

# CYLINDER HEAD GASKET (1CD-FTV)

## REPLACEMENT

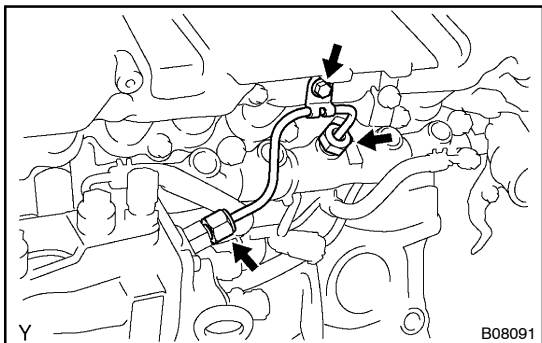
1. REMOVE HOOD SUB-ASSY
2. REMOVE FRONT WIPER ARM HEAD CAP
3. REMOVE FR WIPER ARM LH  
(See page 66-9)
4. REMOVE FRONT WIPER ARM HEAD CAP
5. REMOVE FR WIPER ARM RH  
(See page 66-9)
6. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSY  
(See page 66-9)
7. REMOVE WIPER LINK ASSY  
(See page 66-9)
8. REMOVE COWL TOP PANEL SUB-ASSY OUTER
9. DRAIN COOLANT
10. DRAIN ENGINE OIL (See page 14-141)
11. REMOVE RADIATOR RESERVE TANK ASSY
12. REMOVE FRONT WHEEL
13. REMOVE ENGINE UNDER COVER RH
14. REMOVE VANE PUMP V BELT  
(See page 14-75)
15. REMOVE FAN AND GENERATOR V BELT  
(See page 14-75)
16. REMOVE ENGINE MOUNTING BRACKET NO.2 RH  
(See page 14-114)
17. REMOVE CRANKSHAFT PULLEY  
(See page 14-114)
- SST 09213-54015 (91651-60855), 09330-00021, 09950-50013 (09951-05010, 09952-05010, 09953-05010, 09953-05020, 09954-05021, 09954-05030)
18. REMOVE POWER STEERING IDLE PULLEY ASSY
19. REMOVE VANE PUMP PULLEY  
(See page 14-91)
- SST 09960-10010 (09962-01000, 09963-01000)
20. REMOVE VANE PUMP W/BRAKET (See page 14-91)
21. REMOVE TIMING BELT NO.2 COVER
22. REMOVE PULLEY SUB-ASSY, IDLER
23. REMOVE TIMING BELT NO.1 COVER
24. REMOVE TIMING BELT GUIDE

**25. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET****26. REMOVE SET NO.1 CYLINDER TO TDC/COMPRESSION (See page 14-114)****27. REMOVE TIMING BELT****(See page 14-114)****HINT:**

If re-using the timing belt, draw a direction arrow on the timing belt (in direction of engine revolution), and place matchmarks on the pulleys and timing belt.

**28. REMOVE EXHAUST PIPE ASSY CENTER****29. REMOVE EXHAUST PIPE ASSY FRONT****30. REMOVE BATTERY****31. REMOVE AIR CLEANER ASSY****32. REMOVE AIR TUBE NO.1****33. SEPARATE RADIATOR HOSE INLET****34. SEPARATE HEATER WATER INLET HOSE A****35. SEPARATE HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)****36. SEPARATE INJECTION PUMP TO FUEL PIPE FUEL HOSE****37. SEPARATE OIL COOLER HOSE****38. REMOVE TURBO INSULATOR NO.2****39. REMOVE TURBO INSULATOR NO.1****40. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.2****41. REMOVE MANIFOLD CONVERTER SUB-ASSY****42. SEPARATE TURBO WATER HOSE NO.2****43. SEPARATE TURBO WATER HOSE NO.1****44. SEPARATE TURBO OIL INLET PIPE SUB-ASSY****45. REMOVE TURBOCHARGER SUB-ASSY****(See page 13-6)****46. REMOVE CAMSHAFT TIMING PULLEY****(See page 14-124)**

SST 09960-10010 (09962-01000, 09963-01000), 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04071, 09957-04010, 09958-04011)

**47. REMOVE FUEL INLET PIPE SUB-ASSY**

- (a) Remove the pipe clamp bolt from the intake manifold.
- (b) Using SST, remove the fuel inlet pipe from the common rail side.  
SST 09023-12900
- (c) Using SST, remove the fuel inlet pipe from the pump side.  
SST 09023-12700

**NOTICE:**

After removing the fuel pipe, affix the gum tape on the pump, common rail, and the hole in injector installation area of the cylinder head cover for preventing dust from coming into them.

