

## 1165 / 1445 HYDRO TRACTOR

### 1449595

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PTO CLUTCH

FIG. 5A-48: PTO clutch component list:

- |                           |                   |                    |
|---------------------------|-------------------|--------------------|
| 1. Spacer washer          | 9. Back-up plate  | 17. Cover assembly |
| 2. Ball bearing           | 10. Disc assembly | 18. Seal ring      |
| 3. Ball bearing           | 11. Driven plate  | 19. Spacer washer  |
| 4. Gear and tubular shaft | 12. Piston        | 20. Ball bearing   |
| 5. Ball bearing           | 13. Return plate  | 21. Shaft          |
| 6. Snap ring              | 14. Brake disc    | 22. Washer         |
| 7. Spring                 | 15. Seal ring     |                    |
| 8. Snap ring              | 16. Seal ring     |                    |

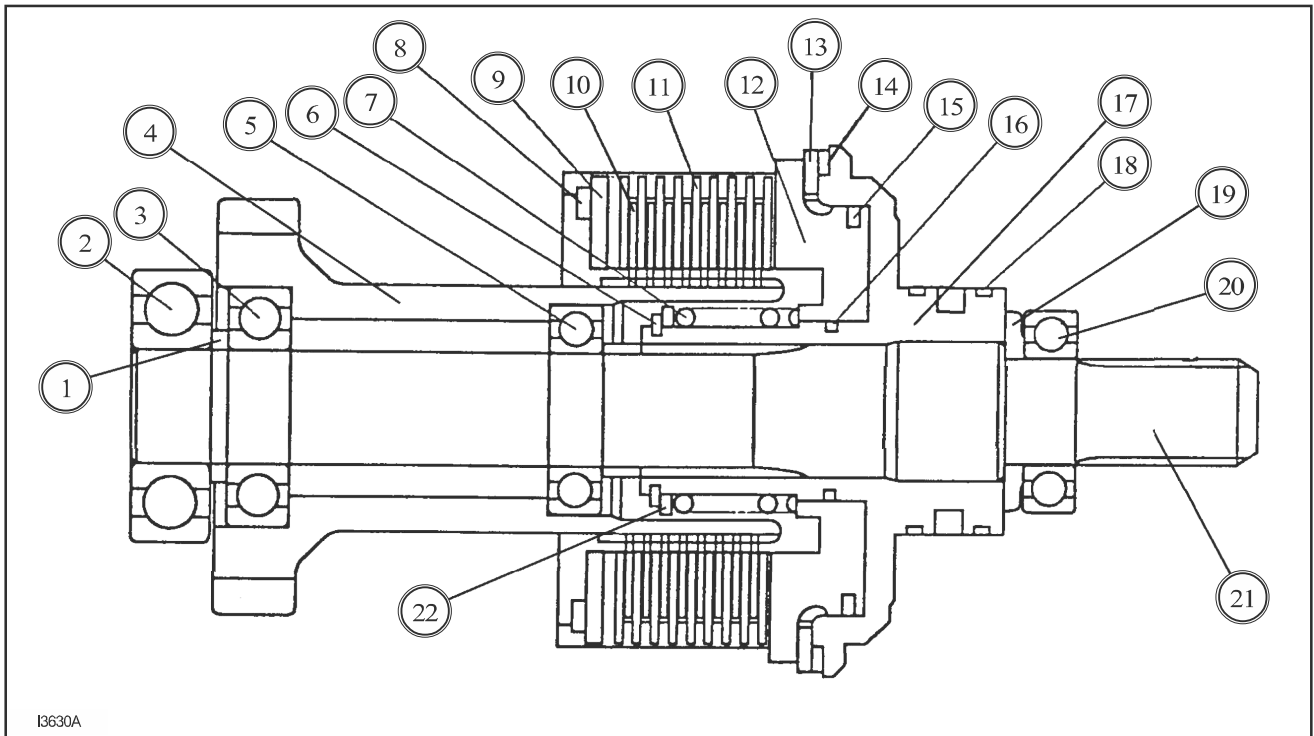


FIG. 5A-48

Overhaul

Remove PTO clutch.

Disassembly

*NOTE: Disassembly of PTO clutch assembly should be done in a clean dust free environment.*

*Use extreme care to avoid damage of seal rings, etc. Pull out drive shaft, 21, to rear.*

Pull out PTO drive gear and shaft, 4.

FIG. 5A-22: Remove snap ring (8) and back-up plate (9) disc assembly (10) and driven plates (11).



FIG. 5A-22

FIG. 5A-23: While holding return spring, 1, compressed with a special tool, 2.

Remove snap ring, 3.

Separate, piston, return spring, brake disc, and cover assembly.

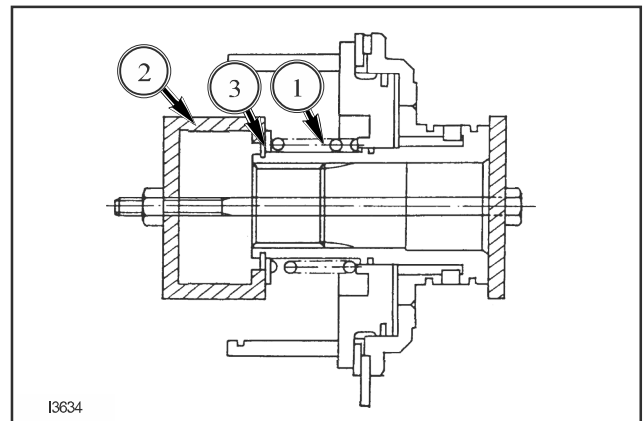


FIG. 5A-23

### Inspection

Inspect all parts and replace any that are damaged or worn excessively, as follows.

### Disc Assembly

FIG. 5A-24: If thickness of a disc assembly exceeds usable limit mentioned below or combined width of disc assembly and driven plate is less than 23.8 mm (0.937 in.), replace both disc assembly and driven plate.

Inspection for disc thickness and serration wear.

Inspection items	Specified values	Usable limit
Disc thickness	1.94 ± 0.06 mm (0.087 in.)	1.68 mm (.06614 in.)
Surface flatness	.076 ± .00236	0.2 mm (0.008 in.)

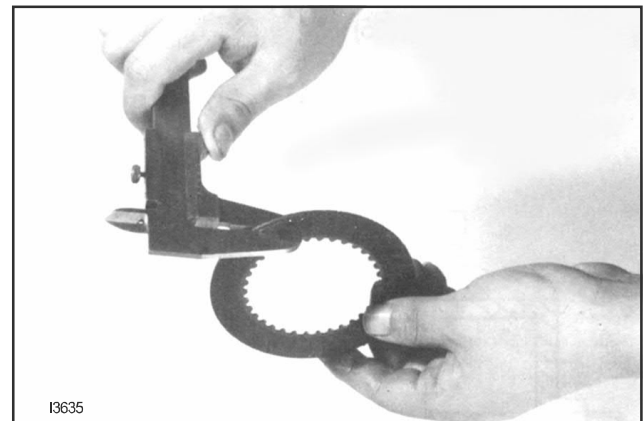


FIG. 5A-24

### Driven Plate

Inspection for deformation and burning.

A serious damaged or worn disc should be replaced.

Inspection items	Specified value	Usable limit
Surface flatness	--	0.2 mm (0.008 in.)

### Brake Disc

FIG. 5A-25: Inspection for deformation and burning.

A serious damaged or worn disc should be replaced.

