COOLING FAN SYSTEM (1AZ–FE)

1600R–13

ON–VEHICLE INSPECTION

HINT:

It is normal that the cooling fan sometime rotates when the ignition switch is turned from ACC to ON.

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 77°C (171°F))

(a) Turn the ignition switch ON.

(b) Check that the cooling fan stops.

If not, check the cooling fan relay and engine coolant temperature sensor, and check for disconnection of connectors or wire break between the cooling fan relay and engine coolant temperature sensor.

(c) Disconnect the engine coolant temperature sensor connector.

(d) Check that the cooling fan rotates.

If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short circuit between the cooling fan relay and engine coolant temperature sensor.

(e) Reconnect the engine coolant temperature sensor connector.

2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 95.5°C (204°F))

(a) Start the engine, and raise coolant temperature to above 95.5°C (204°F).

HINT:

Coolant temperature is the detected value by the engine coolant temperature sensor on the water outlet.

(b) Check that the cooling fan rotates.

If not, replace the engine coolant temperature sensor.

3. INSPECT COOLING FAN

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage:
5.2 to 8.2 A at 20°C (68°F) (M/T)
8.3 to 11.3 A at 20°C (68°F) (A/T)

(d) Reconnect the cooling fan connector.

4. INSPECT COOLING FAN No.2 (With Air Conditioner)

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

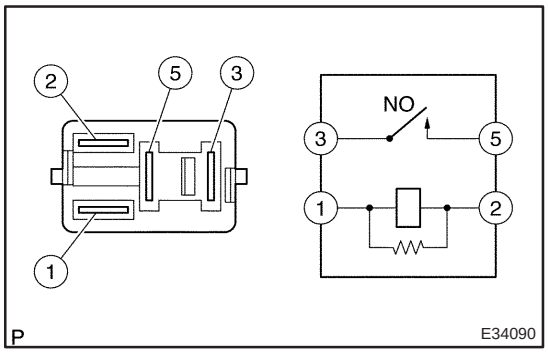
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage:
5.2 to 8.2 A at 20°C (68°F) (M/T)
8.3 to 11.3 A at 20°C (68°F) (A/T)

(d) Reconnect the cooling fan connector.

160N3–01

INSPECTION



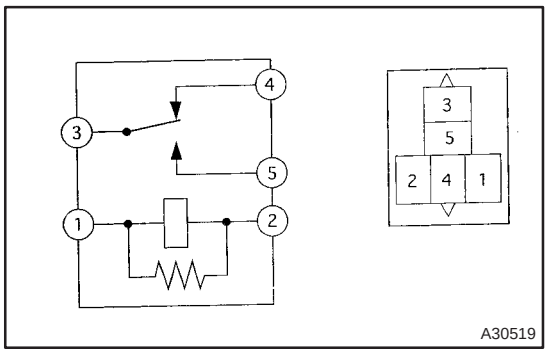
1. INSPECT COOLING FAN RELAY

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No continuity
	Continuity (Apply battery voltage terminals 1 and 2)



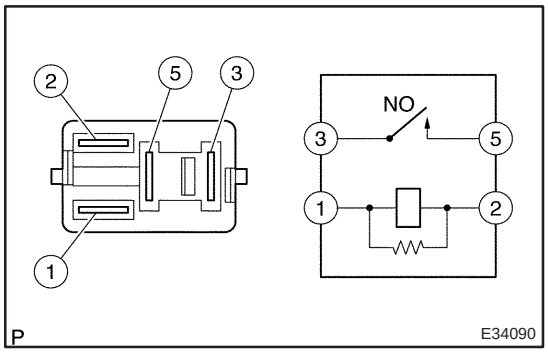
2. INSPECT COOLING FAN RELAY NO.2

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2 3 – 4	Continuity
3 – 5	No continuity
	Continuity (Apply battery voltage terminals 1 and 2)



3. INSPECT COOLING FAN RELAY NO.3

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No continuity
	Continuity (Apply battery voltage terminals 1 and 2)

COOLING FAN SYSTEM (1AZ–FSE)

1600R–12

ON–VEHICLE INSPECTION

HINT:

It is normal that the cooling fan sometime rotates when the ignition switch is turned from ACC to ON.

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

(a) Turn the ignition switch ON.

(b) Check that the cooling fan stops.

If not, check the cooling fan relay and engine coolant temperature sensor, and check for disconnection of connectors or wire break between the cooling fan relay and engine coolant temperature sensor.

(c) Disconnect the engine coolant temperature sensor connector.

(d) Check that the cooling fan rotates.

If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short circuit between the cooling fan relay and engine coolant temperature sensor.

(e) Reconnect the engine coolant temperature sensor connector.

2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 100°C (212°F))

(a) Start the engine, and raise coolant temperature to above 100°C (212°F).

HINT:

Coolant temperature is the detected value by the engine coolant temperature sensor on the water outlet.

(b) Check that the cooling fan rotates.

If not, replace the engine coolant temperature sensor.

3. INSPECT COOLING FAN

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage:
5.2 to 8.2 A at 20°C (68°F) (M/T)
8.3 to 11.3 A at 20°C (68°F) (A/T)

(d) Reconnect the cooling fan connector.

4. INSPECT COOLING FAN No.2 (With Air Conditioner)

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

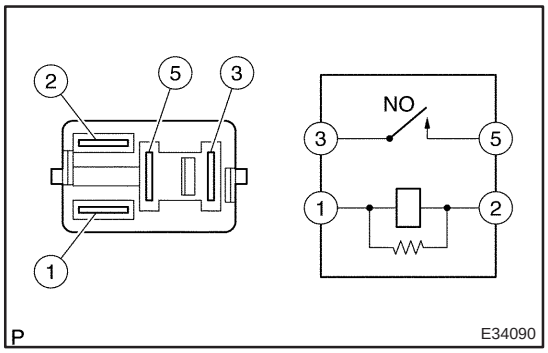
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage:
5.2 to 8.2 A at 20°C (68°F) (M/T)
8.3 to 11.3 A at 20°C (68°F) (A/T)

(d) Reconnect the cooling fan connector.

160N0–01

INSPECTION



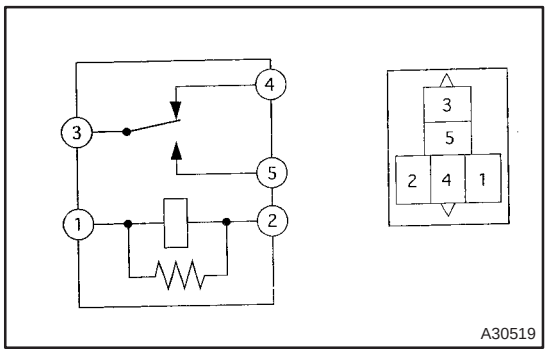
1. INSPECT COOLING FAN RELAY

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No continuity
	Continuity (Apply battery boltage terminals 1 and 2)



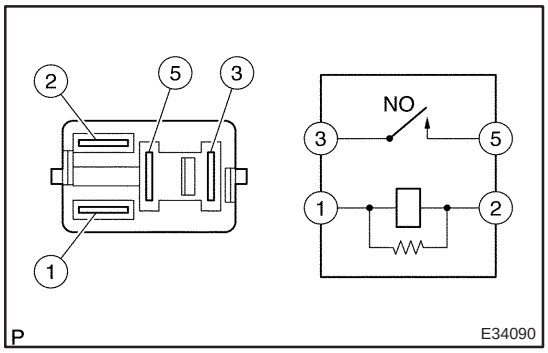
2. INSPECT COOLING FAN RELAY NO.2

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2 3 – 4	Continuity
3 – 5	No continuity
	Continuity (Apply battery boltage terminals 1 and 2)



3. INSPECT COOLING FAN RELAY NO.3

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No continuity
	Continuity (Apply battery boltage terminals 1 and 2)

COOLING FAN SYSTEM (1CD–FTV)

1606N–03

ON–VEHICLE INSPECTION

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

(a) Turn the ignition switch ON.
(b) Check that the cooling fan stops.
(c) Disconnect the temperature detect switch connector.
(d) Connect the terminals on the temperature detect switch connector.
(e) Check that the cooling fan rotates.

If not, check the fuses, cooling fan relay and cooling fan, and check for a open circuit between the cooling fan relay and temperature detect switch.

(f) Reconnect the temperature detect switch connector.

2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93°C (199°F))

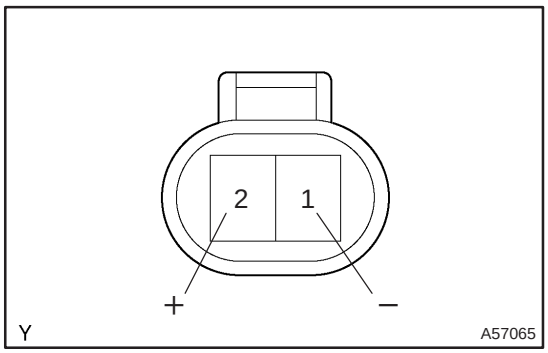
(a) Start the engine, and raise coolant temperature to above 93°C (199°F)

HINT:

Coolant temperature is the detected value by the temperature detect switch on the radiator lower tank.

(b) Check that the cooling fan rotates.

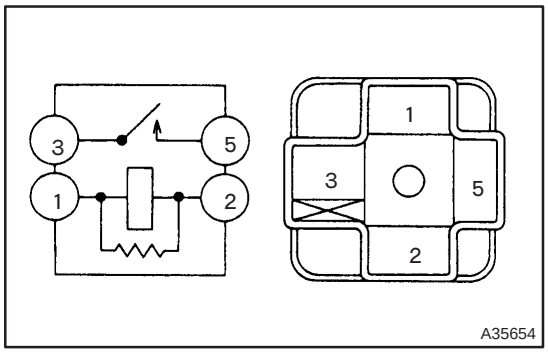
If not, replace the temperature detect switch.



3. INSPECT COOLING FANS

(a) Disconnect the cooling fan connector.
(b) Connect battery and ammeter to the cooling fan connector.
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.
Standard amperage:
Approx. 13.2 A at 20°C (68°F)
(d) Reconnect the cooling fan connector.

INSPECTION



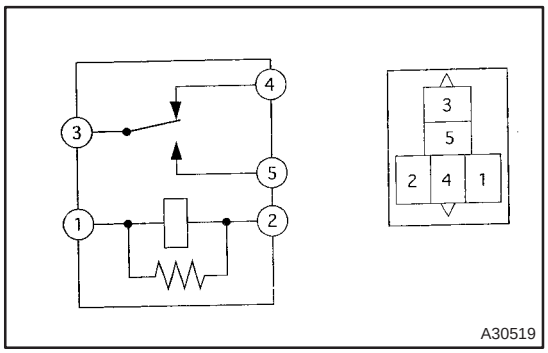
1. INSPECT COOLING FAN RELAY

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No continuity
	Continuity (Apply battery voltage terminals 1 and 2)



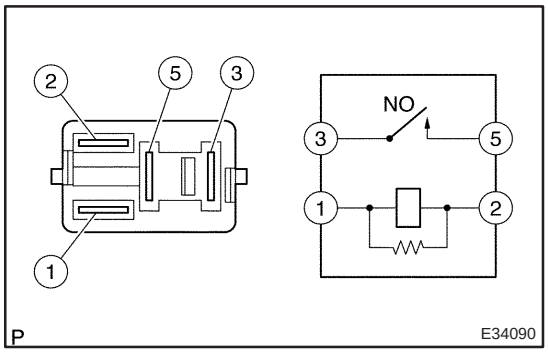
2. INSPECT COOLING FAN RELAY NO.2

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2 3 – 4	Continuity
3 – 5	No continuity
	Continuity (Apply battery boltage terminals 1 and 2)



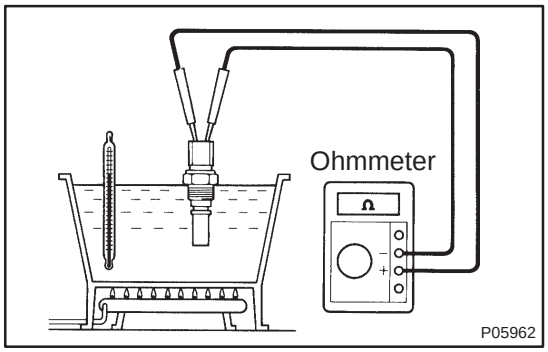
3. INSPECT COOLING FAN RELAY NO.3

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No continuity
	Continuity (Apply battery voltage terminals 1 and 2)



4. INSPECT TEMPERATURE DETECT SWITCH NO.2

(a) Using an ohmmeter, check that there is continuity between the terminals when the coolant temperature is above 93°C (199°F).

Specified condition: Continuity

(b) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is below 83°C (181°F).

Specified condition: No continuity

COOLING FAN SYSTEM (1ZZ–FE/3ZZ–FE)

1600R–14

ON–VEHICLE INSPECTION

HINT:

It is normal that the cooling fan sometime rotates when the ignition switch is turned from ACC to ON.

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 94.5°C (202°F))

(a) Turn the ignition switch ON.

(b) Check that the cooling fan stops.

If not, check the cooling fan relay and engine coolant temperature sensor, and check if there is its connector disconnection or circuit open between them.

(c) Disconnect the engine coolant temperature sensor connector.

(d) Check that the cooling fan rotates.

If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for short in a circuit between the cooling fan relay and the engine coolant temperature sensor.

(e) Reconnect the engine coolant temperature sensor connector.

2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 96°C (205°F))

(a) Start the engine, and raise coolant temperature to above 96°C (205°F).

HINT:

Coolant temperature is detected by the engine coolant temperature sensor on the water outlet.

(b) Check that the cooling fan rotates.

If not, replace the engine coolant temperature sensor.

3. INSPECT COOLING FAN

(a) Disconnect the cooling fan connector.

