU Connector And ECM Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE COOLING FAN ECU (See **COOLING FAN SYSTEM**)

5. **CHECK HARNESS AND CONNECTOR (COOLING FAN ECU - BODY GROUND)**
- a. Disconnect the cooling fan ECU connector.
 - b. Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open)

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A9-1 (E1) - Body ground	Always	Below 1 ohms

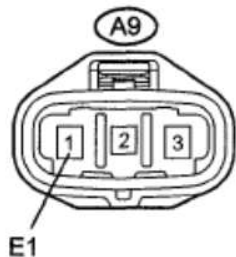
- c. Reconnect the cooling fan ECU connector.

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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (COOLING FAN ECU - BODY GROUND)

Front view of wire harness connector:
(to Cooling Fan ECU)



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Fig. 8: Identifying A9 Cooling Fan ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

6. INSPECT RELAY (FAN MAIN)

- a. Remove the FAN MAIN relay from the engine room relay block.
- b. Measure the resistance according to the value(s) in the table below.

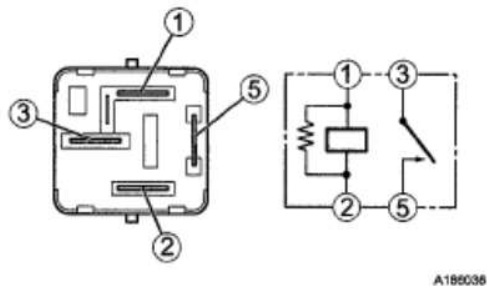


Fig. 9: FAN MAIN Relay Circuit Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
3 - 5	No battery voltage applied to terminals 1 and 2	10 kohms or higher
3 - 5	Battery voltage applied to terminals 1 and 2	Below 1 ohms

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c. Reinstall the FAN MAIN relay.

NG: REPLACE RELAY (FAN MAIN RELAY)

OK: Go to next step

7. **CHECK HARNESS AND CONNECTOR (FAN MAIN RELAY POWER SOURCE)**

- a. Remove the FAN MAIN relay from the engine room relay block.
- b. Measure the voltage according to the value(s) in the table below.

Standard Voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
3 (FAN MAIN relay) - Body ground	Always	11 to 14 V

c. Reinstall the FAN MAIN relay.

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (FAN MAIN RELAY - BATTERY)

Engine Room Relay Block:

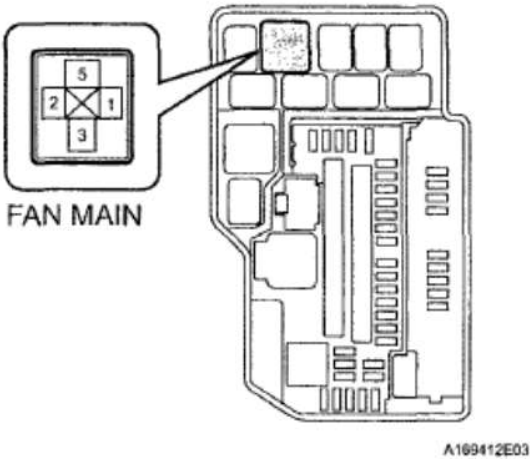


Fig. 10: Identifying FAN MAIN Relay Location
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (COOLING FAN ECU - FAN MAIN RELAY)**

- a. Remove the FAN MAIN relay from the engine room relay block.

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- b. Disconnect the cooling fan ECU connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open)**TESTER CONNECTION SPECIFIED CONDITION CHART**

Tester Connection	Condition	Specified Condition
A9-3 (+B1) - 5 (FAN MAIN relay)	Always	Below 1 ohms

Standard Resistance (Check for Short)**TESTER CONNECTION SPECIFIED CONDITION CHART**

Tester Connection	Condition	Specified Condition
A9-3 (+B1) or 5(FAN MAIN relay) - Body ground	Always	10 kohms or higher

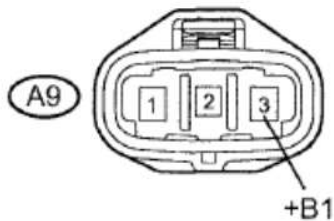
- d. Reconnect the cooling fan ECU connector.
- e. Reinstall the FAN MAIN relay.

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (COOLING FAN ECU - FAN MAIN RELAY)

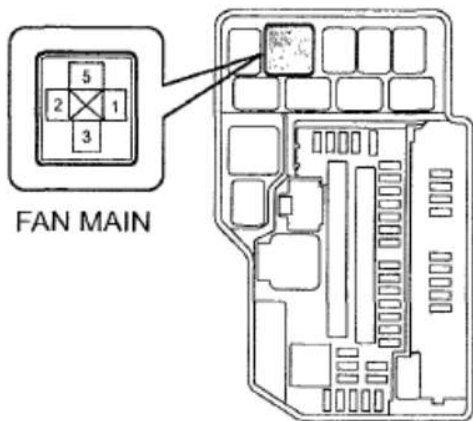
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Front view of wire harness connector:
(to Cooling Fan ECU)



Engine Room Relay Block:



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Fig. 11: Identifying FAN MAIN Relay And Cooling Fan ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. CHECK HARNESS AND CONNECTOR (FAN MAIN RELAY - BODY GROUND)
- a. Remove the FAN MAIN relay from the engine room relay block.

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

Standard Resistance (Check for Open)

TESTER CONNECTION SPECIFIED CONDITION CHART		
Tester Connection	Condition	Specified Condition
2 (FAN MAIN relay) - Body ground	Always	Below 1 ohms

- c. Reinstall the FAN MAIN relay.

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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (FAN MAIN RELAY - BODY GROUND)

Engine Room Relay Block:

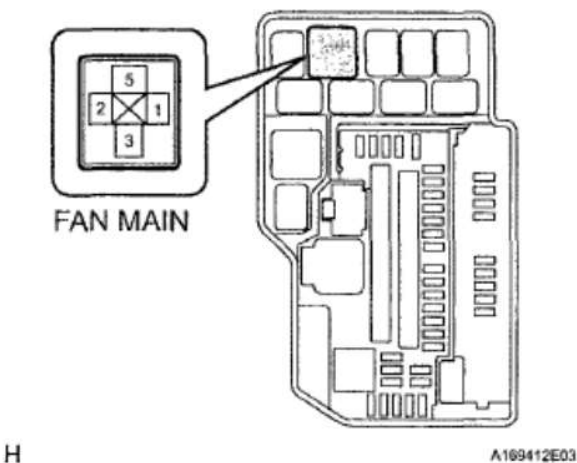


Fig. 12: Identifying FAN MAIN Relay Location
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPAIR OR REPLACE HARNESS OR CONNECTOR (FAN MAIN RELAY - INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)

10. **CHECK HARNESS AND CONNECTOR (ECM - COOLING FAN ECU)**
- a. Disconnect the ECM connector.
 - b. Disconnect the cooling fan ECU connector.
 - c. Measure the resistance according to the value(s) in the table below.

Standard Resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D61-10 (RFC) - A9-2 (SI)	Always	Below 1 ohms

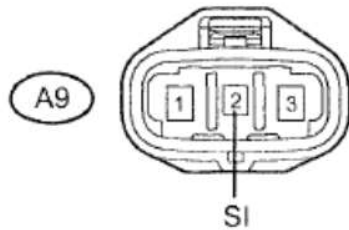
- d. Reconnect the cooling fan ECU connector.
- e. Reconnect the ECM connector.

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - COOLING FAN ECU)

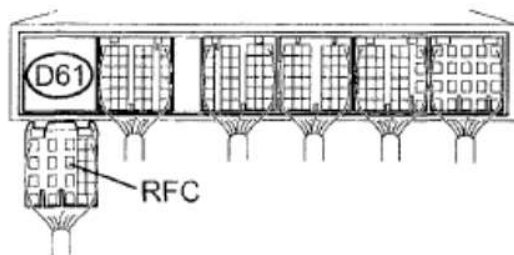
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Front view of wire harness connector:
(to Cooling Fan ECU)



Rear view of wire harness connector:
(to ECM)



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Fig. 13: Identifying Cooling Fan ECU Connector And ECM Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE COOLING FAN ECU (See COOLING FAN SYSTEM)

COOLANT

REPLACEMENT

1. **REMOVE NO. 1 ENGINE UNDER COVER**
2. **DRAIN ENGINE COOLANT**
 - a. Loosen the radiator drain cock plug.

NOTE: Do not loosen the radiator drain cock plug while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

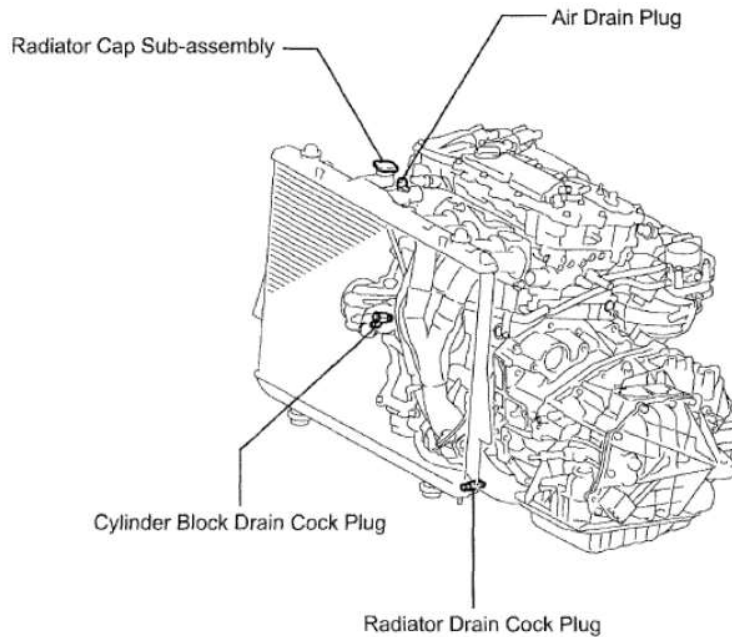
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HINT:

Collect the coolant in a container and dispose of it according to the regulations in your area.

- b. Remove the radiator cap sub-assembly from the radiator assembly.
- c. Loosen the cylinder block drain cock plug.



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Fig. 14: Identifying Cylinder Block Drain Cock Plug, Radiator Drain Cock Plug And Air Drain Plug

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. ADD ENGINE COOLANT

- a. Tighten the radiator drain cock plug by hand.
- b. Tighten the cylinder block drain cock plug.

Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf) for cylinder block drain cock plugs

- c. Loosen the air drain plug at the top of the radiator 3 or 4 turns.
- d. Add TOYOTA Super Long Life Coolant (SLLC) to the radiator inlet opening until coolant overflows from the radiator air drain hole. Then close the air drain plug at the top of the radiator.

Torque: 1.5 N*m (15 kgf*cm, 13 in.*lbf) for air drain plug

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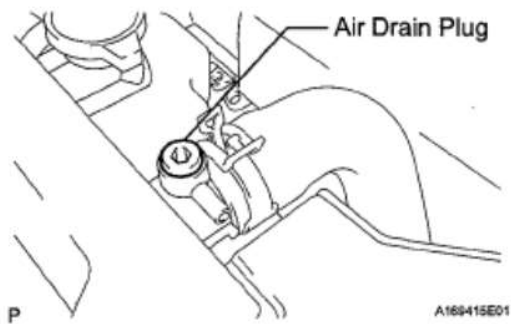


Fig. 15: Identifying Air Drain Plug

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

If the coolant level at the radiator inlet opening drops after squeezing the No. 1 and No. 2 radiator hoses, add coolant.

- e. Slowly fill the radiator with TOYOTA Super Long Life Coolant (SLLC).

Standard capacity

w/o Towing Package

SPECIFIED CONDITION CHART

Condition	Specified Condition
w/ Rear Heater	9.1 liters (9.6 US qts, 8.0 imp. qts)
w/o Rear Heater	6.9 liters (7.3 US qts, 6.1 imp. qts)

w/ Towing Package

SPECIFIED CONDITION CHART

Condition	Specified Condition
w/ Rear Heater	9.8 liters (10.4 US qts, 8.6 imp. qts)
w/o Rear Heater	7.6 liters (8.0 US qts, 6.7 imp. qts)

HINT:

- TOYOTA vehicles are filled with TOYOTA SLLC at the factory. In order to avoid damage to the engine cooling system and other technical problems, only use TOYOTA SLLC or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology is a combination of low phosphates and organic acids).
- Contact your TOYOTA dealer for further details.

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NOTE: **Never use water as a substitute for engine coolant.**

- f. Slowly pour coolant into the radiator reservoir tank until it reaches the FULL line.
- g. Squeeze the No. 1 and No. 2 radiator hoses several times by hand, and then check the level of the coolant.