**48. REMOVE INJECTION PIPE SUB-ASSY NO.1**

(See page 11-23)

SST 09023-12700, 09023-12900

**49. REMOVE INJECTION PIPE SUB-ASSY NO.2**

(See page 11-23)

SST 09023-12700, 09023-12900

**50. REMOVE INJECTION PIPE SUB-ASSY NO.3**

(See page 11-23)

SST 09023-12700, 09023-12900

**51. REMOVE INJECTION PIPE SUB-ASSY NO.4**

(See page 11-23)

SST 09023-12700, 09023-12900

**52. REMOVE VACUUM PUMP ASSY****53. REMOVE CYLINDER HEAD COVER SUB-ASSY****54. REMOVE NOZZLE LEAKAGE PIPE ASSY**

(See page 11-23)

**55. REMOVE INJECTOR ASSY**

(See page 11-23)

**56. REMOVE CAMSHAFT OIL SEAL RETAINER**

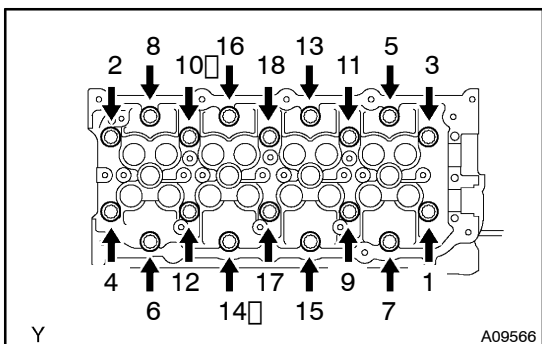
(See page 4-124)

**57. REMOVE NO.2 CAMSHAFT**

(See page 4-124)

**58. REMOVE CAMSHAFT**

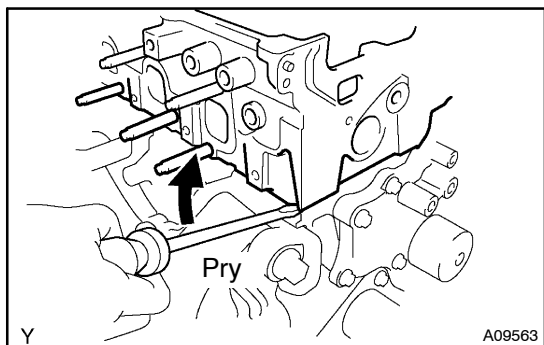
(See page 4-124)

**59. REMOVE CYLINDER HEAD SUB-ASSY**

- (a) Uniformly loosen the 18 cylinder head bolts in several passes and in the sequence shown. Remove the 18 cylinder head bolts and plate washers.

**NOTICE:**

Cylinder head warpage or cracking could result from removing bolts in incorrect order.



- (b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

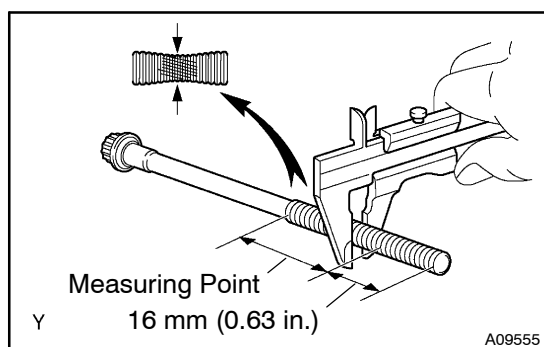
**HINT:**

If the cylinder head is lift off, pry between the cylinder head and cylinder block with a screwdriver.

**NOTICE:**

**Be careful not to damage the contact surfaces of the cylinder head and cylinder block.**

## 60. REMOVE CYLINDER HEAD GASKET



## 61. INSPECT CYLINDER HEAD SET BOLT

- (a) Using vernier calipers, measure the tension portion diameter of the bolts.

**Standard outside diameter:**

**10.75 – 11.00 mm (0.4232 – 0.4331 in.)**

**Minimum outside diameter: 10.40 mm (0.4904 in.)**

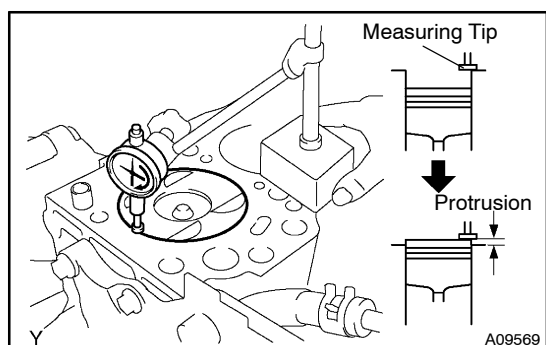
If the diameter is less than minimum, replace the bolt.

