# TURBOCHARGER

## ON—VEHICLE INSPECTION

80MX-05

**1. INSPECT INTAKE AIR SYSTEM**

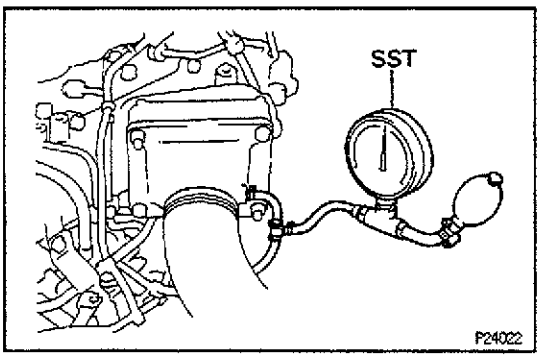
Check for leakage or clogging between the air cleaner housing and turbocharger inlet and between the turbocharger outlet and cylinder head.

- 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 TURBOCHARGING PRESSURE**

(a) Warm up engine.

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

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(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 (3,700 rpm).

**Standard pressure:**

**29.4 — 53.2 kPa**

**(0.30 — 0.54 kgf/cm², 4.6 — 7.7 psi)**

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

If there is no leakage, replace the turbocharger.

If the pressure is above specification, check if the actuator hose is disconnected or cracked. If not, replace the turbocharger.

**4. INSPECT IMPELLER WHEEL ROTATION**

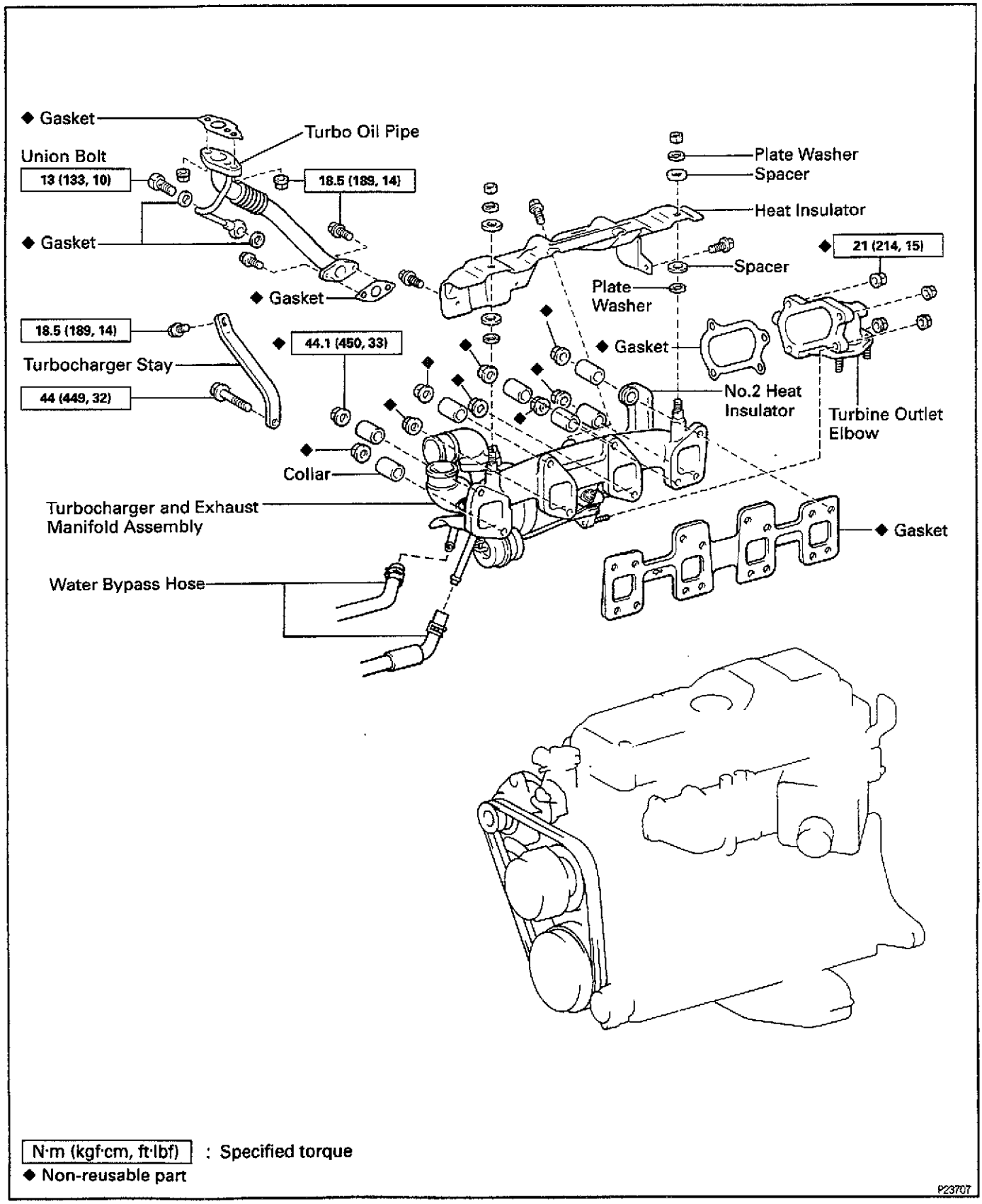
**(See step 1 in turbocharger inspection)**

