

# PARTS & SERVICE NEWS

REF NO. AT04229

DATE Aug. 11, 2004

(C)

Page 1 of 10

**SUBJECT:** MODIFICATION OF INLINE 6 CYLINDER 140 SERIES ENGINE CAM FOLLOWER ASSEMBLY

**PURPOSE:** To inform Field Personnel

**APPLICATION:** BR1000JG-1 Mobile Crusher, S/N 1002  
 CS360-2E Crawler Stabilizer, S/N 11091 thru 11522  
 D155A-2 Bulldozer, S/N 57442 thru 57618  
 D155A-5 Bulldozer, S/N 65061 thru 65112  
 D155AX-5 Bulldozer, S/N 75208 thru 75293  
 D155C-1 Bulldozer, S/N 31586 thru 31591  
 D275A-5 Bulldozer, S/N 25005 thru 25055  
 D275AX-5 Bulldozer, S/N 20029 thru 20077  
 D355C-3 Bulldozer, S/N 14461 thru 14515  
 GD825A-2 Motor Grader, S/N 12114 thru 12119  
 HD325-6E Dump Truck, S/N 6124 thru 6217  
 HD405-6 Dump Truck, S/N 2072 thru 2105  
 HM350-1 Truck, S/N 1040 thru 1045  
 HM400-1 Truck, S/N 1065 thru 1105  
 PC1800E-6F Hydraulic Excavator, S/N 11011 thru 11015  
 PC1800E-6R Hydraulic Excavator, S/N 11011 thru 11015  
 PC600-6 Hydraulic Excavator, S/N 11105 thru 11130  
 PC600LC-6 Hydraulic Excavator, S/N 11104 thru 11129  
 PC600LC-7 Hydraulic Excavator, S/N 20001 thru 20003  
 PC650-6 Hydraulic Excavator, S/N 31042 thru 31050  
 PC650-7 Hydraulic Excavator, S/N 40001  
 PC750-6 Hydraulic Excavator, S/N 11038 thru 11063  
 PC750-7 Hydraulic Excavator, S/N 20006  
 PC750LC-6 Hydraulic Excavator, S/N 11039 thru 11068  
 PC750LC-7 Hydraulic Excavator, S/N 20001 thru 20005  
 PC800-6 Hydraulic Excavator, S/N 31064 thru 31085  
 PC800-7 Hydraulic Excavator, S/N 40001 thru 40011  
 WA500-3 Wheel Loader, S/N 52098 thru 54032  
 WD500-3 Wheel Dozer, S/N 50011

**FAILURE CODE:** A420FF

**DESCRIPTION:**

1. Introduction:

In the inline 6-cylinder 140 series engine, cam follower pin may be broken in some instances due to exceeding its designed durability. When the cam follower pin is broken, repair in accordance with this **Parts & Service News**.

Part No.	Part Name	Purpose of Part	Qty.	Remarks
Lever shaft assembly of cam follower				
6210-41-2020 (6210-41-2011)	Lever Shaft Assy (Lever Shaft Assy)	Replacement	6 (6)	
6210-41-2020 6210-41-2012	Lever Shaft Assy (Lever Shaft Assy)		6 (6)	
6210-41-2320 (6210-41-2302)	Lever Assy (Lever Assy)	Replacement	12 (12)	
6210-41-2320 (6210-41-2301)	Lever Assy (Lever Assy)		12 (12)	
6210-41-2350 (6210-41-2351)	Pin (Pin)		12 (12)	
6210-41-2020	Lever Shaft Assy		6	
6150-41-2430	Pin		12	
6217-11-8830	Gasket		6	
6210-21-6860	O-Ring		3	
6150-21-6391	Packing		6	
07005-01412	Gasket		20	
6210-41-2020	Lever Shaft Assy		6	
6150-41-2430	Pin		12	
6210-11-8820	Gasket		6	
6210-21-6860	O-Ring		2	
6210-21-6452	O-Ring		1	
6210-21-6462	O-Ring		1	
6150-21-6391	Packing		6	
07000-73032	O-Ring		2	
07000-73028	O-Ring		2	
07000-73048	O-Ring		1	
07000-73035	O-Ring		2	
07000-01012	Gasket		4	
07005-01412	Gasket		22	
07005-01212	Gasket	2		

### 1. Improvements

To enhance allowance for breakage of the pin, the following improvements have been made. When the pin is changed, the assembly part number is also changed. (See Table 1.)