Inspection items	Specified values	Usable limit
Disc thickness	3 ± 0.1 mm (0.118 in.)	2.5 mm (0.098 in.)
Surface flatness	--	0.2 mm (0.008 in.)

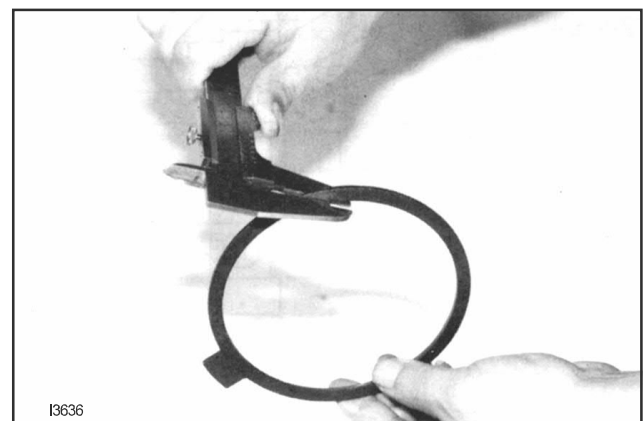


FIG. 5A-25

## 5A-22 - TRANSMISSION

FIG. 5A-26: If combined thickness of return plate and brake disc deviates from specified value, replace both parts

Also inspect other parts for wear and deformation and replace them if necessary.

Inspection items	Specified values	Usable limit
Combined thickness of return plate and brake disc	5.5 ± 0.18 mm (0.217 in.)	5 mm (0.20 in.)

FIG. 5A-27: Seal rings, 1 & 2, and two seal rings, 3, should all be replaced when reassembling unit.

### REASSEMBLY

FIG. 5A-28: Reassemble the parts in reverse order of disassembly, following these instructions.

**NOTE:** Each part should be washed clean before reassembly.

Apply multi-purpose, quality grease to needle bearings in advance.

Each bolt and nut should be tightened to respective specified torque in accordance with torque table.-See Introduction Section.

Every time a gear is installed, its smooth rotation should be checked.

Every snap ring should be seated securely in its groove.

When installing seal rings, apply fresh oil ahead of time and install them carefully so as not to damage them.

FIG. 5A-29: Install return plate with press-processed side turn towards the brake disc.

1. Return plate
2. Brake disc

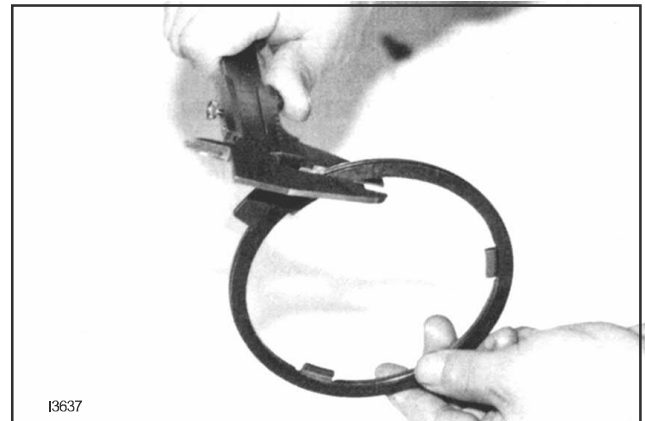


FIG. 5A-26

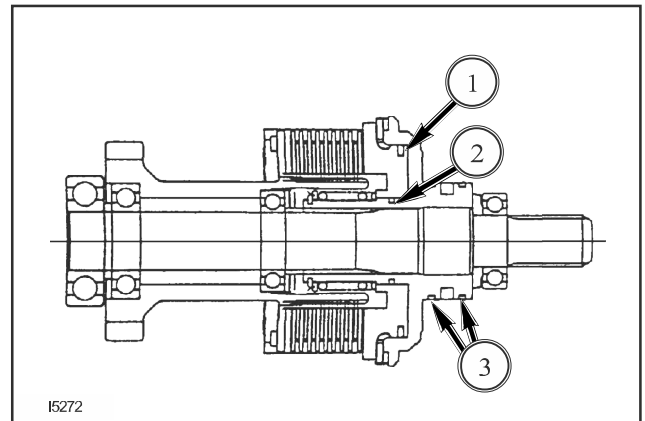


FIG. 5A-27

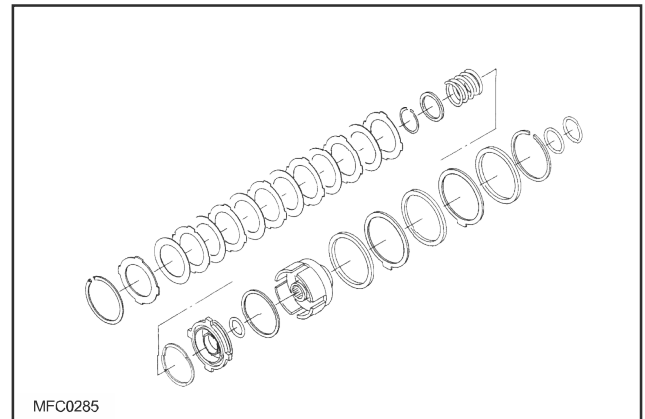


FIG. 5A-28

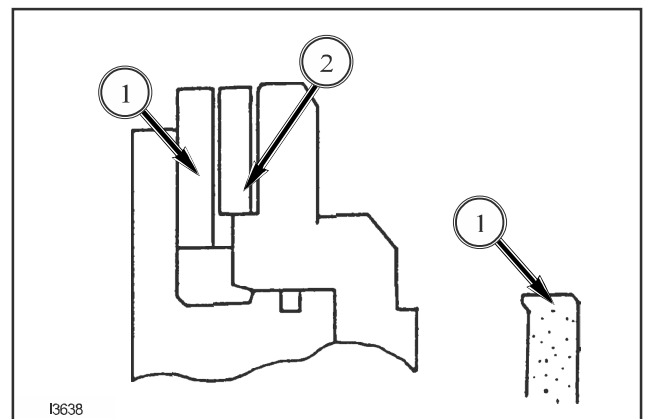


FIG. 5A-29

FIG. 5A-30: When installing return spring, 1, use a special tool, to compress spring. Install snap ring, 2. It should be securely seated in groove.

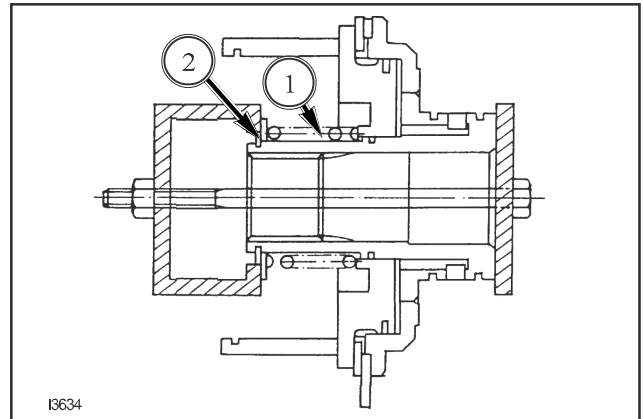


FIG. 5A-30

FIG. 5A-31: Shaft assembly, 1, includes bearings, 2 & 3, when installing bearing, use a bearing installation tool, as shown, at arrow and push only on the outer races as shown.