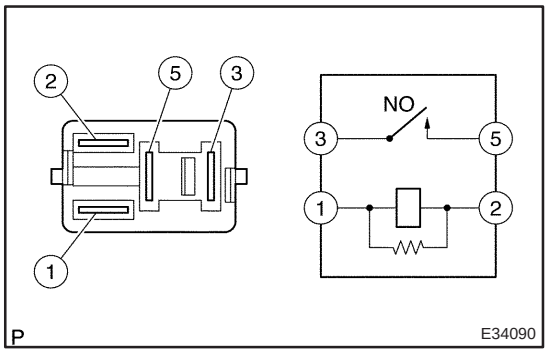
(b) Connect battery and ammeter to the connector.

(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage: Approximately. 8 to 12 A at 20°C (68°F)

(d) Reconnect the cooling fan connector.

INSPECTION



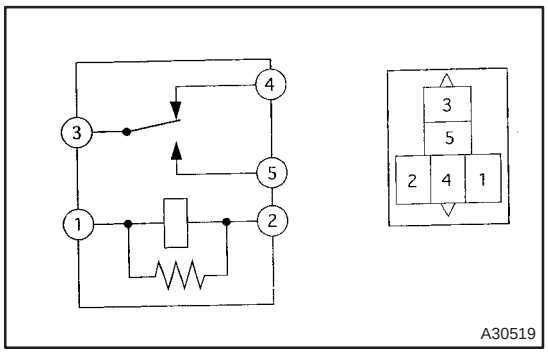
1. INSPECT COOLING FAN RELAY

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2	Continuity
3 – 5	No continuity
	Continuity (Apply battery voltage terminals 1 and 2)



2. INSPECT COOLING FAN RELAY NO.2

(a) Continuity inspection.

(1) Using an ohmmeter, check for continuity between each terminal.

Specified condition:

Terminal No.	Specified condition
1 – 2 3 – 4	Continuity
3 – 5	No continuity
	Continuity (Apply battery boltage terminals 1 and 2)

3. INSPECT COOLING FAN RESISTOR

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

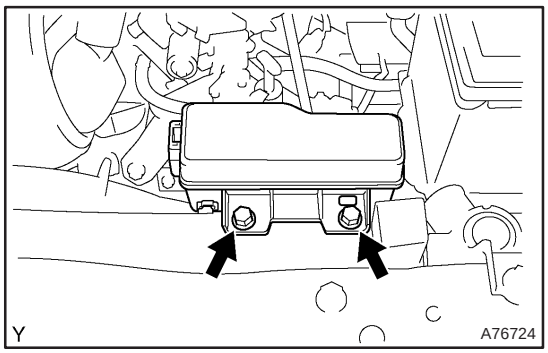
Resistance: 1.17 to 1.43 Ω at 20 °C (68 °F)

RADIATOR ASSY (1ZZ–FE/3ZZ–FE)

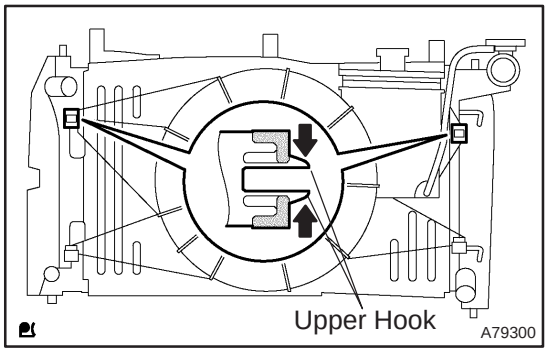
160MK–01

REPLACEMENT

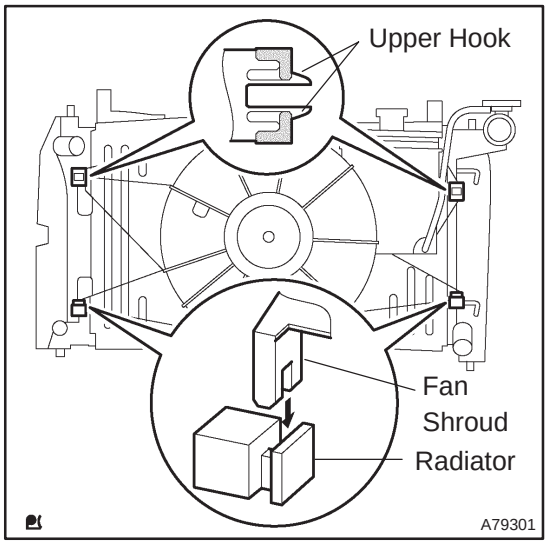
1. REMOVE RADIATOR SUPPORT OPENING COVER (See page 14–27)
2. REMOVE ENGINE ROOM COVER SIDE (See page 14–27)
3. ENGINE UNDER COVER SUB–ASSY NO.1 (See page 14–27)
4. DRAIN ENGINE COOLANT (See page 16–1)
5. DISCONNECT RADIATOR HOSE INLET
(a) Disconnect the radiator hose inlet from the radiator.
6. DISCONNECT RADIATOR HOSE OUTLET
(a) Disconnect the radiator hose outlet from the radiator.
7. DISCONNECT OIL COOLER INLET TUBE NO.1 (A/T TRANSAXLE)
(a) Disconnect the oil cooler inlet tube from the radiator.
8. DISCONNECT OIL COOLER OUTLET TUBE NO.1 (A/T TRANSAXLE)
(a) Disconnect the oil cooler outlet tube from the radiator.



9. REMOVE RADIATOR ASSY
(a) Disconnect the fan connector and the 2 harness clamps.
(b) Remove the 2 bolts and the relay block.
(c) Remove the 2 bolts, the 2 radiator support upper and the radiator.
(d) Remove the 2 support radiator LWRs from the radiator.



(e) Pinch and push each upper hook on the fan shroud to release and remove the fan shroud from the radiator.



10. INSTALL RADIATOR ASSY

(a) Align the 2 keyways of the fan shroud with the 2 keys located on the lower bottom of the radiator and fit them.

(b) Install the fan should to the radiator with the 2 upper hooks. You can hear ”click” sounds when the hooks are securely fitted.

(c) Install the 2 support radiator LWRs to the radiator.

(d) Install the radiator with the 2 bolts and 2 radiator support uppers.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

(e) Install the relay block with the 2 bolts.

(f) Connect the fan connector and 2 harness clamps.

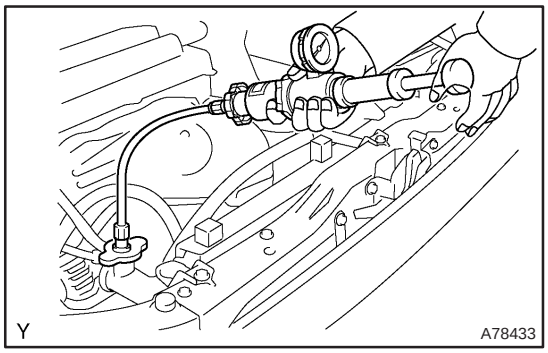
11. ADD ENGINE COOLANT (See page 16–7)

12. CHECK FOR ENGINE COOLANT LEAKS (See page 16–1)

COOLING SYSTEM (1AZ–FE)

ON–VEHICLE INSPECTION

160N1–01



1. INSPECT COOLING SYSTEM FOR LEAKS

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(a) Remove the radiator support opening cover.
(b) Remove the engine room cover side.
(c) Fill the radiator with coolant and attach a radiator cap tester.
(d) Warm up the engine.
(e) Pump it to 137 kPa (1.4 kgf/cm^2, 19.9 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator and water pump for leaks. If there are no signs or traces of external coolant leaks, check the heater core, cylinder block and head.

(f) Reinstall the engine room cover side.
(g) Reinstall the radiator support opening cover.

2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

(a) The engine coolant should be between the ”LOW” and ”FULL” lines, when the engine is cold.

If low, check for leaks and add ”Toyota Long Life Coolant” or equivalent up to the ”FULL” line.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

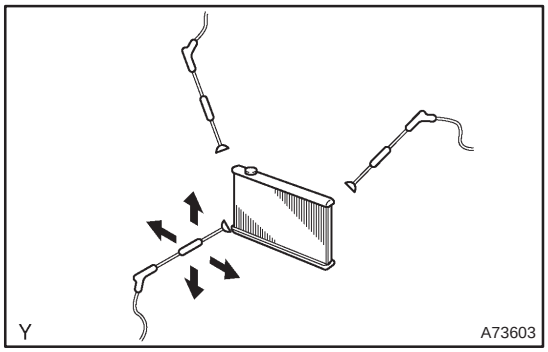
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(b) Check if there is any excessive deposits of rust or scale around the radiator cap and radiator filler hole; the coolant should be free from oil.

If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.



4. INSPECT FINS BLOCKAGE

(a) If fins are clogged, wash them with water or a steam cleaner and dry with compressed air.

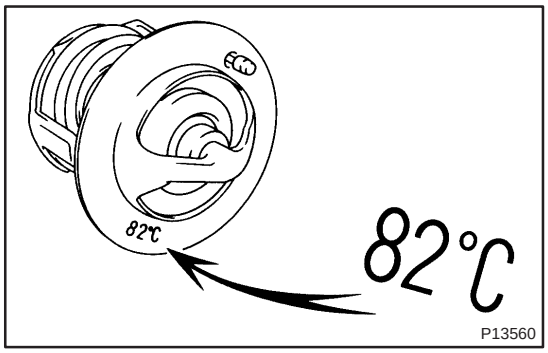
NOTICE:

- **If the distance between the steam cleaner and the core is too close, there is a possibility of damaging the fins, so keep the following injection distance.**

Injection Pressures kPa (kgf/cm^2, psi)	Injection Distance mm (in.)
2,942 to 4,903 (30 to 50, 427 to 711)	300 (11.811)
4,903 to 7,845 (50 to 80, 711 to 1,138)	500 (19.685)

- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Be careful not pour water directly onto electronic components.**

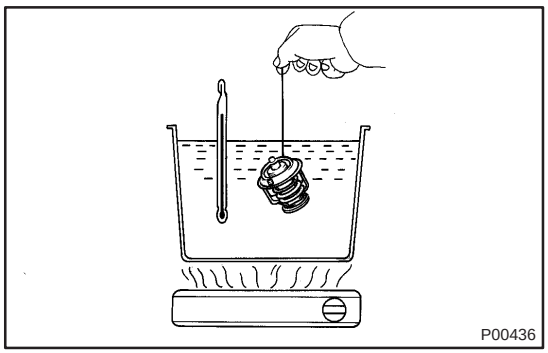
INSPECTION



1. INSPECT THERMOSTAT

HINT:

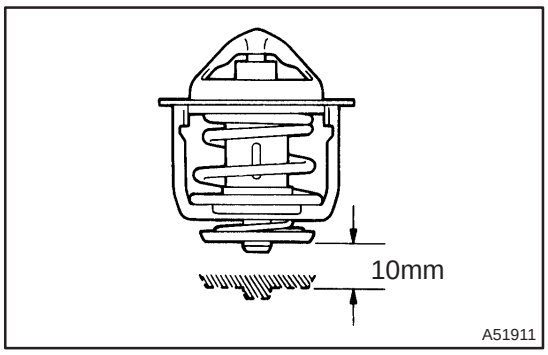
The thermostat is numbered with the valve opening temperature.



(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature of the thermostat.
Valve opening temperature:
80 to 84°C (176 to 183°F)

If the valve opening temperature is not as specified, replace the thermostat.



(c) Check the valve lift.
Valve lift: 10 mm (0.394 in.) or more at 95°C (203°F)

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

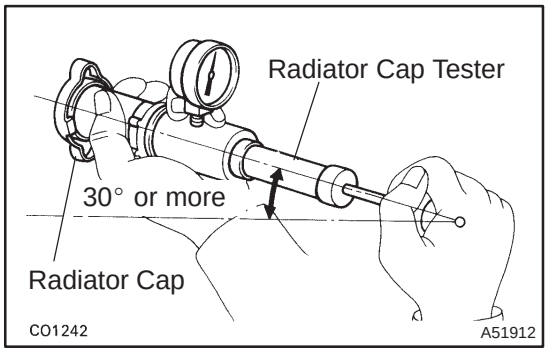
(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).

If not closed, replace the thermostat.

2. INSPECT RADIATOR CAP SUB–ASSY

NOTICE:

- **If the radiator cap is contaminatied, rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and the pressure valve with engine coolant or water.**
- **When performing following steps (a) and (b), keep the tester at an angle of over 30° above horizontal.**



(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push / 3 seconds or more

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the tester and measure the relief valve opening pressure.

NOTICE:

The following pump speed is for the first pump only (in order to close the vacuum valve). After the first pump, the pump speed can be reduced.

Pump speed: 1 push within 1 second

Standard opening pressure:

93 to 122 kPa (0.95 to 1.25 kgf/cm^2, 13.4 to 17.6 psi)

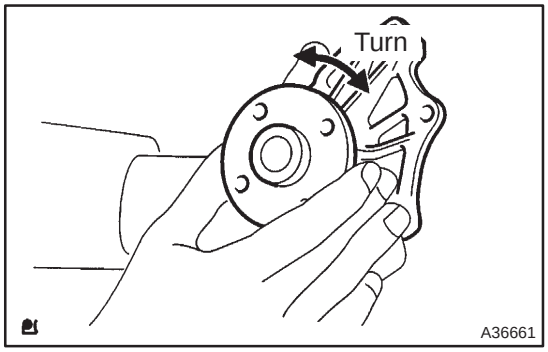
Minimum opening pressure:

78 kPa (0.8 kgf/cm^2, 11.2 psi)

If the opening pressure is less than minimum, replace the radiator cap.

HINT:

Use the tester's maximum reading as the opening pressure.



3. INSPECT WATER PUMP ASSY

(a) Visually check the drain hole for coolant leakage.

If leakage is found, replace the water pump.