If the coolant level is low, add coolant.

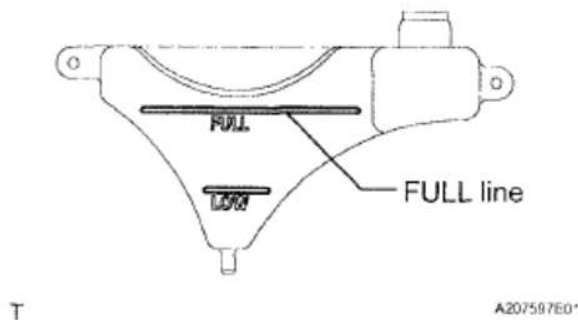


Fig. 16: Identifying Coolant Level Marks

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- h. Bleed air from the cooling system.
 1. Warm up the engine until the thermostat opens. While the thermostat is open, circulate the coolant for several minutes.

HINT:

The thermostat open timing can be confirmed by squeezing the No. 1 radiator hose by hand, and checking when the engine coolant starts to flow inside the hose.

2. Maintain the engine speed at 2500 to 3000 rpm.
3. Squeeze the No. 1 and No. 2 radiator hoses several times by hand to bleed air.

CAUTION: When squeezing the radiator hoses:

- Avoid contact with the cooling fan motor insulator.
- Wear protective gloves.
- Be careful as the radiator hoses are hot.
- Keep your hands away from the radiator fan.

NOTE:

- Make sure that the radiator reservoir still has some coolant in it.
- If the coolant temperature gauge indicates an excessive temperature, turn off the engine and let it cool.
- If there is not enough coolant, the engine may overheat or be

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seriously damaged.

- **If the radiator reservoir does not have enough coolant, perform the following: 1) stop the engine, 2) wait until the coolant has cooled down, and 3) add coolant until the reservoir is filled to the FULL line.**

i. Stop the engine and wait until the engine coolant cools down.

j. Add engine coolant to the FULL line on the radiator reservoir.

4. **INSPECT FOR COOLANT LEAK** (See COOLING SYSTEM)

5. **INSTALL NO. 1 ENGINE UNDER COVER**

WATER PUMP

COMPONENTS

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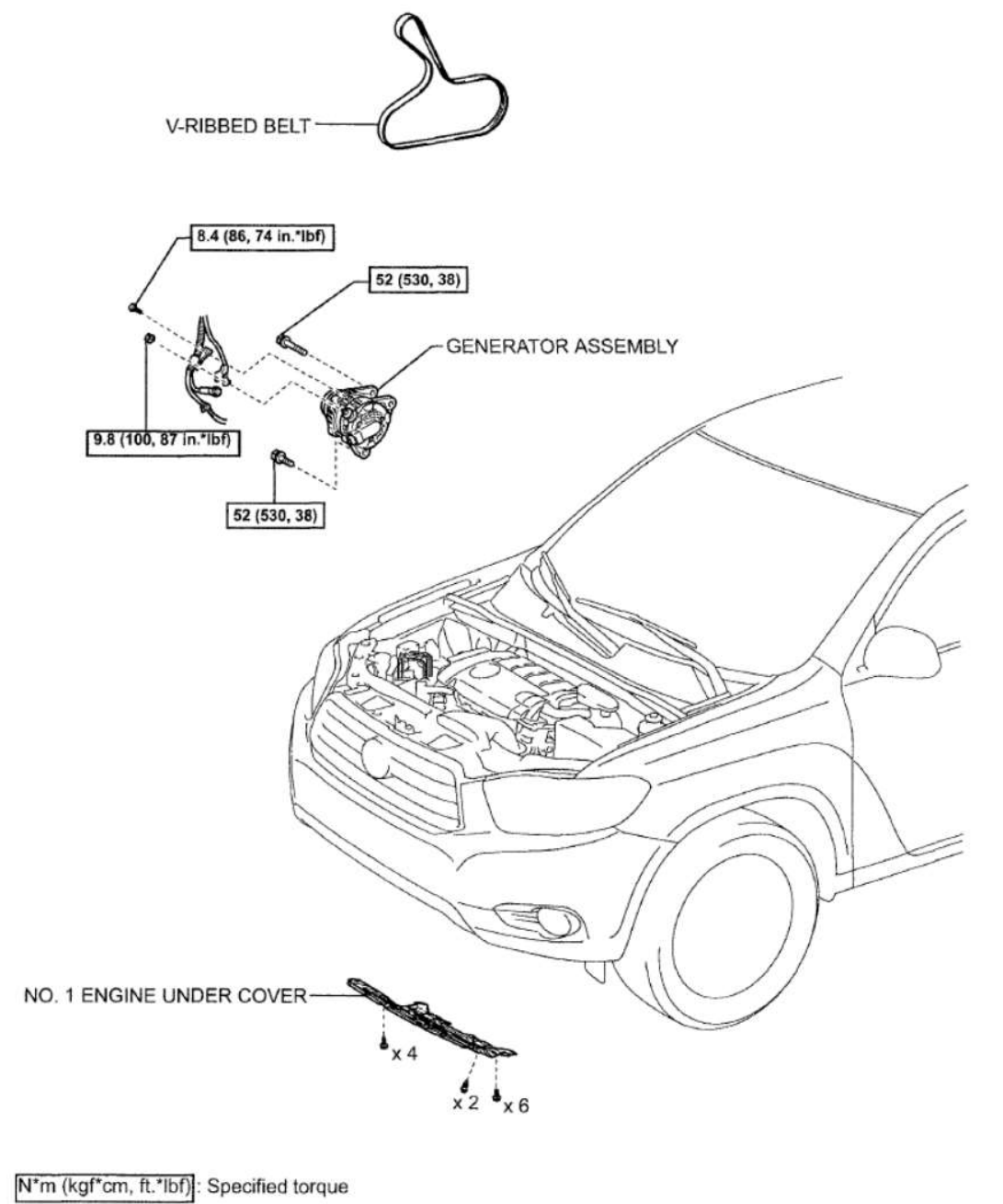
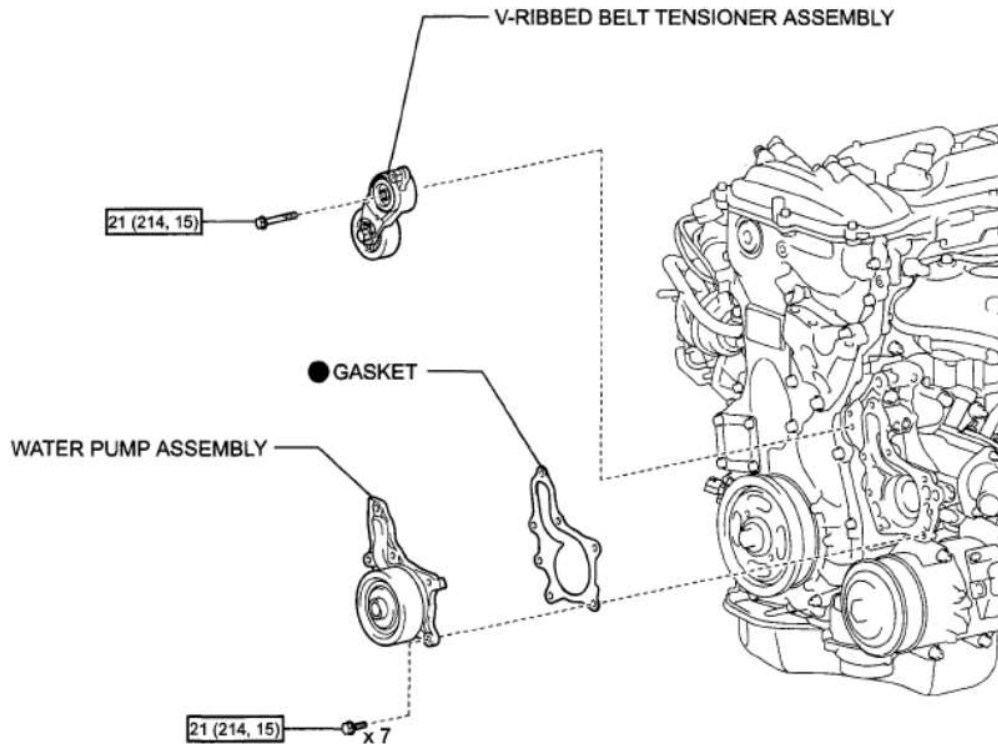


Fig. 17: Identifying Water Pump Components And Torque Specifications (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

● Non-reusable part

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Fig. 18: Identifying Water Pump Components And Torque Specifications (2 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

2. REMOVE NO. 1 ENGINE UNDER COVER

3. DRAIN ENGINE COOLANT (See COOLANT)

4. REMOVE V-RIBBED BELT

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HINT:

See **ON-VEHICLE INSPECTION**

5. **REMOVE GENERATOR ASSEMBLY** (See **REMOVAL**)
6. **REMOVE V-RIBBED BELT TENSIONER ASSEMBLY** (See **DISASSEMBLY**)
7. **REMOVE WATER PUMP ASSEMBLY**
 - a. Remove the 7 bolts, water pump and water pump gasket.

INSPECTION**1. INSPECT WATER PUMP ASSEMBLY**

- a. Visually check the drain hole for coolant leakage. If leakage is found, replace the water pump assembly.

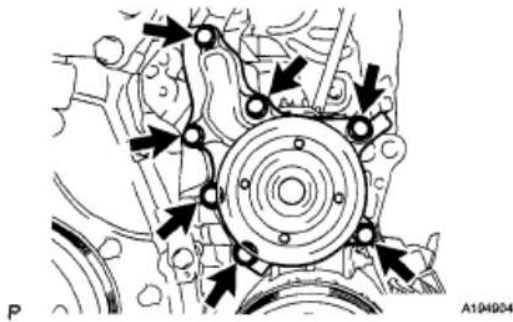


Fig. 19: Locating Bolts And Water Pump

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Turn the pulley and check that the water pump bearing moves smoothly without making a clicking noise.

If the bearing does not move smoothly, replace the water pump assembly.

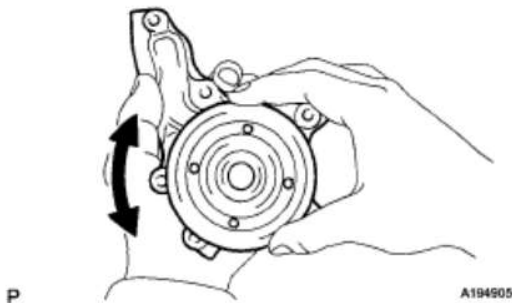


Fig. 20: Turning Pulley

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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INSTALLATION**1. INSTALL WATER PUMP ASSEMBLY**

- a. Install a new gasket and the water pump with the 7 bolts.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

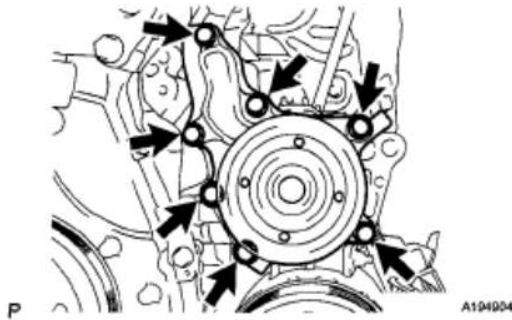


Fig. 21: Locating Bolts And Water Pump

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY** (See REASSEMBLY)
3. **INSTALL GENERATOR ASSEMBLY** (See INSTALLATION)
4. **INSTALL V-RIBBED BELT**

HINT:

