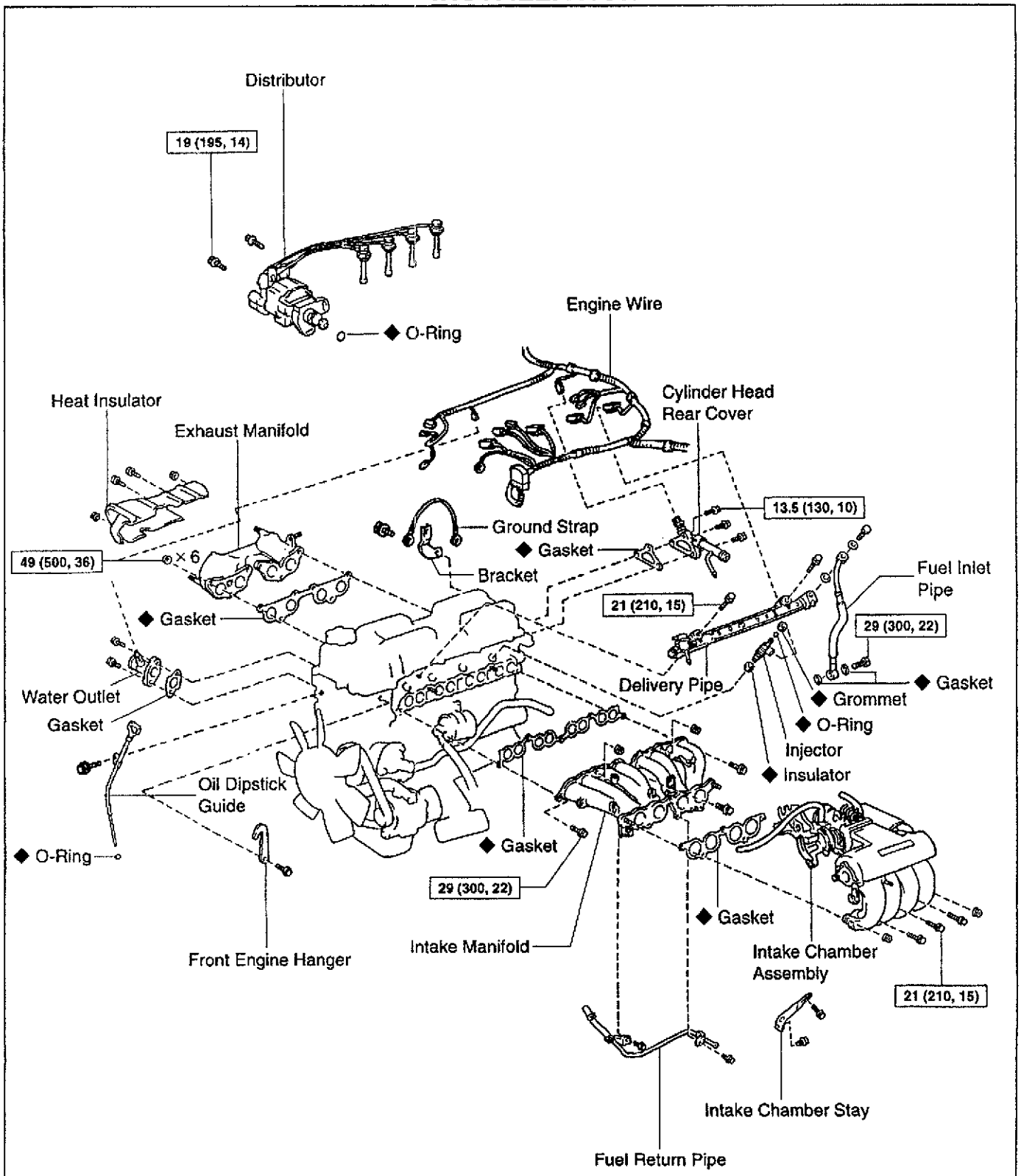
CYLINDER HEAD (3RZ–FE)