**5. INSPECT ACTUATOR OPERATION**

**(See step 4 in turbocharger inspection)**

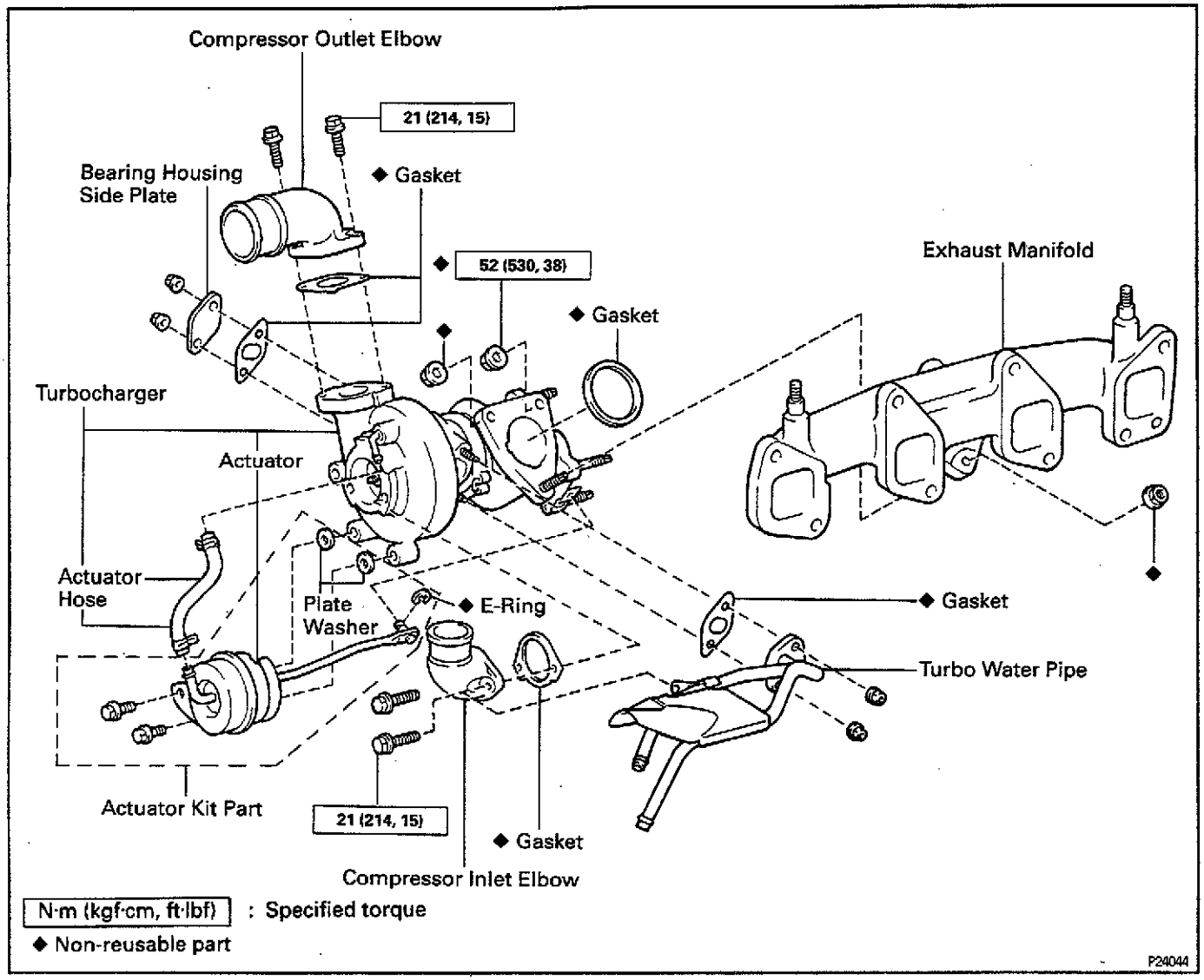
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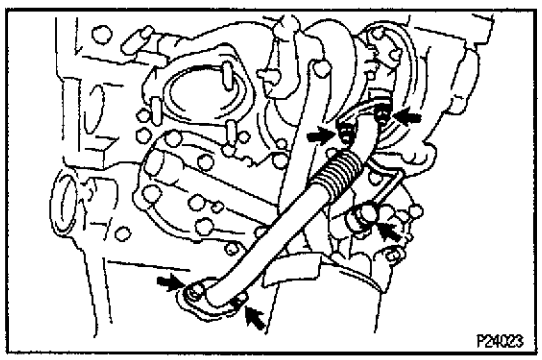
# COMPONENTS FOR REMOVAL AND INSTALLATION

