

CRAWLER EXCAVATOR R145CR-9

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GROUP 3 PUMP DEVICE

1. REMOVAL AND INSTALL

1) REMOVAL

- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

- (4) Loosen the drain plug under the hydraulic tank and drain the oil from the hydraulic tank.

· Hydraulic tank quantity : 96 l (25.4 U.S. gal)

- (5) Remove socket bolts (11) and disconnect hoses (1,2).
- (6) Disconnect pilot line hoses (5, 6, 7, 8, 9, 10).

- (7) Remove socket bolts (12) and disconnect pump suction pipe (4).

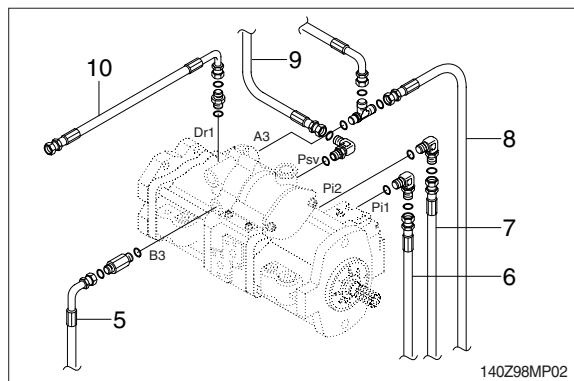
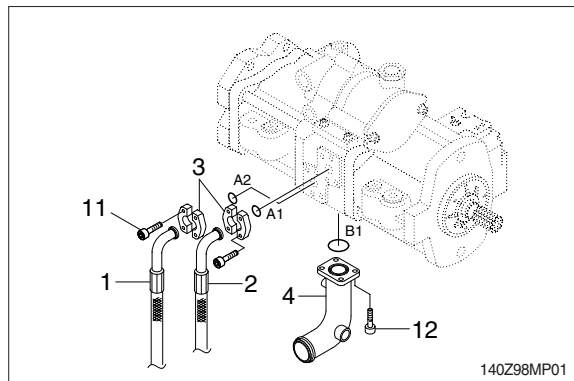
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

- (8) Sling the pump assembly and remove the pump mounting bolts.

· Weight : 90 kg (200 lb)

※ Pull out the pump assembly from housing.

When removing the pump assembly, check that all the hoses have been disconnected.