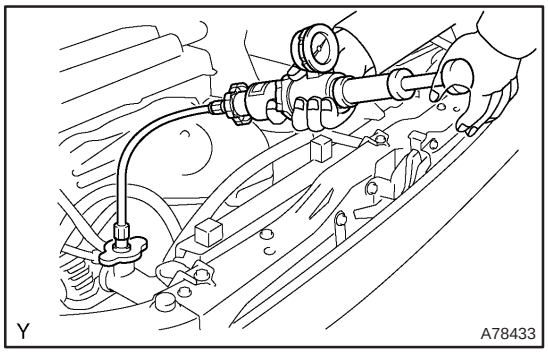
(b) Turn the pulley, and check that the water pump bearing moves smoothly and does not make noise.

If necessary, replace the water pump.

COOLING SYSTEM (1AZ–FSE)

160MY–01

ON–VEHICLE INSPECTION



1. INSPECT COOLING SYSTEM FOR LEAKS

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(a) Remove the radiator support opening cover.
(b) Remove the engine room cover side.
(c) Fill the radiator with coolant and attach a radiator cap tester.
(d) Warm up the engine.
(e) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator and water pump for leaks. If there are no signs or traces of external coolant leaks, check the heater core, cylinder block and head.

(f) Reinstall the engine room cover side.
(g) Reinstall the radiator support opening cover.

2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

(a) The engine coolant should be between the ”LOW” and ”FULL” lines, when the engine is cold.

If low, check for leaks and add ”Toyota Long Life Coolant” or equivalent up to the ”FULL” line.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

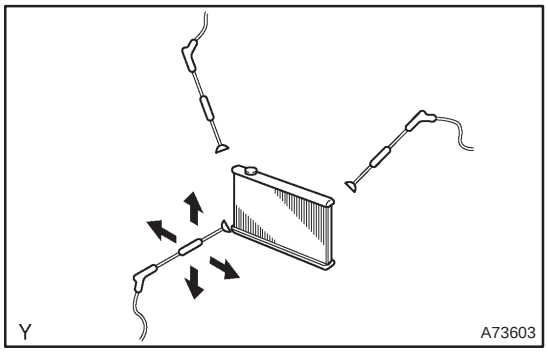
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(b) Check if there is any excessive deposits of rust or scale around the radiator cap and radiator filler hole; the coolant should be free from oil.

If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.



4. INSPECT FINS BLOCKAGE

(a) If fins are clogged, wash them with water or a steam cleaner and dry with compressed air.

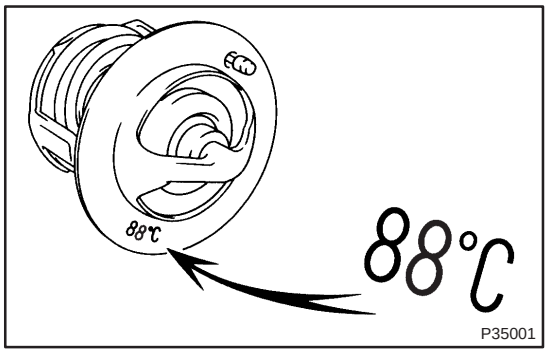
NOTICE:

- **If the distance between the steam cleaner and the core is too close, there is a possibility of damaging the fins, so keep the following injection distance.**

Injection Pressures kPa (kgf/cm^2, psi)	Injection Distance mm (in.)
2,942 to 4,903 (30 to 50, 427 to 711)	300 (11.811)
4,903 to 7,845 (50 to 80, 711 to 1,138)	500 (19.685)

- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Be careful not pour water directly onto electronic components.**

INSPECTION

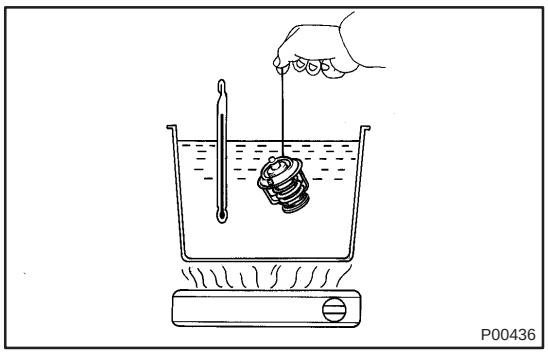


P35001

1. INSPECT THERMOSTAT

HINT:

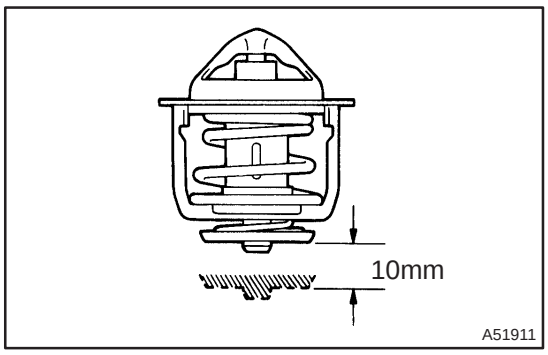
The thermostat is numbered with the valve opening temperature.


P00436

(a) Immerse the thermostat in water an gradually heat the water.

(b) Check the valve opening temperature of the thermostat.
Valve opening temperature:
86 to 90°C (187 to 198°F)

If the valve opening temperature is not as specified, replace the thermostat.



A51911

(c) Check the valve lift.
Valve lift: 10 mm (0.394 in.) or more at 100°C (212°F)

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

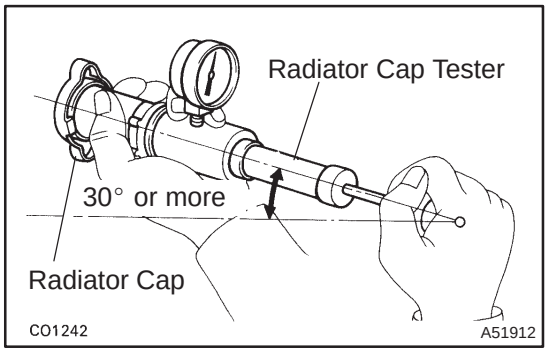
(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 83°C (181°F)).

If not closed, replace the thermostat.

2. INSPECT RADIATOR CAP SUB–ASSY

NOTICE:

- **If the radiator cap is contaminatied, rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and the pressure valve with engine coolant or water.**
- **When performing following steps (a) and (b), keep the tester at an angle of over 30° above horizontal.**



(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push / 3 seconds or more

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the tester and measure the relief valve opening pressure.

NOTICE:

The following pump speed is for the first pump only (in order to close the vacuum valve). After the first pump, the pump speed can be reduced.

Pump speed: 1 push within 1 second

Standard opening pressure:

74 to 103 kPa (0.75 to 1.05 kgf/cm^2, 10.7 to 14.9 psi)

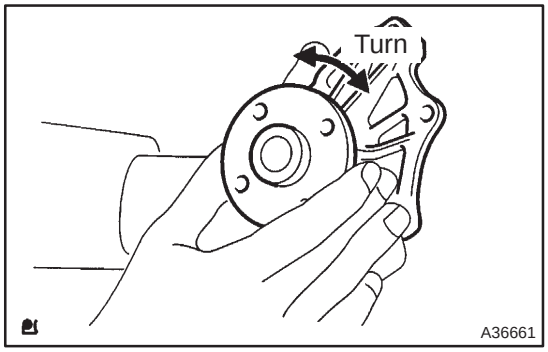
Minimum opening pressure:

59 kPa (0.6 kgf/cm^2, 8.6 psi)

If the opening pressure is less than minimum, replace the radiator cap.

HINT:

Use the tester's maximum reading as the opening pressure.



3. INSPECT WATER PUMP ASSY

(a) Visually check the drain hole for coolant leakage.

If leakage is found, replace the water pump.

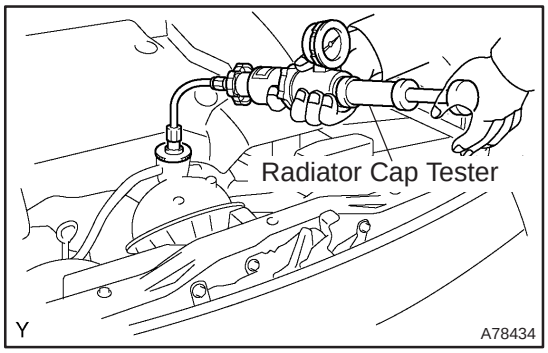
(b) Turn the pulley, and check that the water pump bearing moves smoothly and does not make noise.

If necessary, replace the water pump.

COOLING SYSTEM (1CD–FTV)

ON–VEHICLE INSPECTION

160N6–01



1. INSPECT COOLING SYSTEM FOR LEAKS

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(a) Remove the radiator support opening cover.
(b) Remove the engine room cover side.
(c) Fill the radiator with coolant and attach a radiator cap tester.
(d) Warm up the engine.
(e) Pump it to 137 kPa (1.4 kgf/cm^2, 19.9 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator and water pump for leaks. If there are no signs or traces of external coolant leaks, check the heater core, cylinder block and head.

(f) Reinstall the engine room cover side.
(g) Reinstall the radiator support opening cover.

2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

(a) The engine coolant should be between the ”LOW” and ”FULL” lines, when the engine is cold.

If low, check for leaks and add ”Toyota Long Life Coolant” or equivalent up to the ”FULL” line.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

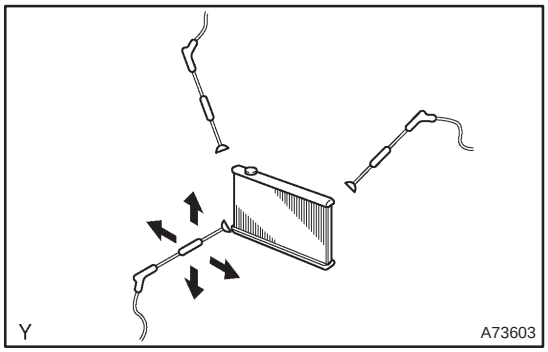
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(b) Check if there is any excessive deposits of rust or scale around the radiator cap and radiator filler hole; the coolant should be free from oil.

If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.



4. INSPECT FINS BLOCKAGE

(a) If fins are clogged, wash them with water or a steam cleaner and dry with compressed air.

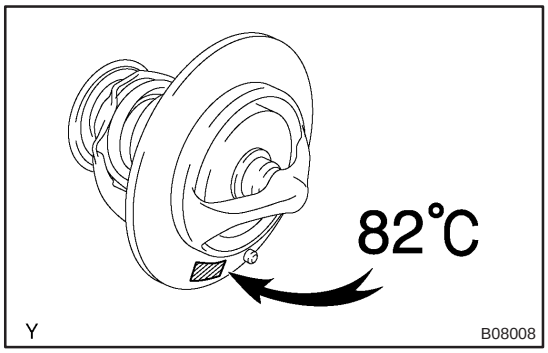
NOTICE:

- **If the distance between the steam cleaner and the core is too close, there is a possibility of damaging the fins, so keep the following injection distance.**

Injection Pressures kPa (kgf/cm^2, psi)	Injection Distance mm (in.)
2,942 to 4,903 (30 to 50, 427 to 711)	300 (11.811)
4,903 to 7,845 (50 to 80, 711 to 1,138)	500 (19.685)

- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Be careful not pour water directly onto electronic components.**

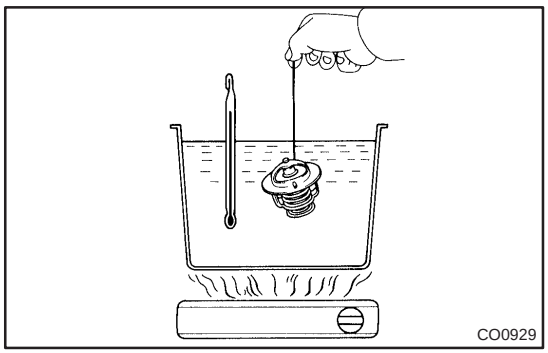
INSPECTION



1. INSPECT THERMOSTAT

HINT:

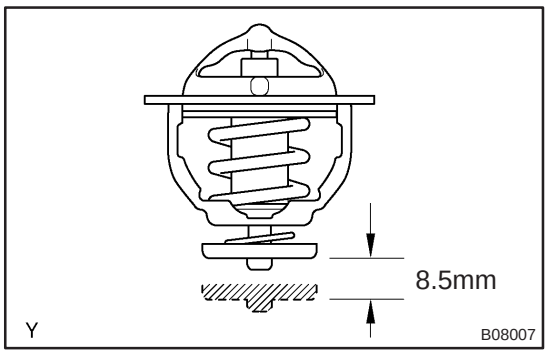
The thermostat is numbered with the valve opening temperature.



(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature of the thermostat.
Valve opening temperature:
80 to 84°C (176 to 183°F)

If the valve opening temperature is not as specified, replace the thermostat.



(c) Check the valve lift.
Valve lift: 8.5 mm (0.33 in.) or more at 95°C (203°F)

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

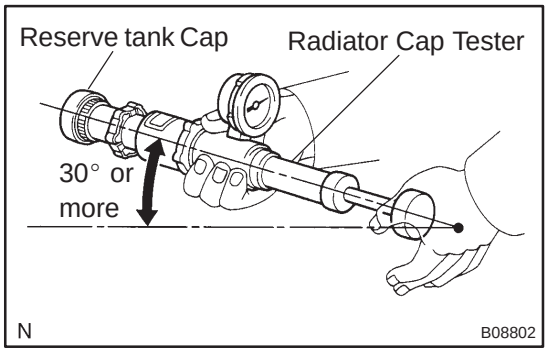
(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).

If not closed, replace the thermostat.

2. INSPECT RESERVE TANK CAP SUB–ASSY

NOTICE:

- **If the radiator cap is contaminatied, rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and the pressure valve with engine coolant or water.**
- **When performing following steps (a) and (b), keep the tester at an angle of over 30° above horizontal.**



(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push / 3 seconds or more

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the reserve tank cap.