EG78P–01

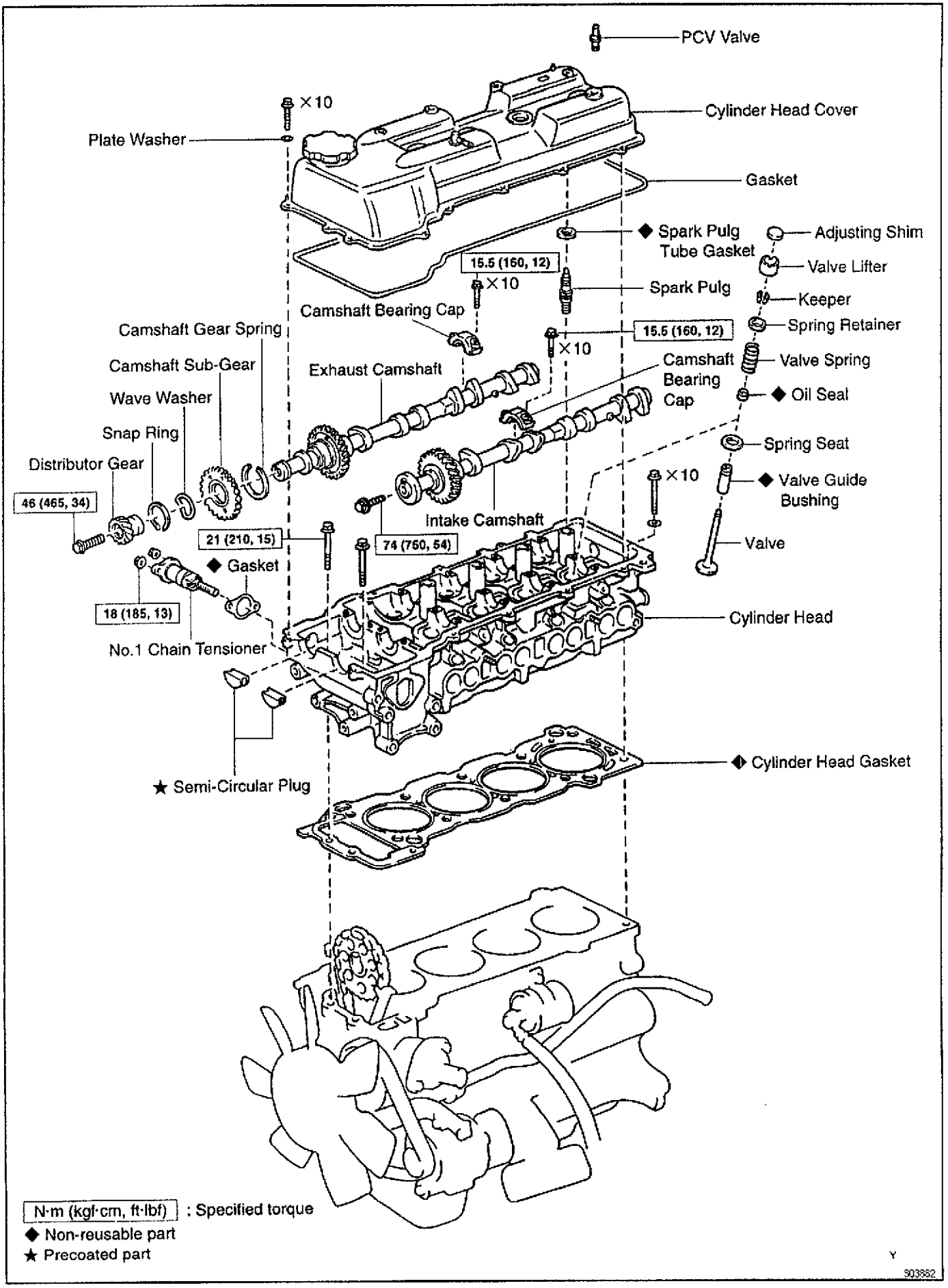
COMPONENTS FOR REMOVAL AND INSTALLATION



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

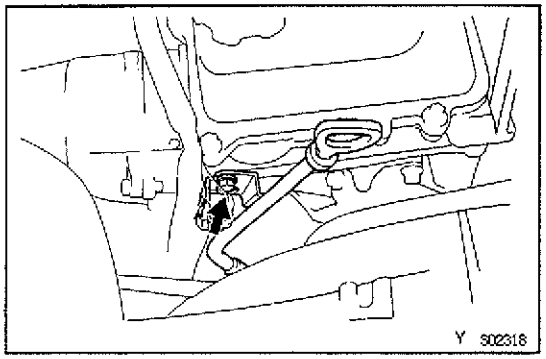
Y S03879

EG


PCV Valve
×10
Plate Washer
Cylinder Head Cover
Gasket
◆ Spark Pulg Tube Gasket
Adjusting Shim
Valve Lifter
15.5 (160, 12)
×10
Spark Pulg
Keeper
Camshaft Bearing Cap
Camshaft Gear Spring
15.5 (160, 12)
Spring Retainer
×10
Camshaft Sub-Gear
Exhaust Camshaft
Camshaft Bearing Cap
Valve Spring
Wave Washer
◆ Oil Seal
Snap Ring
Spring Seat
Distributor Gear
×10
◆ Valve Guide Bushing
46 (465, 34)
Intake Camshaft
21 (210, 15)
74 (750, 54)
◆ Gasket
Valve
18 (185, 13)
Cylinder Head
No.1 Chain Tensioner
◆ Cylinder Head Gasket
★ Semi-Circular Plug
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