See INSTALLATION

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

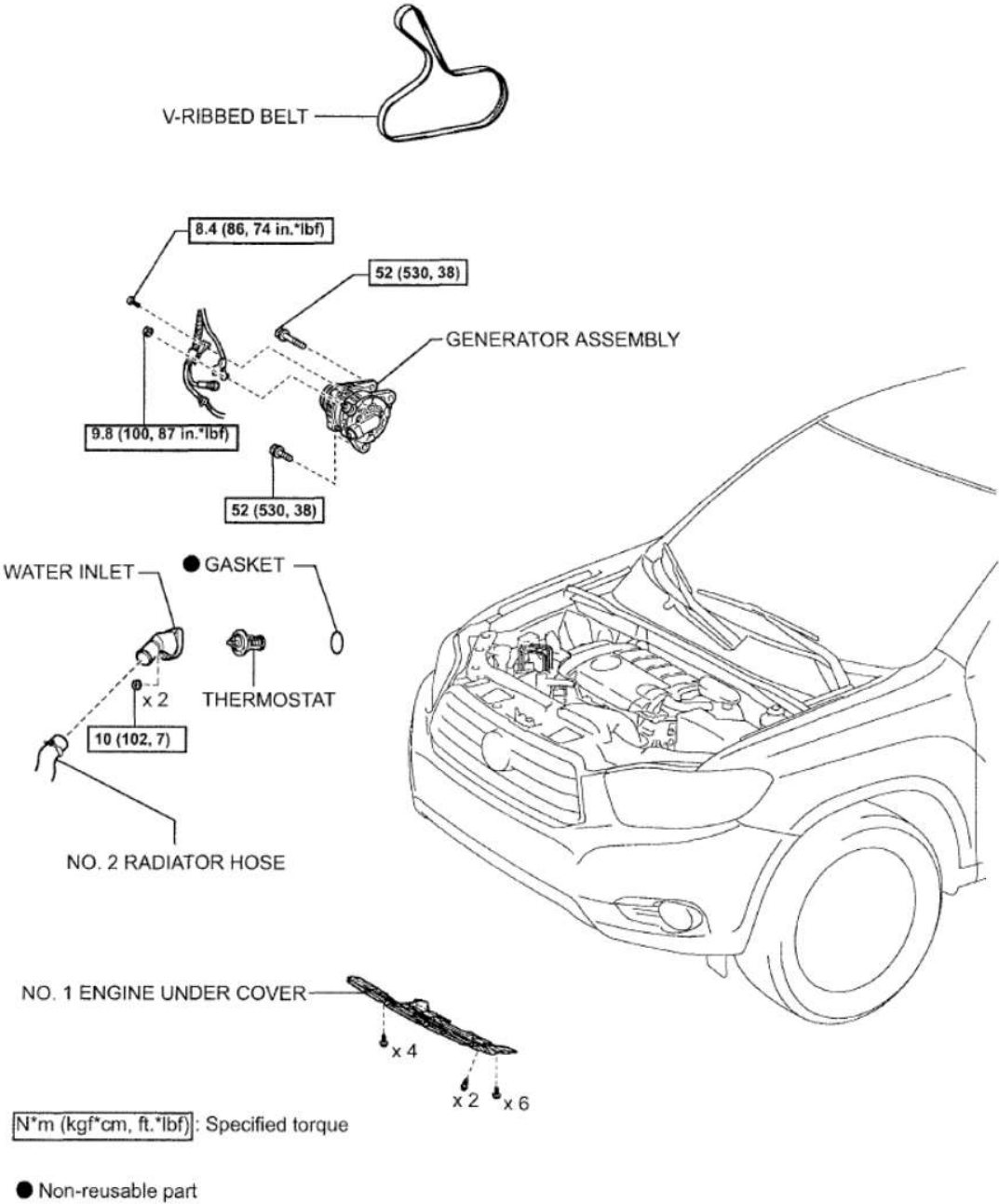
NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

6. **ADD ENGINE COOLANT** (See COOLANT)
7. **INSPECT FOR COOLANT LEAK** (See COOLING SYSTEM)
8. **INSTALL NO. 1 ENGINE UNDER COVER**

THERMOSTAT**COMPONENTS**

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REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTE: When disconnecting the cable, some systems need to be initialized after

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the cable is reconnected (See INITIALIZATION).

2. **REMOVE NO. 1 ENGINE UNDER COVER**
3. **DRAIN ENGINE COOLANT** (See COOLANT)
4. **REMOVE V-RIBBED BELT**

HINT:

See ON-VEHICLE INSPECTION

5. **REMOVE GENERATOR ASSEMBLY** (See REMOVAL)
6. **DISCONNECT NO. 2 RADIATOR HOSE** (See REMOVAL)
7. **REMOVE WATER INLET**
 - a. Remove the 2 nuts and water inlet.
8. **REMOVE THERMOSTAT**
 - a. Remove the thermostat.
 - b. Remove the gasket from the thermostat.

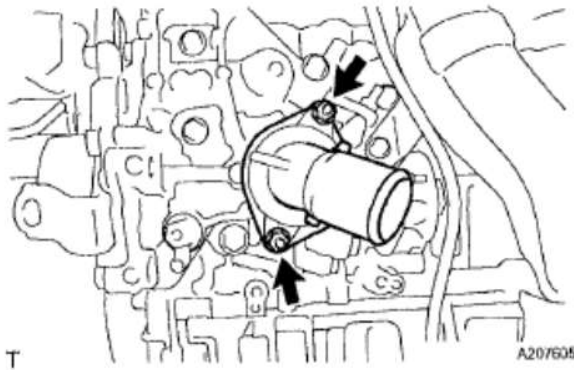


Fig. 23: Locating Nuts And Water Inlet

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT THERMOSTAT**

HINT:

The valve opening temperature is inscribed on the thermostat.

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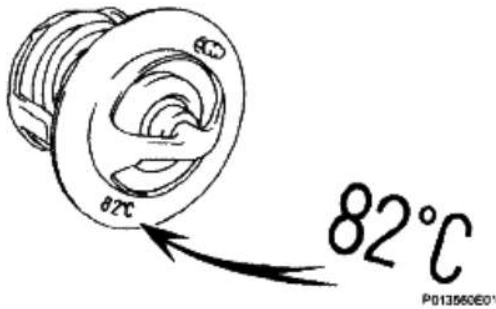


Fig. 24: Identifying Thermostat

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Immerse the thermostat in water, and then gradually heat the water.
- b. Check that the valve of the thermostat opens at the specified temperature.

Standard valve opening temperature:

80 to 84°C (176 to 183°F)

If the valve does not open as specified, replace the thermostat.

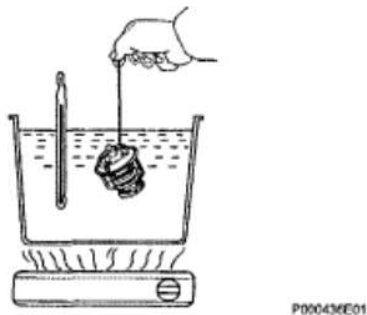


Fig. 25: Checking Valve Opening Temperature Of Thermostat

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Check the valve lift.

Standard valve lift:

10 mm (0.39 in.) or more at 95°C (203°F)

If the valve lift is not as specified, replace the thermostat.

- d. Check that the valve is fully closed when the thermostat is at a low temperature (below 77°C (171°F)).

If the valve is not fully closed, replace the thermostat.

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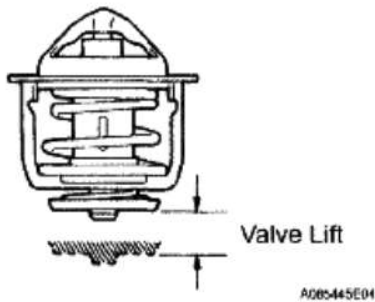


Fig. 26: Checking Valve Lift

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL THERMOSTAT

- Install a new gasket to the thermostat.
- Install the thermostat with the jiggle valve facing upward.

HINT:

The jiggle valve may be set to within 10° on either side of the prescribed position.

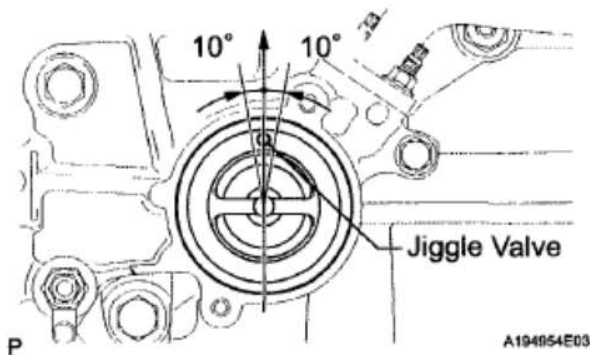


Fig. 27: Identifying Jiggle Valve

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL WATER INLET

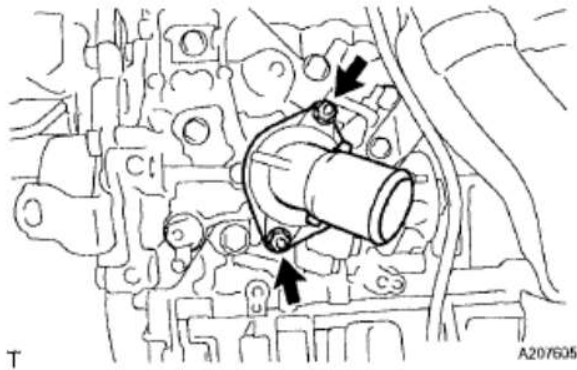
- Install the water inlet with the 2 nuts.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

3. CONNECT NO. 2 RADIATOR HOSE (See INSTALLATION)

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**Fig. 28: Locating Nuts And Water Inlet**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL GENERATOR ASSEMBLY** (See INSTALLATION)
5. **INSTALL V-RIBBED BELT**

HINT:

See INSTALLATION

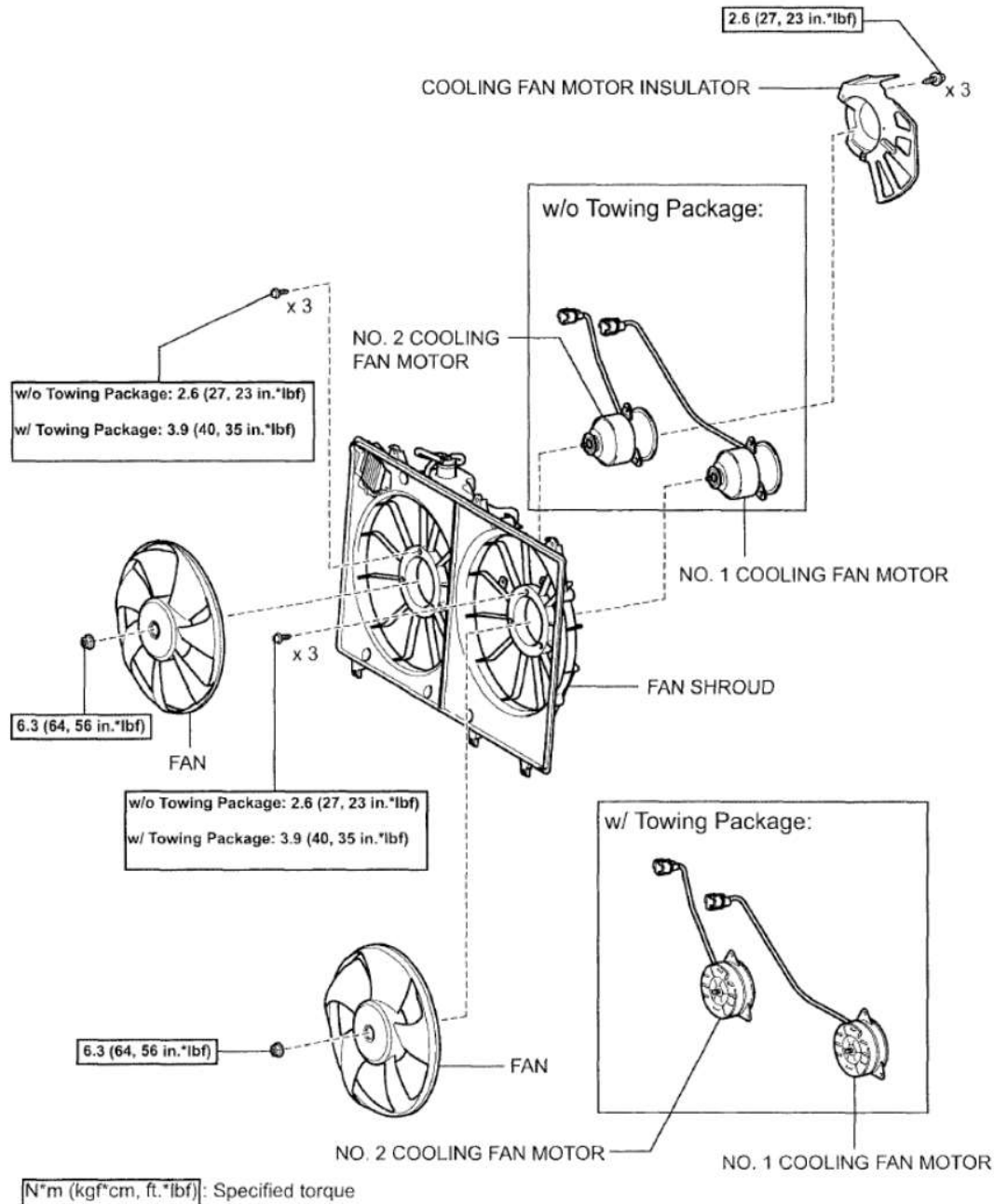
6. **ADD ENGINE COOLANT** (See COOLANT)
7. **INSPECT FOR COOLANT LEAK** (See COOLING SYSTEM)
8. **INSTALL NO. 1 ENGINE UNDER COVER**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

COOLING FAN MOTOR**COMPONENTS**

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Fig. 29: Identifying Cooling Fan Motor Components And Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

1. CHECK NO. 1 COOLING FAN MOTOR

- Disconnect the No. 1 cooling fan motor connector.
- Connect the battery and an ammeter to the No. 1 cooling fan motor connector.