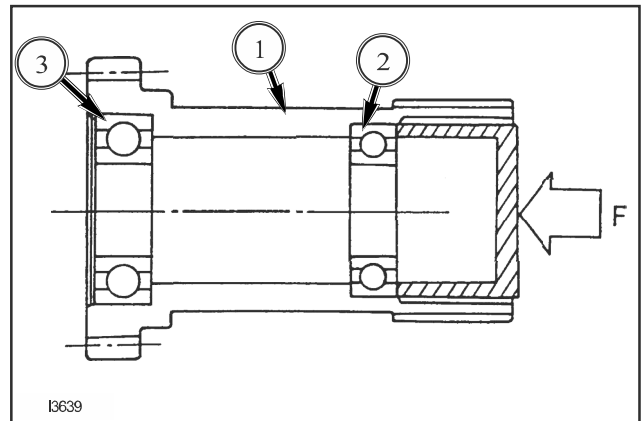


FIG. 5A-31

FIG. 5A-32: Install washer, 1, making certain it is installed in correct direction as shown in inset.

After reassembly, check to see that gear, (31T), PTO drive, 2, turns smoothly by locking PTO clutch.

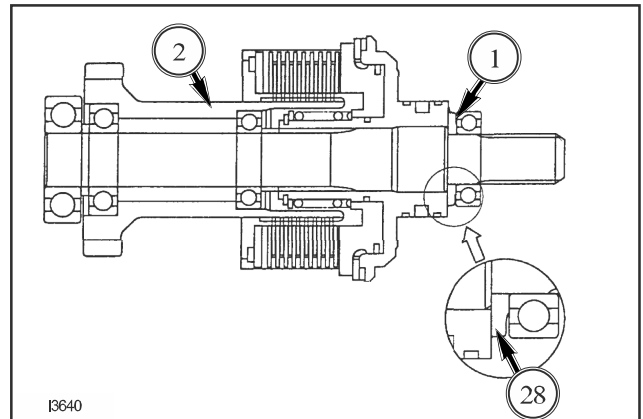


FIG. 5A-32

### TRANSMISSION INPUT SECTION

#### Removal and Installation

FIG. 5A-33: Removal of input section and engine and related parts.

Separate engine from front transmission.

Cut wire and remove roll pin (9)

Pull input shaft, 10, out to the front.

Remove input section bolts and remove input section 1,

Upon installation, take care not to damage input shaft seal o-ring (8).

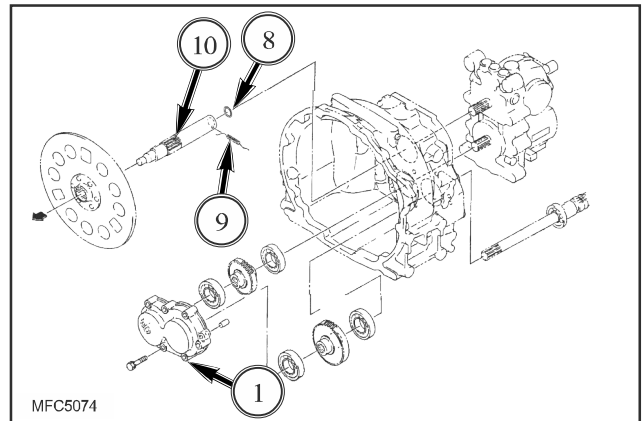


FIG. 5A-33

### INPUT HOUSING AND GEARS

#### Removal and Installation

FIG. 5A-34: Input idler shaft is separate from gear.

Remove cover 1, and pull the shaft out.

#### Replace

Remove input housing and gears.

Replace housing and gears.

Reassemble.

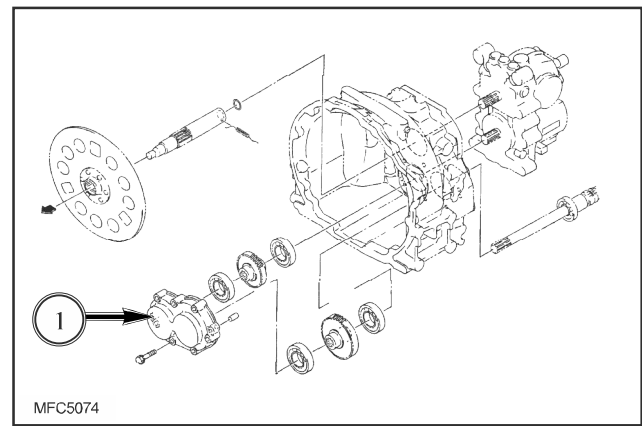


FIG. 5A-34

## HYDROSTAT TRANSMISSION DISASSEMBLY

### Process of Disassembling

FIG. 5A-35: Remove the seal plate.

Remove the hex. Socket head screws, 37.

Remove the seal plate, 18, from the HST housing, 1.

*NOTE: Take care not to damage the oil seal.*

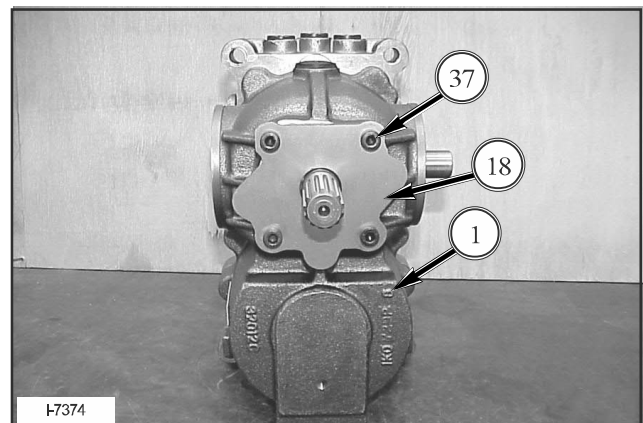


FIG. 5A-35

FIG. 5A-36: Remove the port block.

Remove the hex. Socket head screws, 38.

Remove the port block, 2, from the HST housing.

*NOTE: Take care not to drop the valve plates.*

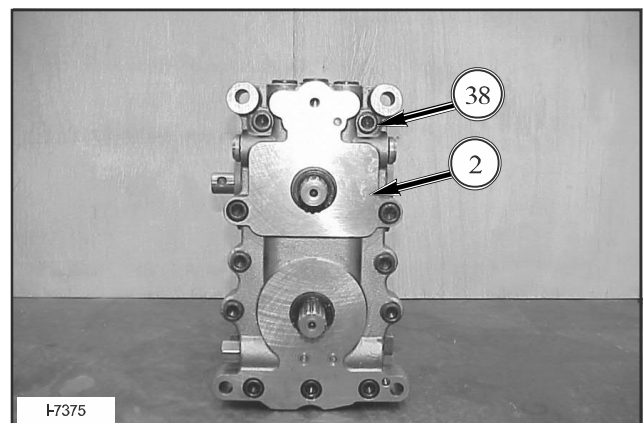


FIG. 5A-36

FIG. 5A-37: Remove the valve plates.

Remove the valve plate, 13, 14.

*NOTE: Take care not to damage the valve plates.*

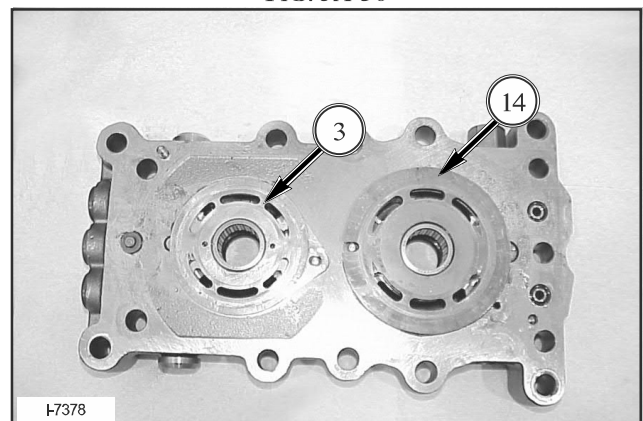


FIG. 5A-37

FIG. 5A-38: Remove the pump cylinder block assembly.

