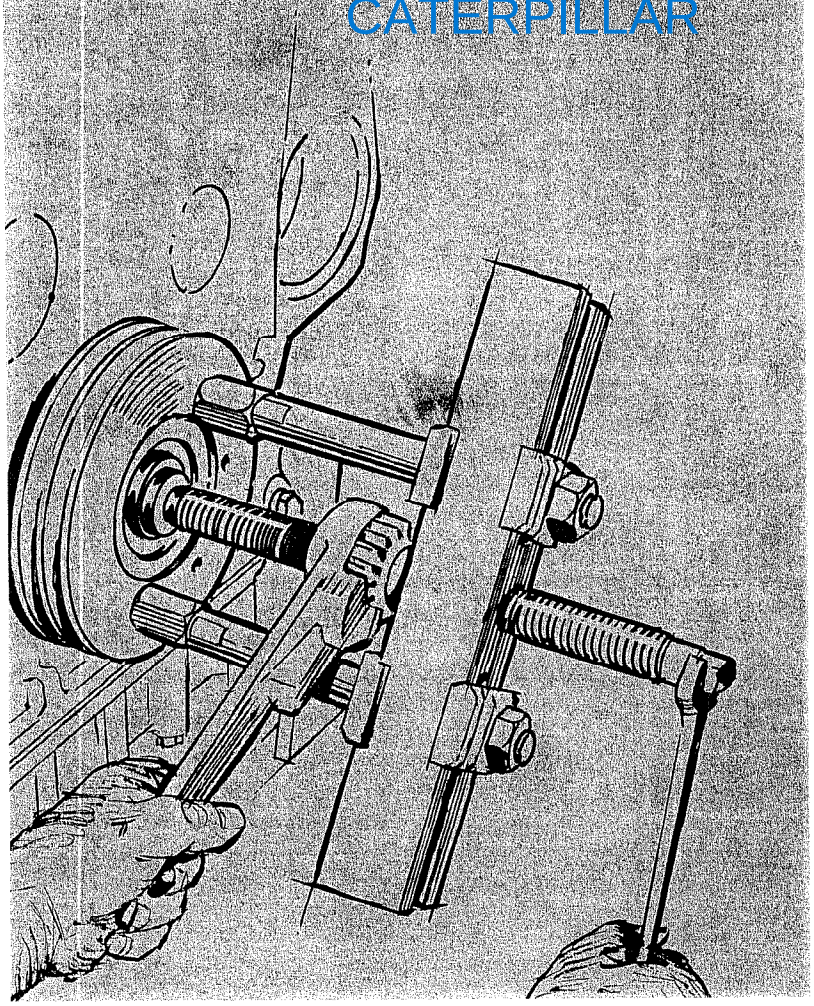
FORM NO. REG00976-01
FOR USE IN MANUAL:
920, 930 WHEEL LOADERS,
FORM REG00514

RUTHZIL TRATOR COMERCIAL DE PEÇAS LTDA 11 97083-6812 ROLANDO

10

920 930

CATERPILLAR



DISASSEMBLY AND ASSEMBLY

920 & 930 WHEEL LOADERS VEHICLE SYSTEMS

SERIAL NUMBERS:
920-41J, 75J, 62K
930-71H, 79J, 41K, 73U

⚠ WARNING

IMPORTANT SAFETY NOTICE

Proper repair is important to the safe and reliable operation of a machine. This Service Manual outlines basic recommended procedures, some of which require special tools, devices or work methods. Although not necessarily all inclusive, a list of additional skills, precautions and knowledge required to safely perform repairs is provided in the SAFETY section of this Manual.

Improper repair procedures can be dangerous and could result in injury or death.

READ AND UNDERSTAND ALL SAFETY PRECAUTIONS AND WARNINGS BEFORE PERFORMING REPAIRS ON THIS MACHINE

Basic safety precautions, skills and knowledge are listed in the SAFETY section of this Manual and in the descriptions of operations where hazards exist. Warning labels have also been put on the machine to provide instructions and identify specific hazards which if not heeded could cause bodily injury or death to you or other persons. These labels identify hazards which may not be apparent to a trained mechanic. There are many potential hazards during repair for an untrained mechanic and there is no way to label the machine against all such hazards. These warnings in the Service Manual and on the machine are identified by this symbol:

⚠ WARNING

Operations that may result only in machine damage are identified by labels on the machine and in the Service Manual by the word **CAUTION**.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this Manual are therefore not all inclusive. If a procedure, tool, device or work method not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the procedures you choose.

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⚠ WARNING

DISCONNECT BATTERIES BEFORE PERFORMANCE OF ANY SERVICE WORK.

⚠ WARNING

SAFETY

⚠ WARNING

The proper and safe lubrication and maintenance procedures for this machine, recommended by Caterpillar, are outlined in the LUBRICATION & MAINTENANCE GUIDE for this machine.

Improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand the LUBRICATION & MAINTENANCE GUIDE before performing any lubrication or maintenance.

⚠ WARNING

Do not operate this machine unless you have read and understand the instructions in the OPERATOR'S GUIDE. Improper machine operation is dangerous and could result in injury or death.

The serviceman or mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. A knowledge of the system and/or component is important before the removal or disassembly of any component.

Because of the size of some of the machine components, the serviceman or mechanic should check the weights noted in this Manual. Use proper lifting procedures when removing any components.

Following is a list of basic precautions that should always be observed.

1. Read and understand all Warning plates and decals on the machine before operating, lubricating or repairing the machine.
2. Always wear protective glasses and protective shoes when working around machines. In particular, wear protective glasses when pounding on any part of the machine or its attachments with a hammer or sledge. Use welders gloves, hood/goggles, apron and other protective clothing appropriate to the welding job being performed. Do not wear loose-fitting or torn clothing. Remove all rings from fingers when working on machinery.
3. Disconnect battery and discharge any capacitors before starting to work on machine. Hang "Do Not Operate" tag in the Operator's compartment.
4. If possible, make all repairs with the machine parked on a level, hard surface. Block machine so it does not roll while working on or under machine.
5. Do not work on any vehicle that is supported only by lift jacks or a hoist. Always use blocks or jack stands to support the vehicle before performing any disassembly.
6. Relieve all pressure in air, oil or water systems before any lines, fittings or related items are disconnected or removed. Always make sure all raised components are blocked correctly and be alert for possible pressure when disconnecting any device from a system that utilizes pressure.
7. Lower the bucket, blade, ripper or other implements to the ground before performing any work on the machine. If this cannot be done, make sure the bucket, blade, ripper or other implement is blocked correctly to prevent it from dropping unexpectedly.
8. Use steps and grab handles when mounting or dismounting a machine. Clean any mud or debris from steps, walkways or work platforms before using. Always face machine when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work platforms to perform safe repair operations.

⚠ WARNING

9. To avoid back injury use a hoist when lifting components which weigh 50 lb. (23 kg) or more. Make sure all chains, hooks, slings, etc., are in good condition and are in the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.

10. To avoid burns, be alert for hot parts on machines which have just been stopped and hot fluids in lines, tubes and compartments.

11. Be careful when removing cover plates. Gradually back off the last two bolts or nuts located at opposite ends of the cover or device and pry cover loose to relieve any spring or other pressure, before removing them completely.

12. Be careful when removing filler caps, breathers and plugs on the machines. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the machine has just been stopped because fluids can be hot.

13. Always use tools that are in good condition and be sure you understand how to use them before performing any service work.

14. Reinstall all fasteners with same part number. Do not use a lesser quality fastener if replacements are necessary.

15. Repairs which require welding should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and knowledgeable in welding procedures. Make reference to "Techniques of Structural Repair Course" form number JEG03719. Determine type of metal being welded and select correct welding procedure and electrodes, rods or wire to provide a weld metal strength equivalent at least to that of parent metal.

16. Do not damage wiring during removal operations. Reinstall the wiring so it is not damaged nor will it be damaged in operation by contacting sharp corners, or by rubbing against some object or hot surface. Do not connect wiring to a line containing fluid.

17. Be sure all protective devices including guards and shields are properly installed and functioning correctly before starting a repair. If a guard or shield must be removed to perform the repair work, use extra caution.

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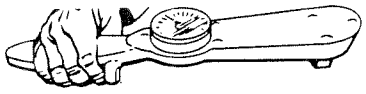
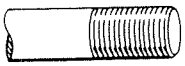
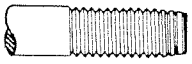
GENERAL TIGHTENING TORQUE FOR BOLTS, NUTS AND TAPERLOCK STUDS



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 other sections of the Service Manual where needed.

THREAD DIAMETER		STANDARD TORQUE	
inches	millimeters	lb. ft.	N·m*
Standard thread 		Use these torques for bolts and nuts with standard threads (conversions are approximate).	
1/4	6.35	9 ± 3	12 ± 4
5/16	7.94	18 ± 5	25 ± 7
3/8	9.53	32 ± 5	45 ± 7
7/16	11.11	50 ± 10	70 ± 15
1/2	12.70	75 ± 10	100 ± 15
9/16	14.29	110 ± 15	150 ± 20
5/8	15.88	150 ± 20	200 ± 25
3/4	19.05	265 ± 35	360 ± 50
7/8	22.23	420 ± 60	570 ± 80
1	25.40	640 ± 80	875 ± 100
1 1/8	28.58	800 ± 100	1100 ± 150
1 1/4	31.75	1000 ± 120	1350 ± 175
1 3/8	34.93	1200 ± 150	1600 ± 200
1 1/2	38.10	1500 ± 200	2000 ± 275
		Use these torques for bolts and nuts on hydraulic valve bodies.	
5/16	7.94	13 ± 2	20 ± 3
3/8	9.53	24 ± 2	35 ± 3
7/16	11.11	39 ± 2	50 ± 3
1/2	12.70	60 ± 3	80 ± 4
5/8	15.88	118 ± 4	160 ± 6
Taperlock stud 		Use these torques for studs with Taperlock threads.	
1/4	6.35	5 ± 2	7 ± 3
5/16	7.94	10 ± 3	15 ± 5
3/8	9.53	20 ± 3	30 ± 5
7/16	11.11	30 ± 5	40 ± 10
1/2	12.70	40 ± 5	55 ± 10
9/16	14.29	60 ± 10	80 ± 15
5/8	15.88	75 ± 10	100 ± 15
3/4	19.05	110 ± 15	150 ± 20
7/8	22.23	170 ± 20	230 ± 30
1	25.40	260 ± 30	350 ± 40
1 1/8	28.58	320 ± 30	400 ± 40
1 1/4	31.75	400 ± 40	550 ± 50
1 3/8	34.93	480 ± 40	650 ± 50
1 1/2	38.10	550 ± 50	750 ± 70

*1 newton meter (N·m) is approximately the same as 0.1 mkg.

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RIM AND TIRE

REMOVE AND INSTALL RIM AND TIRE 4202-10

	Tools Needed	A
8S7640	Stand	2
8S7611	Tube	2
8S7615	Pin	2
8S8048	Saddle	2

NOTE: The bucket is removed for better photo illustration of the tooling position.

CAUTION:
Before the machine is lifted, make sure the parking brake is engaged and blocks are in front and behind the tires on the opposite end of the machine.

1. Lift the machine and put tooling (A) in position under the axle housing as shown.

2. Fasten a hoist to the tire.

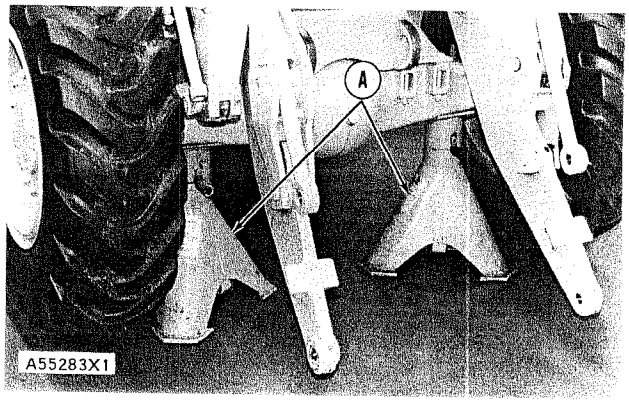
3. Remove nuts (1) and remove the rim and tire. The weight of the rim and tire without fluid is:
   920-320 lb. (144 kg).
   930-420 lb. (189 kg).

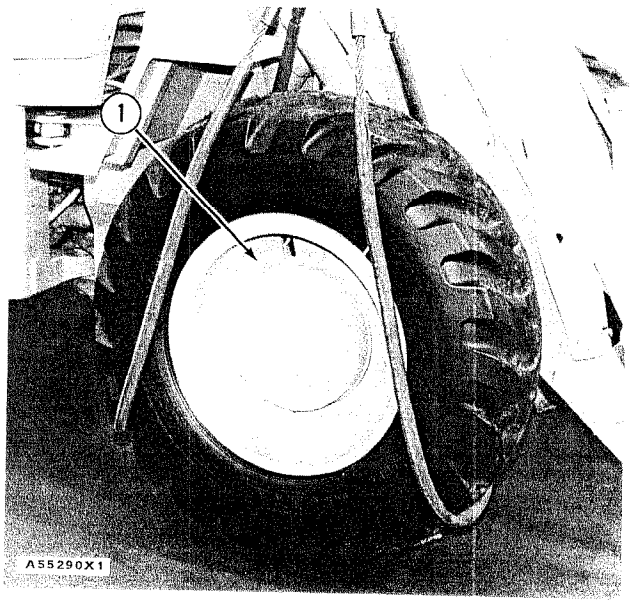
4. Fasten a hoist to the rim and tire and put it in position on the wheel assembly.

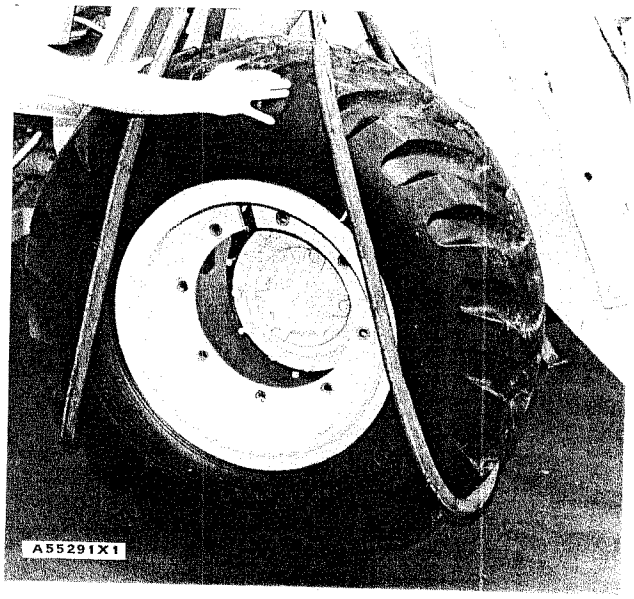
5. Install nuts (1) and tighten them to a torque of 365 ± 50 lb.ft. (490 ± 70 N·m).

6. Lift the machine and remove tooling (A). Lower the machine to the ground.

7. See LUBRICATION AND MAINTENANCE GUIDE for correct tire inflation.





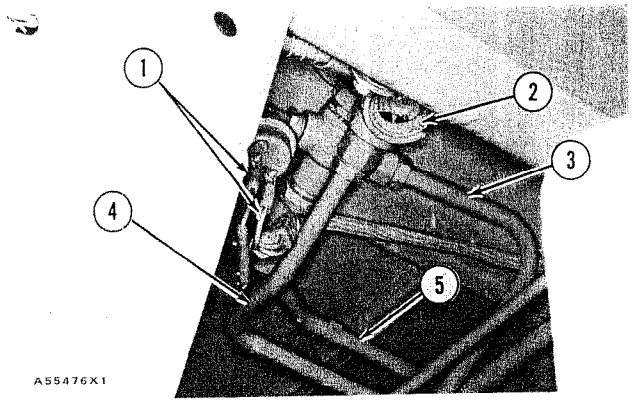


BRAKE CONTROL VALVES

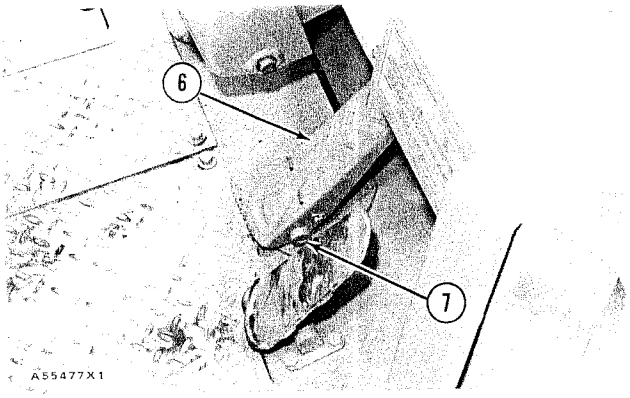
REMOVE BRAKE CONTROL VALVES 4265-11

⚠ WARNING

Open the drain valve on the air tank and remove the pressure from the air system before any lines are disconnected.

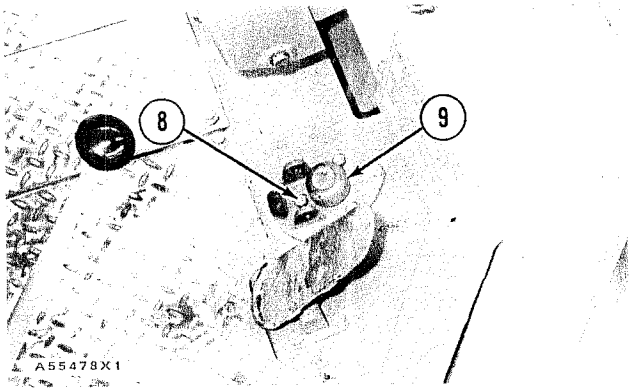


NOTE: The right brake control valve is shown, use the same procedure for the left brake control valve.



1. Put identification on electric wires (1) as to their location and disconnect them from the solenoid.

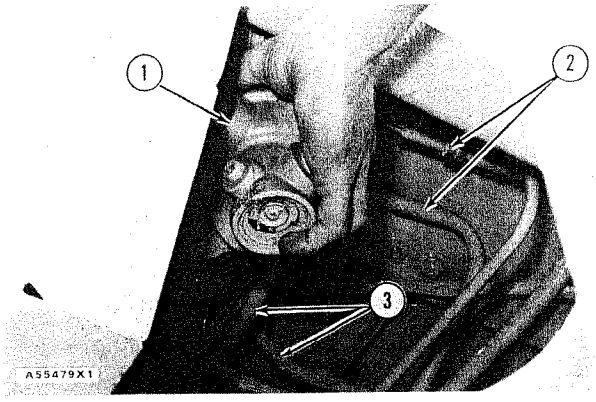
2. Disconnect the four air lines (3), (4), (5) and (one not shown) from valve assembly (2).



3. Remove the pin that holds pin (7). Remove pin (7) and treadle assembly (6).

4. Remove boot (9) from the valve assembly. Remove the three bolts (8) and remove the valve assembly from the bottom of the floor plate.

INSTALL BRAKE CONTROL VALVES 4265-12



1. Put valve assembly (1) in position and install the three bolts that hold it in position.

2. Connect air lines (2) and (3) to valve assembly (1).

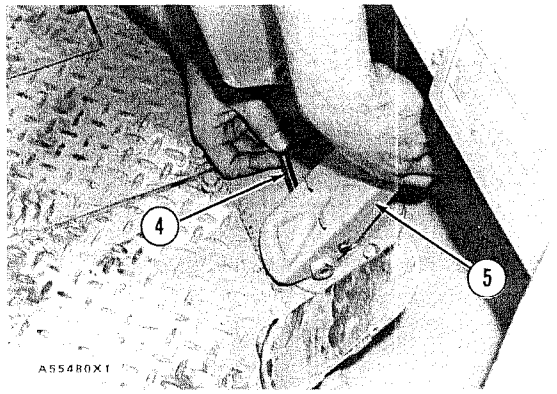
3. Connect the electric wires to their correct location on the solenoid.

BRAKE CONTROL VALVES

4. Install the boot on the valve assembly.

5. Put treadle assembly (5) in position and install pin (4). Install the pin that holds pin (4).

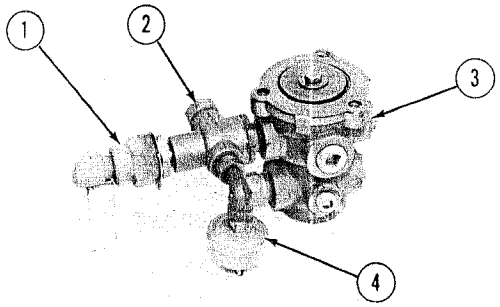
6. Start the engine and inspect the system for leaks.



DISASSEMBLE BRAKE CONTROL VALVES 4265-15

	Tools Needed	A
1P1861	Pliers	1

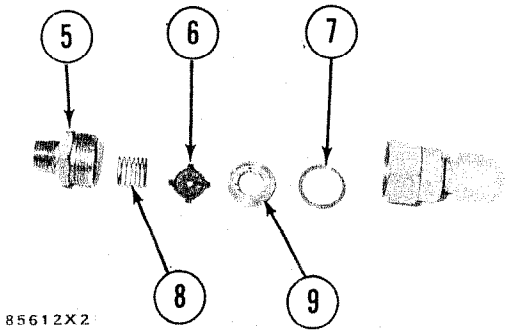
start by:
a) remove brake control valves



NOTE: Steps 1, 2 and 3 are for the right side brake control valve only.

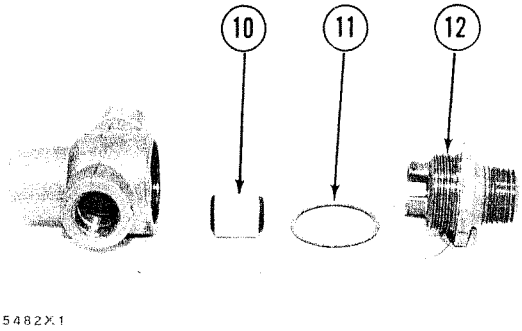
1. Remove stop light switch (4) and the fitting from double check valve (2). Remove check valve (1) and double check valve (2) from valve body (3).

2. Remove cap (5), spring (8), disc (6), seat (9) and washer (7) from the check valve.



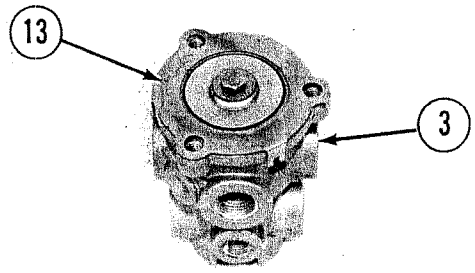
NOTE: The parts of check valve (1) can not be ordered separately. If the parts have wear or damage a replacement of the valve is necessary.

3. Remove cap (12), gasket (11), retainer and seat assembly (10) from the double check valve.



BRAKE CONTROL VALVES

4. Remove retainer (13) from valve body (3).



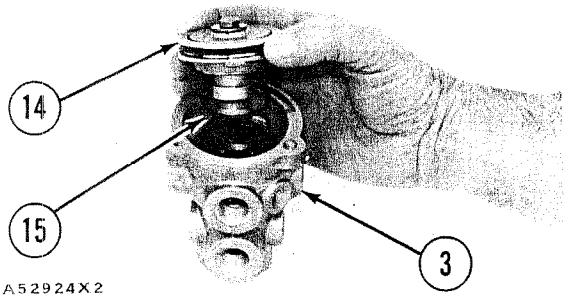
A52923X2

5. Remove piston assembly (14) and spring (15) from brake valve body (3).

6. Remove O-ring seal (19), bolt (17), washer (18), seat (16) and spring (not shown) from piston body (20).

⚠ WARNING

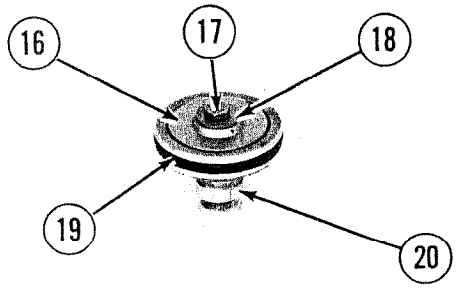
Spring on valve assembly (23) is under compression.



A52924X2

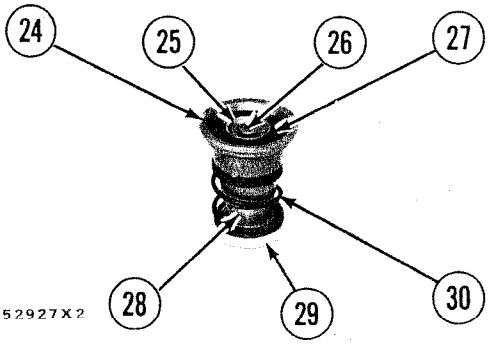
7. Turn the brake valve body over as shown. Remove ring (21) with tool (A). Remove washer (22) and valve assembly (23).

8. Twist valve (28) and pull it away from seat (24). Remove spring (30), retainer (29) and O-ring seal (not shown) from valve (28).



A52925X2

9. Remove screw (26), washer (25), diaphram (27) and spring (not shown) from seat (24).



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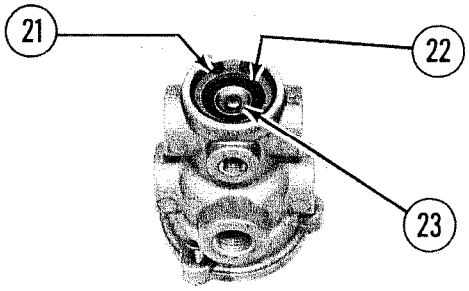

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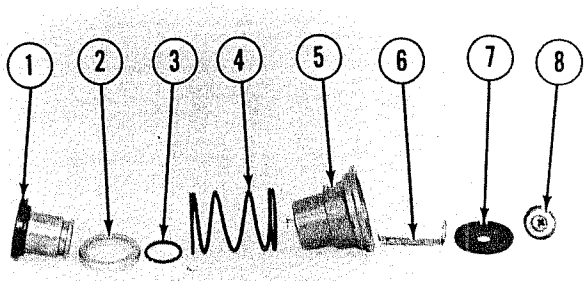
BRAKE CONTROL VALVES

ASSEMBLE BRAKE CONTROL VALVES 4265-16

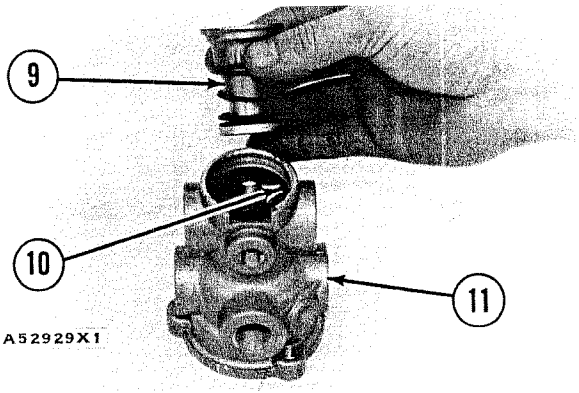
	Tools Needed	A
1P1861	Pliers	1



A52928X1

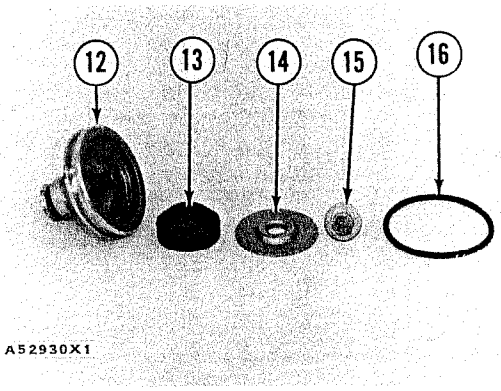
1. Clean all metal parts in nonflammable solvent.

2. Install spring (6), diaphram (7), the washer and screw (8) in the large end of seat (5).



A52929X1

3. Install retainer (2), O-ring seal (3) and spring (4) on valve (1). Push the valve in the small end of seat (5) until spring (6) holds the valve in the seat.



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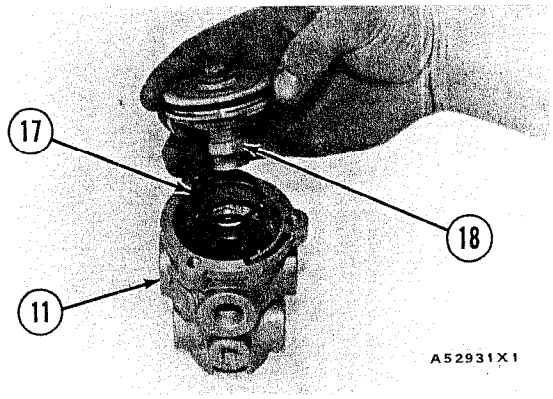
4. Install O-ring seal (10) and valve assembly (9) in brake valve body (11). Put the washer in position and use tool (A) to install the ring that holds valve assembly (9) in position.



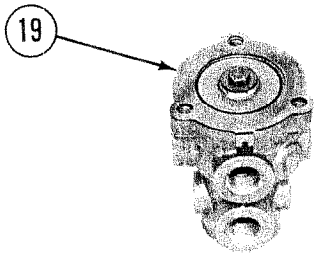
A52931X1

5. Install rubber spring (13), seat (14), the washer and bolt (15) in piston body (12). Install O-ring seal (16) on the piston body.

6. Install spring (17) and piston assembly (18) into brake valve body (11).

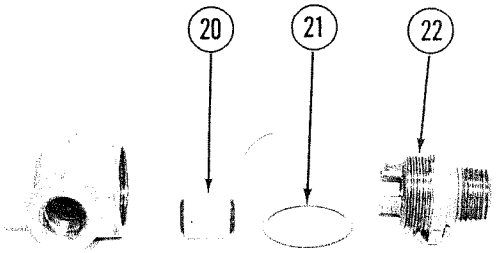
BRAKE CONTROL VALVES

7. Push down on the piston assembly and install retainer (19).



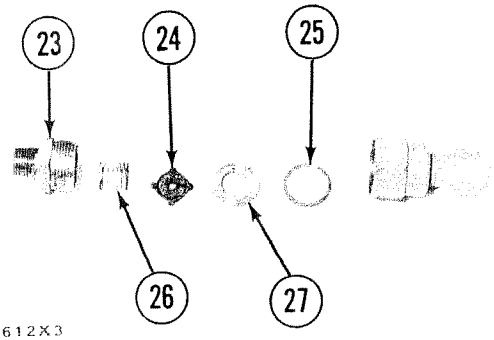
A52932X1

8. Install retainer and seat assembly (20), gasket (21) and cap (22) in the double check valve.



9. Install washer (25), seat (27), disc (24), spring (26) and cap (23) in the check valve.

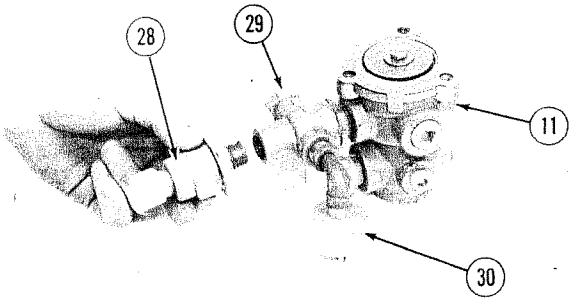
A55482X2



10. Install double check valve (29) on valve body (11). Install stop light switch and the fitting on double check valve (29).

85612X3

11. Install check valve (28) on double check valve (29).



A55483X1

end by:

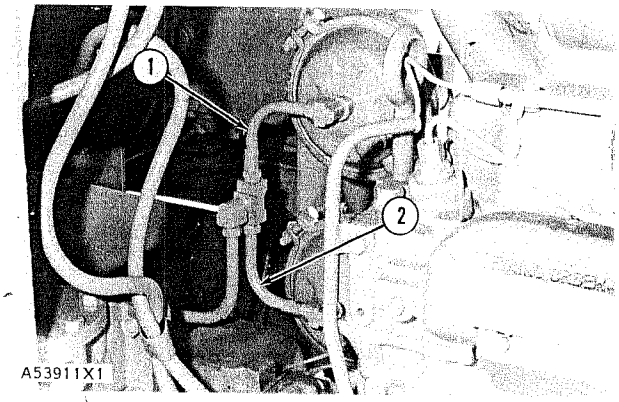
a) install brake control valves

BRAKE MASTER CYLINDER ACTUATORS

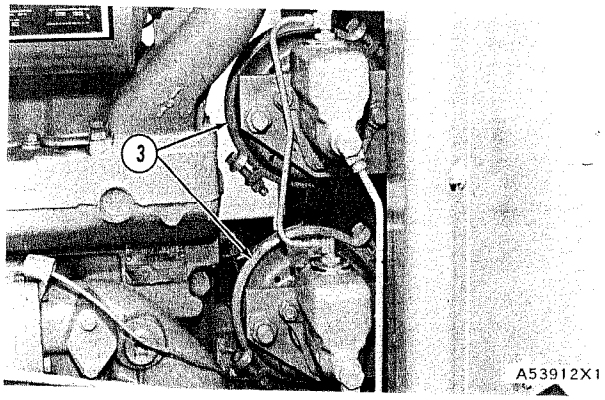
REMOVE BRAKE MASTER CYLINDER ACTUATORS 4266-11

⚠ WARNING

Open the drain valve on the air tank and remove the air pressure from the system before any lines are disconnected.

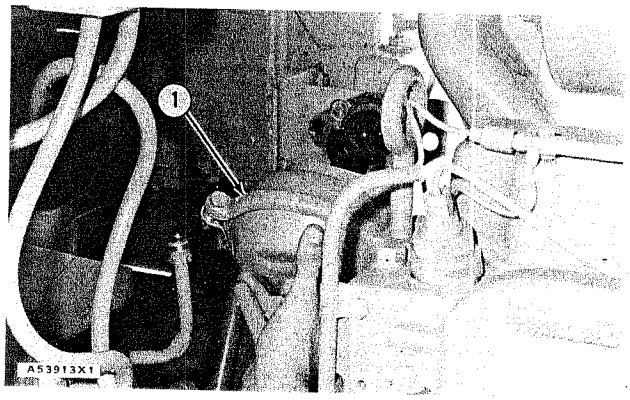


1. Remove tube assemblies (1) and (2) from the machine as a unit.

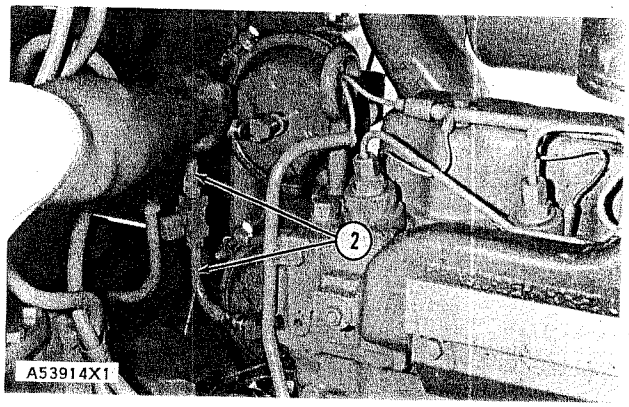


2. Remove the nuts that hold actuators (3) in position and remove.

INSTALL BRAKE MASTER CYLINDER ACTUATORS 4266-12



1. Put actuator (1) in position. Make sure the rod assembly is engaged correctly in the master cylinder and install the nuts that hold it.



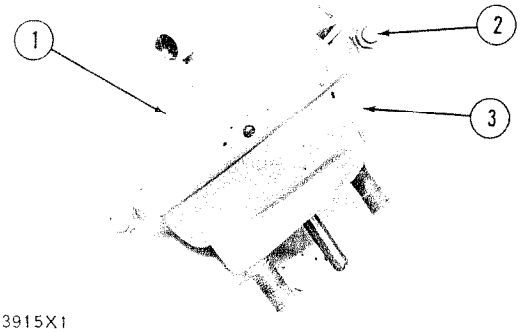
2. Install tube assemblies (2) on the machine.

BRAKE MASTER CYLINDER ACTUATORS

DISASSEMBLE BRAKE MASTER CYLINDER ACTUATORS 4266-15

start by:
a) remove brake master cylinder actuators

1. Put marks on plate assembly (1), band assembly (2) and chamber assembly (3) for correct alignment at assembly.

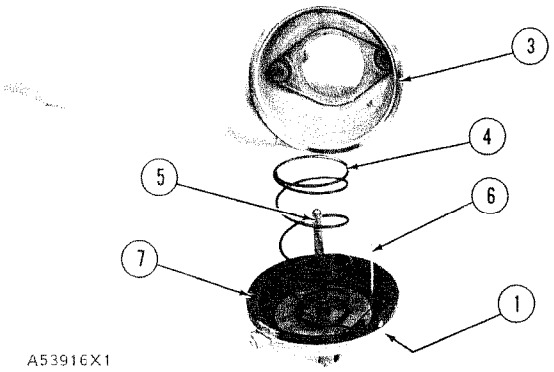


A53915X1

⚠ WARNING

Plate assembly (1) and chamber assembly (2) have spring tension on them. Hold these parts together when band assembly (2) is removed.

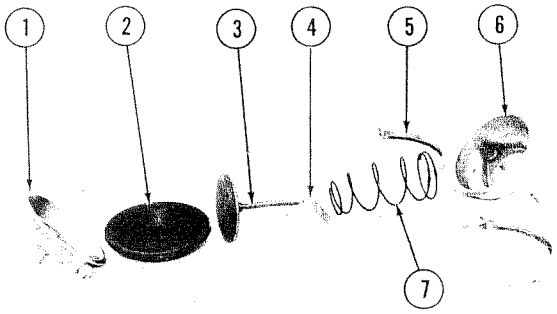
2. Remove the bolts and nuts to remove band assembly (2).
3. Remove chamber assembly (3), spring (4), rod assembly (5) and diaphram (7) from plate assembly (1).
4. Remove indicator (6) from rod assembly (5).



A53916X1

ASSEMBLE BRAKE MASTER CYLINDER ACTUATORS 4266-16

1. Install diaphram (2) in plate assembly (1).
2. Install indicator (4) on rod assembly (3). Put rod assembly (3) in position on diaphram (2) and install spring (7) on the rod assembly. Make sure the small end of the spring is engaged correctly with the base of indicator (4).
3. Make an alignment of the marks on plate assembly (1) and chamber assembly (6). Make sure indicator (4) is through the hole in the chamber assembly and put the unit under compression.
4. Install band assembly (5) to hold the unit together.



A53917X1

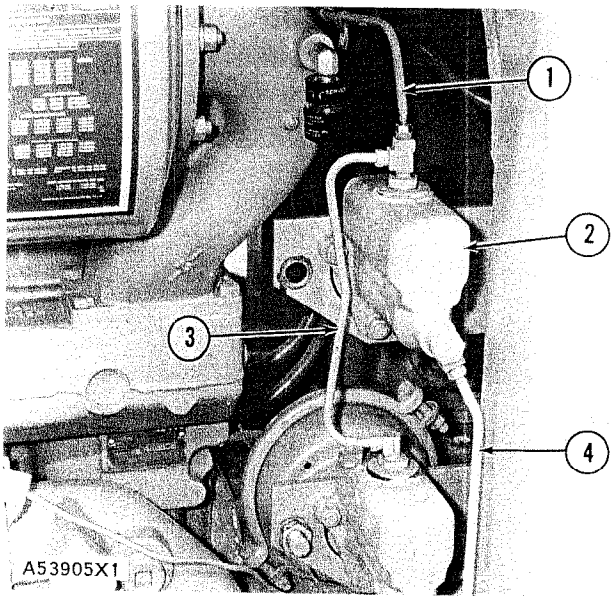
end by:
a) install brake master cylinder actuators

BRAKE MASTER CYLINDERS

REMOVE BRAKE MASTER CYLINDERS 4258-11

start by:
a) remove brake master cylinder actuators

1. Remove the cap from the main brake fluid reservoir. Remove tube assembly (1) from the machine and drain the reservoir.
2. Remove tube assembly (3) from the machine.
3. Remove the cap from master cylinder (2). Disconnect brake line (4) and drain the master cylinder.
4. Remove the bolts and nuts that hold master cylinder (2) in position and remove the master cylinder.

