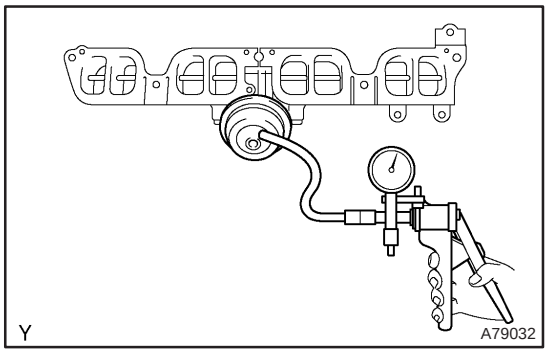
INSPECTION



1. INSPECT INTAKE AIR CONTROL VALVE ASSY

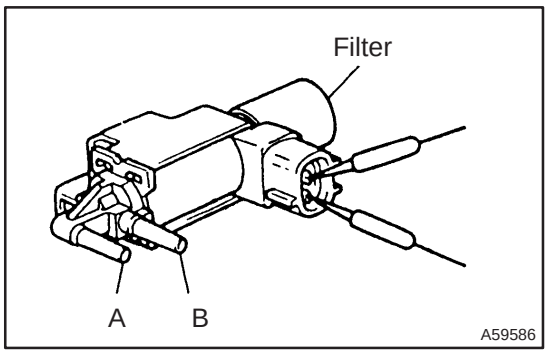
(a) With 34.7 kPa (260 mm Hg, 10.2 in. Hg) of vacuum applied to the actuator, check that the actuator rod moves.

(b) One minute after applying the vacuum, check that the actuator rod does not return.

(c) If the operation is not as specified, replace the intake air control valve assembly.

NOTICE:

Do not touch the adjust screw.



2. INSPECT VACUUM SWITCHING VALVE ASSY NO.1

(a) Using an ohmmeter, measure resistance between each terminal.

Resistance: 33 to 39 Ω at 20°C (68°F)

(b) Check that air flows form port B to the filter.

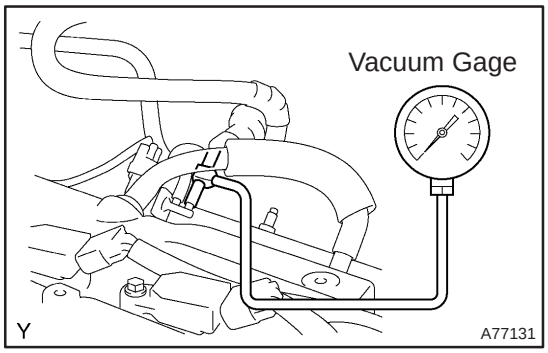
(c) Apply battery voltage across the terminals.

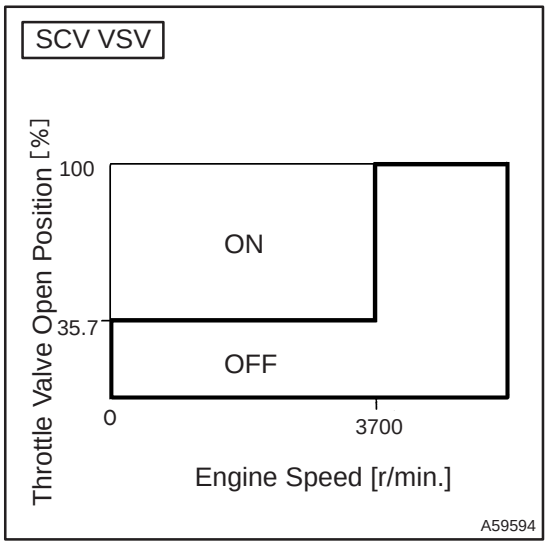
(d) Check that air flows from port B to port A.

INTAKE AIR CONTROL SYSTEM (1AZ–FSE)

1302G–03

ON–VEHICLE INSPECTION





1. INSPECT INTAKE AIR CONTROL SYSTEM

(a) Using a 3–way connector, connect vacuum gauge to the actuator hose.

(b) Connect the hand–held tester to the DLC 3.

(c) Start the engine.

(d) Select the active test mode according to the message on the hand–held tester.

Vacuum:

VSV ON	Approx. 27 kPa (200 mm Hg, 7.9 in. Hg)
VSV OFF	0 kPa (0 mm Hg, 0 in. Hg.)

(e) Shift the transmission into the P range and control the accelerator pedal.

(f) Check the VSV operation using the hang–held tester.

HINT:

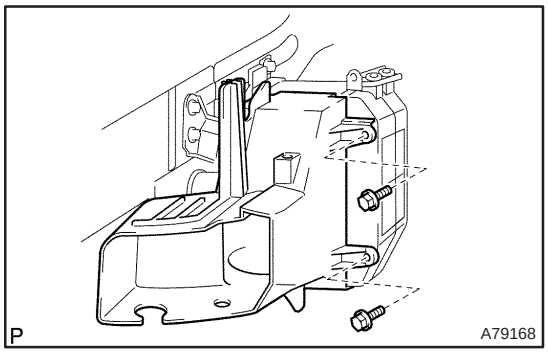
The value in the illustration is only for reference; the throttle valve may operate diversely depend on the engine running condition.

INTERCOOLER ASSY (1CD–FTV)

13070–01

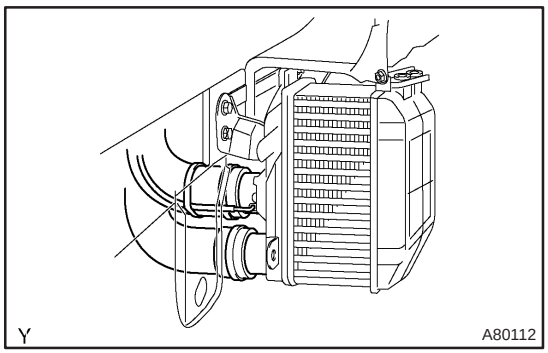
REPLACEMENT

1. REMOVE FRONT BUMPER COVER (See page 76–3)



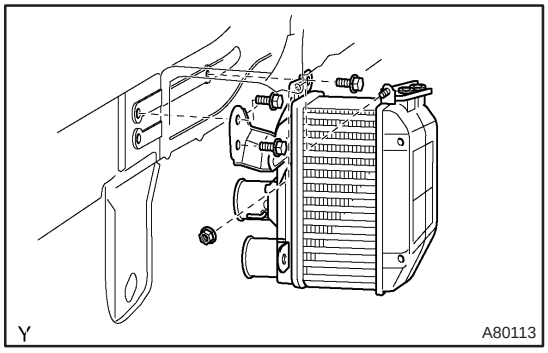
2. REMOVE INTERCOOLER COOLING AIR DUCT SUB–ASSY

(a) Remove the 2 bolts and the cooling air duct.



3. REMOVE INTERCOOLER ASSY

(a) Disconnect the vacuum hose, the air hose No. 2 and No. 3 from the intercooler.

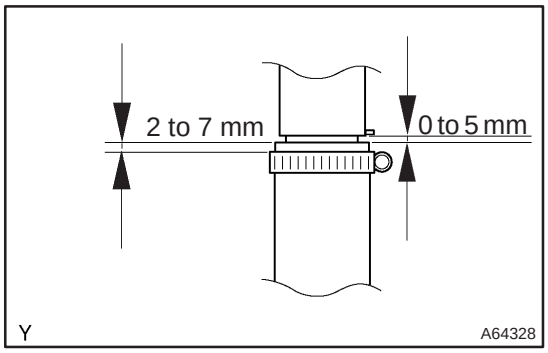


(b) Remove the 3 bolts and nut, and then detach the intercooler assy.