Y
903882

EG78Q-01

CYLINDER HEAD REMOVAL



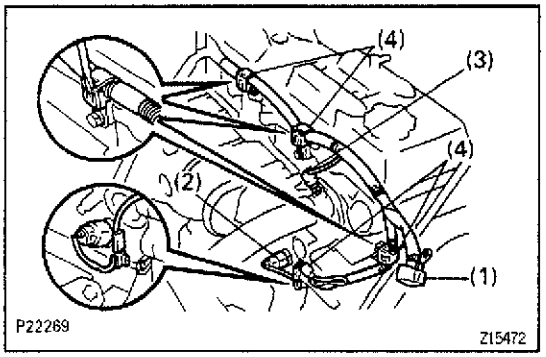
1. REMOVE OIL DIPSTICK GUIDE

(a) Remove the bolt, dipstick guide and engine wire bracket.

(b) Remove the O—ring from the dipstick guide.

2. REMOVE DISTRIBUTOR

(See distributor removal in Ignition System)



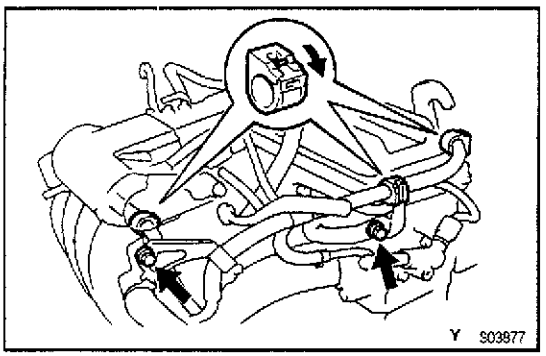
3. DISCONNECT ENGINE WIRE

(a) Disconnect these connectors and clamps:

(1) Oil pressure sensor connector and clamp

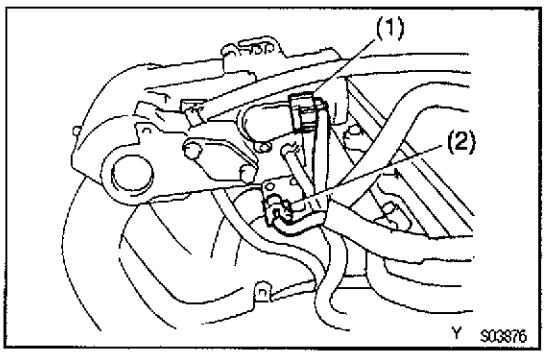
(2) Engine coolant temperature sender gauge connector

(3) 4 engine wire clamps and engine wire



(b) Disconnect the engine wire from the air intake chamber.

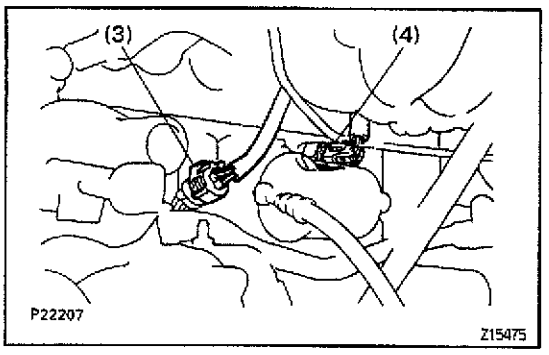
(c) Disconnect the 2 engine wire clamps and engine wire.



