TURBOCHARGING

TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

TC03A-01

HINT:

Before troubleshooting the turbocharger, first check the engine itself. (valve clearance, engine compression, etc.)

INSUFFICIENT ACCELERATION, LACK OF POWER OR EXCESSIVE FUEL CONSUMPTION

Possible Cause	Check Procedure and Correction Method	See page
1. Turbocharging pressure too low	Check turbocharging pressure.	TC–3
2. Restricted intake system	Check intake air system, and repair or replace parts as necessary.	EM–1 EM–41
3. Leak in intake air system	Check intake air system, and repair or replace parts as necessary.	EM–1 EM–41 TC–10
4. Restricted exhaust system	Check exhaust system, and repair or replace parts as necessary.	EM–41
5. Leak in exhaust system	Check exhaust system, and repair or replace parts as necessary.	EM–41
6. Erratic turbocharger operation	Check rotation of turbine shaft, and replace turbocharger if necessary. Check axial and radial plays of turbine shaft, and replace turbocharger if necessary. Check turbocharger operation, and replace turbocharger if necessary.	TC–7 TC–3

ABNORMAL NOISE

Possible Cause	Check Procedure and Correction Method	See page
1. Turbocharging heat insulator resonance	Check for loose, improperly installed or deformed insulator nuts and bolt, and repair or replace as necessary.	TC–5
2. Erratic turbocharger operation	Check rotation of turbine shaft, and replace bearing housing if necessary. Check axial and radial plays of turbine shaft, and replace turbocharger if necessary.	TC–7

EXCESSIVE OIL CONSUMPTION OR WHITE EXHAUST

NOTICE:

Some oil mist in blowby from PCV is normal. Do not mistake it for oil leak from turbocharger.

Possible Cause	Check Procedure and Correction Method	See page
Faulty turbocharger oil seal	Check for oil leakage in exhaust system. • Remove exhaust manifold converter from turbocharger, and check for excessive carbon deposits on turbine wheel. Excessive carbon deposits indicate a faulty turbocharger. Check for oil leakage in intake air system. • Check for axial and radial plays of turbine shaft, and replace turbocharger if necessary.	TC–7

TC

TURBOCHARGER

PRECAUTION

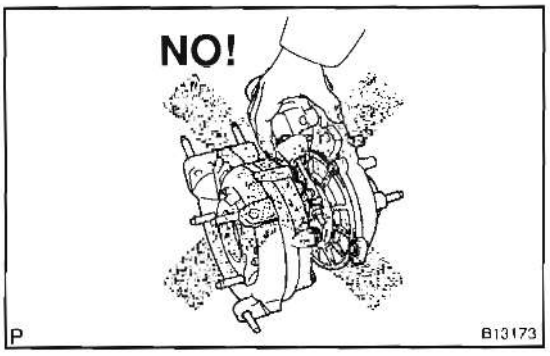
1C03B–01

MAINTENANCE PRECAUTION

(a) Do not stop the engine immediately after pulling a trailer or after high speed or uphill driving. Idle the engine for 20 – 120 seconds, depending on how hard the vehicle has been driven.

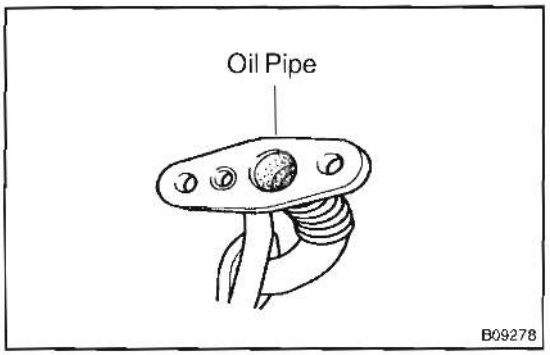
(b) Avoid sudden acceleration or racing immediately after starting a cold engine.

(c) If the turbocharger is found to be defective and must be replaced, check for the cause, and repair or replace the following items as necessary:
- Engine oil level and quality
- Conditions under which the turbocharger was used
- Oil lines leading to the turbocharger



(d) Use caution when removing and reinstalling the turbocharger assembly. Do not drop it or bang it against anything or grasp it by easily–deformed parts, when moving it.

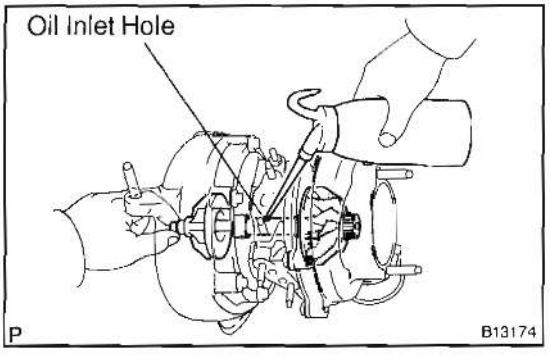
(e) Before removing the turbocharger, plug the intake and exhaust ports and oil inlet to prevent entry of dirt or other foreign material.