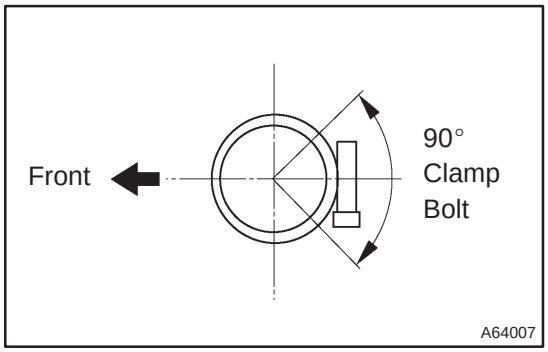
4. INSTALL INTERCOOLER ASSY

(a) Install the intercooler assembly with the 3 bolts and a new nut.

Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)



(b) Install the air hose and hose clamps as shown in the illustration.

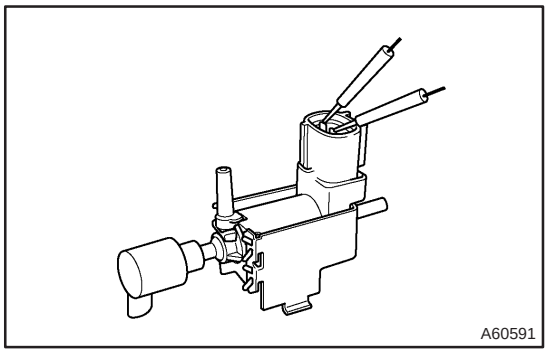


(c) Tighten the hose clamps as shown in the illustration.
Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

5. INSTALL INTERCOOLER COOLING AIR DUCT SUB–ASSY
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

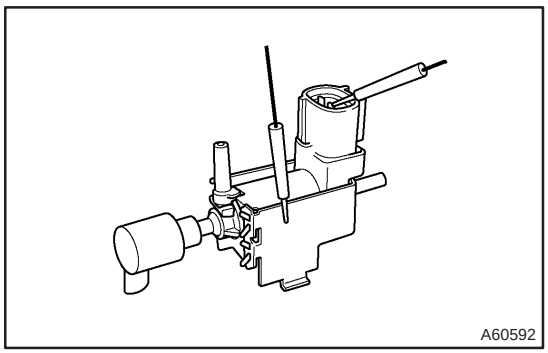
6. INSTALL FRONT BUMPER COVER (See page 76–3)

INSPECTION

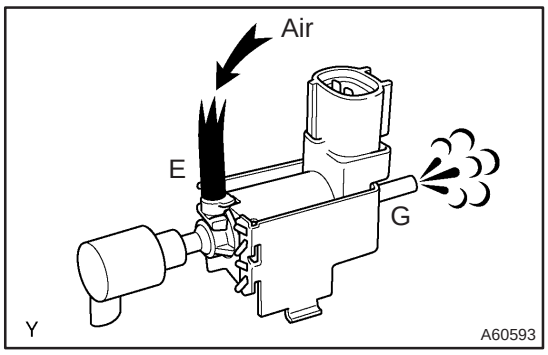


1. VACUUM SWITCHING VALVE ASSY NO.1

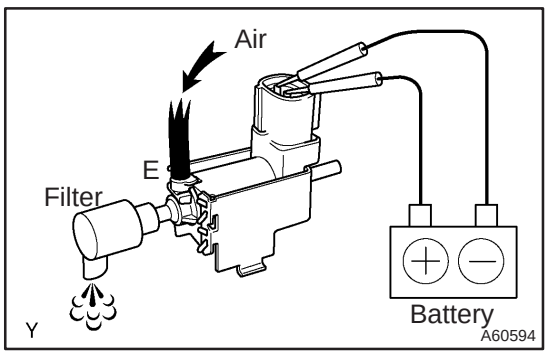
(a) Inspect VSV for open circuit.
(1) Using an ohmmeter, check that the there is continuity between the terminals.
Resistance: 37 – 44 Ω at 20°C (68°F)



(b) Inspect VSV for ground.
(1) Using an ohmmeter, check that there is no continuity between each terminal and the body.
Specified condition: No continuity



(c) Inspect VSV operation.
(1) Check that air flows from port E to G.



(2) Apply battery voltage across the terminals.
(3) Check that air flows from port E to filter.

1302Z–03

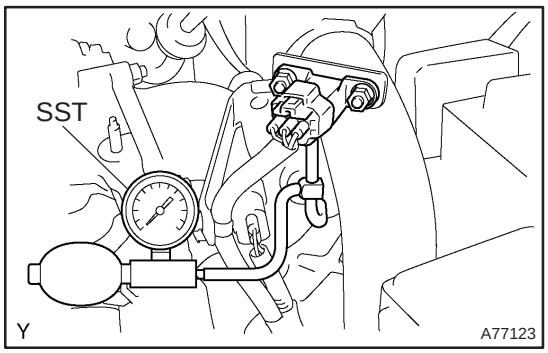
ON–VEHICLE INSPECTION

1. INSPECT INTAKE AIR SYSTEM

(a) Check for leakage or clogging between the air cleaner housing and turbocharger inlet and between the turbocharger outlet and cylinder head.
  (1) Clogged air cleaner...Clean or replace element
  (2) Hoses collapsed or deformed...Repair or replace
  (3) Leakage from connections...Check each connection and repair
  (4) Cracks in components...Check and replace

2. INSPECT EXHAUST SYSTEM

(a) Check for leakage or clogging between the cylinder head and turbocharger inlet and between the turbocharger outlet and exhaust pipe.
  (1) Deformed components...Repair or replace
  (2) Foreign material in passages...Remove
  (3) Leakage from components...Repair or replace
  (4) Cracks in components...Check and replace



3. CHECK TURBOCHARGING PRESSURE

(a) Warm up the engine.

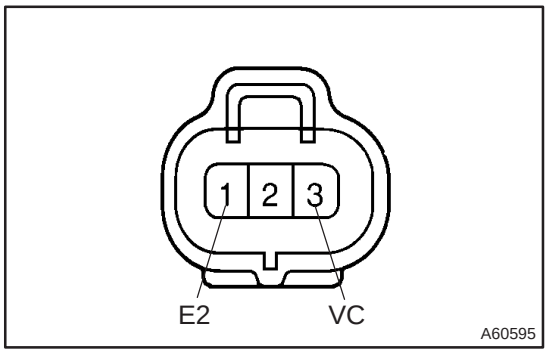
(b) Using a 3–way connector, connect SST (turbocharger pressure gauge) to the hose leading to the intake air connector.
  SST 09992 – 00242

(c) While depressing the clutch pedal, press the accelerator pedal down to the full. Measure the turbocharging pressure at maximum speed (5,100 to 5,250 rpm).
  Standard pressure:
  15 to 45 kPa (0.15 to 0.46 kgf/cm^2, 2.2 to 6.5 psi)

If the pressure is less than specification, check both the intake air and exhaust systems for leakage.

