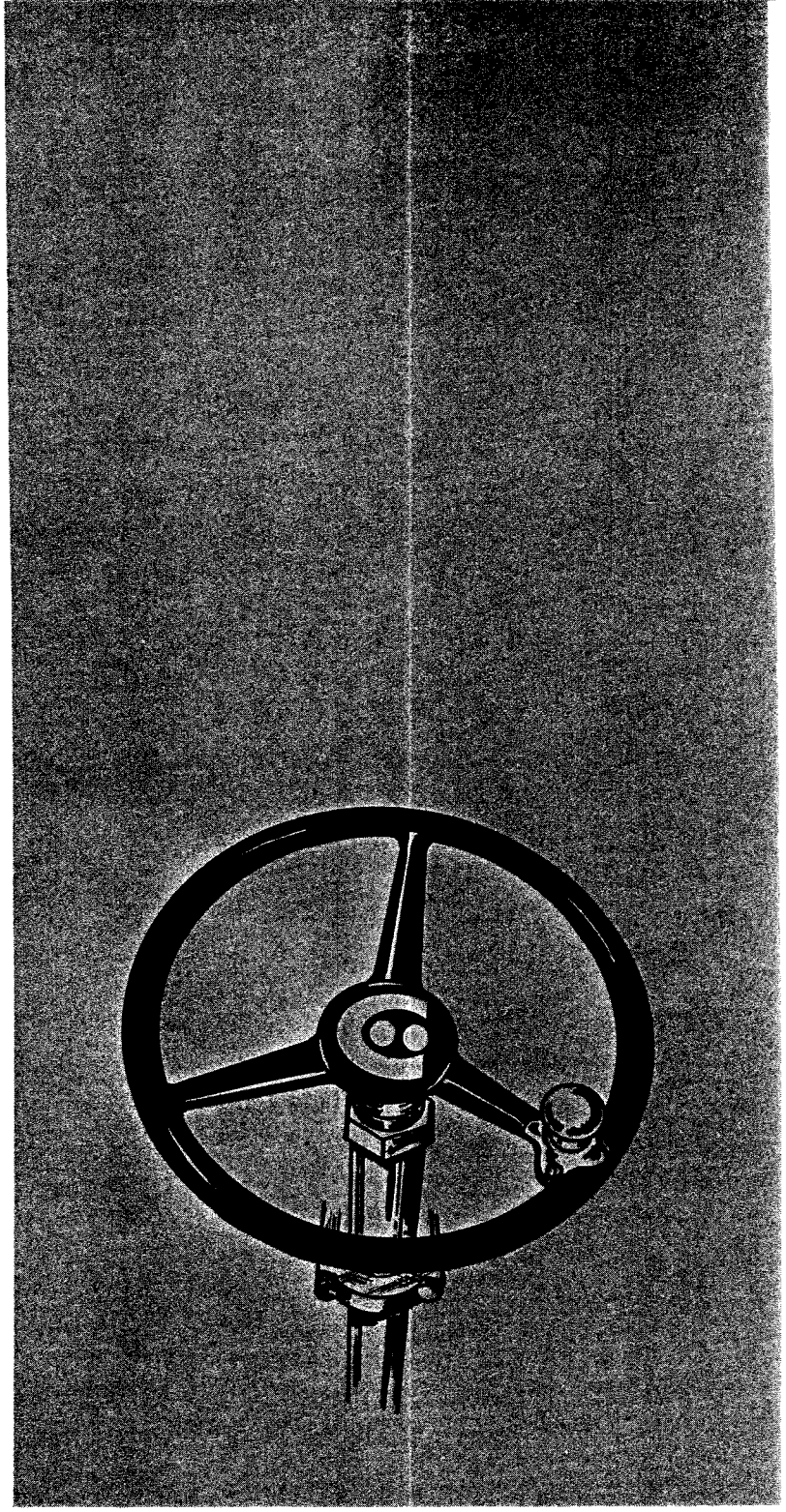


SERVICE MANUAL

SUPPLEMENTAL STEERING SYSTEM

INTRODUCTION

This publication has instructions and procedures for the subject on the front cover. The information, specifications, and illustrations in this publication are on the basis of information that was current at the time this issue was written.

Correct operation, maintenance, test and repair procedures will give this product a long service life. Before starting a test, repair or rebuild job, the serviceman must read the respective sections of the Service Manual, and know all the components he will work on.

Your safety, and the safety of others, is at all times very important. When you see this symbol  in the manual, you must know that caution is needed for the procedure next to it. This symbol is a warning. To work safely, you must understand the job you do. Read all instructions to know what is safe and what is not safe.

It is very important to know the weight of parts. Do not lift heavy parts by hand. Use a hoist. Make sure heavy parts have a good stability on the ground. A sudden fall can cause an accident. When lifting part of a machine, make sure the machine has blocks at front and rear. Never let the machine hang on a hoist, put blocks or stands under the weight.

When using a hoist, follow the recommendation in the manual. Use correct lift tools as shown in illustrations to get the correct balance of the component you lift. This makes your work safe at all times.

SYSTEMS OPERATION

TESTING AND ADJUSTING

DISASSEMBLY AND ASSEMBLY

SPECIFICATIONS

GLOSSARY

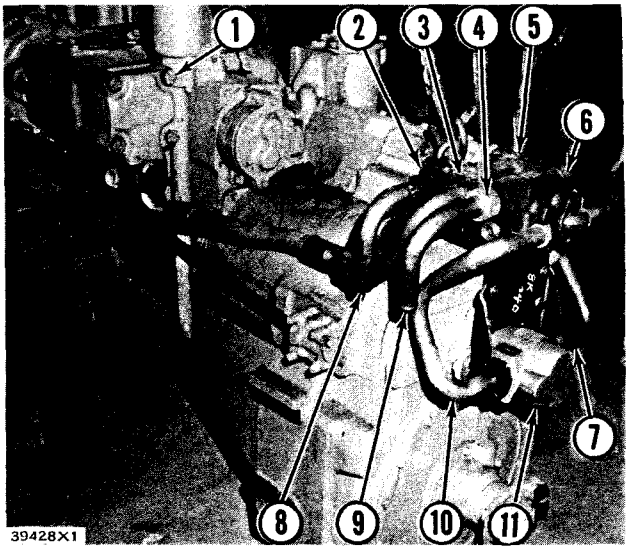
Supplemental: having the capacity to add to

SUPPLEMENTAL STEERING SYSTEM OPERATION

The supplemental steering system has two functions:

1. To move oil flow to the steering cylinders if the engine stops when the machine is moving.

2. To add oil to the primary oil flow to the steering cylinders when the engine rpm is under 900 to 1000 and the machine is moving.



SUPPLEMENTAL STEERING SYSTEM
(Typical Installation)

1. Oil pump for primary oil flow (standard steering pump). 2. Outlet in diverter valve for return of supplemental oil flow to tank. 3. Inlet in diverter valve for supply of oil from the primary pump. 4. Inlet in diverter valve for supplemental oil flow from the hydraulic tank. 5. Outlet in diverter valve for oil supply to the inlet of the valve for steering control. 6. Diverter valve. 7 and 10. Oil tubes, pump to diverter valve. 8 and 9. Oil tubes, diverter valve to hydraulic tank. 11. Oil pump for supplemental oil flow.

The components of a supplemental steering system for wheel loaders or wheel tractors are: a pump (11), a diverter valve (6) and several oil tubes.