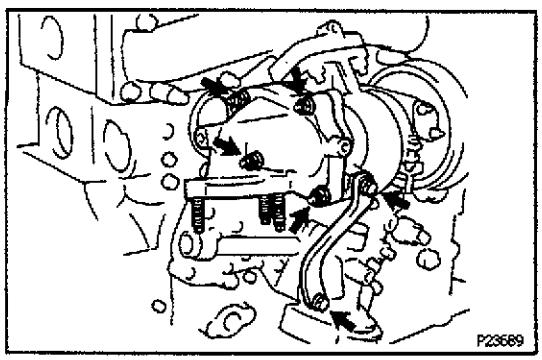



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

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## TURBOCHARGER REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE HEAT INSULATOR**

(a) Remove the 3 bolts, 2 nuts, 2 plate washers, 2 spacers and heat insulator.

(b) Remove the 2 spacers and 2 plate washers.

3. **REMOVE TURBO OIL PIPE**

(a) Remove the union bolt and 2 gaskets.

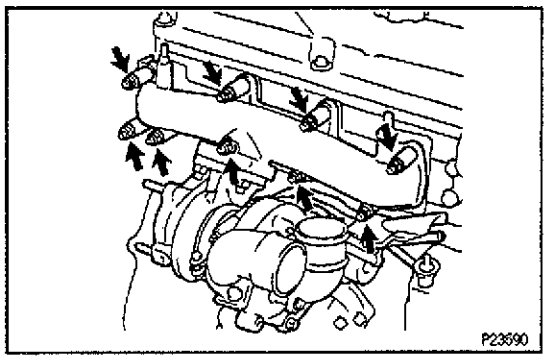
(b) Remove the 2 bolts, 2 nuts, oil pipe and 2 gaskets.

4. **REMOVE TURBINE OUTLET ELBOW**

Remove the 4 nuts, outlet elbow and gasket.

5. **REMOVE TURBOCHARGER STAY**

Remove the 2 bolts and stay.