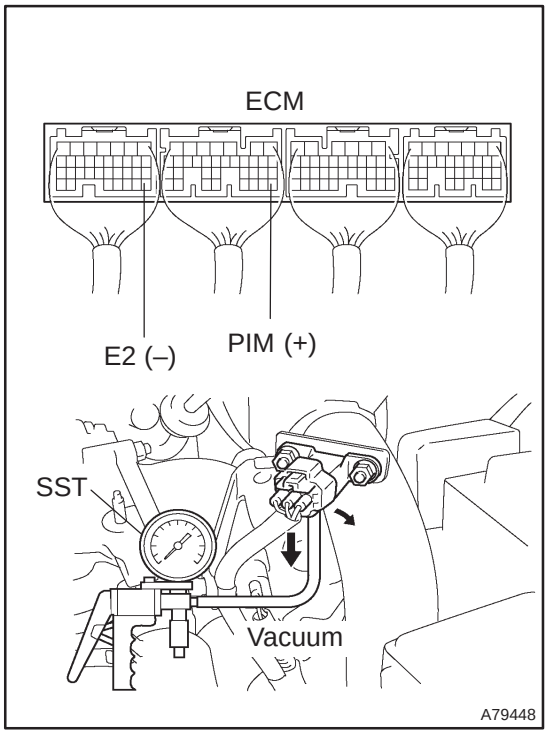
If there is no leakage, check if the actuator hose has disconnected. If not, check the turbocharger.

If the pressure is greater than specification, check if the actuator hose has disconnected or cracked. If not, check the turbocharger.



4. INSPECT TURBO PRESSURE SENSOR

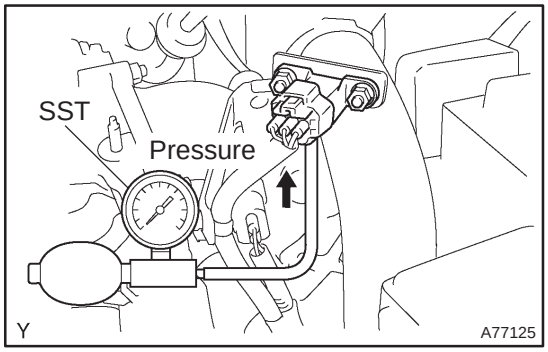
(a) Inspect power source voltage
  (1) Disconnect the turbo pressure sensor connector.
  (2) Turn the ignition switch ON.
  (3) Using a voltmeter, measure the voltage between connector terminals 3 (VC) and 1 (E2) of the wiring harness side.
  Voltage: 4.5 to 5.5 V
  (4) Turn the ignition switch OFF.
  (5) Reconnect the turbo pressure sensor connector.



(b) Inspect supply power
(1) Turn the ignition switch ON.
(2) Disconnect the vacuum hose from the turbo pressure sensor.
(3) Connect a voltmeter to terminals 35 (PIM) and 28 (E2) of the ECM and measure the output voltage under atmospheric pressure.
(4) Apply vacuum to the turbo pressure sensor in 13.3 kPa (100 mmHg, 3.94 in.Hg) segments to 66.7 kPa (500 mmHg, 19.96 in.Hg).
(5) Measure the voltage decrease from step (3) above for each segment.

Voltage drop:

Apply Vacuum [kPa (mmHg, in.Hg)]	Voltage Decrease [V]
13.3 (100, 3.94)	0.1 to 0.3
26.7 (200, 7.87)	0.3 to 0.5
40.0 (300, 11.81)	0.5 to 0.7
57.3 (400, 15.75)	0.7 to 0.9
66.7 (500, 19.96)	0.9 to 1.0



(6) Using SST (turbocharger pressure gauge), apply pressure to the turbo pressure sensor in 19.6 kPa (0.20 kgf/cm^2, 2.84 psi) segments to 98.0 kPa (1.00 kgf/cm^2, 14.2 psi).

SST 09992–00242

(7) Measure the voltage increase from step (3) above for each segment.

Voltage up:

Applied Pressure [kPa (kgf/cm^2, psi)]	Voltage Increase [V]
19.6 (0.20, 2.84)	0.1 to 0.4
39.2 (0.40, 5.69)	0.4 to 0.7
58.8 (0.60, 8.53)	0.7 to 1.0
78.5 (0.80, 11.4)	1.0 to 1.3
98.0 (1.00, 14.2)	1.3 to 1.6

TURBO CHARGER SYSTEM (1CD–FTV)

1302Y–03

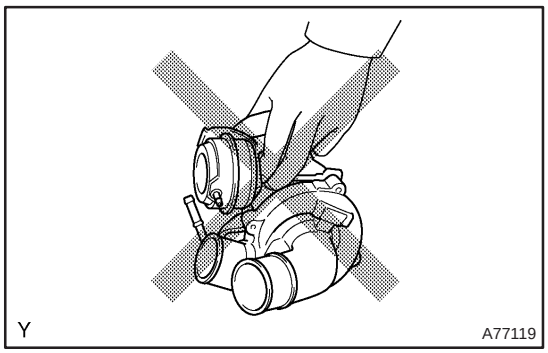
PRECAUTION

1. MAINTENANCE PRECAUTION

(a) Do not stop the engine immediately after pulling a trailer, or after driving at a high speed, or uphill drive. Let the engine Idle for 20 to 120 seconds before turn the ignition switch OFF (According as the driving condition, the idling time varies).

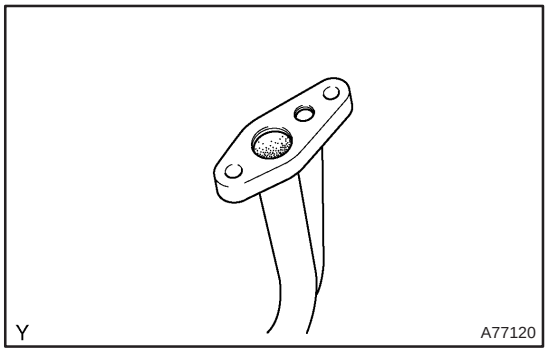
(b) Avoid quick acceleration or quickly accelerating the engine RPM immediately after the starting a cold engine.

(c) If the turbocharger is found to be defective, it must be replaced. Also, inspect a source of the trouble including conditions of the turbocharger that having been used. Repair or replace the followings as necessary:
  (1) Engine oil (Level and quality)
  (2) Oil lines leading to the turbocharger



(d) Pay due attention when removing and reinstalling the turbocharger assembly. Do not drop, or do not give shock, or do not grasp easily–deformed assembly parts such as the actuator or push rod in removal and reinstallation.

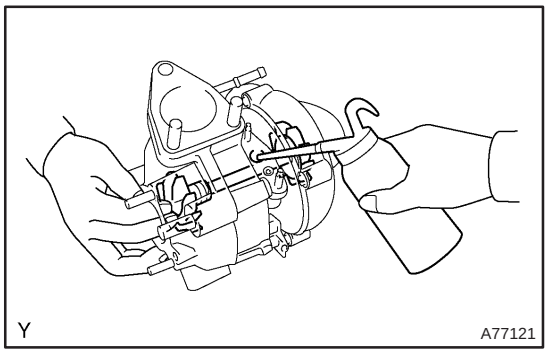
(e) Before removal, cover both the intake and exhaust ports and the oil inlet to prevent dirt or foreign objects from being introduced.



(f) If replacing the turbocharger, check for deposits in the oil pipe. If necessary, replace the oil pipe too.