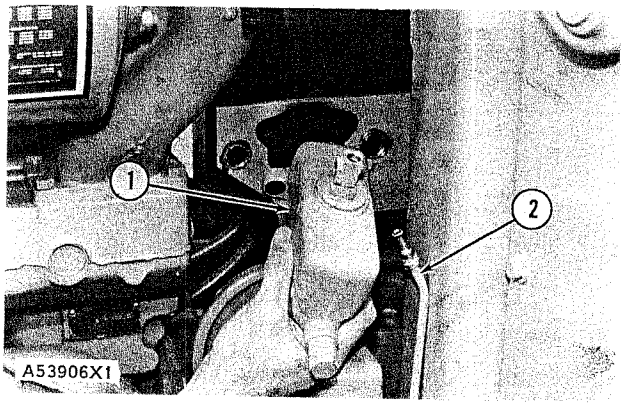


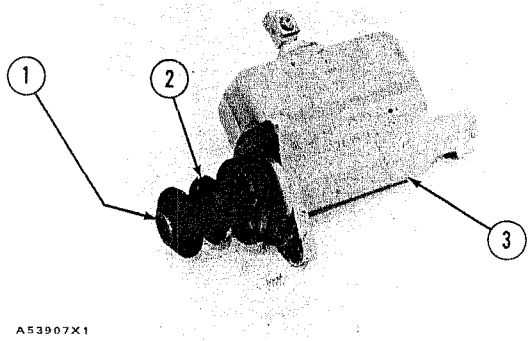
INSTALL BRAKE MASTER CYLINDERS 4258-12

	Tools Needed	A
9S9149	Wrench	1

1. Install the cap on master cylinder (1) and put it in position on the machine. Install the bolts and nuts that hold it.
2. Connect brake line (2) to the master cylinder.
3. Install the tube assembly that connects the two master cylinders.
4. Install the tube assembly that connects the brake fluid reservoir to the master cylinders.

end by:
a) install brake master cylinder actuators
b) use tool (A) and remove (bleed) the air from the brake system (See HYDRAULIC BRAKE SYSTEM SERVICING in TESTING AND ADJUSTING)





DISASSEMBLE BRAKE MASTER CYLINDERS 4258-15

start by:
a) remove brake master cylinders

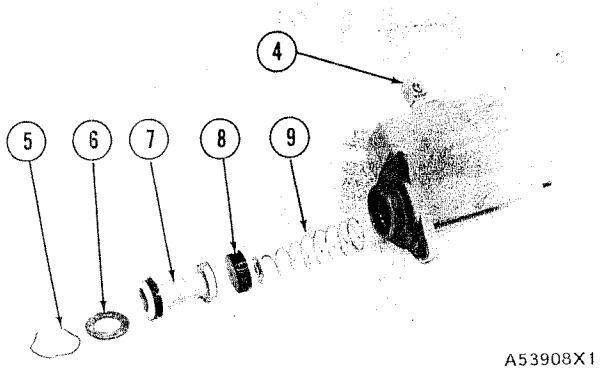
1. Remove boot (2) from cylinder assembly (3). Remove retainer (1) from boot (2).

BRAKE MASTER CYLINDERS

2. Remove lockwire (5), plate (6), piston assembly (7), cup (8) and spring assembly (9) from the cylinder assembly.

3. Remove fitting (4), the plug assembly and gasket from the cylinder assembly.

NOTE: A master cylinder rebuild kit is available. The kit includes a gasket, boot, seal, cup, piston assembly and lockwire. When the master cylinder is disassembled for service, always install a repair kit.



A53908X1

ASSEMBLE BRAKE MASTER CYLINDERS 4258-16

NOTE: When the hydraulic brake system is serviced use caution to prevent introduction of foreign material into the brake fluid. Damaged or worn rubber parts are an indication of other fluids in the brake system. Flush and clean the system with denatured alcohol or clean brake fluid.

1. Put clean brake fluid on the inside parts of the master cylinder at assembly.

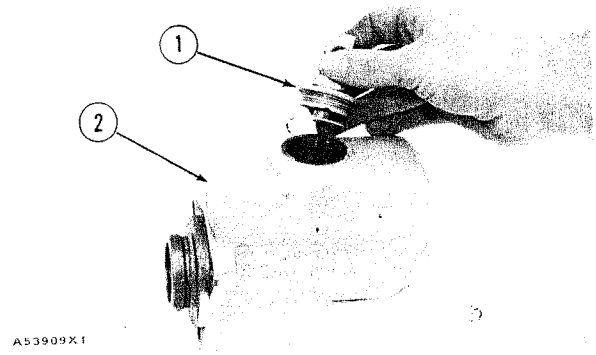
2. Inspect the bore in the master cylinder. Use a brake cylinder hone to remove any rough areas or corrosion in the master cylinder bore. If the cylinder bore has deep scratches a replacement of the master cylinder is needed.

3. Make sure the master cylinder bore is clean.

4. Install the gasket and plug assembly (1) in cylinder assembly (2).

5. Install spring (7) as shown. Install cup (6) with the open end toward spring (7).

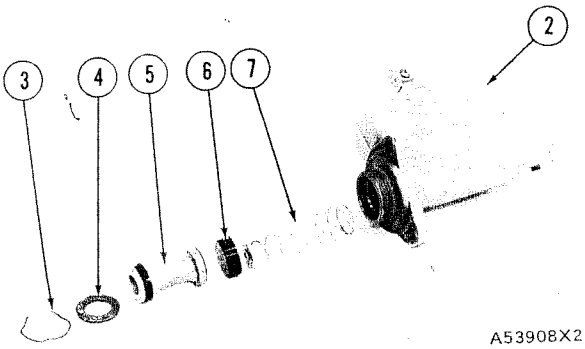
6. Install piston assembly (5) as shown. Install plate (4) and lockwire (3).



A53909X1

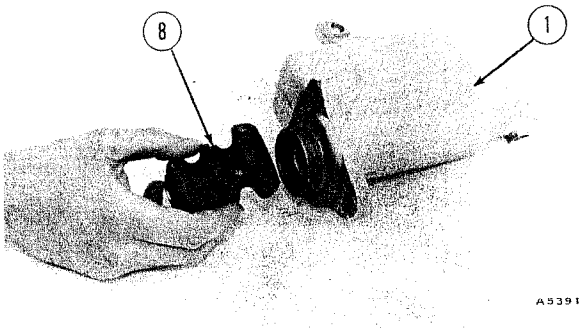
CAUTION

Make sure lockwire (3) is fitted correctly in the groove of the master cylinder and piston assembly (5) returns against plate (4).



A53908X2

7. Install the retainer in boot (8) and install the boot on cylinder assembly (1).



A53910X1

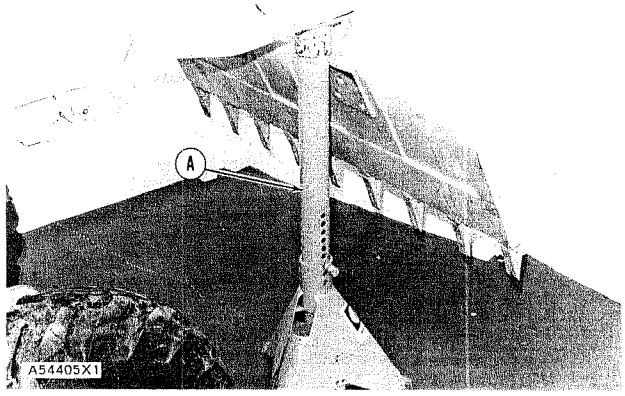
end by:
a) install brake master cylinders

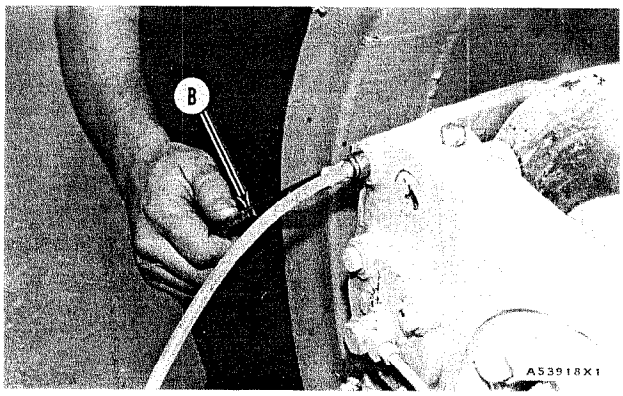
WHEEL BRAKE LININGS

REMOVE WHEEL BRAKE LININGS 4254-11

	Tools Needed	A	B	C
8S7630	Stand	1		
8S7641	Tube	1		
8S8048	Saddle	1		
8S7615	Pin	1		
9S9149	Wrench		1	
FT1048	Brake Anchor Pin Puller			1

1. Move the machine until the valve stem opening in the tire rim is in alignment with the top anchor pin in the brake head assembly.
2. For the front wheel brake linings, lift the bucket and put tooling (A) in position under the lift arm for support. Move the control lever and lower the weight of the lift arms and bucket on tooling (A) as shown.
3. Open the bleed valves with tool (B) to release any pressure on the brake pistons. Push the pistons into the head assembly to remove the pressure on the brake linings.

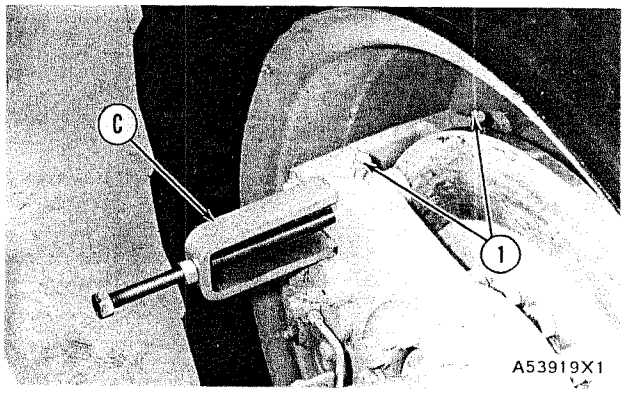




CAUTION

To prevent damage to pistons and seals, do not make an application of the brakes when the brake linings are removed. The pistons must not move out of their bores as the brake linings are removed. If the pistons and seals move out of their bores, the brake head assembly must be removed to install the pistons.

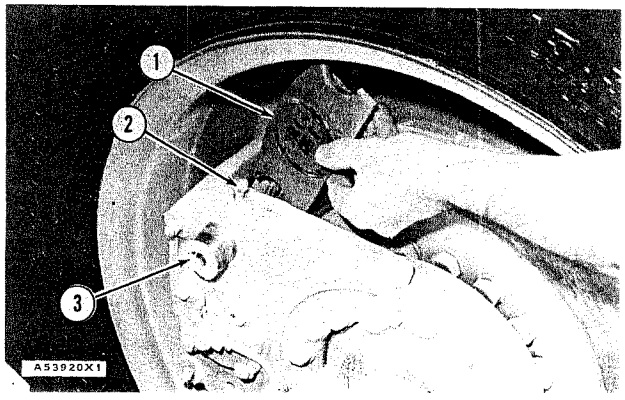
4. Loosen bolts (1) that hold the anchor pins in position.
5. If necessary use tool (C) to pull the anchor pins out of the head assembly .75 in. (19.1 mm) approximately.
6. Remove the brake linings.



INSTALL WHEEL BRAKE LININGS 4254-12

	Tools Needed	A	B	C
8S7630	Stand	1		
8S7641	Tube	1		
8S8048	Pin	1		
8S7615	Saddle	1		
9S9149	Wrench		1	
FT1048	Brake Anchor Pin Puller			1

1. Push the brake pistons into the brake head assembly. This gives clearance for the new brake linings.
2. Install brake linings (1) in the brake head assembly.



WHEEL BRAKE LININGS, BRAKE HEAD ASSEMBLIES

3. Push anchor pins (3) into the brake head assembly.

4. Make sure there is .010 in. (.25 mm) or more distance between the anchor pins and wheel disc. Tighten bolts (2) to hold the anchor pins.

REMOVE AND INSTALL BRAKE HEAD ASSEMBLIES 4256-10

	Tools Needed	A
9S9149	Wrench	1

start by:
a) remove rim and tire

1. Disconnect brake line (2) from brake head assembly (1).
2. Remove the bolts that hold the top anchor pins in position.
3. Install two 3/8"-16 NC forged eyebolts in the brake head assembly and fasten a hoist as shown.

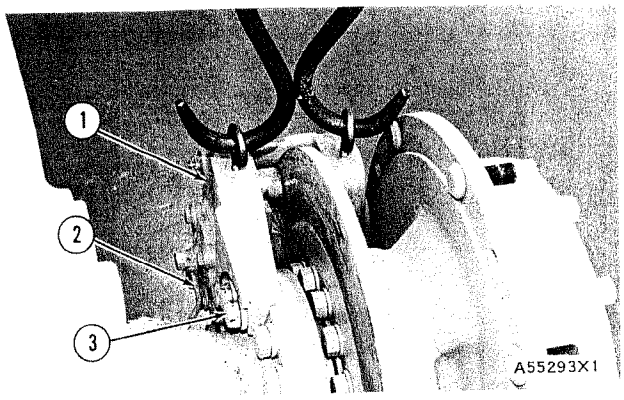
NOTE: If necessary, push the brake linings from the wheel disc to remove the brake head assembly.

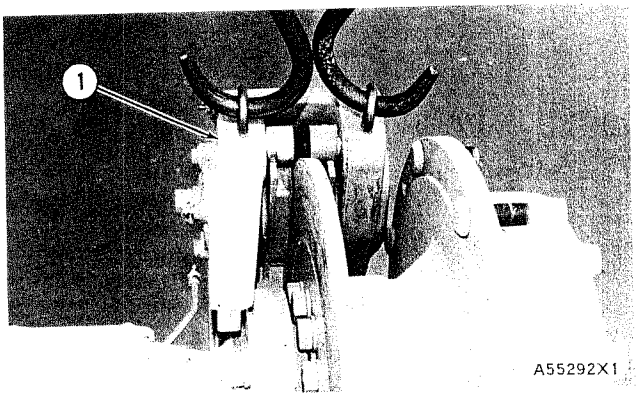
4. Remove bolts (3) that hold the brake head assembly to the axle housing. Remove brake head assembly (1). The weight of the brake head assembly is:
920-60 lb. (27 kg)
930-90 lb. (41 kg)

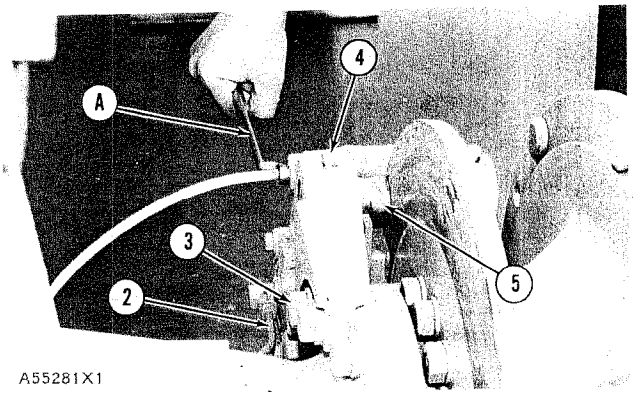
CAUTION

The two anchor pins and brake linings are free to fall out of the brake head assembly and must be held in position when it is removed or installed.

5. Fasten a hoist to brake head assembly (1) with two 3/8"-16 NC forged eyebolts.
6. Put the brake head assembly in position on the machine and tighten bolts (3) to a torque of 225 ± 25 lb.ft. (300 ± 35 N·m).
7. Remove the forged eyebolts and hoist from the brake head assembly.
8. Push anchor pins (5) into the brake head assembly. Make sure there is .010 in. (.25 mm) or more distance between the anchor pins and wheel disc. Install bolts (4) to hold the anchor pins.
9. Connect brake line (2) to the brake head assembly.
5. Use tool (B) and remove (bleed) the air from the hydraulic brake system. See HYDRAULIC BRAKE SYSTEM SERVICING in TESTING AND ADJUSTING.
6. For the front brake linings, remove tooling (A) and lower the bucket to the ground.





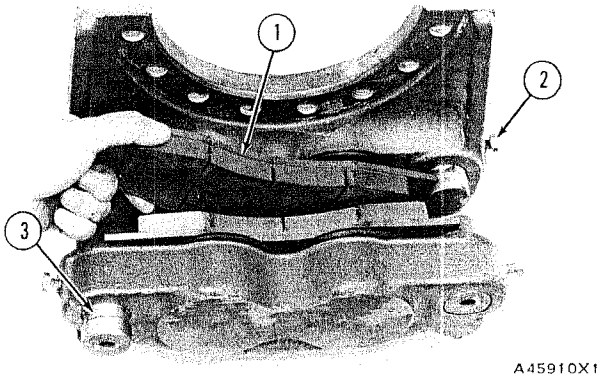


10. Use tool (A) and remove (bleed) the air from the hydraulic brake system. See HYDRAULIC BRAKE SYSTEM SERVICING in TESTING AND ADJUSTING.
end by:
a) install rim and tire

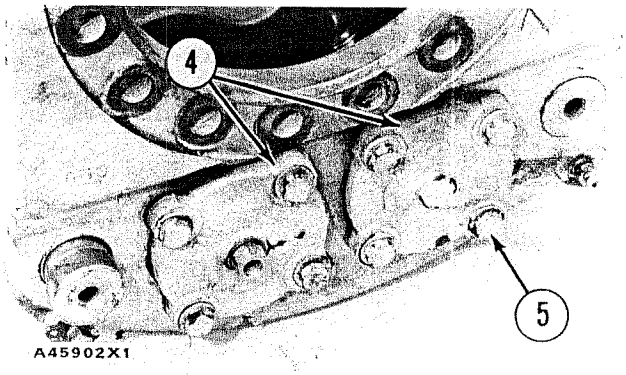
BRAKE HEAD ASSEMBLIES

DISASSEMBLE BRAKE HEAD ASSEMBLIES 4256-15

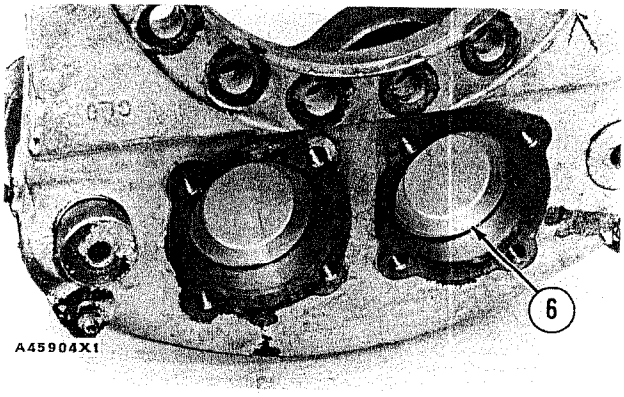
start by:
a) remove brake head assemblies



1. Loosen bolts (2) that hold pins (3) in position and push pins (3) out to remove brake linings (1).



2. Remove bolts (5) and caps (4).

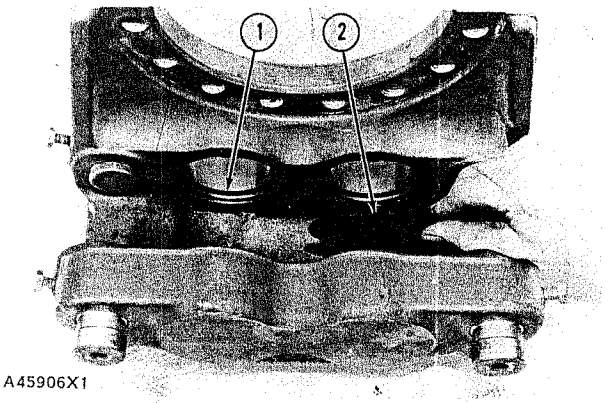


3. Remove four pistons (6) and the boots from the brake head assembly.

4. Remove the boots from the pistons and the seals from the piston bores.

ASSEMBLE BRAKE HEAD ASSEMBLIES 4256-16

	Tools Needed	A
5P3569	Piston Press	1
1P495	Drive Plate	1

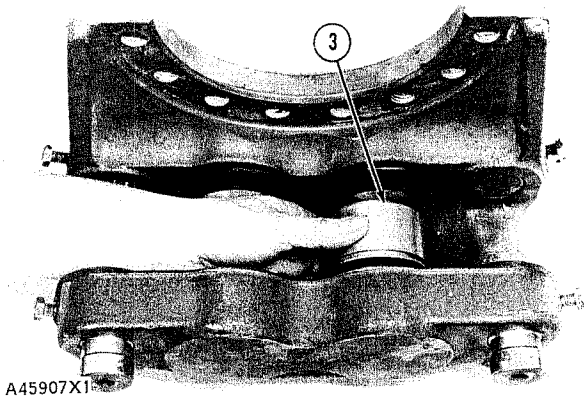


1. Install seals (1) in the four piston bores.

2. Install boots (2) in the piston bores with the lip of the boot in the groove of the bore.

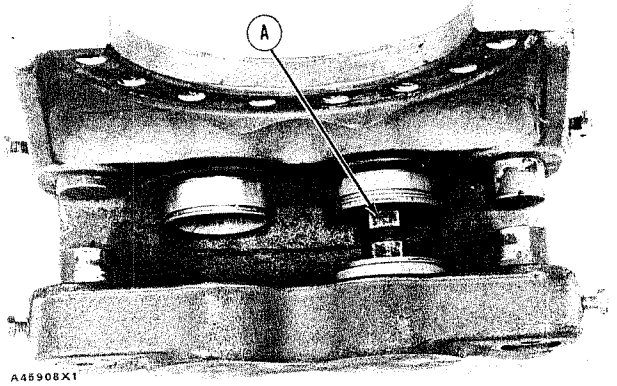
BRAKE HEAD ASSEMBLIES

3. Install the four pistons (3) in the bores of the brake head through the boots.

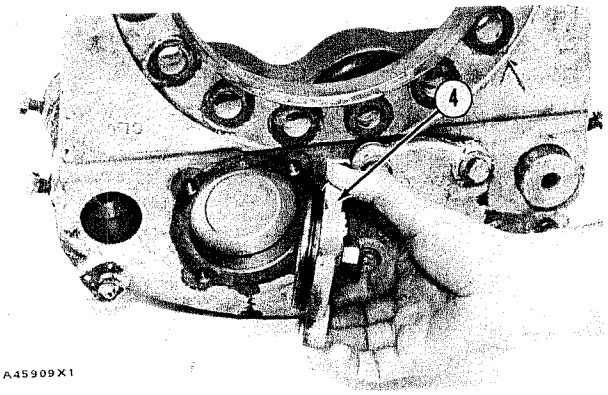


CAUTION: The ends of the pistons must be through the boots before the pistons are pushed into the bores or the damage to the boots will be the result.

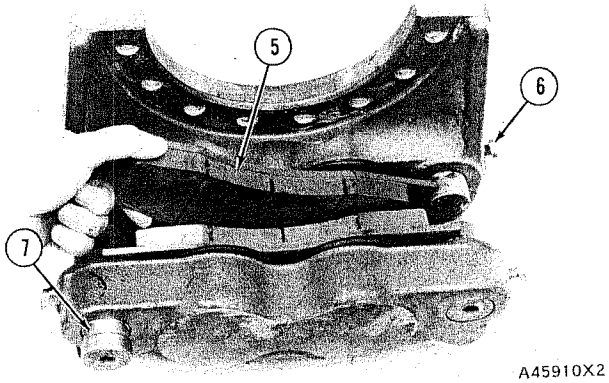
4. Use tooling (A) to push the pistons in the bores. Put the lip of the boots in the groove of the pistons.



5. Install the O-ring seals on the two caps (4) and install the caps on the brake head.



6. Put brake linings (5) in position and push pins (7) in to hold them. Tighten bolts (6) to hold the pins. end by:



a) install brake head assemblies

WHEEL BRAKE DISCS, EMERGENCY AND PARKING BRAKE CONTROL VALVE

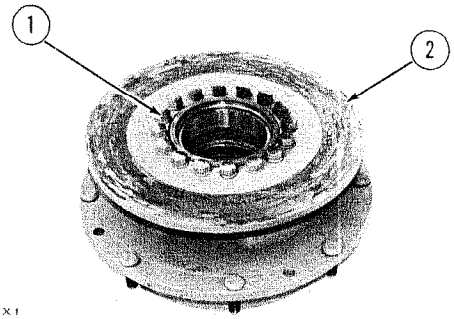
REMOVE AND INSTALL WHEEL BRAKE DISCS 4255-10

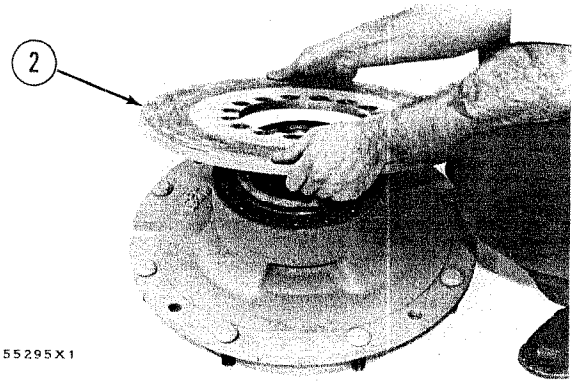
start by:
a) remove wheel assemblies, bearings and seals*

1. Remove bolts (1).
2. Remove wheel brake disc (2).
3. Put wheel brake disc (2) in position on the wheel assembly.
4. Install the bolts that hold the disc to the wheel assembly and tighten them to a torque of 195 ± 20 lb.ft. (265 ± 25 N·m).

end by:
a) install wheel assemblies, bearings and seals*

*These operations are in the POWER TRAIN DISASSEMBLY AND ASSEMBLY section.





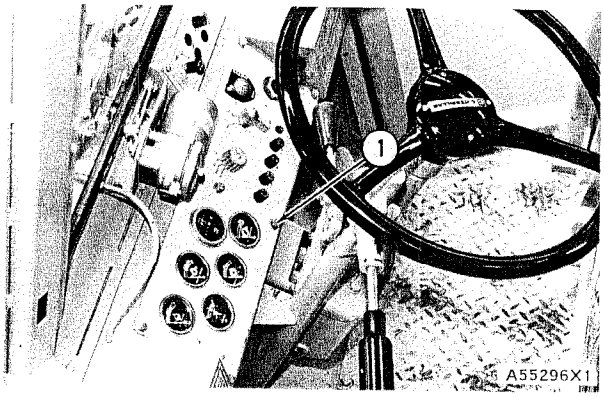
REMOVE EMERGENCY AND PARKING BRAKE CONTROL VALVE 4282-11

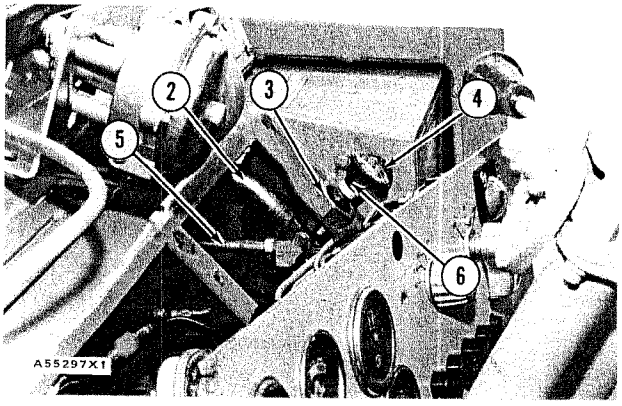
⚠ WARNING

Open the drain valve on the air tank and remove the air pressure from the system before any lines are disconnected.

CAUTION
The disconnect switch must be in the "OFF" position before the dash assembly is moved.

1. Remove the six bolts (1) that hold the dash assembly in position. Pull the dash assembly to the steering column.
2. Remove pin (6) from knob (4) and remove the knob from the valve.
3. Disconnect pipe (2) from the valve. Disconnect the air line (5) from the elbow on pipe (2).
4. Remove nut (3) and pull the valve out a small distance.
5. Put identification on the two wires as to their location on the air pressure indicator [found at the end of pipe (2)] and disconnect them.
6. Remove the valve and air pressure indicator as a unit.

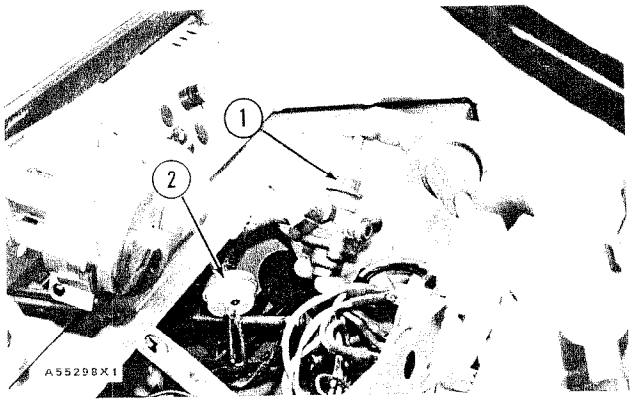




EMERGENCY AND PARKING BRAKE CONTROL VALVE

INSTALL EMERGENCY AND PARKING BRAKE CONTROL VALVE 4282-12

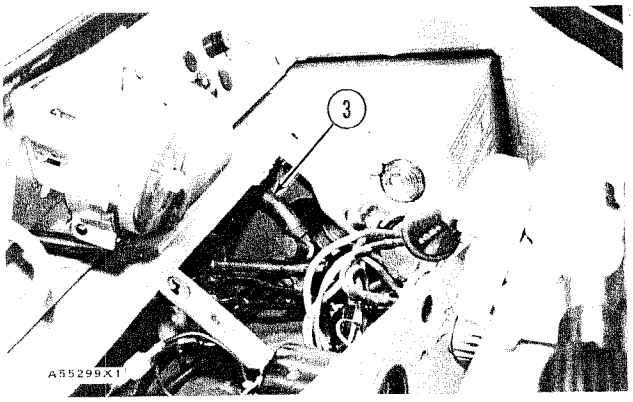
1. Put valve (1) and the air pressure indicator (2) in position on the machine.



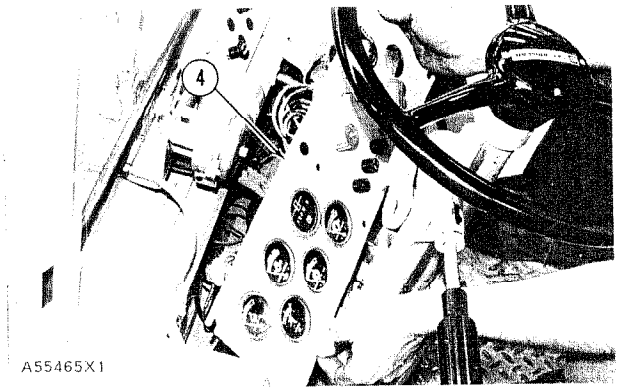
2. Connect the two electric wires to their correct location on air pressure indicator (2).

3. Install the nut to hold valve (1) in position. Install the knob and pin on the valve.

4. Connect air line (3) to the valve. Connect the second air line to the elbow for the air pressure indicator.

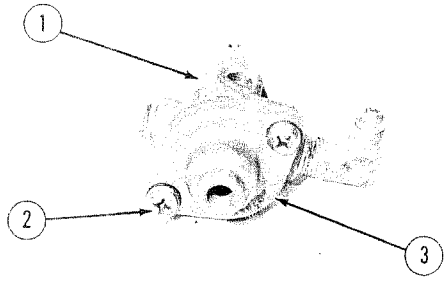


5. Put dash assembly (4) in position and install the six bolts to hold it.



DISASSEMBLE EMERGENCY AND PARKING BRAKE CONTROL VALVE 4282-15

start by:
a) remove emergency and parking brake control valve



1. Remove screws (2) from valve body (1). Remove cover (3).

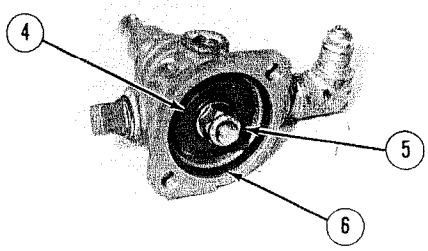
EMERGENCY AND PARKING BRAKE CONTROL VALVE

2. Remove nut (5) and washer from the shaft.

3. Remove rubber spacer (4) and ring (6) from the valve body.

4. Remove shaft (7) and the spring from valve body (1).

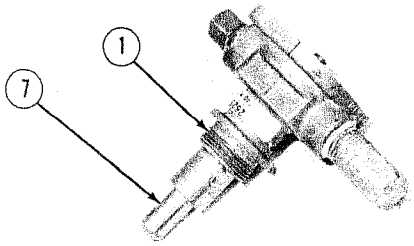
5. Remove seal (8) from shaft (7).



A49080X1

ASSEMBLE EMERGENCY AND PARKING BRAKE CONTROL VALVE 4282-16

1. Install seal (1) on shaft (5). Install spring (6) on the shaft and put shaft (5) in valve body (2).

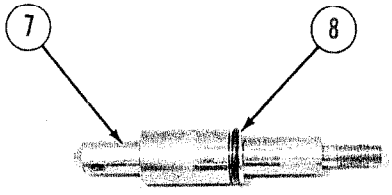


A49081X1

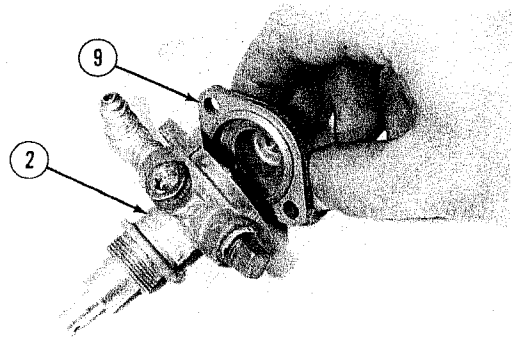
2. Install ring (7) in the valve body. Install spacer (3), washer (8) and nut (4) on the shaft. Hold the end of the shaft and tighten the nut.

3. Install cover (9) on valve body (2) and tighten the screws that hold it.

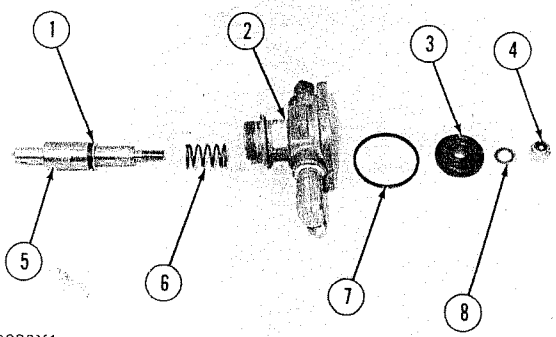
end by:
a) install emergency and parking brake control valve



A49082X1



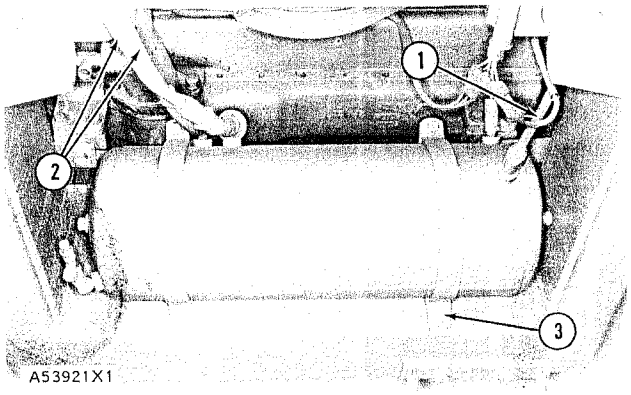
A49084X1



A49083X1

AIR TANK, EMERGENCY AND PARKING BRAKE CHAMBER

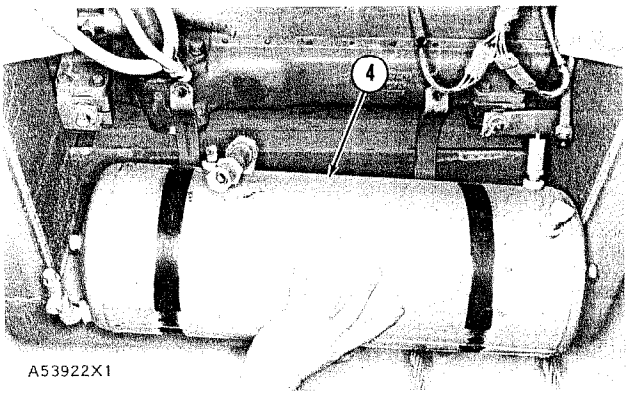
REMOVE AND INSTALL AIR TANK 4272-10



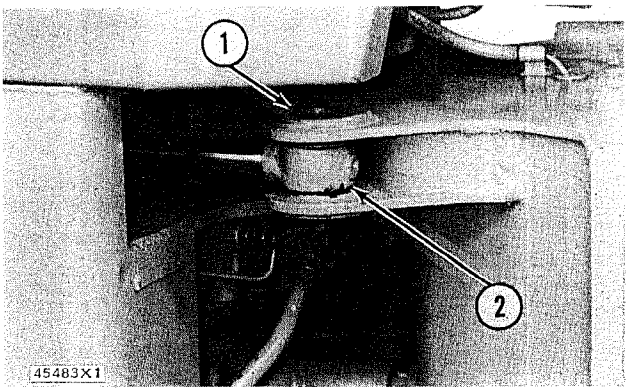
⚠ WARNING

Open the drain valve on the air tank and remove the air pressure from the system before any lines are disconnected.

1. Disconnect air lines (1) and (2) from the air tank.
2. Remove the four bolts (3) and remove the air tank.
3. Put air tank (4) in position. Install the clamps and bolts (3) to hold the air tank.
4. Connect air lines (1) and (2) to the air tank.



REMOVE AND INSTALL EMERGENCY AND PARKING BRAKE CHAMBER 4278 & 4262-10



1. Turn the machine all of the way to the left.
2. Lower the bucket to the ground and put blocks in front and behind the wheels.
3. Remove the bolt and washer from pin (1). Remove pin (1) from the top of the frame.
4. Turn the steering wheel to the right several turns to pull rod (2) into the steering cylinder.

⚠ WARNING

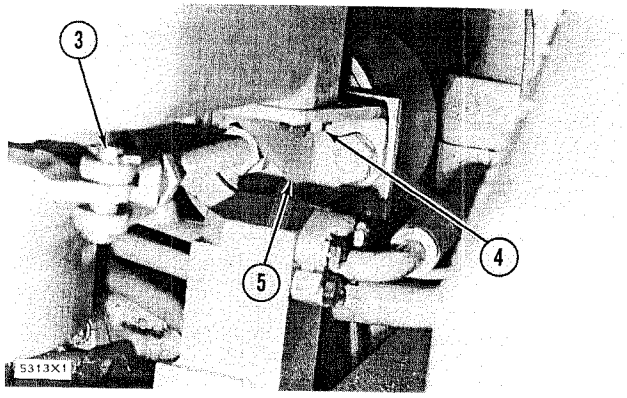
Keep hands away from the brake chamber area until the emergency brake has been released.

5. Push the emergency brake control (found on the dash) to release the emergency brake.

NOTE: Shop air pressure of 70 psi (4.9 kg/cm^2) or (480 kPa) can be used to activate the parking brake chamber.

EMERGENCY AND PARKING BRAKE CHAMBER

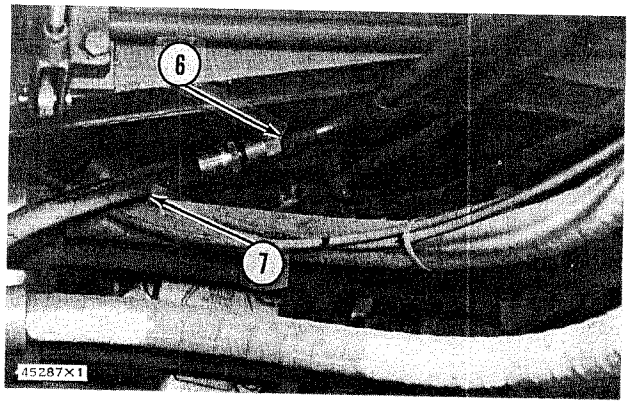
6. Remove the cotter pin and pin (3).