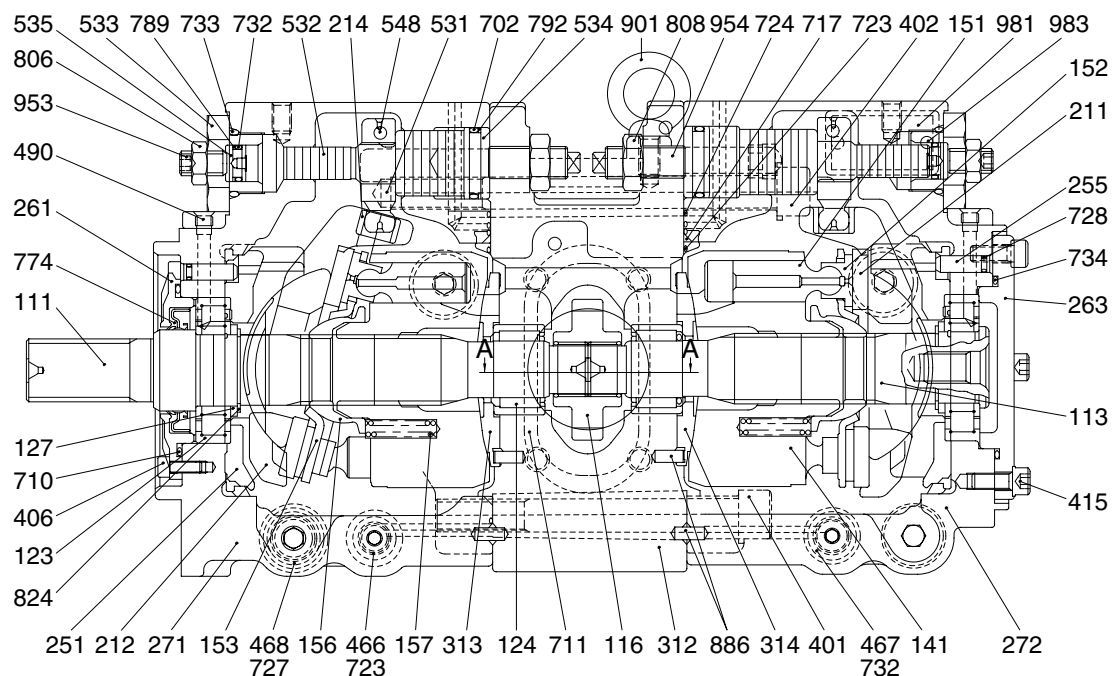


2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Remove the suction strainer and clean it.
- (3) Replace return filter with new one.
- (4) Remove breather and clean it.
- (5) After adding oil to the hydraulic tank to the specified level.
- (6) Bleed the air from the hydraulic pump.
 - ① Remove the air vent plug (2EA).
 - ② Tighten plug lightly.
 - ③ Start the engine, run at low idling, and check oil come out from plug.
 - ④ Tighten plug.
- (7) Start the engine, run at low idling (3~5 minutes) to circulate the oil through the system.
- (8) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. MAIN PUMP (1/3)

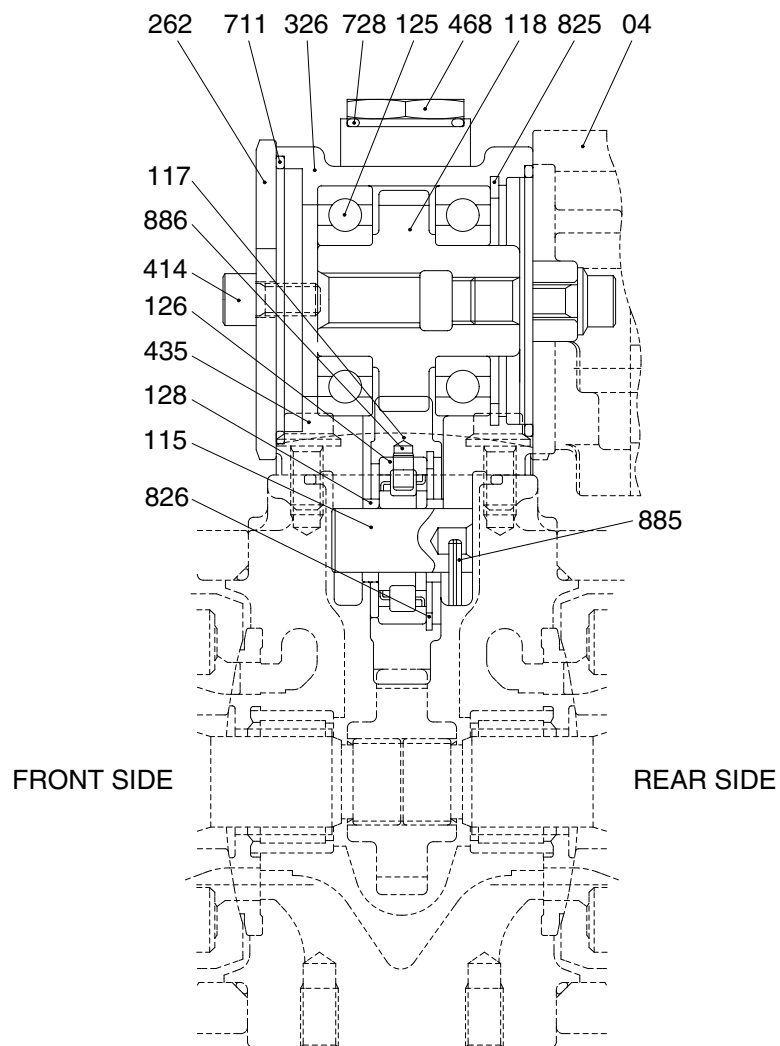
1) STRUCTURE



140Z92MP02

111	Drive shaft (F)	272	Pump casing (R)	711	O-ring
113	Drive shaft (R)	312	Valve block	717	O-ring
116	1st Gear	313	Valve plate (R)	723	O-ring
123	Roller bearing	314	Valve plate (L)	724	O-ring
124	Needle bearing	401	Hexagon socket bolt	728	O-ring
127	Bearing spacer	402	Hexagon socket bolt	732	O-ring
141	Cylinder block	406	Hexagon socket bolt	733	O-ring
151	Piston	415	Hexagon socket bolt	734	O-ring
152	Shoe	466	Plug	774	Oil seal
153	Set plate	467	plug	789	Back up ring
156	Bushing	468	Plug	792	Back up ring
157	Cylinder spring	490	Plug	806	Nut
211	Shoe plate	531	Tilting pin	808	Hexagon head nut
212	Swash plate	532	Servo piston	824	Snap ring
214	Bushing	533	Plug	886	Spring pin
251	Support	534	Stopper (L)	901	Eye bolt
255	Lock pin	535	Stopper (S)	953	Set screw
261	Seal cover (F)	548	Pin	954	Set screw
263	Seal cover (R)	702	O-ring	981	Plate
271	Pump casing (F)	710	O-ring	983	Pin