(b) Pump the tester and measure the relief valve opening pressure.

NOTICE:

The following pump speed is for the first pump only (in order to close the vacuum valve). After the first pump, the pump speed can be reduced.

Pump speed: 1 push within 1 second

Standard opening pressure:

93 to 122 kPa (0.95 to 1.25 kgf/cm^2, 13.4 to 17.6 psi)

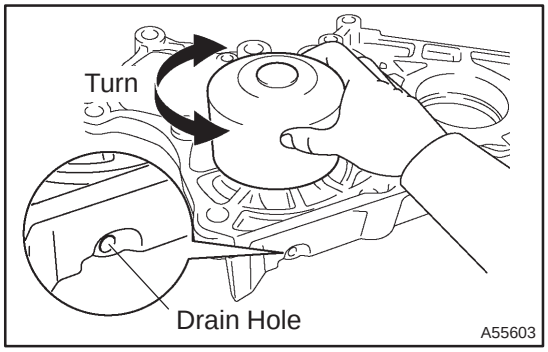
Minimum opening pressure:

78 kPa (0.8 kgf/cm^2, 11.4 psi)

If the opening pressure is less than minimum, replace the reserve tank cap.

HINT:

Use the tester's maximum reading as the opening pressure.



3. INSPECT WATER PUMP ASSY

(a) Visually check the drain hole for coolant leakage.

If leakage is found, replace the water pump.

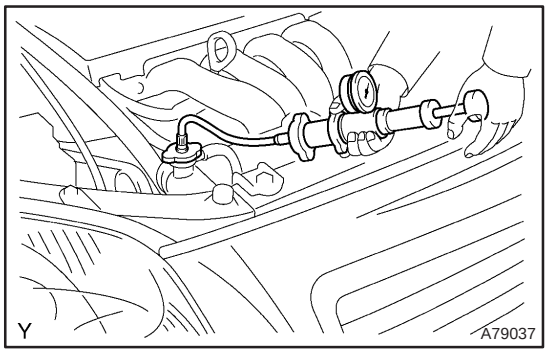
(b) Turn the pulley, and check that the water pump bearing moves smoothly and does not make noise.

If necessary, replace the water pump.

COOLING SYSTEM (1ZZ–FE/3ZZ–FE)

160N4–01

ON–VEHICLE INSPECTION



1. INSPECT COOLING SYSTEM FOR LEAKS

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(a) Remove the radiator support opening cover.
(b) Remove the engine room cover side.
(c) Fill the radiator with coolant and attach a radiator cap tester.
(d) Warm up the engine.
(e) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator and water pump for leaks. If there are no signs or traces of external coolant leaks, check the heater core, cylinder block and head.

(f) Reinstall the engine room cover side.
(g) Reinstall the radiator support opening cover.

2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

(a) The engine coolant level should be between the ”LOW” and ”FULL” lines, when the engine is cold.

If low, check for leaks and add ”Toyota Long Life Coolant” or equivalent up to the ”FULL” line.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

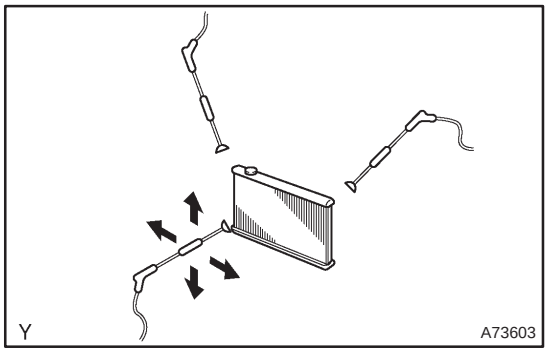
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(b) Check if there is any excessive deposits of rust or scale around the radiator cap and radiator filler hole; the coolant should be free from oil.

If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.



4. INSPECT FINS BLOCKAGE

(a) If fins are clogged, wash them with water or a steam cleaner and dry with compressed air.

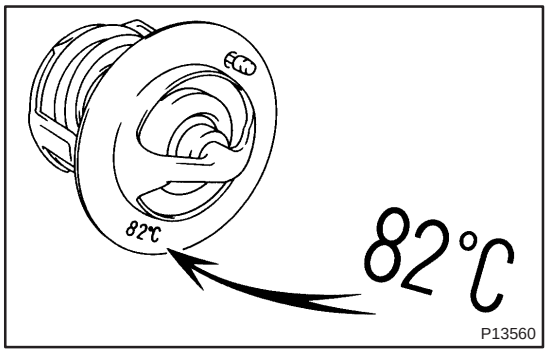
NOTICE:

- **If the distance between the steam cleaner and the core is too close, there is a possibility of damaging the fins, so keep the following injection distance.**

Injection Pressures kPa (kgf/cm^2, psi)	Injection Distance mm (in.)
2,942 to 4,903 (30 to 50, 427 to 711)	300 (11.811)
4,903 to 7,845 (50 to 80, 711 to 1,138)	500 (19.685)

- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Be careful not pour water directly onto electronic components.**

INSPECTION

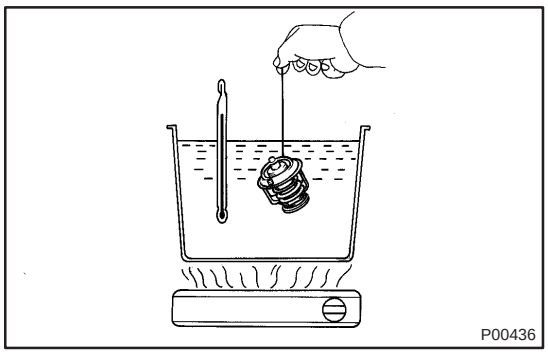


P13560

1. INSPECT THERMOSTAT

HINT:

The valve opening temperature is inscribed on the thermostat.

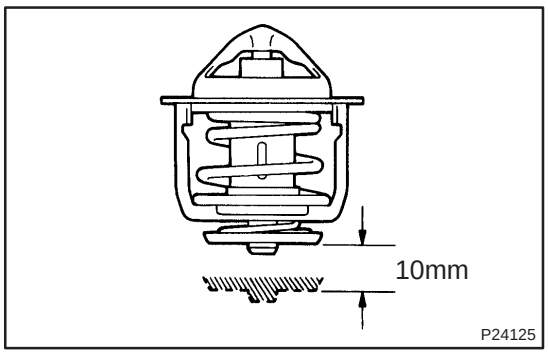

P00436

(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

Valve opening temperature:
80 to 84°C (176 to 183°F)

If the valve opening temperature is not as specified, replace the thermostat.



P24125

(c) Check the valve lift.

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.

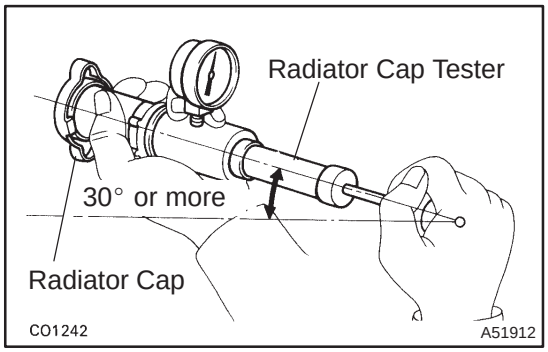
(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).

If not closed, replace the thermostat.

2. INSPECT RADIATOR CAP SUB–ASSY

NOTICE:

- **If the radiator cap is contaminatied, rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and the pressure valve with engine coolant or water.**
- **When performing following steps (a) and (b), keep the tester at an angle of over 30° above horizontal.**



(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push / 3 seconds or more

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the tester and measure the relief valve opening pressure.

NOTICE:

The following pump speed is for the first pump only (in order to close the vacuum valve). After the first pump, the pump speed can be reduced.

Pump speed: 1 push within 1 second

Standard opening pressure:

74 to 103 kPa (0.75 to 1.05 kgf/cm^2, 10.7 to 14.9 psi)

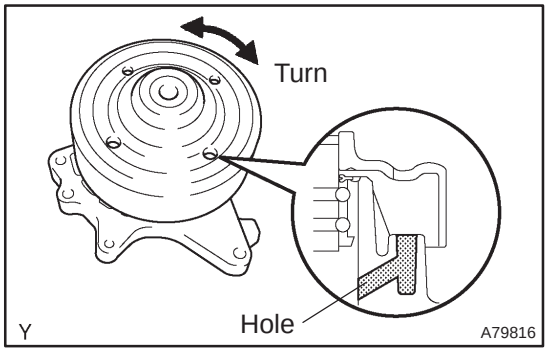
Minimum opening pressure:

59 kPa (0.6 kgf/cm^2, 8.6 psi)

If the opening pressure is less than minimum, replace the radiator cap.

HINT:

Use the tester's maximum reading as the opening pressure.



3. INSPECT WATER PUMP ASSY

(a) Visually check the drain hole for coolant leakage.

If leakage is found, replace the water pump.

(b) Turn the pulley, and check that the water pump bearing moves smoothly and does not make noise.

If necessary, replace the water pump.

ENGINE COOLANT (1AZ–FE)

160MV–01

REPLACEMENT

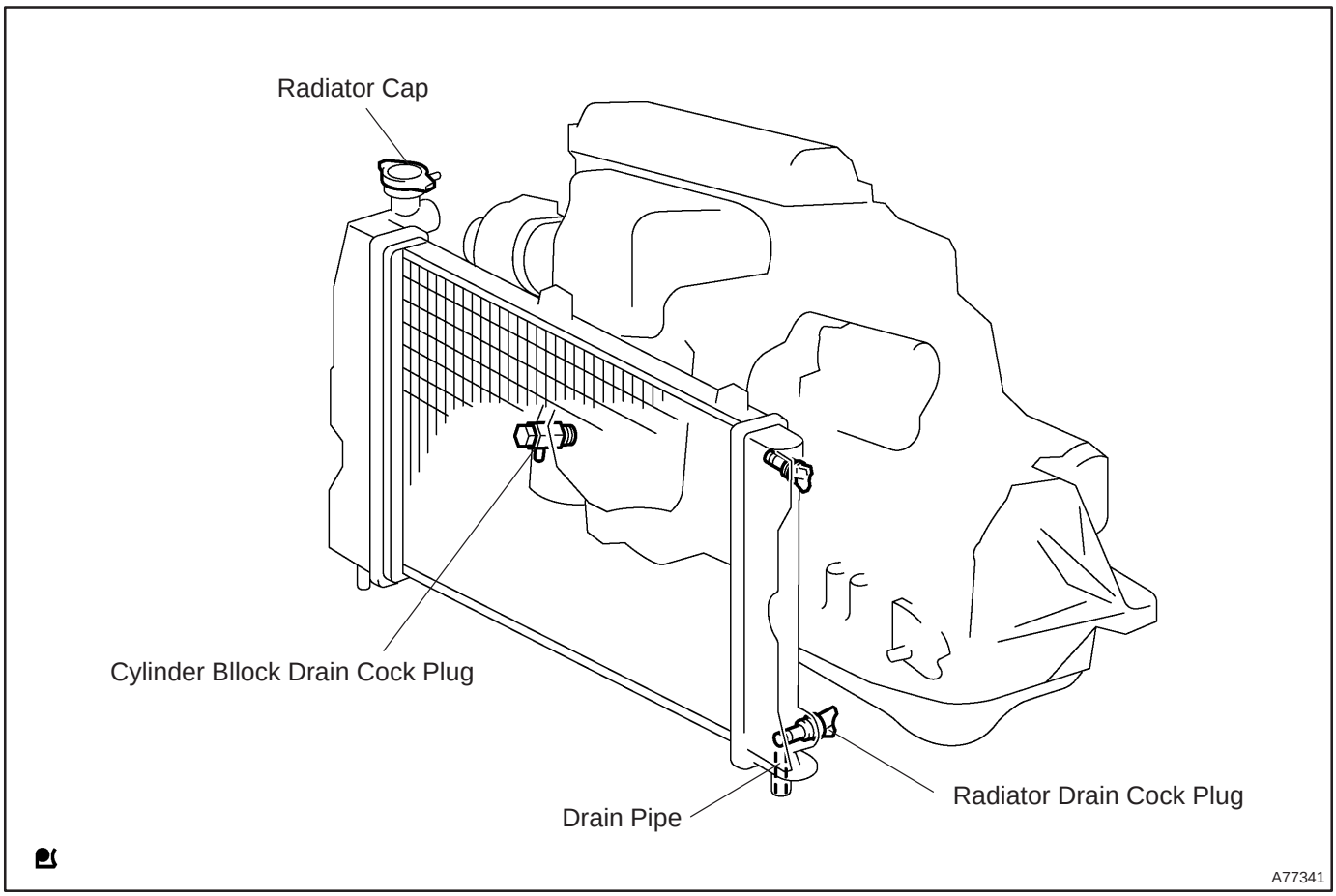
1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(a) Remove the radiator cap.

(b) Loosen the radiator plug and drain the coolant.



2. ADD ENGINE COOLANT

(a) Tighten the radiator drain plug, and pour coolant into radiator until it overflows.
Capacity:

Transmission type	Steering	Coolant Capacity [liters (US gts, lmp. gts)]
M/T	LHD	6.0 (6.3, 5.3)
M/T	RHD	6.1 (6.4, 5.4)
A/T	LHD	6.3 (6.7, 5.5)
A/T	RHD	6.4 (6.8, 5.6)

NOTICE:

- **Do not use an alcohol type coolant or plain water alone.**
- **The coolant should be mixed with plain water (preferably demineralized water or distilled water).**

HINT:

- Use of improper coolants may damage engine cooling system.
- Use ”Toyota Long Life Coolant” or equivalent and mix it with plain water according to the manufacturer’s directions.
- Using of coolant with includes more than 50 % (freezing protection down to –35°C (–31°F)) or 60 % (freezing protection down to –50°C (–58°F)) of ethylene–glycol is recommended but not more than 70 %.
- Press the radiator inlet and outlet hose several times with hard.
- If the coolant level gets lower, pour coolant.

