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The affected pages are indicated by the use of the following marks. It is requested that necessary actions be taken to these pages according to the table below.

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●	Page to be replaced	Replace
( )	Page to be deleted	Discard

Pages having no marks are those previously revised or made additions.

LIST OF REVISED PAGES

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Machine model				D85A-21	
Serial No.				35001 – 36533	36534 and up
Engine	Name			Komatsu S6D125-1	Komatsu S6D125-2
	Type			4-cycle, water cooled, in-line vertical type, direct injection, with turbocharger	4-cycle, water cooled, in-line vertical type, direct injection, with turbocharger
	No. of cylinders — bore x stroke			6 – 125 x 150	6 – 125 x 150
	Piston displacement		(cc)	11,040	11,040
	Performance	Rated horsepower	(KW (HP)/rpm)	168 (225)/2,000	168 (225)/2,000
		Max. torque	(Nm (kgm)/rpm)	1,000 (102)/1,400	1,019 (104)/1,400
		High idling speed	(rpm)	2,200 ± 50	2,200 ± 50
		Low idling speed	(rpm)	650^{+50}_{0}	650± 50
		Min. fuel consumption ratio	(g/KW.h (g/HP.h)	206 (152)	207 (153)
	Starting motor			24V, 11 kW	
	Alternator			24V, 50A (without cab: 35A)	
	Battery			12V, 170Ah x 2	
	Radiator core type			D-6	
Power train system	Torque converter			3-element, 1-stage, 1-phase	
	TORQFLOW transmission			Planetary gear type, hydraulically actuated, lubrication pump force feed, forward 3 speed, reverse 3 speed	
	Bevel gear shaft			Spiral bevel gear, splash type lubrication	
	Steering clutch			Wet type, multiple disc clutch, spring boosted, manually operated, hydraulically actuated (interconnected with brake)	
	Steering brake			Wet type, band type, pedal operated, with hydraulic booster, hydraulically actuated interconnected with clutch)	
	Final drive			Spur gear, 2-stage reduction, splash type lubrication	
Undercarriage	Suspension			Semi-rigid balancing beam	
	Carrier roller			2 on each side	
	Track roller			7 on each side	
	Track shoe			Assembly type Single grouser 39 on each side Pitch: 216 mm Width: 560 mm	

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ADJUSTING VALVE CLEARANCE

D85A, E-21 Serial No. 35001 – 36533
D85P-21 Serial No. 3001 – 3688

★ Adjust clearance between crosshead and rocker lever as follows.

Unit: mm

	Intake valve	Exhaust valve
At 20°C	0.33	0.71

1) Remove fuel injection pipe (1) and spill tube (2).

2) Remove cylinder head cover (3).

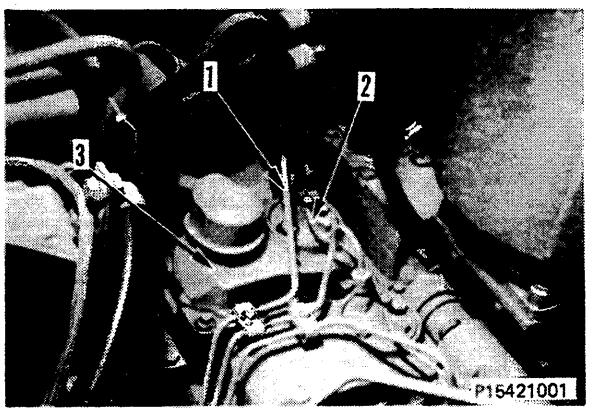
3) Rotate crankshaft in normal direction while watching valve to align "1.6 TOP" mark on crankshaft pulley with pointer (4) when No. 1 cylinder is at compression TDC.

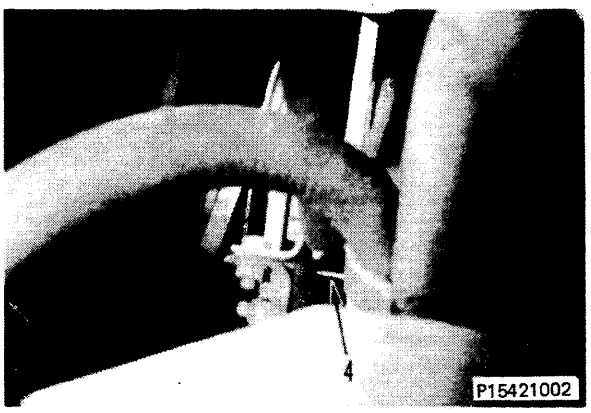
4) While No. 1 cylinder is at compression TDC, adjust the valves marked ● in the table below:
While No. 6 cylinder is at compression TDC, adjust the valves markd ○.

5) Insert feeler gauge **F** between rocker lever (5) and crosshead (6) and adjust adjustment screw (7) until feeler gauge **F** is a sliding fit. Tighten lock nut (8).

kgm Lock nut: **68.6 ± 4.9 Nm (7 ± 0.5 kgm)**

6) Next rotate crankshaft one turn in the normal direction and adjust the valves marked ○.
★ It is also possible to adjust as follows: Adjust valve clearance of No. 1 cylinder when it is at compression TDC, then turn crankshaft 120° each time and adjust valve clearances following firing order.
• Firing order: 1 – 5 – 3 – 6 – 2 – 4
★ After tightening lock nut, confirm valve clearance.