Remove the pump cylinders with pistons.

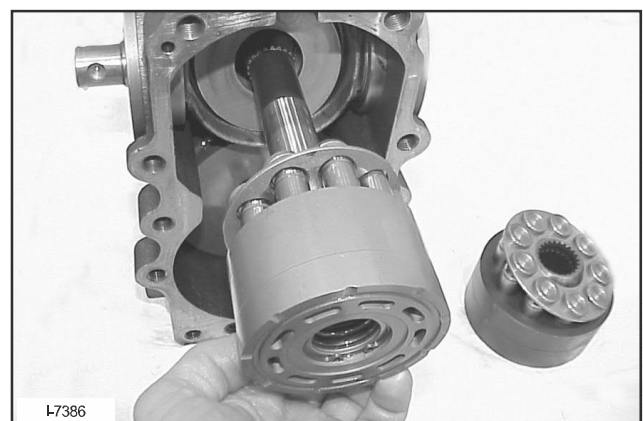


FIG. 5A-38

## 5A-26 - TRANSMISSION

FIG. 5A-39: Construction of the pump cylinder block assembly.

No.	Part Name	QTY	Reference
5	Cylinder Block	1	-
7	Piston	9	-
9	Retainer Plate	1	-
11	Retainer Holder	1	-
22	Washer	1	Do not disassemble
23	Washer	1	Do not disassemble
26	Spring	1	Do not disassemble
28	Snap ring	1	Do not disassemble
30	Pin	3	-

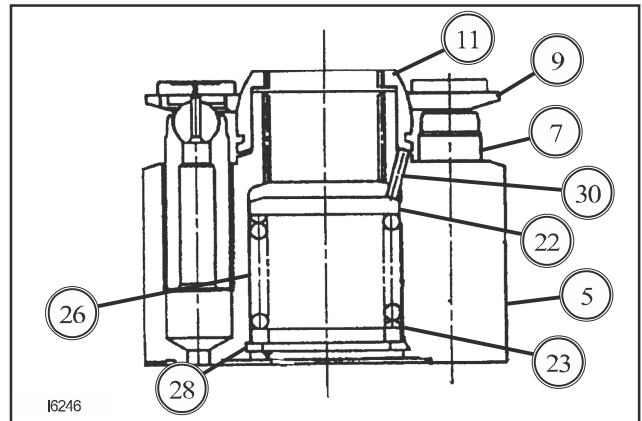


FIG. 5A-39

FIG. 5A-40: Remove the motor cylinder block assembly. Remove the motor cylinders with pistons.

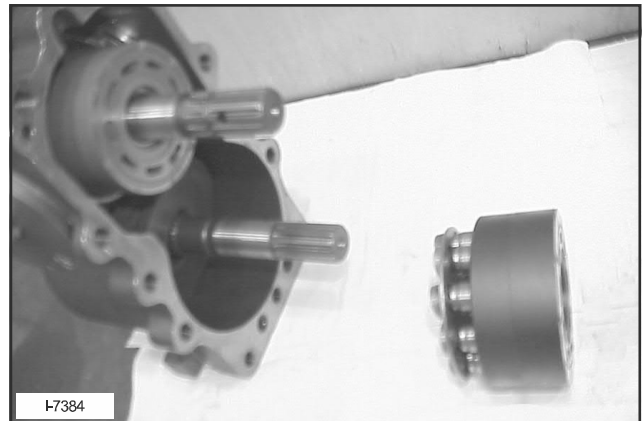


FIG. 5A-40

FIG. 5A-41: Construction of the motor cylinder block assembly.

No.	Part Name	QTY	Reference
6	Cylinder block	1	-
8	Piston	9	-
10	Retainer plate	1	-
12	Retainer holder	1	-
24	Washer	1	Do not disassemble
25	Washer	1	Do not disassemble
27	Spring	1	Do not disassemble
29	Snap ring	1	Do not disassemble
31	Pin	1	-

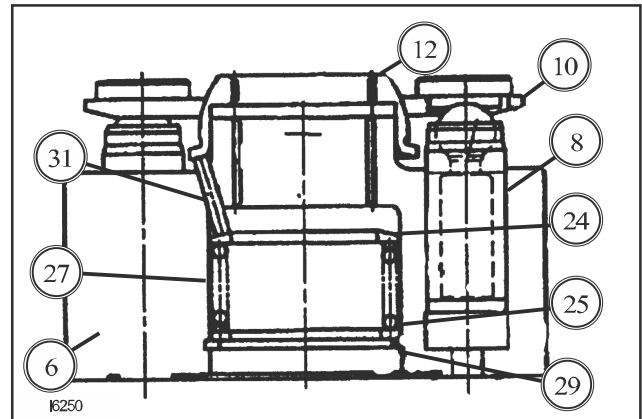


FIG. 5A-41



FIG. 5A-42: Remove the motor swash-plate.

Remove the swash-plate, 4 2 speed range motors piston, 63, spring, 77 steel ball, 62, from the HST housing.

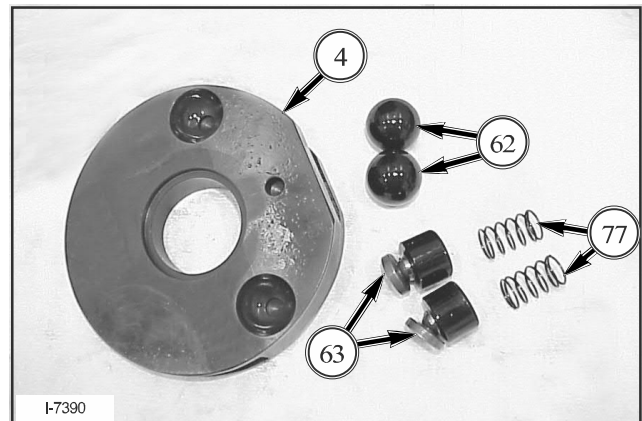


FIG. 5A-42

FIG. 5A-43: Remove the pump thrust plate, 15.

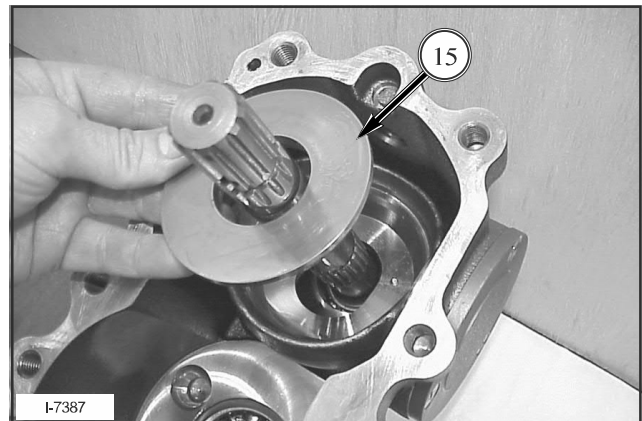


FIG. 5A-43

FIG. 5A-44: Remove the HST shaft.

Remove the pump shaft.

Remove the pump shaft, 16, from the HST housing by tapping top of the pump shaft with a plastic hammer.



FIG. 5A-44

FIG. 5A-45: Remove the motor shaft.