(b) Reinstall the radiator cap.

(c) Pour engine coolant into the reservoir tank until it reaches full line.

(d) Warm up the engine until the thermostat valve begins to open.

HINT:

Press the radiator inlet and outlet hose several times with hard during the warming up.

(e) Stop the engine and wait until the coolant temp. Gets cold. Then remove the radiator cap to check the coolant level.

HINT:

- If the level gets lower, perform the procedures above again.
- If the level does not gets lower, adjust the reservoir tank coolant level.

3. CHECK FOR ENGINE COOLANT LEAKS **(See page 16–13)**

ENGINE COOLANT (1AZ–FSE)

160MU–01

REPLACEMENT

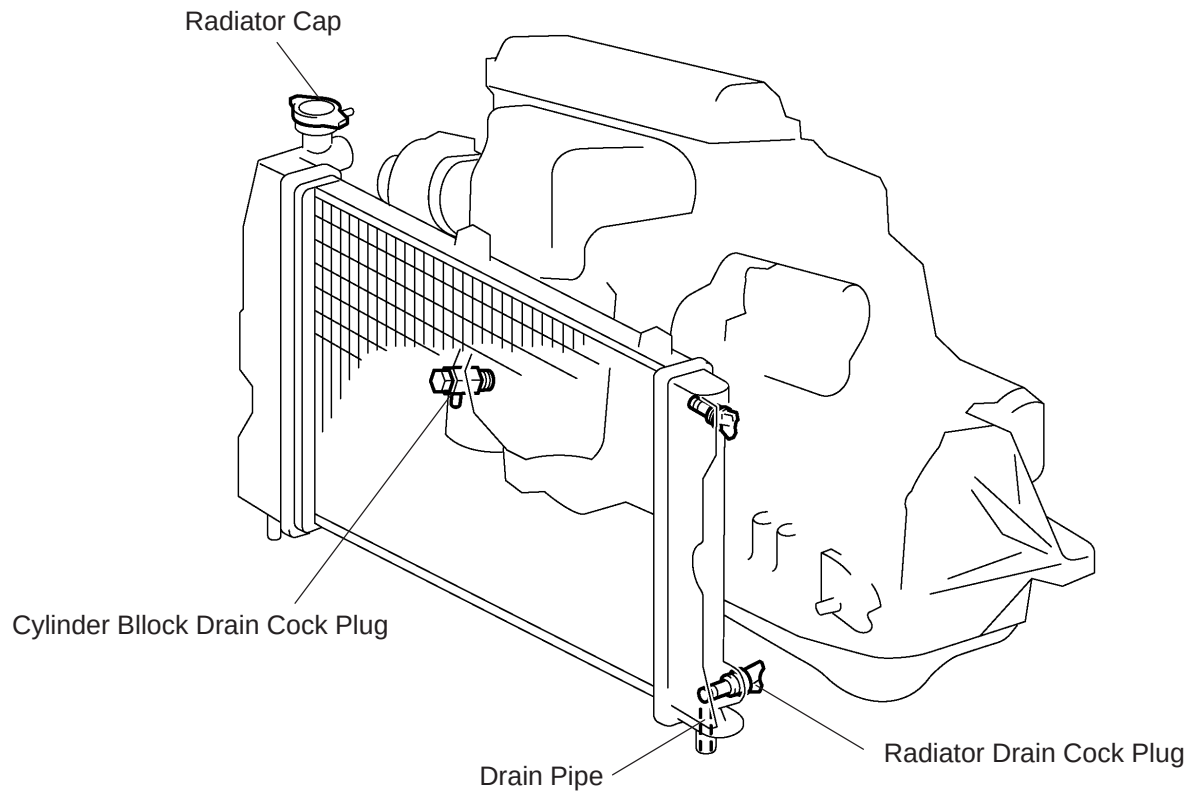
1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(a) Remove the radiator cap.

(b) Loosen the radiator plug and drain the coolant.



2. ADD ENGINE COOLANT

(a) Tighten the radiator drain plug, and pour coolant into radiator until it overflows.
Capacity:

Transmission type	Steering	Coolant Capacity [liters (US gts, lmp. gts)]
M/T	LHD	6.0 (6.3, 5.3)
M/T	RHD	6.1 (6.4, 5.4)
A/T	LHD	6.3 (6.7, 5.5)
A/T	RHD	6.4 (6.8, 5.6)

NOTICE:

- **Do not use an alcohol type coolant or plain water alone.**
- **The coolant should be mixed with plain water (preferably demineralized water or distilled water).**

HINT:

- Use of improper coolants may damage engine cooling system.
- Use ”Toyota Long Life Coolant” or equivalent and mix it with plain water according to the manufacturer’s directions.
- Using of coolant with includes more than 50 % (freezing protection down to –35°C (–31°F)) or 60 % (freezing protection down to –50°C (–58°F)) of ethylene–glycol is recommended but not more than 70 %.
- Press the radiator inlet and outlet hose several times with hard.
- If the coolant level gets lower, pour coolant.

(b) Reinstall the radiator cap.

(c) Pour engine coolant into the reservoir tank until it reaches full line.

(d) Warm up the engine until the thermostat valve begins to open.

HINT:

Press the radiator inlet and outlet hose several times with hard during the warming up.

(e) Stop the engine and wait until the coolant temp. Gets cold. Then remove the radiator cap to check the coolant level.

HINT:

- If the level gets lower, perform the procedures above again.
- If the level does not gets lower, adjust the reservoir tank coolant level.

3. CHECK FOR ENGINE COOLANT LEAKS (See page 16–25)

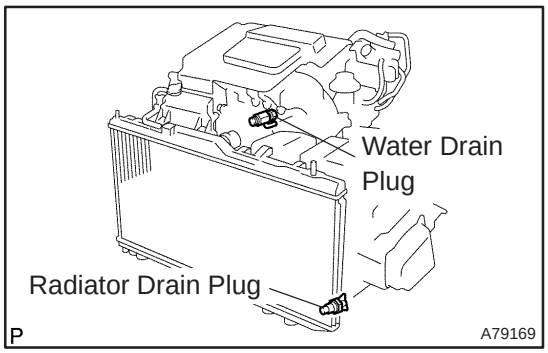
ENGINE COOLANT (1CD–FTV)

160MD–01

REPLACEMENT

1. DRAIN ENGINE COOLANT

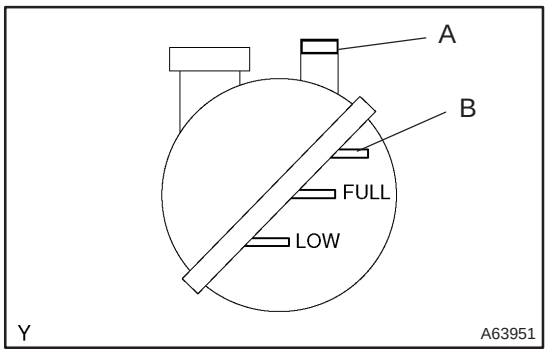
(a) Remove the radiator cap.



(b) Loosen the radiator and engine drain plugs, drain the coolant.

(c) Close the drain plugs.

Torque: 13 N·m (133 kgf·cm, 10 ft·lbf) for engine



2. ADD ENGINE COOLANT

(a) Loosen air bleed valve A.

(b) Fill the cooling system with coolant up to line B.

Capacity:
With heater: 7.6 liters (8.0 US qts, 6.7 lmp. qts)
Without heater: 7.4 liters (7.8 US qts, 6.5 lmp. qts)

HINT:

- Use of improper coolants may damage engine cooling system.
- Use ”Toyota Long Life Coolant” or equivalent and mix it with plain water according to the manufacturer’s instruction.
- Using of coolant which includes more than 50 % (freezing protection down to –35°C (–31°F)) or 60 % (freezing protection down to –50°C (–58°F)) of ethylene–glycol is recommended but not more than 70 %.

(c) Tighten the air bleed valve securely.

(d) Install the radiator cap securely.

(e) Warm up the engine.

HINT:

Warm up the engine with the speed of 2,000 rpm or more and keep the warm–up until the thermostat has open and the radiator reservoir has become hot.

(f) Run the engine intermittently for 5 seconds at 3,000 rpm and for 45 seconds at idle.

(g) Do the above operation for 7 minutes or more.

(h) After the engine has become cold, check that the coolant level is between LOW and FULL lines.

3. CHECK FOR ENGINE COOLANT LEAKS

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Pump it to 137 kPa (1.4 kgf/cm^{2,} 19.9 psi), and check that the pressure does not drop.

ENGINE COOLANT (1ZZ–FE/3ZZ–FE)

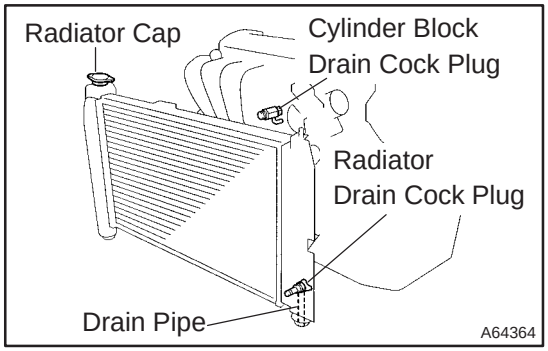
160MH–01

REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:
To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot.
Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(a) Remove the radiator cap.



(b) Loosen the radiator drain cock plug and the cylinder block drain cock plug, and drain engine coolant.
(c) Close the radiator drain cock plug.
(d) Close the cylinder block drain plug.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf) for engine

2. ADD ENGINE COOLANT

(a) Tighten the radiator drain plug, and pour coolant into radiator until it overflows.
Capacity:

Transmission type	Steering	Coolant Capacity [liters (US gts, lmp. gts)]
M/T	LHD	5.8 (6.1, 5.1)
M/T	RHD	5.9 (6.2, 5.2)
A/T	LHD	5.7 (6.0, 5.0)
A/T	RHD	5.8 (6.1, 5.1)

NOTICE:
- **Do not use an alcohol type coolant or plain water alone.**
- **The coolant should be mixed with plain water (preferably demineralized water or distilled water).**

HINT:
- Use of improper coolants may damage engine cooling system.
- Use ”Toyota Long Life Coolant” or equivalent and mix it with plain water according to the manufacturer’s instruction.
- Using of coolant with includes more than 50 % (freezing protection down to –35°C (–31°F)) or 60 % (freezing protection down to –50°C (–58°F)) of ethylene–glycol is recommended but not more than 70 %.
- Press the radiator inlet and outlet hose several times by hand.
- If the coolant level gets lower, pour coolant.

(b) Reinstall the radiator cap.
(c) Pour engine coolant into the reservoir tank until it reaches full line.

(d) Warm up the engine until the thermostat valve begins to open.

HINT:

Press the radiator inlet and outlet hose several times by hand during the warming up.

(e) Stop the engine and wait until the coolant temperature gets cold. Then remove the radiator cap to check the coolant level.
- If the level gets lower, perform the procedures from (a) through (e) again.
- If the level does not gets lower, fill the reservoir tank with engine coolant.

3. CHECK FOR ENGINE COOLANT LEAKS (See page 16–1)

RADIATOR ASSY (1AZ–FE)

160MX–01

REPLACEMENT

1. DRAIN COOLANT (See page 16–19)
2. REMOVE RADIATOR SUPPORT OPENING COVER
3. REMOVE ENGINE ROOM COVER SIDE
4. REMOVE ENGINE UNDER COVER RH
5. DISCONNECT RADIATOR HOSE INLET
6. DISCONNECT RADIATOR HOSE OUTLET
7. REMOVE RADIATOR SUPPORT UPPER
(a) Disconnect the fan w/ motor wire harness, connector and the horn connector.
(b) Remove 4 bolts, the nut and the radiator support.
8. REMOVE RADIATOR ASSY
(a) Remove 2 upper support, and radiator assembly
9. REMOVE RADIATOR SUPPORT LOWER
10. REMOVE FAN ASSY W/MOTOR
(a) Remove 6 bolts and fan w/motor.
11. INSTALL FAN ASSY W/MOTOR
12. INSTALL RADIATOR SUPPORT LOWER
13. INSTALL RADIATOR ASSY
14. INSTALL RADIATOR SUPPORT UPPER
(a) Install radiator support with 2 bolts.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)
15. ADD COOLANT (See page 16–19)
16. INSPECT CHECK FOR ENGINE COOLANT LEAKS (See page 16–13)

RADIATOR ASSY (1AZ–FSE)

160MS–01

REPLACEMENT

1. DRAIN COOLANT (See page 16–31)
2. REMOVE RADIATOR SUPPORT OPENING COVER
3. REMOVE ENGINE ROOM COVER SIDE
4. REMOVE ENGINE UNDER COVER RH
5. DISCONNECT RADIATOR HOSE INLET
6. DISCONNECT RADIATOR HOSE OUTLET
7. REMOVE RADIATOR SUPPORT UPPER
(a) Disconnect the fan w/ motor wire harness, connector and the horn connector.
(b) Remove 4 bolts, the nut and the radiator support.
8. REMOVE RADIATOR ASSY
(a) Remove 2 upper support, and radiator assembly
9. REMOVE RADIATOR SUPPORT LOWER
10. REMOVE FAN ASSY W/MOTOR
(a) Remove 6 bolts and fan w/motor.
11. INSTALL FAN ASSY W/MOTOR
12. INSTALL RADIATOR SUPPORT LOWER
13. INSTALL RADIATOR ASSY
14. INSTALL RADIATOR SUPPORT UPPER
(a) Install radiator support with 2 bolts.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)
15. ADD COOLANT (See page 16–31)
16. INSPECT CHECK FOR ENGINE COOLANT LEAKS (See page 16–25)