MAIN PUMP (2/3)



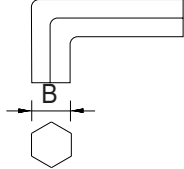
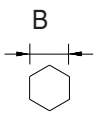
140Z92MP03

04	Gear pump	128	Bearing spacer	711	O-ring
115	Shaft	262	Cover	728	O-ring
117	Gear No. 2	326	Gear case	825	Retainer ring
118	Gear No. 3	414	Hexagon socket bolt	826	Retainer ring
125	Ball bearing	435	Flange socket bolt	885	Spring pin
126	Roller bearing	468	Plug	886	Pin

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

The tools necessary to disassemble/reassemble the pump are shown in the follow list.

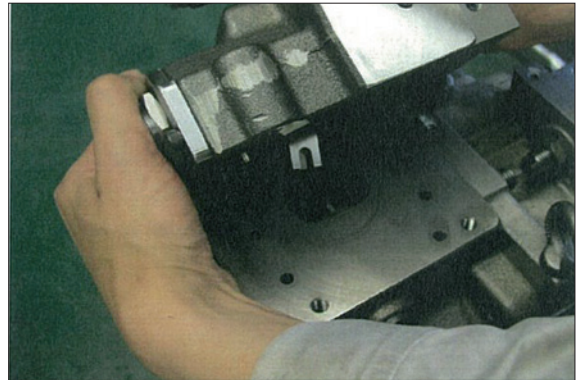
Tool name & size		Part name			
Name	B	Hexagon socket head bolt	PT plug (PT thread)	ROH/VP/UNF plug (PF screw)	Hexagon socket head setscrew
Allen wrench 	4	M 5	BP-1/16	-	M 8
	5	M 6	BP-1/8	-	M10
	6	M 8	BP-1/4	PF-1/4	M12, M14
	8	M10	BP-3/8	PF-3/8	M16, M18
	10	M12	BP-1/2	PF-1/2	M20
	14	M16, M18	BP-3/4	PF-3/4	-
	17	M20, M22	BP-1	PF-1	-
Double ring spanner, socket wrench, double (single) open end spanner 	-	Hexagon bolt	Hexagon nut		VP plug (PF screw)
	19	M12	M12		PF-1/4
	24	M16	M16		-
	27	M18	M18		PF-1/2
	30	M20	M20		-
	41	-	-		PF-1
Adjustable angle wrench		Medium size, 1 set			
Screw driver		Minus type screw driver, Medium size, 2 sets			
Hammer		Plastic hammer, 1 set			
Pliers		For snap ring, TSR-160			
Steel bar		Steel bar of key material approx. 10 × 8 × 200			
Torque wrench		Capable of tightening with the specified torques			

(2) Tightening torque

Part name	Bolt size	Torque		Wrench size	
		kgf · m	lbf · ft	in	mm
Hexagon socket head bolt (material : SCM435)	M 5	0.7	5.1	0.16	4
	M 6	1.2	8.7	0.20	5
	M 8	3.0	21.7	0.24	6
	M10	5.8	42.0	0.31	8
	M12	10.0	72.3	0.39	10
	M14	16.0	116	0.47	12
	M16	24.0	174	0.55	14
	M18	34.0	246	0.55	14
	M20	44.0	318	0.67	17
PT Plug (material : S45C) ※ Wind a seal tape 1.5 to 2 turns round the plug	PT1/16	0.7	5.1	0.16	4
	PT 1/8	1.05	7.59	0.20	5
	PT 1/4	1.75	12.7	0.24	6
	PT 3/8	3.5	25.3	0.31	8
	PT 1/2	5.0	36.2	0.39	10
PF Plug (material : S45C)	PF 1/4	3.0	21.7	0.24	6
	PF 3/8	7.55	54.6	0.31	8
	PF 1/2	10.0	72.3	0.39	10
	PF 3/4	15.0	109	0.55	14
	PF 1	19.0	137	0.67	17
	PF 1 1/4	27.0	195	0.67	17
	PF 1 1/2	28.0	203	0.67	17