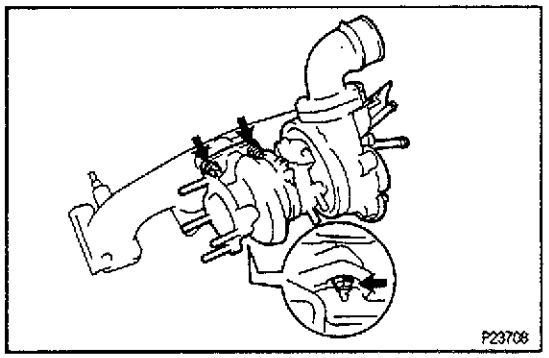



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**6. REMOVE TURBOCHARGER AND EXHAUST MANIFOLD ASSEMBLY**

(a) Disconnect the 2 water bypass hoses from the turbo water pipe.

(b) Remove the 9 nuts, 7 collars, heat insulator, the turbocharger, exhaust manifold assembly and gasket.




**7. REMOVE TURBOCHARGER FROM EXHAUST MANIFOLD**

(a) Remove the 3 nuts and turbocharger.

(b) Remove the gasket from the exhaust manifold.

**8. REMOVE COMPRESSOR OUTLET ELBOW FROM TURBOCHARGER**

Remove the 2 bolts, outlet elbow and gasket.

**9. REMOVE TURBO WATER PIPE FROM TURBOCHARGER**

Remove the bolt, 2 nuts, water pipe and gasket.

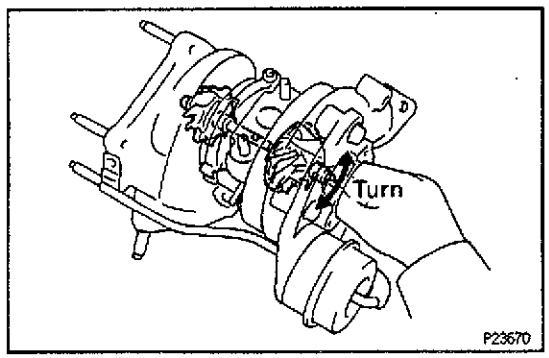
**10. REMOVE COMPRESSOR INLET ELBOW FROM TURBOCHARGER**

Remove the bolt, inlet elbow and gasket.

**11. REMOVE BEARING HOUSING SIDE PLATE FROM TURBOCHARGER**

Remove the 2 nuts, side plate and gasket.

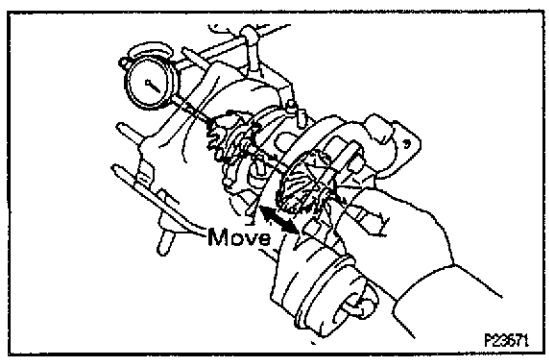
## TURBOCHARGER INSPECTION




**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 turns with a heavy drag, replace the turbocharger.




**2. INSPECT AXIAL PLAY OF TURBINE SHAFT**

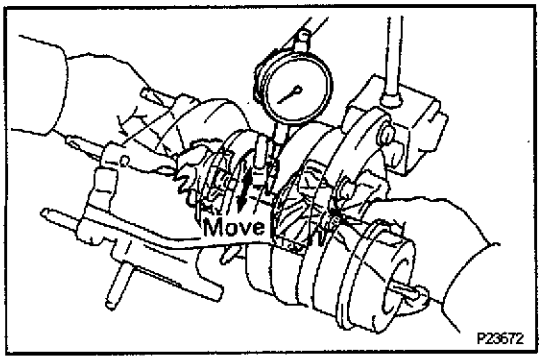
(a) Using a dial indicator, insert the needle of the dial indicator into the exhaust side.

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

**Maximum oil clearance:**

**0.13 mm (0.0051 in.) or less**

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




### 3. INSPECT RADIAL PLAY OF TURBINE SHAFT

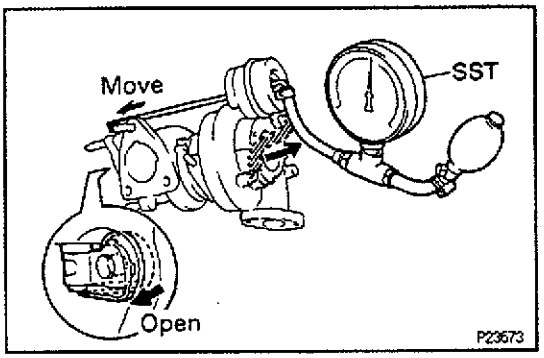
(a) Using a dial indicator, insert the needle of the dial indicator into the oil outlet hole, and set it in the center of the turbine shaft.