⚠ WARNING

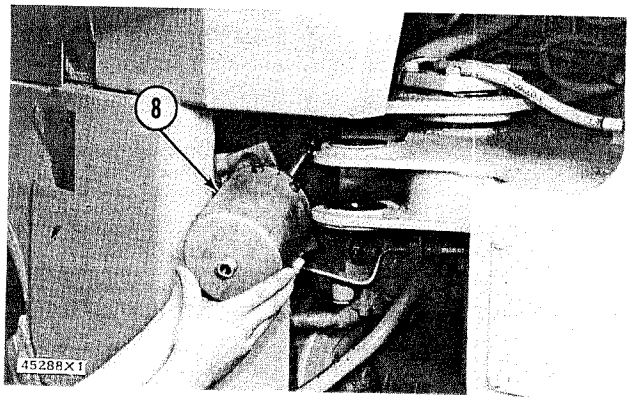
Open the drain valve on the air tank and remove the air pressure from the system before any air lines are disconnected.

7. Disconnect air line (7) for the brake chamber at tube connection (6). Remove air line (7) from the brake chamber.
8. Remove bolts (4) that hold bracket (5) in position.
9. Disconnect bracket (5) from brake chamber (8) and remove the air chamber and bracket from the machine.
10. Put brake chamber (8) in position between the frame and transmission. Connect bracket (5) to the brake chamber.
11. Install bolts (4) to hold bracket (5) in position.
12. Connect air line (7) to the brake chamber and tube connection (6).
13. Close the drain valve on the air tank. Start the engine to increase the pressure in the air system. Stop the engine.



⚠ WARNING

Keep hands away from the brake chamber area until the rod is in position.



14. Pull the emergency brake control (found on the dash) to push the rod into position. Install pin (3) and the cotter pin.
15. Turn the steering wheel several turns to move rod (2) into position. Make sure the washers are installed on both sides of the rod. Install pin (1) and the bolt and washer that hold the pin.
16. Make an adjustment of the emergency brake. See EMERGENCY AND PARKING BRAKE ADJUSTMENT in TESTING AND ADJUSTMENT in TESTNG AND ADJUSTING for this procedure.

EMERGENCY AND PARKING BRAKE CHAMBER

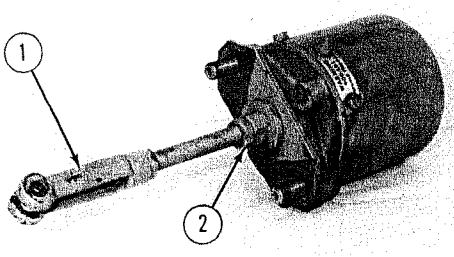
DISASSEMBLE EMERGENCY AND PARKING BRAKE CHAMBER 4278 & 4262-15

	Tools Needed	A
8H684	Ratchet Box Wrench	1
8F3672	Plate	1
8B7548	Puller Assembly	1
8B7549	Leg	2

start by:

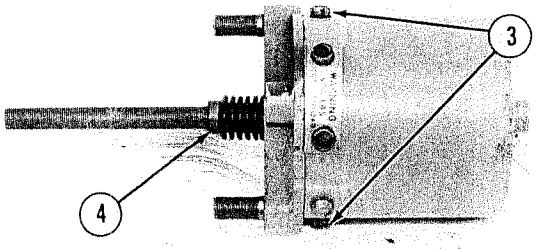
a) remove emergency and parking brake chamber

1. Remove yoke (1) and two adjusting nuts (2) from the rod.



A50055X1

2. Remove two bolts (3) one on each side of chamber. Remove retaining ring (4) from the rubber boot.



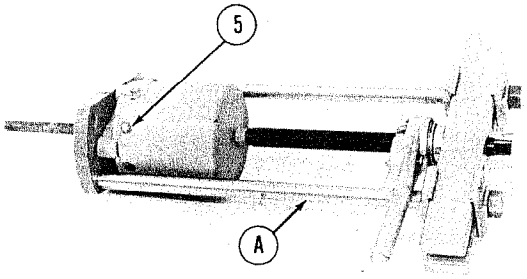
A06290X3

3. Install the chamber in tooling (A). Put force down on the top of the chamber with the puller screw. Remove the remainder of bolts (5) around the base of the chamber.

⚠ WARNING

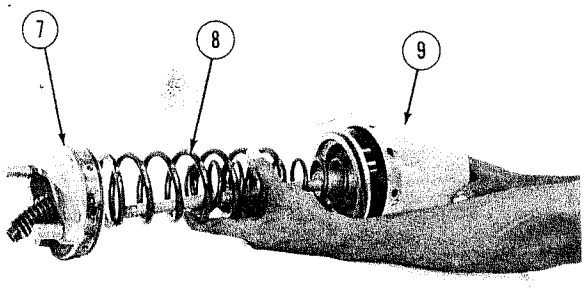
The large spring inside of chamber is under 900 lb. (4000 N) force.

4. Gradually release spring (6) as the puller screw is turned counterclockwise until all spring force is gone. Remove the chamber from tooling (A).

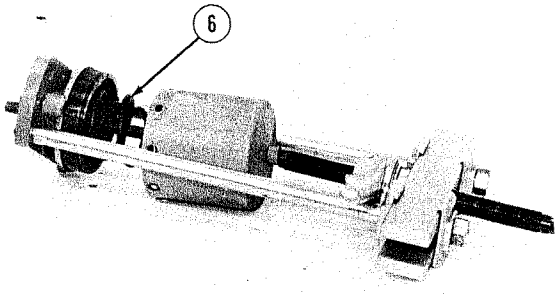


A06697X2

5. Remove base assembly (7), the spring and rod assembly (8) from cylinder (9).



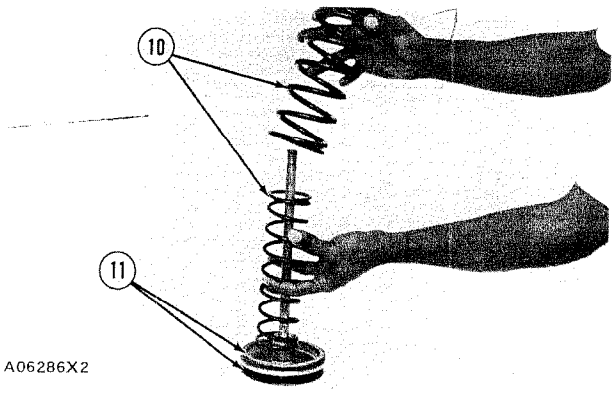
A06289X3



A06698X2

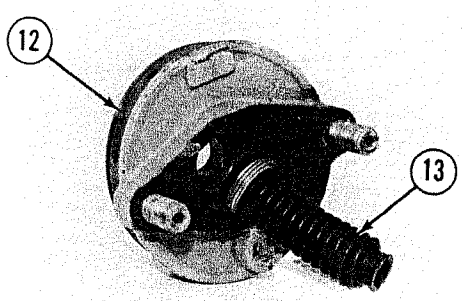
EMERGENCY AND PARKING BRAKE CHAMBER

6. Remove large and small springs (10) from the rod. Remove felt and rubber seals (11) from the bases of the rod. Inspect the two seals and make replacements if necessary.



A06286X2

7. Remove rubber boot (13) and O-ring seal (12) from the base assembly. Check the condition of the seal. If the seal has damage, use new parts for replacement.

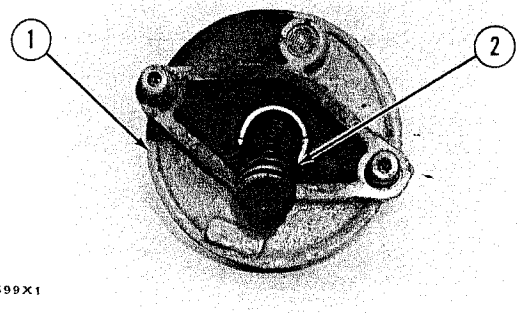


A06285X2

ASSEMBLE EMERGENCY AND PARKING BRAKE CHAMBER 4278 & 4262-16

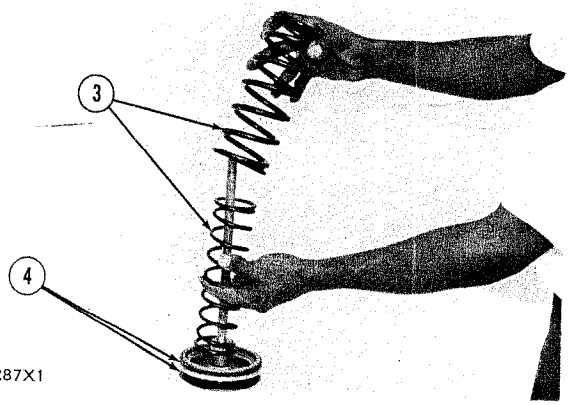
	Tools Needed	A
8H684	Ratchet Box Wrench	1
8F3672	Plate	1
8B7548	Puller Assembly	1
8B7549	Leg	2

1. Install a new O-ring seal (1) on base assembly. Install rubber boot (2) on base assembly.



A06699X1

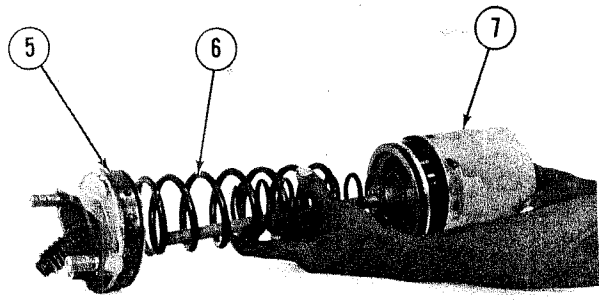
2. Install a new rubber and felt seal (4) on base of the rod. Install small and large springs (3) on the rod.



A06287X1

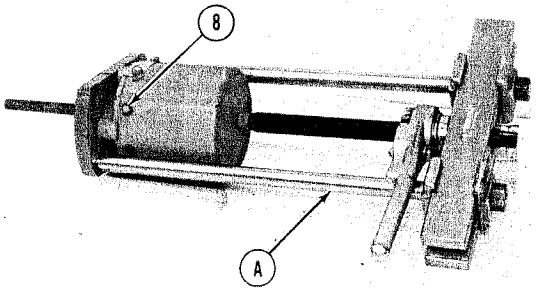
EMERGENCY AND PARKING BRAKE CHAMBER

3. Install base assembly (5), spring and rod assembly (6) into cylinder (7).



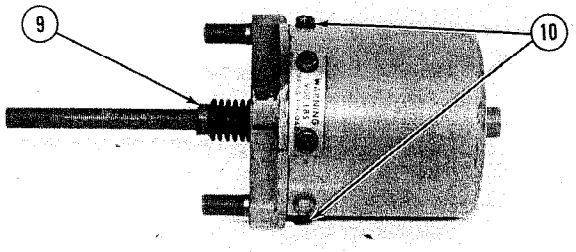
A06289X2

4. Put chamber into position in tooling (A) and put it under compression. Install all but two of the bolts (8). Remove chamber from tooling (A).



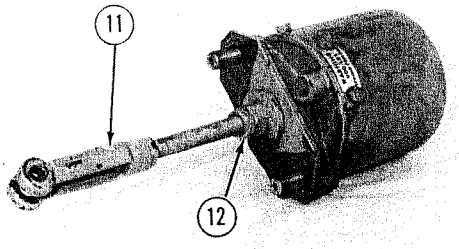
A06697X1

5. Install the other two bolts (10) on each side of chamber. Install retaining ring (9) on the rubber boot.



A06290X2

6. Install two adjusting nuts (12). Install yoke (11) on the rod.
end by:
a) install emergency and parking brake chamber



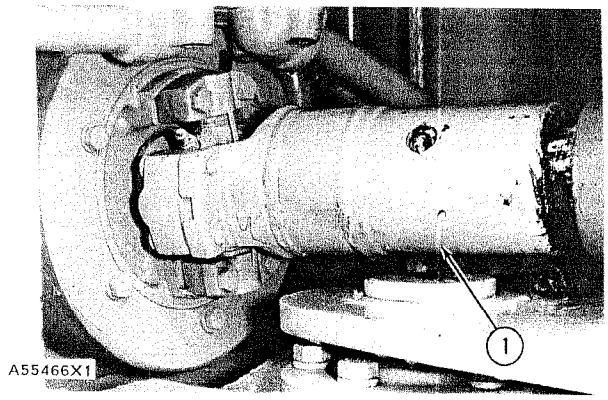
A50055X2

EMERGENCY AND PARKING BRAKE

REMOVE EMERGENCY AND PARKING BRAKE 4267-11

Tools Needed	A
Brake Pliers	1

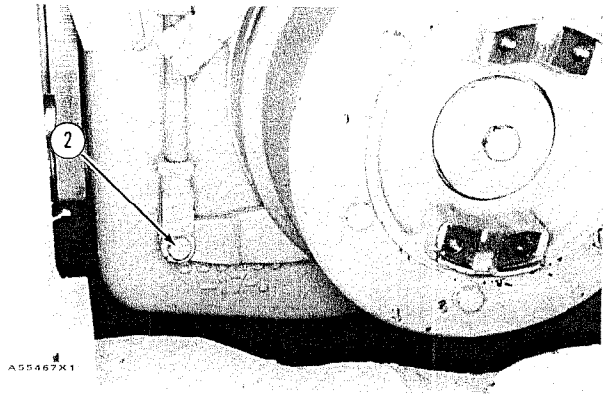
start by:
a) remove steering control valve



1. Turn the machine all of the way to the left. Put blocks in front and behind the wheels.

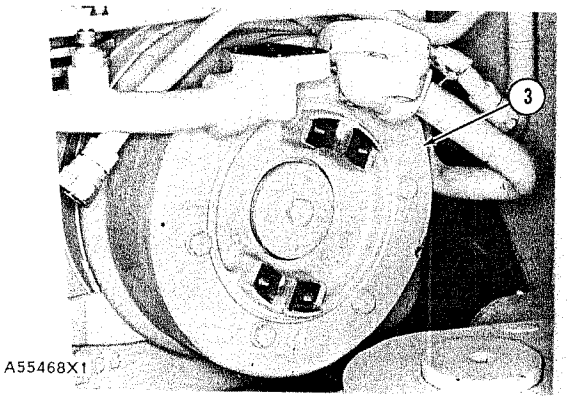
2. Drain the oil from the transmission. The capacity of the transmission is 6.75 U.S. gal. (25.5 litre).

3. Remove the bolts that hold each end of intermediate drive shaft (1) and remove the drive shaft.



⚠ WARNING

Keep hands away from the brake chamber area until the parking brake has been released.



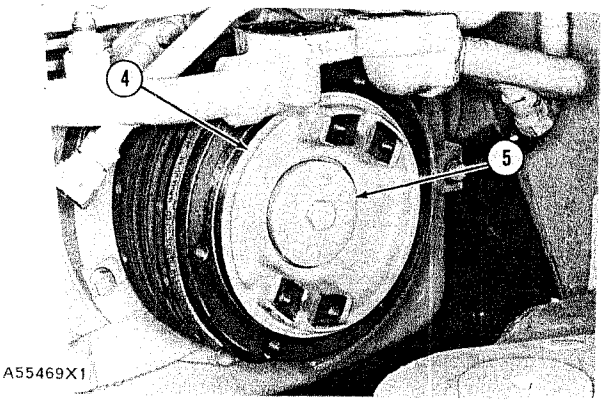
4. Push the emergency brake control (found on the dash) to release the parking brake.

NOTE: If necessary, use shop air pressure of 70 psi (4.9 kg/cm^2) or (480 kPa) to release the parking brake.

5. Remove the cotter pin and pin (2).

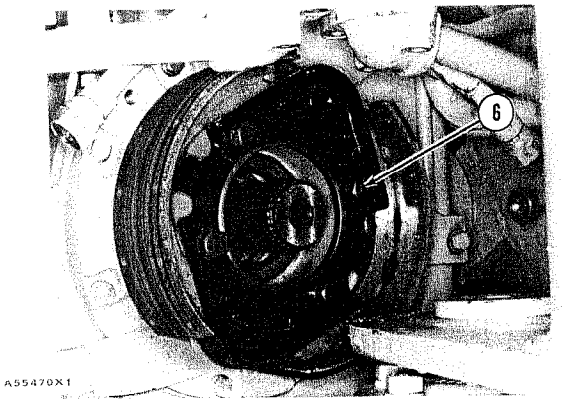
6. Remove the six bolts and remove brake drum (3).

7. Remove the bolt, retainer (5), the O-ring seal and flange (4).

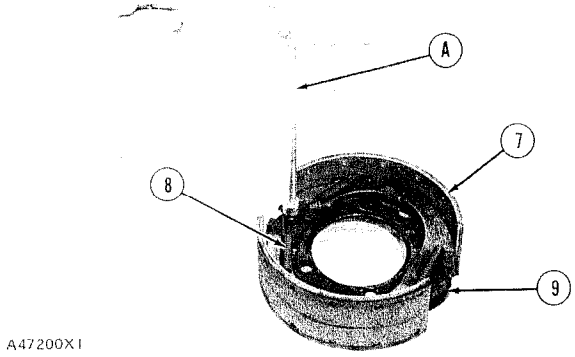


EMERGENCY AND PARKING BRAKE

8. Remove bolts (6) and remove the parking brake group and camshaft assembly from the machine.



9. Use tool (A) to remove springs (8). Remove brake shoes (7) from plate assembly (9).

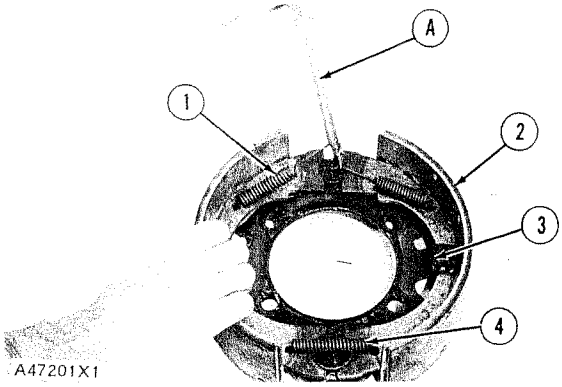


INSTALL EMERGENCY AND PARKING BRAKE 4267-12

Tools Needed	A
Brake Pliers	1

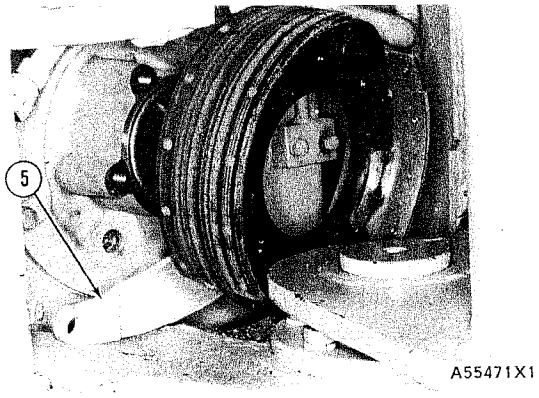
1. Connect brake shoes (2) together with spring (4).

2. Put brake shoes (2) in position on plate assembly (3).



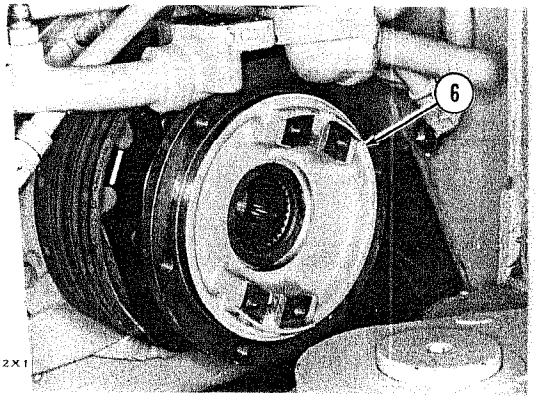
3. Use tool (A) to install two springs (1).

4. Put camshaft assembly (5) and the brake group in position on the output transfer gears case and install the four bolts and lockwashers to hold them.



EMERGENCY AND PARKING BRAKE

5. Put flange (6) in position.

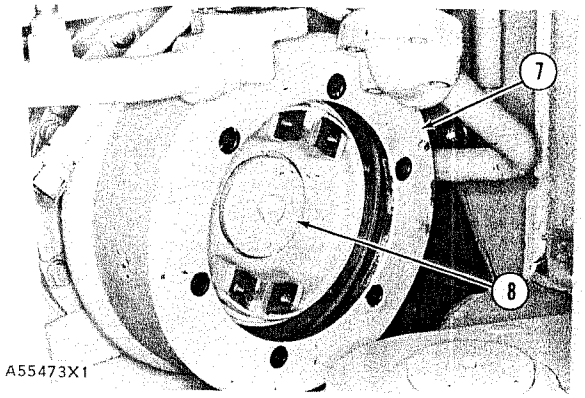


6. Install the O-ring seal, retainer (8) and bolt to hold flange (6) in position. Tighten the bolt to a torque of 80 ± 5 lb.ft. (110 ± 7 N·m).

7. Put brake drum (7) in position and install the six bolts to hold it. Tighten the bolts to a torque of 42 ± 5 lb.ft. (58 ± 7 N·m).

⚠ WARNING

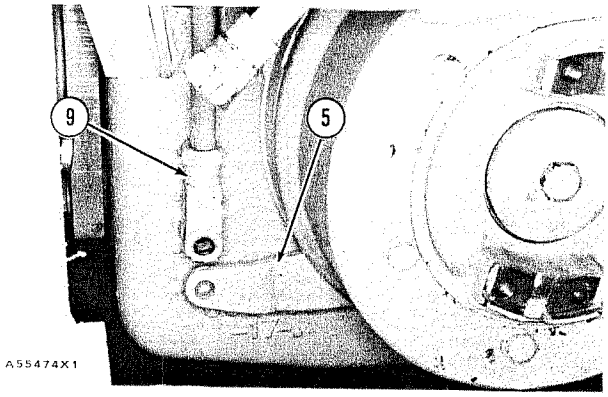
Keep hands away from the brake chamber area until the rod is in position.



8. If necessary, start the engine to increase the pressure in the air system. Stop the engine.

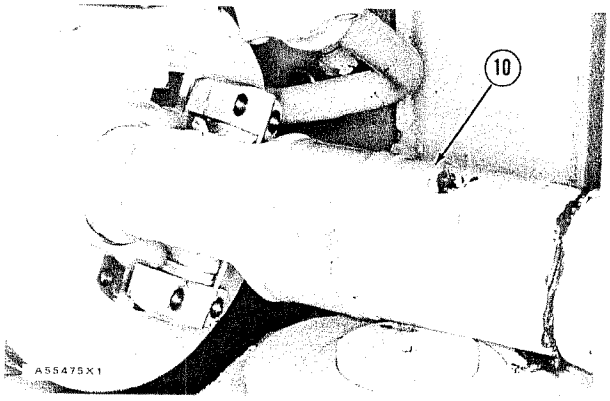
NOTE: Shop air pressure of 70 psi (4.9 kg/cm²) or (480 kPa) can be used to activate the parking brake chamber.

9. Pull the emergency brake control valve (found on the dash) to push the rod into position. Install the pin and cotter pin to hold rod end (9) to camshaft assembly (5).



10. Put intermediate drive shaft (10) in position and install the bolts to hold it. Tighten the bolts to a torque of 45 ± 5 lb.ft. (60 ± 7 N·m) with hardened washers.

11. Fill the transmission with oil to the correct level. Put clean grease in the universal joint and intermediate drive shaft.



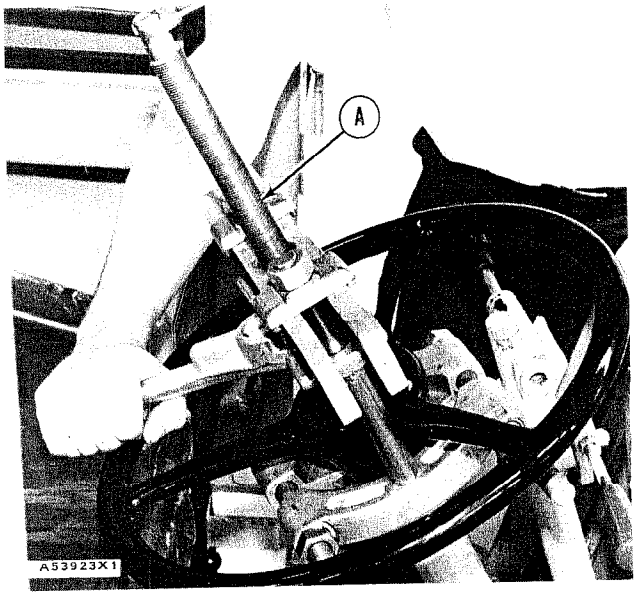
end by:

a) install steering control valve
b) make an adjustment of the parking brake (see EMERGENCY AND PARKING BRAKE ADJUSTMENT in TESTING AND ADJUSTING)

STEERING WHEEL, STEERING COLUMN

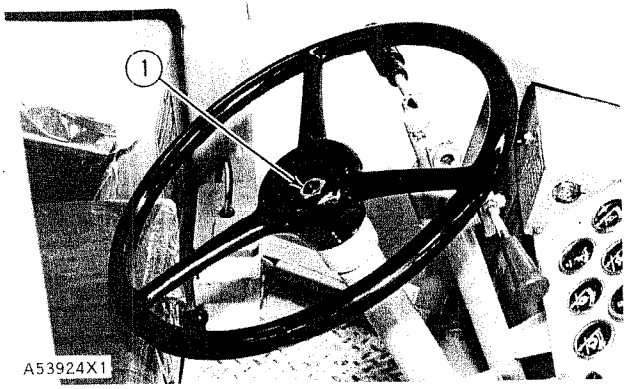
REMOVE STEERING WHEEL 4309-11

	Tools Needed	A
8B7548	Puller Assembly	1
8B7560	Step Plate	1
8H684	Ratchet Box Wrench	1
8B7550	Leg	2
8B7551	Bearing Puller Attachment	1



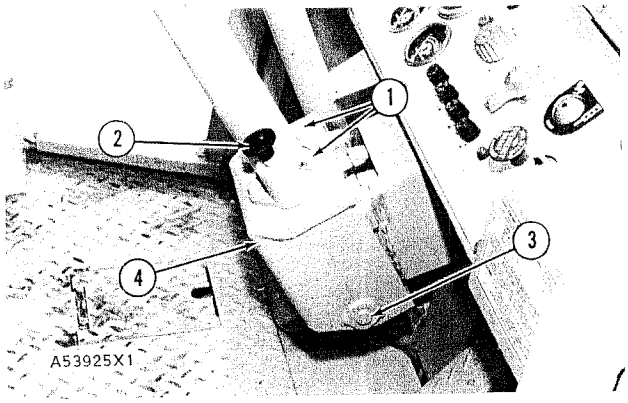
1. Remove the cover from the steering wheel.
2. Remove the nut that holds the steering wheel to the shaft.
3. Move the steering column to install tooling (A) and remove the steering wheel from the shaft.

INSTALL STEERING WHEEL 4309-12



1. Put the steering wheel in position on the shaft.
2. Install nut (1) to hold the steering wheel to the shaft. Tighten the nut to a torque of 42 ± 3 lb.ft. (58 ± 4 N·m).
3. Put a layer of 5P960 Multipurpose Type Grease on nut (1).
4. Install the gasket and cover on the steering wheel.

REMOVE STEERING COLUMN 4310-11

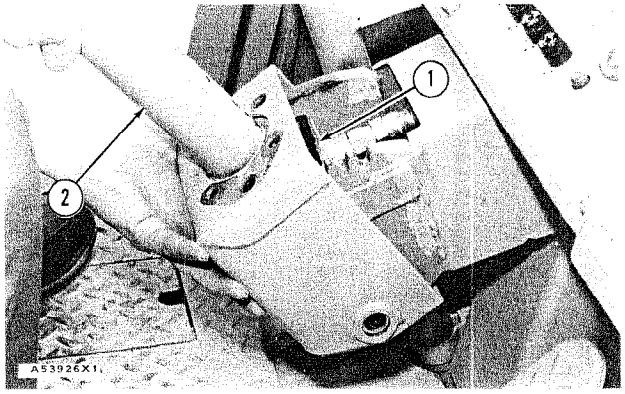


1. Remove four bolts (1) and steering column positioner (2) from steering column (4).
2. Remove the ring from one end of shaft (3) and remove the shaft from the other side of the steering column.
3. Remove steering column (4) from the cover assembly and steering metering unit.

STEERING COLUMN

INSTALL STEERING COLUMN 4310-12

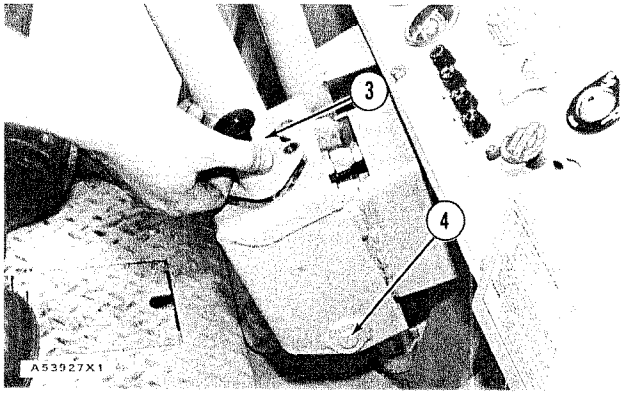
1. Put steering column (2) in position on the cover assembly. Make sure the splines of the steering shaft engage correctly in steering metering unit (1).
2. Install shaft (4) and the rings that hold it in position.
3. Install steering column positioner (3) and the bolts that hold it and hand metering unit (1) in position.



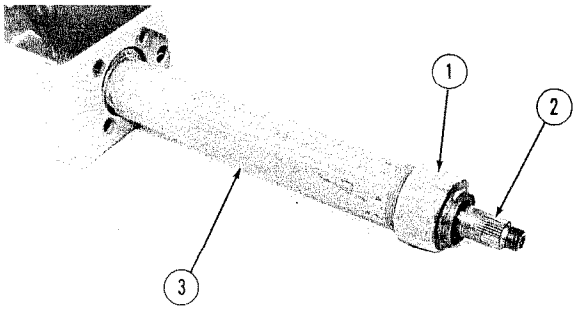
DISASSEMBLE STEERING COLUMN 4310-15

	Tools Needed	A	B	C
2F5131	Wrench	1		
1P510	Driver Group		1	
9S9155	Spacer			1
8H663	Bearing Puller Attachment			1

start by:
a) remove steering wheel
b) remove steering column

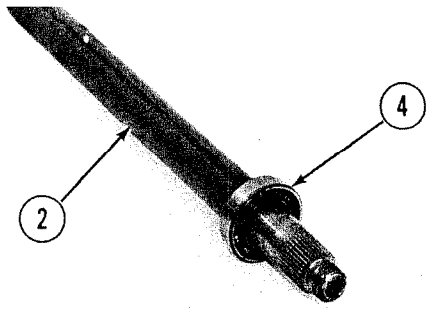


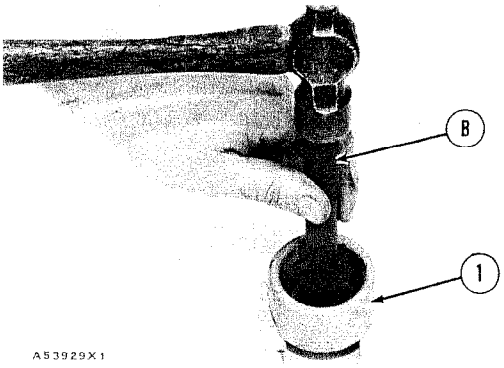
1. Remove nut (1) from tube assembly (3) with tool (A).



2. Remove the seal from nut (1) with tool group (B) as shown.

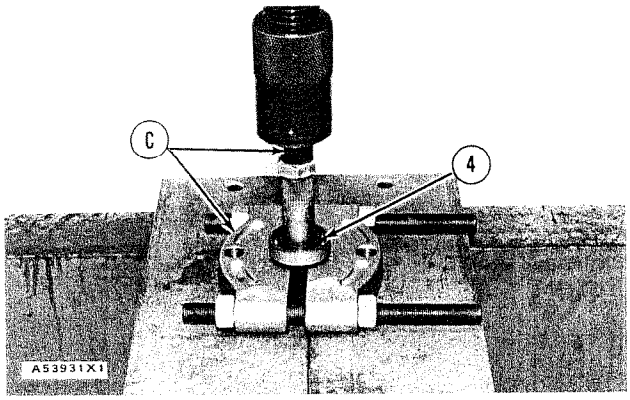
3. Remove shaft (2) from tube assembly (3). Remove the rings from shaft (2) that hold bearing (4) in position.





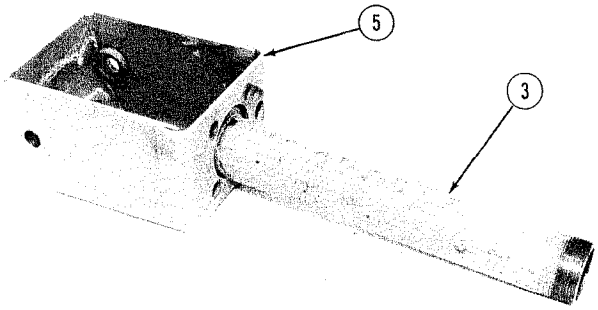
STEERING COLUMN

4. Use a press and tooling (C) to remove the shaft from bearing (4).



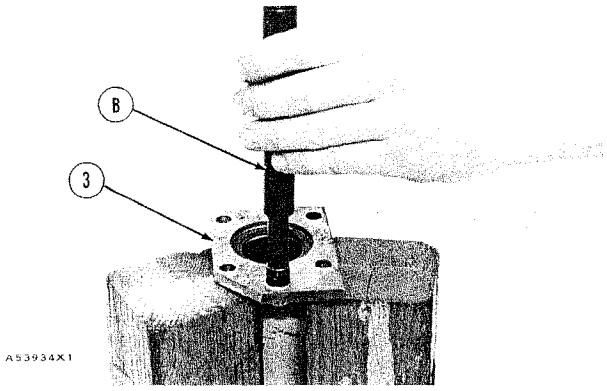
5. Remove tube assembly (3) from cover assembly (5).

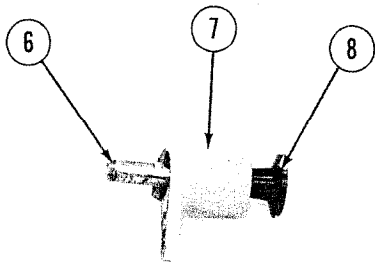
6. Remove the bushing from tube assembly (3) with tool group (B).

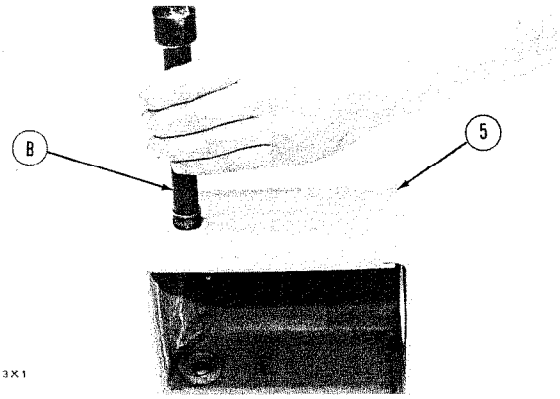


7. Remove the two bearings from cover assembly (5) with tool group (B).

8. If necessary, disassemble the steering column positioner as follows:
   a) Turn knob (8) counterclockwise to remove it from pin assembly (6).
   b) Remove pin assembly (6), the spring and washer from housing (7).





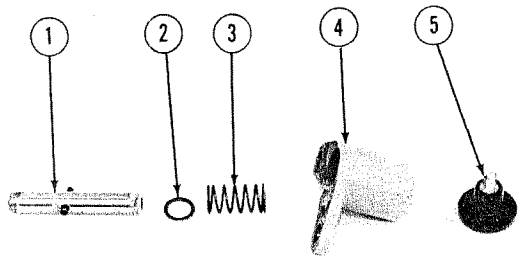


STEERING COLUMN

ASSEMBLE STEERING COLUMN 4310-16

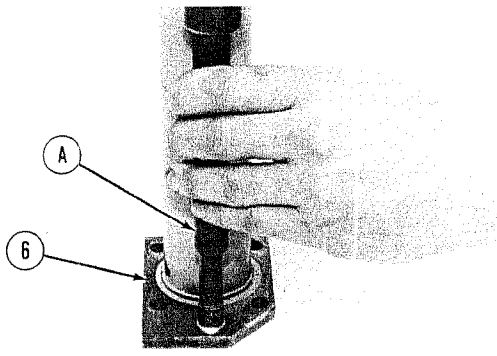
	Tools Needed	A	B
1P510	Driver Group	1	
2F5131	Wrench		1

1. Assemble the steering column positioner as follows:
   a) If necessary, make a replacement of the pin in pin assembly (1). Make sure the pin is extended evenly from both sides of pin assembly (1).
   b) Install washer (2) and spring (3) on pin assembly (1).
   c) Install pin assembly (1) in housing (4) and install knob (5) in the end of pin assembly (1) to hold it in the housing.



A53936X1

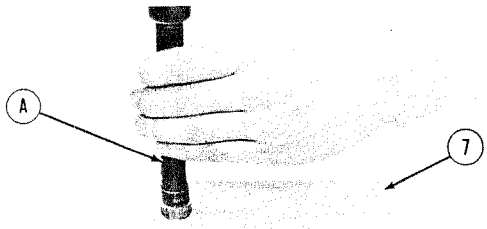
2. Use tool group (A) and install the bushing in tube assembly (6) until the bushing is even with the bottom of the tube assembly.



A53937X1

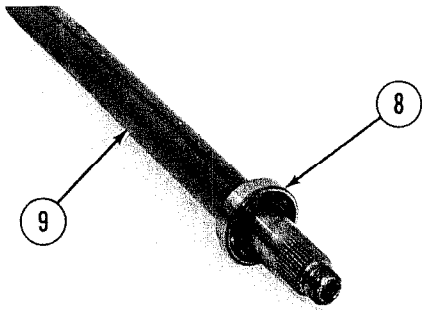
3. Use tool group (A) and install the bearings in each side of cover assembly (7) until the bearings are even with the outside surfaces of the cover assembly.

4. Put tube assembly (6) in position in cover assembly (7).

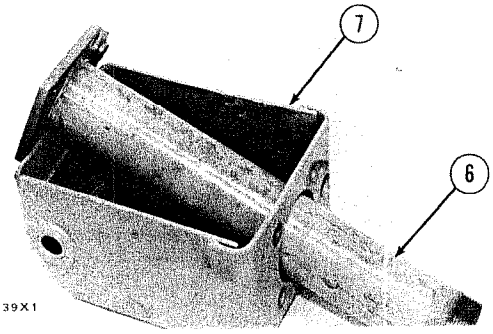


5. Install bearing (8) on shaft (9). Install the rings on each side of bearing (8) to hold it in position on shaft (9).


A53938X1



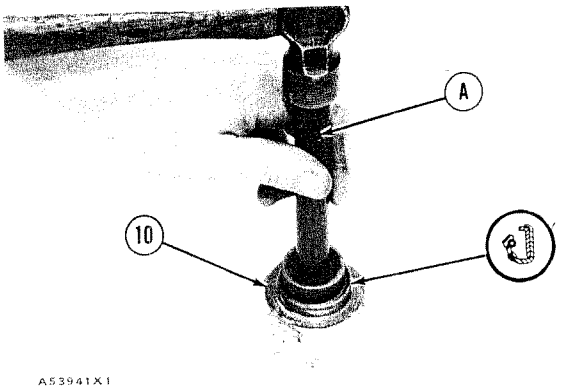
A53930X2



A53939X1

STEERING COLUMN, STEERING METERING UNIT

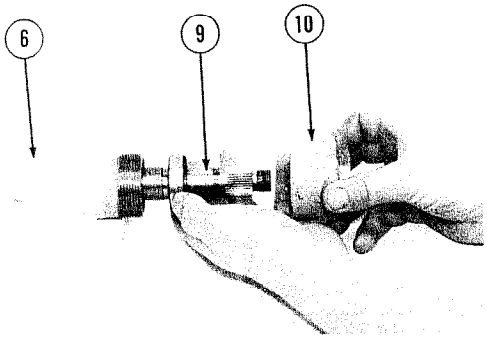
6. Use tool group (A) to install the lip type seal in nut (10). Make sure the lip of the seal is toward the outside as shown.