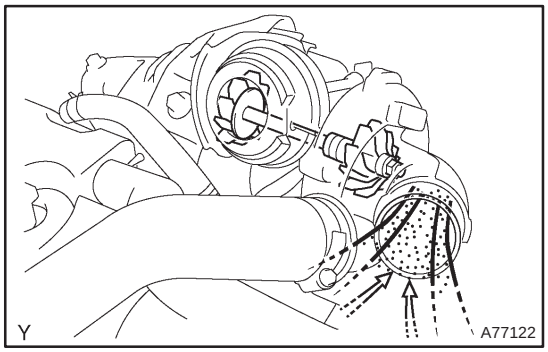
(g) Thoroughly remove old gasket sticking to the lubrication oil pipe flange and the turbocharger oil flange.

(h) If replacing the bolt(s) or nut(s), must use Toyota genuine parts to prevent breakage or deformation.



(i) If replacing the turbocharger, put 20 cm^3 (1.2 cu in.) of fresh oil into the turbocharger oil inlet hole and turn the turbine wheel by hand to spread oil to the bearing.

(j) If overhauling or replacing the engine, cut the fuel supply after reassembly and crank the engine for 30 seconds to feed oil throughout the engine then run the engine at idle for 60 seconds.

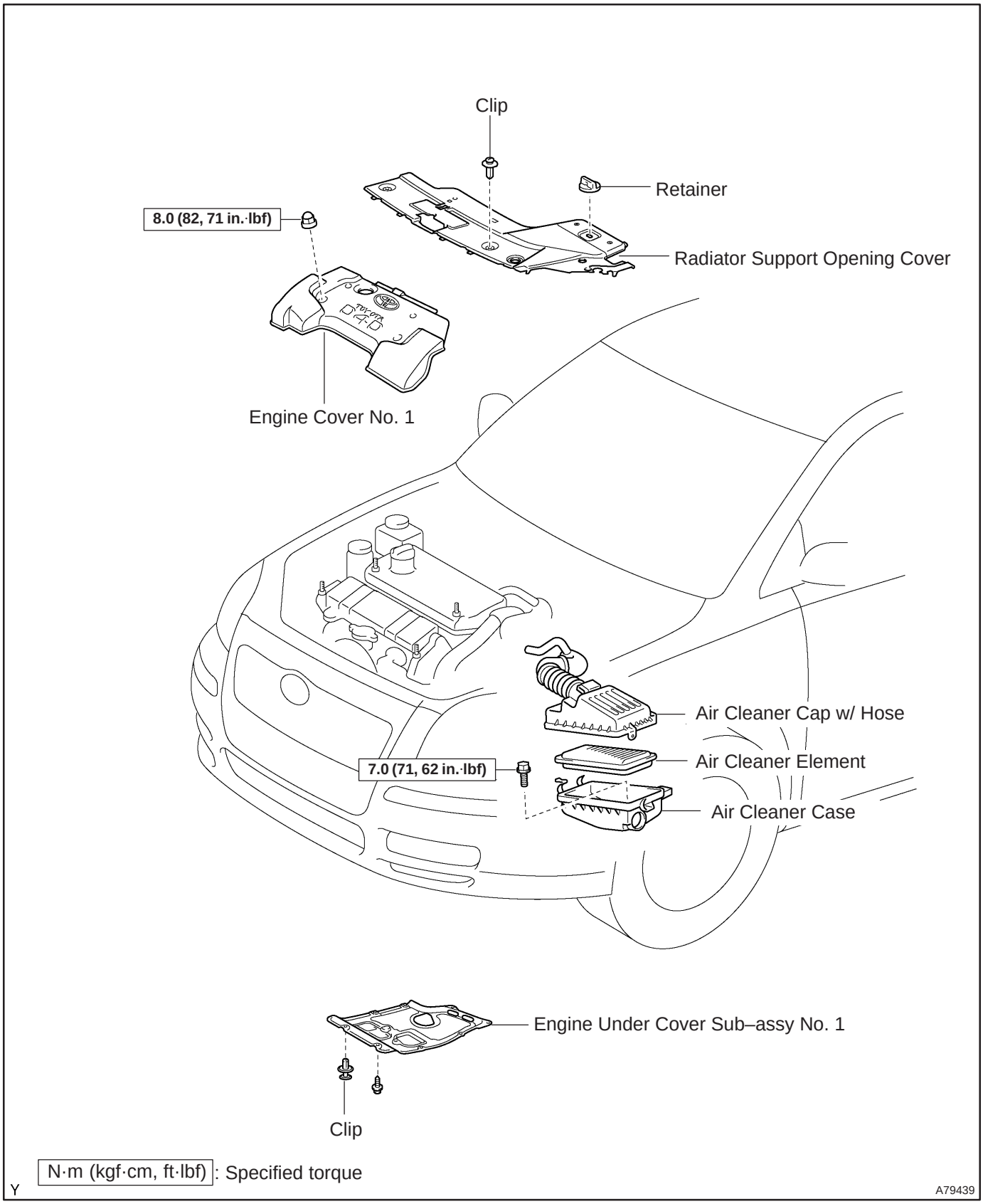


(k) Since the turbine wheels runs at an extremely high speed, if the engine is running without the air cleaner, case cover and hose, damage to the turbine wheel will result by introduced foreign particle.

TURBOCHARGER SUB–ASSY (1CD–FTV)