(f) If replacing the turbocharger, check for accumulation of sludge particles in the oil pipes, and if necessary, replace the oil pipes.

(g) Completely remove the gasket adhered to the lubrication oil pipe flange and turbocharger oil flange.

(h) When replacing bolts or nuts, use only authorized replacement parts to prevent breakage or deformation.



(i) If replacing the turbocharger, put 20 cm^3 (1.2 cu in.) of oil into the turbocharger oil inlet and turn the impeller 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 distribute oil throughout the engine. Then allow the engine to idle for 60 seconds.

(k) Do not run the engine with air cleaner removed, as this may cause foreign material to enter and damage the impeller wheel operating at high speed.

TC03C-01

ON–VEHICLE INSPECTION

1. INSPECT INTAKE AIR SYSTEM

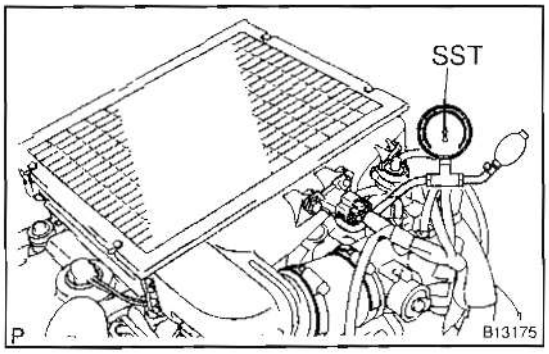
Check for leakage or clogging between the air cleaner housing and turbocharger inlet and between the turbocharger outlet and cylinder head.

- Clogged air cleaner .... Clean or replace element
- Hoses collapsed or deformed .... Repair or replace
- Leakage from connections .... Check each connection and repair
- Cracks in components .... Check and replace

2. INSPECT EXHAUST SYSTEM

Check for leakage or clogging between the cylinder head and turbocharger inlet and between the turbocharger outlet and exhaust pipe.

- Deformed components .... Repair or replace
- Foreign material in passages .... Remove
- Leakage from components .... Repair or replace
- Cracks in components .... Check and replace



3. CHECK TURBOCHARGER PRESSURE

(a) Warm up engine.

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

SST 09992–00242

(c) Press in the clutch pedal, then press the accelerator pedal down as far as it will go. Measure the turbocharging pressure at maximum speed (approx. 4,600 rpm) .

Standard pressure:

205 kPa (2.1 kgf/cm^2, 15.6 psi)

If the pressure is not specification, check the intake air and exhaust systems for leakage.

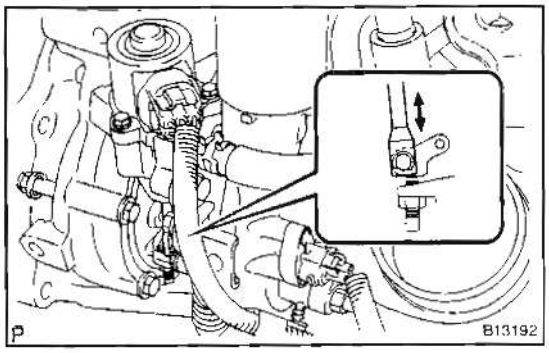
If there is no leakage, check the turbocharger operation.

4. INSPECT TURBINE SHAFT ROTATION

(See page TC–7)

5. INSPECT TURBO PRESSURE SENSOR

(See page ED–15)



6. CHECK STEP MOTOR FOR TURBOCHARGER CONTROL OPERATION

(a) Warm up engine.

(b) Make sure that the connector is properly connected.

(c) Turn the IG switch OFF. Then turn the IG switch ON again.

(d) Start the engine and make it idle.