Remove the snap ring, 64, and remove the motor shaft, 17, from the HST housing.

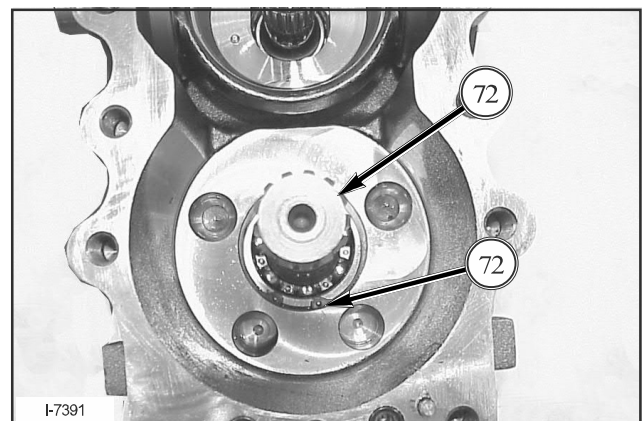


FIG. 5A-45

## 5A-28 - TRANSMISSION

FIG. 5A-46: Remove the pump swash-plate.  
Remove the countersunk head screws, 39.

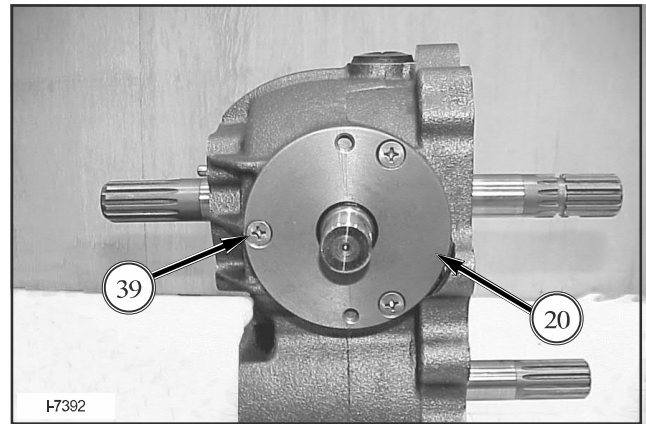


FIG. 5A-46

FIG. 5A-47: Lift the trunnion cover, 20, by tapping top of the trunnion shaft with a plastic hammer, and remove the trunnion cover from the HST housing.

Remove the pump swash-plate, 3, from the HST housing.

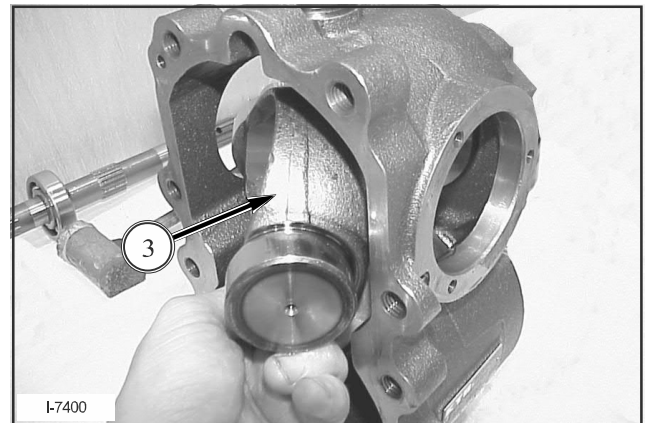


FIG. 5A-47

FIG. 5A-48: Disassemble the port block.  
Remove the high pressure valve and check valve.  
Remove the plug, 43, the spring, 44, and valve, 42.

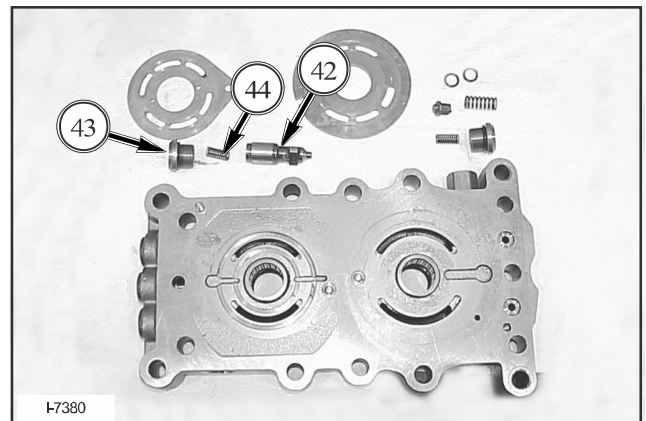


FIG. 5A-48

FIG. 5A-49: Remove the motor speed (2 speed range) change valve.

Remove the plug, 72, plug, 73, spring, 71 and the spool, 70.

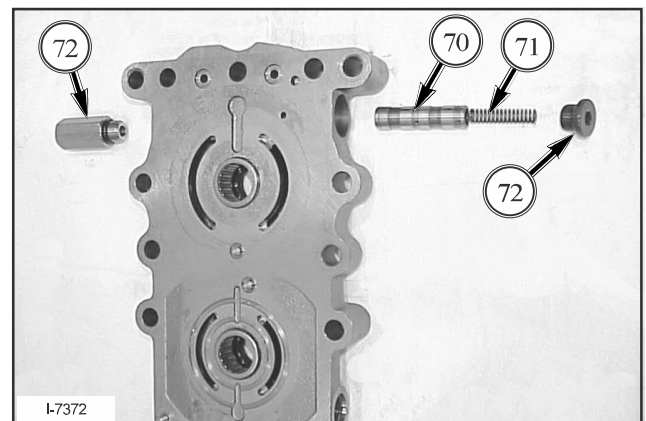
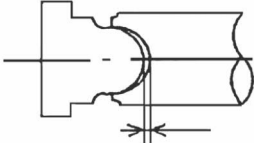
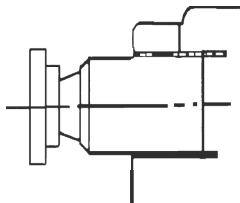
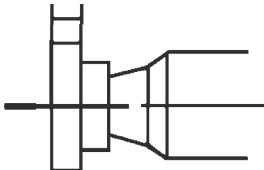


FIG. 5A-49

ALLOWABLE LIMIT OF WEAR

Check the components. If measurement is less than the allowable limit, replace.

No.	Parts name	Inspection item	Factory Spec.	Allowable limit
1	Piston Assembly	a. Clearance between piston and piston slipper: $\varepsilon$ 	0.01 ~ 0.15mm	$\varepsilon < 0.4 \text{ mm}$
		b. Clearance between piston and cylinder block: $\delta = D-d$ 	0.02 mm	$\delta < 0.03 \text{ mm}$
		c. Thickness of the piston slipper: $\tau$ 	Pump 3.0 mm Motor 4.0 mm	$\tau < 2.9 \text{ mm}$ $\tau < 3.9 \text{ mm}$
		d. Surface roughness of the piston slipper.	0.2 a	< 0.4 a
2	Cylinder block	Roughness of the surface contacted to the valve plate.	0.2 a	< 0.4 a
3	Valve plate	Roughness of the surface contacted to the Cylinder block.		
4.	Pump thrust plate	Roughness of the surface contacted to the piston assembly.		
5	Motor swashplate	Roughness of the surface contacted to the assembly.		



CAUTION: Before assembling;

Wash the parts with the flushing oil, and blow with the clean air.

Take care not damage the part, or stick dust to the parts.

When reassembling, replace oil seal, O-rings and gasket.

