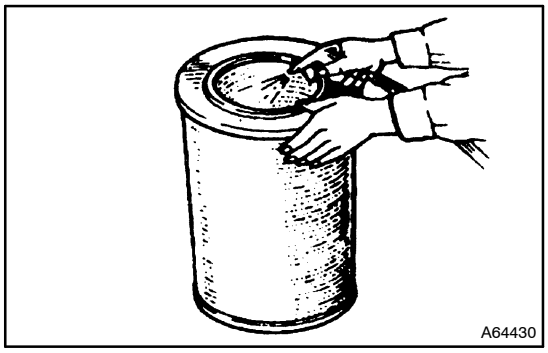
ENGINE (15B–FTE)

14179–01

ADJUSTMENT

1. **INSPECT COOLANT**
2. **INSPECT ENGINE OIL**
3. **INSPECT BATTERY SPECIFIC GRAVITY**


A64430

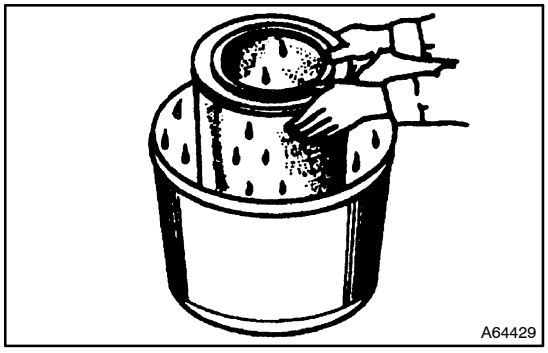
4. INSPECT AIR CLEANER FILTER ELEMENT SUB–ASSY

(a) Paper filter type:
Visually check that the filter is not excessively dirty or oily.

(b) Using an air gun, remove dry dirt or dust, Air pressure: less than 690 kPa (7.0 kgf/cm^2, 100 psi).

HINT:

- Always blow air from the inside of the element to the outside. Never strike or bang the filter to remove dirt or dust.
- If the air pressure is too high and the element deformed, the engine will be in trouble.


A64429

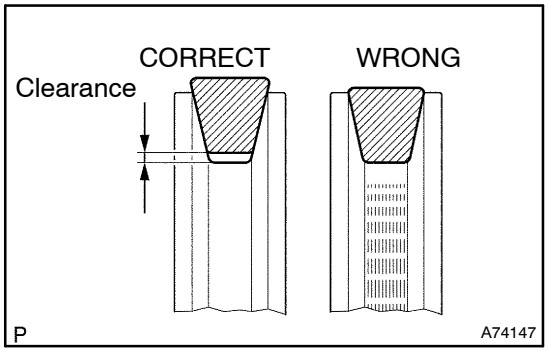
(c) Washable type:
Wash the element by soaking it in a non–sudsy detergent solution for approx. 30 minutes.

(d) Rinse the element with clean water and dry it completely with compressed air.

HINT:

- Check that the inside of the element is not soiled with dust, etc.
- When using an oven to dry the element, the temperature should be set below 80°C (176°F).
- Never install the element before it is completely dried.
- Make sure that the dried element is not broken and that the packing is not broken nor deformed.

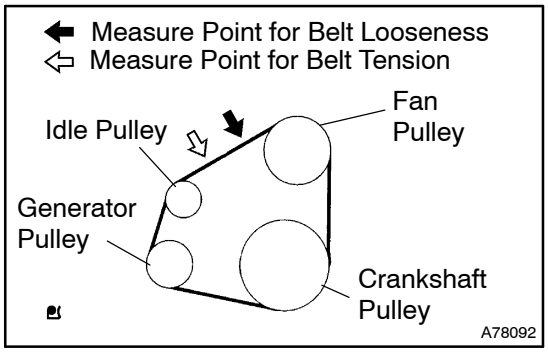
NOTICE:
Never use other solvents, suchaskerosene and gasoline to clean the elements. Use of these could cause the engine to overrun and damage the engine.