A53941X1

7. Fill the bearing on shaft (9) with 5P960 Multipurpose Type Grease and install the shaft in tube assembly (6).

8. Put a layer of 5P960 Multipurpose Grease on the lip of the seal in nut (10) and install the nut on tube assembly (6) and tighten it with tool (B).



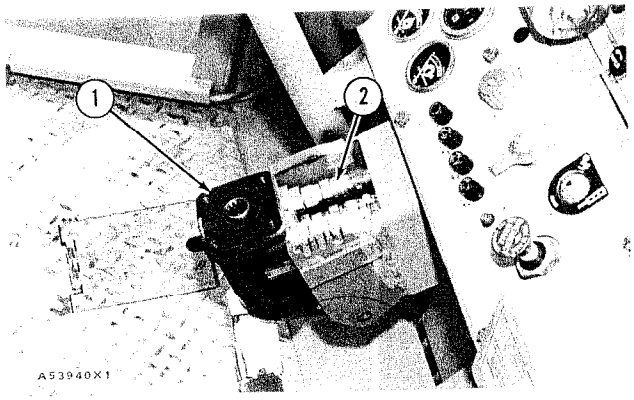
A53942X1

end by:
a) install steering column
b) install steering wheel

REMOVE AND INSTALL STEERING METERING UNIT 4312-10

start by:
a) remove steering column

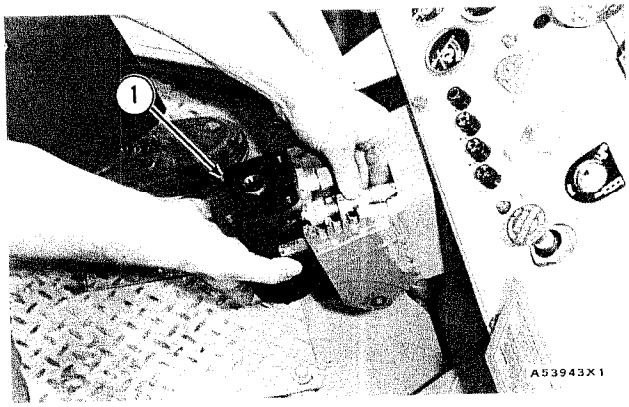
1. Disconnect the four hydraulic lines (2) from hand metering unit (1).



A53940X1

2. Remove steering metering unit (1).

3. Put steering metering unit (1) in position and connect the four hydraulic lines to it.



A53943X1

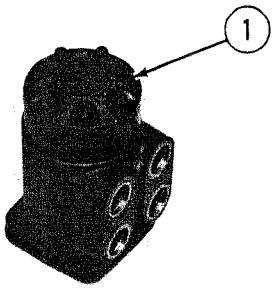
end by:
a) install steering column

STEERING METERING UNIT

DISASSEMBLE STEERING METERING UNIT 4312-15

start by:
a) remove steering metering unit

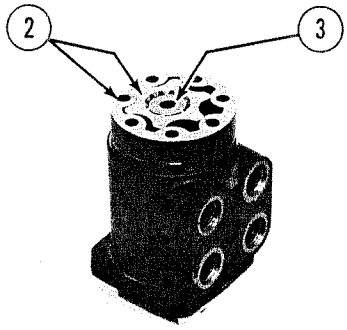
1. Remove cap (1) from the housing.



A53944X1

2. Remove gear set (2) and spacer (3) from the housing.

3. Remove drive (5) and plate (4) from housing (6).

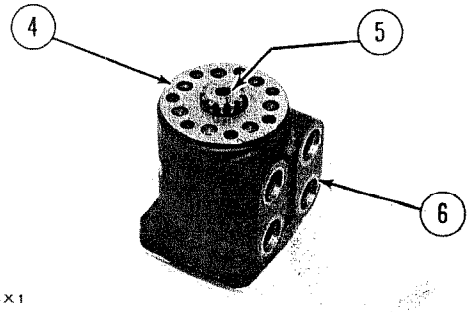


A53945X1

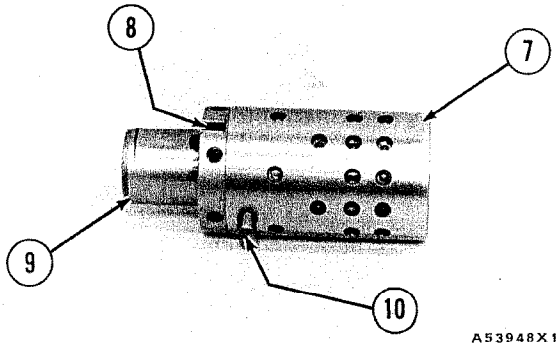
NOTE:If housing (6), sleeve (7) and the spool have damage or wear, these parts can not be ordered separately.

4. Remove sleeve (7) from housing (6).

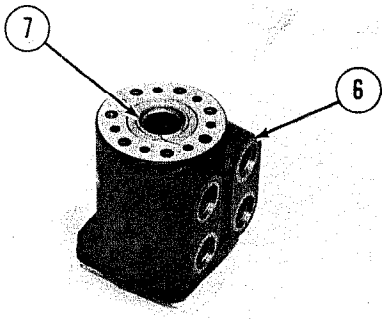
5. Remove pin (10) and remove spool (9) from sleeve (7). Remove six springs (8) from spool (9).



A53946X1



A53948X1



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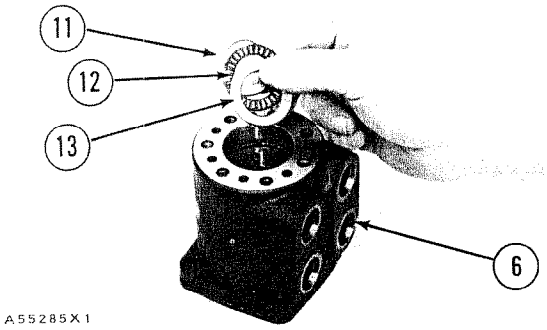
STEERING METERING UNIT

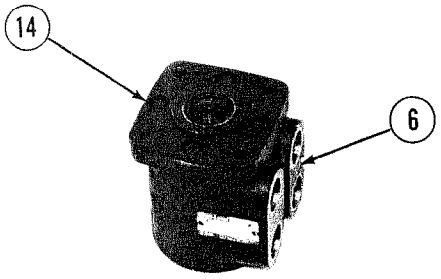
6. Remove race (13), bearing (12) and race (11) from housing (6).



A55285X1

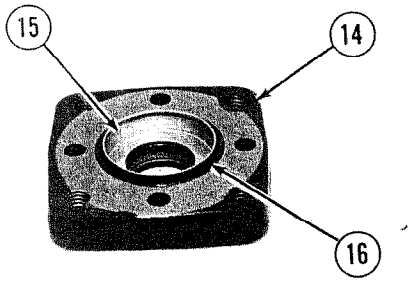
7. Remove plate (14) from housing (6).

8. Remove O-ring seal (16) and bushing (15) from plate (14).



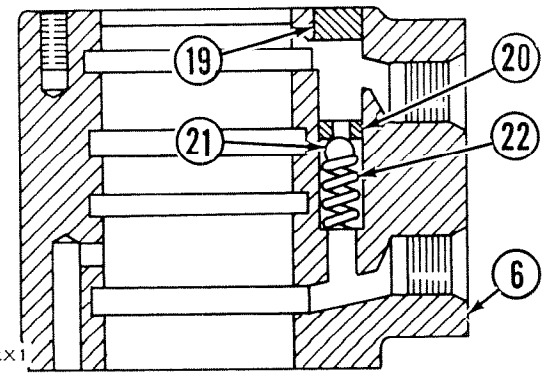
A53949X1

9. Remove seals (17) and (18) from plate (14).

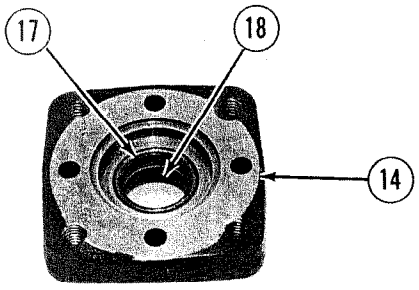


A55279X1

10. Remove plug (19), seat (20), ball (21) and spring (22) from housing (6).



46862X1



A55280X1

STEERING METERING UNIT

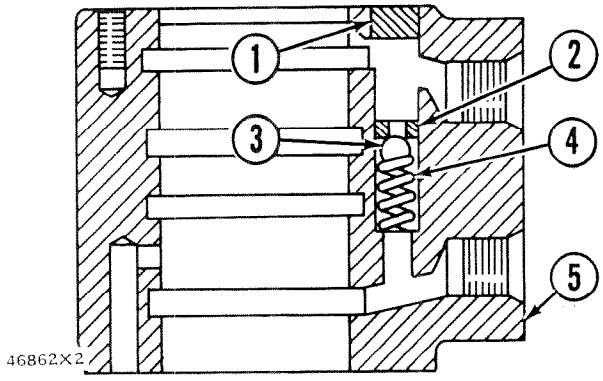
ASSEMBLE STEERING METERING UNIT 4312-16

	Tools Needed	A
1P510	Driver Group	1

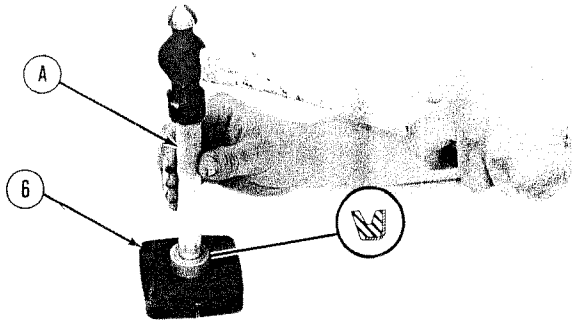
CAUTION

Make sure all of the parts of the hand metering unit are clean and free of dirt and foreign material. Put clean hydraulic oil on all of the parts.

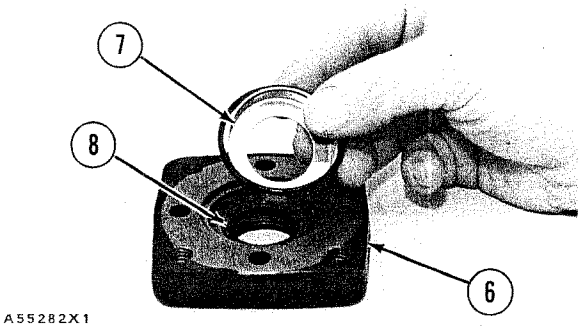
1. Install spring (4), ball (3), seat (2) and plug (1) in housing (5).
2. Use tool group (A) to install the lip type seal in plate (6) with the lip of the seal toward the outside as shown.
3. Install seal (8), bushing (7) and the O-ring seal in plate (6). Make sure the open end of bushing (7) is up when installed.
4. Put plate (6) in position on housing (5) and install the bolts to hold it. Tighten the bolts to a torque of 250 lb.in. (28.3 N·m).
5. Install race (11), bearing (10) and race (9) in housing (5). Make sure that the bearing is between the races.
6. Install six springs (14) in spool (12) with three springs on each side. Make sure the curves of the springs are in contact and in the center of the spool. The notched side of the spring ends must be up.
7. Install sleeve (13) over spool (12) so the notch (slot) in the bottom of sleeve (13) engages with the ends of springs (14). Install the pin that holds the sleeve and spool together.



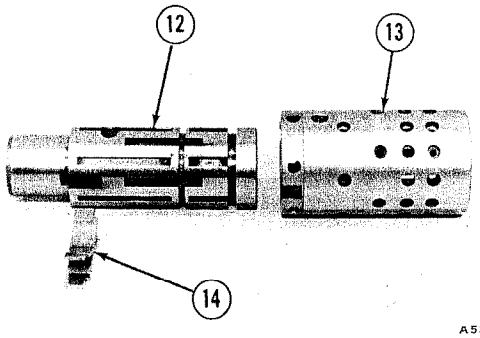
46862X2



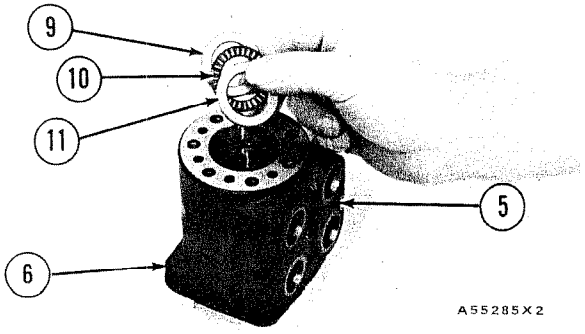
45587X2



A55282X1



A55284X1



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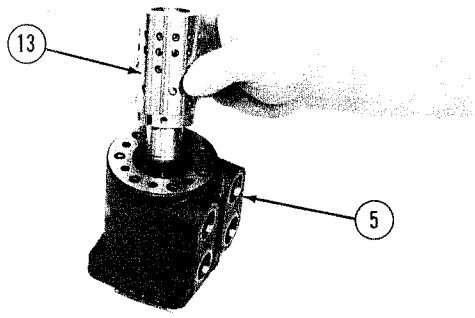
STEERING METERING UNIT

8. Install sleeve (13) in housing (5).

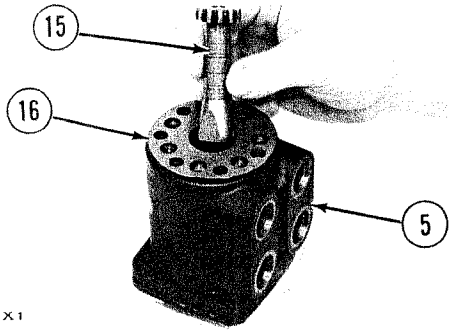


A55286X1

9. Put plate (16) in position on housing (5).

NOTE: The plate will fit on the housing one way only.

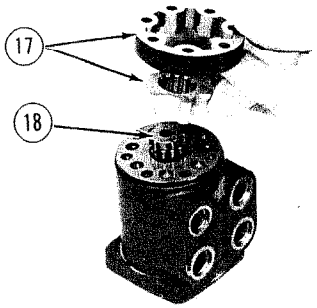
10. Install drive (15) in housing (5). Make sure the notch (slot) in drive (15) is engaged with the pin that holds the sleeve and spool together.



A55287X1

11. Install spacer (18) and gear set (17).

NOTE: Make sure the gear of gear set (17) is in alignment with pin (19) as shown. Pin (19) is the pin that holds the sleeve and spool together.



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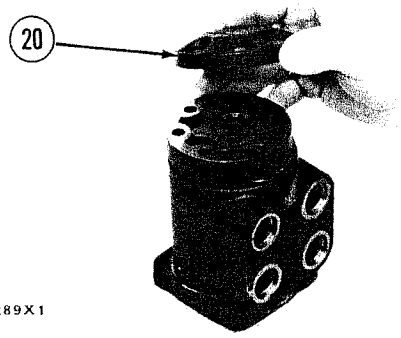
12. Put cap (20) in position and install the bolts to hold it. Tighten the bolts to a torque of 250 lb.in. (28.3 N·m).

end by:
a) install steering metering unit



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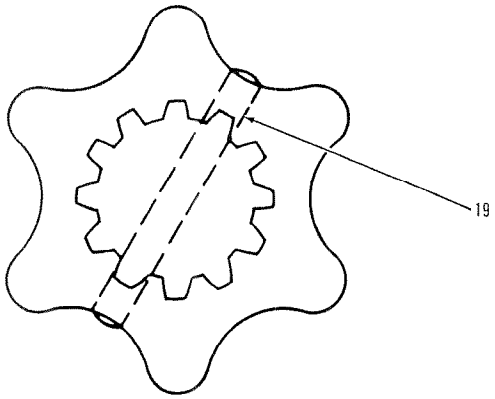


A39391X2

STEERING CONTROL VALVE

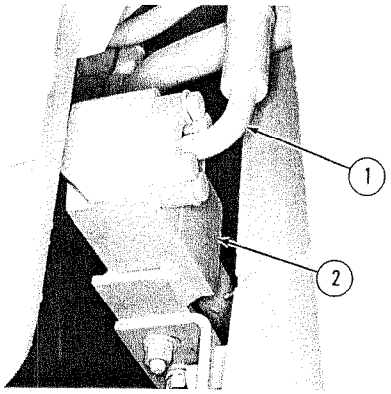
REMOVE AND INSTALL STEERING CONTROL VALVE 4307-10

1. Turn the machine all of the way to the left.

⚠ WARNING

Stop the engine, lower the bucket to the ground, move the control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system. Put blocks in front and behind the wheels.

2. Drain the oil from the hydraulic tank. The capacity of the system is:
   920-17.5 U.S. gal. (66 litre)
   930-19.5 U.S. gal. (74 litre)
3. Disconnect hose assemblies (1) and (3) from tube assemblies (2) and (4).
4. Remove tube assemblies (2) and (4) from the machine.
5. Disconnect tube assembly (5) from tube assembly (6). Disconnect tube assemblies (6) and (7) from the control valve.
6. Disconnect the hose assembly and two tube assemblies from the back of the control valve.
7. Remove the three bolts that hold the control valve to the frame and remove the valve. The weight of the valve is 55 lb. (25 kg).
8. Put the control valve in position and install the bolts to hold it.
9. Put clean hydraulic oil on the O-ring seals for the tube assemblies.
10. Connect tube assemblies (6) and (7) to the control valve. Connect tube assembly (5) to tube assembly (6).
11. Connect the two tube assemblies and hose assembly to the back of the control valve.
12. Install tube assemblies (2) and (4) on the machine and connect them to the control valve.
13. Connect hose assemblies (1) and (3) to tube assemblies (2) and (4).
14. Fill the hydraulic system with oil to the correct level.



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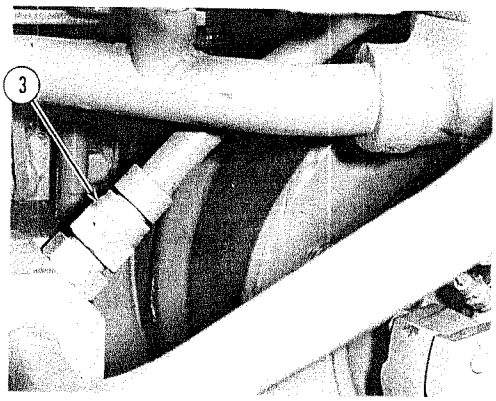

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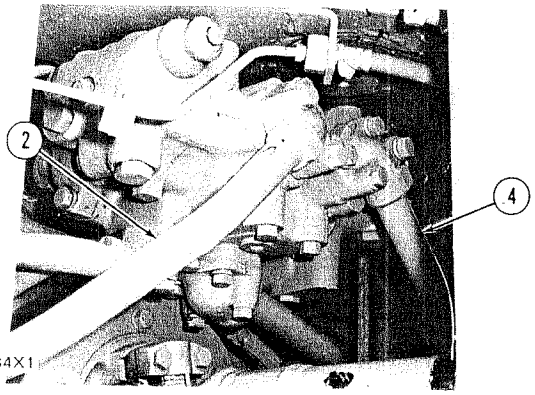

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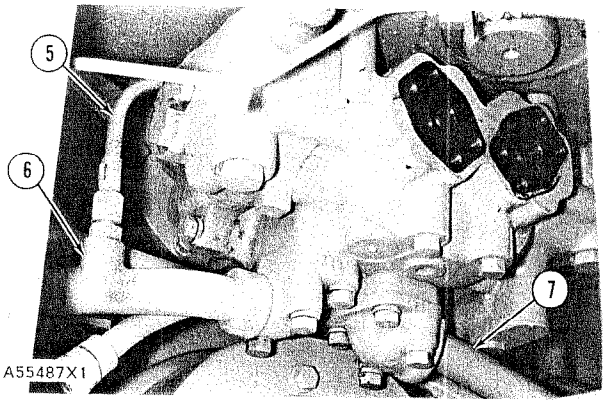


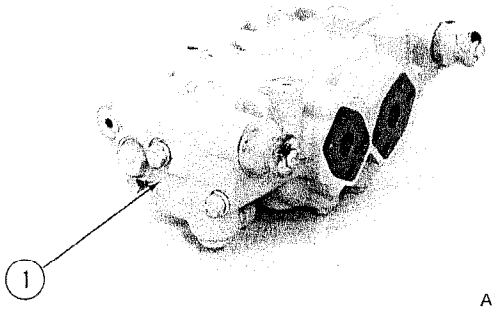
A55487X1

STEERING CONTROL VALVE

DISASSEMBLE STEERING CONTROL VALVE 4307-15

start by:
a) remove steering control valve

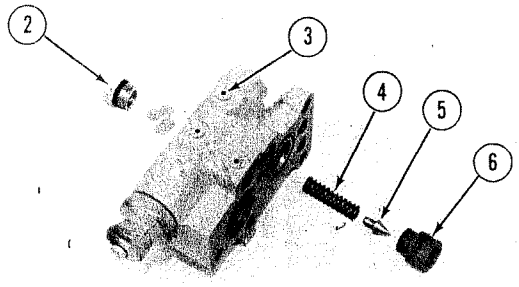
1. Remove the right turn neutralizer valve (1) and the O-ring seals from the main valve body.



A55488X1

⚠ WARNING

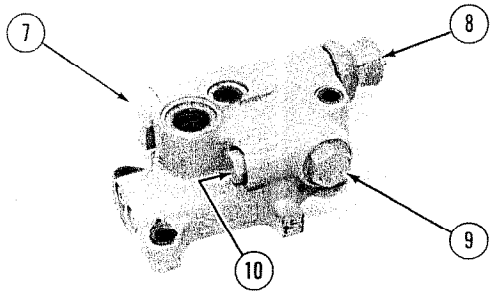
Spring (4) is under tension and can push seat (6) out of the valve body with force. Use care when valve (1) is removed so seat (6) does not come out of the valve body and cause bodily injury.



A55491X1

2. Remove seat (6), valve (5), spring (4), shims (3) and plug (2) from the valve body. Remove the O-ring seals from plug (2), seat (6) and the valve body.

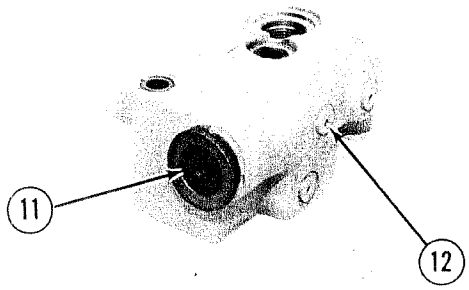
3. Remove plug assembly (10), the O-ring seal, spring and ball from the neutralizer valve body.



A55493X1

4. Remove plug (9) and the O-ring seal.

5. Remove boot (8) from the valve stem. Remove plug (7), the O-ring seal and spring. Remove the bolt, lockwasher and washer that hold the valve stem. Remove the valve stem from the neutralizer valve body.



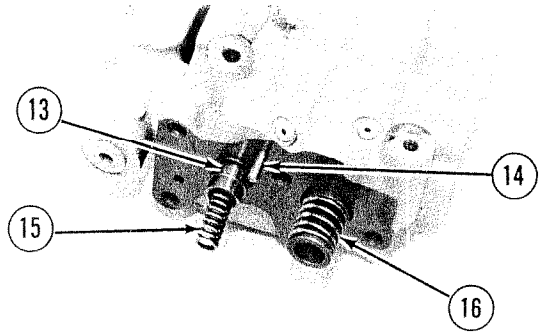
A55494X1

6. Remove seal (11), the five plugs (12) and O-ring seals from the neutralizer valve body.

STEERING CONTROL VALVE

7. Remove spring (15) and valve (13) from the main valve body. Remove spring (15) and the shims from valve (13).

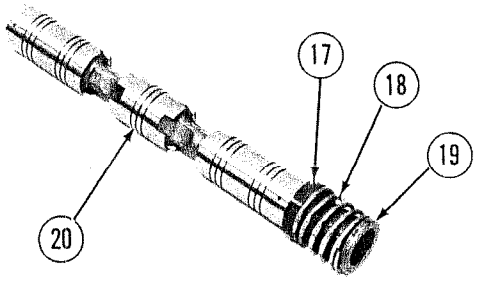
8. Remove valve stem assembly (16) and pin (14) from the main valve body.



A55492X1

9. To disassemble valve stem assembly (16), remove the bolt, lockwasher, washer, retainer (19), spring (18), spacer (17), the retainer and shims from valve stem (20).

10. Remove left turn neutralizer valve (21) and the O-ring seals from the main valve body.

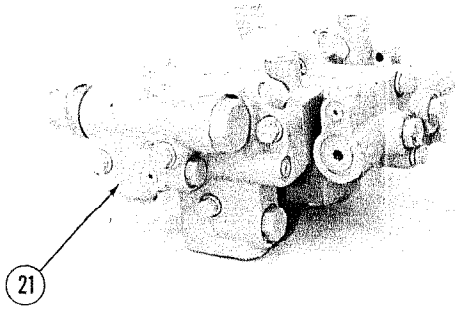


A55498X1

11. Remove spacer (22) from the main valve body.

12. Remove plug assembly (25), the O-ring seal, spring and ball from the neutralizer valve body.

13. Remove boot (23) from the valve stem. Remove plug (24), the O-ring seal and spring. Remove the bolt, lockwasher and washer that hold the valve stem. Remove the valve stem from the neutralizer valve body.



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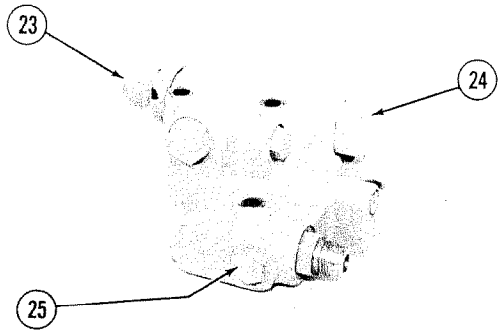

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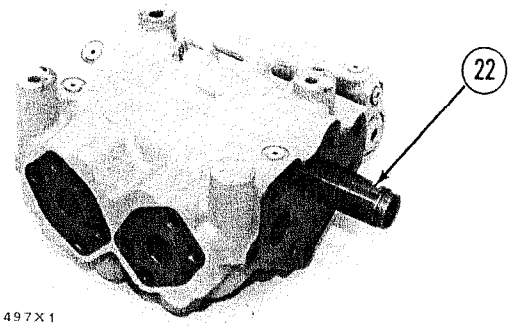


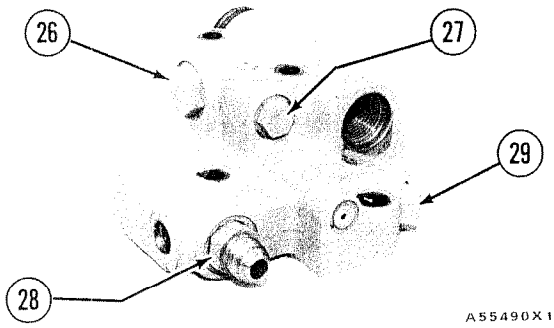
A55497X1

STEERING CONTROL VALVE

14. Remove the lip type seal for the valve stem from the neutralizer valve body.

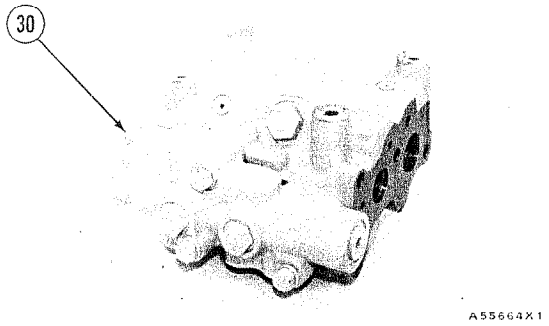
15. Remove plug assembly (27), the O-ring seal, spring and ball from the neutralizer valve body.

16. Remove plugs (26) and (28), fitting (29) and the O-ring seals from the neutralizer valve body.



A55490X1

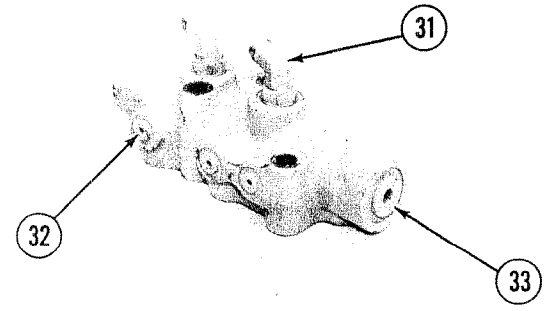
17. Remove selector valve (30) and the O-ring seals from the main valve body.



A55664X1

18. Remove plug (33), the O-ring seal, spring and valve stem. Remove the plug and O-ring seal from the other end of the selector valve body.

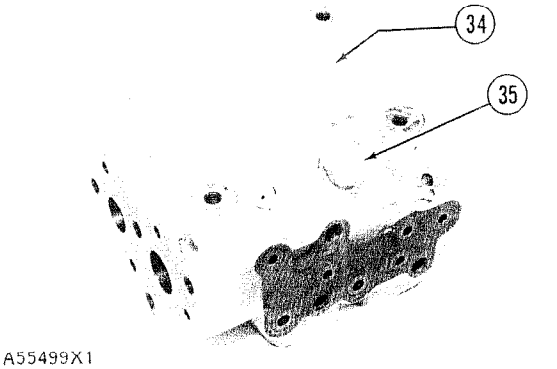
19. Remove fittings (31), plugs (32) and the O-ring seals from the selector valve body.



A55496X1

20. Remove five plugs (34) and the O-ring seals from the main valve body.

21. Remove plug (35), the O-ring seal, seat, ball and seat. Remove the O-ring seals from the seats.



A55499X1

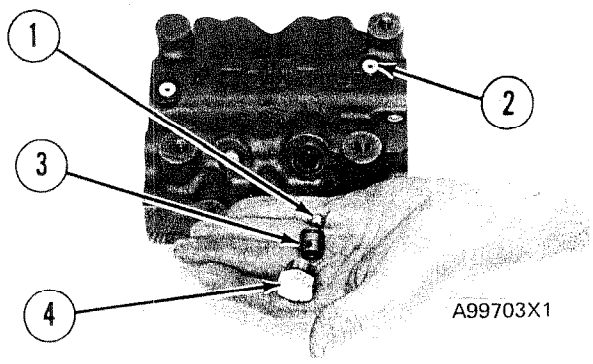
STEERING CONTROL VALVE

ASSEMBLE STEERING CONTROL VALVE 4307-16

	Tools Needed	A
1P510	Driver Group	1

CAUTION

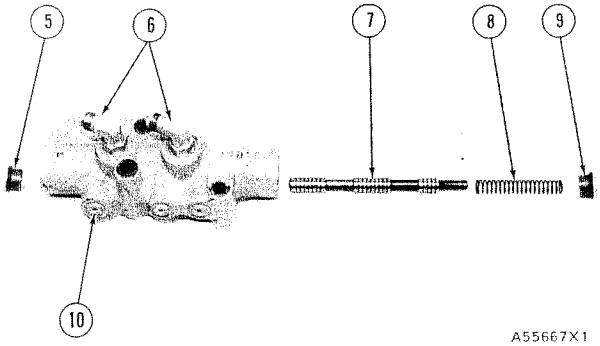
All parts must be kept clean. Use paper free of lint and clean solvent to clean the parts. Put clean hydraulic oil on all of the parts before they are assembled.



A99703X1

1. Install the five plugs (2) and O-ring seals in the main valve body.

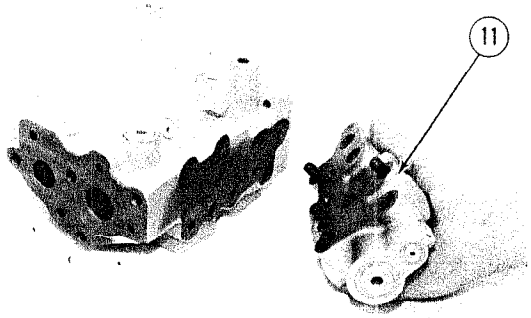
2. Install the O-ring seal on the seat for ball (1) and install it in the main valve body. Put the O-ring seal on seat (3). Install ball (1), seat (3), the O-ring seal and plug (4) in the main valve body.



A55667X1

3. Install the five plugs (10), plug (5), fittings (6) and the O-ring seals in the selector valve body.

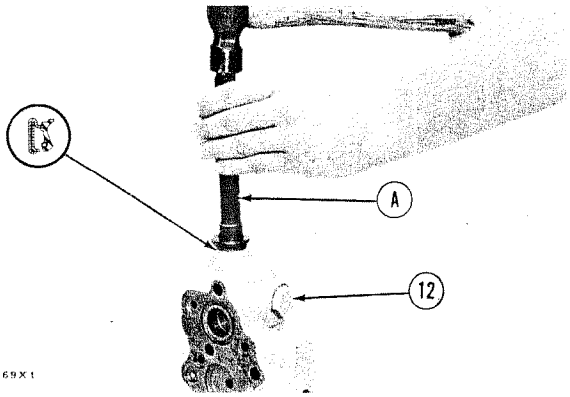
4. Install valve stem (7), spring (8), the O-ring seal and plug (9) in the selector valve body as shown.



A55668X1

5. Install the O-ring seals in selector valve (11) and put it in position on the main valve body. Tighten the bolts that hold the selector valve.

6. Install the O-ring seal and plug (12) in the left turn neutralizer valve body. Tighten the plug to a torque of 42 ± 4 lb.ft. (58 ± 5 N·m).



A55669X1

7. Use tool group (A) and install the seal in the left turn neutralizer valve body. Make sure the lip of the seal is toward the inside as shown.

STEERING CONTROL VALVE

8. Install fitting (13), the five plugs (20) and the O-ring seals in the neutralizer valve body.

9. Install the ball, spring, the O-ring seal and plug assembly (19). Tighten the plug assembly to a torque of 19 ± 2 lb.ft. (25 ± 3 N·m).

10. Install valve stem (14), washer (22), lockwasher (21) and bolt (16). Tighten bolt (16) in the end of valve stem (14) to a torque of 10 ± 2 lb.ft. (14 ± 3 N·m).

11. Install spring (17), the O-ring seal and plug (18). Tighten the plug to a torque of 75 ± 6 lb.ft. (100 ± 8 N·m).

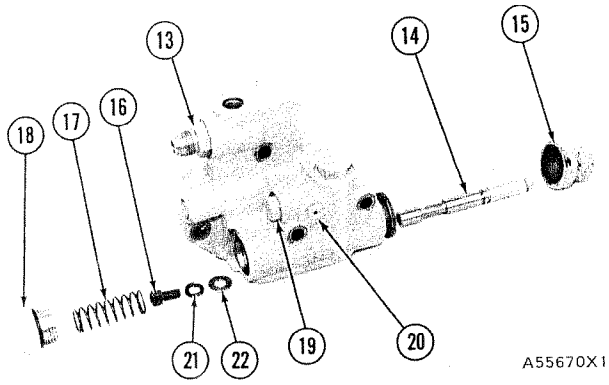
12. Install boot (15) for the valve stem on the neutralizer valve body.

13. Install the O-ring seal and plug (26). Install ball (25), spring (24) and plug assembly (23). Tighten the plug assembly to a torque of 25 ± 3 lb.ft. (35 ± 4 N·m).

14. Install spacer (27) in the main valve body. Install the O-ring seals in the left turn neutralizer valve (28). Put neutralizer valve (28) in position on the main valve body and install the bolts to hold it.

15. Install shims (36), retainer (35), spacer (34), spring (33), retainer (32), washer (31), lockwasher (30) and bolt (29) on valve stem (37). Tighten bolt (29) to a torque of 15 ± 2 lb.ft. (20 ± 3 N·m).

16. Install pin (38), valve spool (39), shims (40), spring (41) and valve stem assembly (42) in the main valve body.



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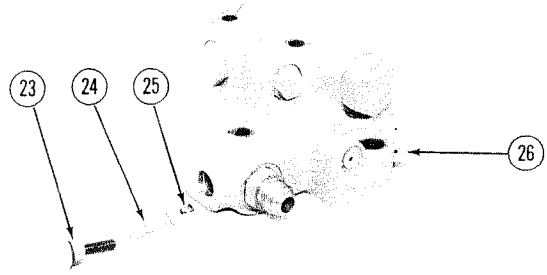

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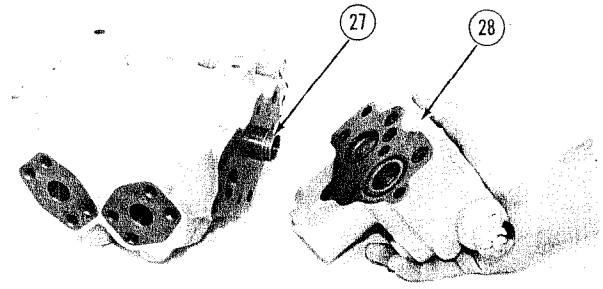

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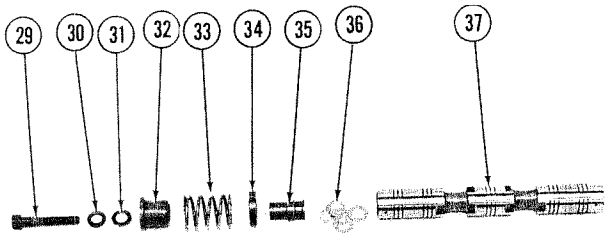

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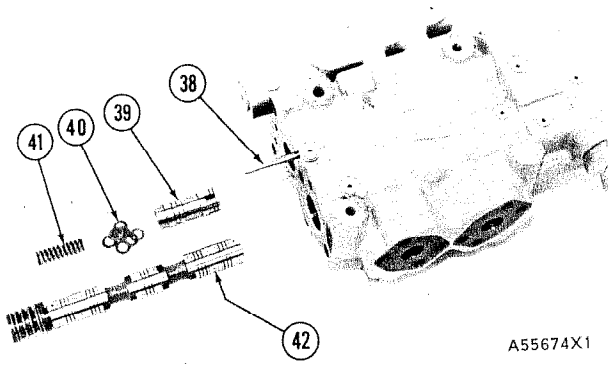
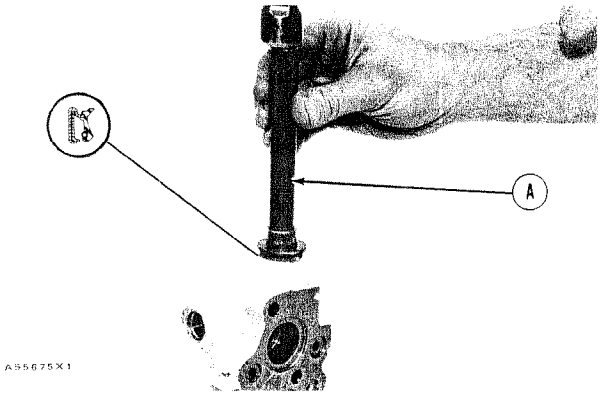


A55674X1

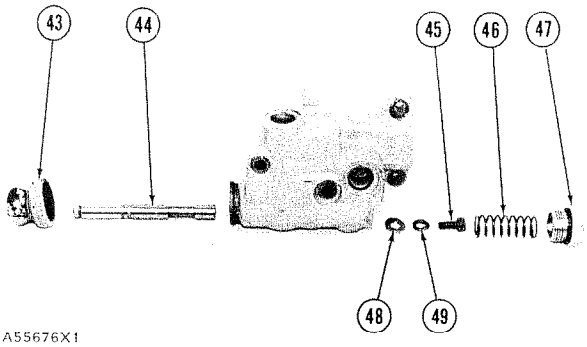
STEERING CONTROL VALVE

17. Use tool group (A) and install the lip type seal for the valve stem in the right turn neutralizer valve body. Make sure the lip of the seal is toward the inside as shown.



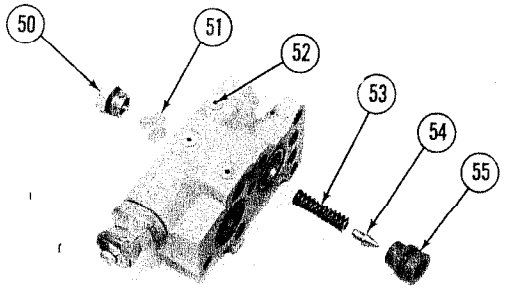
18. Install valve stem (44), washer (48), lockwasher (49) and bolt (45). Tighten bolt (45) in the end of valve stem (44) to a torque of 10 ± 2 lb.ft. (14 ± 3 N·m).