Tighten bolts and screws to specified torque.

Apply lithium grease to oil seals and O-rings

HYDROSTAT REASSEMBLY

FIG. 5A-50: Assemble the pump swash-plate.  
Install the pump swash-plate, 3, to the HST housing, 1.

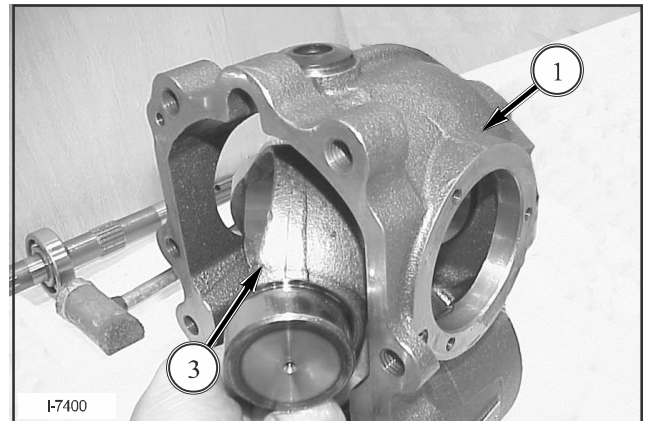


FIG. 5A-50

FIG. 5A-51: Install the trunnion cover, 19, 20, to the HST housing, 1.

*NOTE: The seam of the bushing which is installed in the trunnion cover should look toward the port block.*

Tighten the countersunk head screws, 39. Tightening torque;  $6.7 \pm 0.6$  Nm.

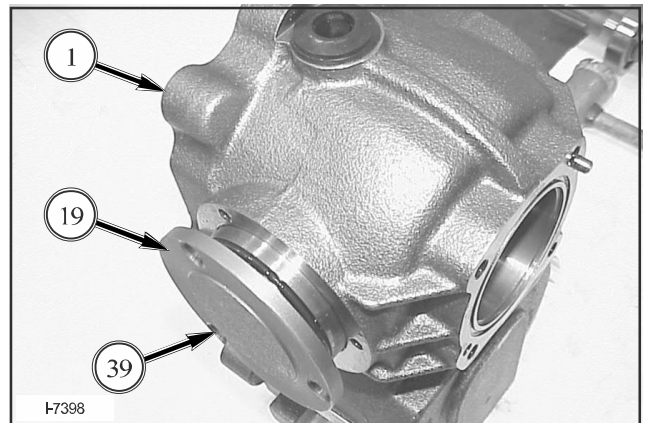


FIG. 5A-51

FIG. 5A-52 & 5A-53: Assemble the pump shaft.  
Install the pump shaft (include the pump shaft, 16) ball bearing, 40, and snap ring to the HST housing.

Assemble seal plate.

Install the pin washer and O-ring to the seal plate.

*NOTE: Take care not to damage the O-ring.*

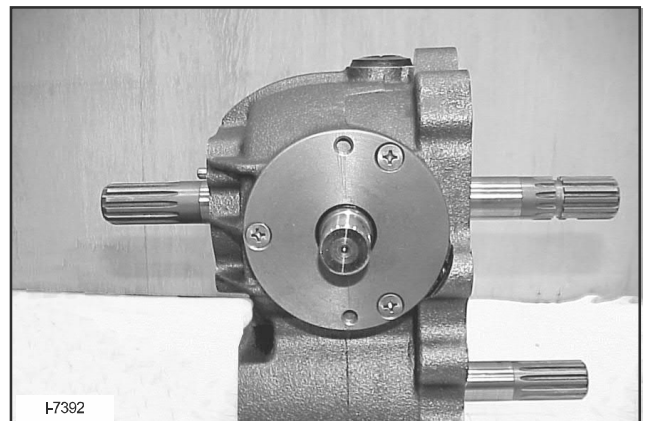


FIG. 5A-52

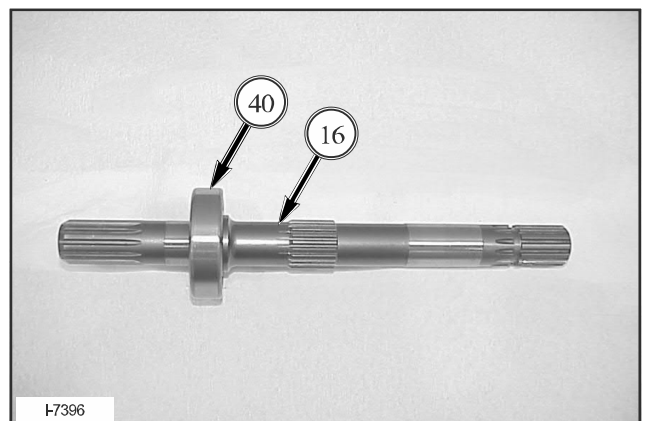


FIG. 5A-53

FIG. 5A-54 Install the seal plate, 18, and tighten the hex socket head screw, 37.

Tightening torque:  $17.7 \pm 0.7$  Nm.

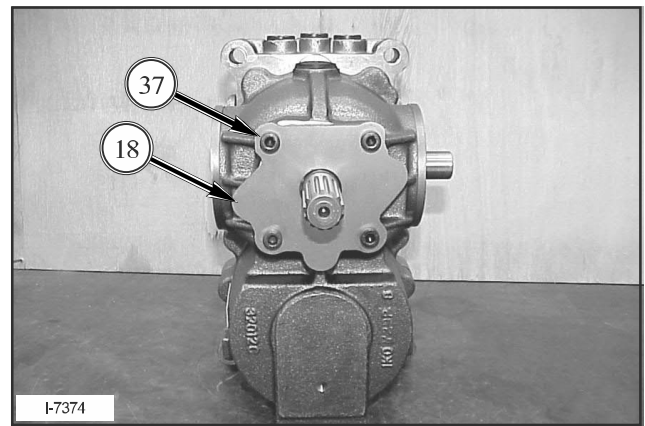


FIG. 5A-54

FIG. 5A-55: Assemble the pump cylinder block assembly.

Install the pump thrust plate, 15, to the pump swashplate, 3.

*NOTE: Align the pin if swashplate and pore of the thrust plate.*

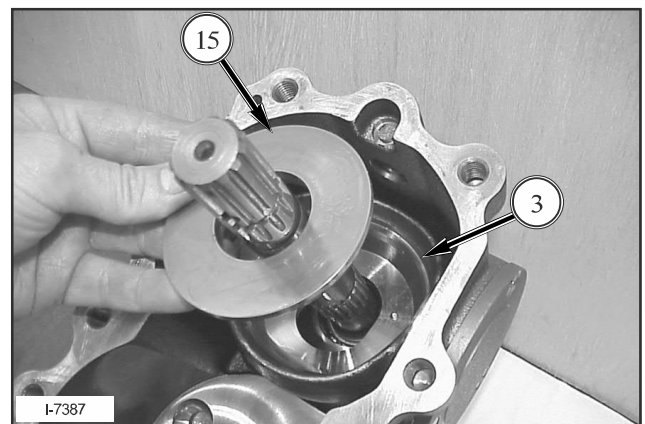


FIG. 5A-55

FIG. 5A-56: Install the cylinder block assembly to the pump shaft.