## 62. INSTALL CYLINDER HEAD GASKET

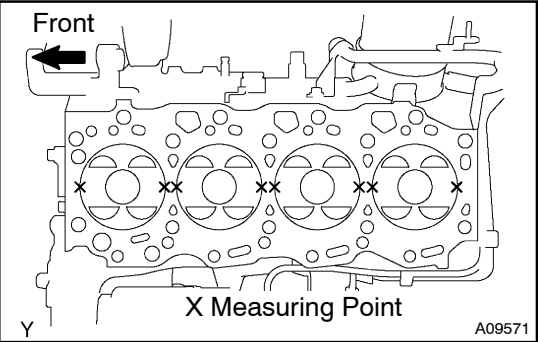
- (a) Check piston protrusions for each cylinder.
- (1) Clean the cylinder block with solvent.
  - (2) Set the piston of the cylinder to be measured to slightly before TDC.
  - (3) Place a dial indicator on the cylinder block, and set the dial indicator at 0 mm (0 in.).

**HINT:**

- Use a dial indicator measuring tip as shown in the illustration.
- Make sure that the measuring tip is square to the cylinder block gasket surface and piston head when taking the measurements.



- (4) Find where the piston head protrudes most by slowly turning the crankshaft clockwise and counter-clockwise.



- (5) Measure each cylinder at 2 places as shown in the illustration, marking a total of 8 measurements.
- (6) For the piston protrusion valve of each cylinder, use the average of the 2 measurements of each cylinder.

**Protrusion: 0.165 – 0.425 mm (0.0065 – 0.0168 in.)**

- (b) Select new cylinder head gasket.

**HINT:**

There are 5 sizes of new cylinder head gaskets, marked "A", "B", "C", "D", or "E" according.

**New installed cylinder head gasket thickness:**

A	0.85 – 0.95 mm (0.0335 – 0.0374 in.)
B	0.90 – 1.00 mm (0.0354 – 0.0394 in.)
C	0.95 – 1.05 mm (0.0374 – 0.0413 in.)
D	1.00 – 1.10 mm (0.0394 – 0.0433 in.)
E	1.05 – 1.15 mm (0.0413 – 0.0453 in.)

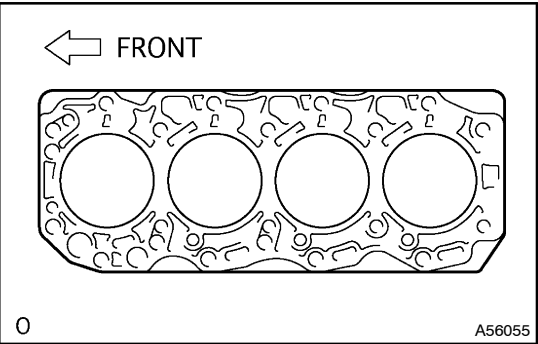
- (1) Select the largest piston protrusion valve from the measurements made, then select a new appropriate gasket according to the table below.

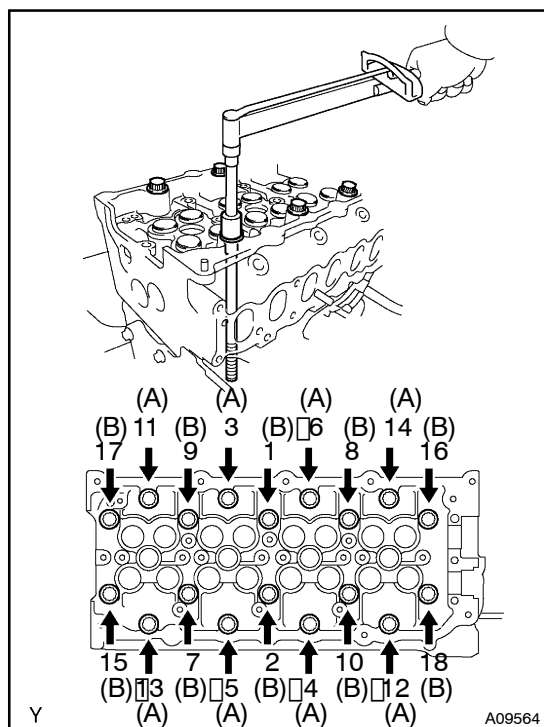
Piston protrusion mm (in.)	Gasket size
0.165 – 0.220 (0.0065 – 0.0087)	Use A
0.220 – 0.270 (0.0087 – 0.0106)	Use B
0.270 – 0.320 (0.0106 – 0.0126)	Use C
0.320 – 0.370 (0.0126 – 0.0146)	Use D
0.370 – 0.425 (0.0146 – 0.0167)	Use E

- (c) Place a new cylinder head gasket in position on the cylinder block.