19. Install spring (46), the O-ring seal and plug (47). Install boot (43) for valve stem (44) on the neutralizer valve body.



20. Install the five plugs (52) and the O-ring seals in the neutralizer valve body. Tighten the plugs to a torque of 3 + 2 or − 1 lb.ft. (4 + 3 or − 1 N·m).

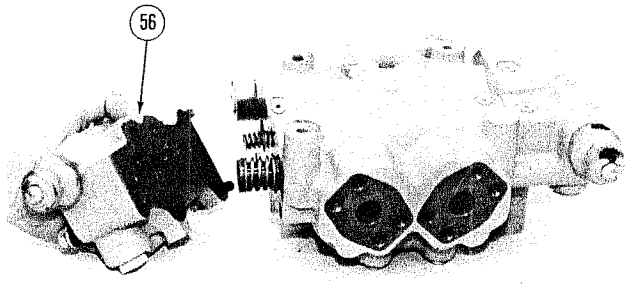
21. Install the O-ring seals on seat (55) and plug (50). Install spring (53), valve (54), seat (55), shims (51) and plug (50) in the neutralizer valve body as shown.



22. Install the O-ring seals in the right turn neutralizer valve (56). Put neutralizer valve (56) in position on the main valve body and tighten the bolts to hold it.

23. See Hydraulic Steering System in TESTING AND ADJUSTINNG for shim adjustment.

end by:
a) install steering control valve



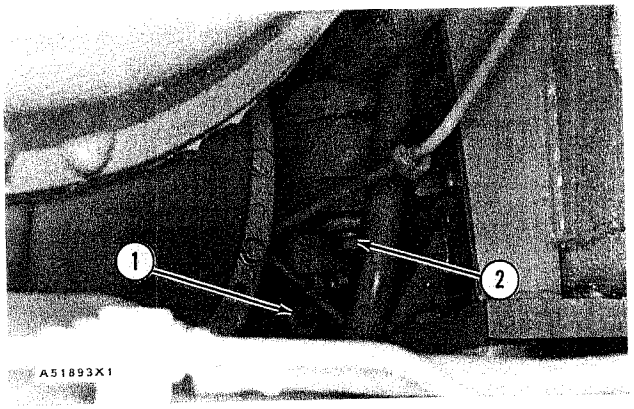
STEERING CYLINDERS

REMOVE STEERING CYLINDERS 4303-11

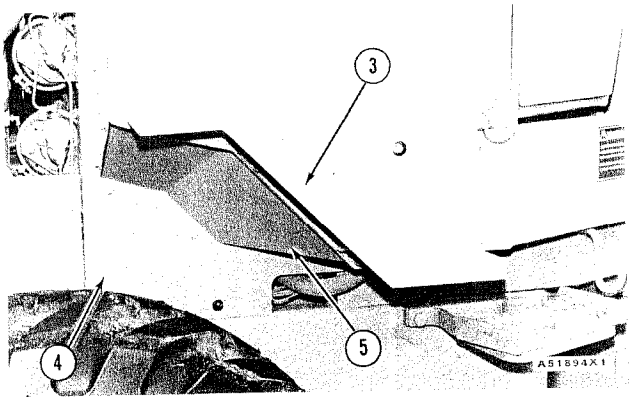
1. Turn the machine all of the way to the left to remove the right steering cylinder. Turn the machine all of the way to the right to remove the left steering cylinder. Put blocks in front and behind the wheels.

⚠ WARNING

Stop the engine, lower the bucket to the ground, move the control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.

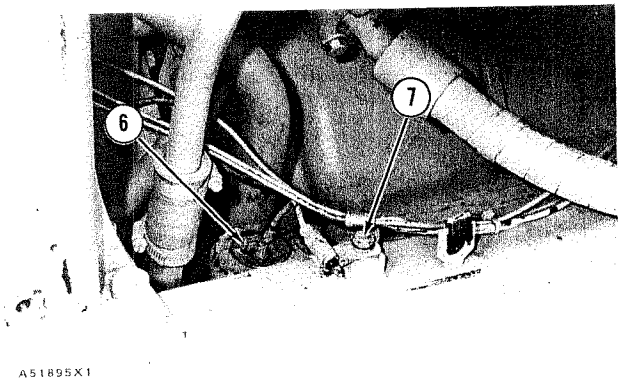


2. Remove bolt (2) from the bottom of the rear cylinder pin.

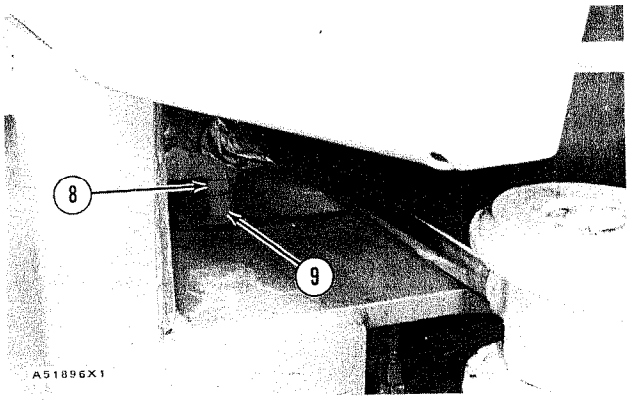


3. Disconnect hose assembly (1) from the rear of the steering cylinder.

4. Remove fender (3) and access covers (4) and (5) from the machine.



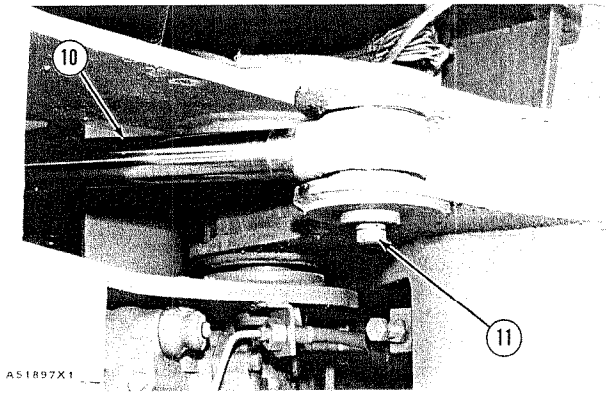
5. Remove bolt (7). Remove pin (6) from the top of the frame.



6. Disconnect the lower end of hose assembly (9) from the tube assembly. Remove hose assembly (9) and fitting (8) from the front of the steering cylinder.

STEERING CYLINDERS

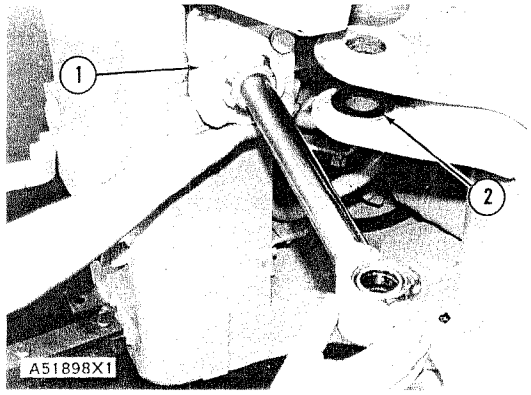
7. Remove bolt (11), the lockwasher and washer. Remove the pin, that holds the cylinder rod to the frame, from the top of the frame.



⚠ WARNING

Use care when the steering cylinder is removed because of its weight. A hoist can not be fastened to the cylinder until it is removed.

8. Remove steering cylinder (10) from the front of the frame. The weight of the cylinder is 50 lb. (23 kg).

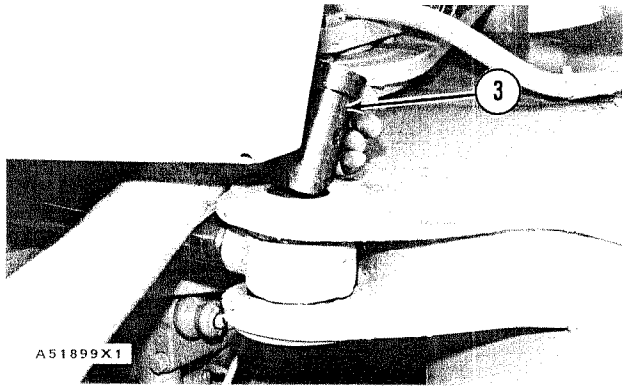


9. Remove the washers for the cylinder rod from the frame.

INSTALL STEERING CYLINDERS 4303-12

NOTE: Make sure the cylinder rod is extended before the steering cylinder is installed.

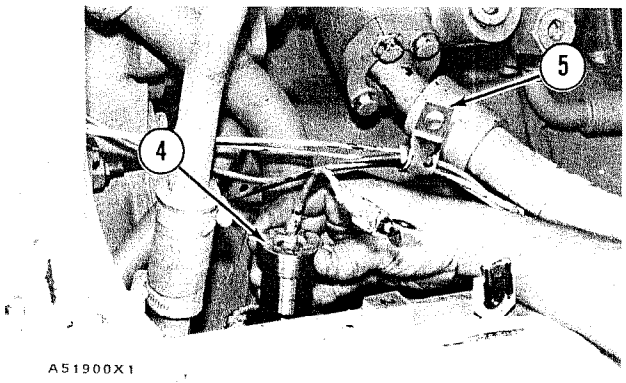
1. Put steering cylinder (1) in position in the frame.



2. Install washers (2) on both sides of the rod end as needed to make the steering cylinder level.

3. Install pin (3) to hold the cylinder rod. Install the bolt, lockwasher and washer that hold the pin.

4. Install pin (4). Install the bolt and lockwasher to hold clip (5) and the grease line for pin (4).



STEERING CYLINDERS

5. Install the washer, lockwasher and bolt (7) to hold the rear cylinder pin.

6. Put clean hydraulic oil on the O-ring seal and connect hose assembly (6) to the steering cylinder.

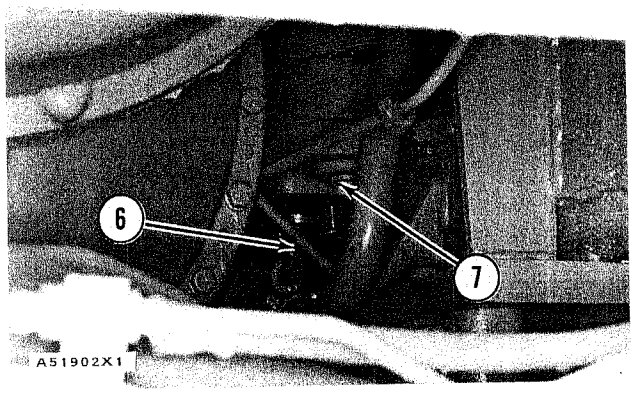
7. Install fitting (8) and hose assembly (9) to the steering cylinder.

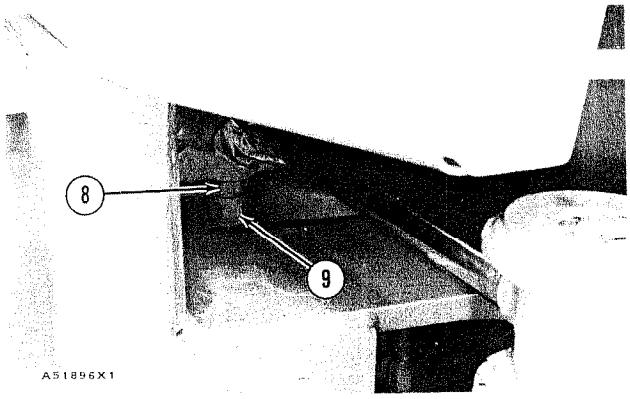
8. Put clean hydraulic oil on the O-ring seal and connect the lower end of hose assembly (9) to the tube assembly.

9. Install access covers (10) and (11) and the fender on the machine.

10. Put clean grease in the cylinder pins.

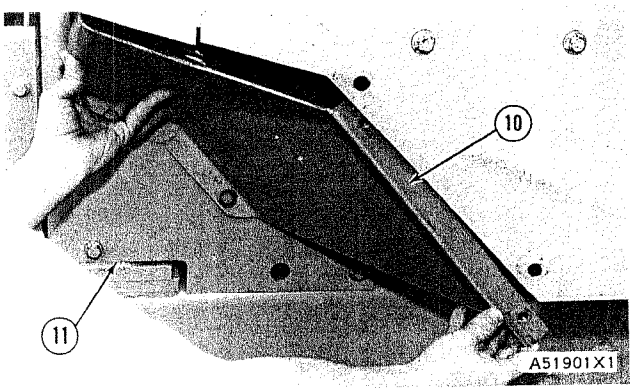
11. Start the engine and turn the machine all of the way in both directions several times. Stop the engine and fill the hydraulic tank to the correct level.





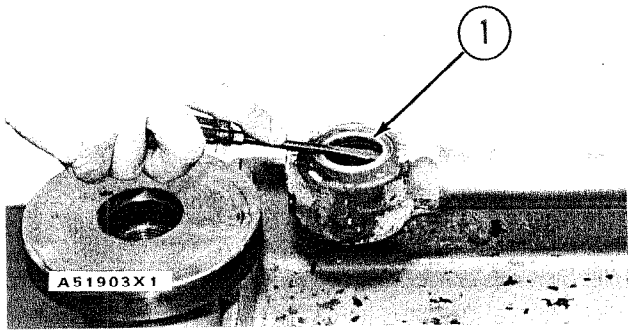
DISASSEMBLE STEERING CYLINDERS 4303-15

	Tools Needed	A	B	C
7F9540	Hydraulic Puller	1		
9S5559	Stud	1		
7M7238	Sleeve (part of 7M7236 Adapter Group)	1		
1P543	Nut	1		
1P1831	Bearing Puller Adapter	1		
5P3100	Pump Group	1	1	
1P1784	Hydraulic Cylinder Repair Stand		1	
1P850	Torque Multiplier			1
1P851	Spline Adapter			1
1P852	Male Adapter			1
5P3588	Adapter			1
8H8539	Socket			1



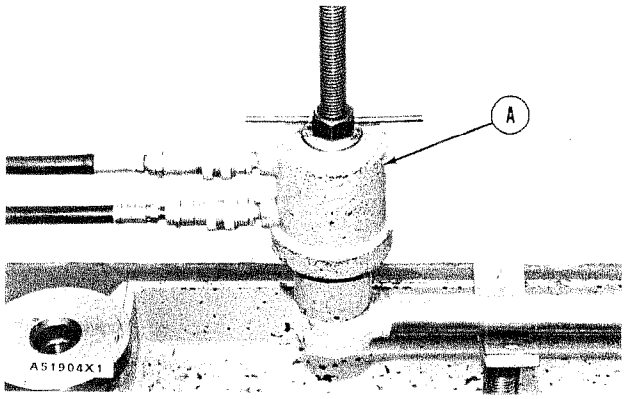
start by:
remove steering cylinders

1. Remove seals (1) from each side of the rod assembly and cylinder assembly.



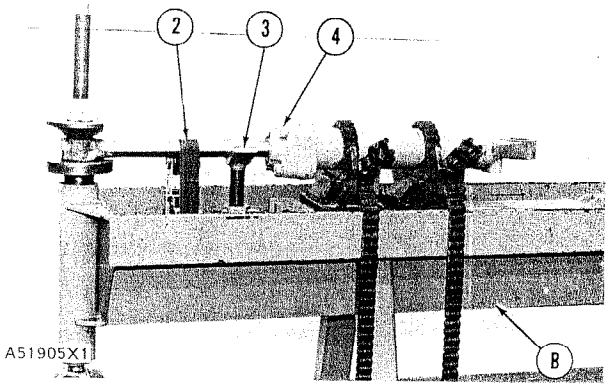
STEERING CYLINDERS

2. Remove the bearings from the rod assembly and cylinder assembly with tooling (A).



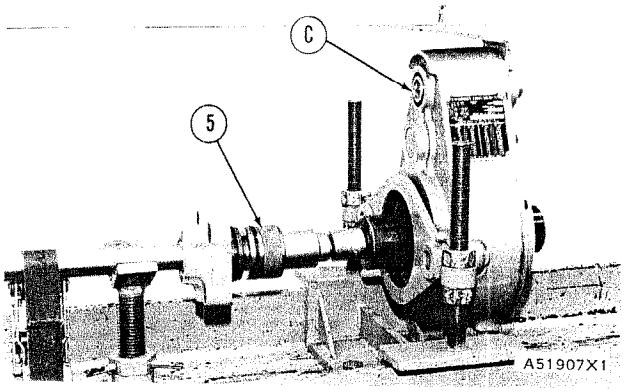
3. Put the cylinder in position on tooling (B). Install support (3) under the rod and fasten strap (2) around the rod to hold it in position.

4. Put a mark on the head and cylinder assembly for correct alignment at assembly. Remove four bolts (4).



5. Pull the cylinder away from the rod and head with tooling (B).

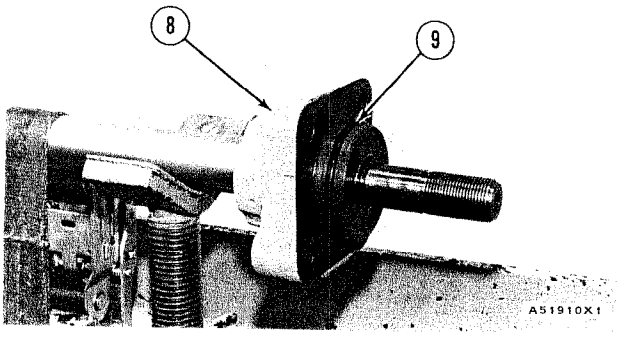
6. Use tooling (C) to remove the nut that holds piston (5) on the rod. Remove piston (5) and the washer from the rod.

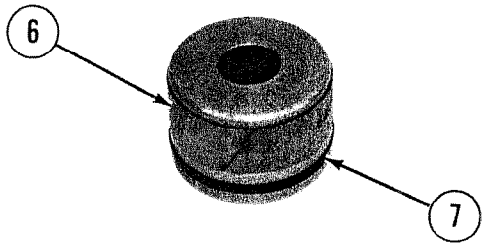


7. Remove seal assembly (7) and ring (6) from the piston.

8. Remove head (8) from the rod.

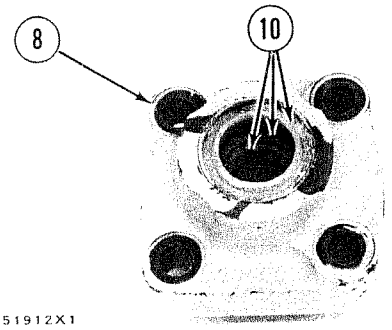
9. Remove the back-up ring and O-ring seal (9) from head (8).





STEERING CYLINDERS

10. Remove three seals (10) from head (8).



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ASSEMBLE STEERING CYLINDERS 4303-16

	Tools Needed	A	B	C	D	E	F	G
5P2980	Seal Installer	1						
1P510	Driver Group		1					
5P3537	Seal Guide			1				
4S9181	Seal Expander				1			
1P1784	Hydraulic Cylinder Repair Stand					1		
5P3100	Pump Group					1		1
1P850	Torque Multiplier						1	
1P851	Spline Adapter						1	
1P852	Male Adapter						1	
5P3588	Adapter						1	
8H8539	Socket						1	
7F9540	Hydraulic Puller							1
9S5559	Stud							1
7M7238	Sleeve							1
1P543	Nut							1
1P1831	Bearing Puller Adapter							1

1. Use tool (A) to install seal (4) in head (1).

2. Install seal (3) in the head with the lip of the seal toward seal (4).

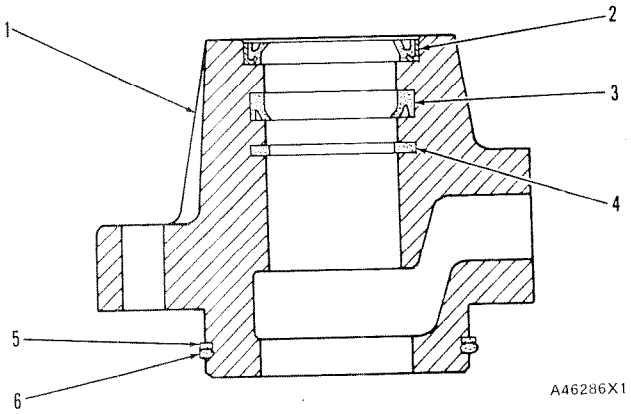
3. Use tool group (B) to install seal (2) in the head with the lip of the seal toward the outside.

4. Install O-ring seal (6) and back-up ring (5) in the head as shown.

5. Put the cylinder assembly and rod on tooling (E).

6. Install tool (C) on the rod. Put clean hydraulic oil on the lips of the seals in the head. Push the head on the rod. Remove tool (C) from the rod.

7. Use tool (D) to cause expansion of the plastic seal (7) of the piston seal assembly.



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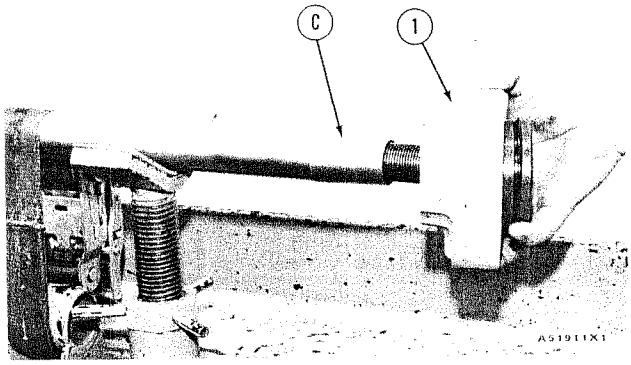
TYPICAL EXAMPLE



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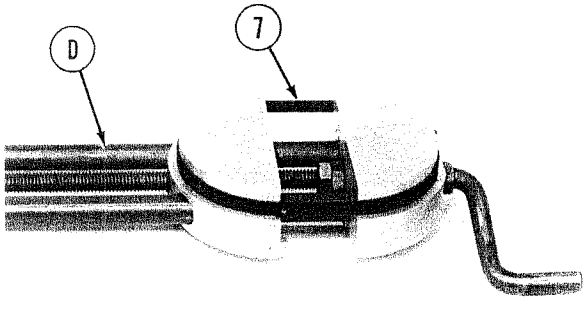

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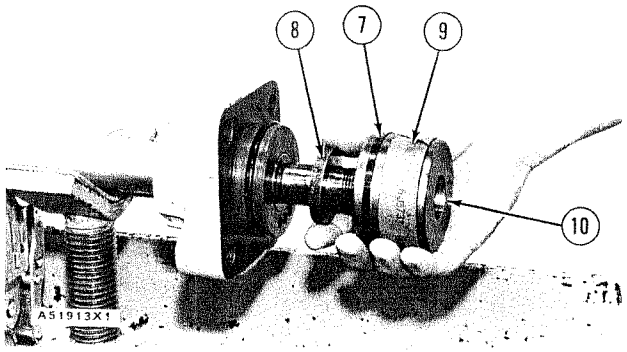
STEERING CYLINDERS

8. Install the rubber expansion ring in the groove of piston (10) and install plastic seal (7) over the rubber expansion ring.

9. Install seal ring (9) on piston (10).

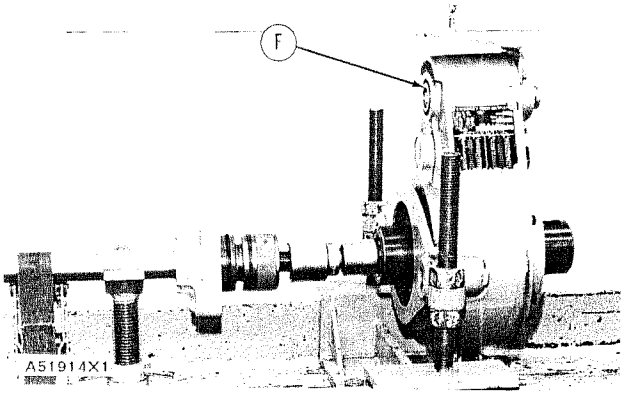
10. Install washer (8) and piston (10) on the rod as shown.



11. Use tooling (F) to tighten the nut that holds the piston on the rod. Tighten the nut to a torque of 650 ± 65 lb.ft. (880 ± 90 N·m).

12. Put clean hydraulic oil on the seal and ring on the piston and on the back-up ring and O-ring seal on the head.

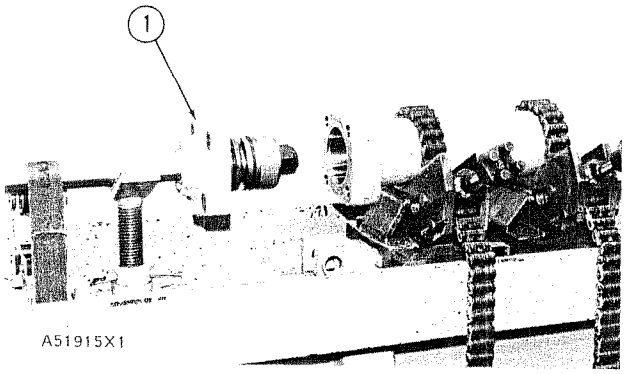
13. Make an alignment of the marks on the head and cylinder assembly. Slowly push the cylinder assembly on to the piston and head with tooling (E). Be careful not to damage the O-ring seal and the back-up ring on the head.



14. Make sure the rod is fully extended from the cylinder assembly and tighten the bolts that hold head (1).

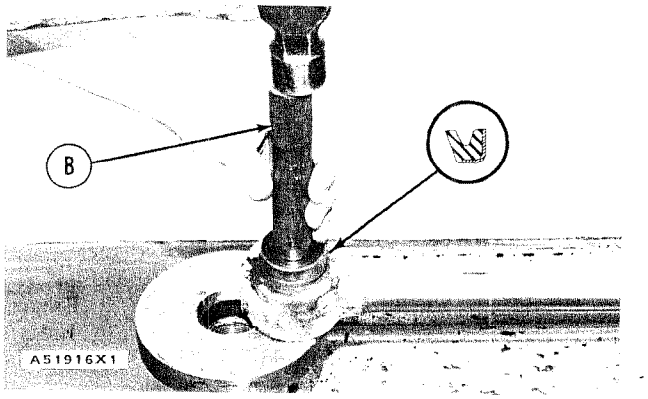
15. Remove the cylinder assembly from tooling (E).

16. Install the bearings in the cylinder assembly and rod assembly with tooling (G). Install the bearings until they are in the center of their bore.



17. Use tool group (B) to install the seals in the cylinder and rod assemblies until the seals make contact with the bearings.

NOTE: The lip of the seals must be toward the outside as shown.



end by:
a) install steering cylinders

BUCKET

REMOVE BUCKET 6101-11

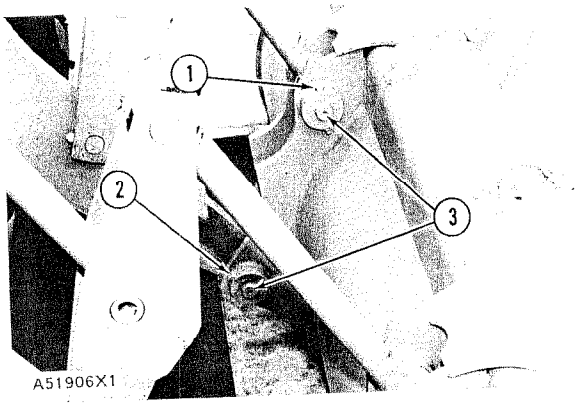
1. Make sure the bucket is flat on the ground.

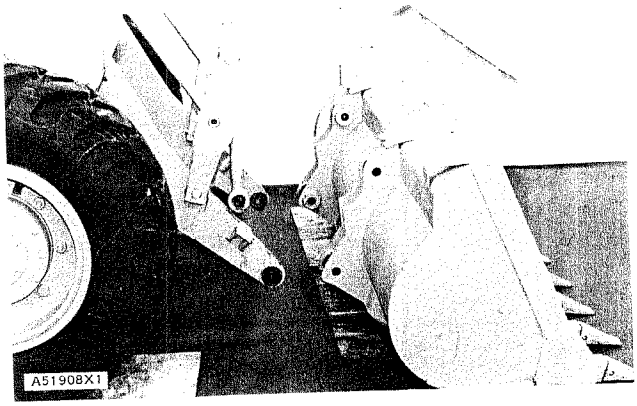
2. Stop the engine and move the hydraulic control levers backward and forward to release the pressure in the hydraulic system.

3. Remove bolts (1) and (2) from each side of the bucket.

4. Remove pins (3) and washers (used for the lower bucket pins) from both sides of the bucket.

5. Start the engine and move the machine away from the bucket. The weight of the bucket is:
   920-1650 lb. (743 kg)
   930-1875 lb. (849 kg)





INSTALL BUCKET 6101-12

1. Move the machine up to the bucket and put the lift arms in position in the lower bucket hinge bosses.

2. Put pins (2) in position in the lower bucket hinge boss with hole in the pin in alignment with the hole in the the boss.

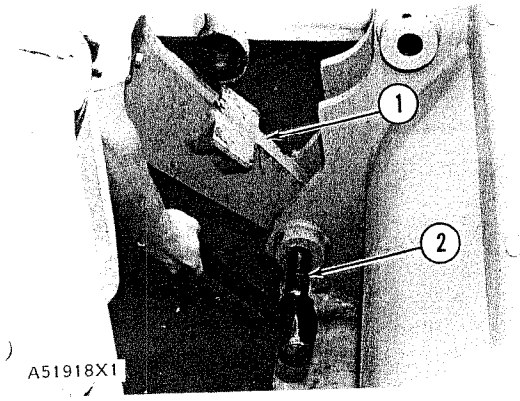
3. Install the washers on each side of lift arms (1). Push pins (2) into position.

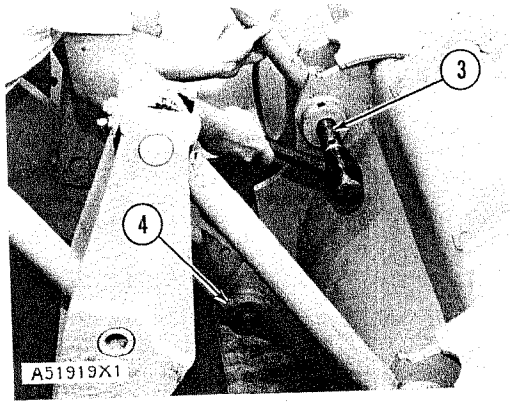
4. Install bolts (4) and the nuts to hold the lower pins in position.

5. Put the link assemblies in position in the upper bucket hinge bosses and install pins (3). Make sure the holes in the pins are in alignment with the holes in the bosses before the pins are installed all of the way.

6. Install the bolts and nuts to hold the upper pins in position.

7. Put clean grease in the four bucket pins.



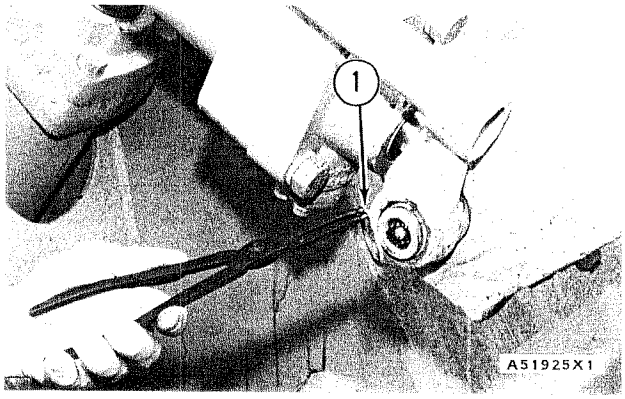


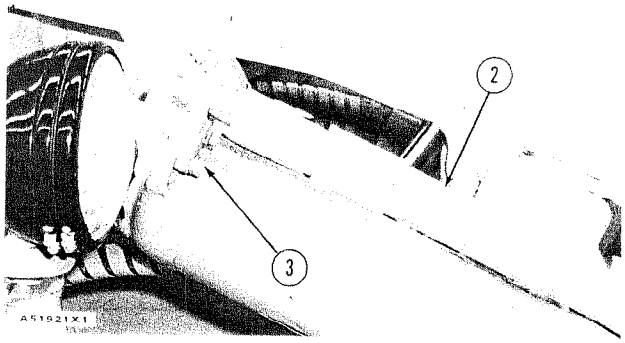
BUCKET POSITIONER

REMOVE BUCKET POSITIONER 5112-11

NOTE: The bucket is in the "RAISED" position for better photo illustration of the removal and installation of the bucket positioner.

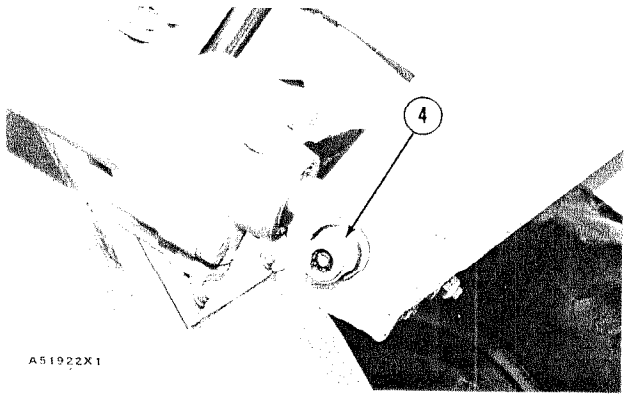
1. Remove ring (1) that holds the lower end of the bucket positioner.
2. Remove the two bolts (3) and remove bucket positioner (2) from the machine.
3. Remove bearing (4) from the tilt cylinder pin.

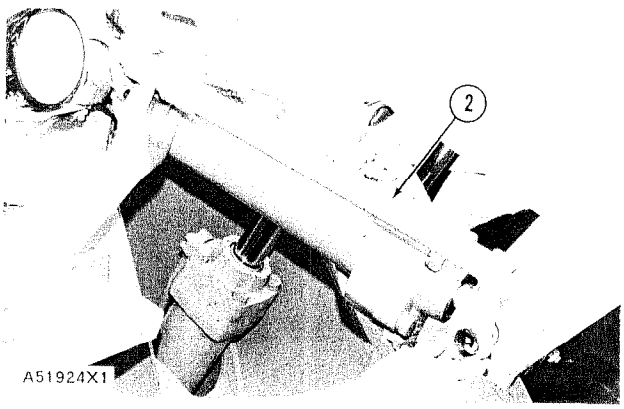


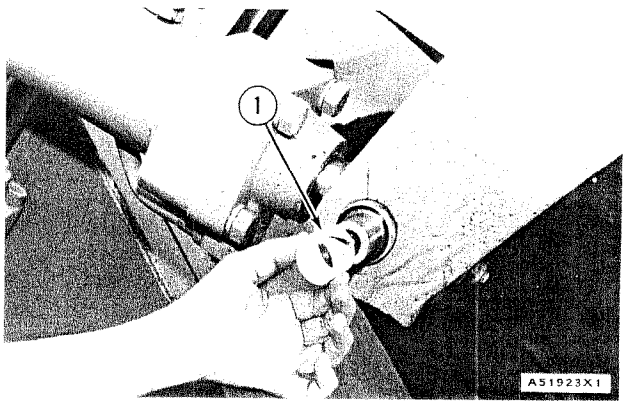


INSTALL BUCKET POSITIONER 5112-12

1. Install bearing (1) on the tilt cylinder pin.
2. Put bucket positioner (2) on the tilt cylinder and install the two bolts to hold it in position.
3. Install the ring on the tilt cylinder pin.
4. Make an adjustment of the bucket positioner. See BUCKET POSITIONER in TESTING AND ADJUSTING.







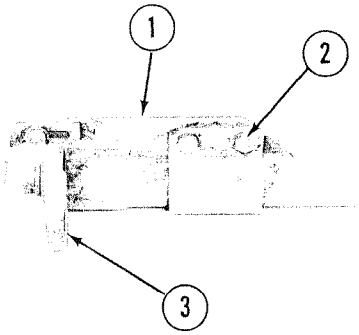
BUCKET POSITIONER

DISASSEMBLE BUCKET POSITIONER

5112-15

	Tools Needed	A
1P1857	Pliers	1

start by:
a) remove bucket positioner



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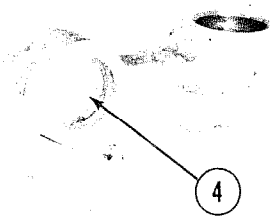
1. Remove bolts (2), cam (1) and the two clamps from the upper end of the tube assembly.

2. Remove the bolt and support (3) from the shaft.



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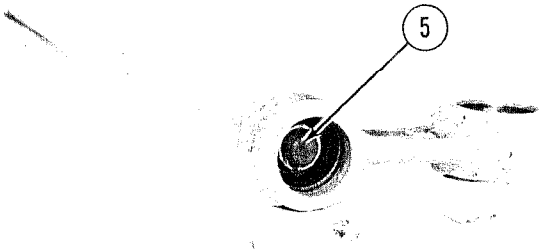
3. Use tool (A) and remove the ring that holds cover (4) in the lower end of the tube assembly. Remove cover (4).

4. Remove shaft (5) from the lower end of the tube assembly.



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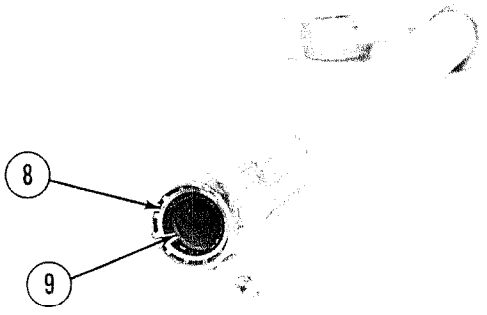
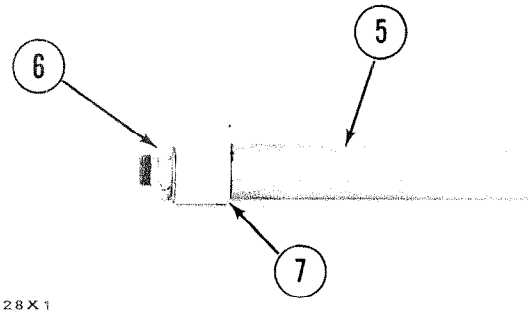
5. Remove nut (6), the washer and bearing (7) from shaft (5).

6. Remove ring (8), seal (9), the bearing and washer from the upper end of the tube assembly.



A51929X1



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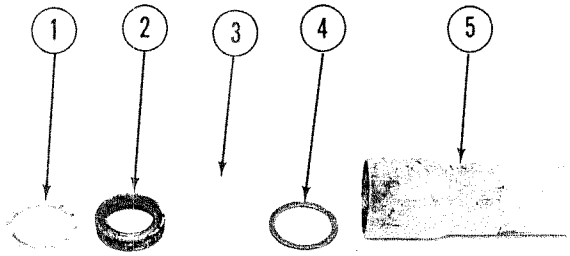
BUCKET POSITIONER

ASSEMBLE BUCKET POSITIONER

5112-16

	Tools Needed	A	B
1P510	Driver Group	1	
1P1857	Pliers		1

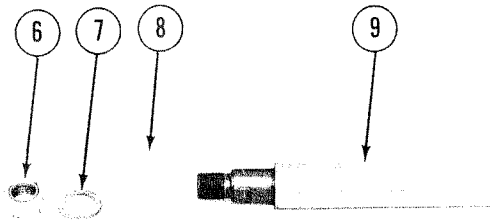
1. Install washer (4) and bearing (3) in the upper end of tube assembly (5).



A51930X1

2. Use tool group (B) to install seal (2) in tube assembly (5) with the lip of the seal toward the outside. Install ring (1).