1306Y–01

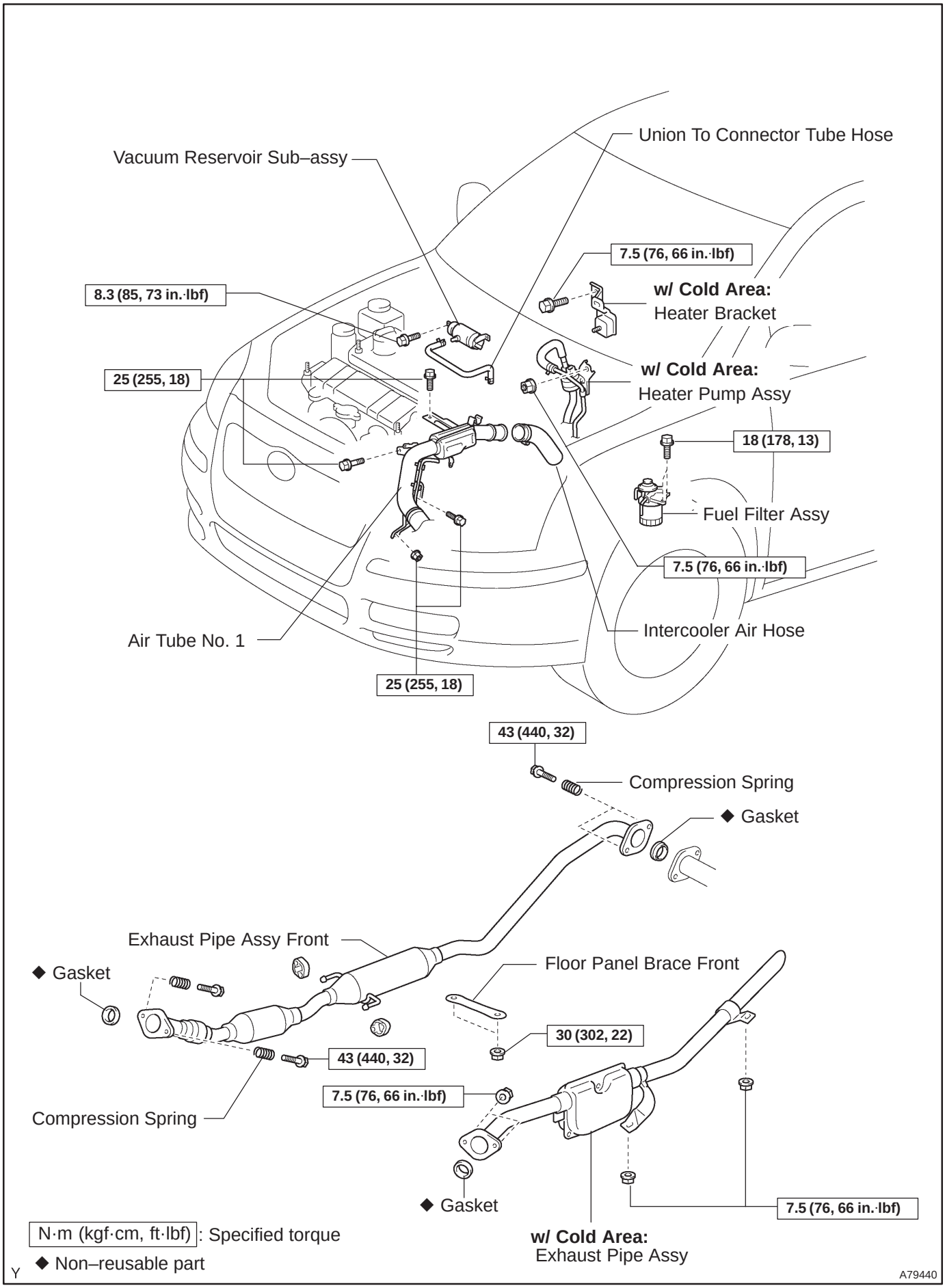
COMPONENTS

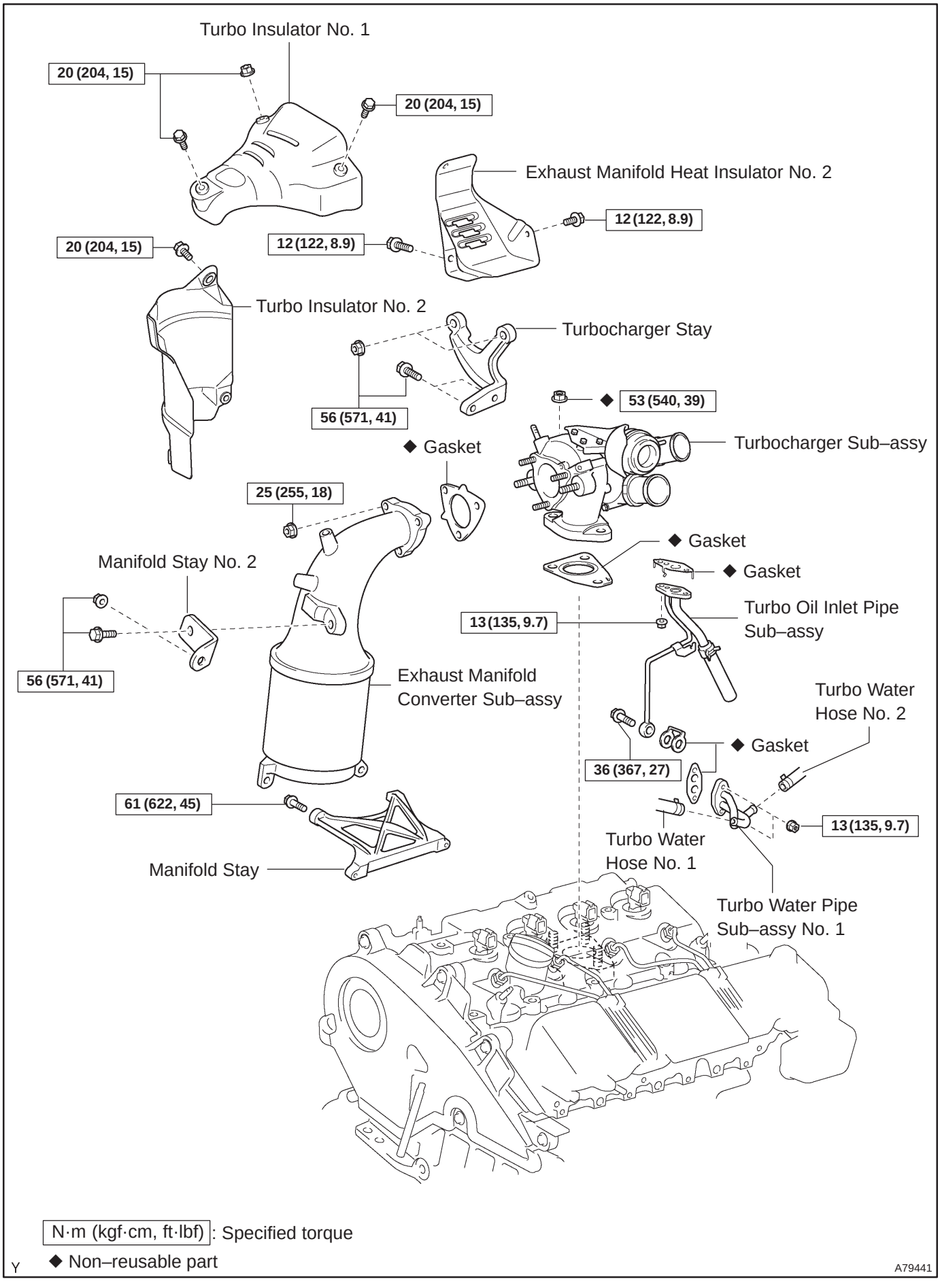


N·m (kgf·cm, ft·lbf): Specified torque

Y

A79439


Union To Connector Tube Hose
Vacuum Reservoir Sub–assy
7.5 (76, 66 in.·lbf)
8.3 (85, 73 in.·lbf)
w/ Cold Area:
Heater Bracket
w/ Cold Area:
Heater Pump Assy
25 (255, 18)
18 (178, 13)
Fuel Filter Assy
7.5 (76, 66 in.·lbf)
Intercooler Air Hose
Air Tube No. 1
25 (255, 18)
43 (440, 32)
Compression Spring
◆ Gasket
Exhaust Pipe Assy Front
◆ Gasket
Floor Panel Brace Front
30 (302, 22)
43 (440, 32)
7.5 (76, 66 in.·lbf)
Compression Spring
◆ Gasket
7.5 (76, 66 in.·lbf)
w/ Cold Area:
Exhaust Pipe Assy
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non–reusable part
Y
A79440


Turbo Insulator No. 1
20 (204, 15)
20 (204, 15)
Exhaust Manifold Heat Insulator No. 2
12 (122, 8.9)
20 (204, 15)
12 (122, 8.9)
Turbo Insulator No. 2
Turbocharger Stay
56 (571, 41)
◆ 53 (540, 39)
Turbocharger Sub–assy
◆ Gasket
25 (255, 18)
◆ Gasket
◆ Gasket
Manifold Stay No. 2
Turbo Oil Inlet Pipe Sub–assy
13 (135, 9.7)
56 (571, 41)
Exhaust Manifold Converter Sub–assy
Turbo Water Hose No. 2
◆ Gasket
36 (367, 27)
61 (622, 45)
13 (135, 9.7)
Turbo Water Hose No. 1
Manifold Stay
Turbo Water Pipe Sub–assy No. 1
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non–reusable part
Y
A79441

REPLACEMENT

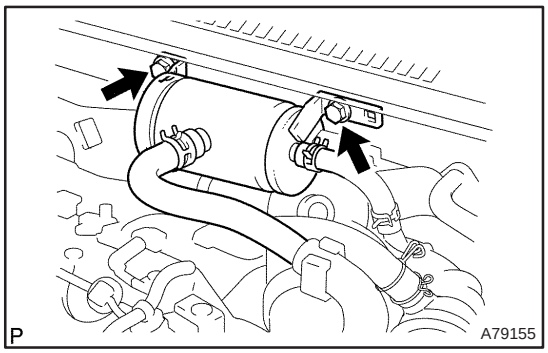
1. REMOVE ENGINE UNDER COVER SUB–ASSY NO.1

2. DRAIN ENGINE COOLANT (See page 16–44)

3. REMOVE RADIATOR SUPPORT OPENING COVER

4. REMOVE ENGINE COVER NO.1

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



5. REMOVE VACUUM RESERVOIR SUB–ASSY

(a) Disconnect the 2 vacuum hoses and the connector.