Change of pin material

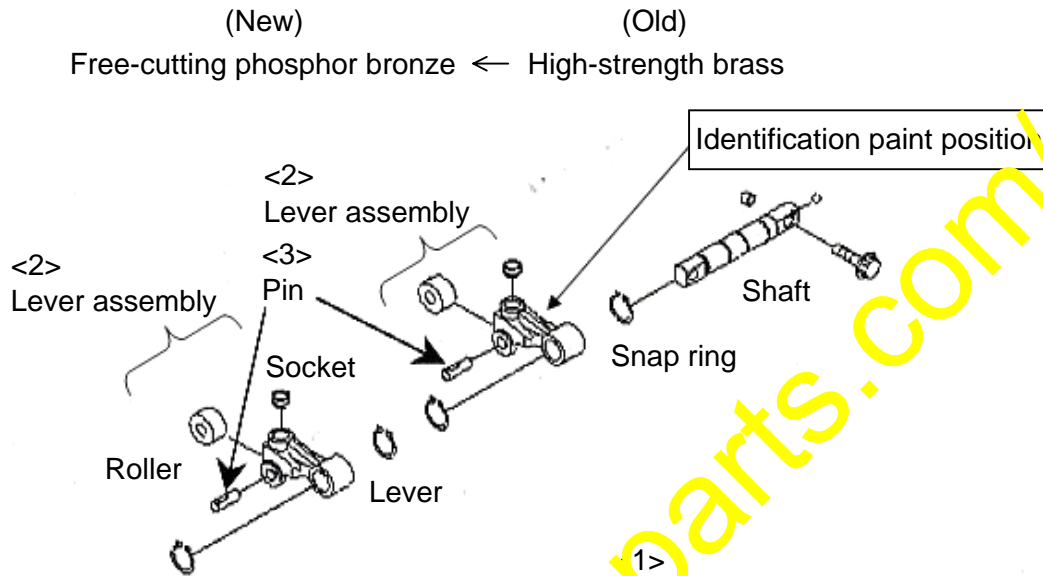


Fig. 1 Components of lever shaft assembly

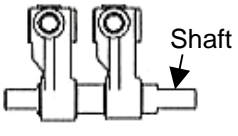
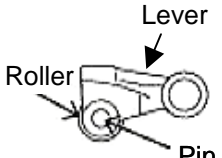

	Designation	Part No.		Pattern diagram
		New	Old	
<1>	Lever shaft assembly (<2> + Shaft snap ring)	6210-41-2020 (Identification paint: green)	6210-41-2011 (Identification paint: white) or 6210-41-2012 (Identification paint: pink)	 Lever shaft assembly
<2>	Lever assembly (Lever, Roller pin socket)	6210-41-2320 (Identification paint: green)	6210-41-2301 (Identification paint: white) or 6210-41-2302 (Identification paint: pink)	 Lever assembly
<3>	Pin	6210-41-2350 (Free-cutting phosphor bronze) Pin color: brown	6210-41-2351 (High-strength brass) Pin color: yellow	 Pin

Table 1 New and Old Lever Part Numbers

## 2. Modification procedure

If the cam follower pin is abnormally worn or broken, repair the cam follower.  
When the following defective conditions occur in the machine under operation, the cam follower can be at fault. In such cases, remove the cam follower to check.

[Nature of problem]

- <1> Exhaust gas color has become extremely bad. (This can be caused by defective turbo.)
  - <2> Abnormal noise
  - <3> Large valve clearance
- It is not easy to detect this phenomenon while the machine is running.  
It can be detected in periodic inspection or check for other defects.

**The modification procedure below is applicable to a cam follower, however, for detailed procedure up to removal of a cam follower cover, see 3. Detail of modification procedure on the following pages.**

(Work on the engine with common rail is different from that on the engine with conventional inline injection.)

- 1) Disassemble the section around the cam follower and remove the cam follower in accordance with the Engine Shop Manual.
- 2) Carefully check the lever shaft assembly for the following abnormalities. (Check the removed ones.)
  - \* Large roller backlash
  - \* The roller is pressed into the lever.
  - \* Broken roller pin and dropped off roller

If the above abnormality is found, also check the peripheral parts (cam shaft, push rod, rocker arm, etc.) for the following abnormalities.

  - \* Separation and abnormal wear of cam shaft
  - \* Bend or breakage of push rod and interference with head block
  - \* Rocker arm adjustment screw nouse, scuffing, abnormal wear, breakage, etc.
- 3) Replace the cam follower lever shaft assembly with the improved parts.
- 4) If any abnormality or damage is found in the above peripheral parts, replace them with new ones at the same time.