When the tractor engine is running and the tractor is moving, the oil flow of the primary circuit is from pump (1) to diverter valve (6) and the oil flow of the supplemental circuit is from pump (11) to diverter valve (6). All of the primary oil flow from pump (1) goes through the diverter valve (6) and goes to the valve for steering control. The oil tube that makes a connection between valve (6) and the steering valve is out of view behind valve (6). The supplemental oil flow from pump (11) goes to the diverter valve (6) and adds to the oil flow from pump (1) to the steering valve, or goes directly to the hydraulic tank through oil tube (2). Engine rpm is the factor that changes the direction of supplemental oil flow through the diverter valve. When engine rpm becomes less than 900 to 1000, the diverter spool moves to send supplemental oil to become part of the steering circuit oil.

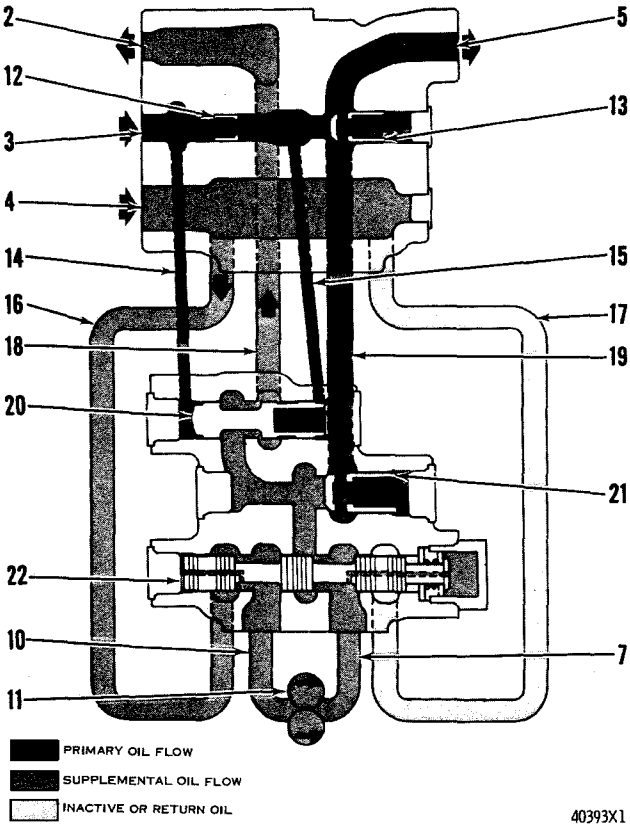
The shaft of pump (11) is turned by the output shaft of the transmission. Machine motion in reverse turns the shaft of pump (11) in the opposite direction of the rotation caused by machine motion in the forward direction. A change in the direction of rotation of the pump shaft makes little change in the pump output.

When the engine is running and the machine is not moving, all the steering system oil comes from pump (1). Primary circuit oil goes into diverter valve (6) through inlet (3) and goes through the valve to outlet (5). If the steering wheel is not turned, oil from outlet (5) goes to the control valve for steering before going back to the tank. When the steering wheel is turned, oil goes from the valve to the steering cylinders. Oil from the steering cylinders goes through the control valve before going back to the tank.

When the machine is moving, oil flow for the supplemental system is from the hydraulic tank through tube (9) to diverter valve (6). A reversing spool (22) in the valve bore behind inlet (4) shifts for supplemental oil flow to either tube (10) or tube (7). [Each change in the direction of rotation of the shaft of pump (11) causes the reversing spool to shift]. When oil flow from valve (6) to pump (11) is through tube (10), oil flow of output oil from pump (11) is through tube (7) to valve (6). The direction of oil flow through tubes (10) and (7) and pump (11) is in a reverse direction when the direction of rotation of pump shaft is changed.

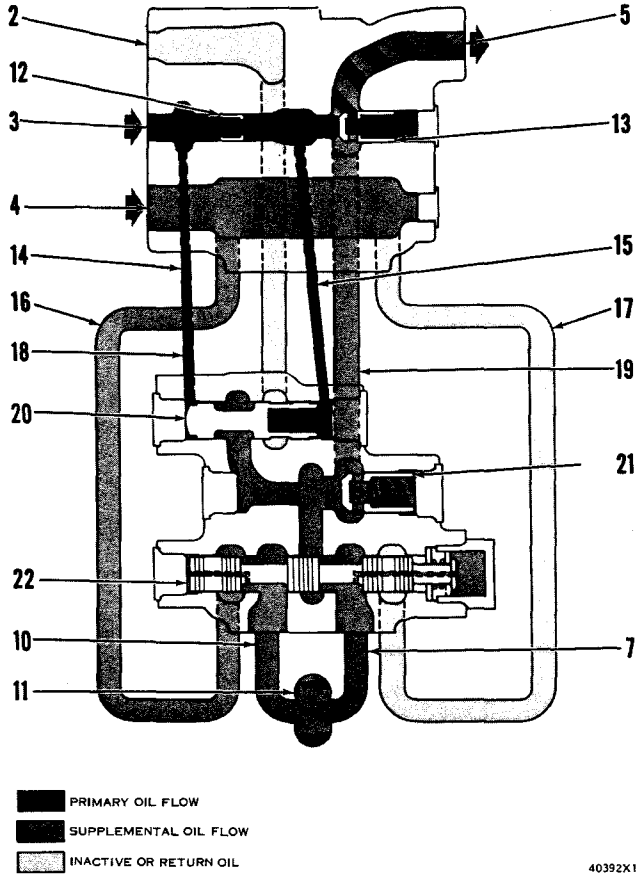
When engine is less than 900 to 1000 rpm, and the machine is moving in either direction, valve spools inside valve (6) shift so that supplemental oil from pump (11) is added to the oil flow from pump (1) before going to outlet (5). The combination of oil flows is used to activate the steering cylinders. If the engine stops, only the oil from the supplemental pump (11) is available for steering and only as long as the machine is in motion.

When the engine is more than 900 to 1000 rpm, and the machine is moving in forward or reverse, oil flow from pump (11) goes directly through valve (6) and goes to the hydraulic tank through tube (8).



DIVERTER VALVE SCHEMATIC
(Engine at Rated Speed and Machine in FORWARD Motion)

2. Outlet in diverter valve for return of supplemental oil flow to tank. 3. Inlet in diverter valve for supply of oil from the primary pump. 4. Inlet in diverter valve for supplemental oil flow from the hydraulic tank. 5. Outlet in diverter valve for oil supply to the inlet of the valve for steering control. 7 and 10. Oil tubes, pump to diverter valve. 11. Oil pump for supplemental oil flow. 12. Orifice. 13. Check valve. 14 and 15. Oil passages, primary oil manifold to bore for diverter spool. 16 and 17. Oil passages, manifold for supplemental oil to bore for reversing spool. 18. Oil passage, from bore for diverter spool to outlet to hydraulic tank. 19. Oil passage, makes a connection between supplemental oil flow and primary oil flow. 20. Diverter spool. 21. Check valve. 22. Reversing spool.