5. INSPECT V BELT

(a) Visually check the V belt for cracks, oiliness or wear. Check that the belt does not touch the bottom of the pulley groove.

If necessary, replace the V belt.



(b) Check the drive belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Deflection:

New Belt mm (in.)	Used Belt mm (in.)
12 – 16 (0.47 – 0.62)	14 – 19 (0.55 – 0.74)

(c) Reference:

Using a belt tension gauge, measure the belt tension.

Tension:

New belt N (kgf)	Used belt N (kgf)
275 – 510 (28 – 52)	196 – 392 (19 – 39)

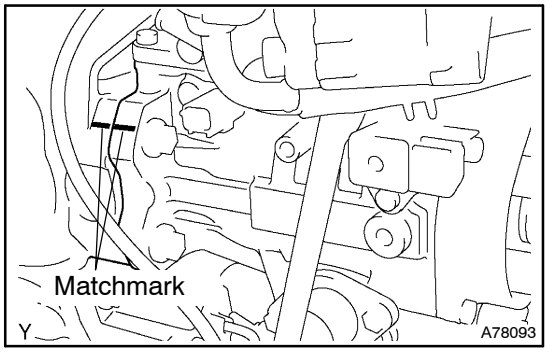
HINT:

Belt tension gauge:

DENSO BTG–20 (95506–00020)

NOTICE:

- **Check that the drive belt deflection at the specified point.**
- **When installing a new belt, set its tension value as specified.**
- **When checking a belt that has been used for over 5 minutes, confirm that the deflection value is within the specified one.**
- **When reinstalling a belt that has been used for over 5 minutes, check the belt,based on the used deflection value.**
- **The tension and deflection value of the V belt should be checked after 2 revolution of engine cranking.**
- **When using a belt tension gauge, confirm the accuracy first using a master gauge.**



6. INSPECT INJECTION TIMING

(a) Check the matchmark of the injection pump flange is aligned with the matchmark of the timing gear case.

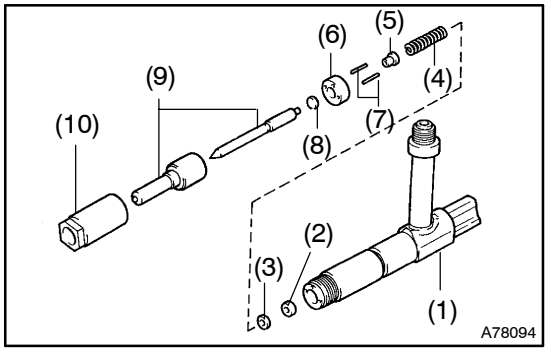
7. ADJUST INJECTION TIMING

SST 09275–54011

(a) Loosen the nuts and bolts:
  (1) Loose the 2 bolts holding injection pump to the injection pump stays.
  (2) Loosen the 4 nuts holding injection pump to the timing gear case.

(b) Align the matchmarks by slightly tilting the injection pump.

(c) Tighten the nuts and bolts:
  (1) Tighten the 4 nuts holding injection pump to timing gear cover.
  Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)
  (2) Tighten the 2 bolts holding injection pump to injection pump stays.
  Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