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- c. Check that the No. 1 cooling fan motor rotates smoothly, and then check the reading on the ammeter.

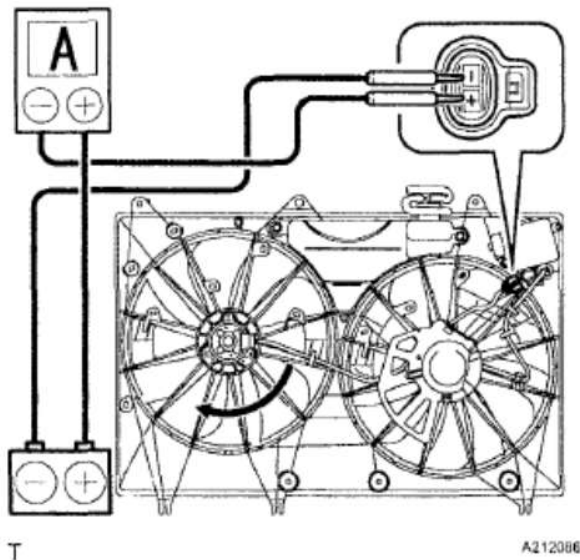


Fig. 30: Checking No. 1 Cooling Fan Motor Rotates
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard current

SPECIFIED CONDITION CHART

Condition	Specified Condition
w/o Towing Package	5.3 to 11.3 A at 12 V
w/ Towing Package	10.0 to 16.0 A at 12 V

HINT:

- Refer to the indication mark illustration for the indication mark location.
- If the result is not as specified, replace the No. 1 cooling fan motor.

- d. Reconnect the No. 1 cooling fan motor connector.

2. CHECK NO. 2 COOLING FAN MOTOR

- Disconnect the No. 2 cooling fan motor connector.
- Connect the battery and an ammeter to the No. 2 cooling fan motor connector.
- Check that the No. 2 cooling fan motor rotates smoothly, and then check the reading on the ammeter.

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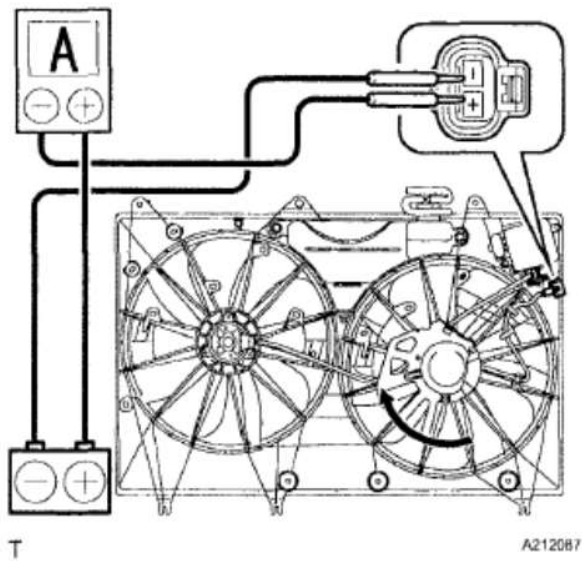


Fig. 31: Checking No. 2 Cooling Fan Motor Rotates
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard current

SPECIFIED CONDITION CHART

Condition	Specified Condition
w/o Towing Package	5.3 to 11.3 A at 12 V
w/ Towing Package	10.0 to 16.0 A at 12 V

- Refer to the indication mark illustration for the indication mark location.
 - If the result is not as specified, replace the No. 2 cooling fan motor.
- d. Reconnect the No. 2 cooling fan motor connector.

REMOVAL

1. REMOVE RADIATOR ASSEMBLY AND FAN ASSEMBLY WITH MOTOR

HINT.

See **REMOVAL**

2. REMOVE FAN ASSEMBLY WITH MOTOR (See **INSTALLATION**)

3. REMOVE FAN

- a. Remove the 2 nuts and 2 fans.

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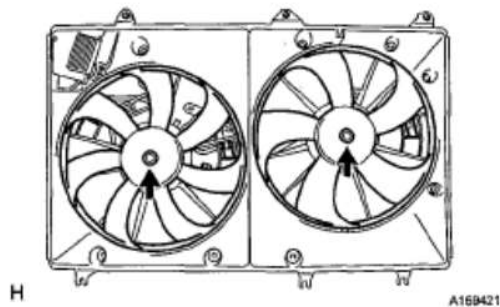


Fig. 32: Locating Nuts And Fans

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REMOVE COOLING FAN MOTOR INSULATOR

- a. Remove the 3 screws and cooling fan motor insulator.

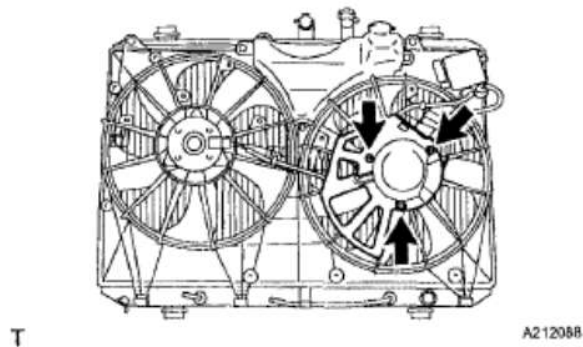


Fig. 33: Locating Screws And Cooling Fan Motor Insulator

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. DISCONNECT COOLING FAN MOTOR CONNECTORS

- a. Disconnect the 2 cooling fan motor connectors.

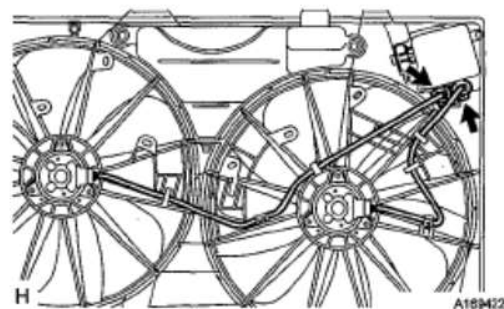


Fig. 34: Locating Cooling Fan Motor Connectors

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE NO. 1 COOLING FAN MOTOR

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- a. Remove the 3 screws and fan motor.

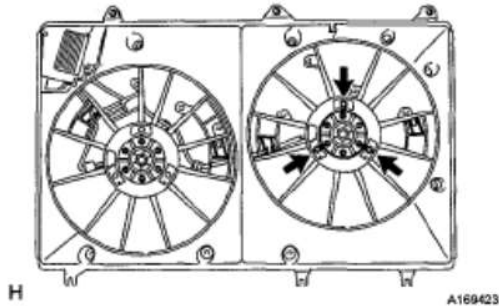


Fig. 35: Locating Screws And Fan Motor

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE NO. 2 COOLING FAN MOTOR

- a. Remove the 3 screws and fan motor.

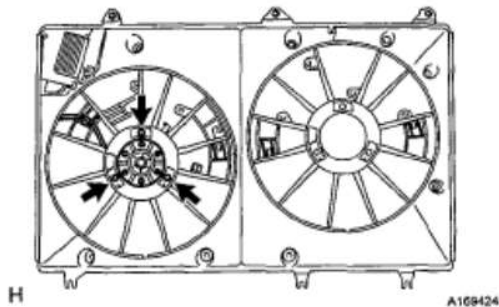


Fig. 36: Locating Screws And Fan Motor

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL NO. 2 COOLING FAN MOTOR

- a. Install the fan motor with the 3 screws.

Torque: w/o Towing package

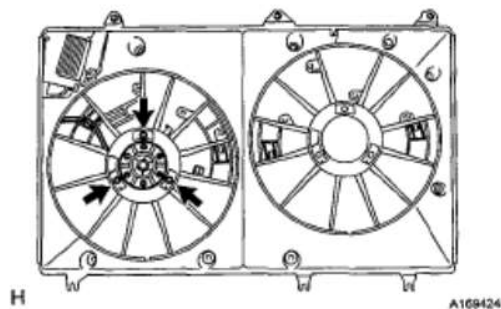
2.6 N*m (27 kgf*cm, 23 in.*lbf)

w/ Towing package

3.9 N*m (40 kgf*cm, 35 in.*lbf)

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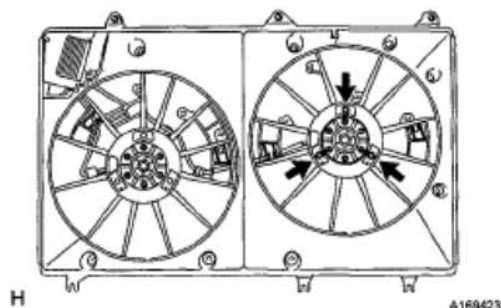
2009 ENGINE Cooling (1AR-FE) - Highlander

**Fig. 37: Locating Screws And Fan Motor**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL NO. 1 COOLING FAN MOTOR

- a. Install the fan motor with the 3 screws.

Torque: w/o Towing package**2.6 N*m (27 kgf*cm, 23 in.*lbf)****w/ Towing package****3.9 N*m (40 kgf*cm, 35 in.*lbf)****Fig. 38: Locating Screws And Fan Motor**

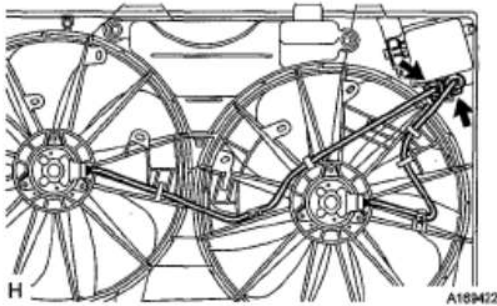
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. CONNECT COOLING FAN MOTOR CONNECTORS

- a. Connect the 2 cooling fan motor connectors.

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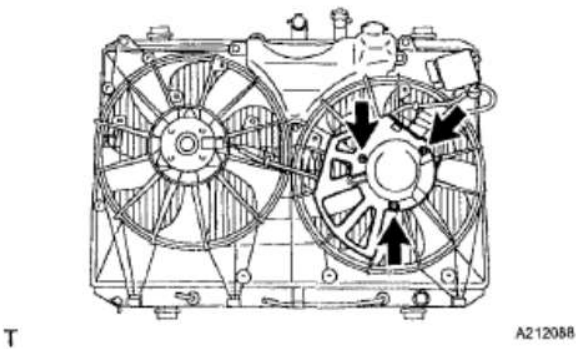
2009 ENGINE Cooling (1AR-FE) - Highlander

**Fig. 39: Locating Cooling Fan Motor Connectors**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL COOLING FAN MOTOR INSULATOR

- a. Install the cooling fan motor insulator with the 3 screws.

Torque: 2.6 N*m (27 kgf*cm, 23 in.*lbf)**Fig. 40: Locating Cooling Fan Motor Insulator And Screws**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL FAN

- a. Install the 2 fans with the 2 nuts.

Torque: 6.3 N*m (64 kgf*cm, 56 in.*lbf)**6. INSTALL FAN ASSEMBLY WITH MOTOR (See INSTALLATION)****7. INSTALL RADIATOR ASSEMBLY AND FAN ASSEMBLY WITH MOTOR****HINT:**See **INSTALLATION**

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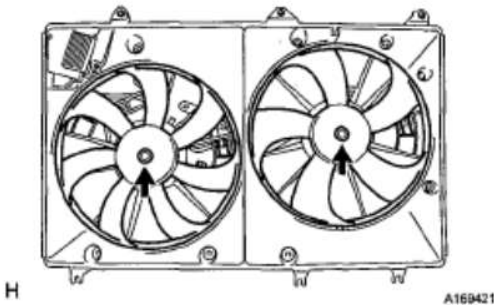


Fig. 41: Locating Nuts And Fans
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COOLING FAN ECU

ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN ECU
- a. Put the vehicle in the following conditions:

1. The ignition switch is off.

2. The coolant temperature is less than 95°C (203°F).

3. The battery voltage is between 11 to 14 V.

4. The A/C switch is off.

b. Clamp the 400 A probe of an ammeter over the M+ wire of each cooling fan motor.

c. Turn the ignition switch to ON and wait for approximately 10 seconds. Check that the fan stops.

d. Start the engine. Check that the fans stop with the engine idling.