DIVERTER VALVE SCHEMATIC
(Engine at approximately 1000 rpm and Machine in FORWARD Motion)

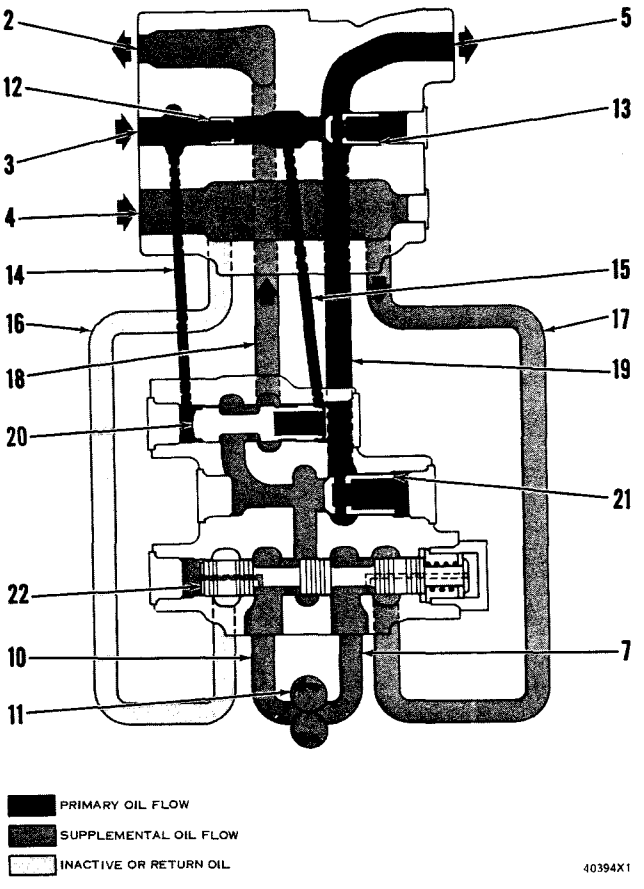
2. Outlet in diverter valve for return of supplemental oil flow to tank. 3. Inlet in diverter valve for supply of oil from the primary pump. 4. Inlet in diverter valve for supplemental oil flow from the hydraulic tank. 5. Outlet in diverter valve for oil supply to the inlet of the valve for steering control. 7 and 10. Oil tubes, pump to diverter valve. 11. Oil pump for supplemental oil flow. 12. Orifice. 13. Check valve. 14 and 15. Oil passages, primary oil manifold for supplemental oil to bore for diverter spool. 16 and 17. Oil passages, manifold for supplemental oil to bore for reversing spool. 18. Oil passage, from bore for diverter spool to outlet to hydraulic tank. 19. Oil passage, makes a connection between supplemental oil flow and primary oil flow. 20. Diverter spool. 21. Check valve. 22. Reversing spool.

At the time when the engine is started, the position of the components of the diverter valve are:

1. Check valves (13) and (21) are closed.
2. Diverter spool (20) is pushed against the left stop by its spring.
3. A spring holds reversing spool (22) in its center position.

The oil pressure of the primary circuit (through inlet 3) opens check valve (13). Oil flow is through outlet (5) to the control valve for steering. The pressure of the oil before orifice (12) is more than the pressure of the oil after orifice (12) [pressure drop across an orifice]. The pressure of the oil at the left end of diverter spool (20) is the same as the pressure of the oil before orifice (12). The pressure of the oil in the spring chamber at the right end of diverter spool (20) is the same as the pressure of the oil after orifice (12). During the increase of engine rpm and flow rate of the oil in the primary circuit, there is an increase in the difference in pressure of the oil before and after orifice (12). When the oil pressure in passage (14) is more than the oil pressure in passage (15) plus the force of the spring for the diverter spool (20), the diverter spool moves to its right stop.

There is no oil flow in the supplemental steering system until the machine moves. Machine movement and/or rotation of the output shaft of the



DIVERTER VALVE SCHEMATIC
(Engine rpm is above 1000 and the Machine in REVERSE Motion)

2. Outlet in diverter valve for return of supplemental oil flow to tank. 3. Inlet in diverter valve for supply of oil from the primary pump. 4. Inlet in diverter valve for supplemental oil flow from the hydraulic tank. 5. Outlet in diverter valve for oil supply to the inlet of the valve for steering control. 7 and 10. Oil tubes, pump to diverter valve. 11. Oil pump for supplemental oil flow. 12. Orifice. 13. Check valve. 14 and 15. Oil passages, primary oil manifold to bore for diverter spool. 16 and 17. Oil passages, manifold for supplemental oil to bore for reversing spool. 18. Oil passage, from bore for diverter spool to outlet to hydraulic tank. 19. Oil passage, makes a connection between supplemental oil flow and primary oil flow. 20. Diverter spool. 21. Check valve. 22. Reversing spool.

transmission turns the shaft of pump (11). Oil flow from the outlet of pump (11) goes through tube (7) and through the drilled passage in the right end of reversing spool (22). Oil pressure moves spool (22) to the left end of the valve bore. The hydraulic tank is higher than pump (11) and force of gravity causes oil flow to the pump through line (16). Oil flow from pump (11) goes by check valve (21), that is closed, around diverter valve (20) and goes out of the valve through outlet (2) to the hydraulic tank.

During any reduction of engine rpm, the flow rate of oil in the primary circuit becomes less. The oil pressure after the orifice (12) becomes nearer the oil pressure before orifice (12). When the oil pressure in passage (15) plus the force of the spring of the diverter valve is greater than the oil pressure in oil passage (14) [oil pressure before orifice (12)], the diverter spool (20) is pushed to its left stop. Diverter spool (20) stops oil flow from pump (11) to passage (18). The increase in oil pressure in the supplemental circuit, caused by the shift of diverter spool (20), opens check valve (21). The oil flow of the supplemental system goes through passage (19) becoming part of the oil for the steering circuit at check valve (13).

When the tractor engine stops, the primary circuit oil that was coming in inlet (3) also stops. Check valve (13) closes. Oil flow of the supplemental system from passage (19) goes around check valve (13) to outlet (5) and to the control valve for steering. As long as the machine is in motion, oil flow for steering cylinders will come from the supplemental system.

When the direction of machine motion is changed to REVERSE, the rotation of the shaft of pump (11) is in the opposite direction from the rotation during machine motion in FORWARD. Oil flow from pump (11) goes through the drilled passage in the left end of reversing spool (22). Spool (22) moves to the right so that the oil supply for pump (11) can come through passage (17). The remainder of the operations of the components of the diverter valve are not changed from their operation during machine motion in FORWARD direction.

TESTING AND ADJUSTING

Any method of instrument testing of the performance of the diverter valve or the pump of the supplemental system, when installed on a machine, is difficult.

For a practical test, do these steps:

1. Find a safe, clear area.

2. While the machine is moving in a forward direction, put the transmission in the NEUTRAL position and shut the engine off.

3. As the machine moves, make an estimate of the performance of the supplemental steering system. The difference in capacity between the supplemental pump and the steering pump must be used as a basis for the estimate.

For example, on the 966C Wheel Loader, the output of the supplemental pump is 17 U.S. gpm (64,3 lit/min) at 12 mph. The output of the standard steering pump is 40 U.S. gpm (151,4 lit/min) at 2200 rpm of the engine (full load rpm).

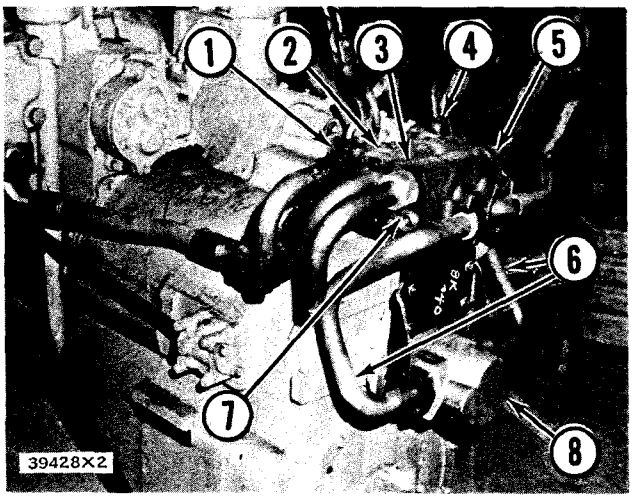
4. Do Steps 2 and 3 with the machine moving in the reverse direction.

If performance is not good enough, remove the diverter valve and inspect for spools that are not free. Remove the supplemental pump and inspect for wear and leakage by the seals.