[References]

Record of changes of lever shaft assembly and roller

The changing of the roller was made in two steps as shown in the table below (No.2 and No.3 in the table.)

Both changes were made to increase durability of the camshaft and roller.

To replace a single item of roller, use either 6210-41-2341 or 6210-41-2342.

No.	Lever shaft assembly part number	Roller		Remarks
		Part No.	Changes	
1	6210-41-2010	6210-41-2340		
2	6210-41-2011	6210-41-2341	Outer edge shape (change of crowning)	Parts with reduced cam surface pressure (increased durability of cam and roller) (Introduced in "AT02194" Service News)
3	6210-41-2012	6210-41-2342	The above 2 + change of heat treatment	Further increase of durability of cam and roller for the above 2.
4	6210-41-2020	↑	↑	The above 3 is identical to roller. (Material of pin only was changed.)

### 3. Detail of modification procedure

#### 3.1) Detail of Modification Procedure for engine with common rail

Remove the cam follower cover at the left of the engine and replace the cam follower lever shaft assembly.

Note: \* An explanation on replacement procedure is given by taking HD325-6 as an example, because fuel and oil filter piping is somewhat different, depending on specifications.

\* Cooling water must be drained from the machine equipped with an air compressor and water separator before proceeding with work.

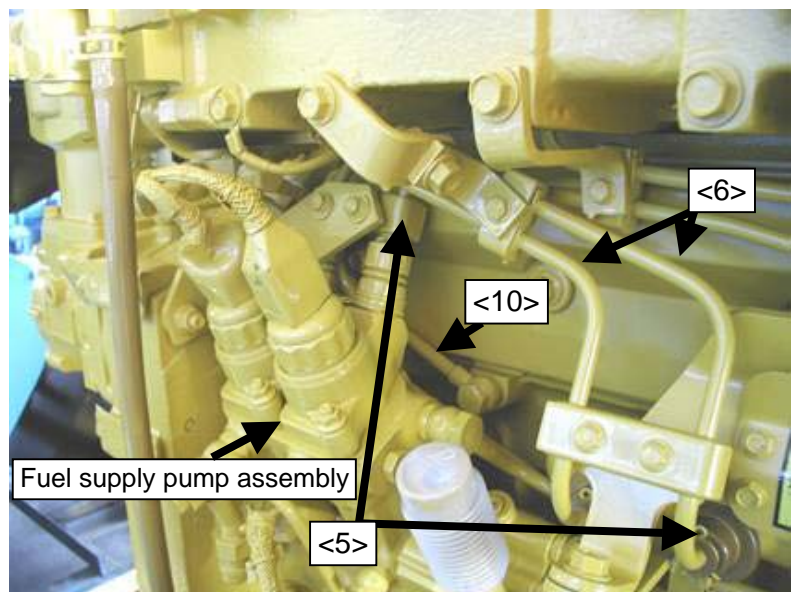
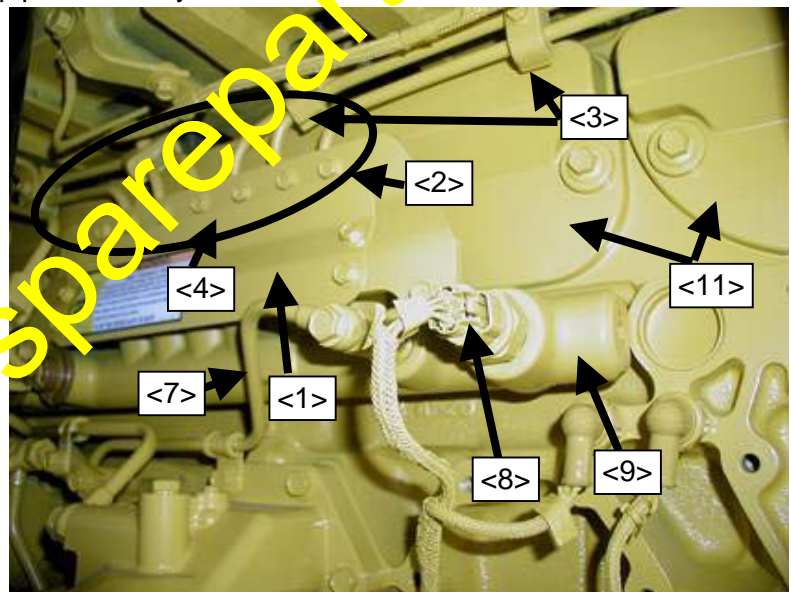
\* Remove any part from the machine body, which may interfere with the following removal work, before starting modifications.