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Valve arrangement

Cylinder No.	1	2	3	4	5	6
Exhaust valve	●	○	●	○	●	○
Intake valve	●	●	○	●	○	○

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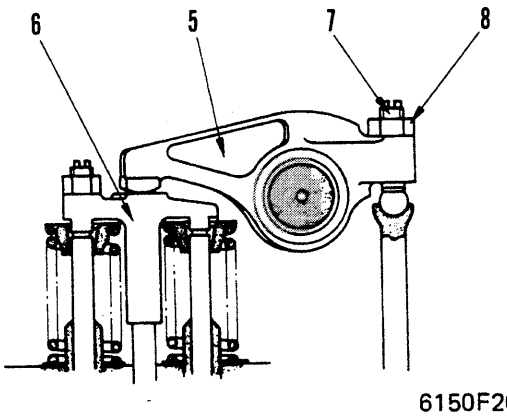

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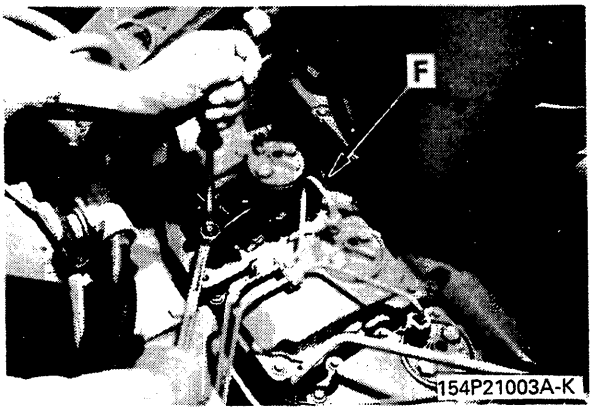

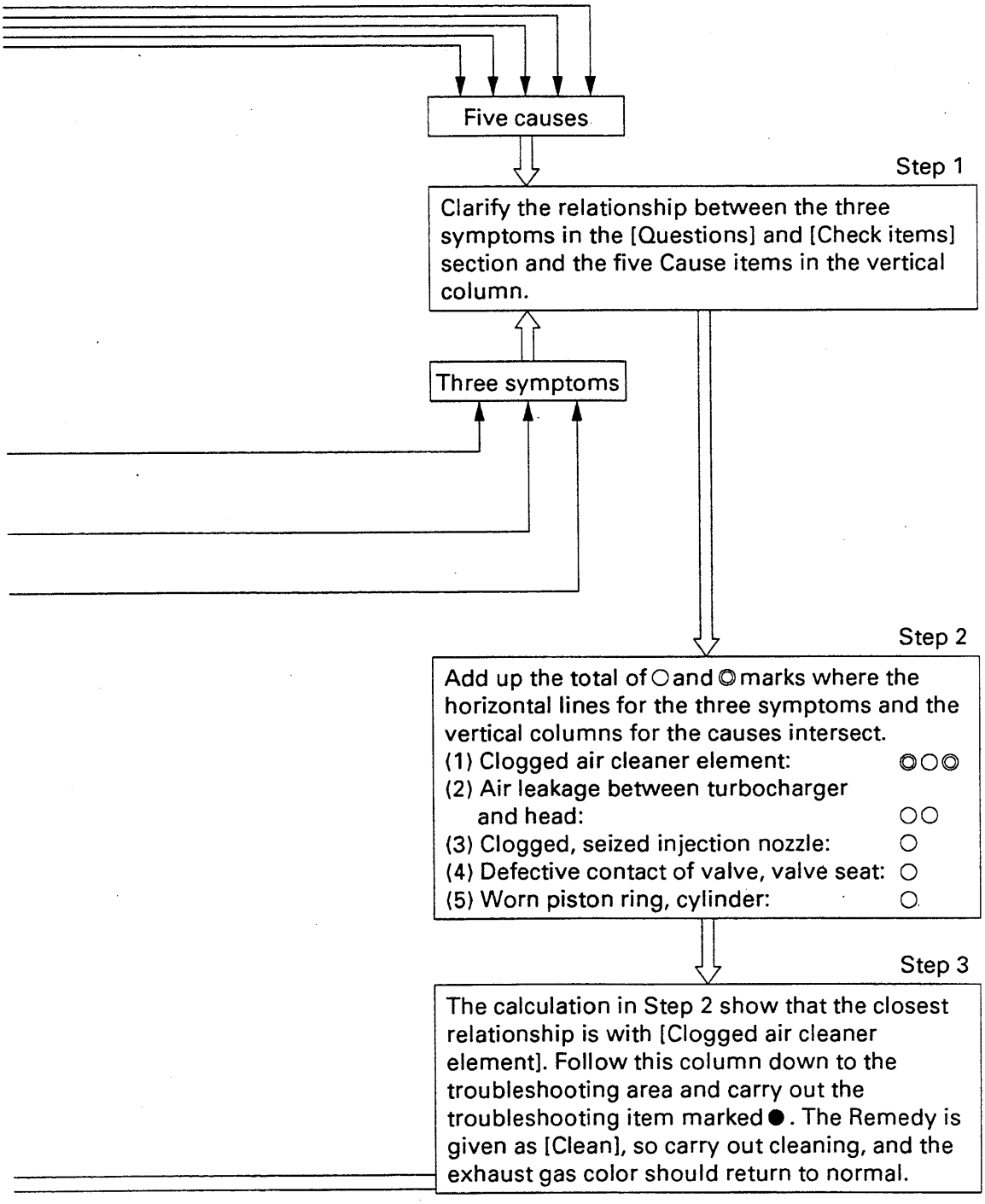
Five causes
Step 1
Clarify the relationship between the three symptoms in the [Questions] and [Check items] section and the five Cause items in the vertical column.
Three symptoms
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Step 2
Add up the total of ○ and ◎ marks where the horizontal lines for the three symptoms and the vertical columns for the causes intersect.
(1) Clogged air cleaner element: ◎○◎
(2) Air leakage between turbocharger and head: ○○
(3) Clogged, seized injection nozzle: ○
(4) Defective contact of valve, valve seat: ○
(5) Worn piston ring, cylinder: ○
Step 3
The calculation in Step 2 show that the closest relationship is with [Clogged air cleaner element]. Follow this column down to the troubleshooting area and carry out the troubleshooting item marked ●. The Remedy is given as [Clean], so carry out cleaning, and the exhaust gas color should return to normal.