DISASSEMBLY AND ASSEMBLY

DIVERTER VALVE

Removal, Disassembly and Inspection



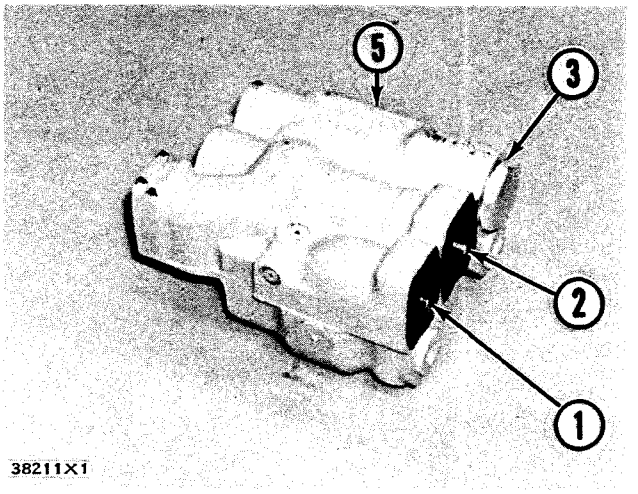
DIVERTER VALVE REMOVAL

1. Outlet in valve for return of supplemental oil to tank. 2. Inlet in valve for supply of oil from the primary pump. 3. Inlet for supplemental oil supply from the hydraulic tank. 4. Outlet in valve for oil supply to inlet of valve for steering control. 5. Diverter valve. 6. Oil tubes between pump for the supplemental system and the diverter valve. 7. Location of reversing spool. 8. Pump for supplemental system.

Disconnect oil tubes at inlet and outlet openings (1), (2), (3), (4) and (6).

Remove the three bolts that hold the diverter valve to its bracket.

Lift the diverter valve from the machine.

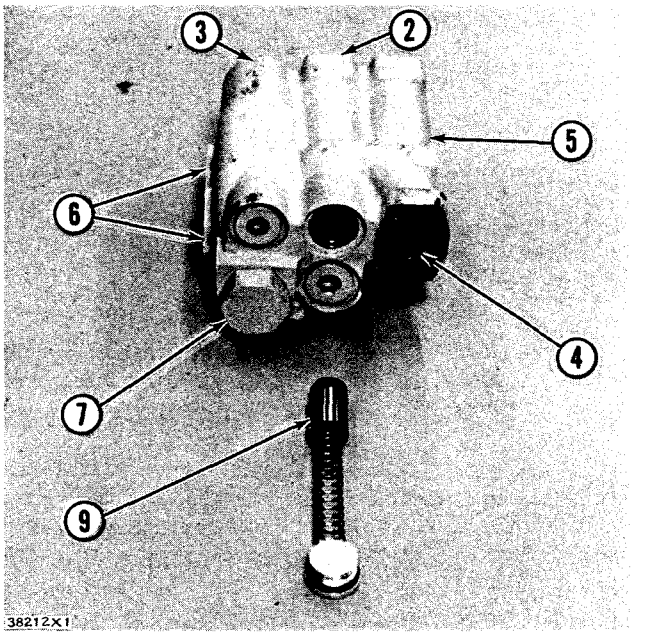


DIVERTER VALVE

1. Outlet in valve for return of supplemental oil to tank. 2. Inlet in valve for supply of oil from primary pump. 3. Inlet for supplemental oil supply from the hydraulic tank. 5. Diverter valve.

Oil from the primary pump goes to inlet (2). The orifice pushed in the bore at inlet (2) is the control for oil pressure to the diverter spool. Each model of the diverter valve (used on the several machines) must have an orifice of the correct size. With an orifice that is the wrong size, the performance of the supplemental steering system will not be good enough.

DIVERTER VALVE	ORIFICE SIZE
7J9976	.460 in. (11,7 mm)
7J9977	.500 in. (12,7 mm)
8J1708	.688 in. (17,5 mm)
8J2261	.562 in. (14,3 mm)



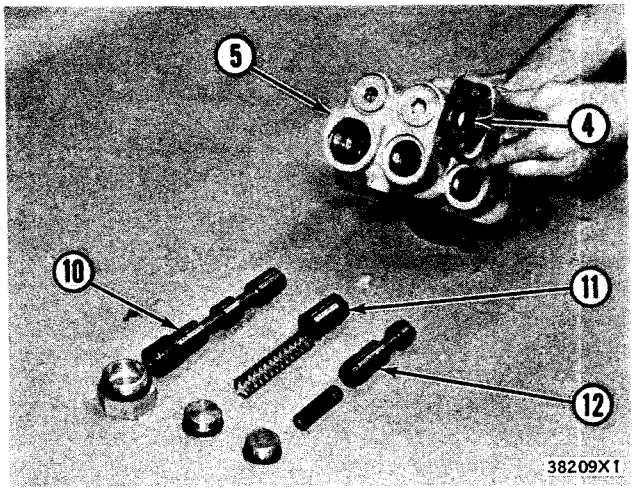
CHECK VALVE REMOVED

2. Inlet in valve for supply of oil from the primary pump. 3. Inlet for supplemental oil supply from the hydraulic tank. 4. Outlet in valve for oil supply to inlet of valve for steering control. 5. Diverter valve. 6. Inlets and outlets for oil tubes between pump for the supplemental system and the diverter valve. 7. Location of reversing spool. 9. Check valve.

Remove plug, spring and check valve (9). Check valve (9) must open for oil flow of the primary circuit from inlet (2) to outlet (4). When there is no oil flow from the primary pump, valve (9) must close to stop any oil flow from the supplemental circuit to inlet (2). When check valve (9) does not close, part of the oil of the supplemental circuit can go out inlet (2) and go to the tank through the primary pump. For good performance when there is no oil flow from the primary pump, all oil flow of the supplemental system must go out outlet (4).

Make an inspection for scratches or other damage to the check valve and its seat in the valve bore.

Oil to supply the supplemental circuit goes in inlet (3) to fill the manifold along the top of the valve. Two passages inside the valve make connections between the manifold and the bore for the reversing spool.



REVERSING AND DIVERTER VALVE SPOOLS

4. Outlet in valve for oil supply to inlet of valve for steering control. 5. Diverter valve. 10. Reversing spool. 11. Check valve. 12. Diverter spool.

Remove plugs, cap, reversing spool (10), check valve (11) and its spring, and diverter valve (12) and its spring.

The shim adjustment between the diverter valve and its spring makes the selection of the time when the diverter spool shifts to send supplemental circuit oil to either the steering circuit or to the tank. Do not throw away any shims that are between the diverter valve and its spring. The shims were installed during factory adjustment. Adding shims causes a delay in the shift of the diverter spool (12). The rate of primary oil flow must then be faster to give a larger difference in pressure between before and after the orifice. The engine rpm must be greater before the diverter spool shifts. Removing shims causes the diverter valve to shift when the flow of primary oil is at a lower rate.

Make an inspection of spool (12) for free movement in its bore.

When check valve (11) is closed, flow of supplemental oil is stopped from going to the passage that makes a connection with the valve bore for check valve (9) and the passage to outlet (4). If valve (11) does not close, some flow of the primary circuit oil must become part of the flow of supplemental oil and go back to the tank. Under this condition, the steering characteristics must become slower than normal.