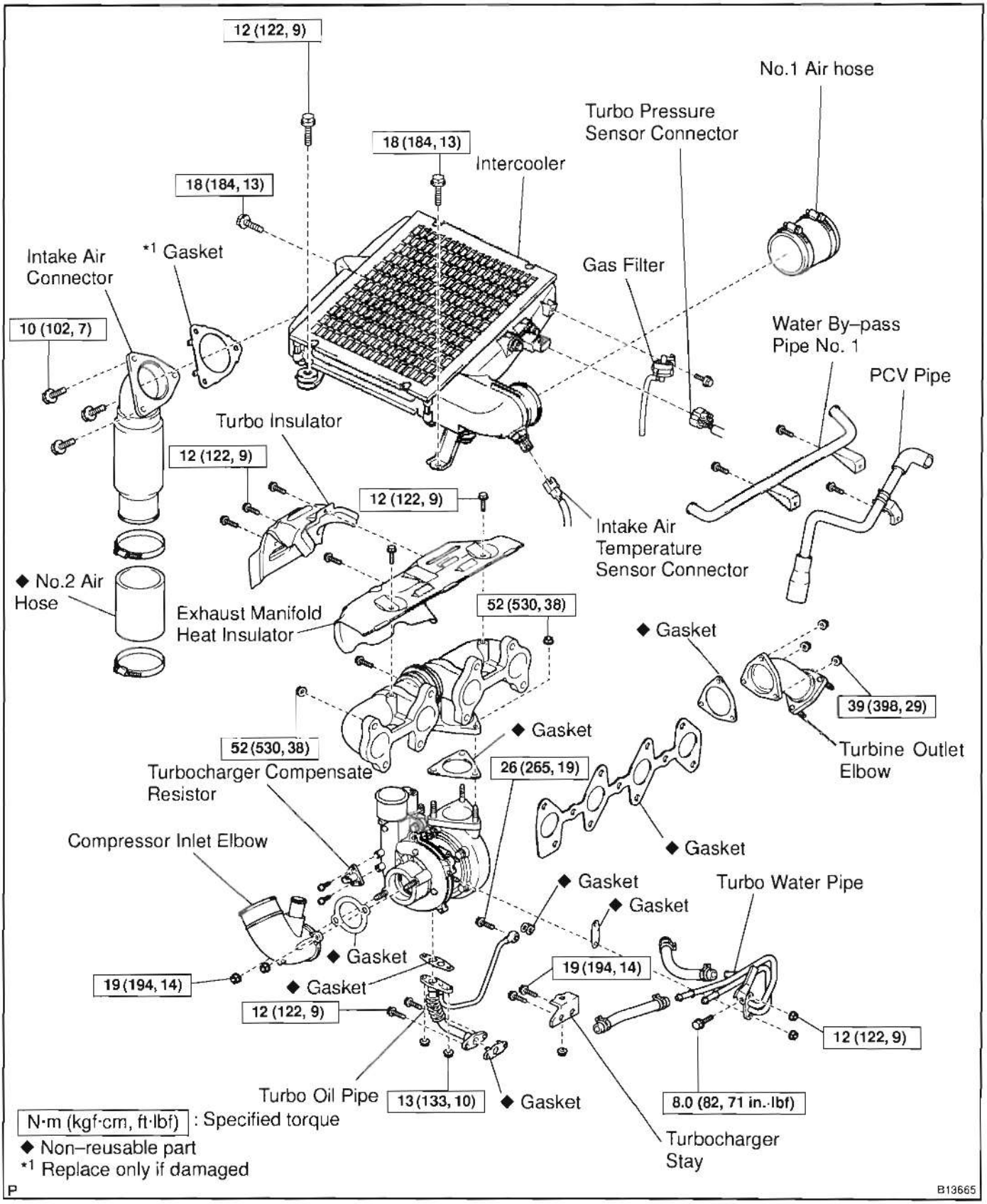
(e) At this time, check visually that the step motor rod strokes.

Reference:

Rod stroke range: 11 ± 0.03 mm (0.43 ± 0.0012 in.)

TC03D-01

COMPONENTS



TC03E-01

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE INTERCOOLER (See page TC–11)

3. REMOVE PCV PIPE

(a) Remove the 2 bolts and disconnect the water by–pass pipe No. 1.

(b) Remove the bolt and PCV pipe.

4. REMOVE TURBO INSULATOR

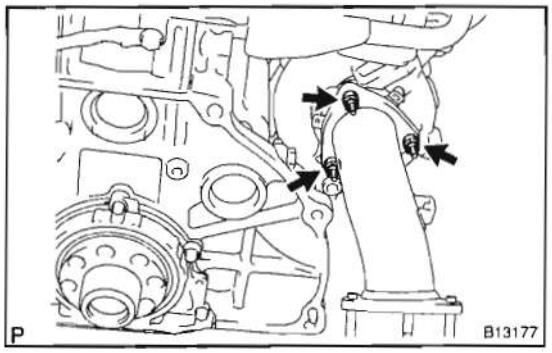
Remove the 3 bolts and turbo insulator.

5. REMOVE EXHAUST MANIFOLD HEAT INSULATOR

Remove the 3 bolts and exhaust manifold heat insulator.

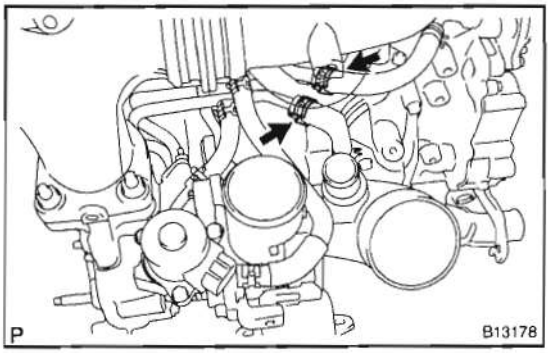
6. REMOVE OIL LEVEL GAUGE GUIDE

Remove the bolt, oil level gauge guide and O–ring.