REMOVAL OF TURBOCHARGER ASSEMBLY

1. Disconnect tubes (1) and (2). (See P1)
2. Disconnect hose (3). (See P2)
3. Disconnect connection of turbocharger and muffler.
4. Remove mounting bolts, then remove turbocharger assembly (4). (See P2)

INSTALLATION OF TURBOCHARGER ASSEMBLY

1. Fit gasket and set turbocharger assembly (4) in mounting position, then tighten with mounting bolts. (See P2)
2. Fit gasket to connection of turbocharger and muffler, then connect.
3. Connect hose (3). (See P2)
4. Fit O-ring and connect tube (2), then fit gasket and connect tube (1). (See P1)

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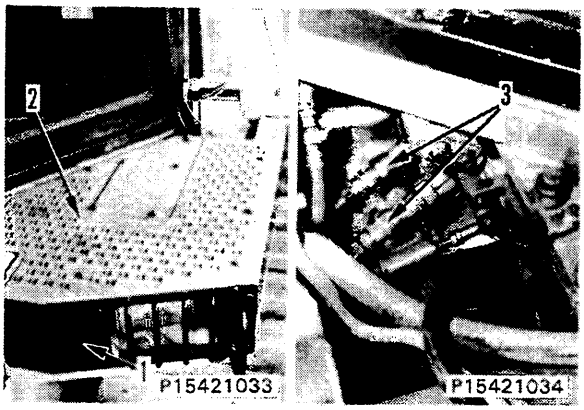
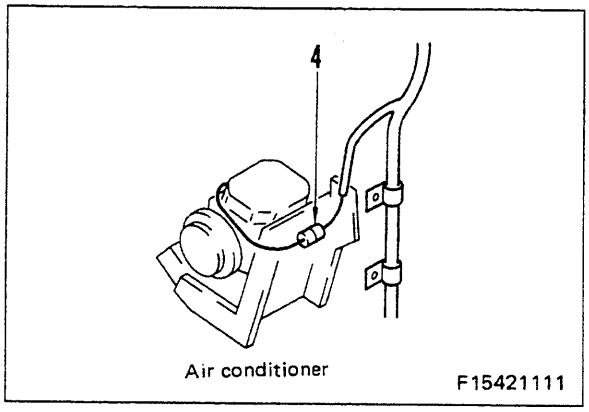
REMOVAL OF AIR CONDITIONER COMPRESSOR ASSEMBLY

D85A, E-21 Serial No. 35001 – 36533
D85P-21 Serial No. 3001 – 3688

1. Remove cover (1) and floor Plate (2).
2. Disconnect quick coupler (3).
3. Remove side cover.
4. Disconnect connector (4).
5. Disconnect hose (5).
6. Loosen mounting bolts (6).
7. Loosen adjustment bolt (7), and remove V-belt.
8. Remove mounting bolts (6), then remove compressor assembly (8) together with bracket.