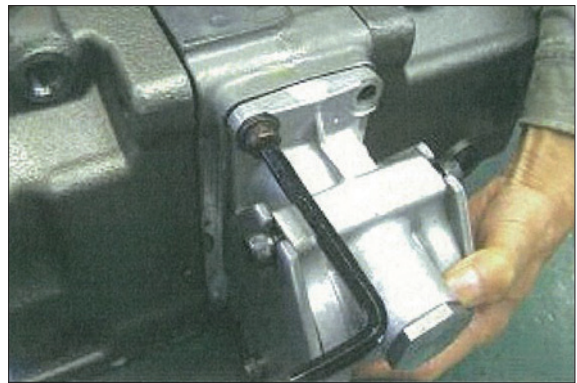
3) DISASSEMBLY

- (1) Select place suitable to disassembling.
 - ※ Select clean place.
 - ※ Spread rubber sheet, cloth or so on overhaul workbench top to prevent parts from being damaged.
- (2) Remove dust, rust, etc, from pump surfaces with cleaning oil or so on.
- (3) Remove drain port plug (468) and drain oil pump casing (271, 272).
- (4) Remove hexagon socket head bolts (412, 413) and remove regulator.



140Z98MP11

- (5) Place pump horizontally on workbench with its regulator fitting surface down, and remove flange socket (435) and remove PTO unit (05).
 - ※ Be careful about the attaching direction of the PTO unit (05).
 - ※ Before bringing regulator fitting surface down, spread rubber sheet on workbench without fail to prevent this surface from being damaged.



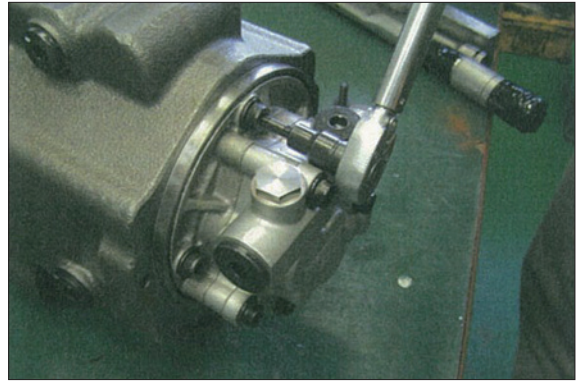
140Z98MP12

- (6) In case the pump is provided without the PTO unit (05), remove the cover (326) with the hexagon socket head cap screws (414).



140Z98MP13

- (7) Remove flange socket (435) and remove gear pump (04).



140Z98MP14

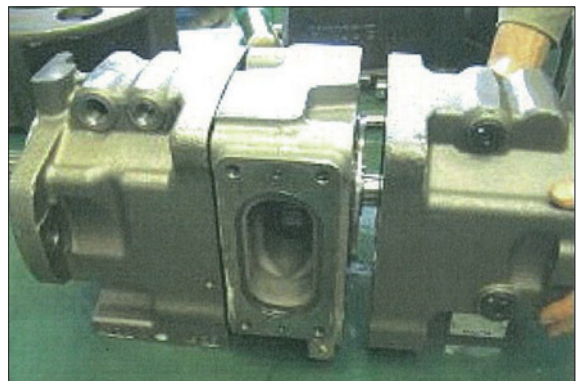
- (8) Loosen hexagon socket head bolt (401) which tighten pump casing (271, 272) and valve block (312).



140Z98MP15

- (9) Place pump horizontally on workbench with its regulator fitting surface down, and separate pump casing (271, 272) from valve block (312).

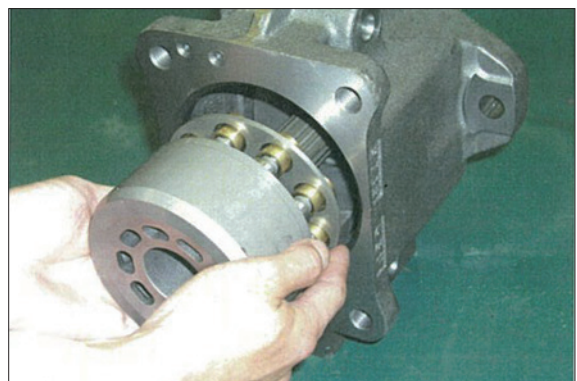
※ Remove 1st gear (116) when separating pump casing from valve block (312) too.



140Z98MP16

- (10) Pull out cylinder (141), pistons (151), set screw (153), spherical bush (156) and cylinder springs (157) simultaneously from pump casing (271, 272) straightly over drive shaft (111, 113).