RADIATOR ASSY (1CD–FTV)

160MG–01

REPLACEMENT

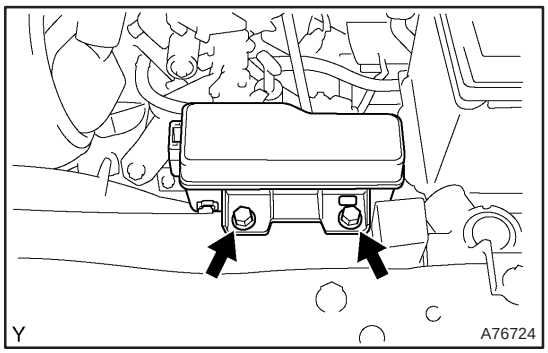
1. DRAIN ENGINE COOLANT (See page 16–44)
2. REMOVE RADIATOR SUPPORT OPENING COVER
3. REMOVE ENGINE ROOM COVER SIDE
4. REMOVE RADIATOR RESERVE TANK ASSY (See page 16–50)
5. DISCONNECT RADIATOR HOSE INLET
6. DISCONNECT RADIATOR HOSE OUTLET
7. REMOVE RADIATOR ASSY
(a) Remove the 2 bolts and separate the relay box.
(b) Remove the 2 upper support and radiator assy.
8. REMOVE RADIATOR SUPPORT LOWER
9. REMOVE FAN ASSY W/MOTOR
(a) Remove the 2 bolts and the fan w/motor.
10. INSTALL FAN ASSY W/MOTOR
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)
11. INSTALL RADIATOR ASSY
(a) Install the 2 upper support and the radiator assembly to the vehicle.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)
(b) Install the 2 bolts and the relay box.
Torque: 5.3 N·m (54 kgf·cm, 47 in.·lbf)
12. INSTALL RADIATOR RESERVE TANK ASSY (See page 16–50)
13. ADD ENGINE COOLANT (See page 16–44)
14. CHECK FOR ENGINE COOLANT LEAKS (See page 16–44)

RADIATOR ASSY (1ZZ–FE/3ZZ–FE)

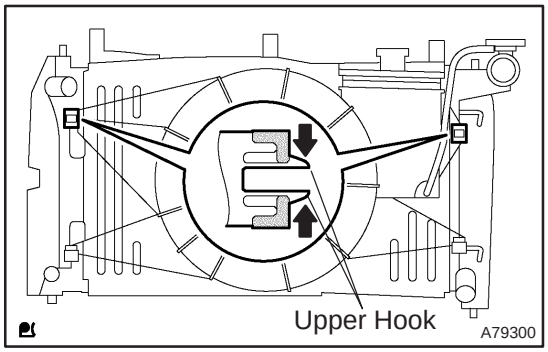
160MK–01

REPLACEMENT

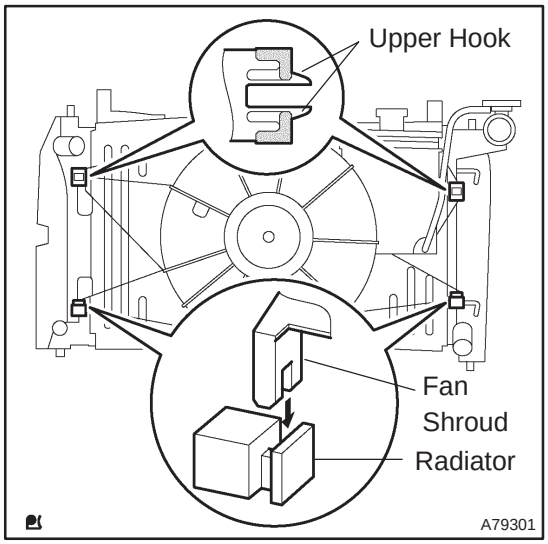
1. REMOVE RADIATOR SUPPORT OPENING COVER (See page 14–27)
2. REMOVE ENGINE ROOM COVER SIDE (See page 14–27)
3. ENGINE UNDER COVER SUB–ASSY NO.1 (See page 14–27)
4. DRAIN ENGINE COOLANT (See page 16–1)
5. DISCONNECT RADIATOR HOSE INLET
(a) Disconnect the radiator hose inlet from the radiator.
6. DISCONNECT RADIATOR HOSE OUTLET
(a) Disconnect the radiator hose outlet from the radiator.
7. DISCONNECT OIL COOLER INLET TUBE NO.1 (A/T TRANSAXLE)
(a) Disconnect the oil cooler inlet tube from the radiator.
8. DISCONNECT OIL COOLER OUTLET TUBE NO.1 (A/T TRANSAXLE)
(a) Disconnect the oil cooler outlet tube from the radiator.



9. REMOVE RADIATOR ASSY
(a) Disconnect the fan connector and the 2 harness clamps.
(b) Remove the 2 bolts and the relay block.
(c) Remove the 2 bolts, the 2 radiator support upper and the radiator.
(d) Remove the 2 support radiator LWRs from the radiator.



(e) Pinch and push each upper hook on the fan shroud to release and remove the fan shroud from the radiator.



10. INSTALL RADIATOR ASSY

(a) Align the 2 keyways of the fan shroud with the 2 keys located on the lower bottom of the radiator and fit them.

(b) Install the fan should to the radiator with the 2 upper hooks. You can hear ”click” sounds when the hooks are securely fitted.

(c) Install the 2 support radiator LWRs to the radiator.

(d) Install the radiator with the 2 bolts and 2 radiator support uppers.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

(e) Install the relay block with the 2 bolts.

(f) Connect the fan connector and 2 harness clamps.

11. ADD ENGINE COOLANT (See page 16–7)

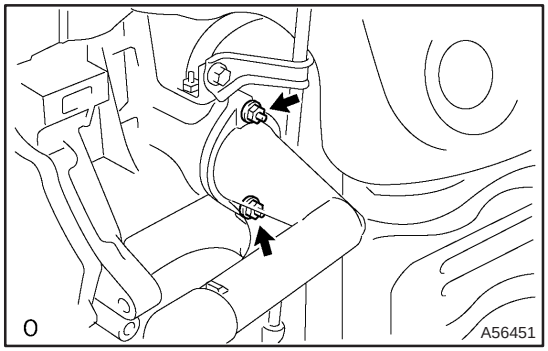
12. CHECK FOR ENGINE COOLANT LEAKS (See page 16–1)

THERMOSTAT (1AZ–FSE)

160MQ–01

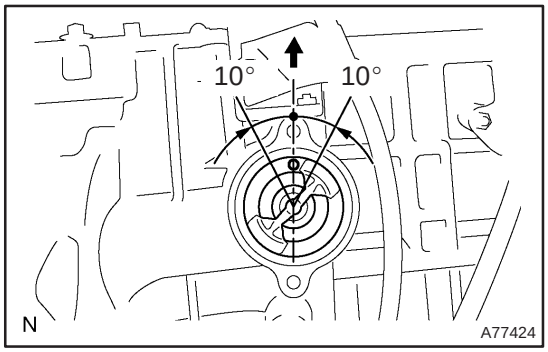
REPLACEMENT

1. **DRAIN COOLANT (See page 16–31)**
2. **REMOVE RADIATOR SUPPORT OPENING COVER**
3. **REMOVE ENGINE ROOM COVER SIDE**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FAN AND GENERATOR V BELT (See page 14–185)**
   SST 09249–63010
6. **REMOVE GENERATOR ASSY (See page 19–20)**



7. **REMOVE WATER INLET**
(a) Remove 2 nuts, and disconnect the water inlet from the cylinder block.

8. **REMOVE THERMOSTAT**



9. **INSTALL THERMOSTAT**
(a) Install a new gasket to the thermostat.
(b) Install the thermostat with the jiggle valve upward.
HINT:
The jiggle valve may be set within 10° on either side of the prescribed position.

10. **INSTALL WATER INLET**
(a) Install the water inlet with 2 nuts.
Torque: 9.0 N·m (92 kgf·cm, 7 in.·lbf)
11. **INSTALL GENERATOR ASSY (See page 19–20)**
12. **INSTALL FAN AND GENERATOR V BELT (See page 14–185)**
SST 09249–63010
13. **ADD COOLANT (See page 16–31)**
14. **INSPECT CHECK FOR ENGINE COOLANT LEAKS (See page 16–25)**

THERMOSTAT (1CD–FTV)

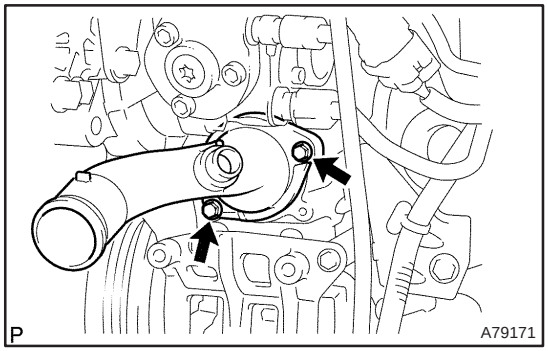
160MF–01

REPLACEMENT

1. **REMOVE RADIATOR SUPPORT OPENING COVER**
2. **REMOVE ENGINE ROOM COVER SIDE**
3. **DRAIN ENGINE COOLANT (See page 16–44)**
4. **REMOVE RADIATOR RESERVE TANK ASSY**

(a) Disconnect the water by–pass hose No. 1 and water by–pass hose No. 2.
(b) Remove the 2 bolts and the reserve tank assembly.

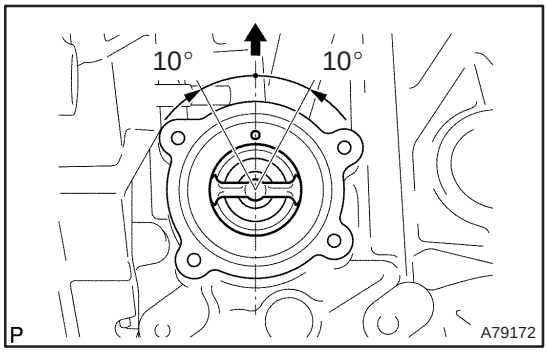
5. **REMOVE RADIATOR HOSE OUTLET**



6. **REMOVE WATER INLET**

(a) Remove the 2 bolts and the water inlet.

7. **REMOVE THERMOSTAT**



8. **INSTALL THERMOSTAT**

(a) Install a new gasket to the thermostat.
(b) Install the thermostat with the jiggle valve facing upward.

HINT:
The jiggle valve may be set within 10° on either side as shown in the illustration.

9. **INSTALL WATER INLET**
   Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)
10. **INSTALL RADIATOR RESERVE TANK ASSY**
    Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)
11. **ADD ENGINE COOLANT (See page 16–44)**
12. **CHECK FOR ENGINE COOLANT LEAKS (See page 16–44)**

THERMOSTAT (1ZZ–FE/3ZZ–FE)

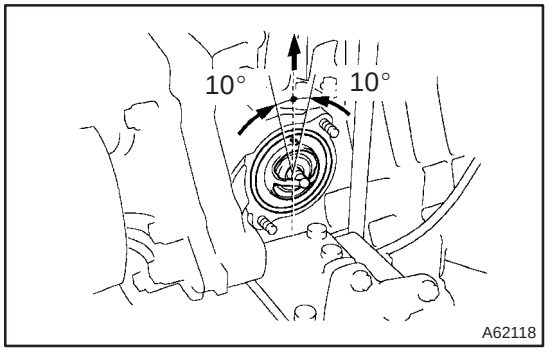
160MJ–01

REPLACEMENT

1. **REMOVE RADIATOR SUPPORT OPENING COVER (See page 14–27)**
2. **ENGINE ROOM COVER SIDE (See page 14–27)**
3. **REMOVE ENGINE UNDER COVER SUB–ASSY NO.1 (See page 14–27)**
4. **DRAIN ENGINE COOLANT (See page 16–1)**
5. **REMOVE FAN AND GENERATOR V BELT (See page 14–5)**
6. **REMOVE GENERATOR ASSY (See page 19–7)**
7. **REMOVE WATER INLET**

(a) Remove the 2 nuts and the water inlet.

8. **REMOVE THERMOSTAT**



9. **INSTALL THERMOSTAT**

(a) Install a new gasket to the thermostat.

(b) Install the thermostat with the jiggle valve upward as shown in the illustration.

10. **INSTALL WATER INLET**

(a) Install the water inlet with the 2 nuts.

Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)

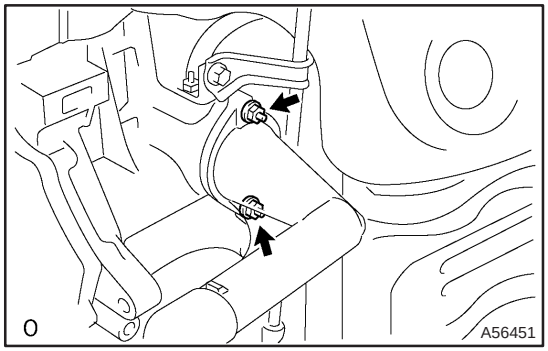
11. **INSTALL GENERATOR ASSY (See page 19–7)**
12. **ADD ENGINE COOLANT (See page 16–7)**
13. **CHECK FOR ENGINE COOLANT LEAKS (See page 16–1)**

THERMOSTAT (1AZ–FE)

160MT–01

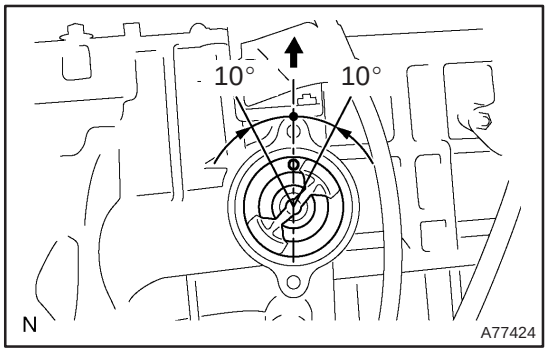
REPLACEMENT

1. **DRAIN COOLANT(See page 16–19)**
2. **REMOVE RADIATOR SUPPORT OPENING COVER**
3. **REMOVE ENGINE ROOM COVER SIDE**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FAN AND GENERATOR V BELT (See page 14–105)**
   SST 09249–63010
6. **REMOVE GENERATOR ASSY (See page 19–20)**



7. **REMOVE WATER INLET**
(a) Remove 2 nuts, and disconnect the water inlet from the cylinder block.