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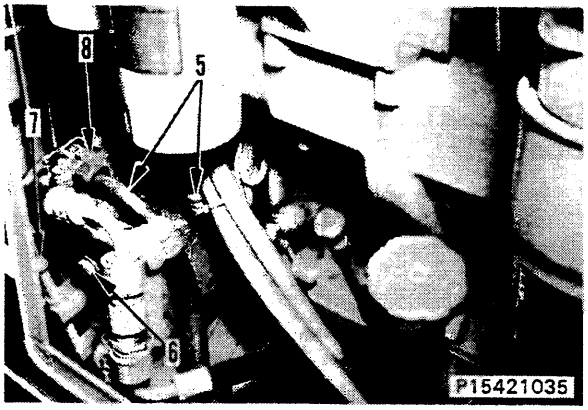
INSTALLATION OF AIR CONDITIONER COMPRESSOR ASSEMBLY

D85A, E-21 Serial No. 36534 and up
D85P-21 Serial No. 3689 and up

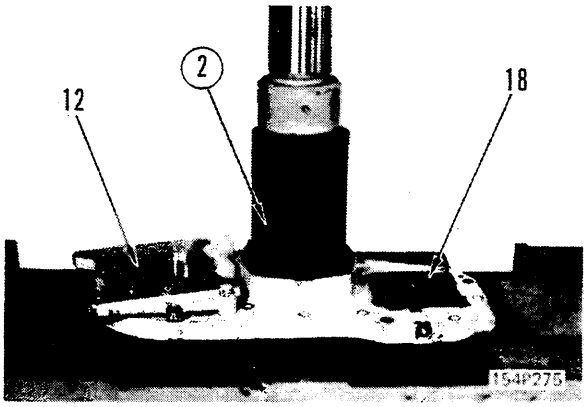
1. Set compressor assembly (8) in position together with bracket, and tighten mounting bolts (6) temporarily.
2. Fit V-belt, then tighten adjustment bolt (7) and adjust belt tension.
   ★ The belt should deflect mm when pushed by hand at a point midway between the pulleys.
3. Tighten mounting bolts (6) fully.
4. Fit O-ring and connect hose (5).
5. Connect connector (4).
6. Install side cover.
7. Connect quick coupler (3).
8. Install floor plate (2) and cover (1).



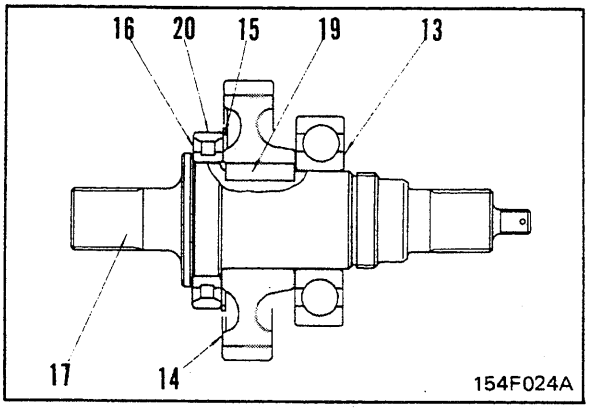
ASSEMBLY OF PTO ASSEMBLY

D85A, E-21 Serial No. 36534 and up
D85P-21 Serial No. 3689 and up

1. Fit O-ring and install bearing cage (12) on case (18).



2. **P.T.O drive gear assembly**
   1) Using push tool (80 mm inside dia), pressfit bearing (16) into shaft (17).
   2) Install key (19) in shaft and using push tool (70 mm inside dia.) pressfit gear (14).
   3) Using push tool ② (ø150 mm) pressfit bearing (13) into case (18).
   4) Using push tool (ø235 mm) pressfit outer race (20) into case (4) and install snap ring (15).



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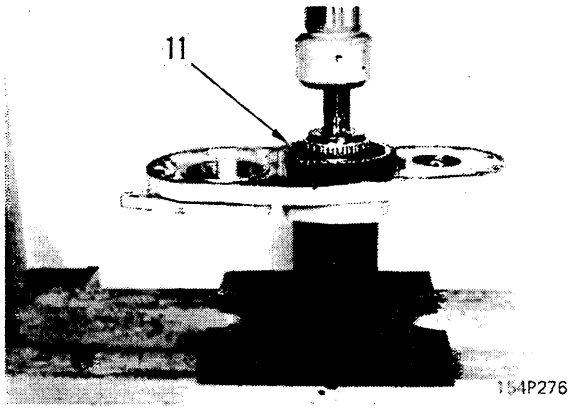
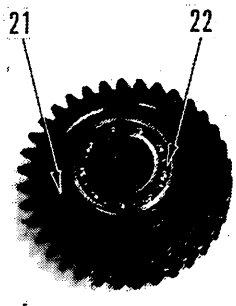
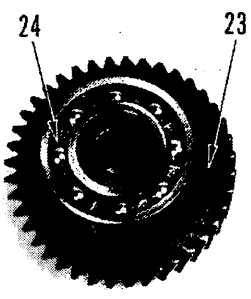
   5) Using push tool ② containing bearing pressfit P.T.O drive gear assembly (11).



3. **Transmission pump driver gear assembly**
   1) Using push tool (45 mm inside dia.) pressfit upper and lower bearings (22) into gear (21).
   2) Install transmission pump drive gear assembly (10) into case with a copper hammer, etc.





D85A, E-21 Serial No. 36534 and up
D85P-21 Serial No. 3689 and up

★ Measure the stall speed under the following conditions.
- Coolant temperature: Within operating range
- Power train oil temperature: 70 – 90°C
- Hydraulic oil temperature: Min. 50°C

⚠ Make sure that there is no one near the machine before starting measurements.