(e) Disconnect these connectors:

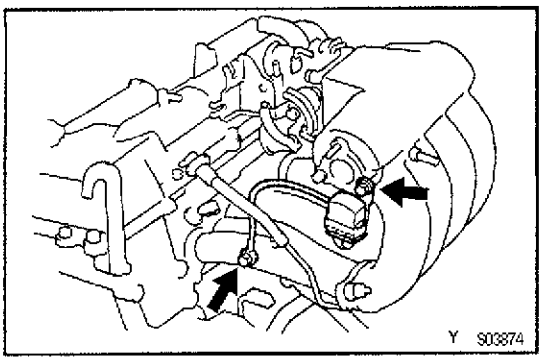
(1) Throttle position sensor connector

(2) ISC valve connector

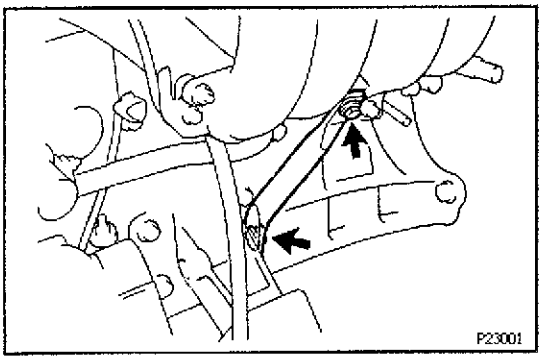


(3) Crankshaft position sensor connector

(4) Knock sensor connector

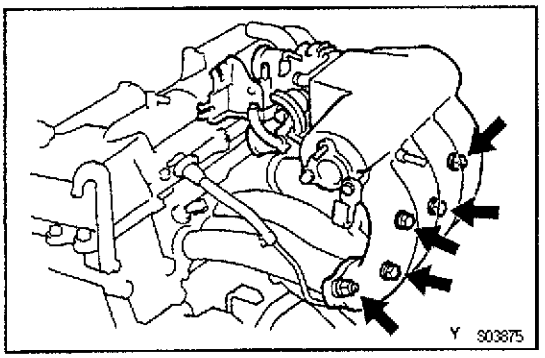


(f) Disconnect the check connecter from the bracket.
(g) Remove the wire ground.



4. REMOVE INTAKE CHAMBER STAY

Remove the 2 bolts and intake chamber stay.

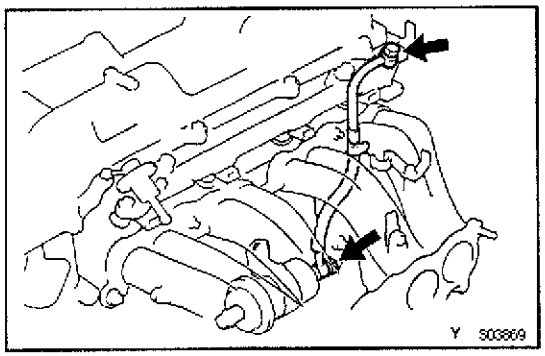


5. REMOVE AIR INTAKE CHAMBER ASSEMBLY

(a) Disconnect these hoses:
- PCV hose from throttle body
- Brake booster vacuum hose from union
- Water bypass hose from water bypass pipe
- Water bypass hose from cylinder head rear cover

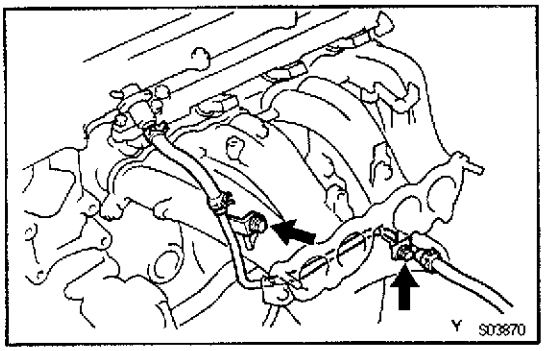
(b) Remove the 3 bolts, 2 nuts, air intake chamber assembly and gasket.