For details, see the next page.



Remove the cam follower cover following the order below:

- (1) Remove the cover <1> (four mounting bolts) and take off the antiscattering rubber boots from the mounting part of the high-pressure pipe <2>.
- (2) Remove clamps <3> from the high-pressure pipes <2>.
- (3) Remove bolts from the high-pressure pipes <2> hold brackets <4> and detach the brackets <4>.
- (4) Remove the mounting parts from high-pressure pipes <2>.  
It is not necessary to remove the high-pressure pipe mounting parts on the nozzle side, however, remove the clamp and fixed brackets on the nozzle side.  
(Not shown in the photos.)  
(Since each high-pressure pipe has flexibility as above, the cam follower is detachable even if the high-pressure pipe <2> is not removed fully.)
- (5) Remove the flying objects prevention rubber boots <5> and clamps from the fuel supply high-pressure pipe <6> and disconnect the fuel supply high-pressure pipe <6>.  
(Don't remove the fuel supply assembly.)
- (6) Disconnect the fuel return pipe <7> and remove the connector from the pressure sensor.
- (7) Remove two bolts and take off the common rail <9>.
- (8) Remove the coolant pipe <10> (for compressor, roller, or water separator).
- (9) Remove other parts such as pipes that may interfere with removal of the cam follower cover as necessary.  
(It is not necessary to remove the oil filter pipe.)
- (10) Remove three cam follower covers <11> (3 pieces).
- (11) Now the cam follower of the engine with common rail is ready for modification.



Perform the following operation in accordance with the Shop Manual.

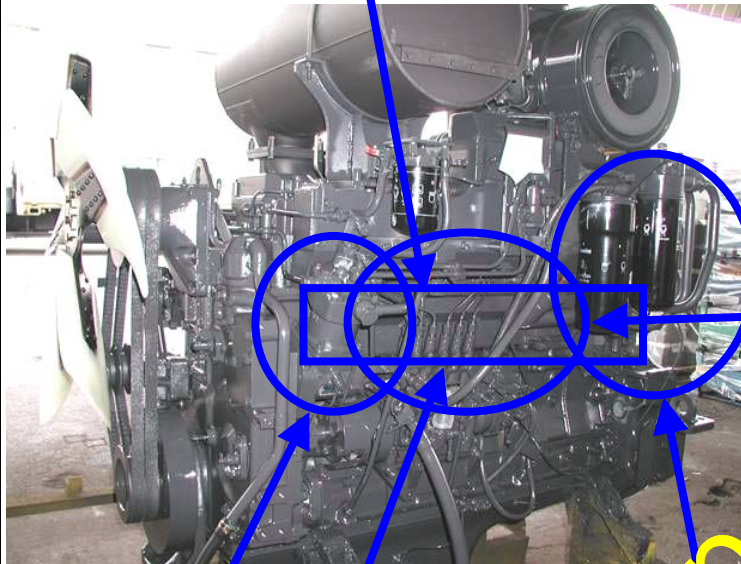
- (12) Remove the head cover, rocker arm assembly and push rod.
- (13) Remove the cam follower lever shaft assembly .  
If the dowel ring for positioning comes into contact with the lever shaft assembly and comes off, fit a new dowel ring to the cylinder block.
- (14) Now removal of the parts is completed.
- (15) Replace the old cam follower lever shaft assembly with the modified ones, following section "2. Modification procedure" above.
- (16) Reassemble following the disassembly procedure in reverse. Perform the followings in accordance with the Shop Manual.  
<1> Tightening torque for assembly  
<2> Valve clearance adjustment  
Note: When installing the cam follower lever shaft assembly, be sure to screw in the bolt with hand until the shaft is seated in the block to prevent the dowel ring from running on the shaft.
- (17) Carry out a trial run after completion of assembly and check that there are no oil leakage and abnormal noise.

[Consumable parts]

Parts (including consumables) necessary for this operation are listed on page 8.

<https://hespareparts.com/>

- 3.2) Detail of modification procedure for engine equipped with conventional inline injection pump  
Remove the cam follower cover at the left of the engine and replace the cam follower lever shaft assembly.  
For details, see the next page.