1. Remove cap (1) of the engine speed pick-up port, then install tachometer **A**.
   For details, see MEASURING ENGINE SPEED.

2. Depress the steering brake firmly and move the gear shift lever to F3.

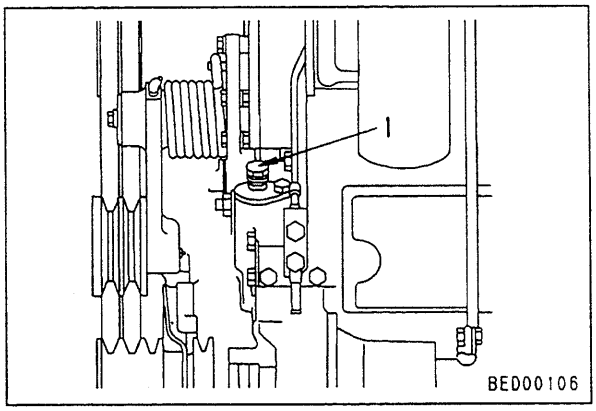
3. Depress the decelerator pedal, set the fuel control lever to FULL, run the engine at full throttle, and stall the torque converter.

4. When the torque converter oil temperature gauge enters the red range, immediately return the gear shift lever to neutral and lower the oil temperature.

5. Repeat Steps 2 – 4 three times.

6. Repeat Steps 2 – 4 to stall the torque converter again.

7. Measure the engine speed immediately the torque converter oil temperature gauge enters the red range.
   ★ After completion of the measurement, return the gear shift lever swiftly to neutral, and run the engine at high idling to lower the oil temperature.



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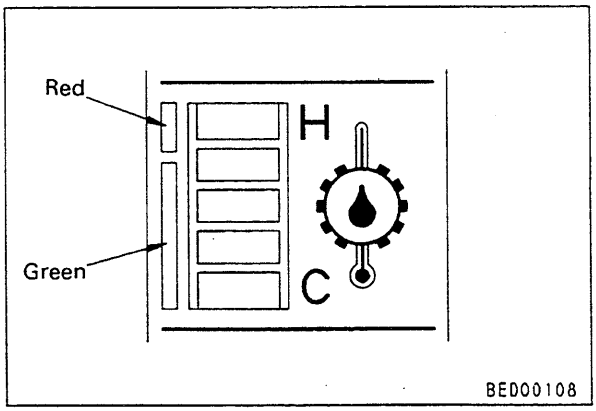

⚠ Precautions when relieving the torque converter
   1) Depress the decelerator pedal before pulling the fuel control lever to the FULL position.
   2) Release the decelerator pedal gradually to run the engine at full throttle. However, for safety reasons, always keep your right foot on the decelerator pedal until the completion of the measurement operation.

2) Remove snap ring, pull out shaft (12) slightly, then remove ball (13), and remove shaft. (See P1)
★ Be careful not to lose the ball, and keep it in a safe place.
3) Remove thrust washer (14), gear (15) then remove bearing (16) from gear. (See P2)

DISASSEMBLY OF NO. 2, 3 CARRIER ASSEMBLY

1. Pull out shaft (1) slightly, remove ball (2), then remove shaft. (See P3)
   ★ Be careful not to lose the ball, and keep it in a safe place.

2. Remove thrust washer (3), gear (4), then remove bearing (5) from gear. (See P4)

3) Pull out shaft (5) slightly, remove ball (6), then remove shaft. (See P7)
★ Be careful not to lose the ball, and keep it in a safe place.
4) Remove thrust washer (7) and gear (8), then remove bearing (9) from gear. (See P8)

2. **No. 5 clutch assembly**
   1) Remove spring (10) and pin (11), then remove spring (12), disc (13) and plate (14) in turn. (See P9)
   2) Remove pin (15). (See P10)
   3) Remove hub (16). (See P10)
   4) Remove snap ring (17), then remove bearing (18). (See P11)
   5) Remove snap ring (19), then remove outer race (20). (See P12)

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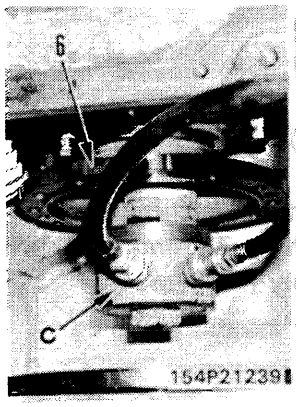
DISASSEMBLY OF NO. 4 CARRIER, NO. 5 CLUTCH ASSEMBLY

1. **No. 4 carrier assembly**
   1) Remove mounting bolts (1), then remove carrier assembly (2). (See P5)
   2) Remove snap ring (3), then remove cover (4). (See P6)