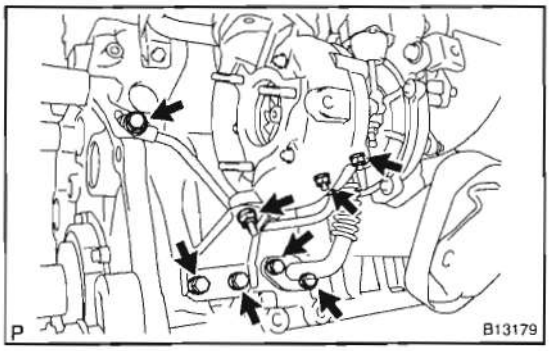


7. REMOVE TURBINE OUTLET ELBOW

Remove the 3 nuts, turbine outlet elbow and gasket.



8. DISCONNECT 2 WATER HOSES



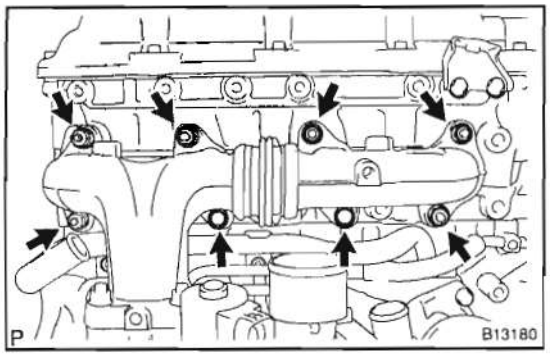
9. REMOVE TURBOCHARGER STAY

Remove the 2 bolts, nut and turbocharger stay.

10. REMOVE TURBO OIL PIPE

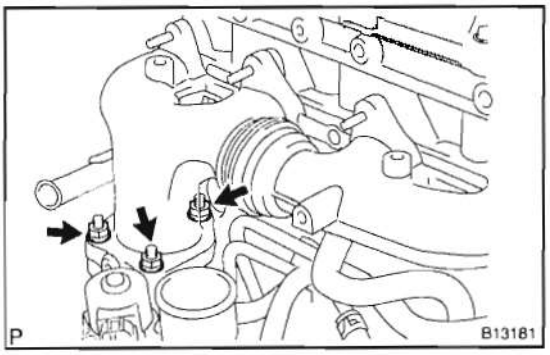
(a) Remove the 2 bolts and union bolt from the turbo oil.

(b) Remove the 2 nuts, turbo oil pipe and 3 gasket.



11. REMOVE TURBOCHARGER AND EXHAUST MANIFOLD ASSEMBLY

Remove the 6 nuts, plate washers, 2 bolts, turbocharger and exhaust manifold assembly and gasket.

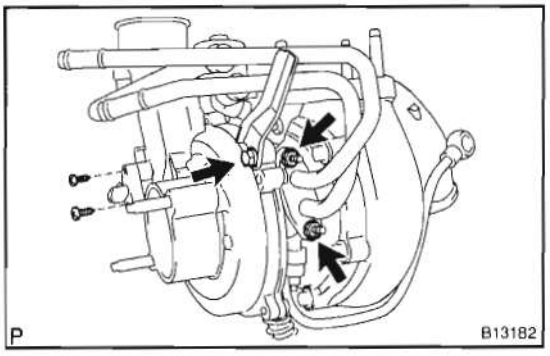


12. REMOVE EXHAUST MANIFOLD

Remove the 3 nuts, exhaust manifold and gasket from the turbocharger.

13. REMOVE COMPRESSOR INLET ELBOW

Remove the 2 nuts, compressor inlet elbow and gasket from the turbocharger.



14. REMOVE TURBO WATER PIPE

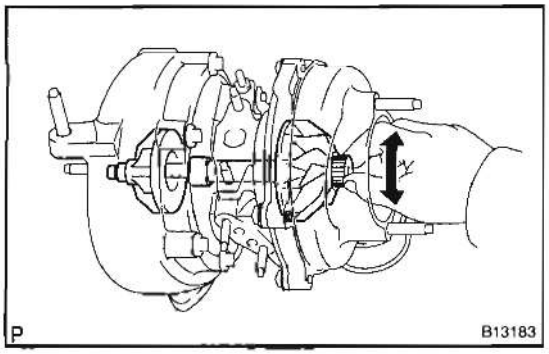
(a) Remove the 2 water hoses.

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

15. REMOVE TURBOCHARGER COMPENSATE RESISTOR

Remove the 2 screws and turbocharger compensate resistor.

TC03F-01

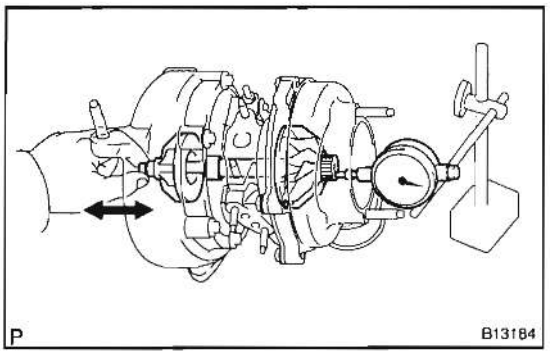


INSPECTION

1. INSPECT TURBINE SHAFT ROTATION

Grasp the edge of the turbine shaft, and turn it. Check that the turbine shaft turns smoothly.