3. Install bearing (8), washer (7) and nut (6) on shaft (9).



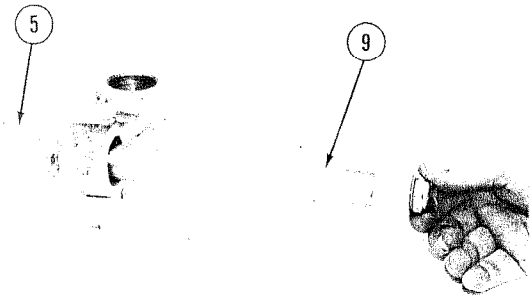
A51931X1

4. Put clean engine oil on bearings (3) and (8). Install shaft (9) in tube assembly (5).

5. Install cover (11) in the lower end of the tube assembly. Use tool (B) to install ring (10) in the tube assembly.

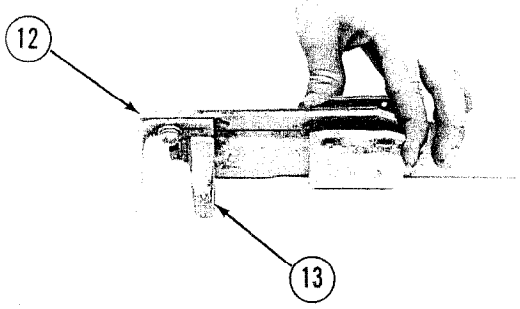
6. Install support (13) on the shaft.

7. Install cam (12) and the clamps on the tube assembly.

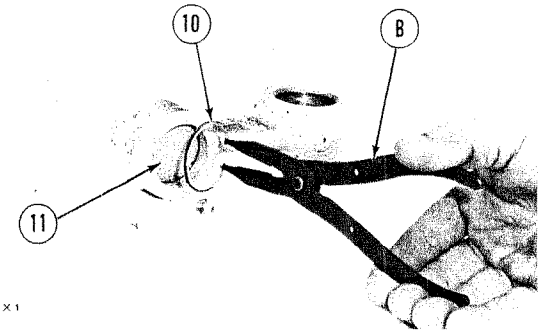


A54400X1

end by:
a) install bucket positioner



A54402X1



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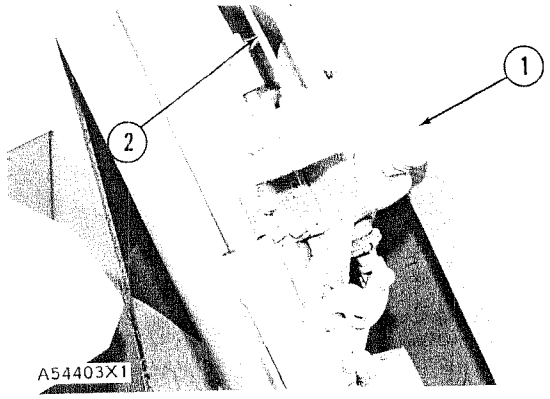
BUCKET POSITIONER MASTER CYLINDER

REMOVE BUCKET POSITIONER MASTER CYLINDER 5112-11

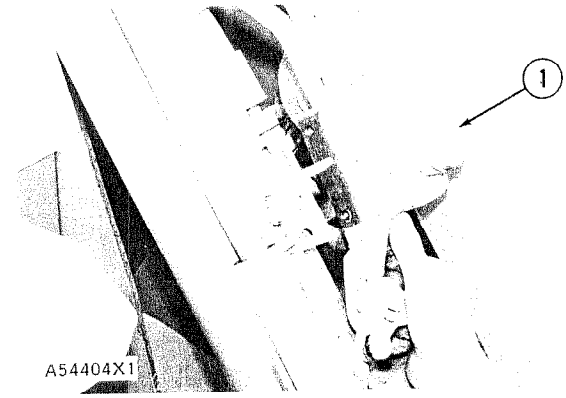
1. Disconnect line (2) from master cylinder (1).
2. Remove the two bolts and remove master cylinder (1) from the tilt cylinder.

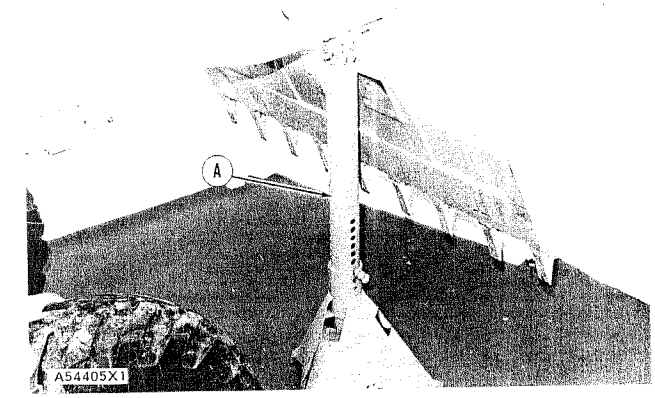


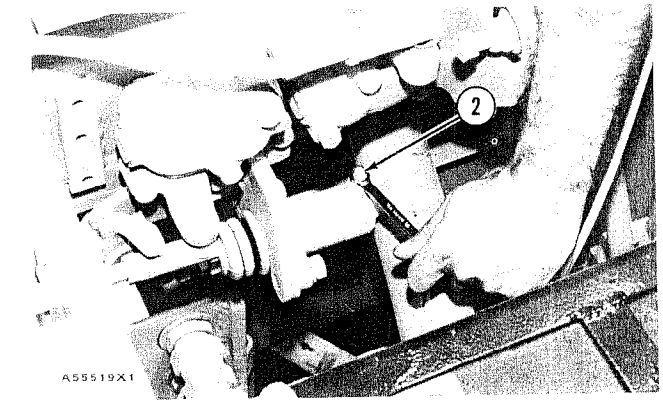
INSTALL BUCKET POSITIONER MASTER CYLINDER 5112-12

	Tools Needed	A
8S7630	Stand	1
8S7641	Tube	1
8S8048	Saddle	1
8S7615	Pin	1

1. Put master cylinder (1) in position on the tilt cylinder and install the two bolts to hold it.
2. Connect the oil line to master cylinder (1).
3. Start the engine and lift the bucket until the tilt cylinder is level. Stop the engine and put tooling (A) under the lift arm for support. Move the control lever to lower the weight of the lift arms and bucket on tooling (A).
4. Fill the master cylinder with brake fluid. Make sure the cap is installed on the master cylinder.
5. Fasten a hose to the bleed valve on the slave cylinder (found under the operator's seat). Put the loose end of the hose in a reservoir (container) of brake fluid until it is below the surface of the fluid.
6. Hold the tilt control lever in the "TILT BACK" position so the slave cylinder push rod does not move.
7. Activate the master cylinder several times and hold the rod and piston all of the way in the master cylinder bore.
8. Open the bleed valve (2) on the slave cylinder. Close the bleed valve when the pressure is not high enough to push brake fluid out.
9. Do Steps 1 through 5 until there are no air bubbles in the brake fluid that comes out of the bleed valve. Fill the master cylinder with brake fluid.
10. Remove tooling (A) from under the lift arms and lower the bucket to the ground.
11. Make an adjustment of the bucket positioner. See BUCKET POSITIONER in TESTING AND ADJUSTING.



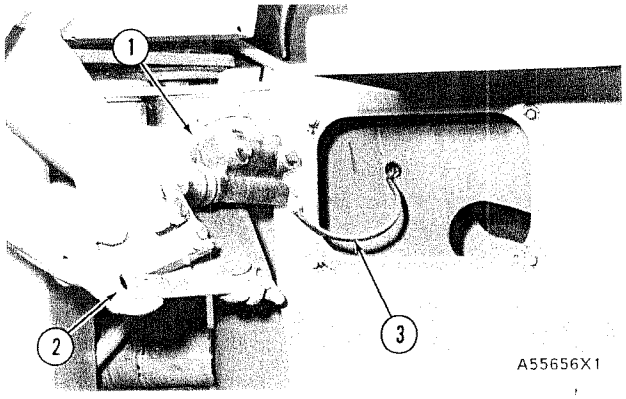




LIFT KICKOUT MASTER CYLINDER, BUCKET POSITIONER OR LIFT KICKOUT MASTER CYLINDER

REMOVE AND INSTALL KICKOUT MASTER CYLINDER 5109-10

1. Remove the four nuts and lockwashers that hold cover assembly (2) to the lower right side of the front frame.
2. Remove cover assembly (2) and master cylinder (1) from the frame. Disconnect oil line (3) from the master cylinder.
3. Connect oil line (3) to master cylinder (1).
4. Fill the master cylinder with brake fluid. Make sure the cap is installed on the master cylinder.
5. Fasten a hose to the bleed valve on the slave cylinder (found under the operator's seat). Put the loose end of the hose in a reservoir (container) of brake fluid until it is below the surface of the fluid.
6. Hold the lift control lever in the "RAISE" position so the slave cylinder push rod does not move.
7. Activate the master cylinder several times and hold the rod and piston all of the way in the master cylinder bore.
8. Open the bleed valve (4) on the slave cylinder. Close the bleed valve when the pressure is not high enough to push brake fluid out.
9. Do Steps 1 through 5 until there are no air bubbles in the brake fluid that comes out of the bleed valve. Fill the master cylinder with brake fluid.
10. Put master cylinder (1) and cover assembly (2) in position. Install the four nuts and lockwashers that hold the cover assembly.



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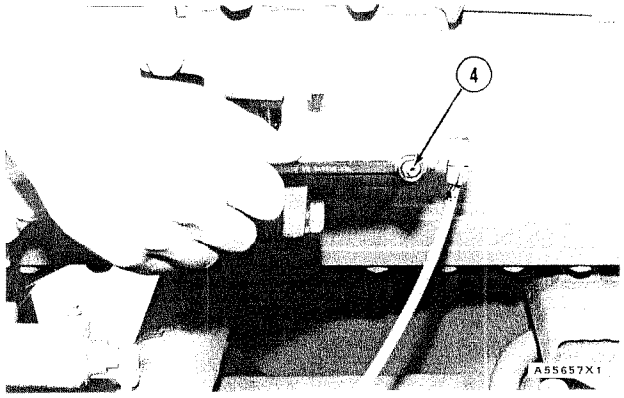


A55657X1

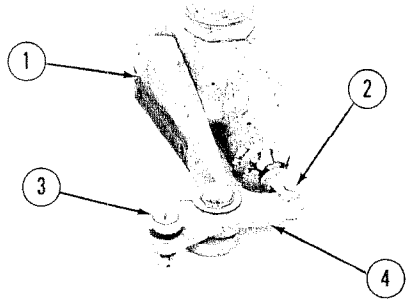
DISASSEMBLE BUCKET POSITIONER OR LIFT KICKOUT MASTER CYLINDER 5112 & 5109-15

	Tools Needed	A	B
1P1855	Pliers	1	
1P510	Driver Group		1

start by:

a) remove bucket positioner or lift kickout master cylinder

1. Remove cotter pin and pin (2). Use tool (A) to remove the ring that holds lever assembly (4) in position. Remove lever assembly (4) and the lock from bracket assembly (1).
2. Remove the nut, washer and roller (3) from lever assembly (4).



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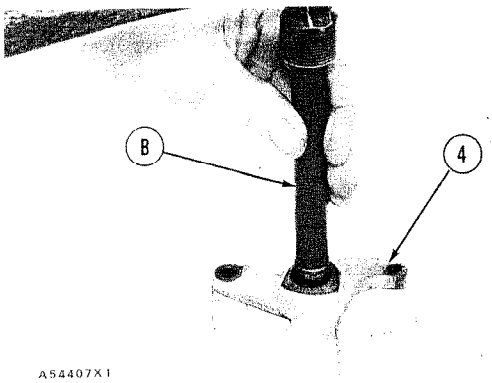
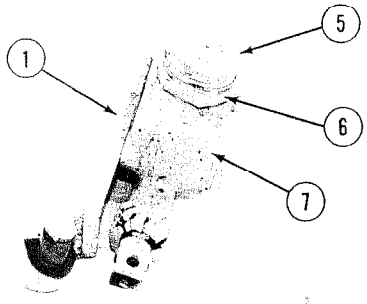
BUCKET POSITIONER OR LIFT KICKOUT MASTER CYLINDER

3. Remove the bearing from lever assembly (4) with tool group (B).



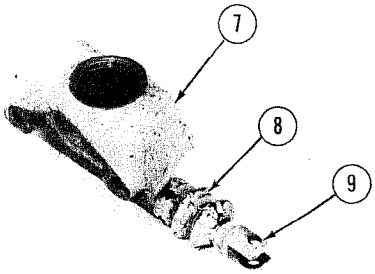
A54407X1

4. Remove bracket assembly (1), cap (5), the diaphram, adapter (6) and the gasket from cylinder assembly (7).



A54408X1

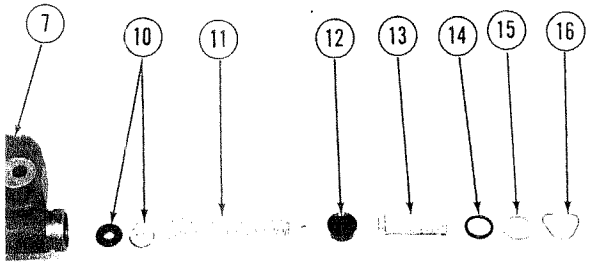
5. Pull boot (8) and rod assembly (9) from cylinder assembly (7).



A54409X1

6. Remove lockwire (16), plate (15), piston assembly (13), cup (12), spring and retainer assembly (11) and seat assembly (10) from cylinder assembly (7). Remove seal (14) from piston assembly (13).

NOTE: A master cylinder repair kit is available. The kit includes a valve and seat assembly, cup, piston assembly, plate, boot and lockwire. When the master cylinder is disassembled for service, always install a repair kit.



A54410X1

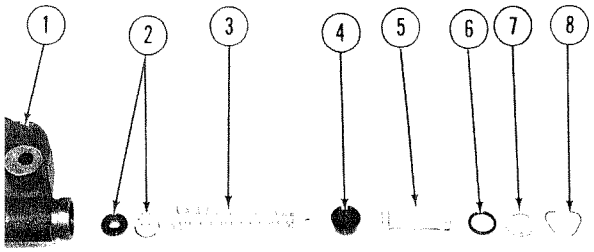
BUCKET POSITIONER OR LIFT KICKOUT MASTER CYLINDER

ASSEMBLE BUCKET POSITIONER OR LIFT KICKOUT MASTER CYLINDER 5112 & 5109-16

	Tools Needed	A	B
1P510	Driver Group	1	
1P1855	Pliers		1

NOTE: When the hydraulic system is serviced use caution to prevent introduction of foreign material into the brake fluid. Damaged or worn rubber parts are an indication of other fluids in the system. Flush and clean the system with denatured alcohol or clean brake fluid.

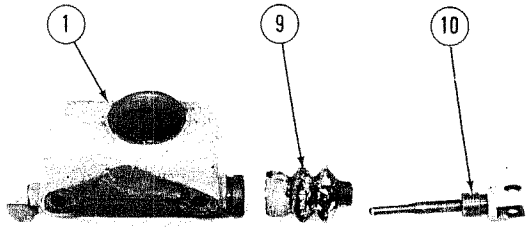
1. Put clean brake fluid on the inside parts of the master cylinder at assembly.
2. Inspect the bore in the master cylinder. Use a brake cylinder hone to remove any rough areas or corrosion in the master cylinder bore. If the cylinder bore has deep scratches a replacement of the master cylinder is needed.
3. Make sure the master cylinder bore is clean. Install seat assembly (2) with the seal and the end of the seat that has the larger outside diameter toward the rear of cylinder assembly (1).
4. Install spring and retainer assembly (3) as shown. Make sure the retainer is installed on the small end of the spring. Install cup (4) with the open end toward spring (3).
5. Install seal (6) in the groove of piston assembly (5) and install the piston assembly as shown. Install plate (7) and lockwire (8).



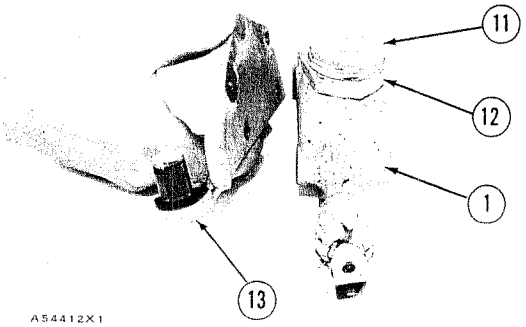
A54410X2

CAUTION

Make sure lockwire (8) is fitted correctly in the groove of cylinder assembly (1) and piston assembly (5) moves back against plate (7).

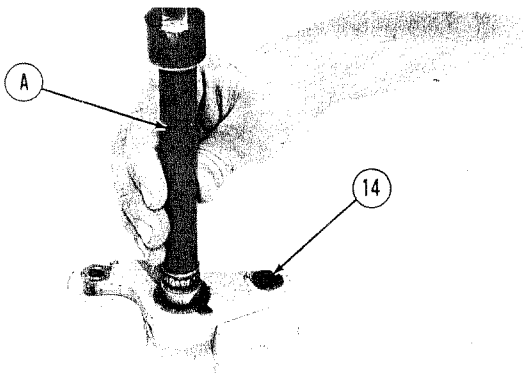


A54411X1



A54412X1

6. Install boot (9) on cylinder assembly (1). Install rod assembly (10) in the cylinder assembly and boot.
7. Install the gasket and adapter (12) in cylinder assembly (1). Tighten adapter (12) to a torque of 150 lb.ft. (205 N·m).
8. Install the diaphram and cover (11).
9. Put bracket assembly (13) in position and install the two bolts that hold it to cylinder assembly (1).
10. Install the bearing in lever assembly (14) with tool group (A) until the bearing is in the center of its bore.



A54413X1

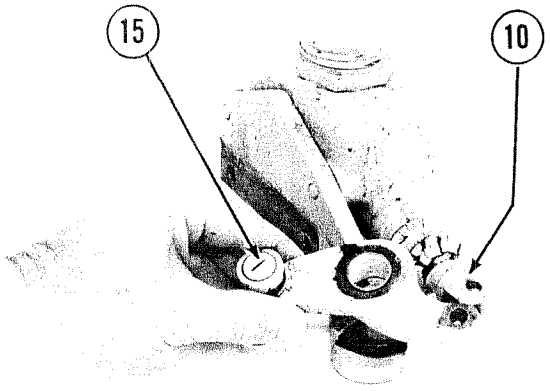
BUCKET POSITIONER OR LIFT KICKOUT MASTER CYLINDER, BUCKET POSITIONER AND LIFT KICKOUT SLAVE CYLINDERS

11. Install roller (15) and the nut on the lever assembly.

12. Put the lever assembly in position on the bracket assembly.

13. Put 5P960 Multipurpose Type Grease on the pin that holds the lever assembly to rod assembly (10). Install the pin and cotter pin.

14. Install the lock and use tool (B) to install the ring that holds the lever assembly to the bracket assembly.

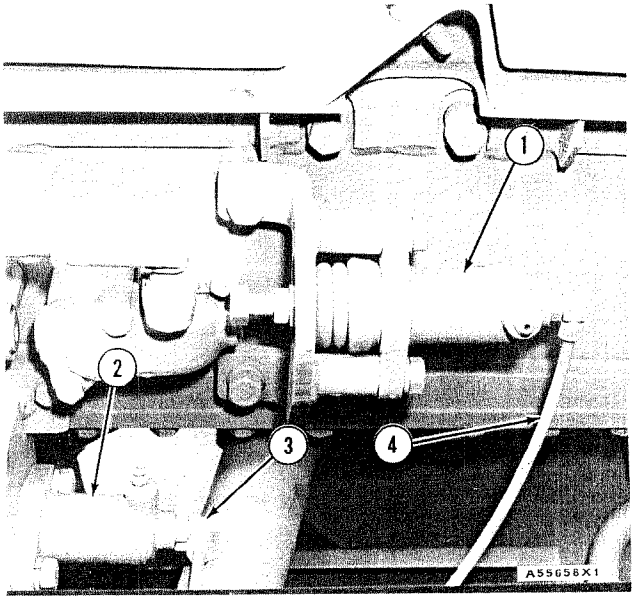


A54414X1

end by:
a) install bucket positioner or lift kickout master cylinder

REMOVE AND INSTALL BUCKET POSITIONER AND LIFT KICKOUT SLAVE CYLINDERS 5112 & 5109-10

1. Lift the operator's seat.
2. Disconnect oil line (4) from lift kickout slave cylinder (1). Disconnect oil line (3) from bucket positioner slave cylinder (2).
3. Remove the bolts that hold slave cylinders (1) and (2) and remove them from the machine.
4. Put slave cylinders (1) and (2) in position on the back of the hydraulic tank. Install the bolts that hold the cylinders.
5. Connect oil lines (3) and (4) to slave cylinders (2) and (1).
6. Remove (bleed) the air from the bucket positioner and lift kickout systems. See Install Bucket Positioner Master Cylinder for this procedure.
7. Make an adjustment to the slave cylinders. See Bucket Positioner Indicator and Positioner also Lift Kickout in TESTING AND ADJUSTING.



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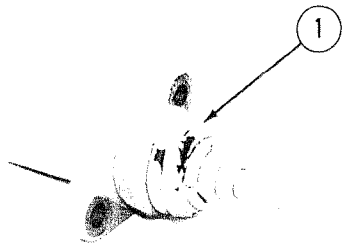
BUCKET POSITIONER OR LIFT KICKOUT SLAVE CYLINDER

DISASSEMBLE BUCKET POSITIONER OR LIFT KICKOUT SLAVE CYLINDER 5112 OR 5109-15

	Tools Needed	A
1P1857	Pliers	1

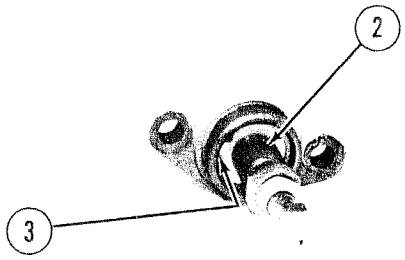
start by:

a) remove bucket positioner or lift kickout slave cylinder



A55659X1

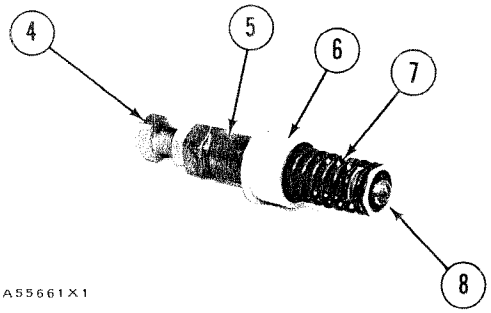
1. Remove boot (1) from the cylinder.



A55660X1

2. Remove ring (3) from the cylinder with tool (A).

3. Remove push rod and spring assembly (2) from the cylinder. Remove the piston assembly from the cylinder.



A55661X1

NOTE: The individual parts of the push rod and spring assembly can not be ordered separately.

4. The push rod and spring assembly can be disassembled to clean and inspect as follows:
   a) Push spring (7) and retainer (8) toward bolt (4). Remove the rings that hold retainer (8) in position.
   b) Remove retainer (8), spring (7) and seat (6) from rod (5).
   c) Remove bolt (4) and the nut from rod (5).

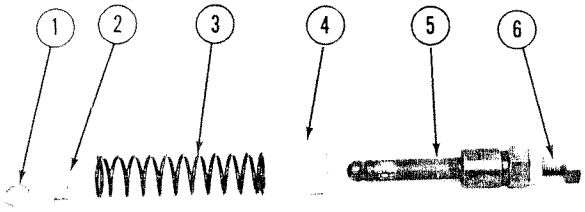
NOTE: A cylinder repair kit is available. The kit includes a piston, cup, cup retainer, two retainer rings, lockwire and a boot. When the slave cylinder is disassembled for service, always install a repair kit.

BUCKET POSITIONER OR LIFT KICKOUT SLAVE CYLINDER

ASSEMBLE BUCKET POSITIONER OR LIFT KICKOUT SLAVE CYLINDER 5112 OR 5109-16

	Tools Needed	A
1P1857	Pliers	1

NOTE: When the hydraulic system is serviced, use caution to keep foreign material out of the brake fluid. Damaged or worn rubber parts are an indication of other fluids in the system. Flush and clean the system with denatured alcohol or clean brake fluid.



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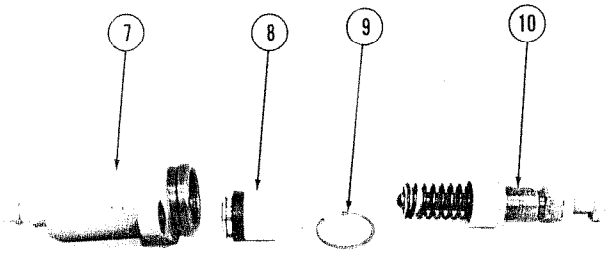

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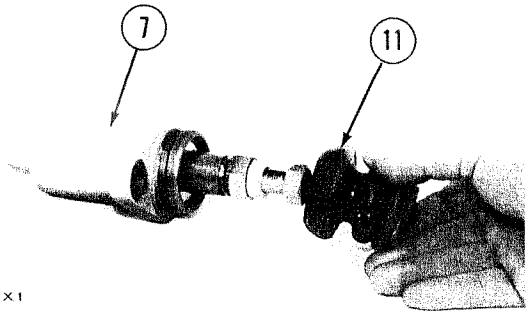


A55665X1

1. Put clean brake fluid on the inside parts of the cylinder at assembly.

2. Inspect the bore in the cylinder. Use a brake cylinder hone to remove any rough areas or corrosion in the cylinder bore. If the cylinder bore has deep scratches a replacement of the cylinder is needed.

3. Install the nut and bolt (6) in the end of rod (5).

4. Install seat (4), spring (3) and retainer (2) on rod (5).

5. Push retainer (2) toward bolt (6) and install rings (1) to hold the retainer in position.

6. Install the cup on piston assembly (8).

7. Make sure the cylinder bore is clean and install piston assembly (8), the push rod and spring assembly (10) in cylinder (7).

8. Use tool (A) to install ring (9) that holds the push rod and spring assembly in position.

9. Install boot (11) on cylinder (7).

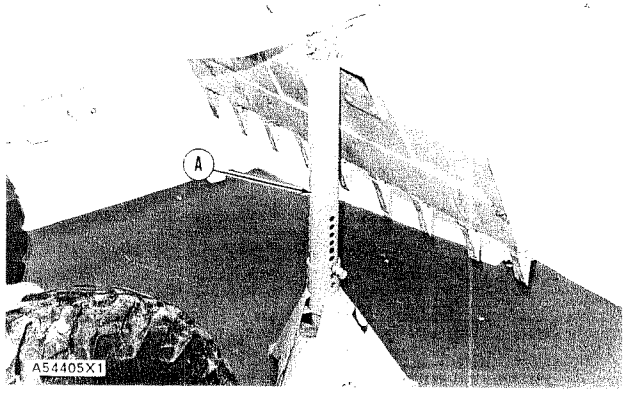
end by:
a) install bucket positioner or lift kickout slave cylinder

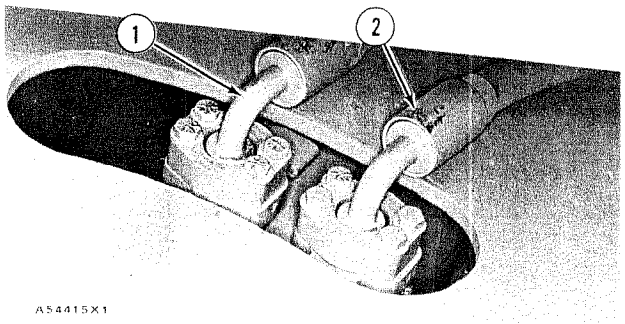
LIFT CYLINDERS

REMOVE LIFT CYLINDERS 5102-11

	Tools Needed	A	B	C
8S7630	Stand	1		
8S7641	Tube	1		
8S8048	Saddle	1		
8S7615	Pin	1		
1P7421	Tap (1"-14 NF)		1	
7F9540	Hydraulic Puller			1
5F7693	Spacer (part of 5F7334 Spacer Group)			1
1B4209	Nut (part of 8B7548 Puller Assembly)			1
5F7366	Stud (part of 8B7548 Puller Assembly)			1
5P3100	Pump Group			1

1. Lift the bucket and put tooling (A) in position under the lift arm for support. Move the control lever and lower the weight of the lift arms and bucket on tooling (A) as shown.

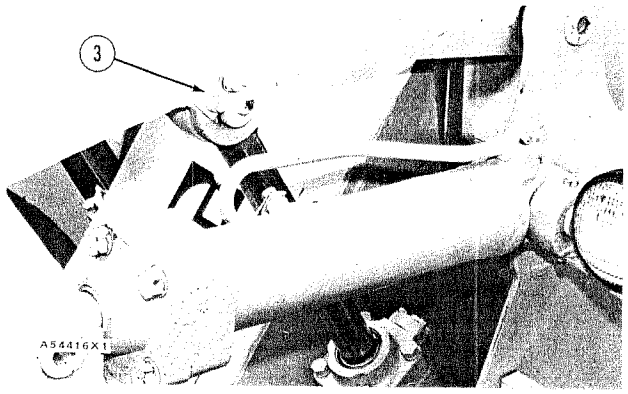




VIEW FROM UNDER MACHINE

⚠ WARNING

Stop the engine, move all control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.



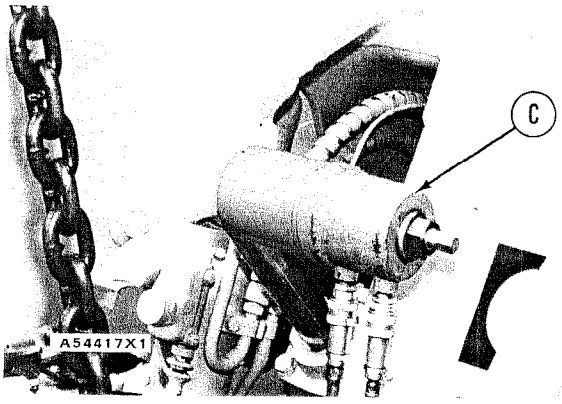
2. Disconnect hose assemblies (1) and (2) from inside the front frame.

3. Remove bar (3) that holds the rod pin.

4. Fasten a hoist to the lift cylinder.

5. If necessary use tool (B) to clean the threads of the rod pin.

6. Install tool (C) and remove the rod pin from inside of the lift arm.

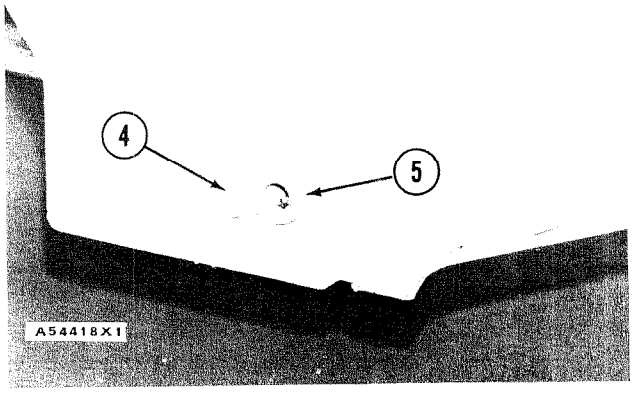


LIFT CYLINDERS

7. Remove bar (4) that holds the cylinder pin in the frame.

8. If necessary use tool (B) to clean the threads in the cylinder pin (5). Use tool (C) and remove the cylinder pin.

9. Remove the lift cylinder. The weight of the cylinder is 168 lb. (76 kg).



INSTALL LIFT CYLINDERS 5102-12

	Tools Needed	A
8S7630	Stand	1
8S7641	Tube	1
8S8048	Saddle	1
8S7615	Pin	1

1. Pull the rod (1) almost all of the way out of the cylinder.

2. Fasten a hoist to the lift cylinder and put it in position on the machine.

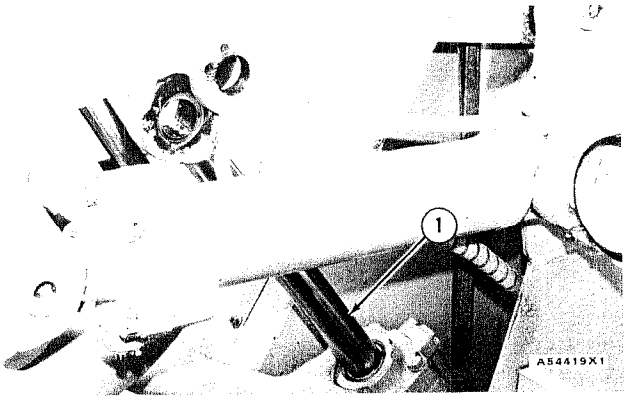
3. Install pins (2) and (3) to hold the cylinder in position. Install the bars to hold pins (2) and (3).

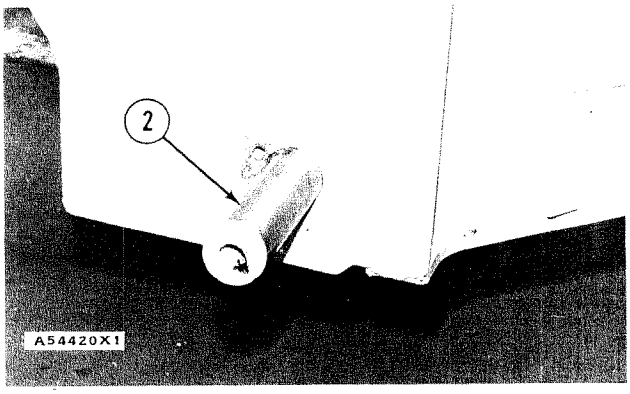
4. Put clean hydraulic oil on the O-ring seals and connect hose assemblies (4) and (5) to the lift cylinder.

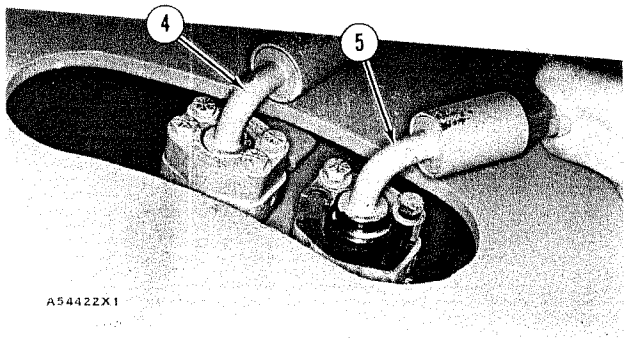
5. Put clean grease in the cylinder pins.

6. Remove tooling (A) from under the lift arms and lower the bucket to the ground.

7. Fill the hydraulic system with oil to the correct level.







VIEW FROM UNDER MACHINE



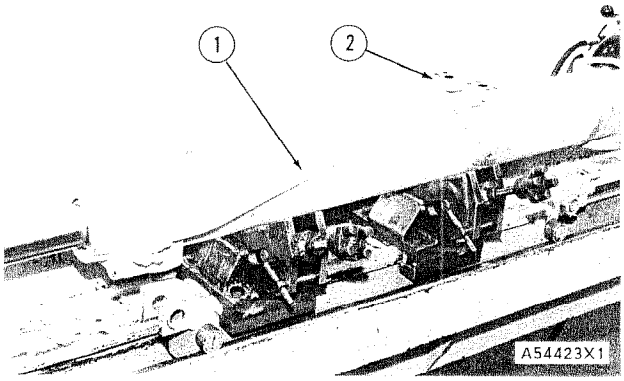
LIFT CYLINDERS

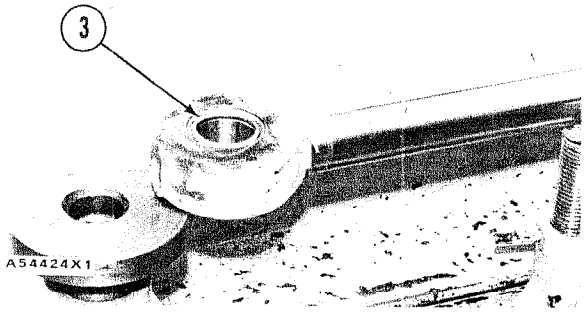
DISASSEMBLE LIFT CYLINDERS 5102-15

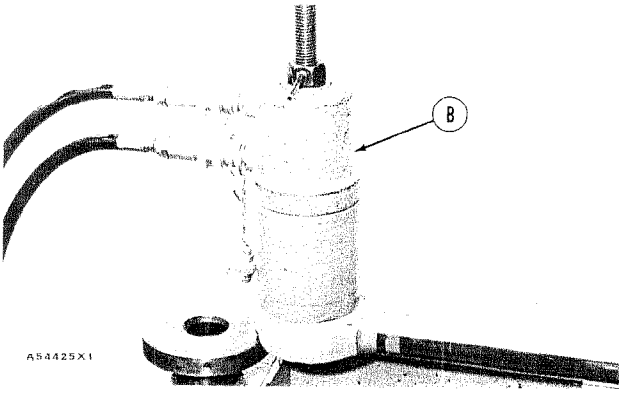
	Tools Needed	A	B	C	D
1P1784	Hydraulic Cylinder Repair Stand	1			
5P3100	Pump Group	1	1	1	
7F9540	Hydraulic Puller		1	1	
9S5559	Stud		1	1	
1P543	Nut		1	1	
5F7693	Spacer (part of 5F7334 Spacer Group)		1	1	
1P1833	Adapter		1		
1P1834	Adapter			1	
1P850	Torque Multiplier				1
1P851	Spline Adapter				1
1P852	Male Adapter				1
5S6077	Socket				1

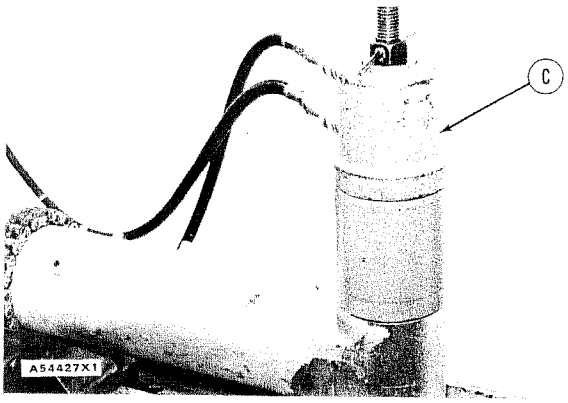
start by:
a) remove lift cylinders

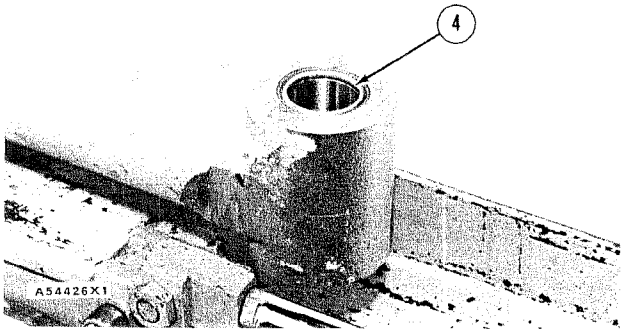
1. Fasten a hoist to the lift cylinder and put it in position on tooling (A).
2. Remove tube assemblies (1) and (2) from the cylinder assembly.
3. Remove seals (3) from each side of the rod assembly.
4. Use tooling (B) to pull the bearing out of the rod assembly.
5. Remove seals (4) from each side of the cylinder assembly.
6. Use tooling (C) to pull the bearings and spacer from the cylinder assembly.





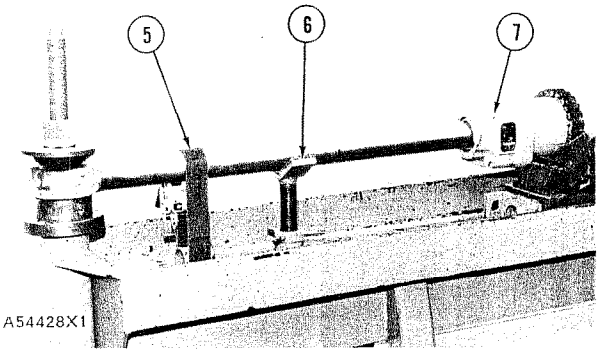






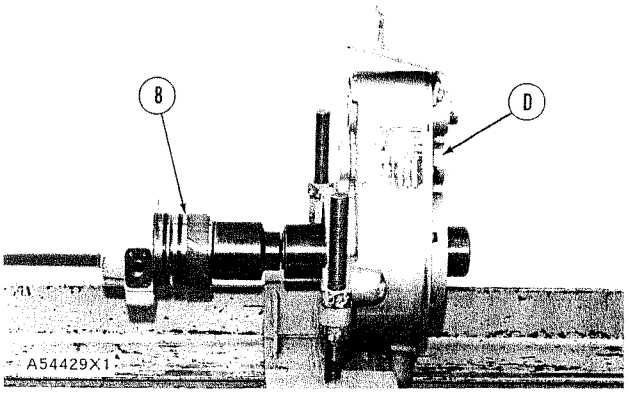
LIFT CYLINDERS

7. Make sure support (6) is in position under the rod and fasten strap (5) around the rod to hold it.



8. Put a mark on the head and cylinder assembly for correct alignment at assembly. Remove four bolts (7).

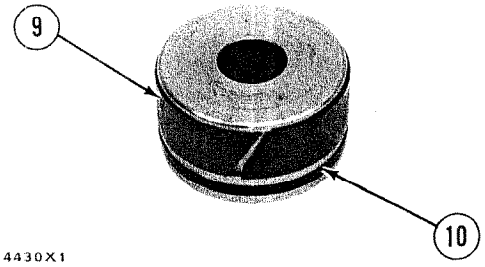
9. Pull the cylinder away from the rod and head with tooling (A).