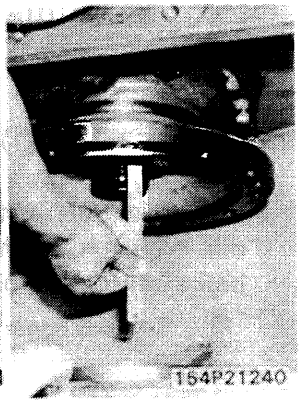
DISASSEMBLY OF BEVEL PINION ASSEMBLY

1. **Holder**
   Remove holder (1). (See P13)

P1



P2



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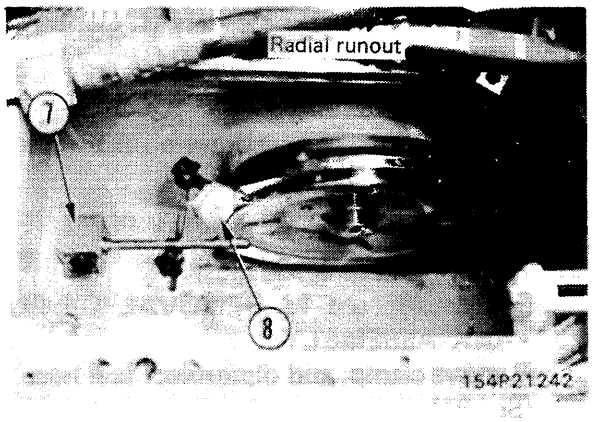
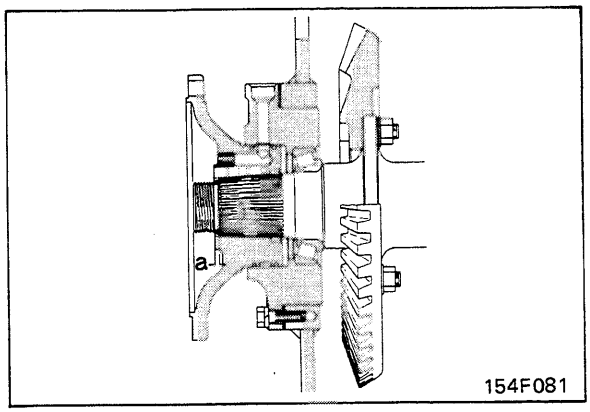
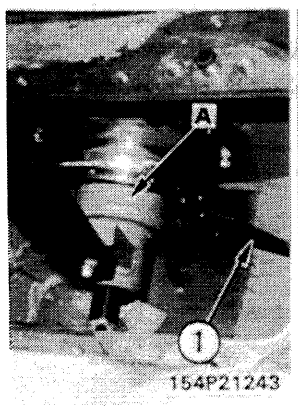


F1



P6



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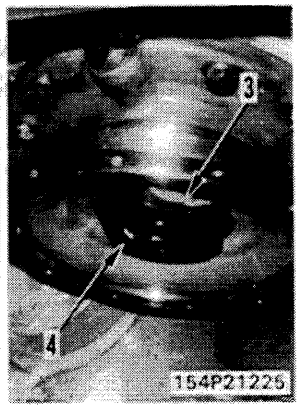

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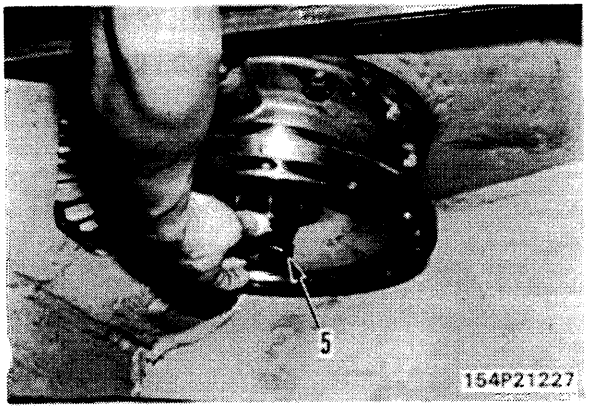

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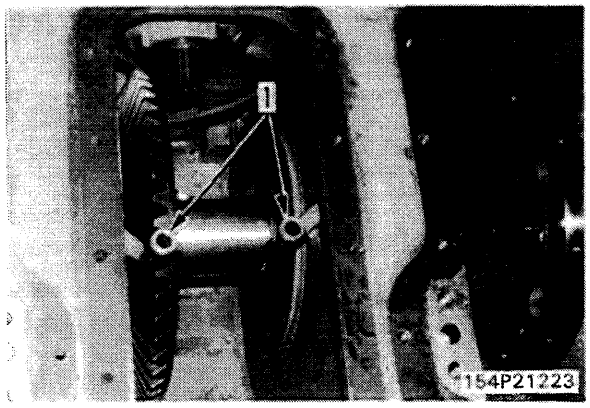
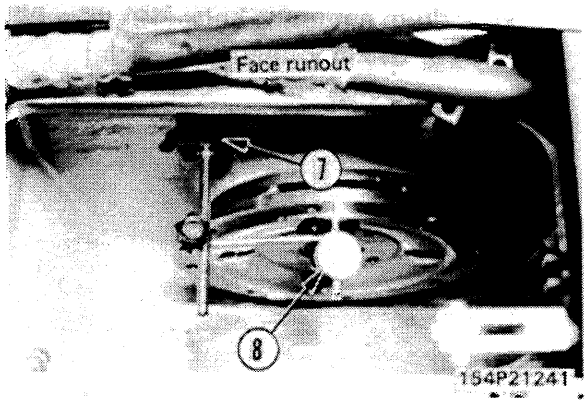