*NOTE: See Construction of the pump cylinder block assembly.*

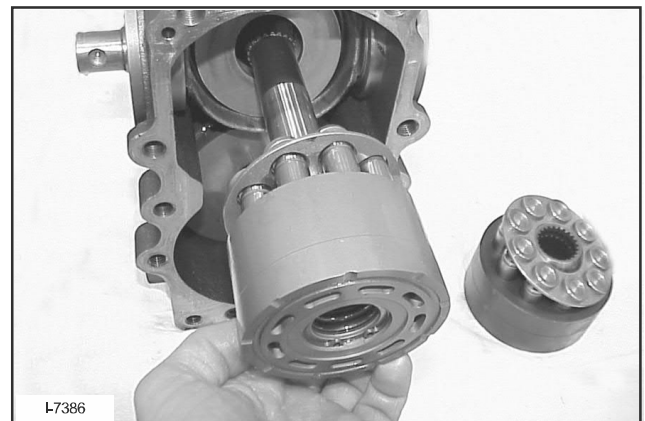


FIG. 5A-56

FIG. 5A-57: Assemble the motor shaft.

Install the motor shaft (include the motor shaft, 17, ball bearing, 40, and snap ring, 56) to the HST housing, 1. And install the snap ring.

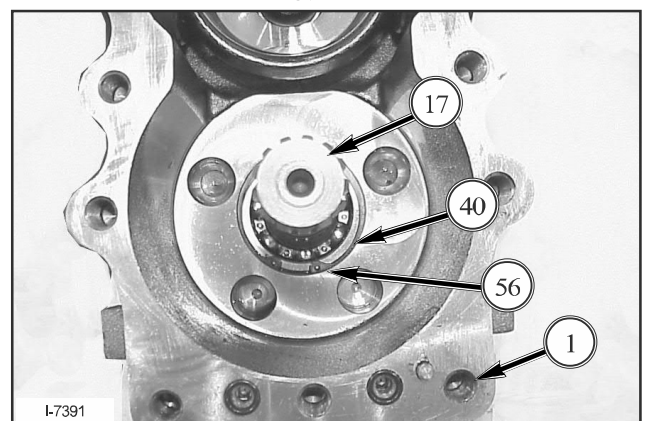


FIG. 5A-57

FIG. 5A-58: Assemble the motor cylinder block assembly.

Install the spring and piston, 63, to the HST housing, 1.  
Install the steel ball, 62, to the HST housing, 1.

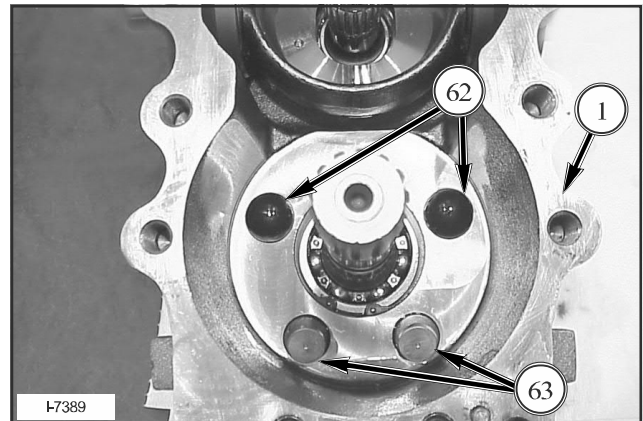


FIG. 5A-58

FIG. 5A-59: Install the swashplate, 4, to the HST housing, 1.

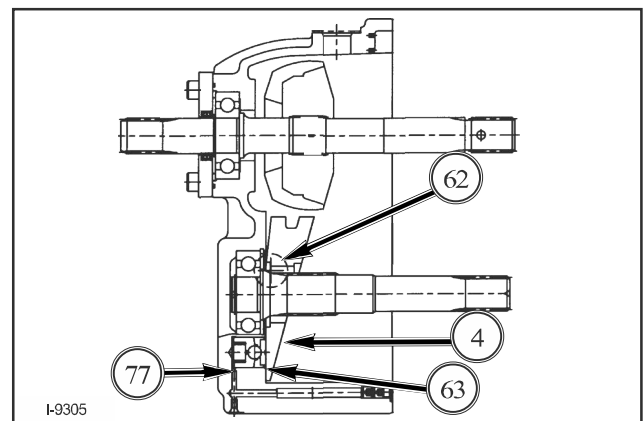


FIG. 5A-59

FIG. 5A-60: Install the cylinder block assembly to the motor shaft.

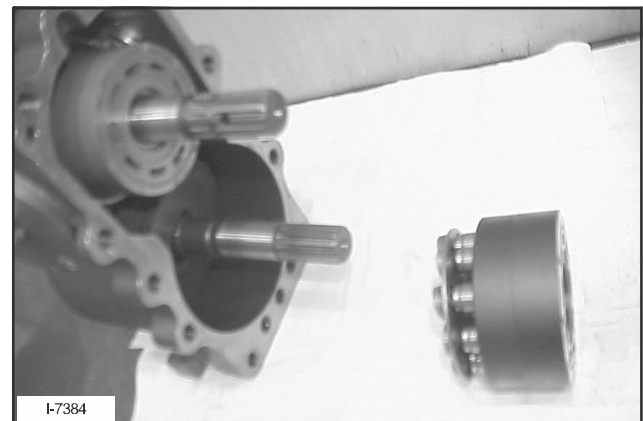


FIG. 5A-60

FIG. 5A-61: Assemble the port block.

Assemble the high pressure valve. Install the valve, 42, spring, 44, and plug, 43, to the port block.

Tightening torque of plug, 43:  $63.7 \pm 6$  Nm.

Assemble the motor speed change valve. Install the spool, 70, spring, 71, plug, 72, and plug, 73, to the port block, 2.

**NOTE:** Install the plug, 72 and plug, 73, in correct direction.

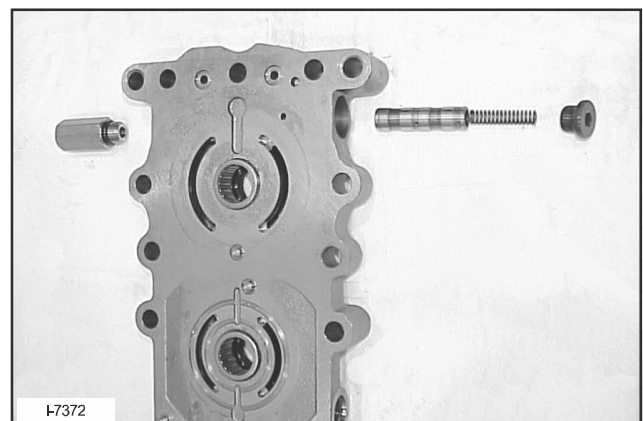


FIG. 5A-61

FIG. 5A-62: Fitting the port block assembly. Install the valve plate, 13, 14, to the port block, 2.

Install the valve, 32, O-rings, 65, and spring to the port block.

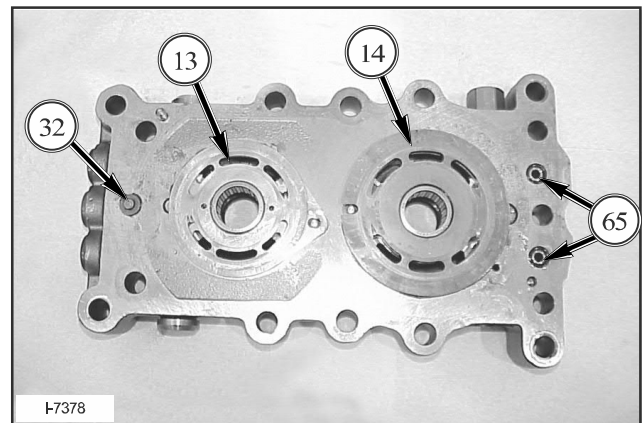


FIG. 5A-62

FIG. 5A-63: Place the gasket, 34, around the mating surface of the HST housing, 1.