6. DISCONNECT INJECTOR CONNECTORS



7. REMOVE FUEL INLET PIPE

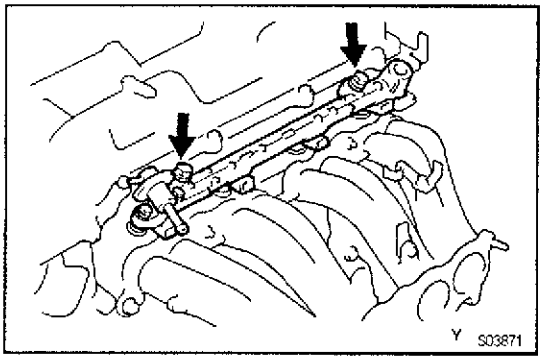
Remove the 2 union bolts, 4 gaskets and fuel inlet pipe.



8. REMOVE FUEL RETURN PIPE

(a) Disconnect these hoses:
- Fuel return hose from fuel pressure regulator
- Fuel return hose from fuel return pipe

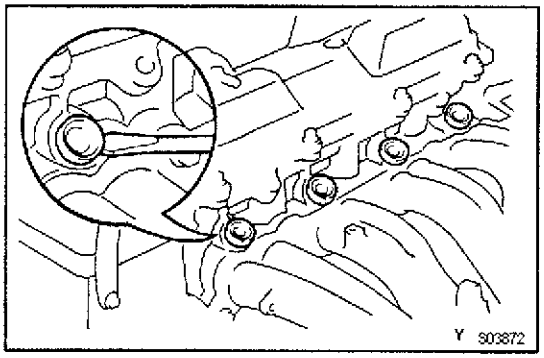
(b) Remove the 2 bolts and fuel return pipe.



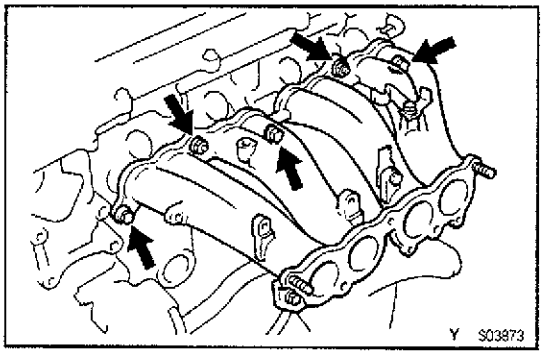
9. REMOVE DELIVERY PIPE AND INJECTORS

(a) Remove the 2 bolts and delivery pipe together with the 4 injectors.

NOTICE: Be careful not to drop the injectors when removing the delivery pipe.

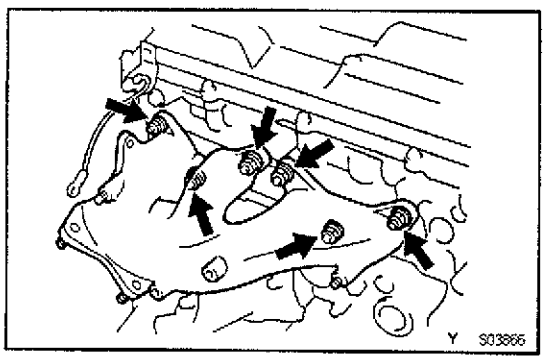


(b) Remove the 4 insulators from the 4 spacers.
(c) Pull out the 4 injectors from the delivery pipe.
(d) Remove the O–ring and grommet from each injector.
(e) Using a screwdriver, pry out the 4 spacers.



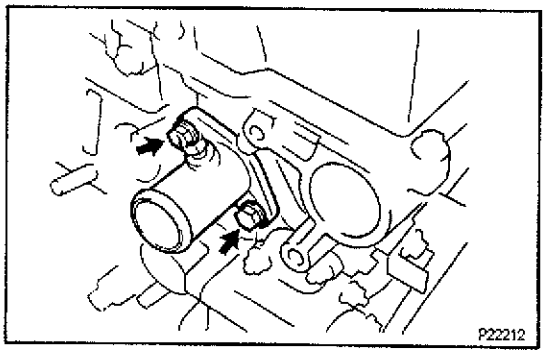
10. REMOVE INTAKE MANIFOLD

Remove the 3 bolts, 2 nuts, intake manifold and gasket.