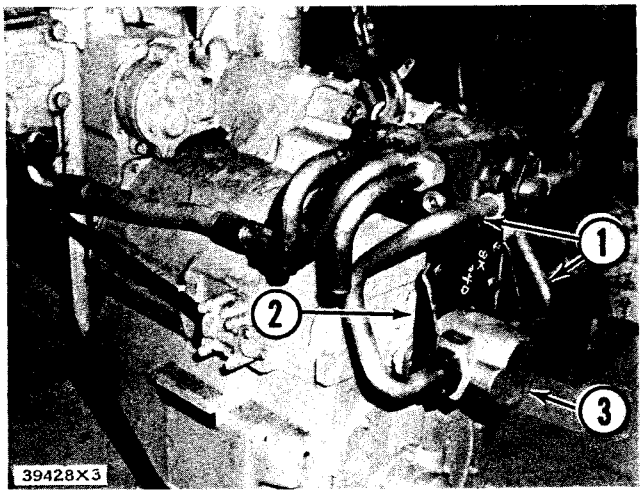
When engine is under 900 to 1000 rpm, the diverter valve (12) shifts to stop flow of supplemental oil to the tank. When the flow of supplemental oil is stopped, the pressure increase opens check valve (11). Oil flow of the supplemental circuit then goes through a passage to the valve bore for check valve (9) and becomes part of the oil flow to the steering cylinders.

Oil flow of the supplemental circuit comes in inlet (2) and goes around reversing spool (10). Each change of direction of the machine causes the direction of pump rotation to change and the reversing spool to shift. The shift of the reversing spool makes a selection of one of the inlet-outlet (6) for sending oil to the supplemental pump. Supplemental oil comes back through the other inlet-outlet. Oil flow from the pump, going in either inlet-outlet (6) goes through a passage to the diverter spool (12).

Make an inspection of reversing spool (10) for scratches or other damage and for free movement in the bore of the valve.

PUMP

Removal



REMOVING PUMP

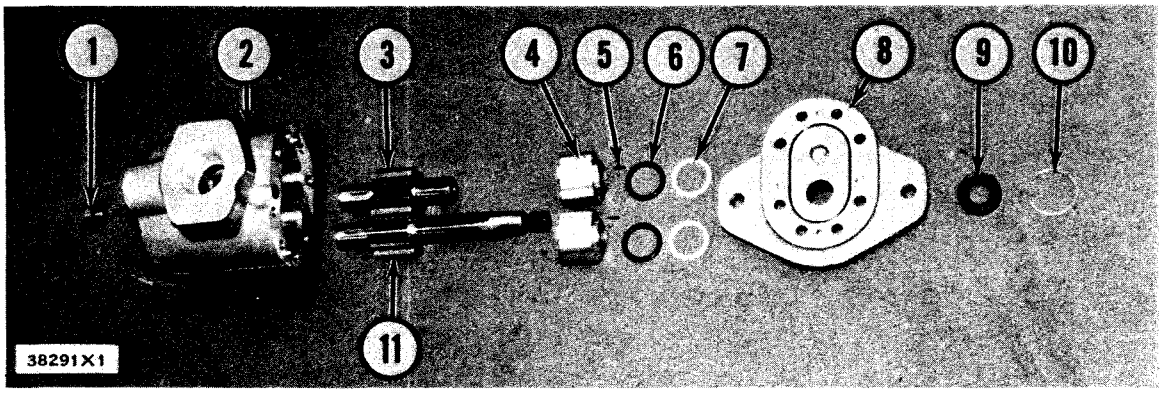
1. Oil tubes, pump to diverter valve. 2. Bracket, pump to transmission case. 3. Supplemental pump.

1. Remove oil tubes (1).
2. Remove bracket (2).
3. Slide pump (3) from transmission case. When pump shaft is free of coupling between pump shaft and shaft in transmission, lift pump from machine.

Installation

1. Install new gasket between pump flange and transmission case.
2. Lower the pump into position. When pump shaft and coupling are in alignment, slide pump and coupling on shaft in transmission.
3. Install bolts that go through flange into transmission case. Tighten bolts.
4. Install oil tubes (1) and bracket (2).

Disassembly and Assembly

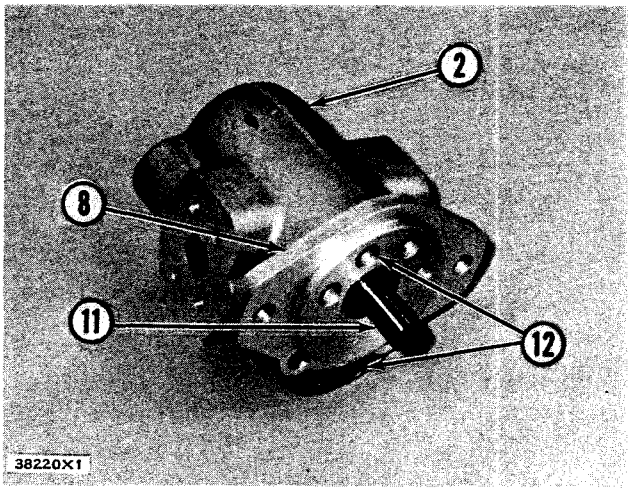


DISASSEMBLED PUMP

1. Plug. 2. Body of pump. 3. Idler shaft and gear assembly. 4. Bushing. 5. Spring pin. 6. Seal. 7. Back-up ring. 8. Flange. 9. Seal. 10. Snap ring. 11. Drive shaft and gear assembly.

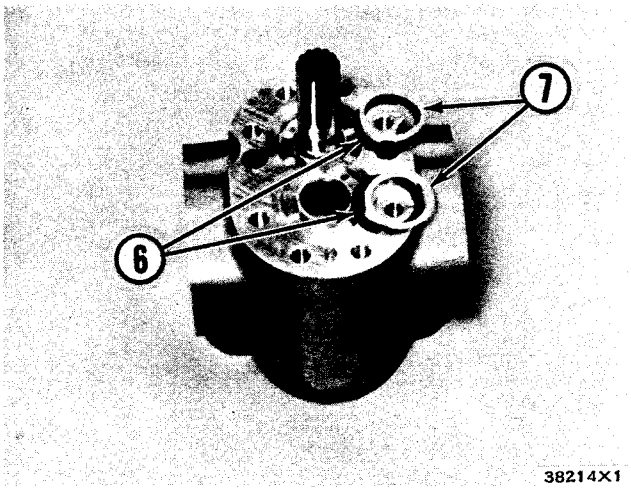
Disassembly

1. Put the pump in a vise with the shaft end of the pump on top. Put blocks of wood between pump and vise for protection of the pump.
2. Remove the eight hollow-head bolts (12). Lift flange (8) from body (2) of pump.



PUMP

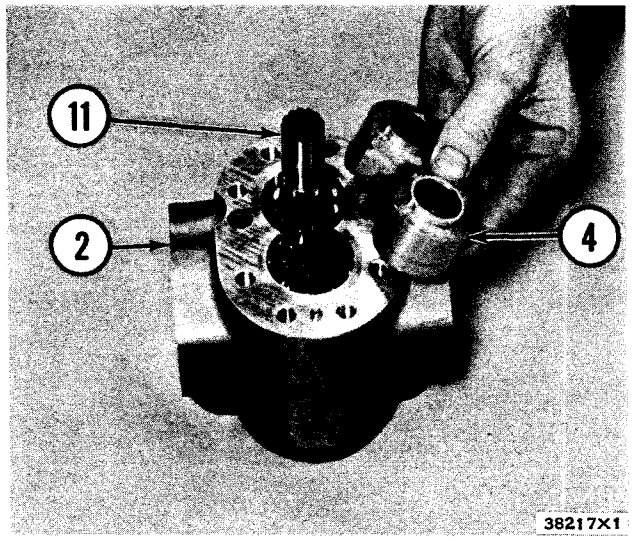
2. Body of pump. 8. Flange. 11. Drive shaft and gear assembly. 12. Hollow head bolts (eight).