8. **REMOVE THERMOSTAT**



9. **INSTALL THERMOSTAT**
(a) Install a new gasket to the thermostat.
(b) Install the thermostat with the jiggle valve upward.
HINT:
The jiggle valve may be set within 10° on either side of the prescribed position.

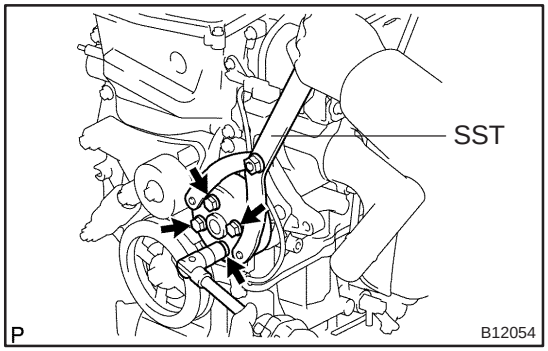
10. **INSTALL WATER INLET**
(a) Install the water inlet with 2 nuts.
Torque: 9.0 N·m (92 kgf·cm, 7 in.·lbf)
11. **INSTALL GENERATOR ASSY (See page 19–20)**
12. **INSTALL FAN AND GENERATOR V BELT (See page 14–105)**
SST 09249–63010
13. **ADD COOLANT (See page 16–19)**
14. **INSPECT CHECK FOR ENGINE COOLANT LEAKS (See page 16–13)**

WATER PUMP ASSY (1AZ–FE)

160MW–01

REPLACEMENT

1. **DRAIN COOLANT (See page 16–19)**
2. **REMOVE RADIATOR SUPPORT OPENING COVER**
3. **REMOVE ENGINE ROOM COVER SIDE**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FAN AND GENERATOR V BELT (See page 14–105)**
   SST 09249–63010
6. **REMOVE GENERATOR ASSY (See page 19–20)**

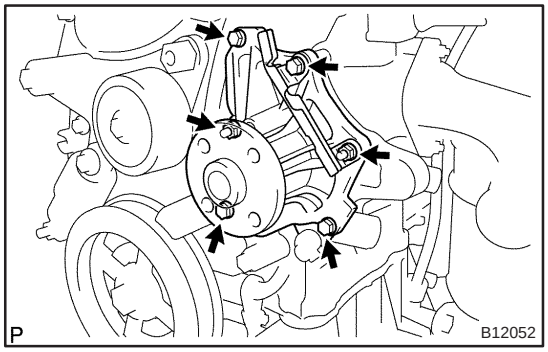


7. REMOVE WATER PUMP PULLEY

(a) Using SST, remove 4 bolts and pump pulley.
SST 09960–10010 (09962–01000, 09963–00700)

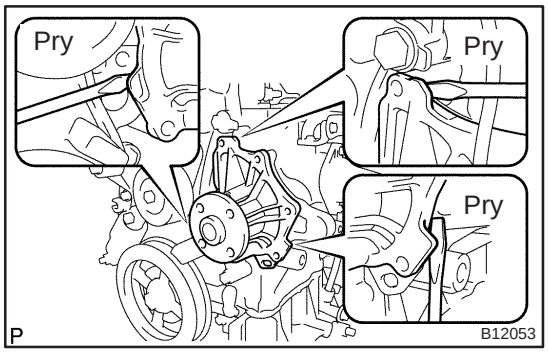
(b) Disconnect the crankshaft position sensor wire clamp from the water pump.

(c) Disconnect the crankshaft position sensor wire from the clamp on the water pump.



8. REMOVE WATER PUMP ASSY

(a) Remove 4 bolts, 2 nuts, wire clamp and water pump.



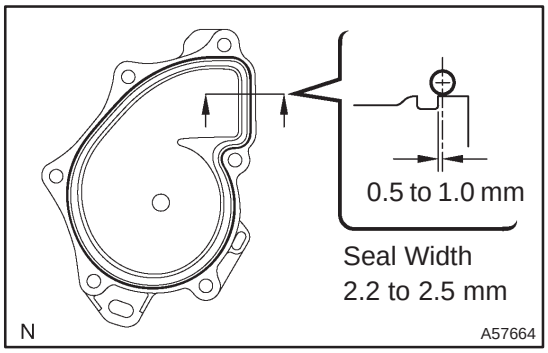
(b) Using a screwdriver, pry between the water pump and cylinder block, and remove the water pump.

NOTICE:

Be careful not to damage the contact surface of the water pump and cylinder block.

9. INSTALL WATER PUMP ASSY

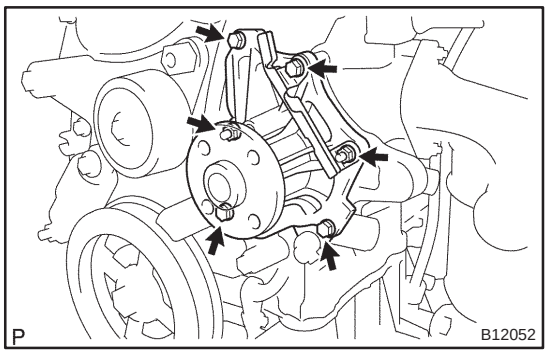
(a) Remove any old packing (FIPG) material from the contact surface.



(b) Apply seal packing to the water pump as shown in the illustration.

Seal packing: Part No. 08826 – 00100 or equivalent

- Install a nozzle that has been cut to a 2.2 to 2.5 mm (0.09 to 0.10 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

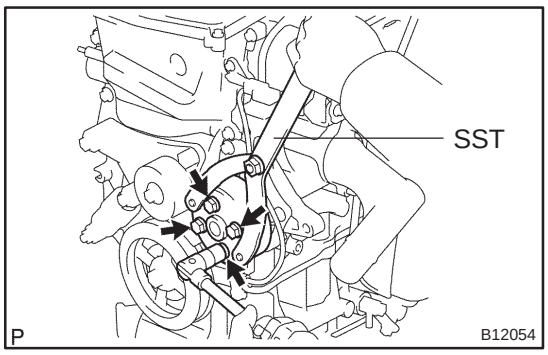


(c) Install the water pump and wire clamp with 4 bolts and 2 nuts.

Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

(d) Install the crankshaft position sensor wire harness clamp to the water pump.

(e) Install the crankshaft position sensor wire to the wire clamp on the water pump.



10. INSTALL WATER PUMP PULLEY

(a) Using SST, install the pump pulley with 4 bolts.

SST 09960–10010 (09962–01000, 09963–00700)

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

11. INSTALL GENERATOR ASSY (See page 19–20)

12. INSTALL FAN AND GENERATOR V BELT (See page 14–105)

SST 09249–63010

13. ADD COOLANT (See page 16–19)

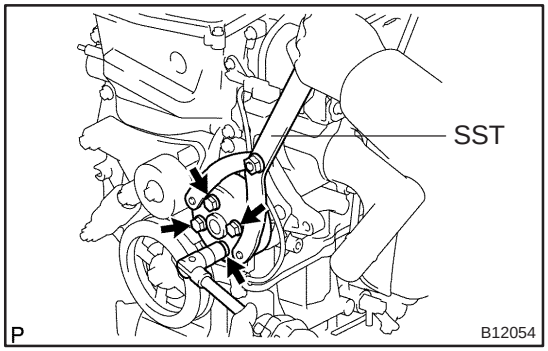
14. INSPECT CHECK FOR ENGINE COOLANT LEAKS (See page 16–17)

WATER PUMP ASSY (1AZ–FSE)

160MR–01

REPLACEMENT

1. **DRAIN COOLANT (See page 16–31)**
2. **REMOVE RADIATOR SUPPORT OPENING COVER**
3. **REMOVE ENGINE ROOM COVER SIDE**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FAN AND GENERATOR V BELT (See page 14–185)**
   SST 09249–63010
6. **REMOVE GENERATOR ASSY (See page 19–20)**

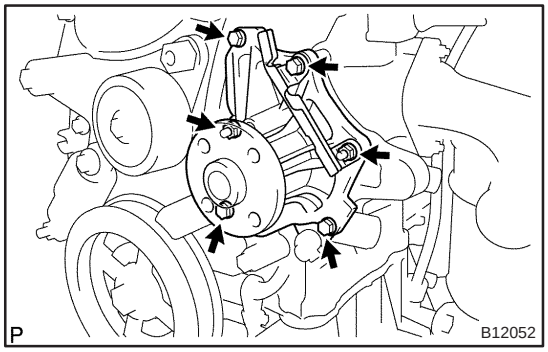


7. REMOVE WATER PUMP PULLEY

(a) Using SST, remove 4 bolts and pump pulley.
SST 09960–10010 (09962–01000, 09963–00700)

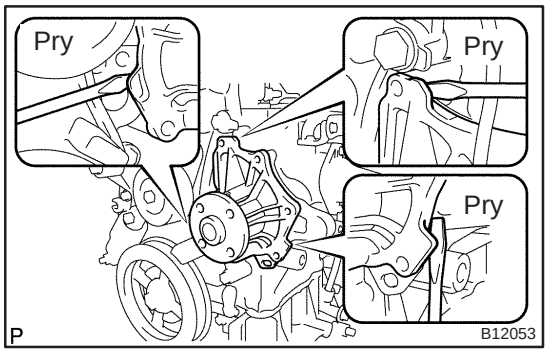
(b) Disconnect the crankshaft position sensor wire clamp from the water pump.

(c) Disconnect the crankshaft position sensor wire from the clamp on the water pump.



8. REMOVE WATER PUMP ASSY

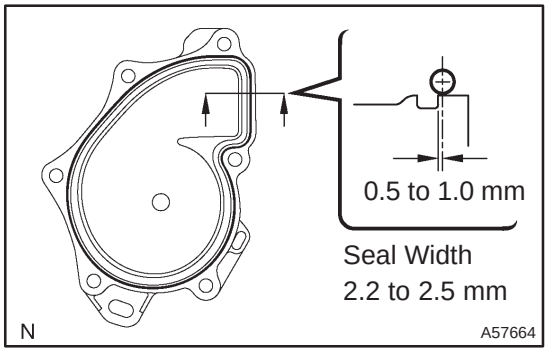
(a) Remove 4 bolts, 2 nuts, wire clamp and water pump.



(b) Using a screwdriver, pry between the water pump and cylinder block, and remove the water pump.

NOTICE:

Be careful not to damage the contact surface of the water pump and cylinder block.



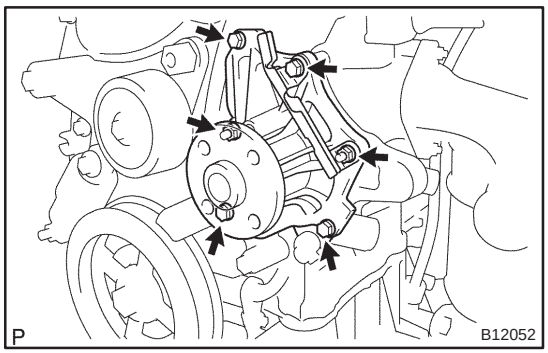
9. INSTALL WATER PUMP ASSY

(a) Remove any old packing (FIPG) material from the contact surface.

(b) Apply seal packing to the water pump as shown in the illustration.

Seal packing: Part No. 08826 – 00100 or equivalent

- Install a nozzle that has been cut to a 2.2 to 2.5 mm (0.09 to 0.10 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

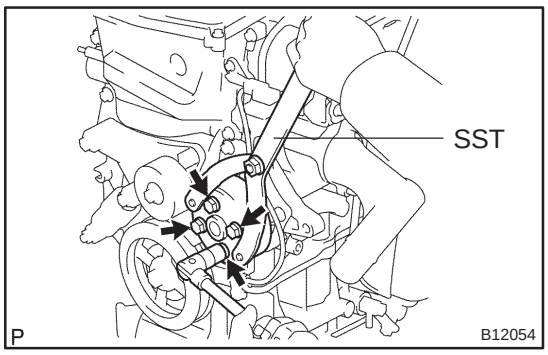


(c) Install the water pump and wire clamp with 4 bolts and 2 nuts.

Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

(d) Install the crankshaft position sensor wire harness clamp to the water pump.

(e) Install the crankshaft position sensor wire to the wire clamp on the water pump.



10. INSTALL WATER PUMP PULLEY

(a) Using SST, install the pump pulley with 4 bolts.

SST 09960–10010 (09962–01000, 09963–00700)

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

11. INSTALL GENERATOR ASSY (See page 19–20)

12. INSTALL FAN AND GENERATOR V BELT (See page 14–185)

SST 09249–63010

13. ADD COOLANT (See page 16–31)

14. INSPECT CHECK FOR ENGINE COOLANT LEAKS (See page 16–25)

WATER PUMP ASSY (1CD–FTV)

160ME–01

REPLACEMENT

1. REMOVE RADIATOR SUPPORT OPENING COVER
2. REMOVE ENGINE ROOM COVER SIDE
3. DRAIN ENGINE COOLANT (See page 16–44)
4. REMOVE FRONT WHEEL RH
5. REMOVE ENGINE UNDER COVER SUB–ASSY NO.1
6. REMOVE ENGINE UNDER COVER RH
7. REMOVE ENGINE COVER NO.1

(a) Remove the 5 nuts and the engine cover.