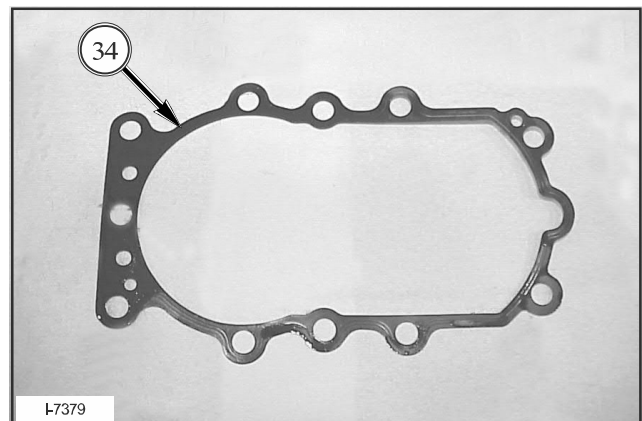


FIG. 5A-63

FIG. 5A-64: Install the port block assembly onto the HST housing assembly.

*NOTE: Apply clean hydrostatic transmission oil to the surface of the cylinder blocks.*

Tighten the hex socket head screws, 38.

Tightening torque:  $70.6 \pm 7$  Nm.

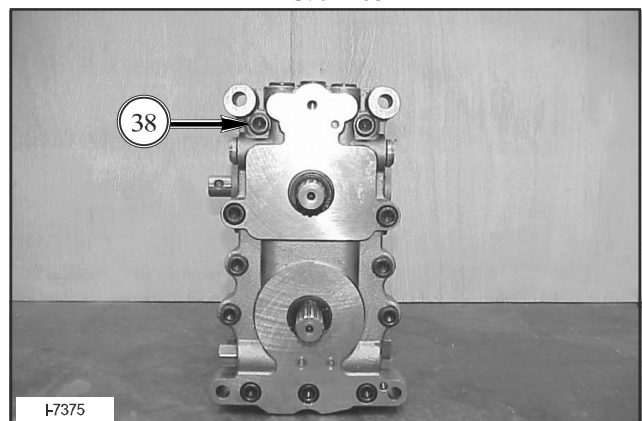


FIG. 5A-64

FIG. 5A-65: Check that the pump shaft, 16, and the motor shaft, 17, rotate smoothly.

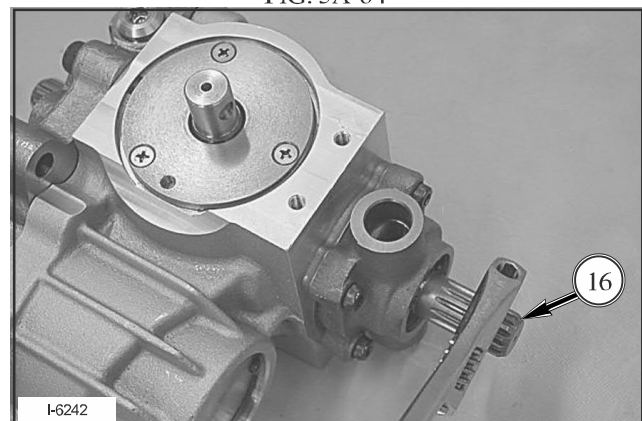


FIG. 5A-65

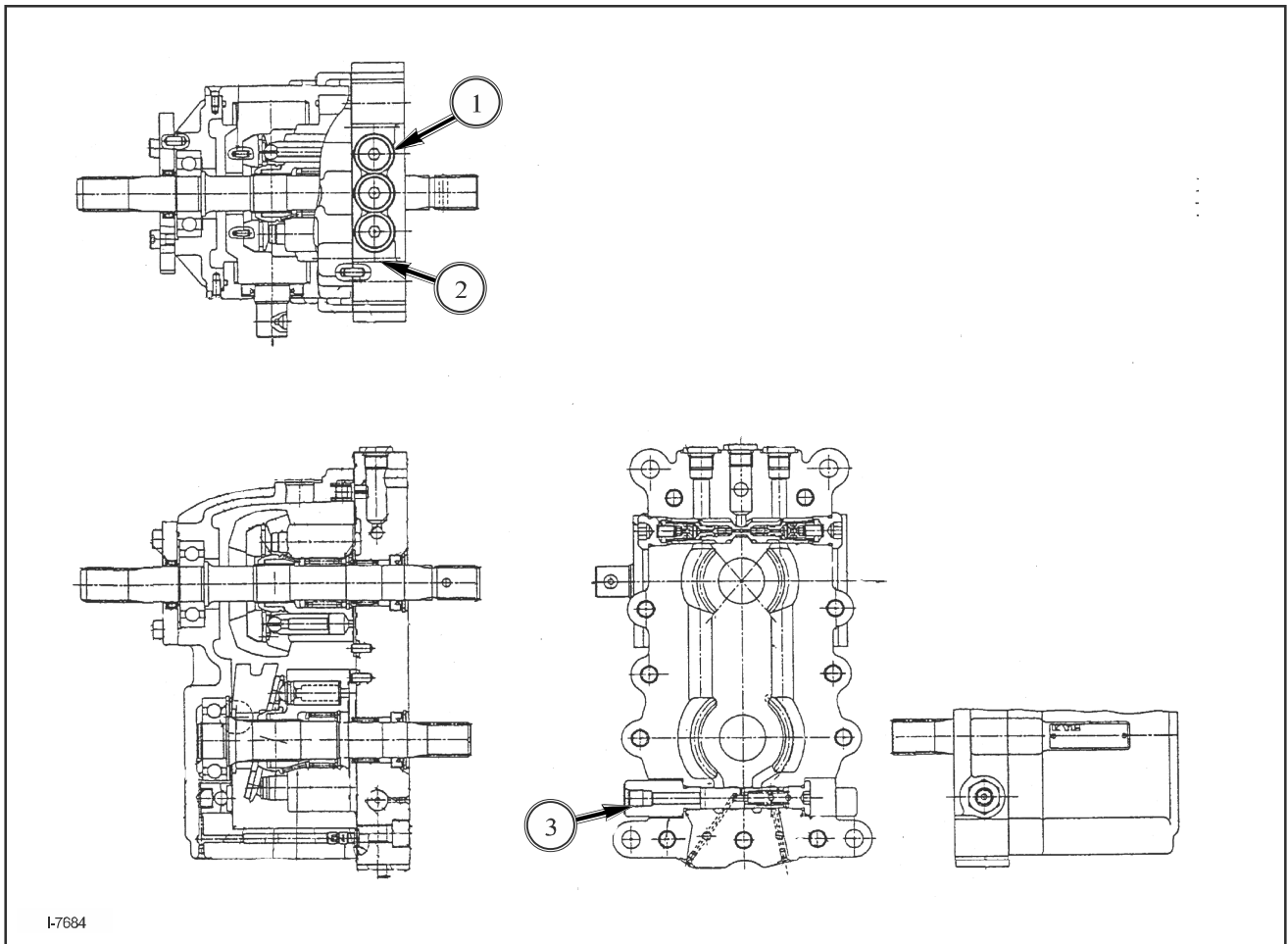


FIG. 5A-66

FIG. 5A-66:

1. Forward high pressure test port
2. Reverse high pressure
3. Two speed change over valve



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