BACK-UP RINGS AND SEALS

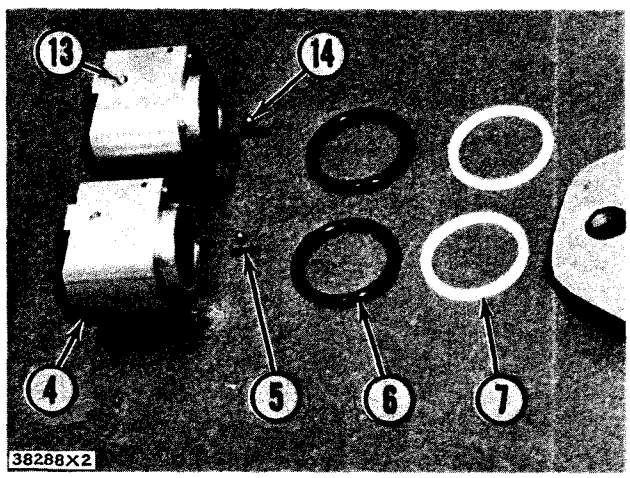
6. Seals. 7. Back-up rings.

3. Lift seals (6) and rings (7) from around shafts.



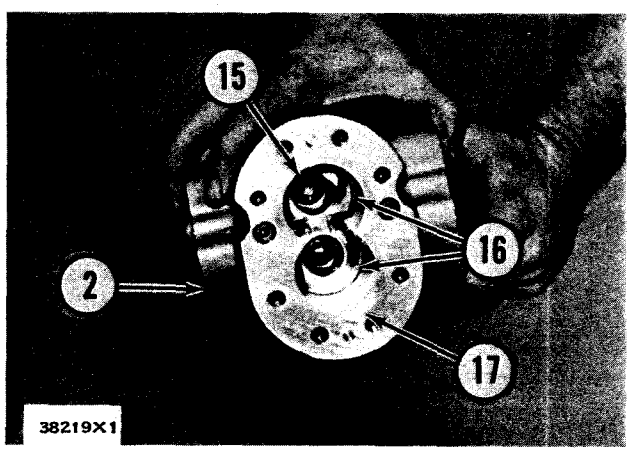
BUSHINGS

2. Body of pump. 4. Bushing (two). 11. Drive shaft and gear assembly.



BUSHINGS AND SEALS

4. Bushing (two). 5. Spring pin (two). 6. Seal (two). 7. Back-up ring (two). 13. Dowel (two). 14. Ball (two).



REMOVING BUSHINGS

2. Body of pump. 15. Bore for drive shaft and gear assembly (11). 16. Bushings. 17. Bore for idler gear.

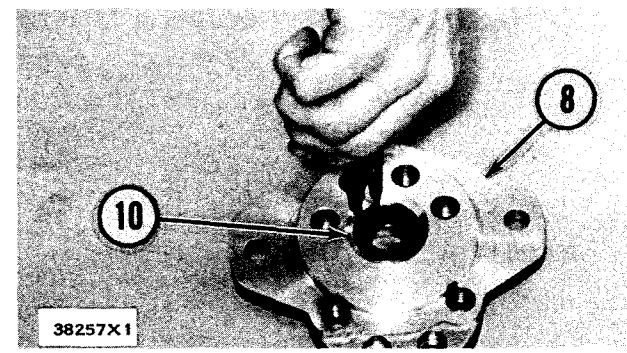
4. Lift drive shaft and gear assembly (11) part of the way out of the body of the pump. If the shaft assembly is not free, turn the shaft assembly and use small radial movements until it is free. Lift bushings (4) from around the shafts. Remove spring pin (5) and ball (14) from each bushing.

5. Lift the drive shaft and gear assembly (11) and the idler gear and shaft assembly (3) out of the body of the pump.

6. Remove body of pump (2) from vise. Turn the open end down. Let the body fall against a block of wood until bushings (16) fall from the body. Be careful so there is no damage to the face of the body that fits against the flange (8). Bushings (16) are the same as bushings (4).

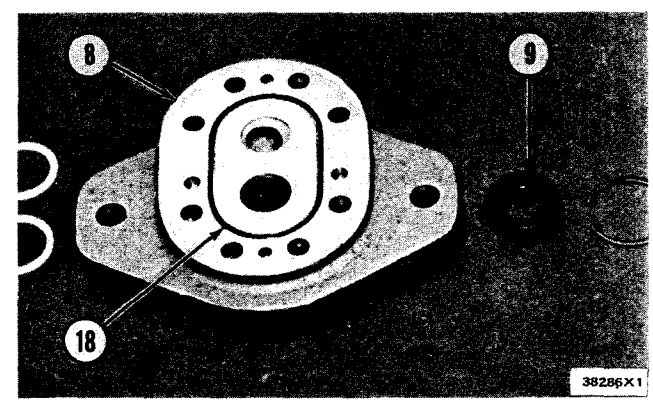
7. Check the bores (15) and (17) in body for wear. Do not use a new body (2) unless a gear has worn more than .015 in. (0,38 mm) of metal from the bore in any area of (17).

8. Remove snap ring (10) from flange (8).



REMOVING SNAP RING

8. Flange. 10. Snap ring.

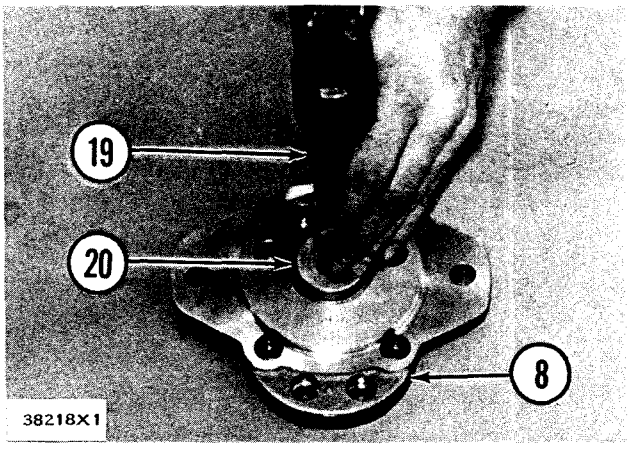


SEAL REMOVED

8. Flange. 9. Lip-type seal. 18. O-ring seal.

9. Put flange (8) on bench with the face that has the seat for seal (18) on top. Drive the lip-type seal (9) from the flange.

Assembly

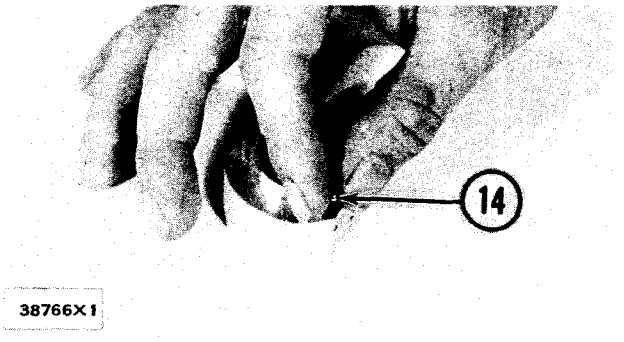


INSTALLING SEAL

8. Flange. 19. 1P529 Handle. 20. 1P463 Drive Plate.

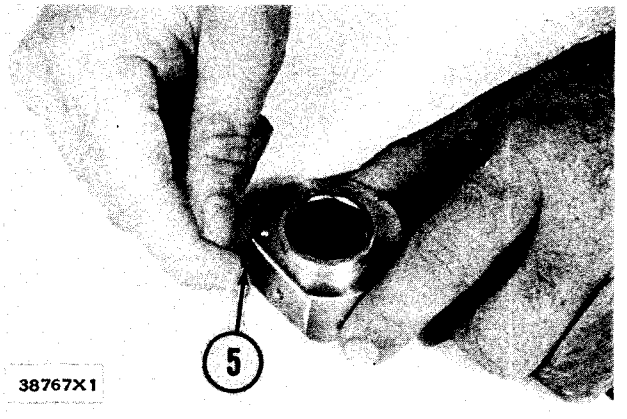
1. Install a new O-ring seal (18).