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

**Maximum oil clearance:**

**0.18 mm (0.0071 in.) or less**

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




### 4. INSPECT ACTUATOR AND WASTE GATE VALVE OPERATION

(a) Disconnect the actuator air hose from the compressor housing.

(b) Using SST, apply approx. 69 kPa (0.70 kgf/cm², 9.95 psi) of pressure to the actuator.

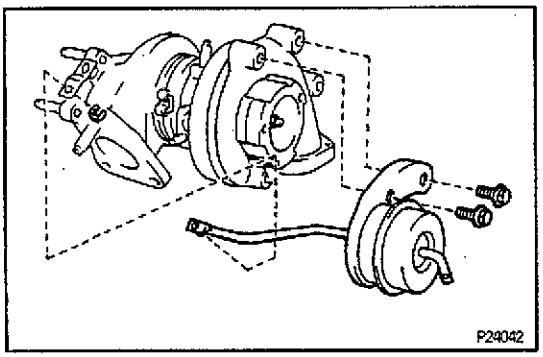
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(c) Move the actuator push rod, and check that the waste gate valve is open.

If operation is not as specified, replace the turbocharger.

**NOTICE: Never apply more than 91 kPa (0.93 kgf/cm², 13.2 psi) of pressure to the actuator.**

(d) Reconnect the actuator air hose to the compressor housing.



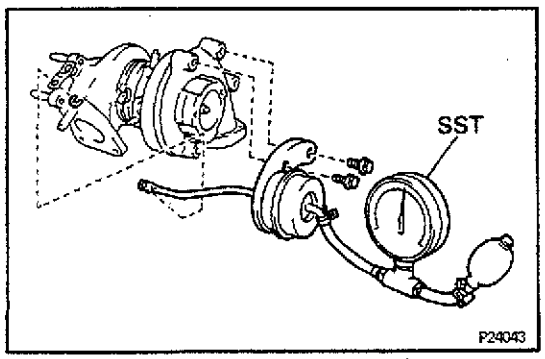

## ACTUATOR REPLACEMENT

### 1. REMOVE ACTUATOR

(a) Remove the actuator hose.

(b) Remove the 2 bolts holding the actuator to the compressor housing.

(c) Remove the E–ring holding the actuator push rod to the waste gate valve link, and remove the actuator.




### 2. INSTALL ACTUATOR

(a) Using SST, apply approx. 69 kPa (0.70 kgf/cm², 9.95 psi) of pressure to a new actuator.

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(b) Connect the actuator push rod to the waste gate valve link with a new E–ring.

(c) Install the actuator to the compressor housing with the 2 bolts.

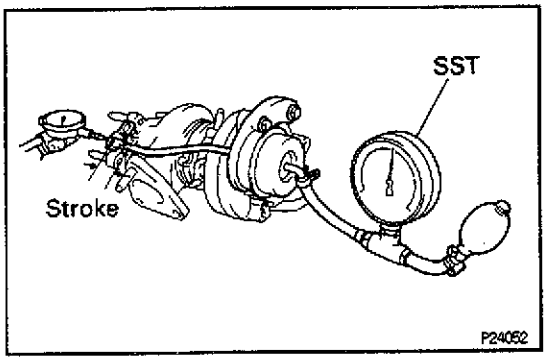
**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**

(d) Remove the SST.

**NOTICE:**

- **Never apply more than 91 kPa (0.93 kgf/cm², 13.2 psi) of pressure to the actuator.**
- **Do not use a hammer, etc. to force the actuator push rod onto the waste gate valve link.**

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### 3. ADJUST ACTUATOR ROD STROKE

(a) Using a dial indicator, set the dial indicator in a straight line with the actuator push rod.