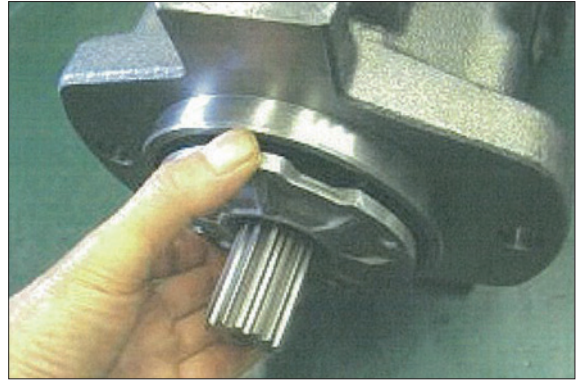
※ Take care not to damage sliding surface of cylinder (141), spherical bush (156), shoes (152), swash plate (212), etc.



140Z98MP17

(11) Remove hexagon socket head bolts (406) and then seal cover (F, 261).

- ※ In the case removing it is difficult, and hooking pull thin rod into notch, and the cover can be removed easily.
- ※ Since oil seal is fitted on seal cover (F) (261), take care not to damage it at removing the cover.



140Z98MP18

(12) Tapping shaft ends of drive shaft (111, 113) lightly with plastic hammer, remove it from pump casing (271, 272).



140Z98MP19

(13) Remove shoe plate (211) and swash plate (212) from pump casing (271, 272).



140Z98MP20

(14) Insert thin steel bar into the hole and remove the lock pin (255) from pump casing (271, 272).

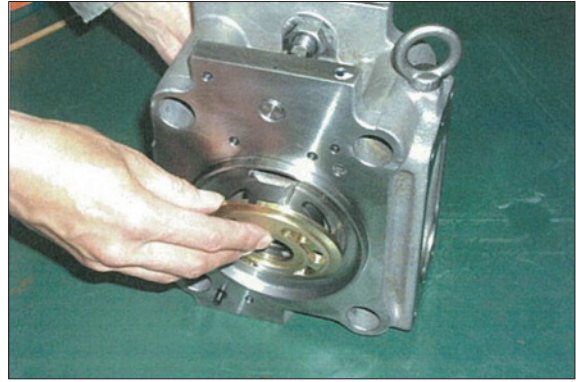
- ※ When holding with thin steel bar, do not confuse the unlocking hole with the arc shaped oil passage.



140Z98MP21

(15) Remove valve plate (313, 314) from valve block (312).

※ These may be removed in Work 8.



140Z98MP22

If necessary, remove stopper (L) (534), Qmin. plug (533), servo piston (532) and tilting pin (531) from pump casing (271, 272), and needle bearing (124) from valve block.

- ※ When removing tilting pin, use a protector to prevent pin head from being damaged.
- ※ Since lock tight is applied to fitting areas of tilting pin (531) and servo piston (532), take care not to damage servo piston (532).
- ※ Do not remove needle bearing (124) as far as possible, except the case that considered to be out of its life span.
- ※ Do not loosen hexagon nuts of valve block (312) and Qmin. plug (533).
If loosened, flow setting will be changed.

4) ASSEMBLY

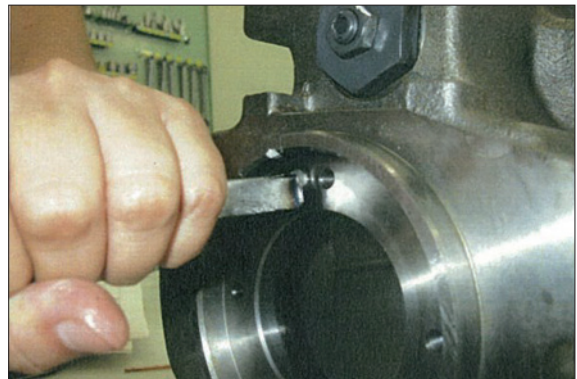
(1) For reassembling reverse the disassembling procedures, paying attention to the following items.

- ① Do not fail to repair the parts damaged during disassembling, and repair replacement parts in advance.
- ② Clean each part fully with cleaning oil and dry it with compressed air.
- ③ Do not fail to apply clean working oil to sliding sections, bearings, etc. before assembling them.
- ④ In principle, replace seal parts, such as O-rings, oil seals, etc.
- ⑤ For fitting bolts, plug, etc., prepare a torque wrench or so on, and tighten them with torques shown in page 8-11, 12.
- ⑥ For the double-pump, take care not to mix up parts of the front pump with those of the rear pump.

(2) Insert the lock pin (255) after the swash plate support (251) into the pump casing (271, 272), and fit the lock pin (255) into the hole of the swash plate support (251).

※ In case the servo piston, tilting pin, stopper (L), stopper (S), and Qmin. plug have been removed, attached then to the pump casing in advance.