**NOTICE:**

**Be careful of the installation direction.**





### 63. INSTALL CYLINDER HEAD SUB-ASSY

#### HINT:

- The cylinder head bolts are tightened in 4 progressive steps (steps (c), (e), (f) and (g)).
  - If any cylinder head bolt is broken or deformed, replace it.
- (a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts and plate washers.
  - (b) Install the plate washer to the cylinder head bolt.
  - (c) Install and uniformly tighten the 18 cylinder head bolts and plate washers in several passes and in the sequence shown.

**Torque: 45 N·m (460 kgf·cm, 33 ft·lb)**

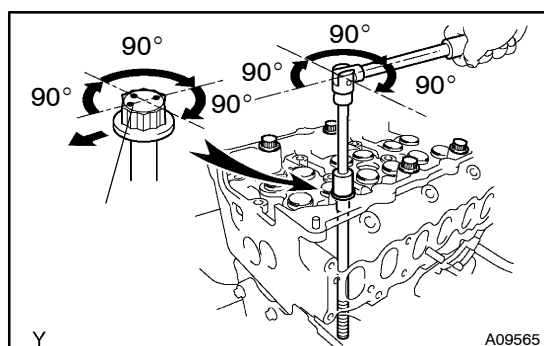
#### HINT:

Each bolt length is indicated in the illustration.

#### Bolt length:

(A)	160mm (6.30 in.)
(B)	104mm (4.09 in.)

If any of the cylinder head bolt does not meet the torque specification, replace the cylinder head bolt.



- (d) Mark the front of the cylinder head bolt with paint.
- (e) Retighten the cylinder head bolts by 90° in the numerical order shown first.
- (f) Retighten the cylinder head bolts by 90° in the numerical order shown secondary.
- (g) Retighten the cylinder head bolts by additional 90° in the numerical order shown third.
- (h) Check that the painted mark is at the intake manifold side now.

### 64. INSTALL CAMSHAFT

(See page 14-124)

### 65. INSTALL NO.2 CAMSHAFT

(See page 14-124)

### 66. REMOVE CAMSHAFT OIL SEAL

(See page 14-124)

### 67. INSTALL CAMSHAFT OIL SEAL

(See page 14-124)

SST 09223-46011

### 68. INSTALL CAMSHAFT OIL SEAL RETAINER

(See page 14-124)

### 69. INSTALL INJECTOR ASSY

(See page 14-124)

**70. INSTALL NOZZLE LEAKAGE PIPE ASSY**(See [page 1-23](#))

SST 09992-00242

**71. INSTALL CYLINDER HEAD COVER SUB-ASSY**(See [page 1-23](#))**72. INSTALL VACUUM PUMP ASSY**(See [page 4-124](#))**73. INSTALL INJECTION PIPE SUB-ASSY NO.1**(See [page 1-23](#))

SST 09023-12700, 09023-12900

**NOTICE:****When removing the injection pipe, clean up with a brush and compressed air.****74. INSTALL INJECTION PIPE SUB-ASSY NO.2**(See [page 1-23](#))

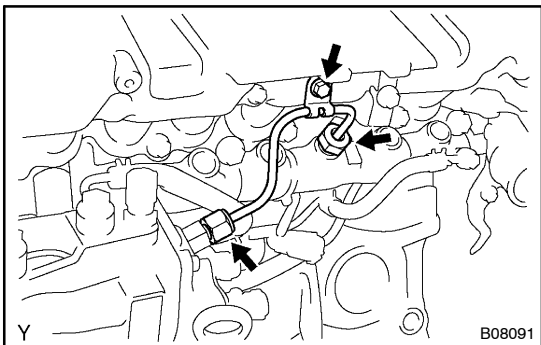
SST 09023-12700, 09023-12900

**NOTICE:****When removing the injection pipe, clean up with a brush and compressed air.****75. INSTALL INJECTION PIPE SUB-ASSY NO.3**(See [page 1-23](#))