(b) Using SST, apply 69 kPa (0.70 kgf/cm², 9.95 psi) of pressure to the actuator, and measure the actuator push rod stroke.

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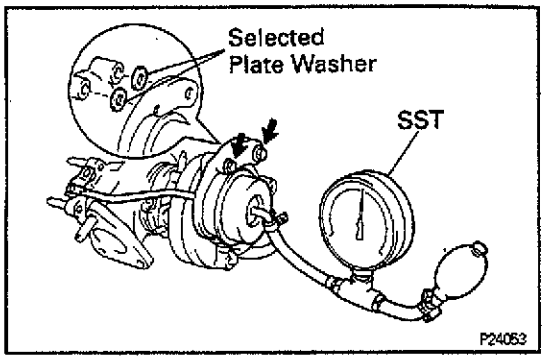
**NOTICE: Never apply more than 91 kPa (0.93 kgf/cm², 13.2 psi) of pressure to the actuator.**

(c) From the table below select the plate washer thickness to match the stroke measured in (b) above.

| Stroke measurement mm (in.) | Required plate washer thickness mm (in.) |
|---|---|
| 1.20 – 1.70 (0.0472 – 0.0670) | None required |
| 1.71 – 2.20 (0.0673 – 0.0866) | 0.5 (0.020) |
| 2.21 – 2.70 (0.0870 – 0.1063) | 1.0 (0.039) |
| 2.71 – 3.20 (0.1067 – 0.1260) | 1.5 (0.059) |
| 3.21 – 3.70 (0.1264 – 0.1457) | 2.0 (0.079) |
| 3.71 – 4.20 (0.1461 – 0.1654) | 2.5 (0.098) |
| 4.21 – 4.70 (0.1657 – 0.1850) | 3.0 (0.118) |
| 4.71 – 5.20 (0.1854 – 0.2047) | 3.5 (0.138) |
| 5.21 – 5.70 (0.2051 – 0.2244) | 4.0 (0.157) |
| 5.71 – 6.20 (0.2248 – 0.2441) | 4.5 (0.177) |
| 6.21 – 6.70 (0.2445 – 0.2638) | 5.0 (0.197) |
| 6.71 – 7.20 (0.2642 – 0.2827) | 5.5 (0.217) |
| 7.21 – 7.70 (0.2839 – 0.3031) | 6.0 (0.236) |
| 7.71 – 8.20 (0.3035 – 0.3228) | 6.5 (0.256) |

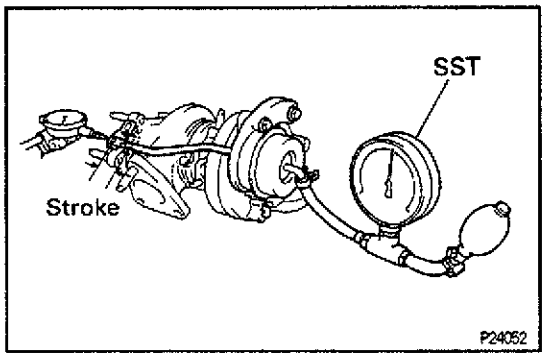
**NOTICE:**

- **Use a combination of plate washers of 0.5 mm (0.020 in.), 1.0 mm (0.039 in.), 2.0 mm (0.079 in.) and 3.0 mm (0.118 in.) thickness to achieve the required thickness.**
- **Use the same thickness of plate washer for the 2 locations between the actuator and compressor housing.**
- **If the plate washer thickness exceeds 3.5 mm, (0.138 in.) replace the actuator installation bolts with the bolts from the kit part.**



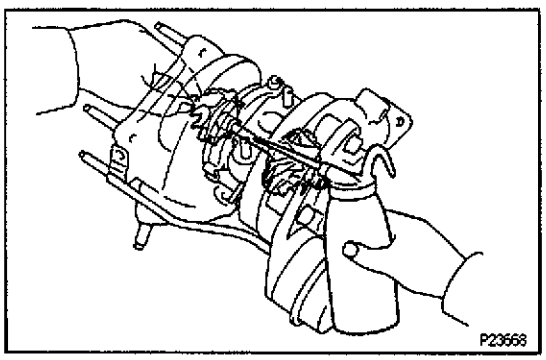

(d) Using SST, apply approx. 69 kPa (0.70 kgf/cm², 9.95 psi) of pressure to the actuator, and install the selected plate washers between the actuator and compressor housing with the 2 bolts.
**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**
**NOTICE: Never apply more than 91 kPa (0.93 kgf/cm², 13.2 psi) of pressure to the actuator.**