※ In the tightening work of the servo piston and the tilting pin, use the tool not to damaged the head of the tilting pin and the feed back pin. Besides, apply loctite (of medium strength) to the thread portion.



140Z98MP23

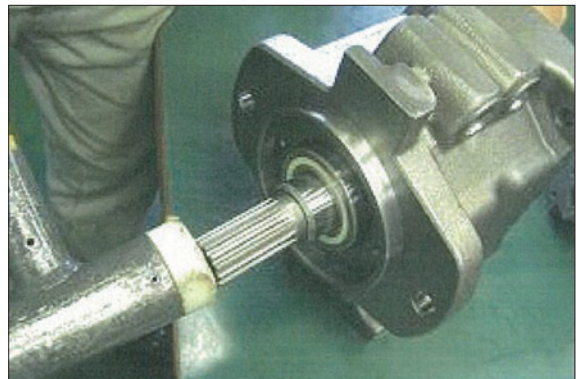
(3) Fit tilting bush (214) of swash plate (212) to tilting pin (531), and fit swash plate (212) with shoe plate (211) to swash plate support (251) correctly.

- ※ Confirm with fingers of both hands that swash plate can be removed smoothly.
- ※ Apply grease to sliding sections of swash plate (212) and swash plate support (251), and drive shaft (111, 113) can be fitted easily.
- ※ Take care not to damage shoe plate (211) surface.



140Z98MP24

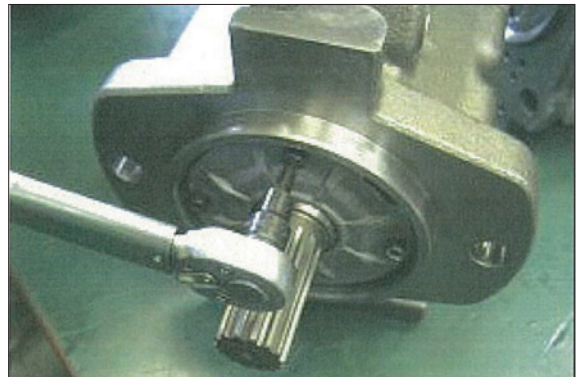
(4) To pump casing (271, 272), fit drive shaft (111, 113) set with bearing (123), bearing spacer (127) and stop ring (824).



140Z98MP25

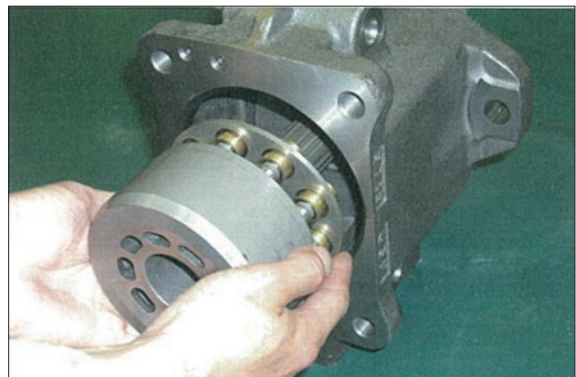
(5) In assemble of front pump, assemble seal cover (F) (261) to pump casing (271) and fix it with hexagon socket head bolt (406).

- ※ Apply grease lightly to oil seal in seal cover (F) (261).
- ※ For assemble oil seal (774), taking full care not to damage it.



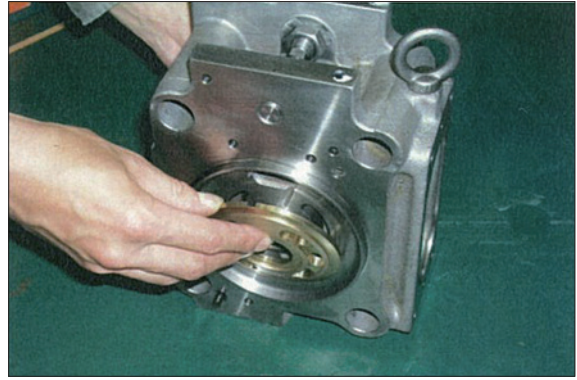
140Z98MP26

(6) Assemble piston cylinder subassembly [cylinder (141), piston subassembly (151, 152), set plate (153), spherical bush (156) and cylinder spring (157)]. Fitting spline phases of cylinder, spherical bush (156) and drive shaft (111, 113), insert piston cylinder subassembly into pump casing (271, 272).