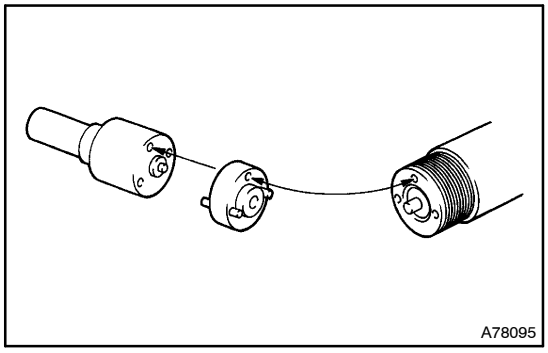


8. ADJUST INJECTION PRESSURE

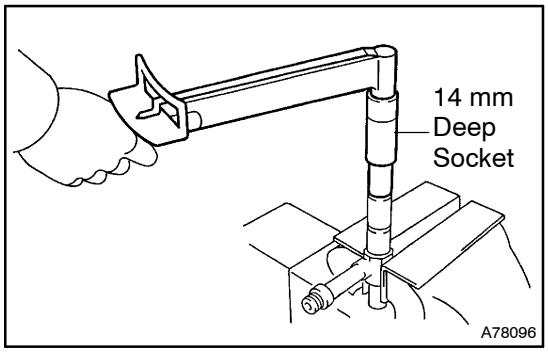
(a) Check the No. 2 opening pressure (assemble these parts):
  (1) Nozzle holder body
  (2) No. 1 pressure spring seat
  (3) No. 2 Adjusting shim
  (4) No. 2 pressure spring
  (5) SST
  (6) Tip packing
  (7) Straight pins
  (8) No. 3 Adjusting shim
  (9) Nozzle assembly
  (10) Retaining nut
  SST 09268–17020

NOTICE:

Do not assemble the No. 1 pressure spring, No. 1 pressure pin and adjusting shim for adjustment of the No. 1 opening pressure.

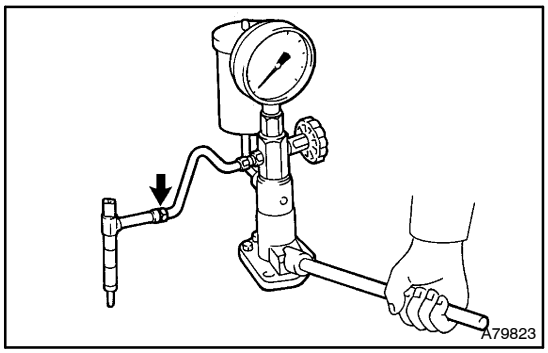


HINT:
Align the holes of the nozzle body, tip packing and nozzle holder body.



(b) Using a 14 mm deep socket wrench, tighten the retaining nut.
Torque: 29.4 N·m (300 kgf·cm^2, 22 ft·lbf)

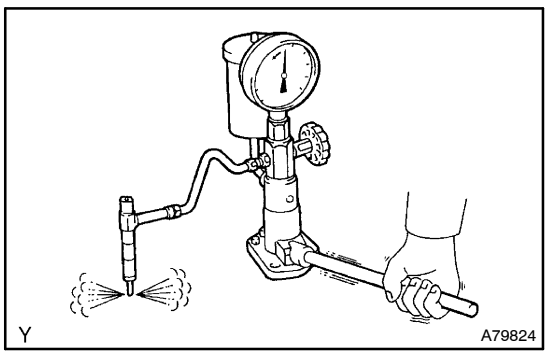
NOTICE:
Over torquing could cause the nozzle deformation and the needle adhesion or other defects.



(c) Install the injection nozzle to the injection nozzle hand tester and bleed air from the union nut.

CAUTION:
Do not place your finger over the nozzle injection hole.

(d) Pump the tester handle a few times as fast as possible to discharge the carbon from the injection hole.



(e) Pump the tester handle slowly and observe the pressure gauge.

(f) Read the pressure gauge just as the injection pressure begins to drop.
No. 2 opening pressure (Inspection pressure):
25.5 – 26.48 MPa
(260 – 270 kgf/cm^2, 3,698 – 3,840 psi)

HINT:
Proper nozzle operation can be determined by a swishing sound.

If the opening pressure is not as specified, disassemble the nozzle and change the adjusting shim on the top of the No. 2 pressure spring.