(e) Using SST, apply 69 kPa (0.70 kgf/cm², 9.95 psi) of pressure to the actuator, and measure the actuator push rod stroke.
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**Standard stroke:**
**1.20 − 1.70 mm (0.0472 − 0.0669 in.)**
If the stroke is outside specifications, reselect the plate washers.

4. **INSTALL ACTUATOR HOSE**
5. **APPLY YELLOW PAINT**
Apply yellow paint from the actuator bolts to the actuator bracket to indicate that they have been correctly installed.
6. **CHECK TURBOCHARGING PRESSURE**
**(See step 3 in on−vehicle inspection)**




## TURBOCHARGER INSTALLATION

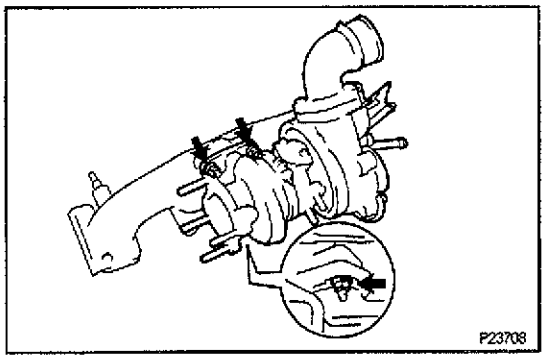
**NOTICE: After replacing the turbocharger assembly, pour approx. 20 cm³ (1.2 cu in.) of fresh oil into the oil inlet hole and turn the turbine wheel by hand to splash oil on the bearing.**

1. **INSTALL BEARING HOUSING SIDE PLATE TO TURBOCHARGER**
Install a new gasket and the side plate with the 2 nuts.
**Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)**
2. **INSTALL TURBO WATER PIPE AND COMPRESSOR INLET ELBOW TO TURBOCHARGER**
(a) Temporarily install a new gasket and the water pipe with the 2 nuts.
(b) Temporarily install a new gasket and the inlet elbow with the 2 bolts.
(c) Tighten the nuts and bolts.

**Torque:**
**Nut**
**12 N·m (122 kgf·cm, 9 ft·lbf)**
**Bolt**
**21 N·m (214 kgf·cm, 15 ft·lbf)**

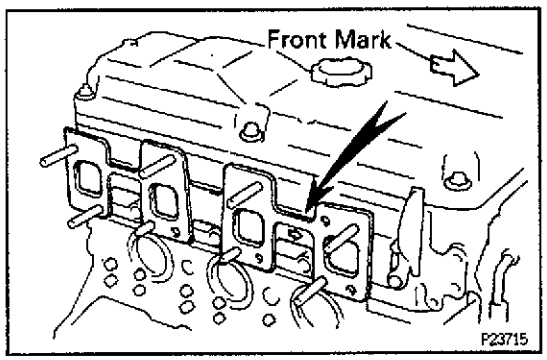
### 3. INSTALL COMPRESSOR OUTLET ELBOW TO TURBOCHARGER

Install a new gasket and outlet elbow with the 2 bolts.
**Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)**



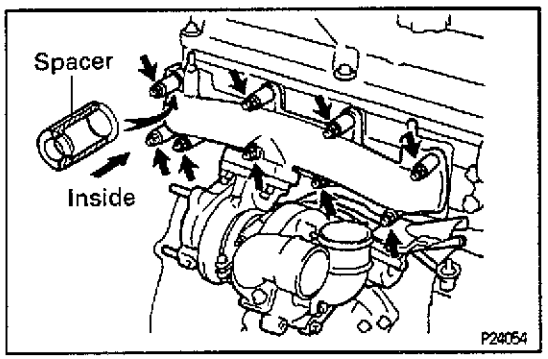

### 4. INSTALL TURBOCHARGER TO EXHAUST MANIFOLD

(a) Install a new gasket to the exhaust manifold.
(b) Install the turbocharger with the 3 new nuts.
**Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)**