If the turbine shaft does not turn or if it turn s with a heavy drag, replace the turbocharger.



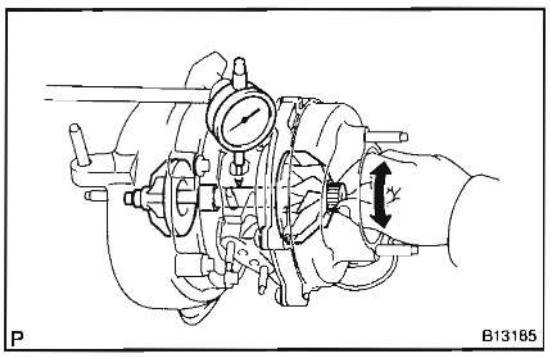
2. INSPECT AXIAL PLAY OF TURBINE SHAFT

(a) Using a dial indicator, insert the needle of the dial indicator into the exhaust side.

(b) Move the turbine shaft in an axial direction, measure the axial play of the turbine shaft.

Maximum axial play: 0.15 mm (0.0063 in.)

If the axial play is greater than maximum, replace the turbocharger.



3. INSPECT RADIAL PLAY OF TURBINE SHAFT

(a) Using a dial indicator, insert the needle of the dial indicator into the oil outlet hole, and set it in the center of the turbine shaft.

(b) Move the turbine shaft in a radial direction, measure the radial play of the turbine shaft.

Maximum radial play: 0.13 mm (0.0051 in.)

If the radial play is greater than maximum, replace the turbocharger.

4. INSPECT TURBOCHARGER COMPENSATE RESISTOR

Using an Ohmmeter, measure the resistance between terminals.

Standard Resistance:

Mark	Resistance
1	214 – 228 Ω
2	285 – 303 Ω
3	372 – 394 Ω
4	472 – 502 Ω
5	600 – 638 Ω
6	763 – 811 Ω
7	989 – 1,051 Ω
8	1,290 – 1,370 Ω
9	1,727 – 1,833 Ω

If resistance is not specification, replace the turbocharger compensate resistor.

TC

TC03G-01

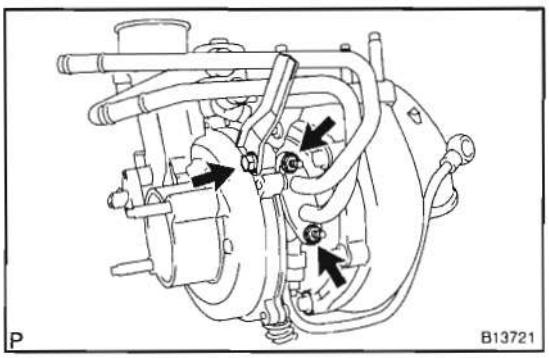
INSTALLATION

1. INSTALL TURBOCHARGER COMPENSATE RESISTOR

Install the turbocharger compensate resistor with the 2 screws.

NOTICE:

Use the same numbered turbocharger compensate resistor for replacement, because the air amount of the turbocharger is measured, to install the turbocharger compensate resistor with resistance value corresponding to the air amount.



2. INSTALL TURBO WATER PIPE

(a) Install a new gasket, turbo water pipe with the 2 nuts and bolt.

Torque:

Bolt: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

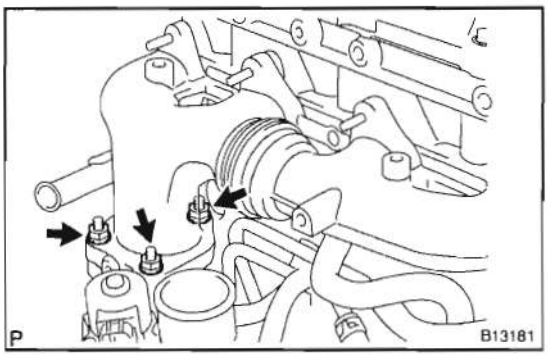
Nut: 12 N·m (122 kgf·cm, 9 ft·lbf)

(b) Install the 2 water hoses.

3. INSTALL COMPRESSOR INLET ELBOW

Install a new gasket and compressor inlet elbow with the 2 nuts.