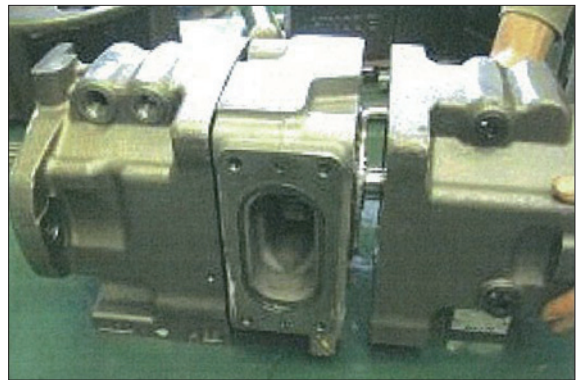
140Z98MP27

- (7) Fit valve plate (313, 314) to valve block (312), spring pin (886) into pin hole.
※ Take care not to mistake suction/delivery direction of valve plate (312).



140Z98MP28

- (8) Place pump horizontally on workbench with its regulator fitting surface down, and attach pump casing (271, 272) to valve block (312). Fit 1st gear (116) simultaneously.
※ Before bringing regulator fitting surface down, spread rubber sheet on workbench without fail to prevent this surface from being damaged.
※ Take care not to mistake direction of valve block (312). [Clockwise rotation (viewed from input shaft side)]. Fit the valve block (312) with suction flange left when regulator side below, viewed from front side.



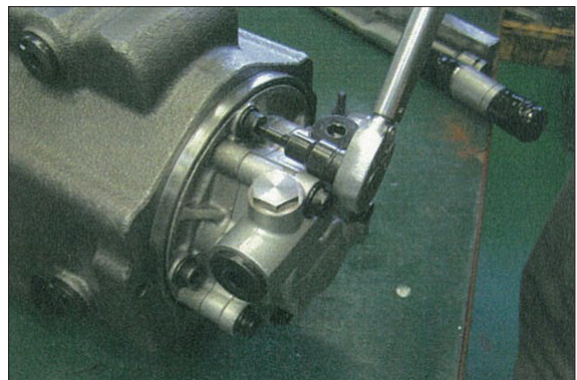
140Z98MP29

- (9) Fix valve block (312) to pump casing (271, 272) with hexagon socket head bolts (401).



140Z98MP30

- (10) Fit gear pump (04) to pump casing (272) with hexagon socket head bolts (435).



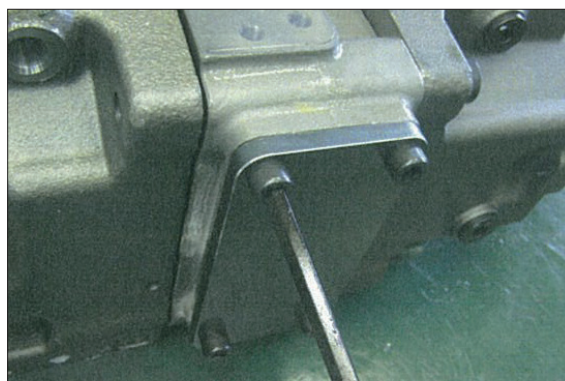
140Z98MP31

- (11) Attach the PTO unit (05) by fastening the flange socket (435) to the valve block (312).



140Z98MP32

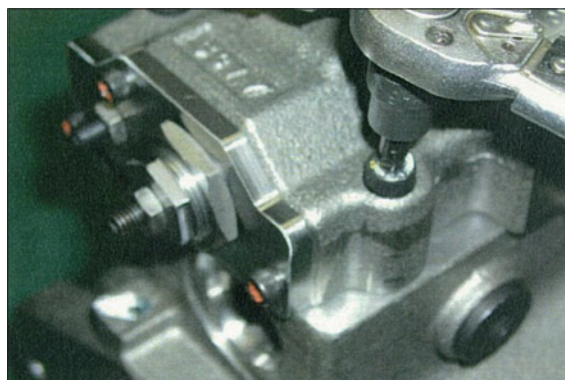
- (12) In case the pump is not provided with the PTO unit (05), attach the cover (326) with the hexagon socket head cap screw (414).



140Z98MP33

- (13) Putting feedback lever (611) of regulator into feedback pin (548) of tilting pin (531), fit regulator with hexagon socket head bolt (415).

※ Take care not to mix up regulator of front pump and that of rear pump.