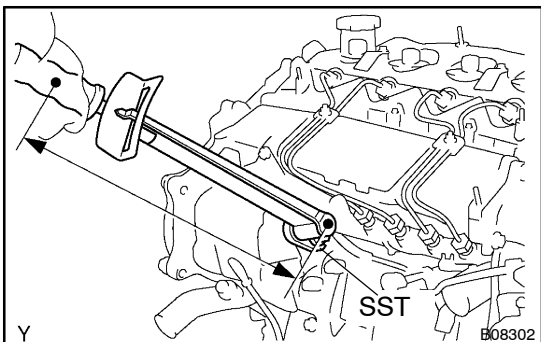
SST 09023-12700, 09023-12900

**NOTICE:****When removing the injection pipe, clean up with a brush and compressed air.****76. INSTALL INJECTION PIPE SUB-ASSY NO.4**(See [page 1-23](#))

SST 09023-12700, 09023-12900

**NOTICE:****When removing the injection pipe, clean up with a brush and compressed air.****77. INSTALL FUEL INLET PIPE SUB-ASSY**

- (a) Remove the gum tape from the common rail and supply pump.
- (b) Temporarily tighten the new inlet pipe and pipe clamp bolt.

**NOTICE:****In case of having the cylinder head gasket replaced, must replace fuel inlet pipe, too.**

- (c) Using SST, tighten the inlet pipe from the common rail side.

SST 09023-12900

**Torque:****37 N·m (377 kgf·cm, 27 ft·lbf) for use with SST****41 N·m (418 kgf·cm, 30 ft·lbf)****HINT:****Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).**

- (d) Using SST, tighten the inlet pipe from the pump side.  
SST 09023-12700

**Torque:**

**31 N·m (316 kgf·cm, 23 ft.·lbf) for use with SST**

**34 N·m (347 kgf·cm, 25 ft.·lbf)**

**HINT:**

Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

- (e) Tighten the pipe clamp bolt.

**Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)**

## 78. INSTALL CAMSHAFT TIMING PULLEY

(See page 14-124)

SST 09960-10010 (09962-01000, 09963-01000)

## 79. INSTALL TURBOCHARGER SUB-ASSY

(See page 13-6)

## 80. INSTALL MANIFOLD CONVERTER SUB-ASSY

(See page 13-6)

## 81. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.2

(See page 13-6)

## 82. INSTALL TURBO INSULATOR NO.1

(See page 13-6)

## 83. INSTALL TURBO INSULATOR NO.2

(See page 13-6)

## 84. INSTALL AIR TUBE NO.1

(See page )

## 85. INSTALL EXHAUST PIPE ASSY FRONT

(See page 15-2)

## 86. INSTALL EXHAUST PIPE ASSY CENTER

(See page 15-2)

## 87. SET NO.1 CYLINDER TO TDC/COMPRESSION (See page 14-114)

SST 09960-10010 (09962-01000, 09963-01000)

## 88. INSTALL TIMING BELT

(See page 14-114)

## 89. CHECK VALVE TIMING (See page 14-114)

## 90. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(See page 14-114)

## 91. INSTALL TIMING BELT GUIDE

(See page 14-114)

## 92. INSTALL TIMING BELT NO.1 COVER

(See page 14-114)

## 93. INSTALL TIMING BELT NO.2 COVER

(See page 14-114)

## 94. INSTALL PULLEY SUB-ASSY, IDLER (See page 14-114)

## 95. INSTALL VANE PUMP W/BRAKET (See page 14-91)

## 96. INSTALL VANE PUMP PULLEY

(See page 14-91)

SST 09960-10010 (09962-01000, 09963-01000)



- 97. INSTALL POWER STEERING IDLE PULLEY ASSY  
(See page 14-91)
- 98. INSTALL CRANKSHAFT PULLEY  
(See page 14-114)  
SST 09213-54015 (91651-60855), 09330-00021
- 99. INSTALL ENGINE MOUNTING BRACKET NO.2 RH  
(See page 14-114)
- 100. INSTALL VANE PUMP V BELT  
(See page 14-75)
- 101. INSPECT VANE PUMP V BELT  
(See page 14-72)
- 102. INSTALL COWL TOP PANEL SUB-ASSY OUTER  
(See page 14-91)
- 103. INSTALL WIPER LINK ASSY  
(See page 66-9)
- 104. INSTALL FR WIPER ARM RH  
(See page 66-9)
- 105. INSTALL FR WIPER ARM LH  
(See page 66-9)
- 106. INSPECT HOOD SUB-ASSY  
(See page 75-1)
- 107. ADJUST HOOD SUB-ASSY  
(See page 75-1)
- 108. ADD ENGINE OIL
- 109. ADD COOLANT (See page 16-19)
- 110. INSPECT FUEL LEAK
- 111. CHECK ENGINE OIL LEAK
- 112. CHECK ENGINE COOLANT LEAK (See page 16-19)
- 113. CHECK EXHAUST GAS LEAK