10. Use tooling (D) to remove the nut that holds piston (8) on the rod. Remove piston (8) from the rod.

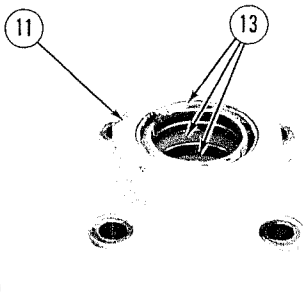
11. Remove wear ring (9) and seal assembly (10) from the piston.

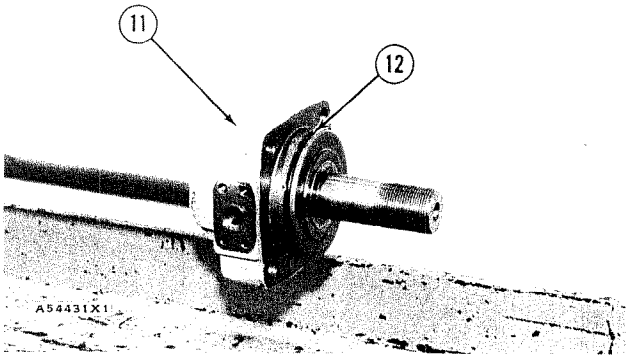
12. Remove head (11) from the rod.



13. Remove the back-up ring and O-ring seal (12) from head (11).

14. Remove three seals (13) from head (11).





LIFT CYLINDERS

ASSEMBLE LIFT CYLINDERS 5102-16

	Tools Needed	A	B	C	D	E	F	G	H
5F2980	Seal Installer	1							
1P510	Driver Group		1						
1P765	Seal Guide			1					
4S9181	Seal Expander				1				
1P1784	Hydraulic Cylinder Repair Stand					1			
5P3100	Pump Group					1		1	1
1P850	Torque Multiplier						1		
1P851	Spline Adapter						1		
1P852	Male Adapter						1		
5S6077	Socket						1		
7F9540	Hydraulic Puller							1	1
9S5559	Stud							1	1
1P543	Nut							1	1
1P1834	Adapter							1	
1P1833	Adapter								1

1. Use tool (A) to install seal (4) in head (1).

2. Install seal (3) in the head with the lip of the seal toward seal (4).

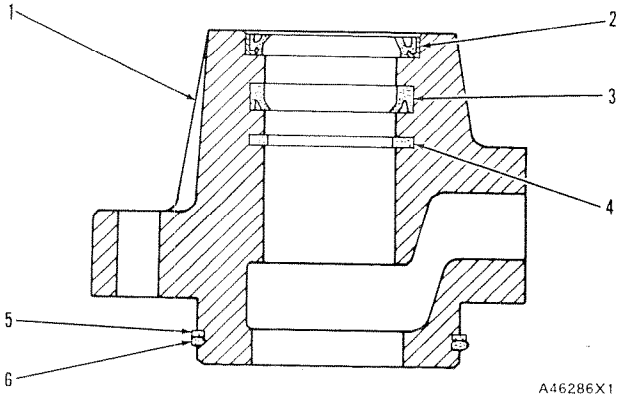
3. Use tool group (B) to install seal (2) in the head with the lip of the seal toward the outside.

4. Install O-ring seal (6) and back-up ring (5) in the head as shown.

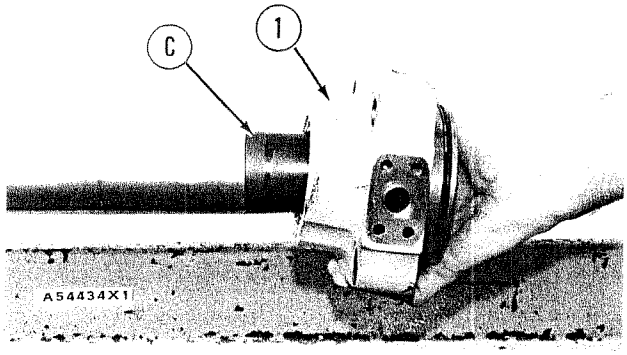
5. Put the cylinder assembly and rod on tooling (E).

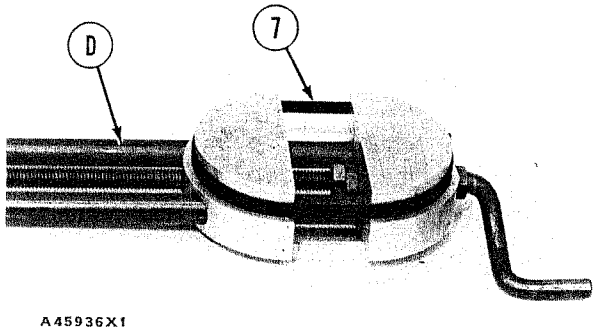
6. Install tool (C) on the rod. Put clean hydraulic oil on the lips of the seals in the head. Push the head on the rod. Remove tool (C) from the rod.

7. Use tool (D) to cause expansion of the plastic seal (7) of the piston seal assembly.



TYPICAL EXAMPLE





LIFT CYLINDERS

8. Install the rubber expansion ring in the groove of the piston and install plastic seal (7) over the rubber expansion ring.

9. Install wear ring (9) on the piston. Install piston (8) on the rod as shown.

10. Use tooling (F) to tighten the nut that holds the piston on the rod. Tighten the nut to a torque of 1200 ± 120 lb.ft. (1620 ± 160 N·m).

11. Put clean hydraulic oil on the seal and wear ring on the piston and on the back-up ring and O-ring seal on the head.

12. Make an alignment of the marks on the head and cylinder assembly. Slowly push the cylinder assembly on to the piston and head with tooling (E). Be careful not to damage the O-ring seal and the back-up ring on the head.

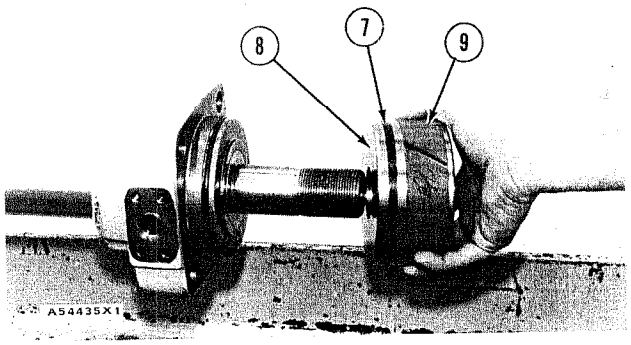
13. Make sure the rod is fully extended from the cylinder assembly and tighten the bolts that hold head (1).

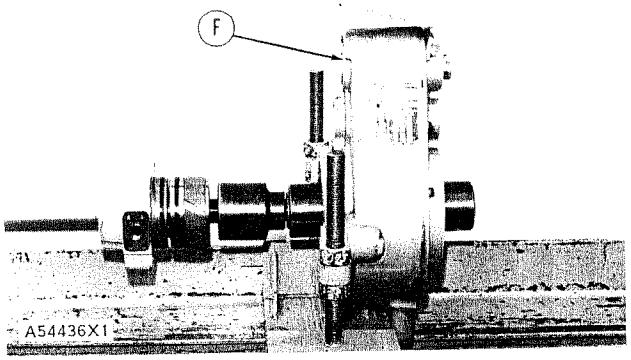
14. Remove the cylinder assembly from tooling (E).

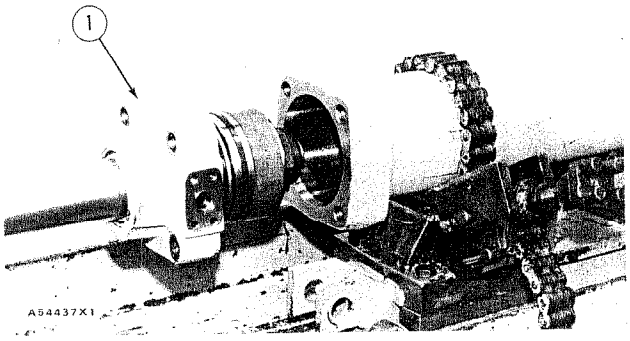
15. Use tooling (G) to pull a bearing in the cylinder assembly bore until it is .312 in. (7.92 mm) from the surface of the cylinder assembly.

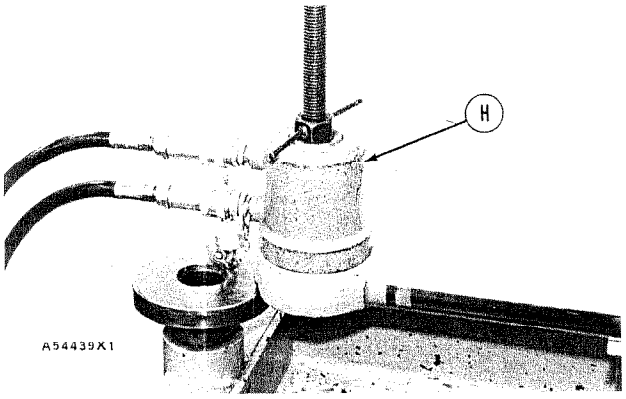
16. Turn the cylinder assembly over and use tooling (G) to pull the spacer and second bearing in the cylinder assembly bore until the spacer makes contact with the first bearing installed.

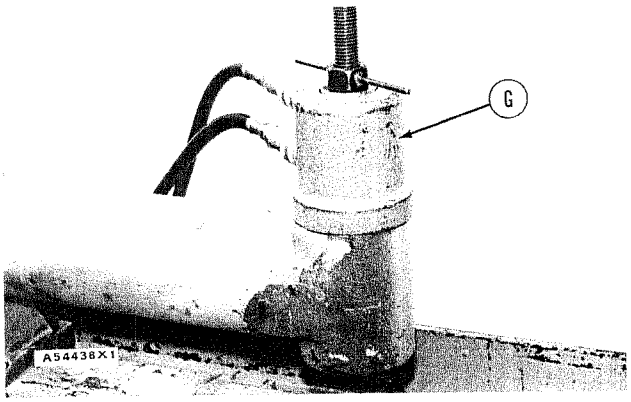
17. Use tooling (H) to pull the bearing into the rod assembly until it is in the center of its bore.







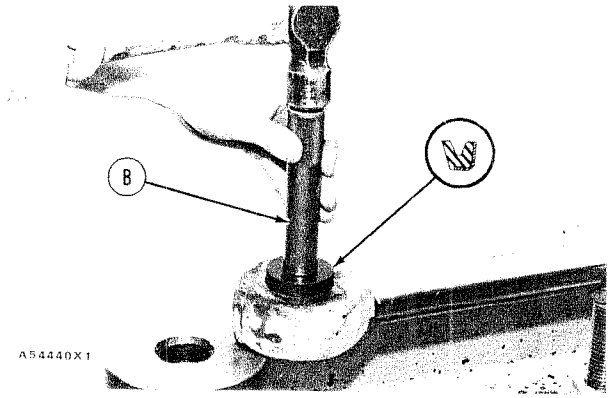




LIFT CYLINDERS, TILT CYLINDERS

18. Use tool group (B) to install the seals in the cylinder and rod assemblies until the seals make contact with the bearings.

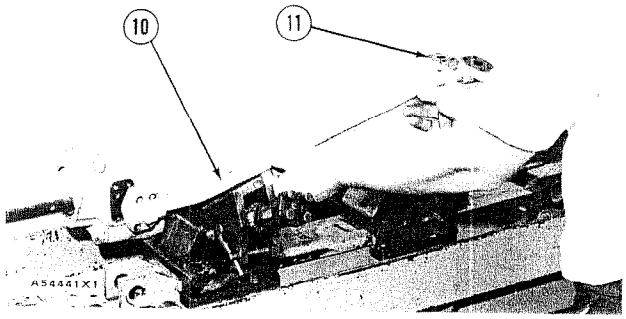
NOTE: The lip of the seals must be toward the outside as shown.



19. Put clean hydraulic oil on the O-ring seals and install tube assemblies (10) and (11) on the cylinder assembly.
end by:
a) install lift cylinders

REMOVE TILT CYLINDERS 5104-11

	Tools Needed	A	B
1P7421	Tap (1"-14 NF)	1	
7F9540	Hydraulic Puller		1
9S5565	Sleeve Assembly		1
9S5559	Stud		1
1P543	Nut		1
5P3100	Pump Group		1

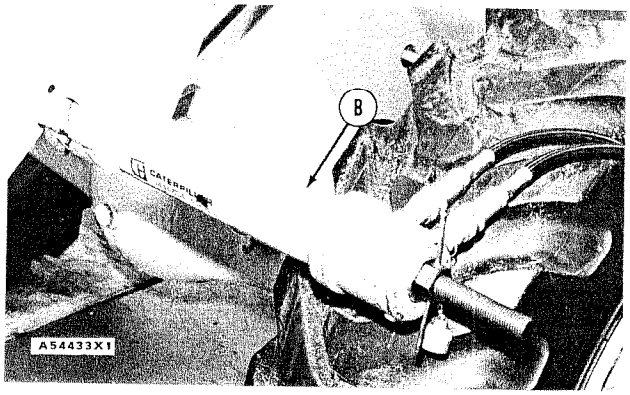


start by:
a) remove bucket positioner*
b) remove bucket positioner master cylinder*
*NOTE: These steps are needed for the right side only.

1. Lift the bucket until tooling (B) can be installed. Install blocks or stands under the lift arms and bucket for support.

⚠ WARNING

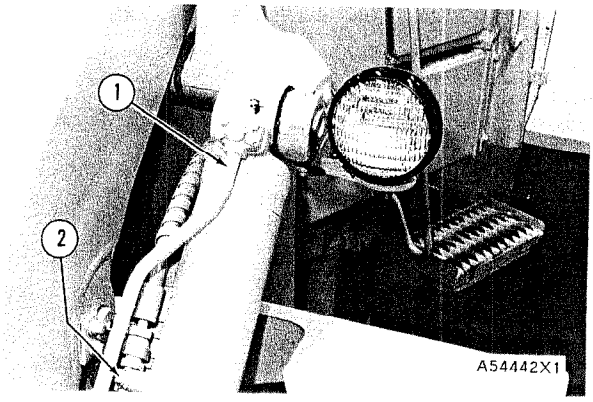
Stop the engine and move all control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.



2. Fasten a hoist to the tilt cylinder.
3. If necessary use tool (A) and clean the threads in the rod pin.
4. Remove the bolt that holds the rod pin. Install tooling (B) and remove the rod pin.

NOTE: Tooling (B) can not be used on the right side.

5. Remove two bolts (2) that hold the upper tube assembly (1) and the lower tube assembly to the tilt cylinder.
6. Disconnect upper tube assembly (1) and the lower tube assembly from the tilt cylinder. Move the tube assemblies out of the way for removal of the tilt cylinder.



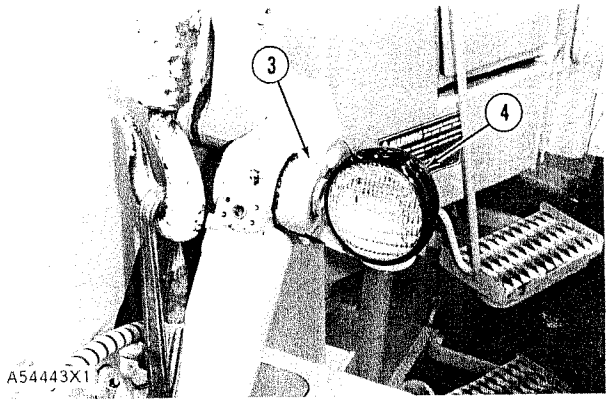
TILT CYLINDERS

7. Disconnect the wire from headlight (4).

8. Remove bolt (3) and headlight (4) from the frame.

9. If necessary use tool (A) and clean the threads of the cylinder pin.

10. Install tooling (B) and remove the cylinder pin. Remove the tilt cylinder. The weight of the tilt cylinder is 110 lb. (49.5 kg).

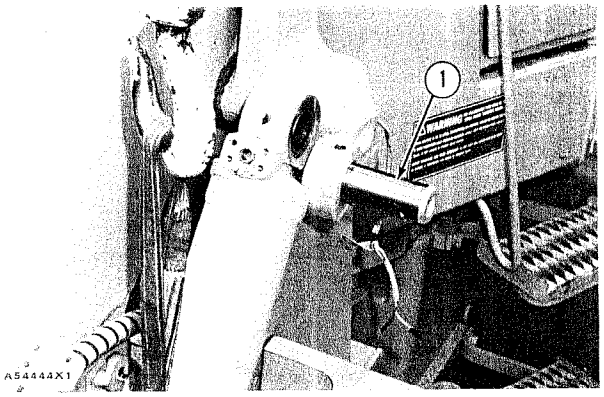


INSTALL TILT CYLINDERS 5104-12

1. Fasten a hoist to the tilt cylinder and put it in position in the machine.

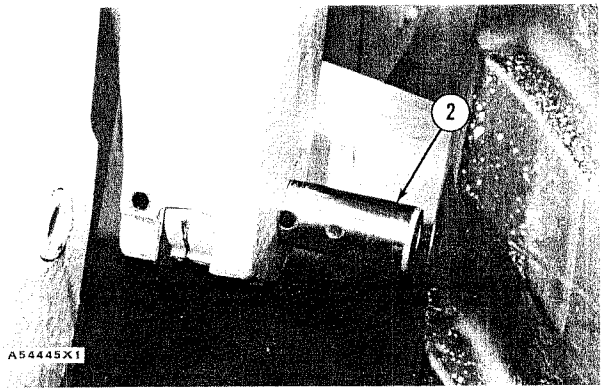
2. Install cylinder pin (1) with the hole in the pin in alignment with the hole in the frame.

3. Put the headlight in position and install the bolt that holds it and the cylinder pin.



4. Put the rod in position and install rod pin (2) with the hole in the pin in alignment with the hole in the lever.

5. Install the bolt that holds the rod pin.



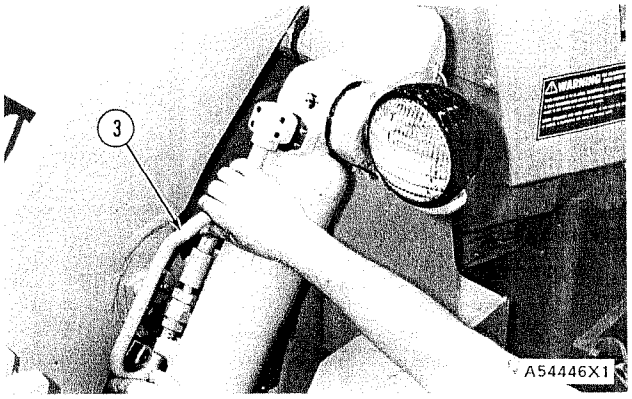
6. Put clean hydraulic oil on the O-ring seals. Connect the lower tube assembly and upper tube assembly (3) to the tilt cylinder. Install the bolts that hold the tube assembly clamps.

7. Put clean grease in the cylinder and rod pins.

8. Remove the blocks or stands from under the bucket and lift arms. Lower the bucket to the ground.

9. Fill the hydraulic system with oil to the correct level.

end by:
a) install bucket positioner
b) install bucket positioner master cylinder



TILT CYLINDERS

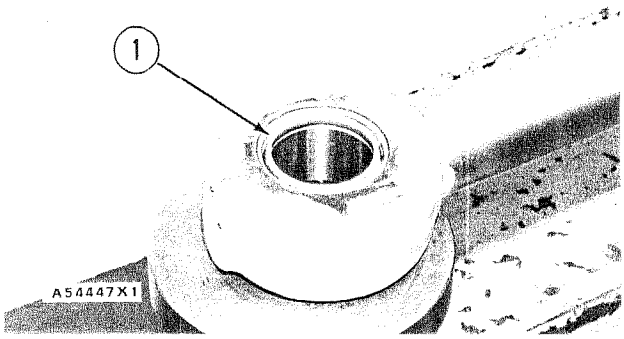
DISASSEMBLE TILT CYLINDERS 5104-15

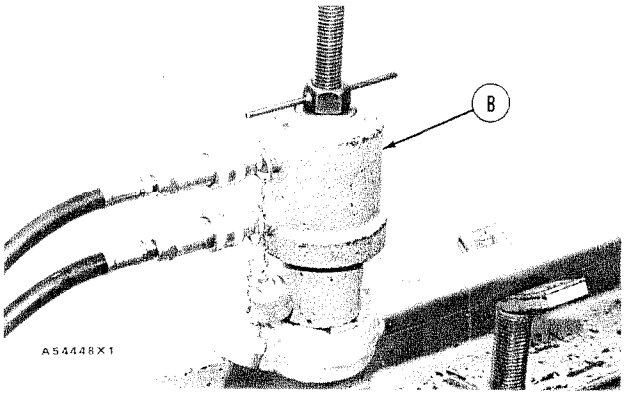
	Tools Needed	A	B	C
1P1784	Hydraulic Cylinder Repair Stand	1		
5P3100	Pump Group	1	1	
7F9540	Hydraulic Puller		1	
7M7238	Sleeve (part of 7M7236 Adapter Group)		1	
5P2145	Adapter		1	
9S5559	Stud		1	
1P543	Nut		1	
1P580	Torque Multiplier			1
1P581	Spline Adapter			1
1P582	Male Adapter			1
5S6077	Socket			1

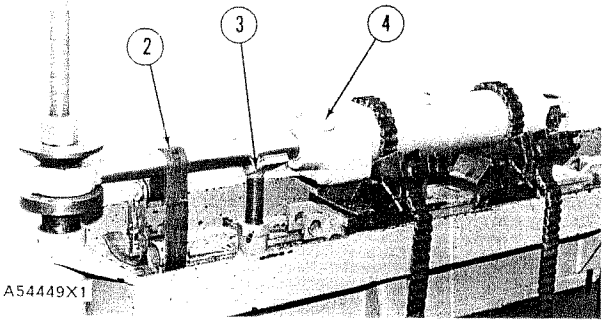
start by:

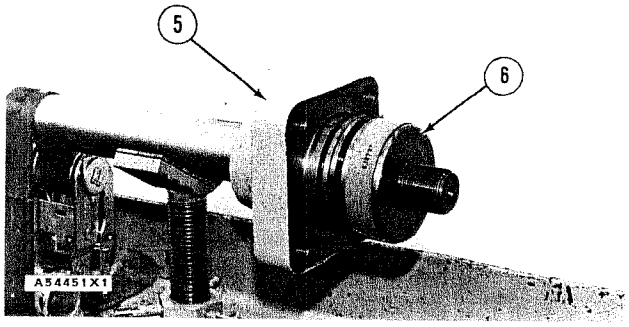
a) remove tilt cylinders

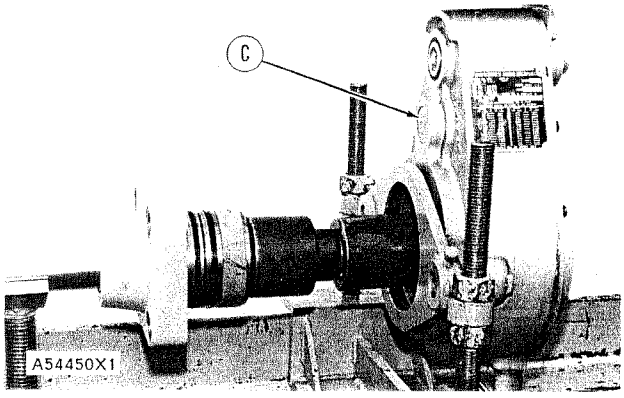
1. Remove seals (1) from each side of the cylinder and rod assemblies.
2. Use tooling (B) to pull the bearings from the cylinder and rod assemblies.
3. Fasten a hoist and put the cylinder in position on tooling (A). Install support (3) under the rod and fasten strap (2) around the rod to hold it in position.
4. Put a mark on the head and cylinder assembly for correct alignment at assembly. Remove bolts (4).
5. Pull the cylinder away from the head with tooling (A).
6. Use tooling (C) to remove the nut that holds the piston on the rod.
7. Remove piston (6) and head (5) from the rod.









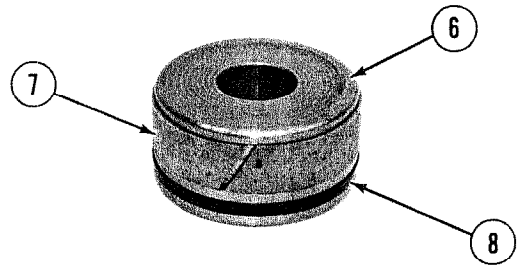


TILT CYLINDERS

8. Remove wear ring (7) and seal assembly (8) from piston (6).

9. Remove the back-up ring and O-ring seal (9) from head (5).

10. Remove three seals (10) from head (5).



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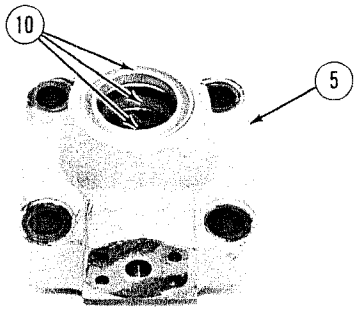

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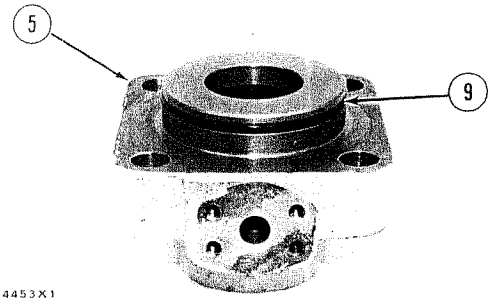

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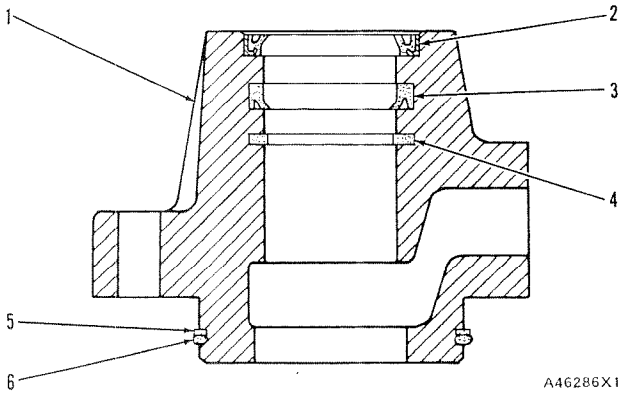
ASSEMBLE TILT CYLINDERS 5104-16

	Tools Needed	A	B	C	D	E	F	G
5P2980	Seal Installer	1						
1P510	Driver Group		1					
5P320	Seal Guide			1				
4S9181	Seal Expander				1			
1P1784	Hydraulic Cylinder Repair Stand					1		
5P3100	Pump Group					1		1
1P850	Torque Multiplier						1	
1P851	Spline Adapter						1	
1P852	Male Adapter						1	
5S6077	Socket						1	
7F9540	Hydraulic Puller							1
5P2145	Adapter							1
9S5559	Stud							1
1P543	Nut							1



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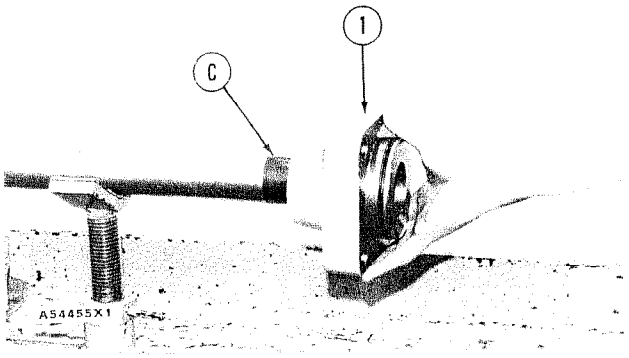
1. Use tool (A) to install seal (4) in head (1).
2. Install seal (3) in the head with the lip of the seal toward seal (4).
3. Use tool group (B) to install seal (2) in the head with the lip of the seal toward the outside.
4. Install O-ring seal (6) and back-up ring (5) in the head as shown.

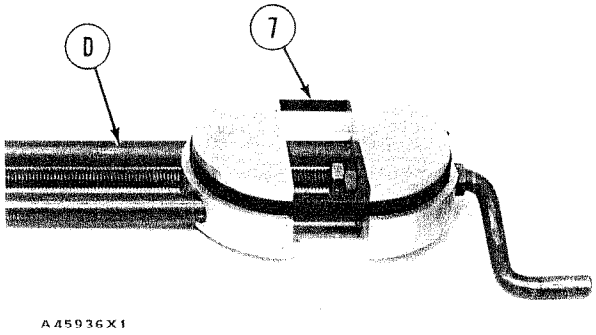
TILT CYLINDERS

5. Put the cylinder assembly and rod on tooling (E).



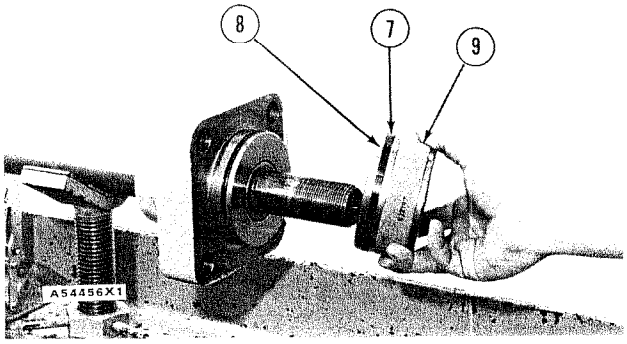
6. Install tool (C) on the rod. Put clean hydraulic oil on the lips of the seals in the head. Push the head on the rod. Remove tool (C) from the rod.

7. Use tool (D) to cause expansion of the plastic seal (7) of the piston seal assembly.



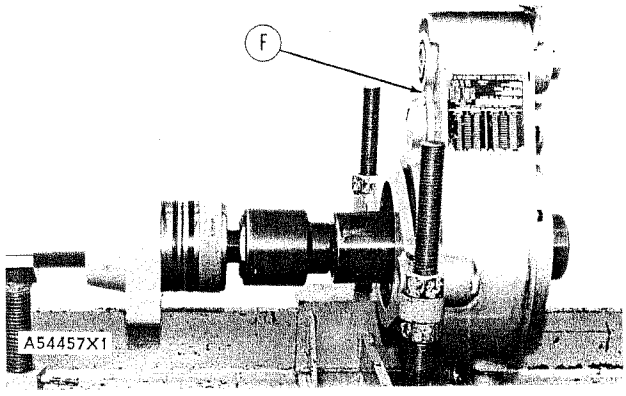
8. Install wear ring (9) on piston (8).

9. Install the rubber expansion ring in the groove of piston (8) and install plastic seal (7) over the rubber expansion ring.



10. Install piston (8) on the rod.

11. Use tooling (F) to tighten the nut that holds the piston on the rod. Tighten the nut to a torque of 1200 ± 120 lb.ft. (1620 ± 160 N·m).



TILT CYLINDERS, LIFT ARMS

12. Put clean hydraulic oil on the seal and wear ring on the piston and on the back-up ring and O-ring seal on the head.
13. Make an alignment of the marks on the head and cylinder assembly. Slowly push the cylinder assembly on to the piston and head with tooling (E). Be careful not to damage the O-ring seal and the back-up ring on the head.
14. Make sure the rod is fully extended from the cylinder assembly and tighten the bolts that hold head (1).
15. Remove the cylinder assembly from tooling (E).
16. Install the bearings in the cylinder assembly and rod assembly with tooling (G). Install the bearings until they are in the center of their bore.
17. Use tool group (B) to install the seals in the cylinder and rod assemblies until the seals make contact with the bearings.

NOTE: The lip of the seals must be toward the outside as shown.

end by:

a) install tilt cylinders

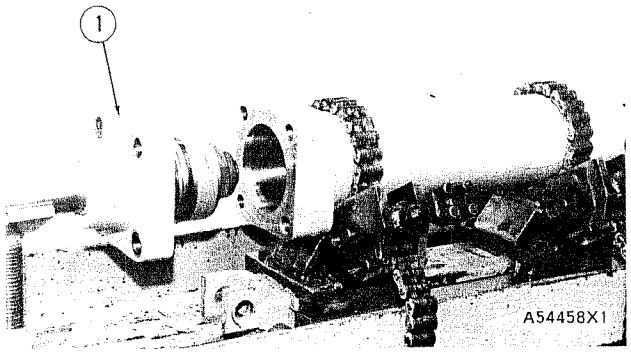
REMOVE LIFT ARMS 6119-11

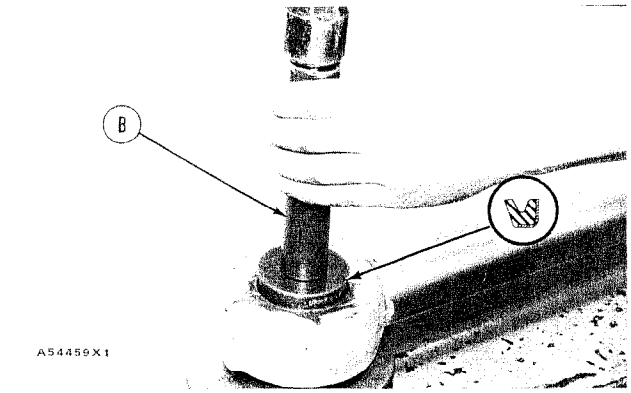
	Tools Needed	A	B	C	D	E
1P7421	Tap (1"-14 NF)	1				
7F9540	Hydraulic Puller		1	1		1
9S5565	Sleeve Assembly		1			
9S5559	Stud		1			1
1P543	Nut		1			1
5P3100	Pump Group		1	1	1	1
5F7693	Spacer (part of 5F7334 Spacer Group)			1		
1P4209	Nut (part of 8B7548 Puller Assembly)			1		
5F7366	Stud (part of 8B7548 Puller Assembly)			1		
5H9817	Hydraulic Puller Assembly				1	
9S5558	Stud				1	
9S5564	Sleeve Assembly				1	
1P544	Nut				1	
1P1835	Bearing Puller Assembly				1	
1P1831	Bearing Puller Assembly					1

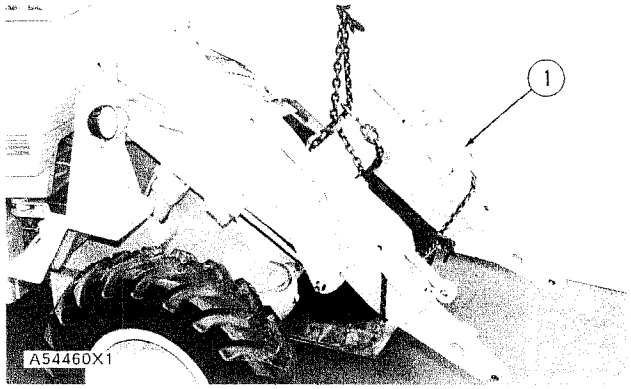
start by:

a) remove bucket positioner

b) remove bucket







1. Start the engine and extend the tilt cylinders until lever assemblies (1) are in the position shown. Stop the engine and fasten chains around lever assemblies (1) to hold them to the lift arms.

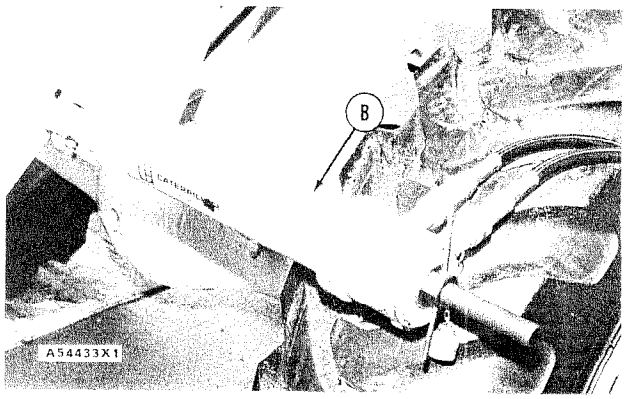
2. Fasten a hoist to the lift arms as shown. Lift the arms until tooling (B) can be installed.

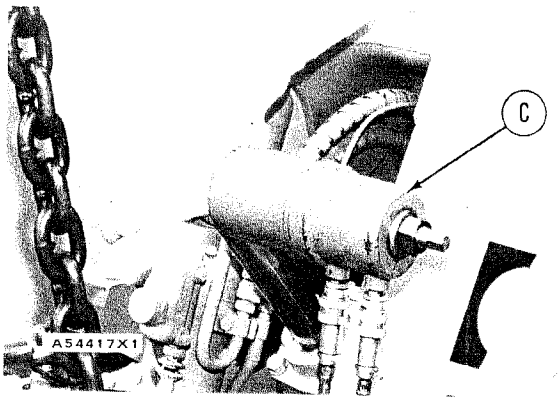
LIFT ARMS

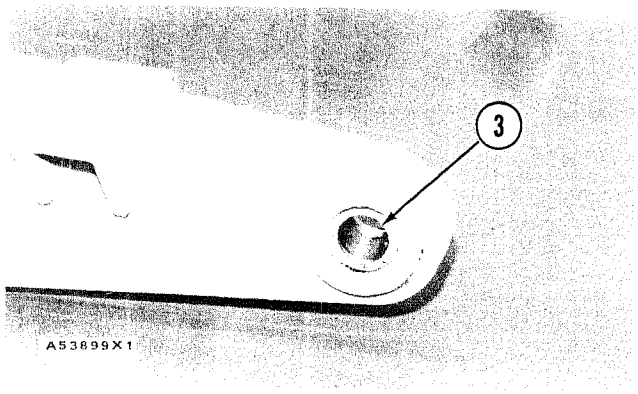
3. If necessary use tool (A) and clean the threads of the cylinder and lift arm pins.
4. Remove the bolt that holds the tilt cylinder rod pin. Fasten a hoist to the tilt cylinder and install tooling (B). Remove the pin and lower the cylinder rod to the axle housing. Remove the hoist.

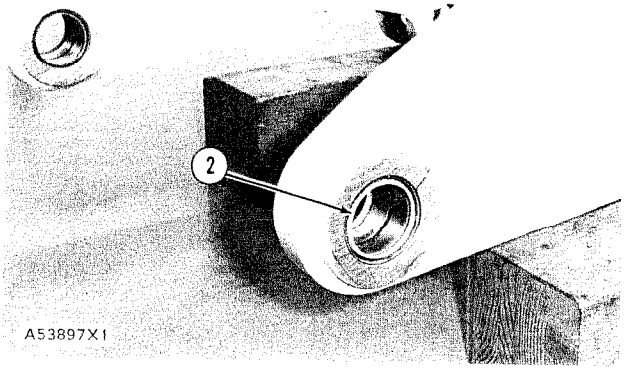
NOTE: Tooling (B) can not be used on the right side.