2. Use a handle (19) and a drive plate (20) to install lip-type seal (9) in flange (8).



INSTALLING BALL

14. Ball.



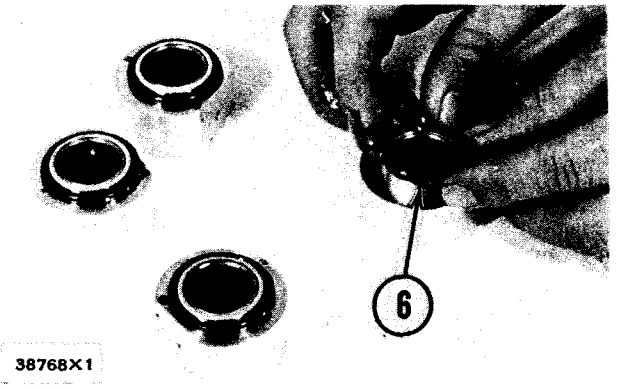
INSTALLING SPRING PIN

5. Spring pin.

3. Install a ball (14) and a spring pin (5) in bushings (16). Put a little clean grease in the holes for the spring pins to keep the pins from falling out.

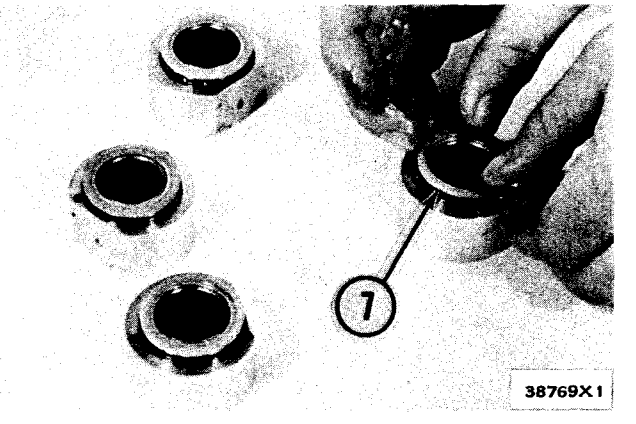
4. Put a little clean grease on the two O-ring seals (6) and install in bushings (16).

5. Put a little clean grease on two back-up rings (7) and install them on bushings (16).



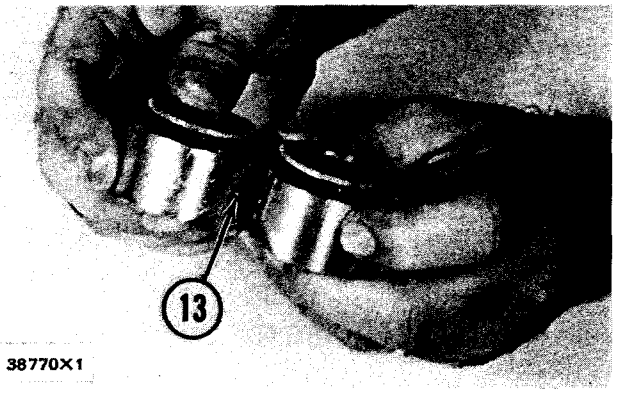
INSTALLING O-RING SEAL

6. O-ring seal.



INSTALLING BACK-UP RING

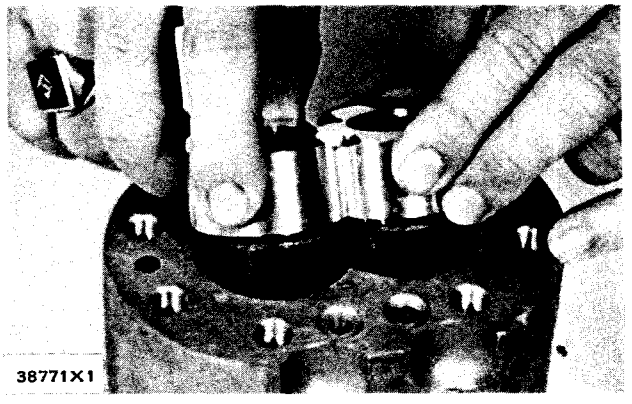
7. Back-up ring.



INSTALLING DOWEL

13. Dowel.

6. Put dowel (13) in one of the bushings. Put the flat side of the other bushing in a position so that its dowel hole will fit over the dowel. The ends of the bushings that have the seals must be side-by-side.

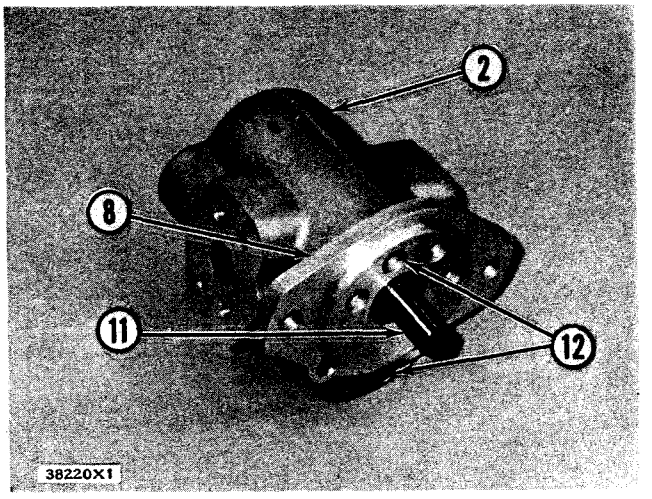


INSTALLING BUSHINGS

7. Put a little clean oil in the bores (15) and (17). Install bushings (16) in the body of the pump. The ends with the seals must be against the bottom of the pump chamber.

8. Install gear and shaft assemblies (3) and (11).

9. Do Step 6 again using bushings (4). Install the two bushing assemblies on the shaft assemblies in the body of the pump. The ends of the bushings with the seals must be against flange (8).



ASSEMBLED PUMP

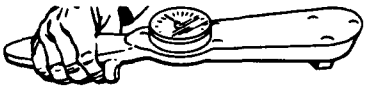
2. Body. 8. Flange. 11. Drive shaft and gear assembly. 12. Bolts.

10. Put pump in vise as during disassembly. Put flange (8) in position so that dowel holes in flange fit dowels in pump body. Install bolts (12) and tighten.

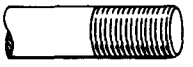
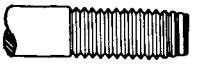
11. Turn shaft (11). Shaft must turn freely and have no tight places.

12. Install the remainder of the bolts (12). Tighten the eight bolts to 30 to 35 lb. ft. (4,1 to 4,8 mkg).

GENERAL TIGHTENING TORQUE FOR BOLTS, NUTS AND TAPERLOCK STUDS



The following charts give the standard torque values for bolts, nuts and taperlock studs of SAE Grade 5 or better quality. Exceptions are given in the Specifications.