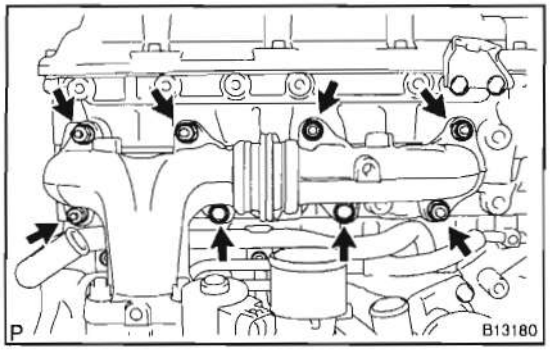
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



4. INSTALL EXHAUST MANIFOLD

Install a new gasket and exhaust manifold to the turbocharger with the 3 nuts.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)



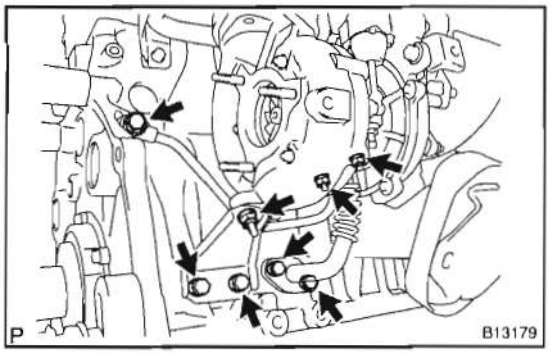
5. INSTALL TURBOCHARGER AND EXHAUST MANIFOLD ASSEMBLY

Install a new gasket and turbocharger and exhaust manifold assembly with the 6 nuts, plate washers and 2 bolts.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

6. INSTALL TURBO OIL PIPE

(a) Install new 2 gasket to the turbo oil pipe.



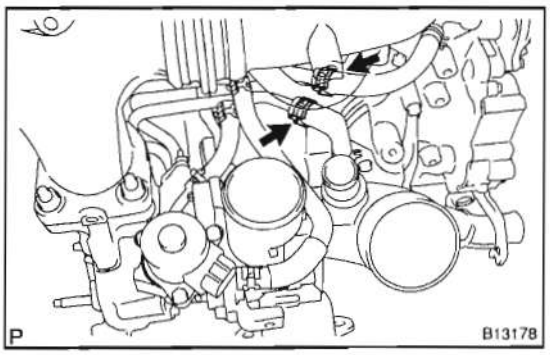
(b) Install a new gasket and turbo oil pipe with the 2 bolts, nuts and union bolt.

Torque:
Nut: 13 N·m (133 kgf·cm, 10 ft·lbf)
Bolt: 12 N·m (122 kgf·cm, 9 ft·lbf)
Union Bolt: 26 N·m (265 kgf·cm, 19 ft·lbf)

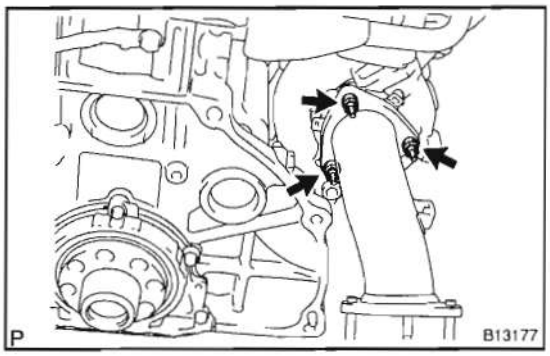
7. INSTALL TURBOCHARGER STAY

Install the turbocharger stay with the 2 bolts and nut.

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



8. CONNECT 2 WATER HOSES



9. INSTALL TURBINE OUTLET ELBOW

Install a new gasket and turbine outlet elbow with the 3 nuts.

Torque: 39 N·m (398 kgf·cm, 29 ft·lbf)

10. INSTALL OIL LEVEL GAUGE GUIDE

Install a new O–ring and oil level gauge guide with the bolt.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

11. INSTALL EXHAUST MANIFOLD HEAT INSULATOR

Install the exhaust manifold heat insulator with the 3 bolts.

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

12. INSTALL TURBO INSULATOR

Install the turbo insulator with the 3 bolts.

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

13. INSTALL PCV PIPE

(a) Install the PCV pipe with the bolt.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(b) Install the No. 1 water by–pass pipe with the 2 bolts.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