(b) Remove the 2 bolts and the vacuum reservoir.

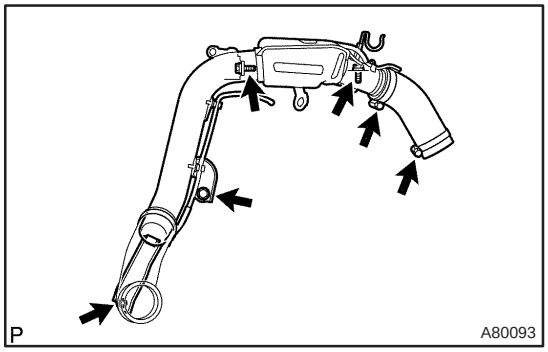
6. REMOVE AIR CLEANER ASSY

(a) Disconnect the PCV hose and the connector.

(b) Remove the air cleaner cap with the air cleaner hose.

(c) Remove the air cleaner filter element.

(d) Remove the 3 bolts and the air cleaner case.

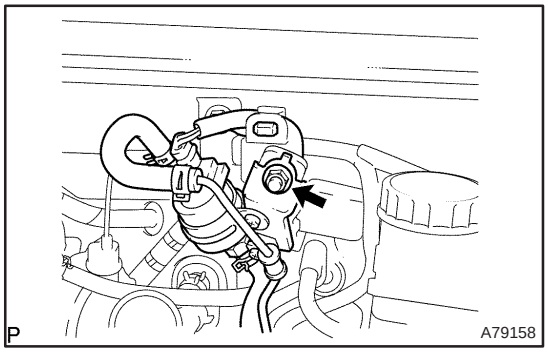


7. REMOVE INTERCOOLER AIR HOSE

(a) Remove the 3 bolts and nut, separate the air tube No.1.

(b) Loosen the hose clamp bolts and remove the air hose No.1.

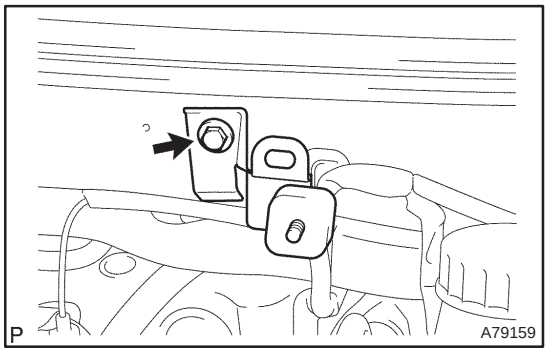
8. REMOVE FUEL FILTER ASSY (See page 11–82)



9. SEPARATE HEATER PUMP ASSY (W/ COLD AREA)

(a) Remove the nut and disconnect the connector.

(b) Separate the heater pump.

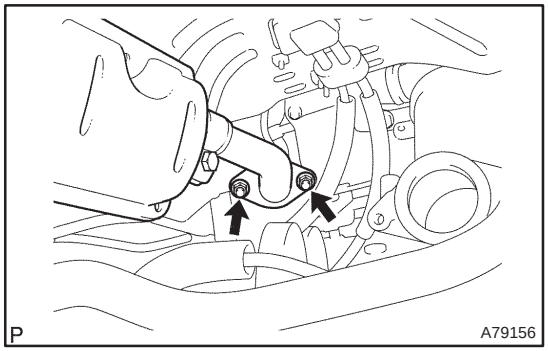


10. REMOVE HEATER BRACKET (W/ COLD AREA)

(a) Remove the bolt and the heater bracket.

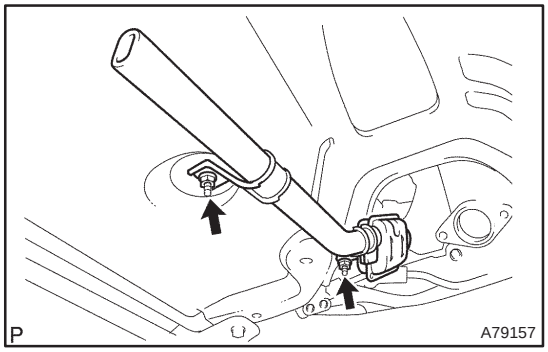
11. REMOVE FLOOR PANEL BRACE FRONT (See page 15–10)

12. REMOVE EXHAUST PIPE ASSY FRONT (See page 15–10)

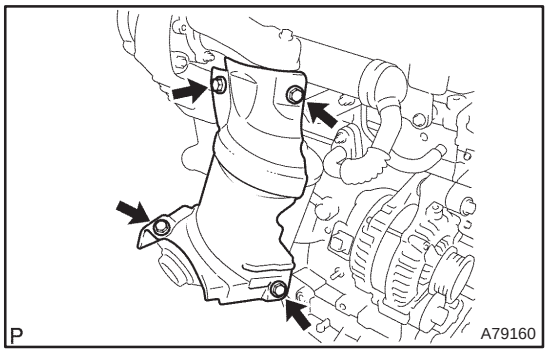


13. REMOVE EXHAUST PIPE ASSY (W/ COLD AREA)

(a) Remove the 2 nuts.

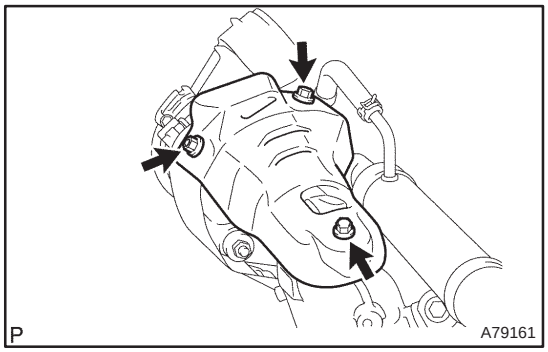


(b) Remove the 2 nuts and the exhaust pipe sub–assy.



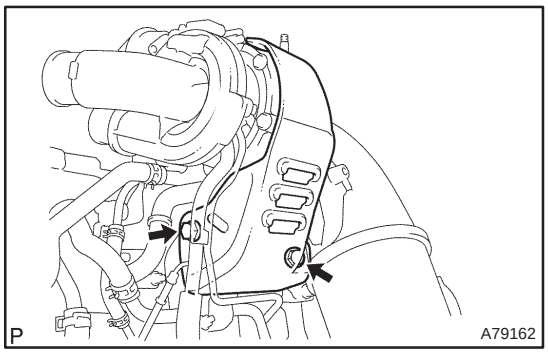
14. REMOVE TURBO INSULATOR NO.2

(a) Remove the 4 bolts and the turbo insulator.