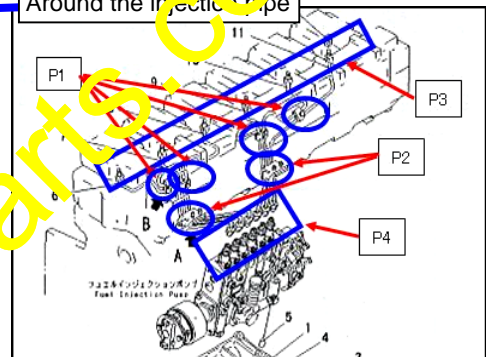
(GD825A-2 is shown in the photo.)

An explanation on replacement procedure is given by taking GD825A-2 with the air compressor as an example, because fuel and oil filter piping around here is somewhat different, depending on specifications.

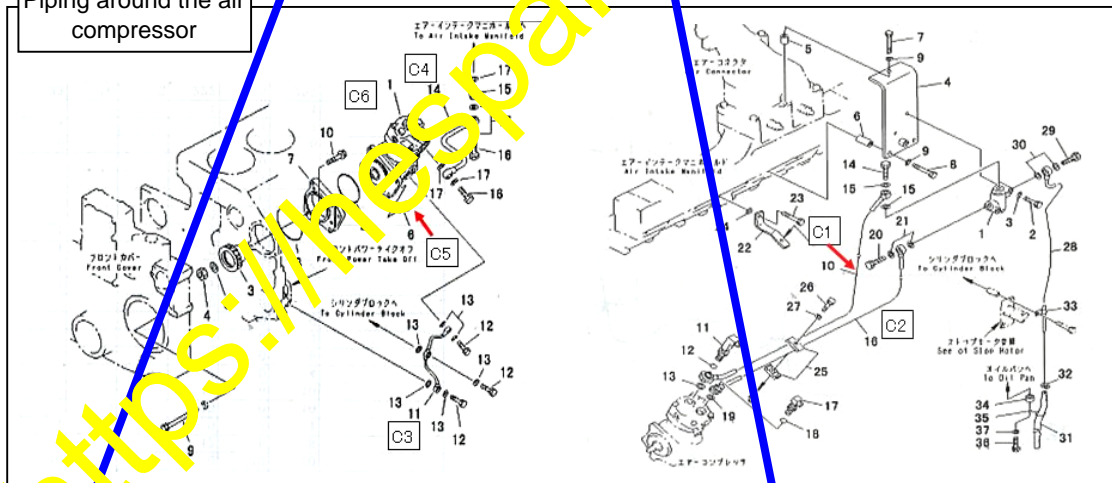
Cooling water must be drained from the machine equipped with an air compressor and water separator before proceeding with work.

Remove any part from the machine body, which may interfere with modification work, before starting modification.

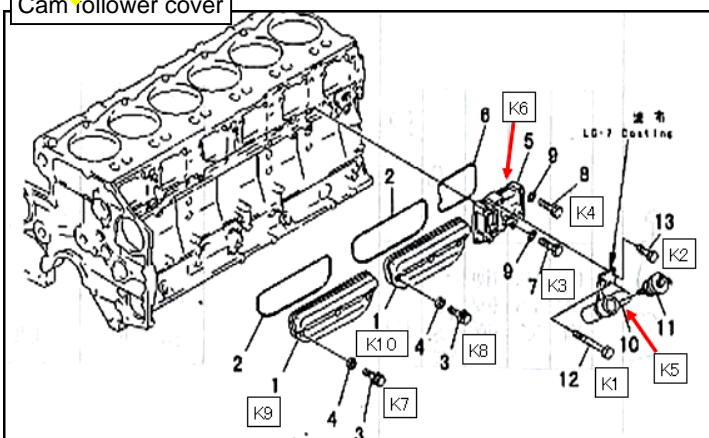
Around the injection pump



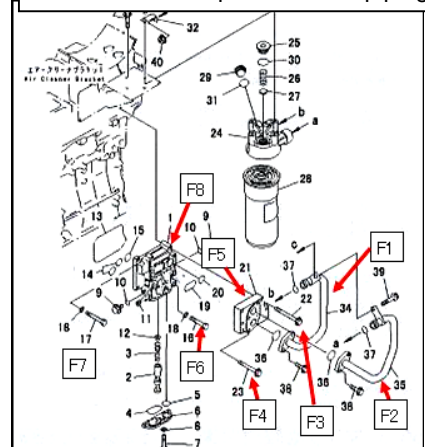
Piping around the air compressor



Cam follower cover



Around the oil adapter and filter piping





Remove the cam follower cover following the order below:

(1) Around the injection pipe

- <1> Remove four P1 aerial clamps and two P2 fixed clamps in the drawings on the previous page.
- <2> Remove the P3 nozzle-side injection pipe hexagon cap nut and the P4 injection pump-side injection pipe hexagon cap nut and free the #1 thru #6 injection pipes. Cover the injection pipe mounting part of the injection pump with new cloth or the like to prevent the dust.