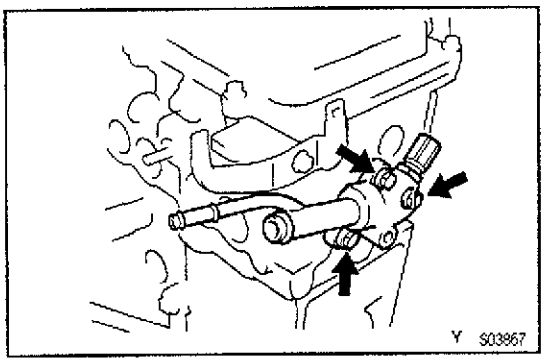
11. REMOVE EXHAUST MANIFOLD

(a) Remove the 2 bolts, 2 nuts and heat insulator.
(b) Remove the 6 nuts, exhaust manifold and gasket.

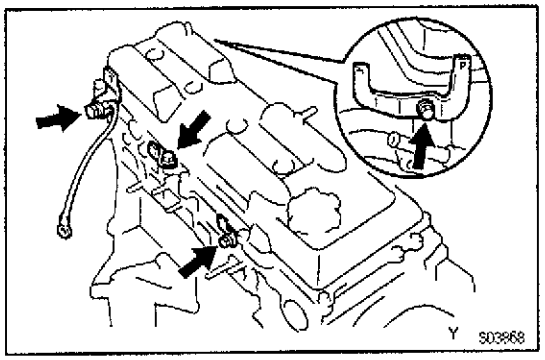


12. REMOVE WATER OUTLET

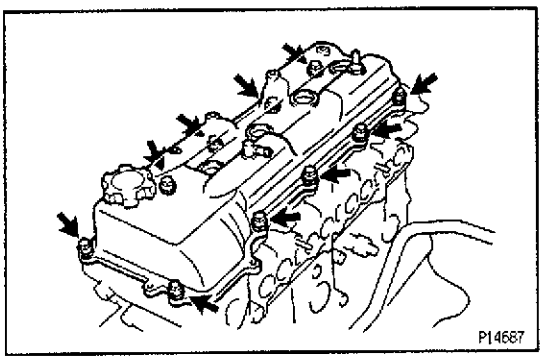
(a) Disconnect the upper radiator hose.
(b) Remove the 2 bolts, water outlet and gasket.



13. **REMOVE CYLINDER HEAD REAR COVER**
Remove the 3 bolts, cylinder head rear cover and gasket.
14. **REMOVE SPARK PLUGS**
15. **REMOVE FRONT ENGINE HANGER**



16. **REMOVE ENGINE WIRE BRACKETS**
Remove the 4 bolts, 4 wire brackets and ground strap.



17. **REMOVE CYLINDER HEAD COVER**
Remove the 10 bolts, seal washers, cylinder head cover and gasket.
18. **SET NO.1 CYLINDER TO TDC/COMPRESSION**
(See step 18 in cylinder head removal in 3RZ—F cylinder head)
19. **REMOVE CHAIN TENSIONER**
(See step 19 in cylinder head removal in 3RZ—F cylinder head)
20. **REMOVE CAMSHAFT TIMING GEAR**
(See step 20 in cylinder head removal in 3RZ—F cylinder head)
21. **REMOVE CAMSHAFTS**
(See step 21 in cylinder head removal in 3RZ—F cylinder head)
22. **DISASSEMBLE EXHAUST CAMSHAFT**
(See step 22 in cylinder head removal in 3RZ—F cylinder head)
23. **REMOVE CYLINDER HEAD**
(See step 23 in cylinder head removal in 3RZ—F cylinder head)

CYLINDER HEAD DISASSEMBLY

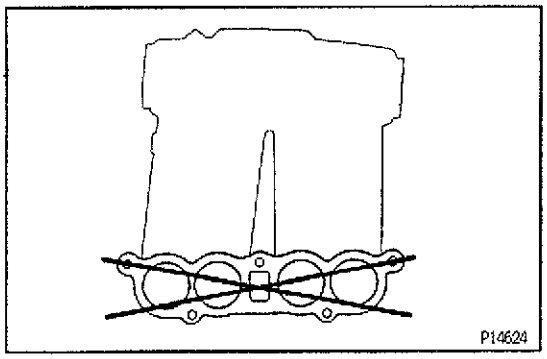
EG78R-01

(See cylinder head disassembly in 3RZ—F cylinder head)