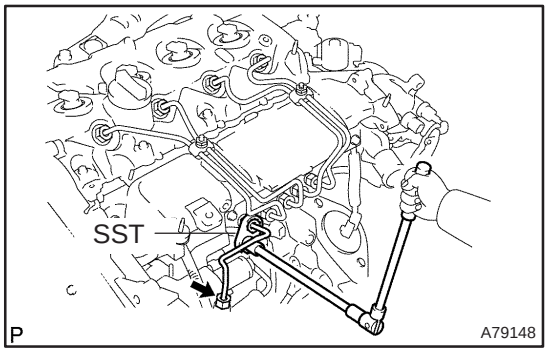
8. REMOVE INJECTOR DRIVER (See page 14–286)
9. REMOVE V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1 (See page 14–269)
10. REMOVE GENERATOR V BELT (See page 14–269)
11. SEPARATE POWER STEERING IDLE PULLEY BRACKET (See page 14–286)
12. SEPARATE ENGINE MOUNTING INSULATOR SUB–ASSY RH (See page 14–307)
13. REMOVE CRANKSHAFT PULLEY (See page 14–307)

SST 09213–54015 (90105–08076), 09330–00021, 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05031)

14. REMOVE IDLER PULLEY SUB–ASSY

(a) Remove the bolt, the washer and the pulley.

15. REMOVE TIMING BELT NO.2 COVER (See page 14–307)
16. REMOVE TIMING BELT NO.1 COVER (See page 14–307)
17. REMOVE TIMING BELT GUIDE
18. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET (See page 14–307)
19. SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page 14–307)
20. REMOVE TIMING CHAIN COVER PLATE (See page 14–307)
21. REMOVE TIMING BELT (See page 14–307)



22. REMOVE FUEL INLET PIPE SUB–ASSY (See page 11–69)

NOTICE:

After removing the fuel inlet pipe, cover the common rail and injection pump with vinyl tape to prevent dust from being introduced.

(a) Remove the wire bracket and slide the engine wire.

(b) Using SST, remove the fuel inlet pipe from the common rail.

SST 09023–12700

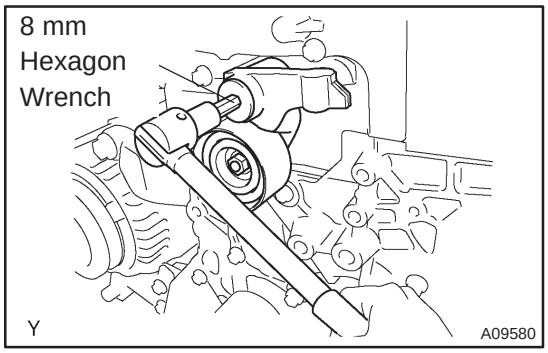
(c) Using SST, remove the fuel inlet pipe from the injection pump.

SST 09023–12700

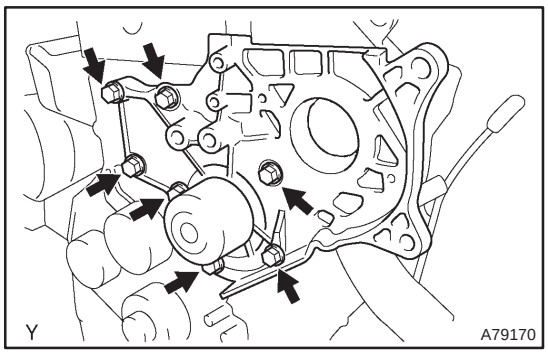
23. REMOVE INTAKE MANIFOLD INSULATOR NO.1 (See page 11–69)
24. REMOVE OIL LEVEL GAGE SUB–ASSY
25. REMOVE OIL LEVEL GAGE GUIDE (See page 17–22)
26. REMOVE WATER INLET (See page 16–50)
27. DISCONNECT INJECTION PUMP TO FUEL PIPE FUEL HOSE (See page 11–69)
28. DISCONNECT INJECTION PUMP TO FUEL FILTER FUEL HOSE OR PIPE (See page 11–69)

29. REMOVE INJECTION PUMP DRIVE PULLEY (See page 11–69)
SST 09960–10010 (09962–01000, 09963–01000), 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05021)

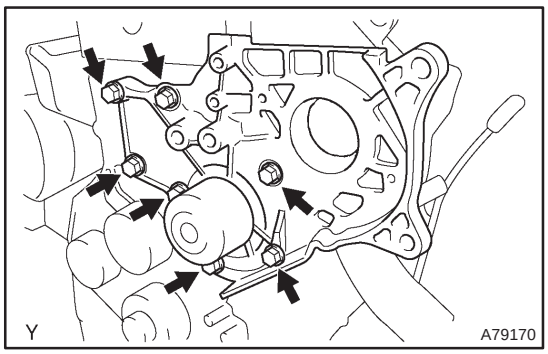
30. REMOVE INJECTION OR SUPPLY PUMP ASSY (See page 11–69)



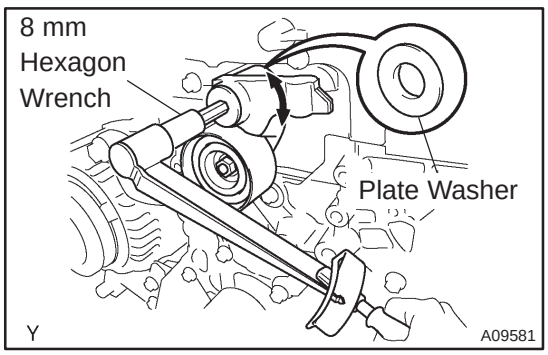
31. REMOVE TIMING BELT IDLER SUB–ASSY NO.1
(a) Using an 8 mm hexagon wrench, remove the idler pulley shaft, the idler pulley and the plate washer.



32. REMOVE WATER PUMP ASSY
(a) Remove the 7 bolts, then remove the water pump and the gasket.



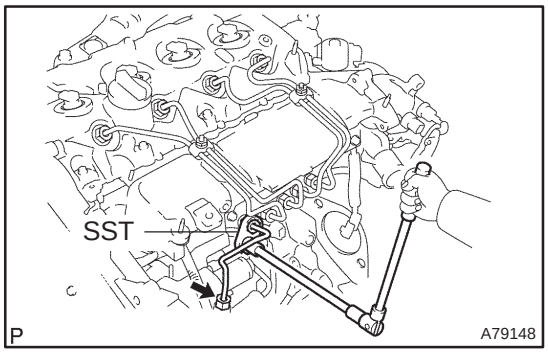
33. INSTALL WATER PUMP ASSY
(a) Install a new gasket and the water pump with the 7 bolts.
Torque: 31 N·m (320 kgf·cm, 23 ft.·lbf)



34. INSTALL TIMING BELT IDLER SUB–ASSY NO.1
(a) Using an 8 mm hexagon wrench, install the plate washer and the idler pulley with the idler pulley shaft.
Torque: 35 N·m (357 kgf·cm, 26 ft·lbf)
(b) Check that the pulley bracket moves smoothly.

35. INSTALL INJECTION OR SUPPLY PUMP ASSY (See page 11–69)
36. INSTALL INJECTION PUMP DRIVE PULLEY (See page 11–69)
SST 09960–10010 (09962–01000, 09963–01000)
37. INSTALL WATER INLET (See page 16–50)
38. INSTALL OIL LEVEL GAGE GUIDE (See page 17–22)

39. INSTALL INTAKE MANIFOLD INSULATOR NO.1 (See page 11–69)

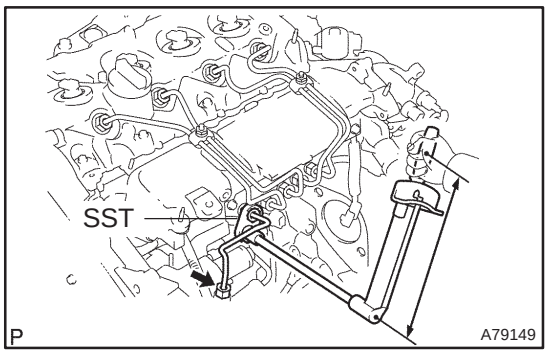


40. INSTALL FUEL INLET PIPE SUB–ASSY

NOTICE:

- **In case of having the water pump replaced, must replace fuel inlet pipe, too.**
- **When assembling the pipe, perform the operation with the engine cold under room temperature.**

(a) Temporarily install the new fuel inlet pipe.



(b) Using SST, tighten the nut of the fuel inlet pipe to the common rail side.

SST 09023–12700

Torque:

42 N·m (428 kgf·cm, 31 ft·lbf) for a used pipe using SST

46 N·m (469 kgf·cm, 34 ft·lbf) for a used pipe not using SST

31 N·m (316 kgf·cm, 23 ft·lbf) for a new pipe using SST

34 N·m (347 kgf·cm, 25 ft·lbf) for a new pipe not using SST

HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.81 in.)
- Check if the used pipe has deflection or is installed properly after inlet pipe is reassembled. If there is deflection or if it can not be installed properly, replace the used pipe with a new pipe.

(c) Using SST, tighten the nut of the fuel inlet pipe to the injection pump side.

SST 09023–12700

Torque:

42 N·m (428 kgf·cm, 31 ft·lbf) for a used pipe using SST

46 N·m (469 kgf·cm, 34 ft·lbf) for a used pipe not using SST

31 N·m (316 kgf·cm, 23 ft·lbf) for a new pipe using SST

34 N·m (347 kgf·cm, 25 ft·lbf) for a new pipe not using SST

HINT:

- Use a torque wrench with a fulcrum length of 30 cm (11.81 in.)
- Check if the used pipe has deflection or is installed properly after inlet pipe is reassembled. If there is deflection or if it can not be installed properly, replace the used pipe with a new pipe.

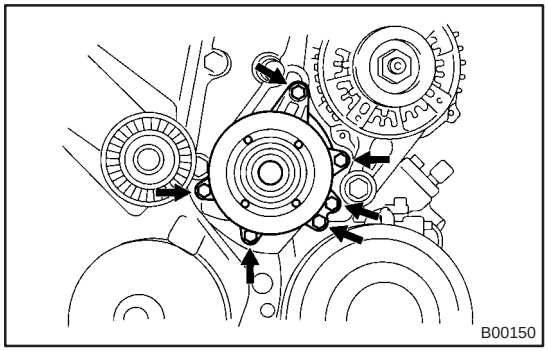
41. **SET NO. 1 CYLINDER TO TDC/COMPRESSION**
    SST 09960–10010 (09962–01000, 09963–01000)
42. **INSTALL TIMING BELT (See page 14–307)**
43. **CHECK VALVE TIMING (See page 14–307)**
44. **INSTALL TIMING CHAIN COVER PLATE (See page 14–307)**
45. **INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET (See page 14–307)**
46. **INSTALL TIMING BELT GUIDE (See page 14–307)**
47. **INSTALL TIMING BELT NO.1 COVER (See page 14–307)**
48. **INSTALL TIMING BELT NO.2 COVER (See page 14–307)**
49. **INSTALL IDLER PULLEY SUB–ASSY (See page 11–69)**
50. **INSTALL CRANKSHAFT PULLEY (See page 14–307)**
    SST 09213–54015 (90105–08076), 09330–00021
51. **INSTALL ENGINE MOUNTING INSULATOR SUB–ASSY RH (See page 14–307)**
52. **INSTALL POWER STEERING IDLE PULLEY BRACKET (See page 14–286)**
53. **ADJUST V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1 (See page 14–269)**
54. **INSTALL INJECTOR DRIVER (See page 11–69)**
55. **INSTALL FRONT WHEEL RH**
    Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
56. **INSTALL ENGINE COVER NO.1**
    Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
57. **ADD ENGINE COOLANT (See page 16–44)**
58. **CHECK FOR ENGINE COOLANT LEAKS (See page 16–44)**
59. **CHECK FOR FUEL LEAKS (See page 11–60)**

WATER PUMP ASSY (1ZZ–FE/3ZZ–FE)

160MI–01

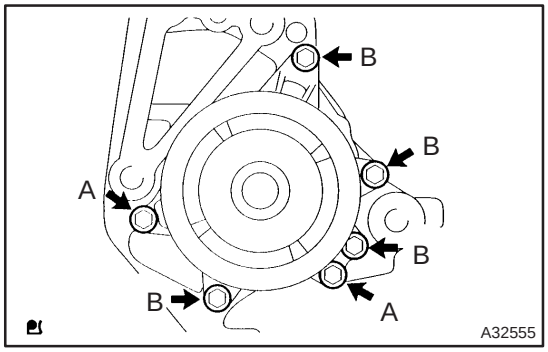
REPLACEMENT

1. REMOVE RADIATOR SUPPORT OPENING COVER (See page 14–27)
2. REMOVE ENGINE ROOM COVER SIDE (See page 14–27)
3. REMOVE ENGINE UNDER COVER SUB–ASSY NO.1 (See page 14–27)
4. REMOVE ENGINE UNDER COVER RH (See page 14–27)
5. DRAIN ENGINE COOLANT (See page 16–1)
6. REMOVE FAN AND GENERATOR V BELT (See page 14–5)
7. REMOVE GENERATOR ASSY (See page 19–7)



8. **REMOVE WATER PUMP ASSY**

(a) Remove the 6 bolts, the water pump and the O–ring.



9. **INSTALL WATER PUMP ASSY**

(a) Place a new O–ring on the timing chain cover.

(b) Install the water pump with the 6 bolts.

Torque:
9.0 N·m (92 kgf·cm, 80 in·lbf) for Bolt A
11 N·m (113 kgf·cm, 8 ft·lbf) for Bolt B

10. INSTALL GENERATOR ASSY (See page 19–7)
11. ADD ENGINE COOLANT (See page 16–7)
12. CHECK FOR ENGINE COOLANT LEAKS (See page 16–1)