P4



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Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between modulating valve sleeve and valve body	35	−0.035 −0.045	+0.016 0	0.035 – 0.061	0.081	Replace
2	Clearance between valve sleeve and modulating valve	25	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.078	
3	Clearance between modulating valve and piston	15	−0.020 −0.030	+0.018 0	0.020 – 0.048	0.068	
4	Clearance between quick return valve and valve body	12	−0.035 −0.045	+0.011 0	0.035 – 0.056	0.076	
5	Clearance between reducing valve and valve body	28	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.078	
6	Clearance between reducing valve and piston	15	−0.020 −0.030	+0.018 0	0.020 – 0.048	0.068	
7	Clearance between F-R valve and valve body	28	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.078	
8	Clearance between speed valve and valve body	28	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.078	
9	Modulating valve sleeve spring	Standard size			Repair limit		
		Free length	Installation length	Installation load	Free length	Installation load	
		53.0	35.0	8.65 kg	51.4	8.2 kg	
10	Modulating valve spring (Large)	38.0	26.5	16.4 kg	36.9	15.6 kg	
11	Modulating valve spring (Small)	43.8	32.5	38.9 kg	42.6	37.0 kg	
12	Reducing valve spring	59.0	44.4	25.2 kg	57.2	23.9 kg	

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PRECAUTIONS WHEN CARRYING OUT OPERATION

[When carrying out removal or installation (disassembly or assembly) of units, be sure to follow the general precautions given below when carrying out the operation.]

1. Precautions when carrying out removal work

- If the coolant contains antifreeze, dispose of it correctly.
- After disconnecting hoses or tubes, cover them or fit blind plugs to prevent dirt or dust from entering.
- When draining oil, prepare a container of adequate size to catch the oil.
- Confirm the match marks showing the installation position, and make match marks in the necessary places before removal to prevent any mistake when assembling.
- To prevent any excessive force from being applied to the wiring, always hold the connectors when disconnecting the connectors
- Fit wires and hoses with tags to show their installation position to prevent any mistake when installing.
- Check the number and thickness of the shims, and keep in a safe place.
- When raising components, be sure to use lifting equipment of ample strength.
- When using forcing screws to remove any components, tighten the forcing screws alternately.
- Befor removing any unit, clean the surrounding area and fit a cover to prevent any dust or dirt from entering after removal.

★ **Precautions when handling piping during disassembling**

Fit the following blind plugs into the piping after disconnecting it during disassembly operations.

1) Hoses and tubes using sleeve nuts

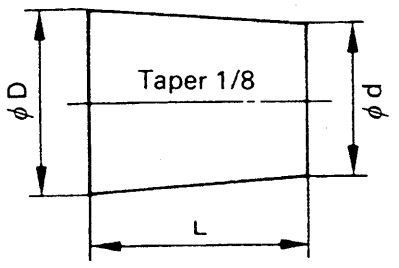
Nominal number	Plug (nut end)	Sleeve nut (elbow end) Use the two items below as a set
02	07376-50210	07221-20210 (Nut), 07222-00210 (Plug)
03	07376-50315	07221-20315 (Nut), 07222-00312 (Plug)
04	07376-50422	07221-20422 (Nut), 07222-00414 (Plug)
05	07376-50522	07221-20522 (Nut), 07222-00515 (Plug)
06	07376-50628	07221-20628 (Nut), 07222-00616 (Plug)
10	07376-51034	07221-21034 (Nut), 07222-01018 (Plug)
12	07376-51234	07221-21234 (Nut), 07222-01219 (Plug)

2) Split flange type hoses and tubes

Nominal number	Flange (hose end)	Sleeve head (tube end)	Split flange
04	07379-00400	07378-10400	07371-30400
05	07379-00500	07378-10500	07371-30500

3) If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Part number	Dimensions		
		D	d	L
06	07049-00608	6	5	8
08	07049-00811	8	6.5	11
10	07049-01012	10	8.5	12
12	07049-01215	12	10	15
14	07049-01418	14	11.5	18
16	07049-01620	16	13.5	20
18	07049-01822	18	15	22
20	07049-02025	20	17	25
22	07049-02228	22	18.5	28
24	07049-02430	24	20	30
27	07049-02734	27	22.5	34