HINT:

- Make sure that the radiator engine coolant temperature is less than 95°C (203°F).

• Turn the A/C switch off.

e. Check that the fans operate when the A/C switch is turned on (MAX COOL and the magnetic clutch is operating).

Standard current

w/o Towing Package

ITEM SPECIFIED CONDITION CHART	
Item	Specified Condition
No. 1 cooling fan motor	5.3 to 11.3 A
No. 2 cooling fan motor	5.3 to 11.3 A

w/ Towing Package

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ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
No. 1 cooling fan motor	10.0 to 16.0 A
No. 2 cooling fan motor	10.0 to 16.0 A

HINT:

The coolant temperature is less than 95°C (203°F).

- f. Check that the fans operate when the engine coolant temperature sensor connector is disconnected.

Standard current

w/o Towing Package

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
No. 1 cooling fan motor	5.3 to 11.3 A
No. 2 cooling fan motor	5.3 to 11.3 A

w/ Towing Package

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
No. 1 cooling fan motor	10.0 to 16.0 A
No. 2 cooling fan motor	10.0 to 16.0 A

- g. After the engine is warmed up, check that the fans operate as shown in the illustration.

HINT:

- The coolant temperature at which the fans start operating is approximately 97°C (207°F).
- This system can also be checked using the Techstream.
- Select the following menu items: Powertrain/Engine/Data List/Initial Engine Coolant Temp.

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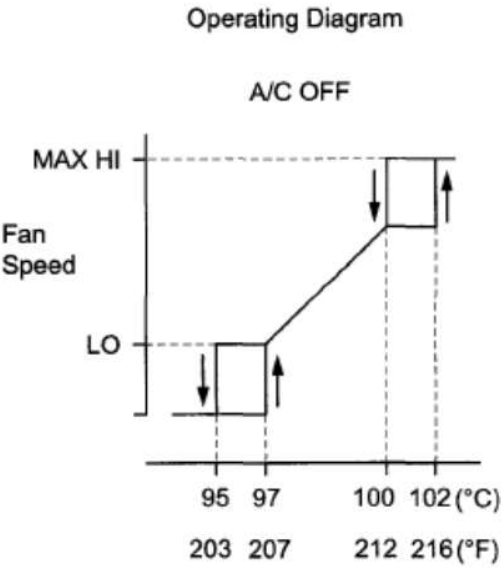


Fig. 42: Fan Operation Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COOLING FAN RELAY

ON-VEHICLE INSPECTION

1. INSPECT FAN MAIN RELAY

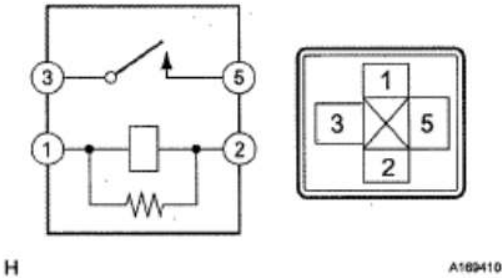


Fig. 43: FAN MAIN Relay Circuit Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Remove the FAN MAIN relay from the engine room relay block and junction block.
- b. Measure the resistance of the relay.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Condition	Specified Condition
3 - 5	Battery voltage is not applied between terminals 1 and 2	10 kohms or higher
3 - 5	Apply battery voltage between terminals 1 and 2	Below 1 ohms

If the result is not as specified, replace the FAN MAIN relay.

- c. Install the FAN MAIN relay to the engine room relay block and junction block.

RADIATOR**COMPONENTS**

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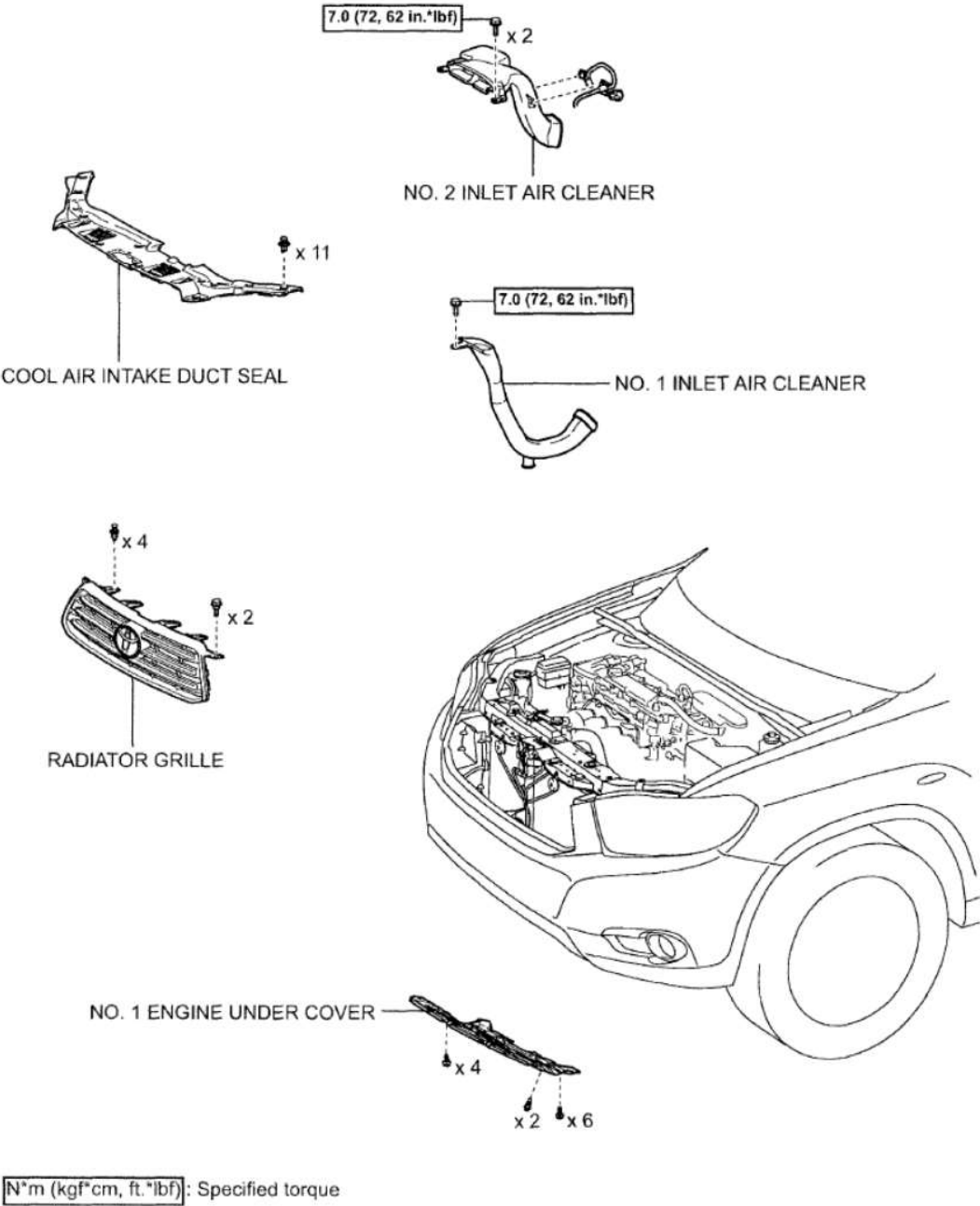


Fig. 44: Identifying Radiator Components And Torque Specifications (1 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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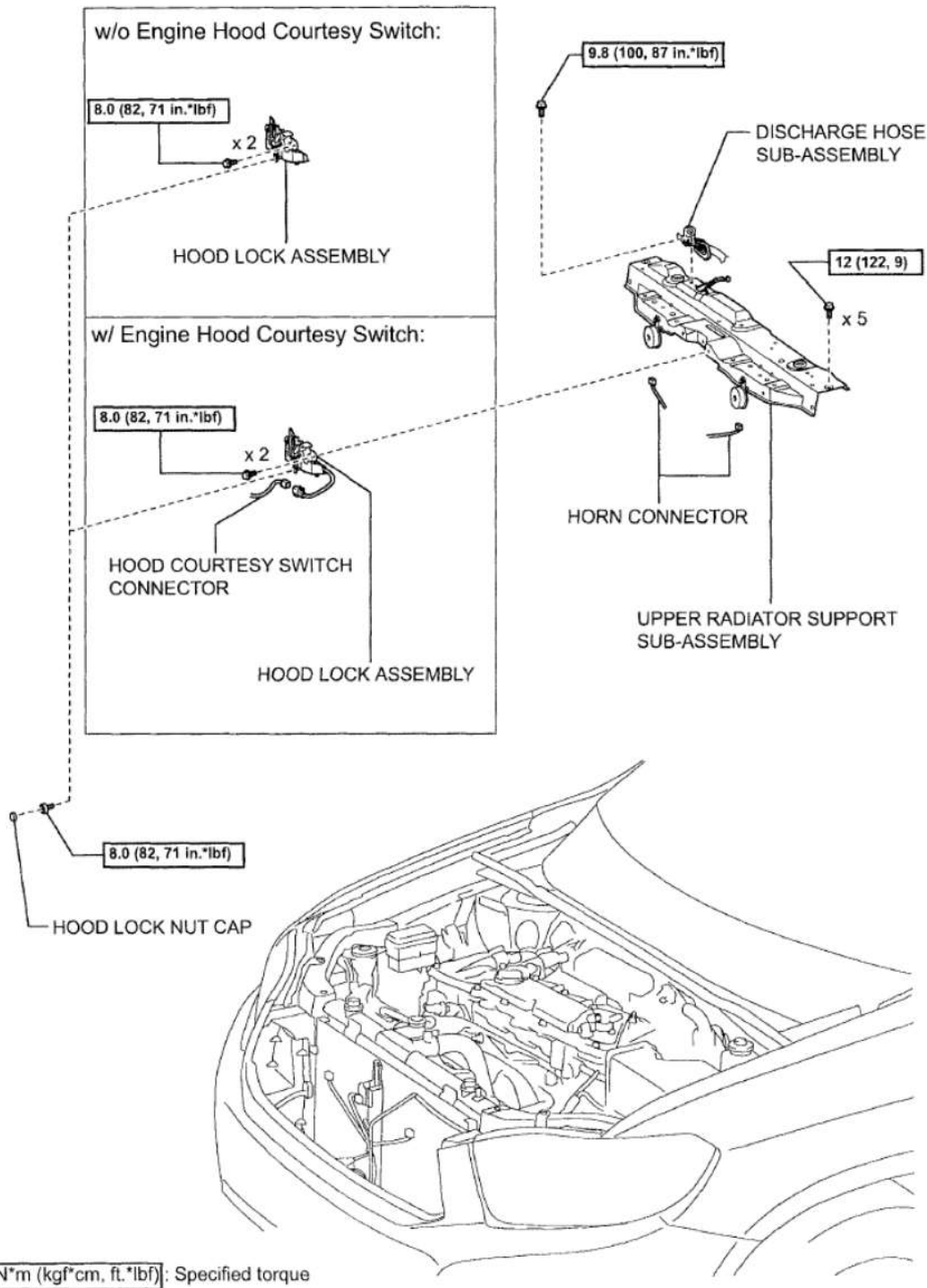
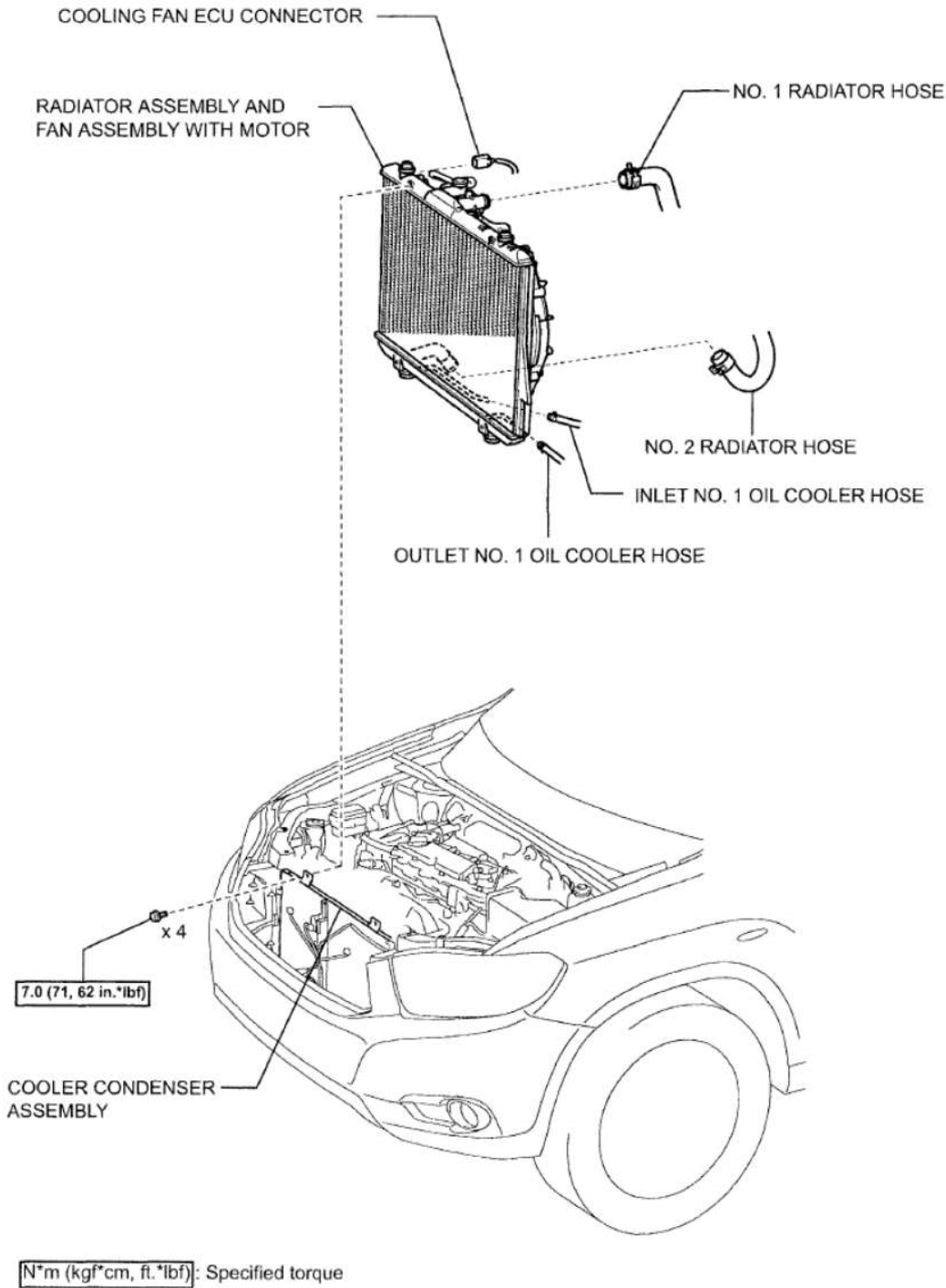