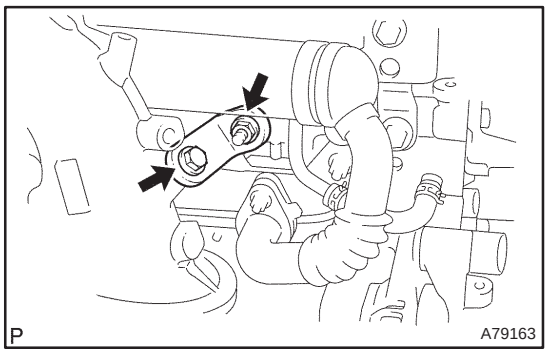
15. REMOVE TURBO INSULATOR NO.1

(a) Remove the 2 bolts and nut, and then remove the turbo insulator.



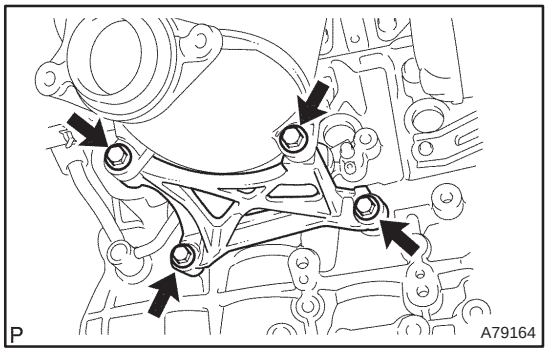
16. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.2

(a) Remove the 2 bolts and the exhaust manifold heat insulator.



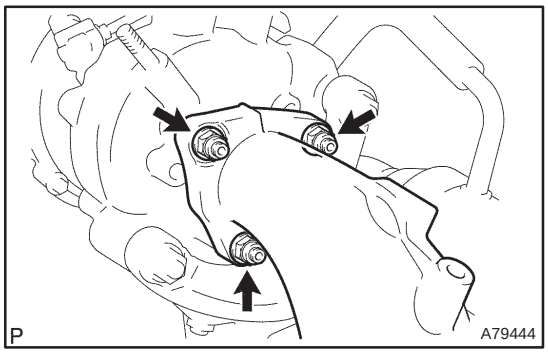
17. REMOVE MANIFOLD STAY NO.2

(a) Remove the bolt and nut and then remove the manifold stay.



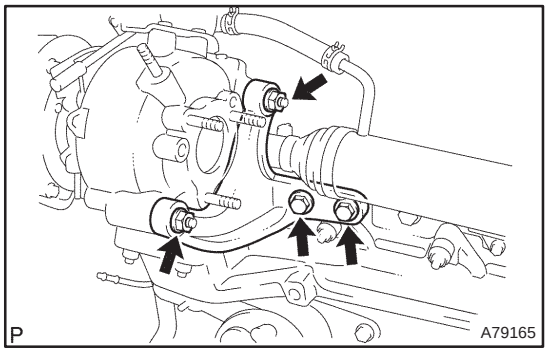
18. REMOVE MANIFOLD STAY

(a) Remove the 4 bolts and the manifold stay.



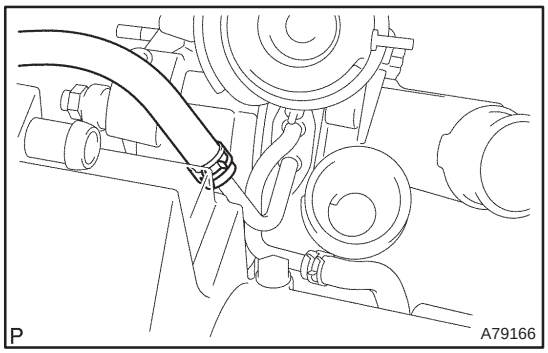
19. REMOVE EXHAUST MANIFOLD CONVERTER SUB–ASSY

(a) Remove the 3 nuts, the manifold converter and the gasket.

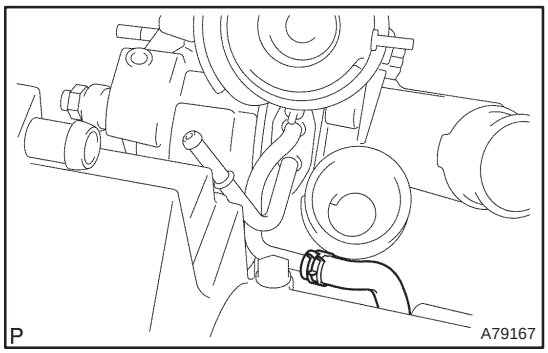


20. REMOVE TURBOCHARGER STAY

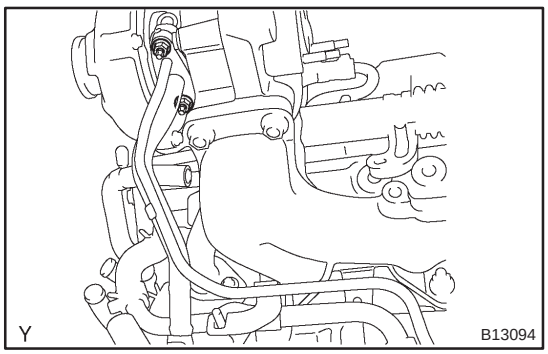
(a) Remove the 2 bolts and 2 nuts, and then remove the turbocharger stay.



21. DISCONNECT TURBO WATER HOSE NO.1

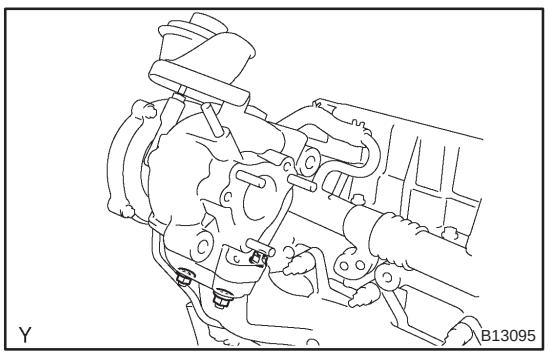


22. DISCONNECT TURBO WATER HOSE NO.2



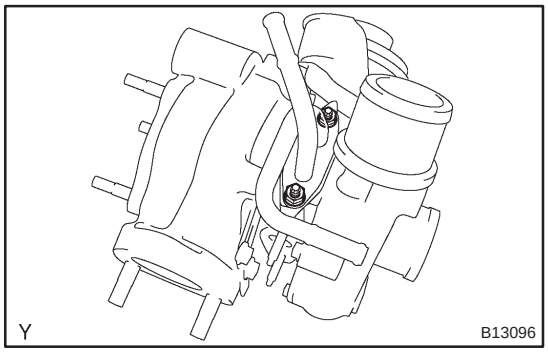
23. SEPARATE TURBO OIL INLET PIPE SUB–ASSY

(a) Remove the 2 nuts, the turbo oil pipe and the gasket.



24. REMOVE TURBOCHARGER SUB–ASSY

(a) Remove the 3 nuts, the turbocharger and the gasket.



25. REMOVE TURBO WATER PIPE SUB–ASSY NO.1

(a) Remove the 2 nuts, the turbo water pipe and the gasket.