14. INSTAL INTERCOOLER (See page TC–12)

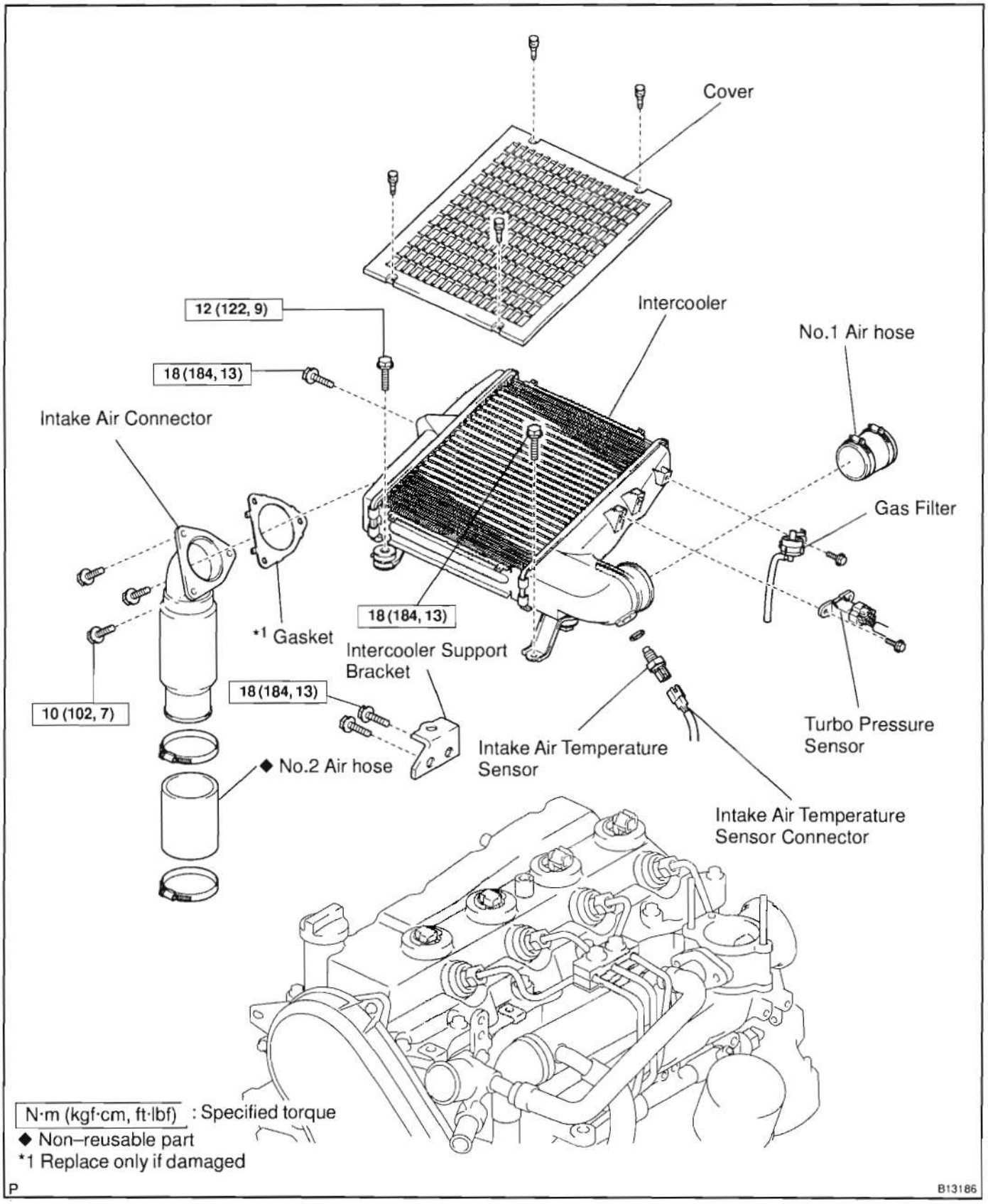
15. FILL WITH ENGINE COOLANT (See page CO–2)

16. START ENGINE AND CHECK FOR LEAKS.

INTERCOOLER

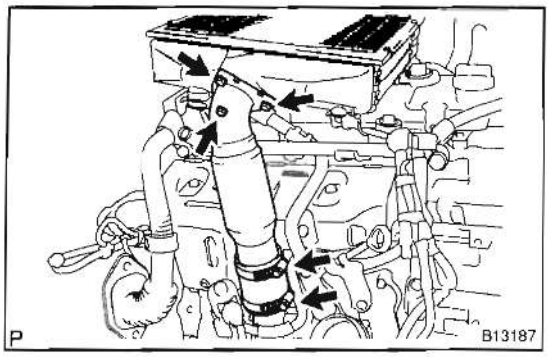
COMPONENTS

TC03H-01



TC631-01

REMOVAL



1. REMOVE INTAKE AIR CONNECTOR

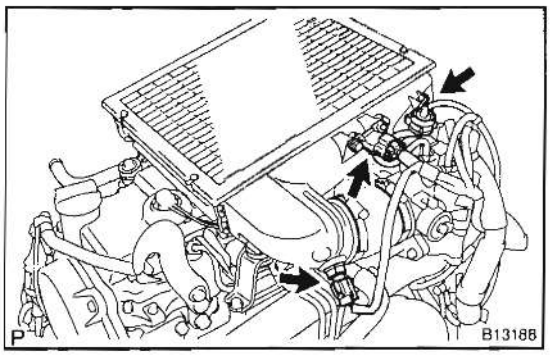
(a) Loosen the 2 clamp for No. 2 air hose.

(b) Remove the 3 bolts intake air connector and gasket.

(c) Remove the No. 2 air hose.

2. REMOVE NO. 1 AIR HOSE

Loosen the 2 clamp, and remove the No. 1 air hose.