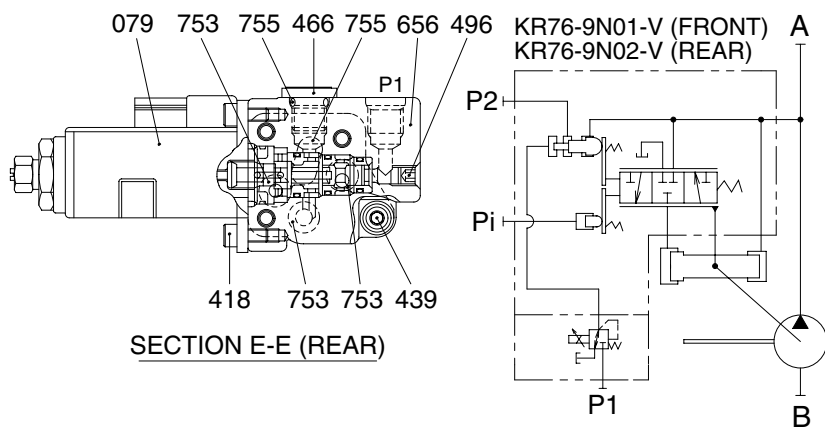
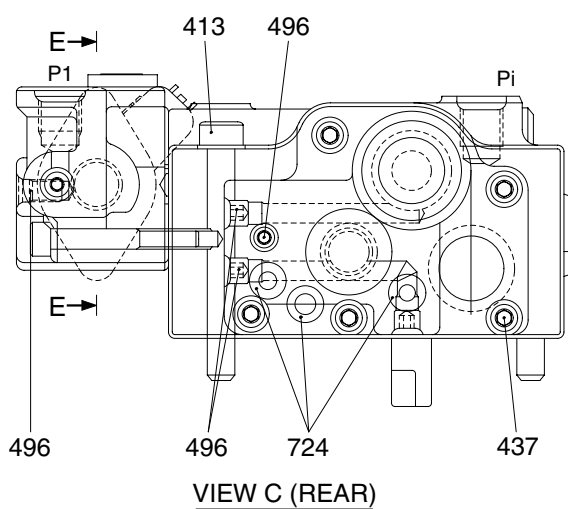
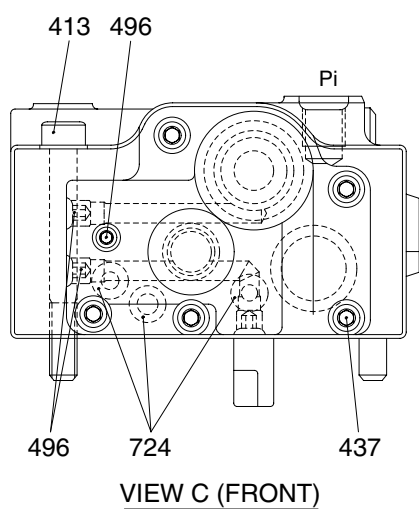
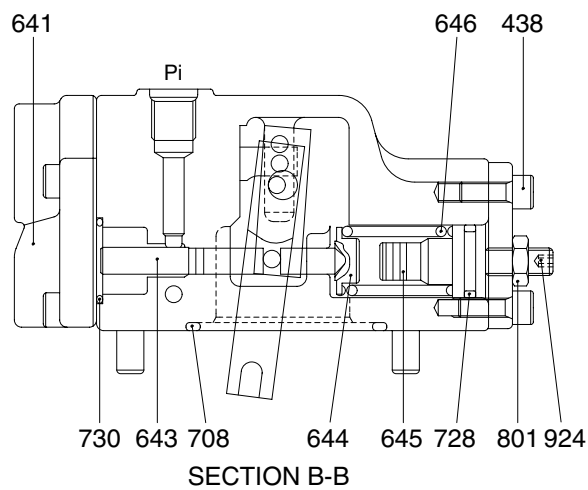
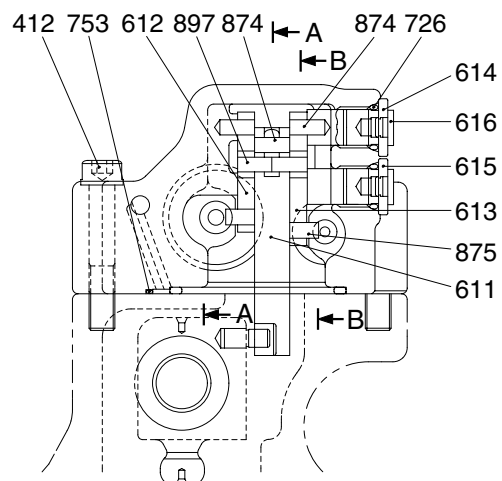


140Z98MP34

- (14) Fit drain port plug (468).
This is the end of reassembling procedures.

3. REGULATOR

1) STRUCTURE (1/2)



140Z92MP04

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