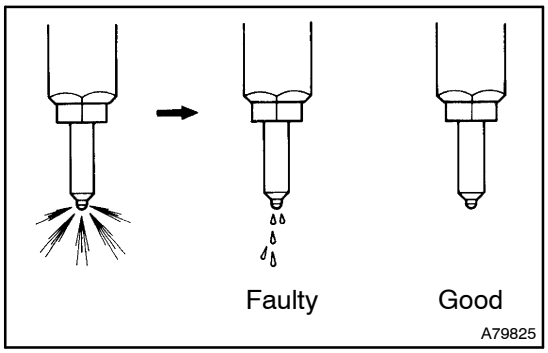
Adjusting shim thickness: mm (in.)

mm (in.)	mm (in.)	mm (in.)
0.700 (0.0276)	1.225 (0.0482)	1.625 (0.0640)
0.750 (0.0295)	1.250 (0.0492)	1.650 (0.0650)
0.800 (0.0315)	1.275 (0.0502)	1.675 (0.0659)
0.850 (0.0335)	1.300 (0.0512)	1.700 (0.0669)
0.900 (0.0354)	1.325 (0.0521)	1.725 (0.0679)

mm (in.)	mm (in.)	mm (in.)
0.950 (0.0374)	1.350 (0.0531)	1.750 (0.0689)
0.975 (0.0384)	1.375 (0.0541)	1.775 (0.0699)
1.000 (0.0394)	1.400 (0.0551)	1.800 (0.0709)
1.025 (0.0404)	1.425 (0.0561)	1.850 (0.0728)
1.050 (0.0413)	1.450 (0.0571)	1.900 (0.0748)
1.075 (0.0423)	1.475 (0.0581)	1.950 (0.0768)
1.100 (0.0433)	1.500 (0.0591)	2.000 (0.0787)
1.125 (0.0443)	1.525 (0.0600)	2.050 (0.0807)
1.150 (0.0453)	1.550 (0.0610)	2.100 (0.0827)
1.175 (0.0463)	1.575 (0.0620)	2.150 (0.0846)
1.200 (0.0472)	1.600 (0.0630)	–

HINT:

- Varying the adjusting shim thickness by 0.025 mm (0.0010 in.) changes the injection pressure by about 373 kPa (3.8 kgf/cm^2, 54 psi).
- Only one adjusting shim should be used.



(g) There should be no dripping after injection.

(h) After checking the No. 2 opening pressure, disassemble the nozzle.

(i) Adjust the No. 1 opening pressure.

(1) Assemble the nozzle holder body, No. 1 adjusting shim for adjustment of No. 1 opening pressure, No.1 pressure spring, pressure pin, No. 1 pressure spring seat, No. 2 adjusting shim selected in step 1 above, No. 2 pressure spring, No. 2 pressure spring seat, tip packing, straight pins, No. 3 adjusting shim and nozzle assembly, and finger tighten the retaining nut.

HINT:

- Align the holes of the nozzle body, the distance piece and the nozzle holder body.
- When the thickness of the original used adjusting shim is not known, use a shim 1.5 mm (0.59 in.) thick instead.

(2) Read the pressure gauge just as the injection pressure begins to drop.

No. 1 opening pressure:
17.65 – 18.63 MPa
(180 – 190 kgf/cm^2, 2,560 – 2,700 psi)

HINT:

Proper nozzle operation can be determined by a swishing sound.

If the opening pressure is not as specified, disassemble the nozzle and change the No. 2 adjusting shim.

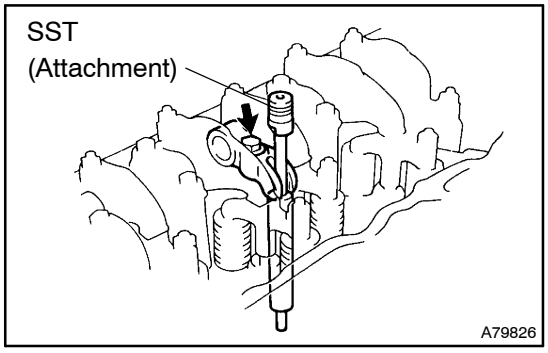
No. 2 pressure spring washer (adjusting shim) thickness:

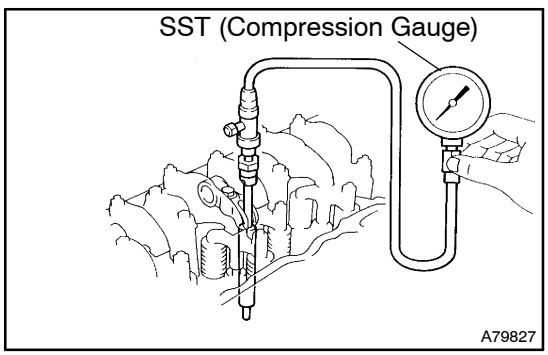
mm (in.)	mm (in.)	mm (in.)
0.800 (0.0315)	1.275 (0.0502)	1.750 (0.0689)
0.825 (0.0325)	1.300 (0.0512)	1.775 (0.0699)
0.850 (0.0335)	1.325 (0.0521)	1.800 (0.0709)
0.875 (0.0344)	1.350 (0.0531)	1.825 (0.0719)
0.900 (0.0354)	1.375 (0.0541)	1.850 (0.0728)
0.925 (0.0364)	1.400 (0.0551)	1.875 (0.0738)
0.950 (0.0374)	1.425 (0.0561)	1.900 (0.0748)
0.975 (0.0384)	1.450 (0.0571)	1.925 (0.0758)
1.000 (0.0394)	1.475 (0.0581)	1.950 (0.0768)
1.025 (0.0404)	1.500 (0.0591)	1.975 (0.0778)
1.050 (0.0413)	1.525 (0.0600)	2.000 (0.0787)
1.075 (0.0423)	1.550 (0.0610)	2.025 (0.0797)
1.100 (0.0433)	1.575 (0.0620)	2.050 (0.0807)
1.125 (0.0443)	1.600 (0.0630)	2.075 (0.0817)
1.150 (0.0453)	1.625 (0.0640)	2.100 (0.0827)
1.175 (0.0463)	1.650 (0.0650)	2.125 (0.0837)
1.200 (0.0472)	1.675 (0.0659)	2.150 (0.0846)
1.225 (0.0482)	1.700 (0.0669)	2.175 (0.0856)
1.250 (0.0492)	1.725 (0.0679)	2.200 (0.0866)

HINT:

- Varying the adjusting shim thickness by 0.025 mm (0.0010 in.) changes the injection pressure by about 373 kpa (3.8 kgf/cm^2, 54 psi).
- Only one adjusting shim should be used.

(3) There should be no dripping after injection.





9. INSPECT COMPRESSION

NOTICE:

When measuring the compression pressure of each, the other 3 injection nozzles must be installed in the cylinder head.

(a) Remove the injection nozzle (See page 11–60).

(b) Install the gasket and SST (attachment) to the injection nozzles hole with the nozzle holder clamp and bolt.

SST 09992–00400

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(c) Connect SST (compression gauge) to the SST (attachment).

SST 09992–00025 (09992–00211)

(d) Fully open the throttle valve, and start the engine.

(e) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain engine revolution of 250 rpm or more.

(f) Repeat steps (a) through (d) for each cylinder.

NOTICE:
This measurement must be done in as short a time as possible.

Compression pressure:
3,000 kPa (31.0 kgf/cm^2, 441 psi) or more
Minimum pressure: 1,960 kPa (20.0 kgf/cm^2, 284 psi)
Difference between each cylinder:
196 kPa (2.0 kgf/cm^2, 28 psi) or less

(g) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the injection nozzle hole and repeat steps (a) through (e) for the cylinder with low compression.
- If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn of damaged.
- If pressure stays low, a valve may be sticking or seating improperly, of there may be leakage past the gasket.

(h) Remove the SST.
SST 09992–00025 (09992–00211), 09992–00400
(i) Reinstall the injection nozzle.
(j) Connect (fuel cut solenoid) connector.
(k) Install the injection pipes.
(l) Install the nozzle leakage pipe.
(m) Install the cylinder head cover.
(n) Start the engine and check for leaks.

10. INSPECT DIESEL SMOKE