EG788-01

CYLINDER HEAD COMPONENTS, INSPECTION, CLEANING AND REPAIR

1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK
   (See step 1 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
2. CLEAN CYLINDER HEAD
   (See step 2 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
3. INSPECT CYLINDER HEAD
   (See step 3 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
4. CLEAN VALVES
   (See step 4 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
5. INSPECT VALVE STEMS AND GUIDE BUSHINGS
   (See step 5 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS
   (See step 6 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
7. INSPECT AND GRIND VALVES
   (See step 7 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
8. INSPECT AND CLEAN VALVE SEATS
   (See step 8 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
9. INSPECT VALVE SPRINGS
   (See step 9 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
10. INSPECT CAMSHAFTS AND BEARINGS
    (See step 10 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)
11. INSPECT VALVE LIFTERS AND LIFTER BORES
    (See step 11 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)



EG

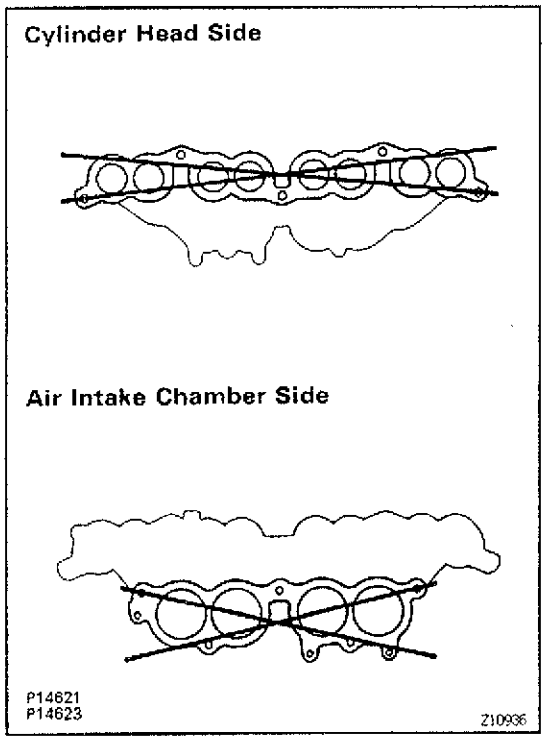
12. **INSPECT AIR INTAKE CHAMBER**

Using a precision straight edge and thickness gauge, measure the surface contacting the intake manifold for warpage.

Maximum warpage:

0.20 mm (0.0078 in.)

If warpage is greater than maximum, replace the air intake chamber.



13. **INSPECT INTAKE MANIFOLD**

Using a precision straight edge and thickness gauge, measure the surface contacting the cylinder head and air intake chamber for warpage.

Maximum warpage:

0.20 mm (0.0078 in.)

If warpage is greater than maximum, replace the manifold.

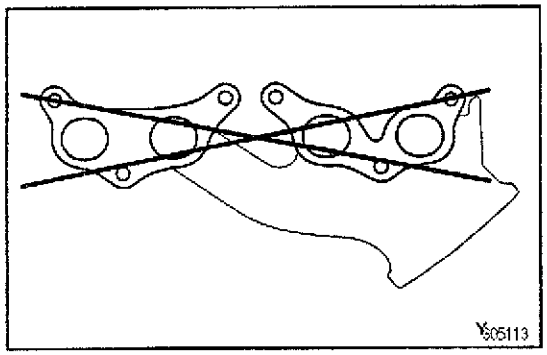
14. **INSPECT EXHAUST MANIFOLD**

Using a precision straight edge and thickness gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage:

0.50 mm (0.0197 in.)

If warpage is greater than maximum, replace the manifold.