THREAD DIAMETER		STANDARD TORQUE	
inches	millimeters	lb. ft.	mkg
Standard thread 		Use these torques for bolts and nuts with standard threads.	
1/4	6,35	9±3	1,24±0,4
5/16	7,94	18±5	2,5±0,7
3/8	9,53	32±5	4,4±0,7
7/16	11,11	50±10	6,9±1,4
1/2	12,70	75±10	10,4±1,4
9/16	14,29	110±15	15,2±2,0
5/8	15,88	150±20	20,7±2,8
3/4	19,05	265±35	36,6±4,8
7/8	22,23	420±60	58,1±8,3
1	25,40	640±80	88,5±11,1
1 1/8	28,58	800±100	110,6±13,8
1 1/4	31,75	1000±120	138±16,6
1 3/8	34,93	1200±150	166±20,7
1 1/2	38,10	1500±200	207±27,7
		Use these torques for bolts and nuts on hydraulic valve bodies.	
5/16	7,94	13±2	1,8±0,3
3/8	9,53	24±2	3,3±0,3
7/16	11,11	39±2	5,4±0,3
1/2	12,70	60±3	8,3±0,4
5/8	15,88	118±4	16,3±0,5
Taperlock stud 		Use these torques for studs with Taperlock threads.	
1/4	6,35	5±2	0,69±0,3
5/16	7,94	10±3	1,4±0,4
3/8	9,53	20±3	2,8±0,4
7/16	11,11	30±5	4,1±0,7
1/2	12,70	40±5	5,5±0,7
9/16	14,29	60±10	8,3±1,4
5/8	15,88	75±10	10,4±1,4
3/4	19,05	110±15	15,2±2,0
7/8	22,23	170±20	23,5±2,8
1	25,40	260±30	35,9±4,1
1 1/8	28,58	320±30	44,2±4,1
1 1/4	31,75	400±40	55±5,5
1 3/8	34,93	480±40	66±5,5
1 1/2	38,10	550±50	76±7

T95416-4

DIVERTER VALVE

7J9976 & 7J9977 Diverter Valves

(1) Diameter of orifice:

7J9976 Valve ..... .460 in. (11,7 mm)

7J9977 Valve ..... .500 in. (12,7 mm)

(2) 6D1601 Spring:

Length under test force ..... 1.59 in. (40,4 mm)

Test force ..... 5.9 to 6.8 lb. (2,6 to 3,1 kg)

Free length after test ..... 2.12 in. (53,8 mm)

Outside diameter ..... .625 in. (15,9 mm)

(3) 1L4418 Spring:

Length under test force ..... 1.47 in. (37,3 mm)

Test force ..... 4.9 to 5.5 lb. (2,2 to 2,5 kg)

Free length after test ..... 3.78 in. (96,0 mm)

Outside diameter ..... .813 in. (20,7 mm)

(4) Thickness of shims:

6J3993 Shim ..... .010 in. (0,25 mm)

5J1036 Shim ..... .031 in. (12,7 mm)

(5) 7S8491 Spring:

Length under test force ..... 1.00 in. (25,4 mm)

Test force ..... 4.0 to 4.7 lb. (1,8 to 2,1 kg)

Free length after test ..... 1.62 in. (41,2 mm)

Outside diameter ..... 1.188 in. (30,2 mm)

8J1708 & 8J2261 Diverter Valves

(1) Diameter of orifice:

8J1708 Valve ..... .688 in. (17,5 mm)

8J2261 Valve ..... .562 in. (14,3 mm)

(2) 3J3370 Spring:

Length under test force ..... 1.582 in. (40,2 mm)

Test force ..... 9.5 to 10.5 lb. (4,3 to 4,8 kg)

Free length after test ..... 2.20 in. (55,9 mm)

Outside diameter ..... 1.5 in. (38,1 mm)

(3) 1J9533 Spring:

Length under test force ..... 2.250 in. (57,2 mm)

Test force ..... 10.0 to 11.0 lb. (4,5 to 5,0 kg)

Free length after test ..... 5.75 in. (146,0 mm)

Outside diameter ..... 1.375 in. (35,0 mm)

(4) Thickness of 5J9101 Shim ..... .010 in. (0,25 mm)

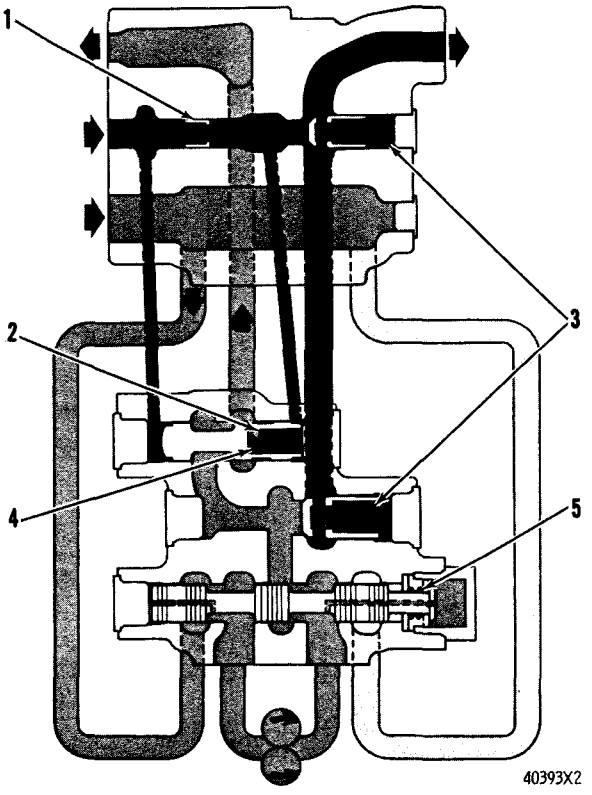
(5) 8J1705 Spring:

Length under test force ..... 2.17 in. (55,1 mm)

Test force ..... 12.5 ± 1.1 lb. (5,7 ± 0,5 kg)

Free length after test ..... 3.25 in. (82,5 mm)

Outside diameter ..... 1.125 in. (28,6 mm)



NOTE: FOR TORQUE VALUES NOT GIVEN, SEE THE FIRST PAGE OF SPECIFICATIONS FOR GENERAL TIGHTENING TORQUES

PUMP

Rotation—Pumps can be turned in either direction for bench testing

Type pump: Gear

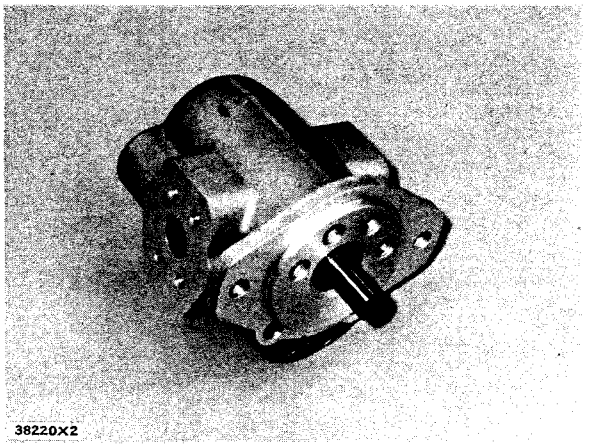
Bench test: for test use SAE 10W oil at ..... 150° F (65° C)

Output:

- 8J3834 ..... 24.5 U.S. gpm (92,75 lit/min)
- 8J1568 ..... 7.0 U.S. gpm (26,5 lit/min)
- 8J5983 ..... 43.0 U.S. gpm (162,77 lit/min)
- 7J8199 ..... 17.0 U.S. gpm (64,3 lit/min)
- 8J2611 ..... 77.0 U.S. gpm (291,50 lit/min)

Speed—pump ..... 2000 rpm

Pressure ..... 1000 psi (7,0 kg/cm²)



FEBRUARY 1972
FORM NO. REG00939-01
CATERPILLAR FUNDAMENTAL ENGLISH

PRINTED IN U.S.A.