Fig. 45: Identifying Radiator Components And Torque Specifications (2 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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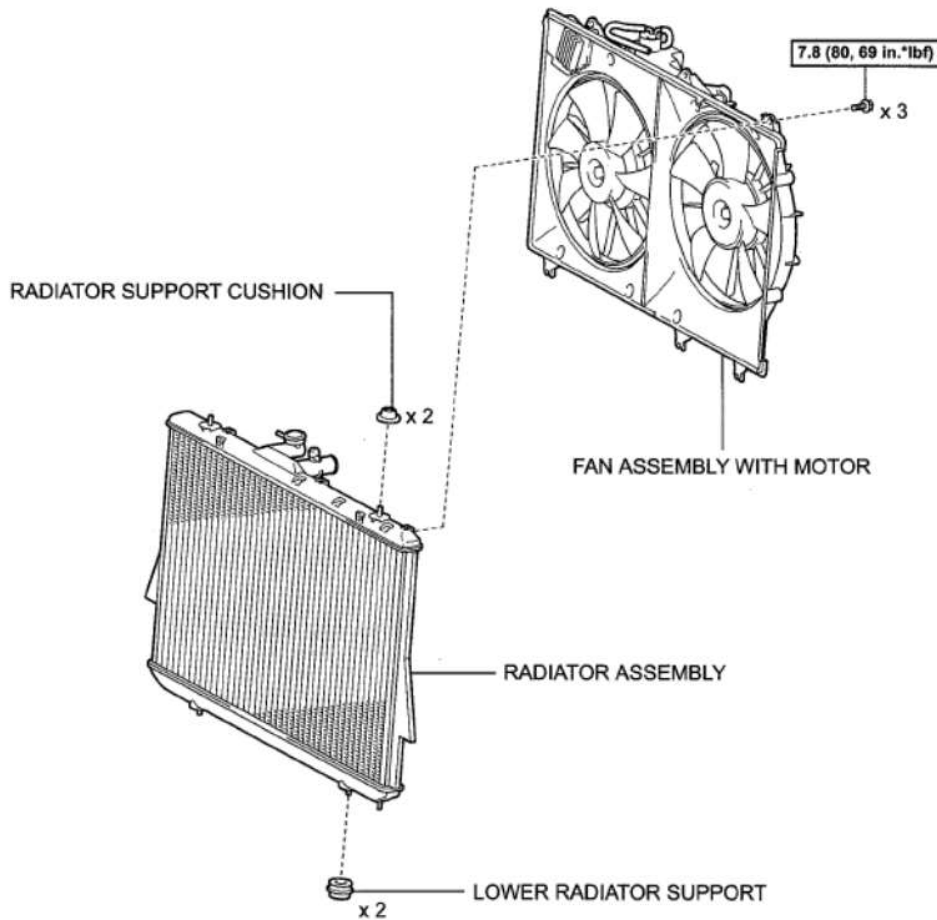


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Fig. 46: Identifying Radiator Components And Torque Specifications (3 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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Fig. 47: Identifying Radiator Components And Torque Specifications (4 Of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

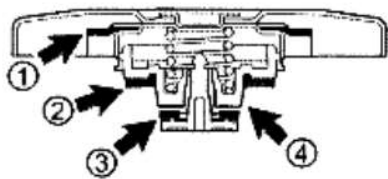
ON-VEHICLE INSPECTION

1. CHECK RADIATOR CAP SUB-ASSEMBLY

- a. Measure the valve opening pressure.
 1. If there are water stains or foreign matter on rubber packings 1, 2 or 3, clean the part(s) with water and finger scouring.
 2. Check that rubber packings 1, 2 and 3 are not deformed, cracked or swollen.

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Fig. 48: Locating Rubber Packings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 3. Check that 3 and 4 are not stuck together.
- 4. Apply engine coolant to rubber packings 2 and 3 before using the radiator cap tester.
- 5. When using the cap tester, tilt it to 30° or more above the horizontal.
- 6. Pump the cap tester several times, and check the maximum pressure*.

Pump speed:

1 pump per second

*: Even if the cap cannot maintain the maximum pressure, it is not a defect.

Judgment criterion

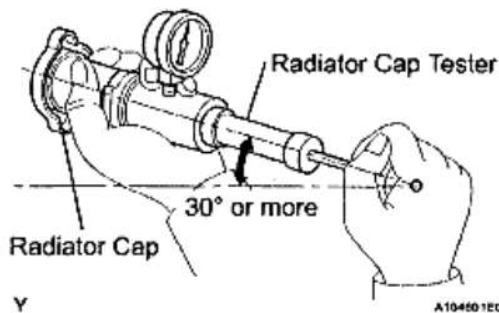


Fig. 49: Checking Radiator Cap Maximum Pressure
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Standard value (for brand-new cap)	94 to 122 kPa (1.0 to 1.2 kgf/cm ² , 13.6 to 17 psi)
Minimum standard value (for used cap)	79 kPa (0.8 kgf/cm ² , 11.4 psi)

If the maximum pressure is less than the minimum standard value, replace the radiator cap sub-assembly.

ON-VEHICLE CLEANING

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2009 ENGINE Cooling (1AR-FE) - Highlander

1. **INSPECT RADIATOR ASSEMBLY**

- a. Check that the radiator and condenser are not blocked with leaves, dirt, or insects. Clean the hose connections.

If the fins are blocked, wash them with water or a steam cleaner.

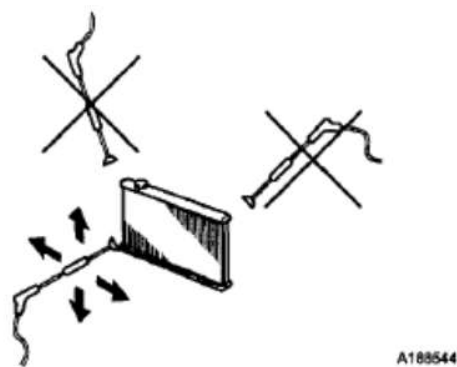


Fig. 50: Checking Radiator And Condenser
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- If the distance between the steam cleaner and core is too close, the fins may be damaged.
- Keep the following injection distance.

Standard injection distance

INJECTION PRESSURE CHART

Injection Pressure	Specified Condition
2942 to 4903 kPa (30 to 50 kgf/cm ² , 427 to 711 psi)	300 mm (11.81 in.)
4903 to 7845 kPa (50 to 80 kgf/cm ² , 711 to 1138 psi)	500 mm (19.69 in.)

- If the fins are bent, straighten them with a screwdriver or pliers.
- Never apply water directly onto the electronic components.

- b. Dry the fins with compressed air.

REMOVAL

1. **REMOVE NO. 1 ENGINE UNDER COVER**
2. **DRAIN ENGINE COOLANT** (See **COOLANT**)
3. **REMOVE COOL AIR INTAKE DUCT SEAL** (See **REMOVAL**)

2009 Toyota Highlander Limited**2009 ENGINE Cooling (1AR-FE) - Highlander**

4. **REMOVE NO. 2 INLET AIR CLEANER** (See **REMOVAL**)
5. **REMOVE NO. 1 INLET AIR CLEANER** (See **REMOVAL**)
6. **REMOVE RADIATOR GRILLE** (See **REMOVAL**)
7. **DISCONNECT NO. 1 RADIATOR HOSE**
 - a. Disconnect the No. 1 radiator hose from the radiator.

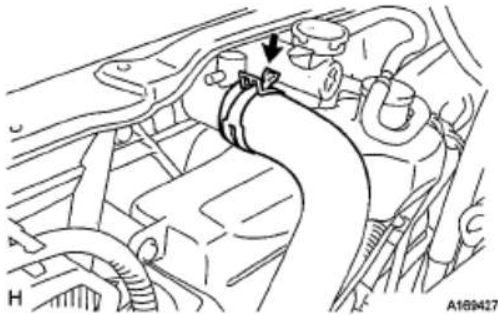


Fig. 51: Locating No. 1 Radiator Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **DISCONNECT NO. 2 RADIATOR HOSE**
 - a. Disconnect the No. 2 radiator hose from the radiator.

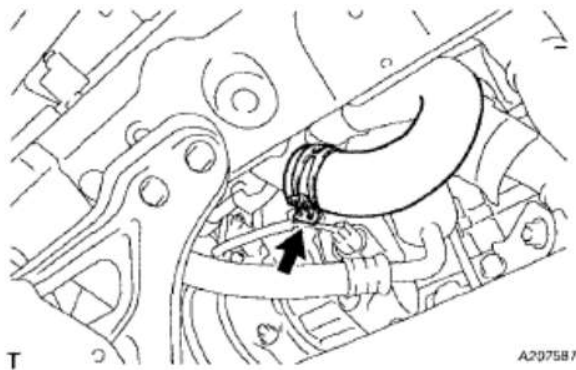


Fig. 52: Locating No. 2 Radiator Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **DISCONNECT INLET NO. 1 OIL COOLER HOSE**
 - a. Disconnect the inlet oil cooler hose from the radiator.

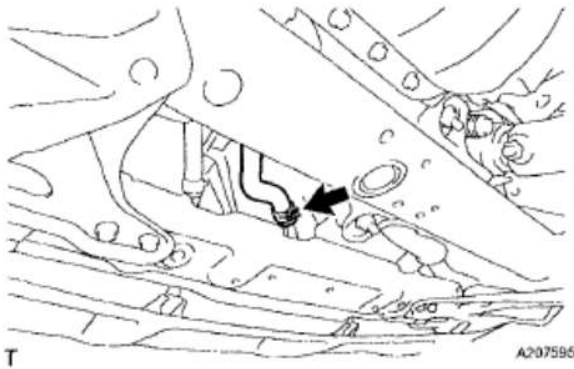
2009 Toyota Highlander Limited**2009 ENGINE Cooling (1AR-FE) - Highlander**

Fig. 53: Locating Inlet Oil Cooler Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. DISCONNECT OUTLET NO. 1 OIL COOLER HOSE

- a. Disconnect the outlet oil cooler hose from the radiator.