(2) Around the compressor

- <1> Disconnect the C1 and C2 air pipes after taking off joint bolts from the mounting part.
- <2> Disconnect the C3 oil pipe and C4 air pipe.
- <3> Take off four C5 air compressor mounting bolts and remove the C6 compressor body.

(3) Around the oil adapter and oil filter piping

- <1> Disconnect the F1 and F2 oil filter inlet and outlet pipes.
- <2> Remove two F3 bolts and four F4 bolts and detach the F5 oil adapter.
- <3> Remove five F6 bolts and two F7 bolts and detach the F8 oil adapter assembly.

(4) Around the cam follower cover

- <1> Remove one K1 bolt and three K2 bolts and detach the K5 oil filler. Then, remove two K3 bolts and one K4 bolt and take off the K6 cover.
- <2> Remove three K7 bolts and three K8 bolts and take off the K9 and K10 covers.

Now, everything is set for replacement of the cam follower.

Since the machine without compressor does not require job in (2) above, it makes modification work easy.

Perform the following operation in accordance with the Shop Manual.

(5) Remove the head cover, rocker arm assembly and push rod.

(6) Remove the cam follower lever shaft assembly.

If the dowel ring for positioning comes into contact with the lever shaft assembly and comes off, fit a new dowel ring to the cylinder block.

(7) Now removal of the parts is completed.

(8) Replace the old cam follower lever shaft assembly with the modified ones, following 2. Modification procedure above.

(9) Reassemble, following the disassembly procedure in reverse. Perform the following in accordance with the Shop Manual.

- <1> Tightening torque for assembly
- <2> Valve clearance adjustment

Note: When installing the cam follower lever shaft assembly, be sure to screw in the bolt with hand until the shaft is seated in the block to prevent the dowel ring from running on the shaft.

(10) Carry out a trial run after completion of assembly and check that there are no oil leakage and abnormal noise.

[Consumable parts]

Parts (including consumables) necessary for this operation are listed on page 8.

## 4. Repair parts and consumables for repairs

No.	Part No.	Part name	Portion	Quantity/unit	
				For engine with common rail	For engine with conventional inline injection pump
1	6210-41-2020	LEVER SHAFT Ass'y	LEVER Ass'y + SHAFT Ass'y	6	6
2	6150-41-2430	PIN	Cam follower mounting part	12	12
3	6210-11-8820	GASKET	cover, rocker arm housing	-	6
4	6217-11-8830	GASKET	cover, cylinder head	6	-
5	6210-21-6860	O-RING	cover, camfollower	3	2
6	6210-21-6452	O-RING	cover, camfollower	-	1
7	6210-21-6462	O-RING	Cam follower-side of the oil adapter	-	1
8	6150-21-6391	PACKING	Cover, cam follower bolts	6	6
9	07000-73032	O-RING	oil adapter	-	2
10	07000-73028	O-RING	oil adapter	-	2
11	07000-73048	O-RING	oil adapter	-	1
12	07000-73035	O-RING	Flange of the pipe between oil adapter and filter	-	2
13	07000-73025	O-RING	Filter section of the pipe between oil adapter and filter	-	2
14	07005-01012	GASKET	Injection pump feed oil pipe	-	4
15	07005-01412	GASKET	Around the injection pump piping	20	22
16	07005-01212	GASKET	Around the injection pump piping	-	2
* 17	6210-81-3150	O-RING	Air compressor mounting part	-	1
* 18	07002-22434	O-RING	Air compressor air pipe	-	1
* 19	6164-21-6320	GASKET	Air compressor air pipe	-	6
* 20	07003-01419	GASKET	Air compressor air pipe	-	4
* 21	07002-21423	O-RING	Air compressor air pipe	-	1
* 22	07003-01419	GASKET	Air compressor air pipe	-	1
* 23	07005-01012	GASKET	Air compressor oil pipe	-	6

## Notes:

- <1> Repair parts kit includes repairs parts (including consumables) from No.1 thru No.16 above, but the consumables from Nos.17 thru 23 marked with an asterisk (\*) are not included.
- <2> To repair the engine with the conventional inline injection pump and air compressor, be sure to have the consumables from Nos.17 thru 23 on hand.