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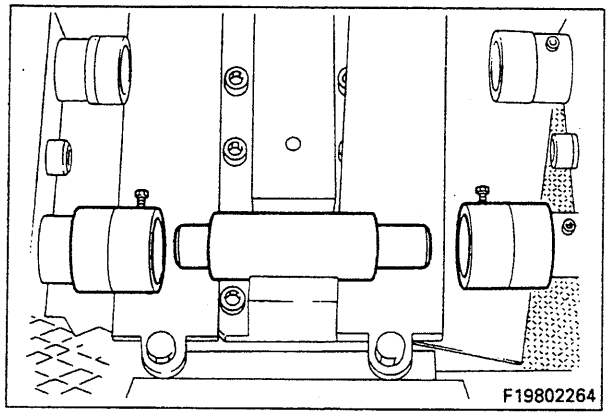
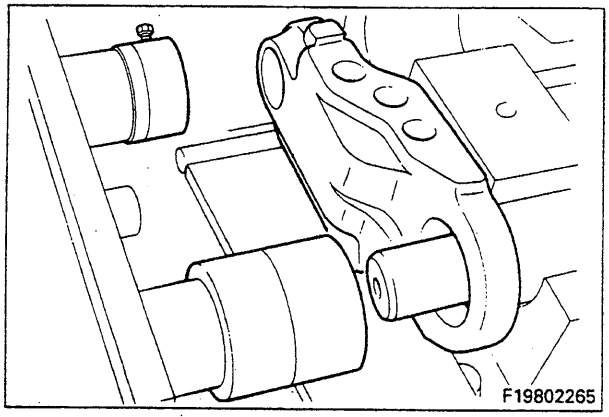
2. Assembly of link

1) Coat the area between the pin and bushing with lithium grease (G2-LI), set in position, then set in front of the jaw of the link press.
   ★ When reusing (turning) the bushing, set the worn surface on the outside circumference of the bushing facing the shoe mounting surface of the link (facing up on the link press).

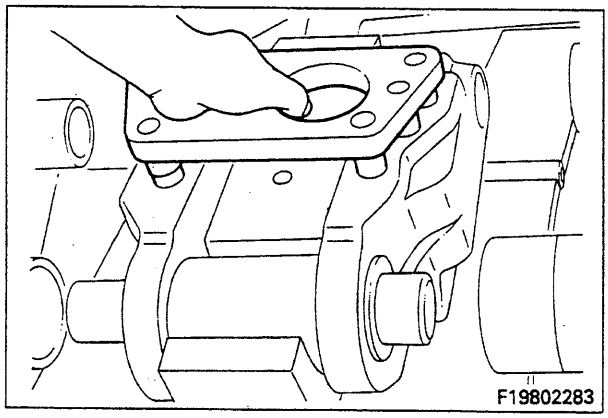


2) Set the left and right bushing end master link with the shoe mounting surface facing up, then press fit to the bushing.
   ★ When doing this, use the pin end master link as a support.
   ★ Bushing press fitting force:
   49 – 147 KN (5 – 15 ton)

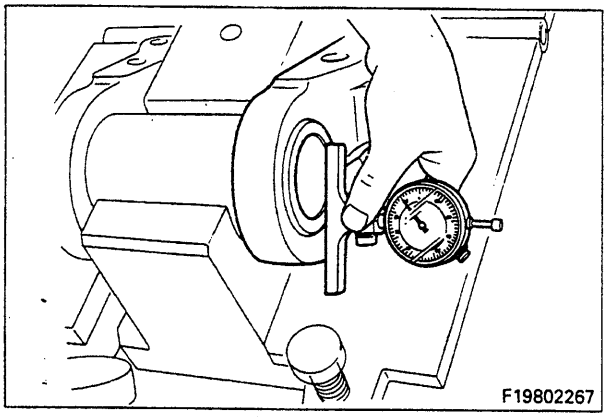


3) Using a shoe bolt hole pitch gauge, press fit until the distance between the shoe bolt holes of the left and right link is the specified value.
   ★ Use compressed air to remove all metal particles from burrs while press fitting the bushing.

4) Turn over the master link, and check that the left and right master links have been press fitted in parallel.



5) Measure the amount of protrusion of the left and right bushings with a depth gauge.
   ★ Adjust the press fitting jig for the link press so that the protrusion of the left and right bushings is uniform.



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TESTING AND ADJUSTING TOOL LIST

Test measurement item	Symbol		Part No.	Part Name	Remarks
Engine speed	A	1	799-203-8001	Multi-tachometer	Digital display: L : 60 – 2,000 rpm H: 60 – 19,990 rpm
		2	(799-203-8901)	(Clamp set)	
Water temperature, oil temperature, exhaust temperature	B	1	799-101-6000	Digital temperature gauge	–50 – 1,200°C (meter)
		2	6125-11-8180	Exhaust temperature sensor	–50 – 350°C (sensor)
Oil pressure	C		799-101-5002	Hydraulic tester	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa (25, 60, 400, 600 kg/cm^2)
			790-261-1203	Digital hydraulic tester	Pressure gauge: 58.8 MPa (600 kg/cm^2)
			799-401-2320	Hydraulic gauge	1 MPa (10 kg/cm^2)
Operating force	I		79A-264-0020	Push-pull scale	0 – 294.2 N (0 – 30 kg)
			79A-264-0090	Push-pull scale	0 – 490.3 N (0 – 50 kg)
Stroke, hydraulic drift	J		Cmmercially available	Scale	—
Time	K		Commercially available	Stopwatch	—

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