15. **INSPECT CHAIN TENSIONER**

(See step 14 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)

16. **IF NECESSARY, REPLACE SPARK PLUG TUBE GASKETS**

(See step 15 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)

17. **INSPECT CYLINDER HEAD BOLTS**

(See step 16 in cylinder head components, inspection, cleaning and repair in 3RZ–F cylinder head)

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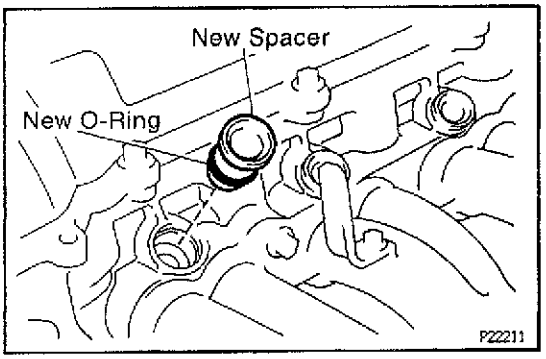
CYLINDER HEAD ASSEMBLY

(See cylinder head assembly in 3RZ—F cylinder head)

EG78U-01

CYLINDER HEAD INSTALLATION

1. INSTALL CYLINDER HEAD
   (See step 1 in cylinder head installation in 3RZ—F cylinder head)
2. ASSEMBLE EXHAUST CAMSHAFT
   (See step 2 in cylinder head installation in 3RZ—F cylinder head)
3. SET NO.1 CYLINDER TO TDC/COMPRESSION
   (See step 4 in cylinder head installation in 3RZ—F cylinder head)
4. INSTALL CAMSHAFT TIMING GEAR
   (See step 5 in cylinder head installation in 3RZ—F cylinder head)
5. INSTALL CHAIN TENSIONER
   (See step 6 in cylinder head installation in 3RZ—F cylinder head)
6. SET CHAIN TENSIONER
   (See step 7 in cylinder head installation in 3RZ—F cylinder head)
7. CHECK VALVE TIMING
   (See step 8 in cylinder head installation in 3RZ—F cylinder head)
8. CHECK AND ADJUST VALVE CLEARANCE
   (See step 9 in cylinder head installation in 3RZ—F cylinder head)
9. INSTALL SPARK PLUGS
   (See step 10 in spark plugs inspection in on—vehicle inspection in Ignition System)
10. INSTALL SEMI—CIRCULAR PLUGS
    (See step 11 in cylinder head installation in 3RZ—F cylinder head)
11. INSTALL CYLINDER HEAD COVER
12. INSTALL ENGINE WIRE BRACKETS
13. INSTALL FRONT ENGINE HANGER
    Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)
14. INSTALL CYLINDER HEAD REAR COVER
    Install a new gasket and the rear cover with the 3 bolts.
    Torque: 13.5 N·m (135 kgf·cm, 10 ft·lbf)



15. INSTALL WATER OUTLET

(a) Install a new gasket and the water outlet with the 2 bolts.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

(b) Connect the upper radiator hose.

16. INSTALL EXHAUST MANIFOLD

(a) Install a new gasket and the exhaust manifold with the 6 nuts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Install the heat insulator with the 2 bolts and 2 nuts.
Torque: 5.5 N·m (55 kgf·cm, 48 in.·lbf)

17. INSTALL INTAKE MANIFOLD

Install a new gasket and the intake manifold with the 3 bolts and 2 nuts.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

18. INSTALL INJECTORS AND DELIVERY PIPE

(See steps 3 in injectors installation in EFI System)

HINT: When using a new cylinder head, spacers must be installed.

Apply a light coat of gasoline to a new O–ring and install it to a new spacer.

19. INSTALL FUEL RETURN PIPE

20. INSTALL FUEL INLET PIPE

Install the fuel inlet pipe and 4 new gaskets with 2 union bolts.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

21. CONNECT INJECTOR CONNECTORS

22. INSTALL AIR INTAKE CHAMBER ASSEMBLY

(a) Install a new gasket and the air intake chamber assembly with the 3 bolts and 2 nuts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(b) Connect these hoses:
- PCV hose from throttle body
- Brake booster vacuum hose to union
- Water bypass hose to water bypass pipe
- Water bypass hose to cylinder head rear cover

23. INSTALL INTAKE CHAMBER STAY
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

24. CONNECT ENGINE WIRE

25. INSTALL DISTRIBUTOR
(See distributor installation in Ignition System)

26. INSTALL OIL DIPSTICK GUIDE
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

27. FILL WITH ENGINE COOLANT

28. START ENGINE AND FOR LEAKS

29. RECHECK ENGINE COOLANT LEVEL