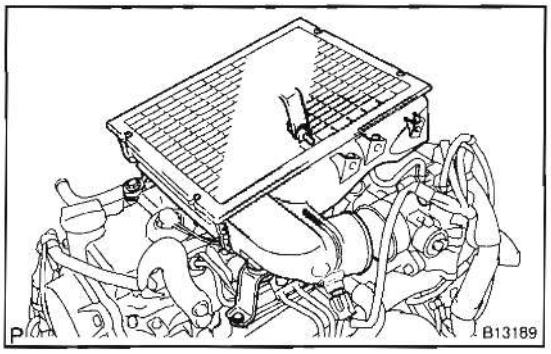


3. REMOVE INTERCOOLER

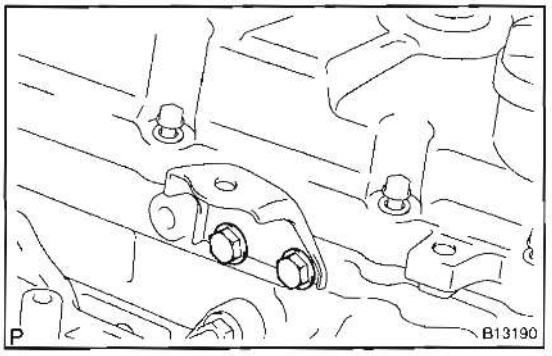
(a) Remove the bolt, and disconnect the turbo pressure sensor.

(b) Remove the bolt, and disconnect the gas filter.

(c) Disconnect the intake air temperature sensor connector and remove the intake air temperature sensor and gasket.



(d) Remove the 3 bolts and inter cooler.

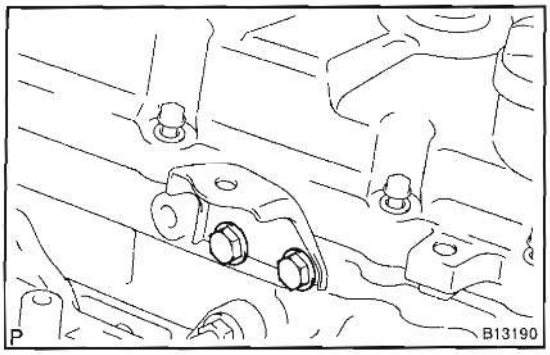


(e) Remove the 2 bolts and intercooler support bracket.

(f) Remove the 4 clips and cover from the intercooler.

TC00J-01

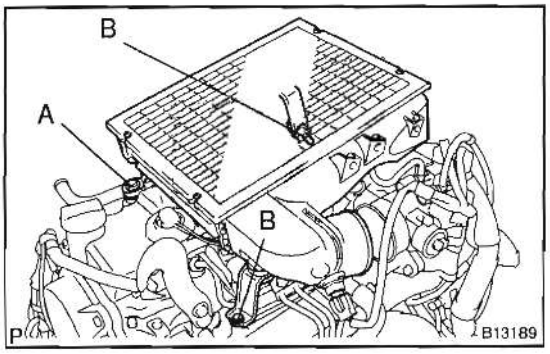
INSTALLATION



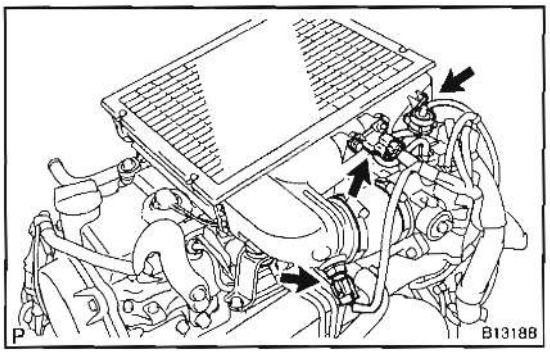
1. INSTALL INTERCOOLER

(a) Install the intercooler support bracket with the 2 bolts.
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

(b) Install the cover with 4 clips.



(c) Install the intercooler with the 3 bolts.
Torque:
Bolt A: 12 N·m (122 kgf·cm, 9 ft·lbf)
Bolt B: 18 N·m (184 kgf·cm, 13 ft·lbf)



(d) Install a new gasket and intake air temperature sensor.
Torque: 29.4 N·m (300 kgf·cm, 22 ft·lbf)

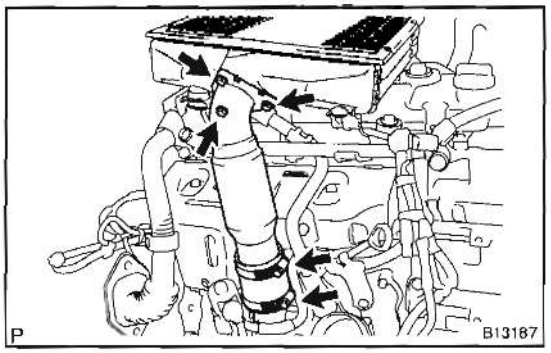
(e) Connect the intake air temperature sensor connector.

(f) Install the turbo pressure sensor with the bolt.

(g) Install the gas filter with the bolt.

2. INSTALL NO. 1 AIR HOSE

Install the No. 1 air hose, tighten the 2 clamps.



3. INSTALL INTAKE AIR CONNECTOR

(a) Install a new No. 2 air hose.

(b) Install the gasket and intake air connector with the 3 bolts.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

(c) Tighten the 2 clamps for No. 2 air hose.