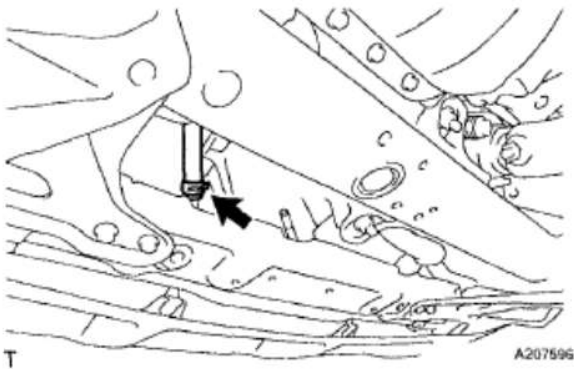


Fig. 54: Locating Outlet Oil Cooler Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. DISCONNECT COOLING FAN ECU CONNECTOR

- a. Detach the wire harness clamps from the fan shroud LH side.

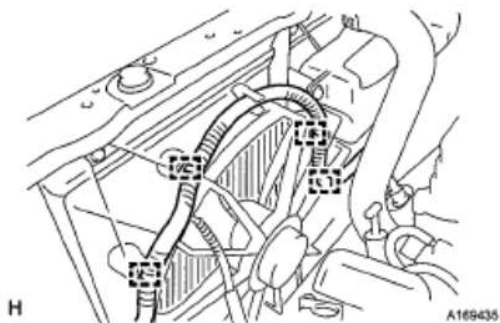


Fig. 55: Identifying Wire Harness Clamps

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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- b. Detach the wire harness clamps from the fan shroud RH side and disconnect the cooling fan ECU connector.
- 12. **REMOVE HOOD LOCK ASSEMBLY (w/o Engine Hood Courtesy Switch)** (See **REMOVAL**)
- 13. **REMOVE HOOD LOCK ASSEMBLY (w/ Engine Hood Courtesy Switch)** (See **REMOVAL**)

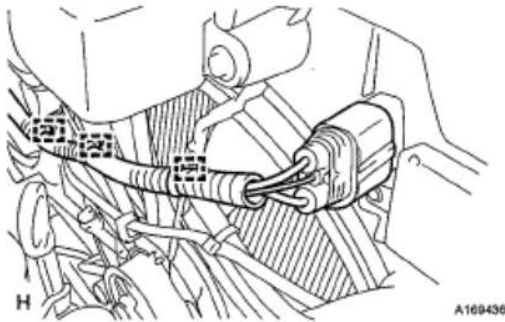


Fig. 56: Identifying Wire Harness Clamps And Cooling Fan ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 14. **REMOVE UPPER RADIATOR SUPPORT SUB-ASSEMBLY**
 - a. Disconnect the low pitched horn and high pitched horn connectors.
 - b. Detach the hood lock control cable clamp and wire harness clamp.

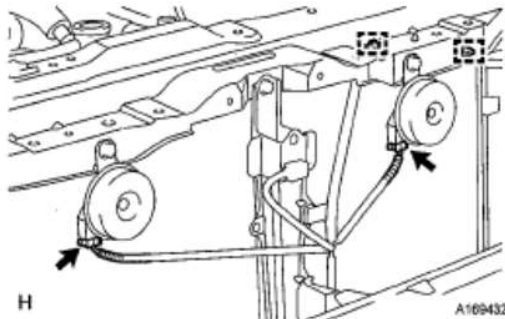


Fig. 57: Locating Low Pitched Horn And High Pitched Horn Connectors
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the bolt and separate the discharge hose sub-assembly.

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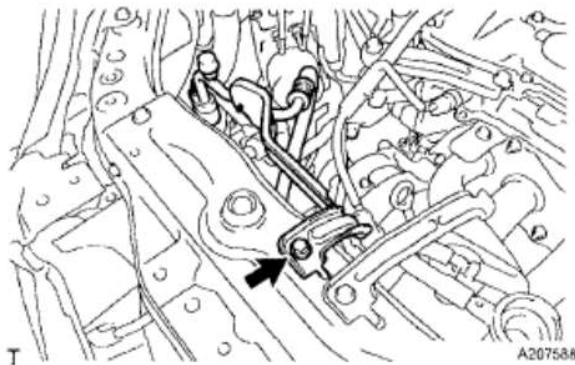


Fig. 58: Locating Bolt And Discharge Hose Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Remove the 5 bolts and upper radiator support sub-assembly.

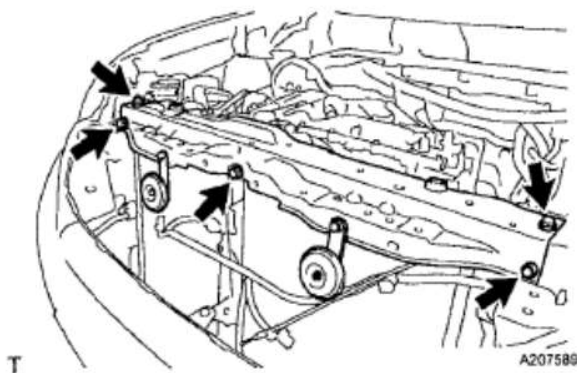


Fig. 59: Locating Bolts And Upper Radiator Support Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. SEPARATE COOLER CONDENSER ASSEMBLY

- a. Remove the 4 bolts and move the cooler condenser assembly to remove the radiator assembly and fan assembly with motor.

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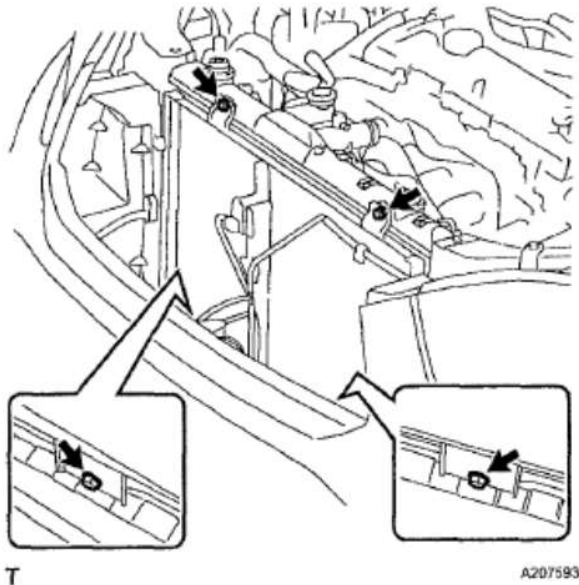


Fig. 60: Locating Bolts And Cooler Condenser Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. REMOVE RADIATOR ASSEMBLY AND FAN ASSEMBLY WITH MOTOR

- a. Remove the radiator assembly and fan assembly with motor.

NOTE: Do not apply any excessive force to the cooler condenser assembly or pipe when removing the radiator assembly.

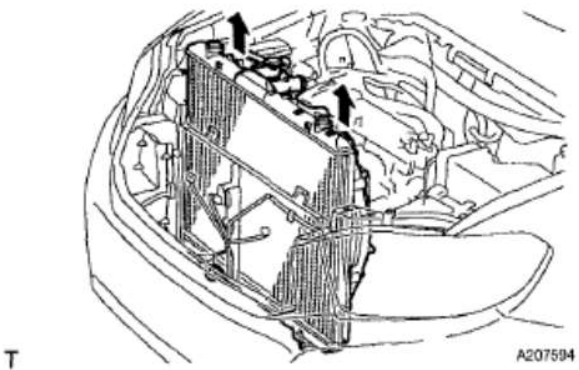


Fig. 61: Removing Radiator Assembly And Fan Assembly With Motor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. REMOVE FAN ASSEMBLY WITH MOTOR

- a. Disconnect the radiator reserve tank hose or pipe from the radiator assembly.

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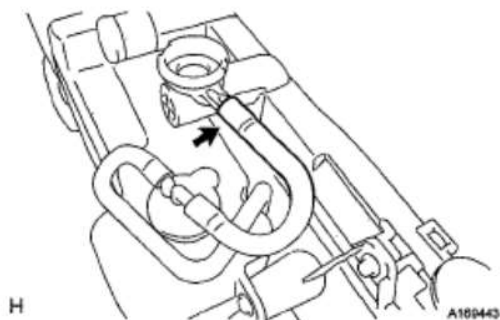
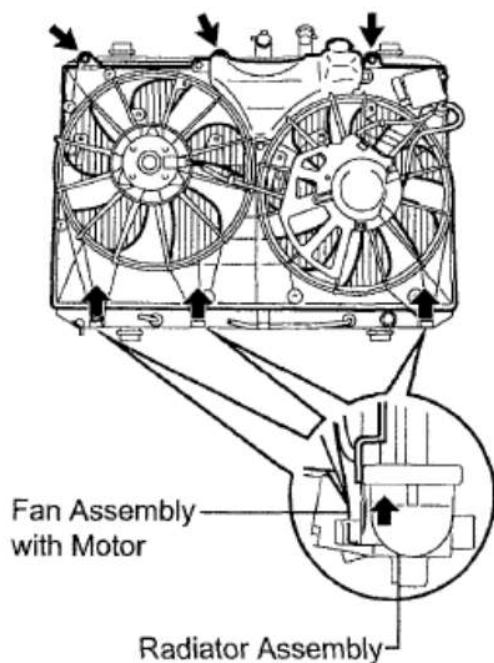


Fig. 62: Locating Radiator Reserve Tank Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 3 bolts.
- c. Pull up the fan assembly with motor from the radiator assembly to remove the fan assembly with motor.



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Fig. 63: Locating Fan Assembly With Motor And Bolts

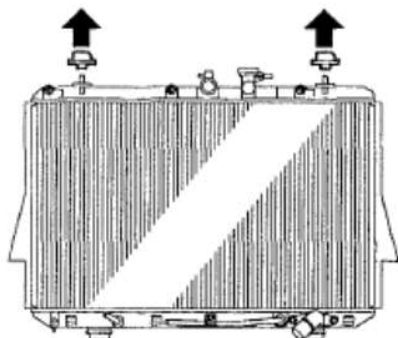
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. REMOVE RADIATOR SUPPORT CUSHION

- a. Remove the 2 radiator support cushions.

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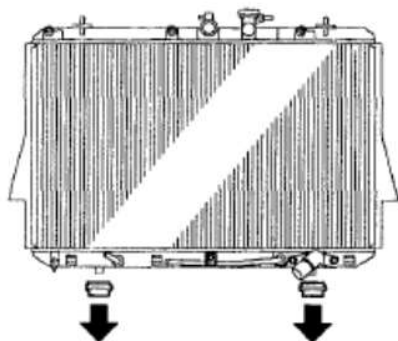
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Fig. 64: Removing Radiator Support Cushions

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. REMOVE LOWER RADIATOR SUPPORT

- a. Remove the 2 lower radiator supports.



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Fig. 65: Removing Lower Radiator Supports

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION**1. INSTALL LOWER RADIATOR SUPPORT**

- a. Install the 2 lower radiator supports.

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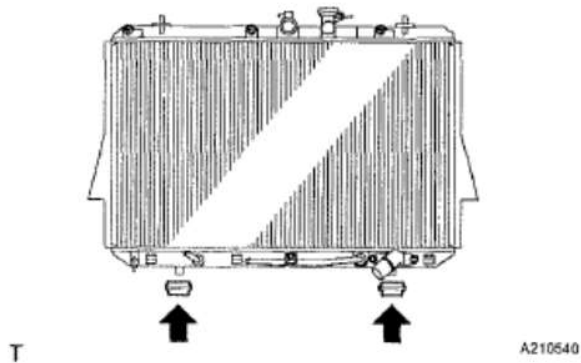


Fig. 66: Installing Lower Radiator Supports
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL RADIATOR SUPPORT CUSHION

- a. Install the 2 radiator support cushions.

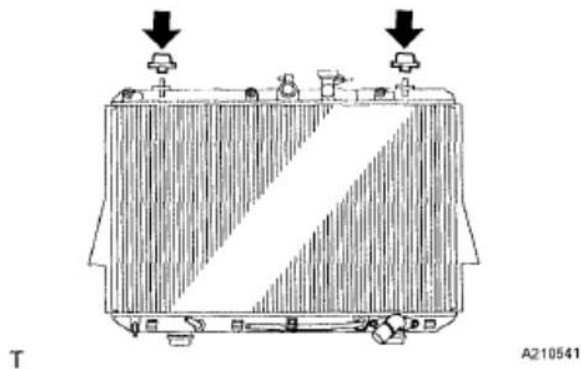


Fig. 67: Installing Radiator Support Cushions
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

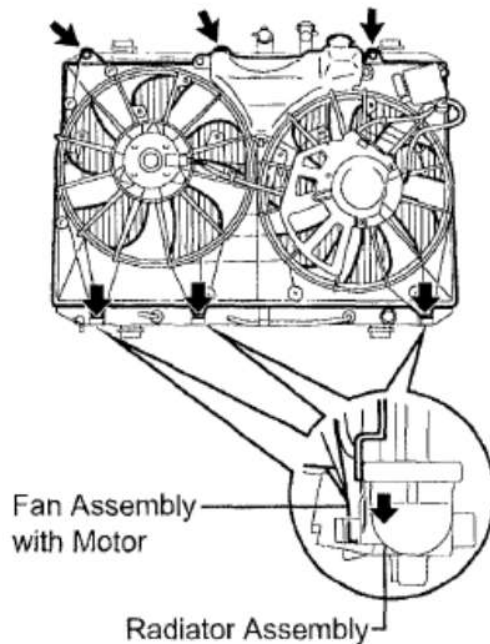
3. INSTALL FAN ASSEMBLY WITH MOTOR

- a. Put in the fan assembly with motor to the radiator assembly.
- b. Install the fan assembly with motor with the 3 bolts.

Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

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Fig. 68: Locating Fan Assembly With Motor And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the radiator reserve tank hose or pipe to the radiator assembly.

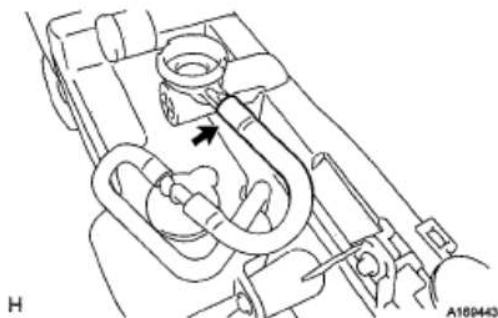


Fig. 69: Locating Radiator Reserve Tank Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL RADIATOR ASSEMBLY AND FAN ASSEMBLY WITH MOTOR

- a. Install the radiator assembly and fan assembly with motor.

NOTE: Do not apply any excessive force to the cooler condenser assembly or pipe when installing the radiator assembly.

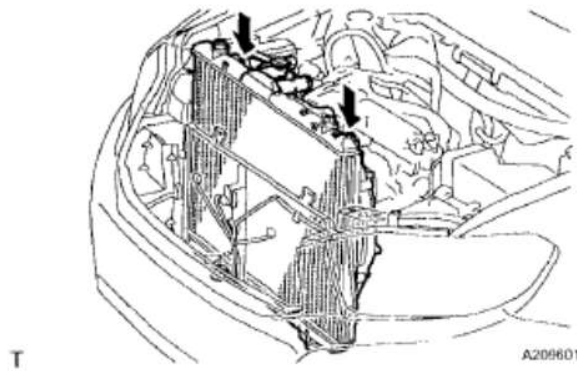
2009 Toyota Highlander Limited**2009 ENGINE Cooling (1AR-FE) - Highlander**

Fig. 70: Installing Radiator Assembly And Fan Assembly With Motor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL COOLER CONDENSER ASSEMBLY

- a. Install the cooler condenser assembly with the 4 bolts.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

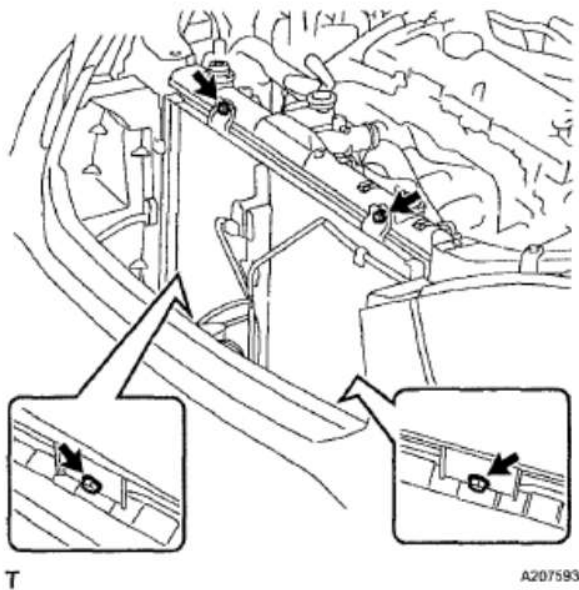


Fig. 71: Locating Bolts And Cooler Condenser Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSTALL UPPER RADIATOR SUPPORT SUB-ASSEMBLY

- a. Install the upper radiator support sub-assembly with the 5 bolts and attach the hood lock control cable clamp to the radiator support.

Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

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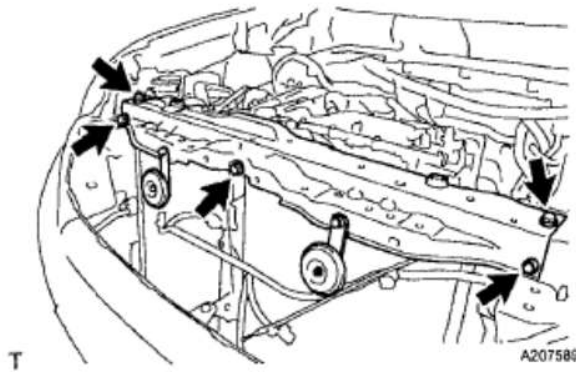


Fig. 72: Locating Bolts And Upper Radiator Support Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the discharge hose sub-assembly with the bolt.

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

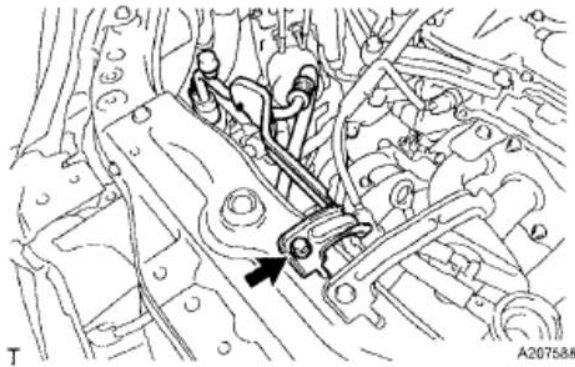


Fig. 73: Locating Bolt And Discharge Hose Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the low pitched horn and high pitched horn connectors.
- d. Attach the hood lock control cable clamp and wire harness clamp.
7. **INSTALL HOOD LOCK ASSEMBLY (w/o Engine Hood Courtesy Switch)** (See **INSTALLATION**)
8. **INSTALL HOOD LOCK ASSEMBLY (w/ Engine Hood Courtesy Switch)** (See **INSTALLATION**)

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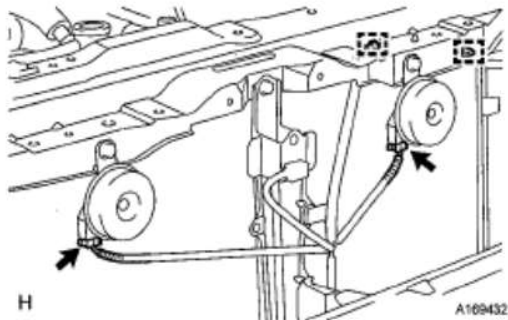


Fig. 74: Locating Low Pitched Horn And High Pitched Horn Connectors

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. CONNECT COOLING FAN ECU CONNECTOR

- a. Connect the cooling fan ECU connector and attach the wire harness clamps to the fan shroud RH side.

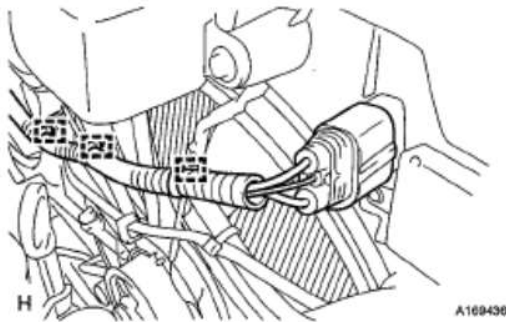


Fig. 75: Identifying Wire Harness Clamps And Cooling Fan ECU Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Attach the wire harness clamps to the fan shroud LH side.

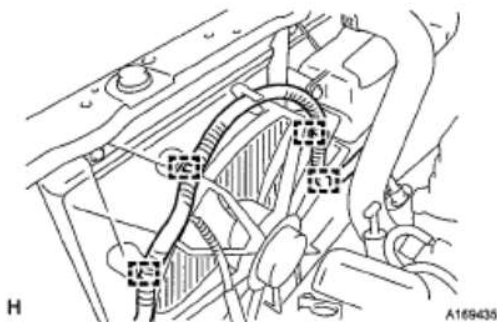


Fig. 76: Identifying Wire Harness Clamps

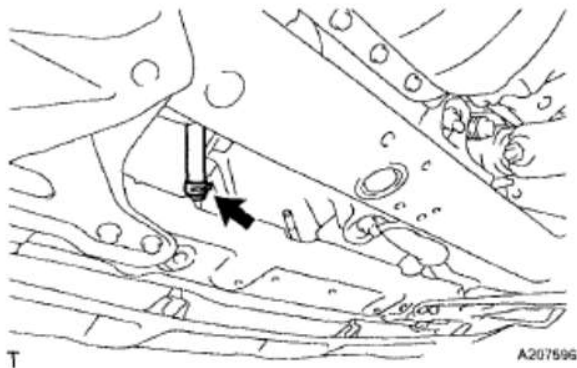
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. CONNECT OUTLET NO. 1 OIL COOLER HOSE

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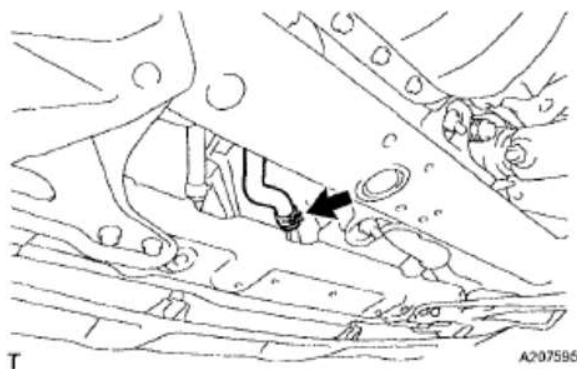
- a. Connect the outlet oil cooler hose to the radiator.

**Fig. 77: Locating Outlet Oil Cooler Hose**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. CONNECT INLET NO. 1 OIL COOLER HOSE

- a. Connect the inlet oil cooler hose to the radiator.

**Fig. 78: Locating Inlet Oil Cooler Hose**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. CONNECT NO. 2 RADIATOR HOSE

- a. Connect the No. 2 radiator hose to the radiator.

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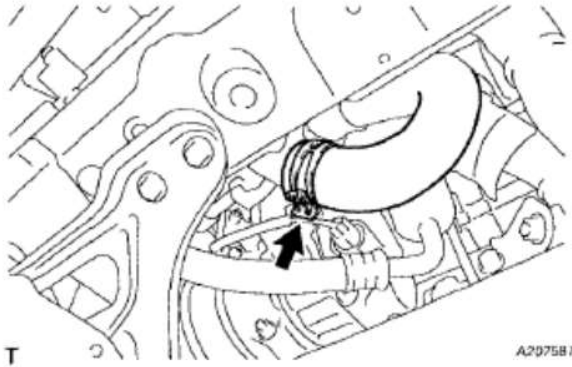


Fig. 79: Locating No. 2 Radiator Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. CONNECT NO. 1 RADIATOR HOSE

- a. Connect the No. 1 radiator hose to the radiator.

14. INSTALL NO. 1 INLET AIR CLEANER (See REMOVAL)

15. INSTALL NO. 2 INLET AIR CLEANER (See INSTALLATION)

16. INSTALL COOL AIR INTAKE DUCT SEAL (See INSTALLATION)

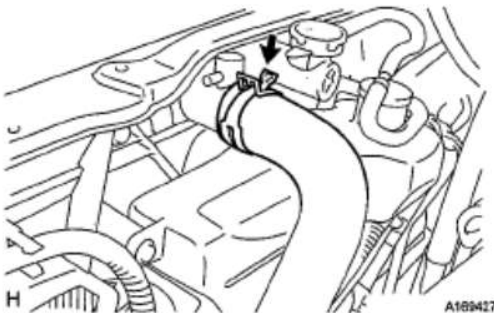


Fig. 80: Locating No. 1 Radiator Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. INSTALL RADIATOR GRILLE (See INSTALLATION)

18. ADD ENGINE COOLANT (See COOLANT)

19. INSPECT FOR COOLANT LEAK (See COOLING SYSTEM)

20. INSPECT AUTOMATIC TRANSAXLE FLUID

HINT:

See DISASSEMBLY .

21. INSPECT FOR OIL LEAK

22. INSTALL NO. 1 ENGINE UNDER COVER