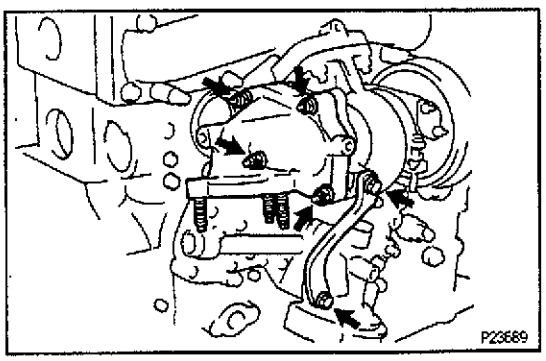



### 5. INSTALL TURBOCHARGER AND EXHAUST MANIFOLD ASSEMBLY

(a) Install a new gasket to the cylinder head.
**NOTICE: Be careful of the installation direction.**




(b) Install the turbocharger and exhaust manifold assembly with the 7 collars and 9 new nuts.
**Torque: 44.1 N·m (450 kgf·cm, 33 ft·lbf)**
**NOTICE: Be careful of the collar installation direction.**
(c) Connect the 2 water bypass hoses to the turbo water pipe.

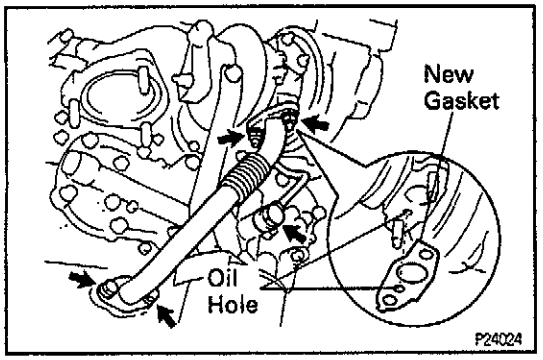


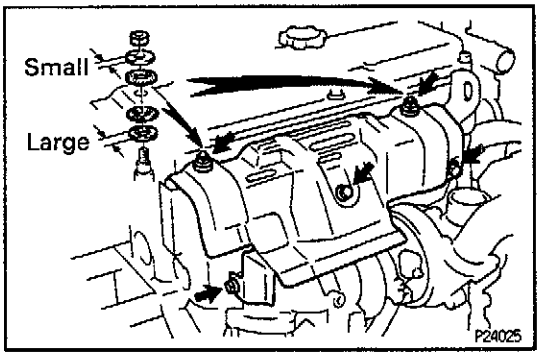

### 6. INSTALL TURBOCHARGER STAY

Install the stay with the 2 bolts. Alternately tighten the bolts.
**Torque:**
**To Turbocharger**
**18.5 N·m (189 kgf·cm, 14 ft·lbf)**
**To oil filter bracket, oil cooler cover, cylinder block**
**44 N·m (449 kgf·cm, 32 ft·lbf)**

### 7. INSTALL TURBINE OUTLET ELBOW

Install a new gasket and the outlet elbow with 4 new nuts.
**Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)**




**8. INSTALL TURBO OIL PIPE**

(a) Install 2 new gaskets and the oil pipe with the 2 bolt and 2 nuts.

**Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)**

**NOTICE: Be careful of the gasket (turbocharger side) installation direction. Align the small oil holes of the gasket and oil pipe.**

(b) Install the oil pipe with 2 new gasket and the union bolt.

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

**9. INSTALL HEAT INSULATOR**

(a) Install the 2 plate washers and 2 spacers to the stud bolts on the exhaust manifold.

HINT: Install the plate washers with the large inside diameter.

(b) Install the heat insulator with the 2 spacers, 2 plate washers and 3 bolts.

HINT: Install the plate washers with the small inside diameter.

**10. FILL WITH ENGINE COOLANT**

**11. START ENGINE AND CHECK FOR LEAKS**

**12. CHECK ENGINE OIL LEVEL**