26. INSTALL TURBO WATER PIPE SUB–ASSY NO.1

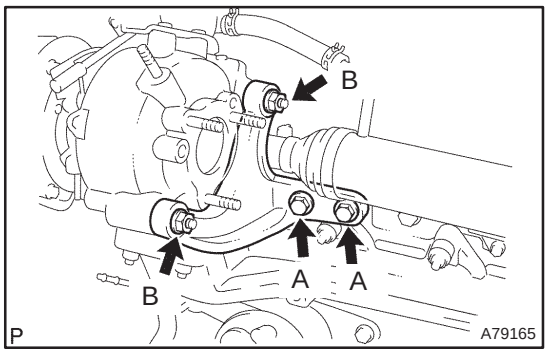
(a) Install a new gasket and the turbo water pipe with the 2 nuts.
Torque: 13 N·m (135 kgf·cm, 9.7 ft·lbf)

27. INSTALL TURBOCHARGER SUB–ASSY

(a) Install a new gasket and the turbocharger with the 3 nuts.
Torque: 53 N·m (540 kgf·cm, 39 ft·lbf)

28. INSTALL TURBO OIL INLET PIPE SUB–ASSY

(a) Install a new gasket and the oil pipe with the 2 nuts.
Torque: 13 N·m (135 kgf·cm, 9.7 ft·lbf)



29. INSTALL TURBOCHARGER STAY

(a) Install the turbocharger stay, and temporarily tighten bolt A.

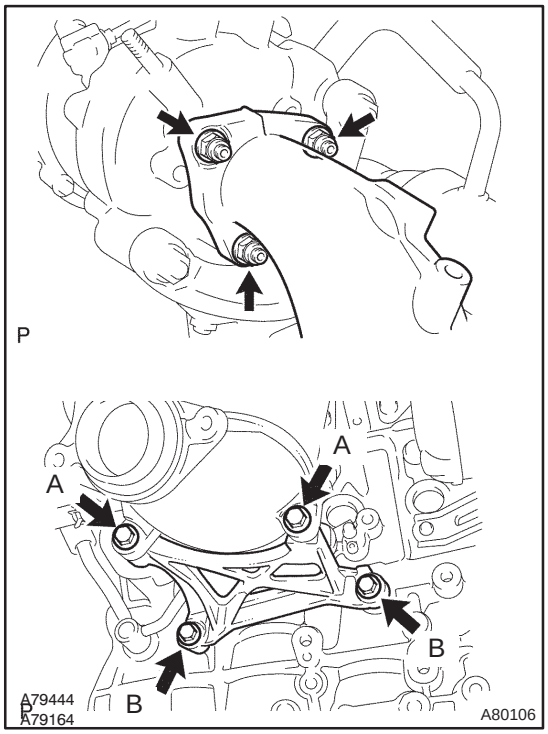
(b) Temporarily tighten nut B while pushing the cylinder head toward the turbocharger stay.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) Tighten bolt A.
Torque: 56 N·m (571 kgf·cm, 41 ft·lbf)

(d) Tighten nut B.
Torque: 56 N·m (571 kgf·cm, 41 ft·lbf)

30. INSTALL EXHAUST MANIFOLD CONVERTER SUB–ASSY

(a) Install the manifold stay, and temporarily tighten the cylinder block side of the manifold stay.

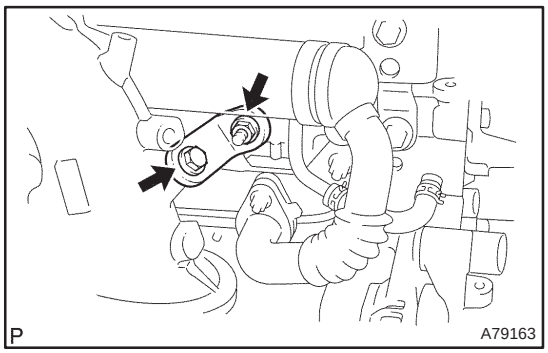


(b) Install a new gasket and the manifold converter, and temporarily tighten bolts A and bolts B while pushing the upper portion of the converter toward the turbocharger.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) Tighten the 3 nuts.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

(d) Tighten bolts A.
Torque: 61 N·m (622 kgf·cm, 45 ft·lbf)

(e) Tighten bolts B.
Torque: 61 N·m (622 kgf·cm, 45 ft·lbf)



31. INSTALL MANIFOLD STAY NO.2

(a) Install the manifold stay No. 2, and temporarily tighten the bolt.

(b) Temporarily tighten the nut while pushing the manifold stay No. 2 toward the cylinder head.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

HINT:
No clearance between the stay and the cylinder head should be confirmed.

(c) Tighten the bolt.
Torque: 56 N·m (571 kgf·cm, 41 ft·lbf)

(d) Tighten the nut.
Torque: 56 N·m (571 kgf·cm, 41 ft·lbf)

32. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.2
Torque: 12 N·m (122 kgf·cm, 8.9 ft·lbf)

33. INSTALL TURBO INSULATOR NO.1
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

34. INSTALL TURBO INSULATOR NO.2
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

35. INSTALL EXHAUST PIPE ASSY (W/ COLD AREA)
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

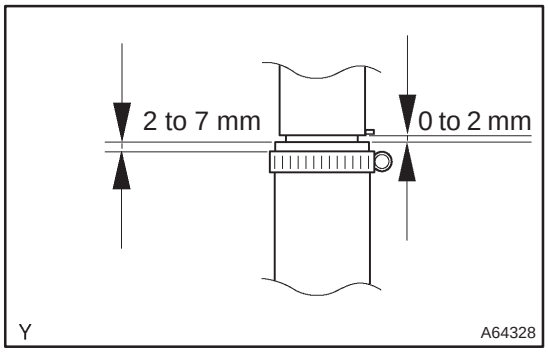
36. INSTALL EXHAUST PIPE ASSY FRONT (See page 15–10)

37. INSTALL FLOOR PANEL BRACE FRONT (See page 15–10)

38. INSTALL HEATER BRACKET (W/ COLD AREA)
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

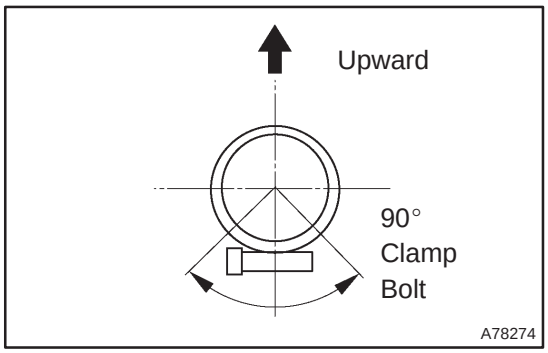
39. INSTALL HEATER PUMP ASSY (W/ COLD AREA)
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

40. INSTALL FUEL FILTER ASSY (See page 11–82)



41. INSTALL INTERCOOLER AIR HOSE

(a) Install the air hose and hose clamps as shown in the illustration.



(b) Tighten the hose clamps as shown in the illustration.
Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

(c) Install the air tube No. 1 with the 3 bolts and nut.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

42. INSTALL AIR CLEANER ASSY
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

43. INSTALL VACUUM RESERVOIR SUB–ASSY
Torque: 8.3 N·m (85 kgf·cm, 73 in.·lbf)

44. INSTALL ENGINE COVER NO.1
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

45. ADD ENGINE COOLANT (See page 16–44)

46. CHECK ENGINE OIL LEVEL

47. CHECK FOR ENGINE COOLANT LEAKS (See page 16–44)

48. CHECK FOR ENGINE OIL LEAKS

49. CHECK FOR FUEL LEAKS (See page 11–60)

50. CHECK FOR EXHAUST GAS LEAKS