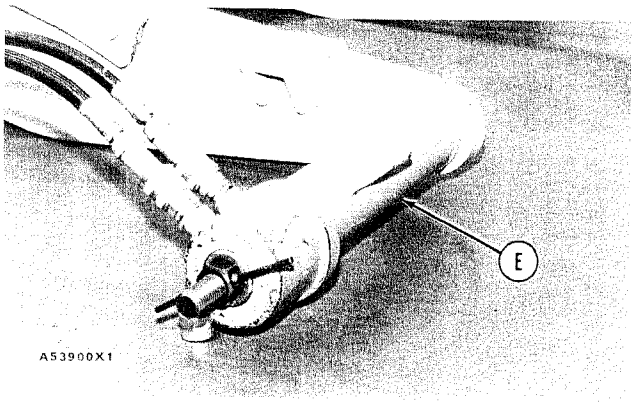
5. Remove the bars that hold the lift cylinder rod pins and install tooling (C). Remove the pins and lower the cylinder rods to the frame.
6. Remove the bolts that hold the lift arm pins in position. Install tooling (B) and remove the pins.
7. Remove the lift arms. The weight of the lift arms is 1540 lb. (693 kg).
8. Remove seals (2) from the frame end of the lift arms.
9. Use tooling (D) to remove the bearings from the frame end of the lift arms.
10. Remove seals (3) from the bucket end of the lift arms.
11. Use tooling (E) to remove the bearings from the bucket end of the lift arms.

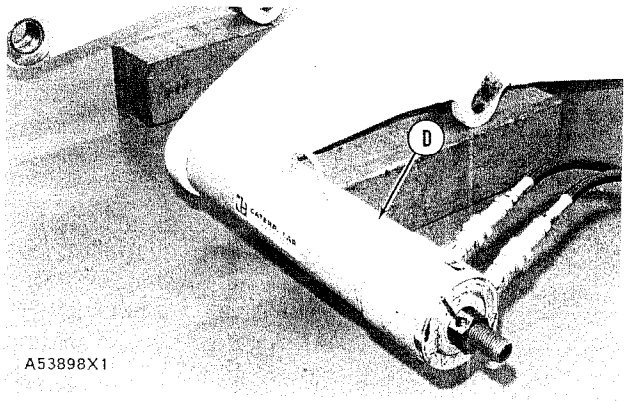










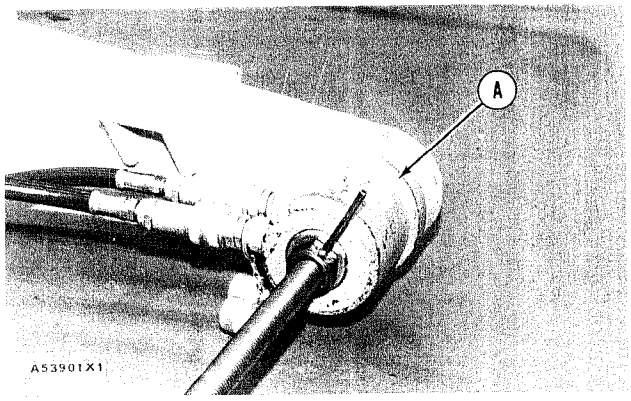


LIFT ARMS

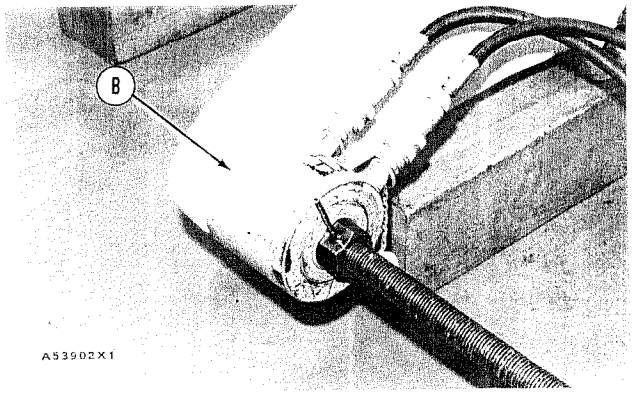
INSTALL LIFT ARMS 6119-12

	Tools Needed	A	B	C
7F9540	Hydraulic Puller	1		
9S5559	Stud	1		
1P1831	Bearing Puller Assembly	1		
1P543	Nut	1		
5P3100	Pump Group	1	1	
5H9817	Hydraulic Puller Assembly		1	
9S5558	Stud		1	
1P544	Nut		1	
1P1835	Bearing Puller Assembly		1	
1P510	Driver Group			1

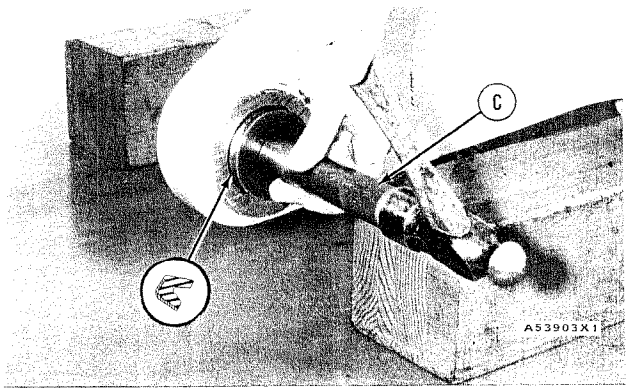
1. Use tooling (A) to install the bearings in the bucket end of the lift arms until the bearings are in the center of their bore.



2. Use tooling (B) to install the bearings in the frame end of the lift arms, until the bearings are in the center of their bore.



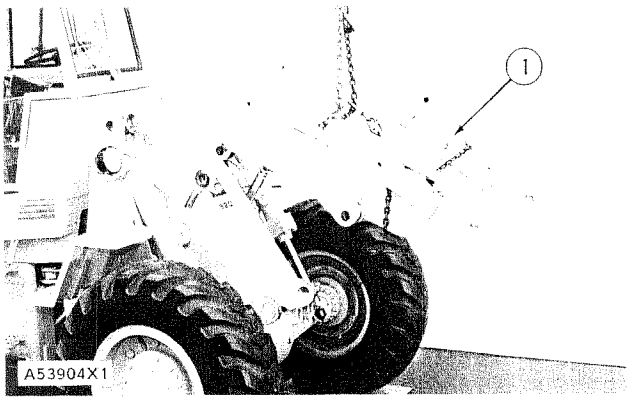
3. Use tool group (C) to install the seals on each side of the bearings. Make sure the lip of the seals is toward the outside as shown.



4. Fasten a hoist to the lift arms and put them in position on the machine.

5. Install the pins that hold the cylinder rods and lift arms in position. Install the bolts that hold the pins. Put clean grease in the pins.

6. Remove the chains from lever assemblies (1). Remove the hoist from the lift arms.



end by:
a) install bucket
b) install bucket positioner

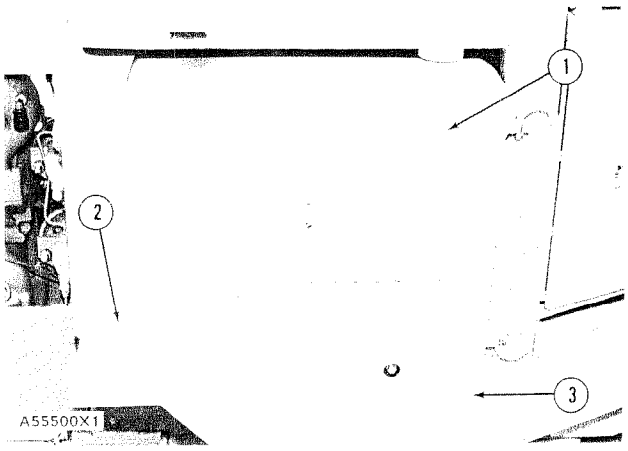
HYDRAULIC CONTROL VALVE

REMOVE HYDRAULIC CONTROL VALVE 5051-11

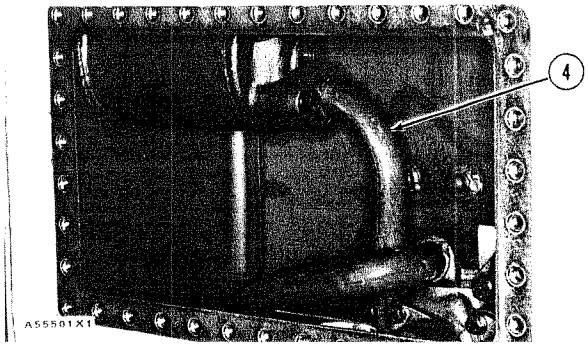
⚠ WARNING

Stop the engine, lower the bucket to the ground, move the control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.

1. Drain the oil from the hydraulic tank. The capacity of the system is:
   920-17.5 U.S. gal. (66 litre)
   930-19.5 U.S. gal. (74 litre)

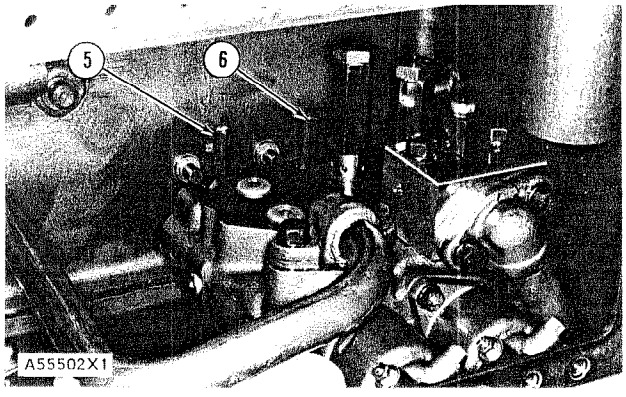


2. Remove fender (2), cover (3) and the cover from the bottom of the hydraulic tank.



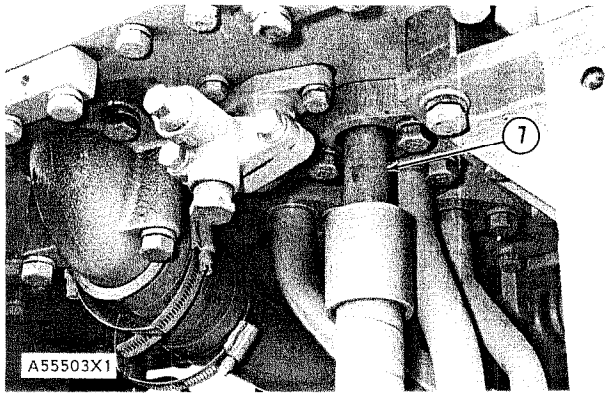
3. Remove cover (1) and the gasket from the hydraulic tank.

4. Remove baffle assembly (4) and the O-ring seal from the oil filter housing.



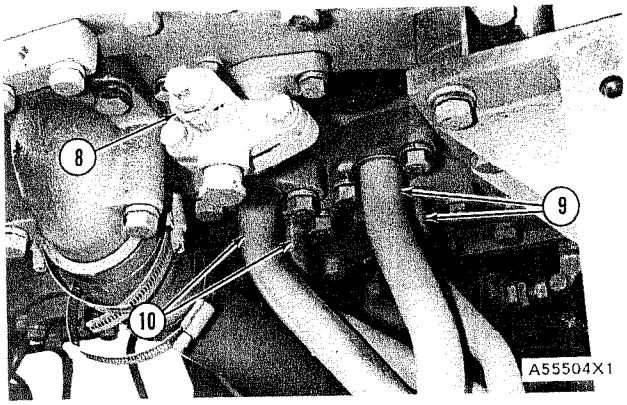
5. Remove bolts (5) and (6) to disconnect the tilt and lift lever linkages.

6. Disconnect hose assembly (7) from the bottom of the hydraulic tank.



HYDRAULIC CONTROL VALVE

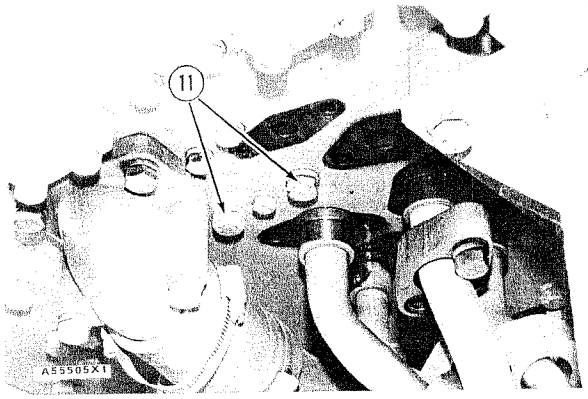
7. Disconnect four tube assemblies (9) and (10) from the bottom of the hydraulic tank.



NOTE: Drain valve (8) was removed for better photo illustration of the location of bolts (11).

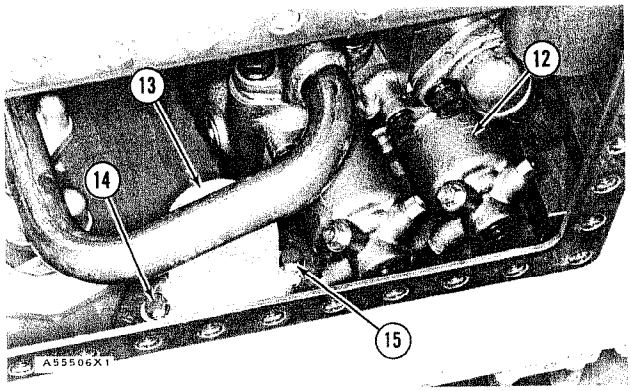
8. Remove bolts (11) that hold the hydraulic control valve in position.

9. Move control valve (12) to the left. Remove bolt (14). Loosen bolt (15) and remove strainer (13).

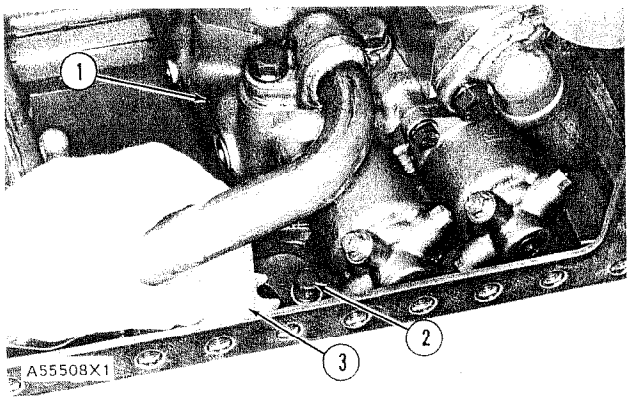


10. Two persons are needed to remove control valve (12) from the hydraulic tank. The weight of the control valve is 65 lb. (29 kg).

INSTALL HYDRAULIC CONTROL VALVE 5051-12



1. Two persons are needed to put the control valve in the hydraulic tank. Make sure the O-ring seals are held in position with clean grease before control valve (1) is put on the make-up valve body.

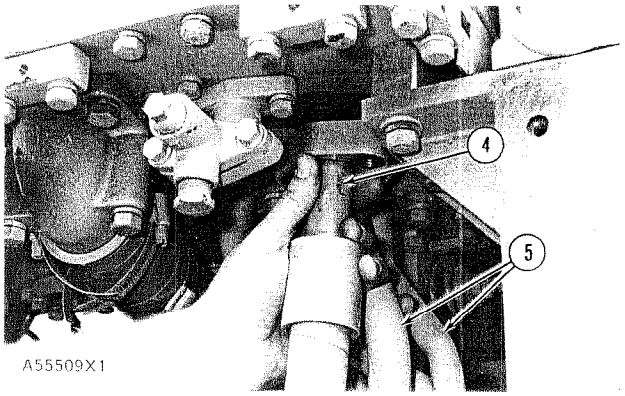


2. Put strainer (3) in position under bolt (2) and install the second bolt that holds it. Tighten the two bolts.

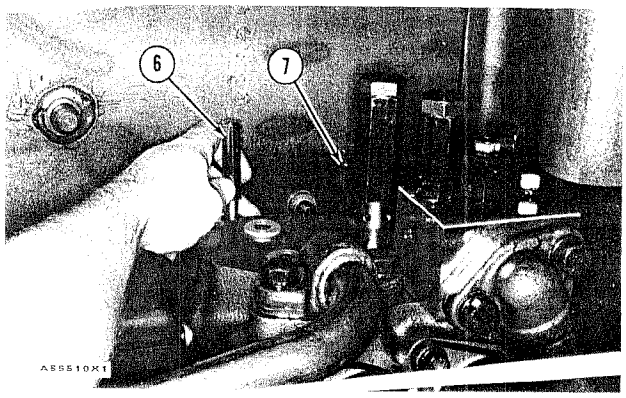
3. Install the two bolts that hold control valve (1) in position from the bottom of the hydraulic tank. Tighten the bolts to a torque of 65 ± 3 lb.ft. (90 ± 4 N·m).

HYDRAULIC CONTROL VALVE

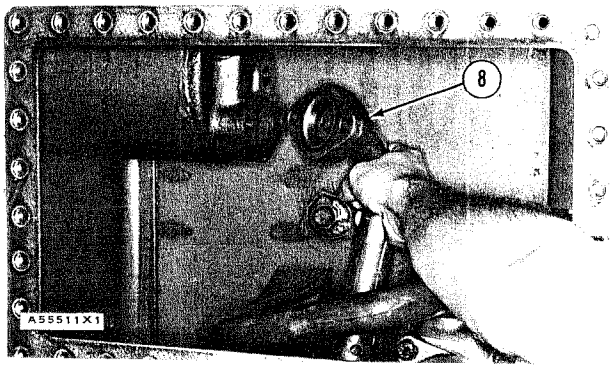
4. Put clean hydraulic oil on the O-ring seals and connect the four tube assemblies (5) and hose assembly (4) to the bottom of the hydraulic tank.



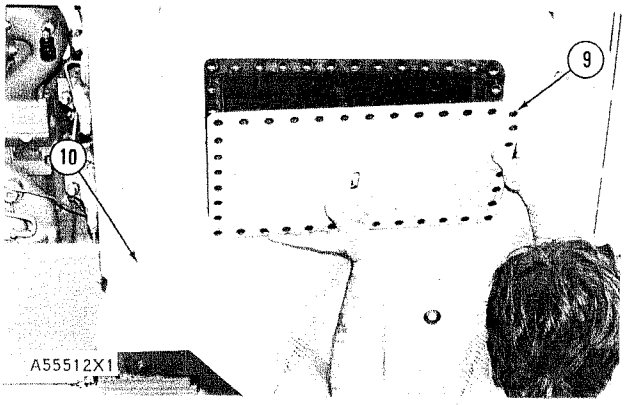
5. Put the tilt and lift linkages in alignment with the valve spools and install bolts (6) and (7). Tighten the bolts to a torque of 14 ± 2 lb.ft. (19 ± 3 N·m).



6. Put clean hydraulic oil on the O-ring seal and install baffle assembly (8).



7. Install fender (10), the two covers to the bottom of the hydraulic tank, the gasket and cover (9).



8. Fill the hydraulic system with oil to the correct level.

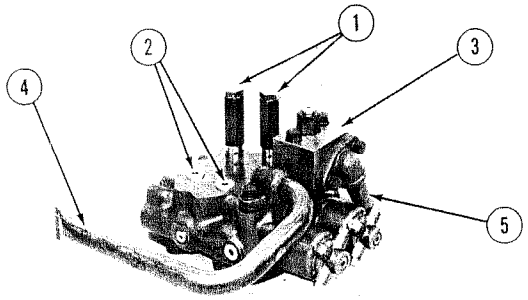
9. See LOADER HYDRAULIC SYSTEMS in TESTING AND ADJUSTING for the relief valve settings.

HYDRAULIC CONTROL VALVE

DISASSEMBLE HYDRAULIC CONTROL VALVE 5051-15

start by:
a) remove hydraulic control valve

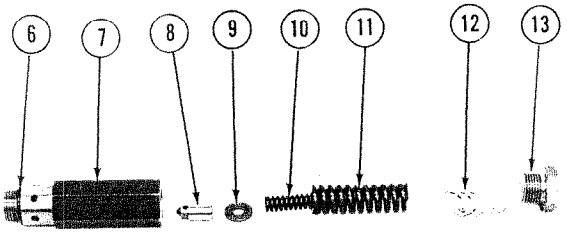
1. Remove baffle assemblies (4) and (5) from the control valve.



A55708X1

2. Remove body (3), tilt relief valve groups (1), plugs (2) and the O-ring seals from the control valve.

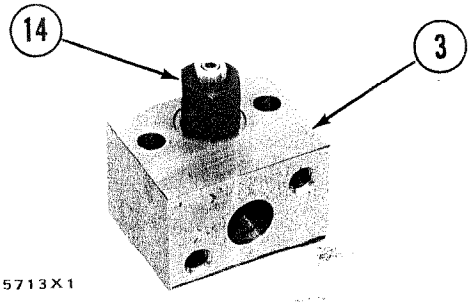
3. Disassemble tilt relief valve groups (1) as follows:
Remove plug (13), shims (12), springs (11) and (10), washer (9) and valve (8) from body (7). Remove O-ring seal (6) from body (7).



A55717X1

4. Remove relief valve group (14) from body (3). Remove the two O-ring seals and back-up ring from valve group (14).

NOTE: Do not disassemble valve group (14). There are no serviced parts to this assembly so use a new part for replacement if necessary.

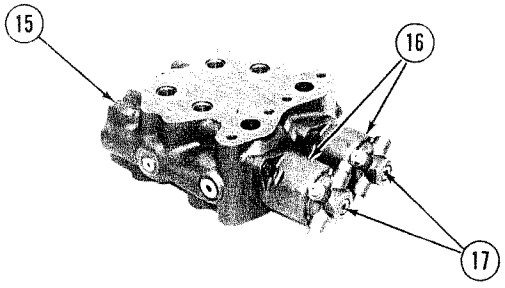


A55713X1

5. Hold the tilt and lift valve stems in valve body (15) so they will not turn. Loosen detents (17) from the valve stems.

⚠ WARNING

Retainers (16) have spring tension on them. Remove the bolts that hold the retainers slowly.

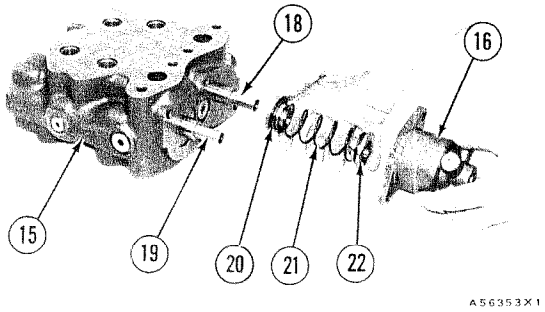


A55714X1

6. Remove the bolts that hold retainers (16) to valve body (15).

HYDRAULIC CONTROL VALVE

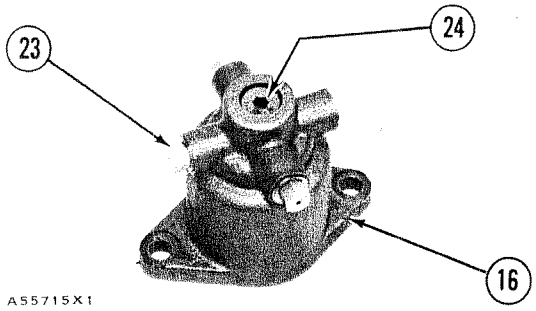
7. Remove retainers (16), spacers (22), springs (21), spacers (20), valve stems (18) and (19) from valve body (15).



8. Remove plugs (23), the shims, springs and balls to remove detents (24) and spacers from retainers (16).

9. Remove the two plugs (26) and O-ring seals from valve body (15).

10. Remove the three plugs (27) and O-ring seals from valve body (15).

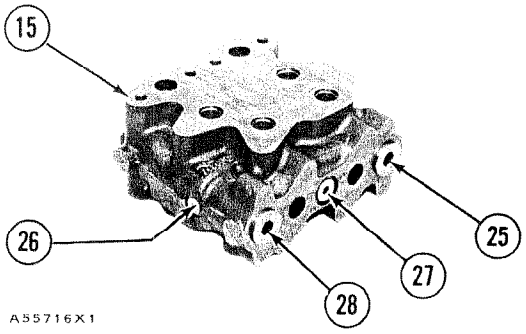


11. Remove plugs (25), (28), the O-ring seals, springs and valves from valve body (15).

ASSEMBLE HYDRAULIC CONTROL VALVE 5051-16

CAUTION

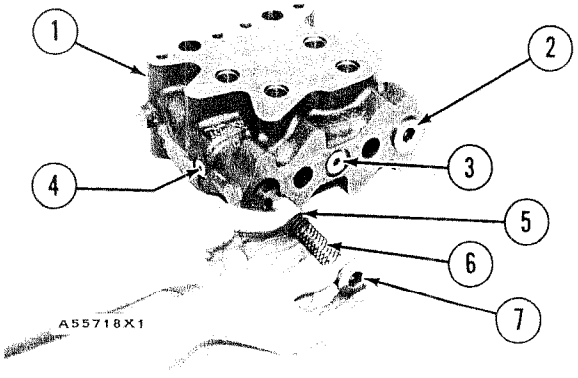
All parts must be kept clean. Use paper free of lint and clean solvent to clean the parts. Put clean hydraulic oil on all of the parts before they are assembled.



1. Install the two plugs (4) and O-ring seals in valve body (1).

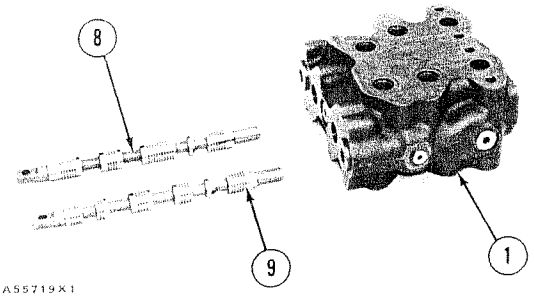
2. Install the three plugs (3) and O-ring seals in valve body (1).

3. Install valves (5), springs (6), the O-ring seals, plugs (2) and (7) in valve body (1).



HYDRAULIC CONTROL VALVE

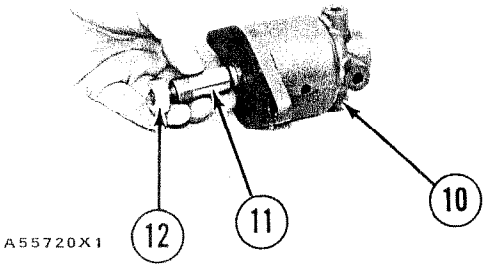
4. Install tilt valve stem (8) and lift valve stem (9) in valve body (1) as shown.



5. Install detent (11) and spacer (12) in retainer (10) as shown for the tilt valve stem.

6. Install detent (15) and spacer (14) in retainer (13) as shown for the lift valve stem.

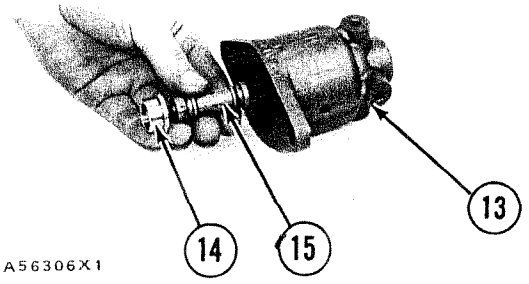
7. Install balls (16), springs (17), shims (18) and plugs (19) in the retainers to hold the detents. Tighten plugs (19) to a torque of 9 ± 2 lb.ft. (12 ± 3 N·m).



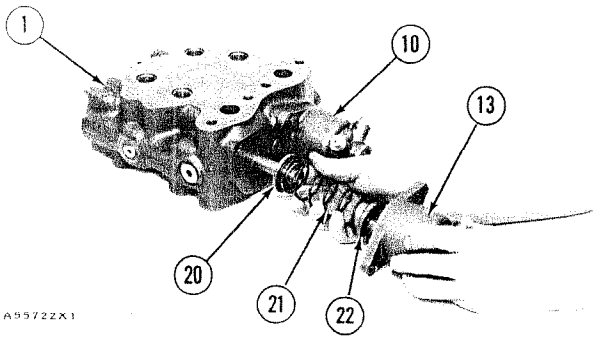
8. Install the three spacers (20), two springs (21) and spacer (22) on the valve stems.

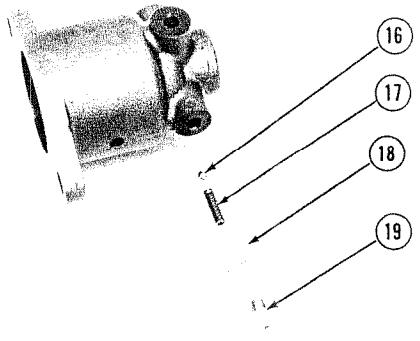
NOTE: Spacer (22) must be installed in the position shown on the lift valve stem.

9. Put 9S3263 Thread Lock on the threads of both detents. Make sure the detents are visually in alignment with the valve stems and install retainers (10) and (13) in the positions shown.



10. Tighten the detents in the ends of the valve stems to a torque of 27 ± 3 lb.ft. (38 ± 4 N·m).

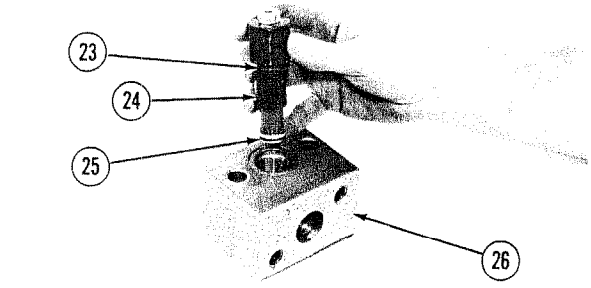




HYDRAULIC CONTROL VALVE

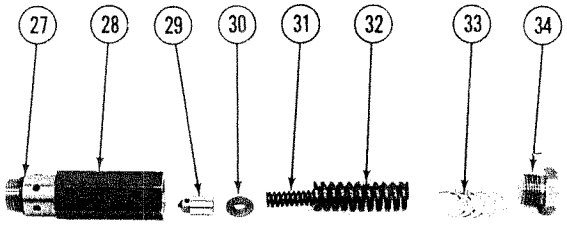
11. Install O-ring seal (23), the back-up ring and O-ring seal (25) on valve group (24). Make sure the back-up ring for O-ring seal (25) is toward O-ring seal (23).

12. Install valve group (24) in body (26).



A55723X1

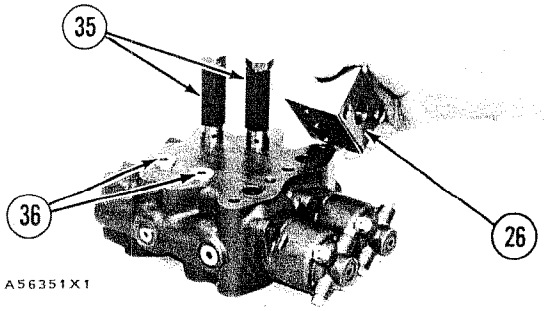
13. Assemble the two tilt relief valve groups as follows:
Install valve (29), washer (30), springs (31) and (32), shims (33) and plug (34) in valve body (28). Tighten plug (34) to a torque of 100 ± 5 lb.ft. (135 ± 7 N·m). Install O-ring seal (27) on valve body (28).



A55717X2

NOTE: See LOADER HYDRAULIC SYSTEM in TESTING AND ADJUSTING for the correct pressure setting of the relief valve groups.

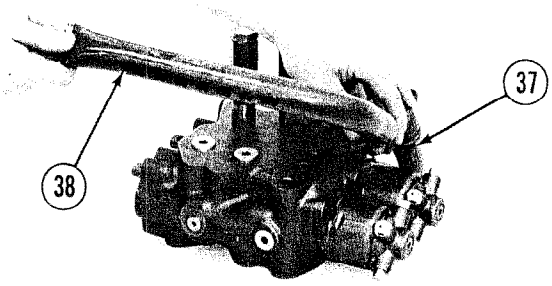
14. Install the O-ring seals, plugs (36) and tilt relief valve groups (35) in the valve body. Tighten valve groups (35) to a torque of 50 ± 3 lb.ft. (70 ± 4 N·m).



A56351X1

15. Put the O-ring seal in position on body (26) and install it on the valve body.

16. Install the O-ring seals and baffles (37) and (38). Tighten the bolts that hold the baffles to a torque of 65 ± 3 lb.ft. (90 ± 4 N·m).



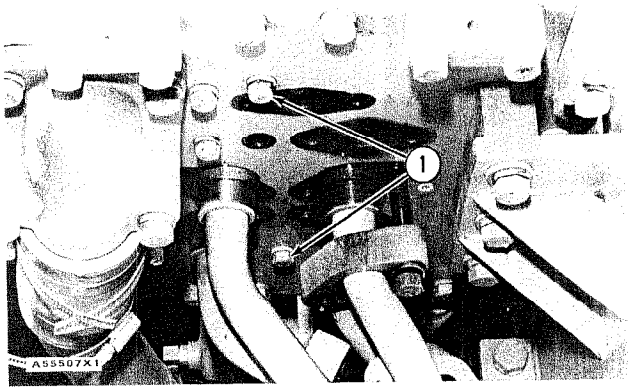
A56352X1

end by:
a) install hydraulic control valve

MAKE-UP VALVE

REMOVE AND INSTALL MAKE-UP VALVE 5117-10

	Tools Needed	A
1P1853	Pliers	1

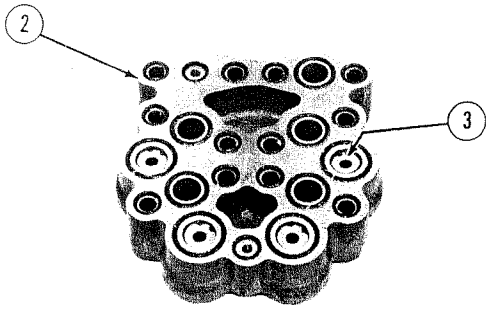


start by:
a) remove hydraulic control valve

1. Remove the two bolts (1) that hold the valve body in position. Remove the valve body from the hydraulic tank.

2. Remove the O-ring seals from valve body (2).

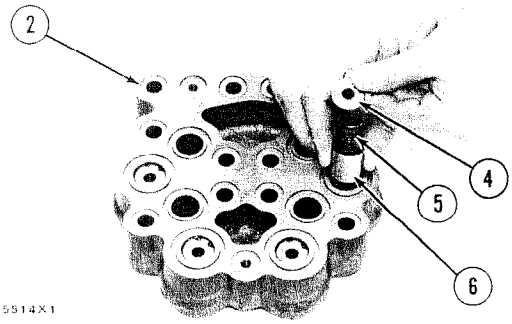
3. Use tool (A) and remove rings (3).



4. Remove washers (4), springs (5) and valves (6) from valve body (2).

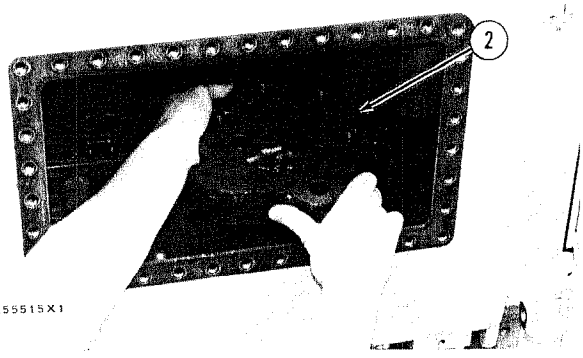
5. Put clean hydraulic oil on the parts of the make-up valve.

6. Put valves (6), springs (5) and washers (4) in valve body (2). Use tool (A) to install rings (3) to hold the valves.



7. Install the O-ring seals in valve body (2) and use clean grease to hold them in position.

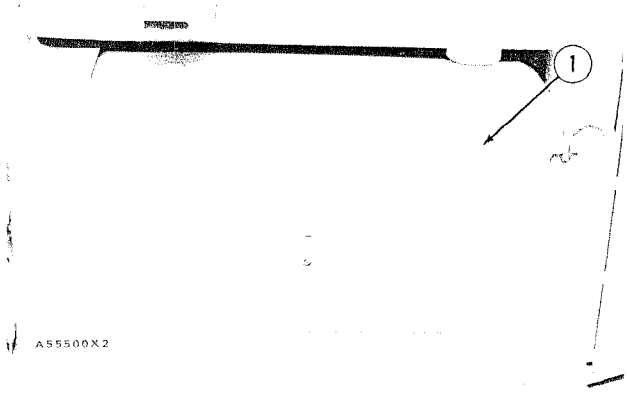
8. Put valve body (2) in position in the hydraulic tank and install bolts (1) to hold it.



end by:
a) install hydraulic control valve

LIFT AND TILT CONTROL LEVER HOUSINGS

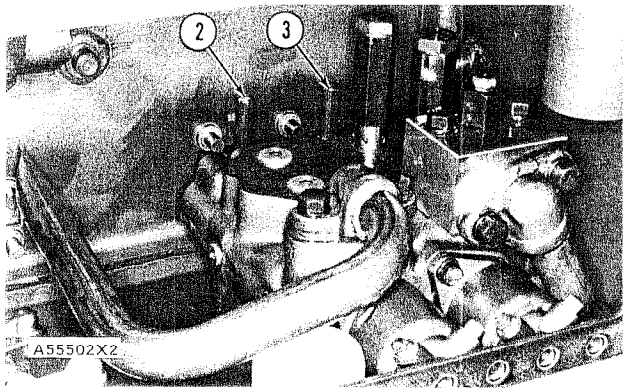
REMOVE LIFT AND TILT CONTROL LEVER HOUSINGS 5100-11



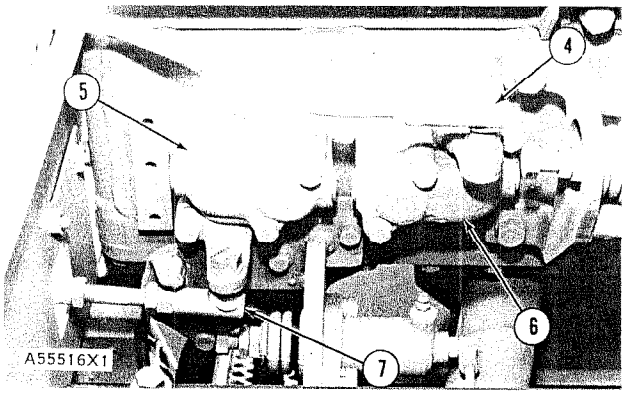
1. Turn the machine all of the way to the left.

⚠ WARNING

Stop the engine, lower the bucket to the ground, move the control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.



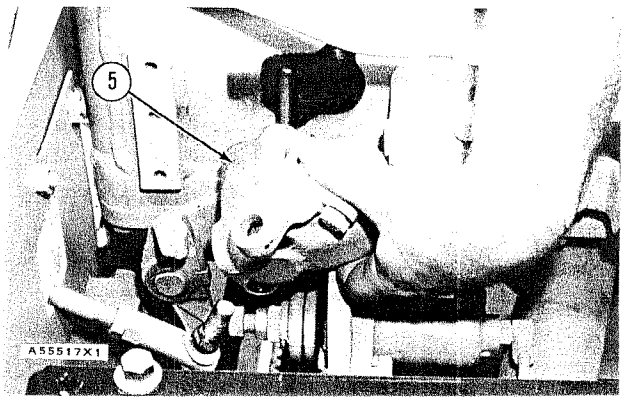
2. Drain the oil from the hydraulic tank. The capacity of the system is:
   920-17.5 U.S. gal. (66 litre)
   930-19.5 U.S. gal. (74 litre)



3. Remove cover (1) and the gasket from the hydraulic tank.

4. Remove bolts (2) and (3) to disconnect the lift and tilt linkages from the control valve spools.

5. Lift the seat and put blocks in position to hold it up.



6. Disconnect rod ends (4) and (7) from the lift and tilt control lever housings.

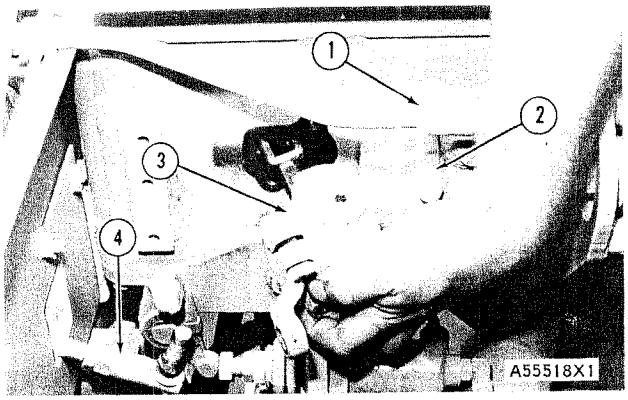
7. Remove the bolts and remove lift control lever housing (6) and tilt control lever housing (5) from the back of the hydraulic tank.

NOTE: The housings will have to be turned as they are pulled out of the hydraulic tank to give clearance for the linkage.

LIFT AND TILT CONTROL LEVER HOUSINGS

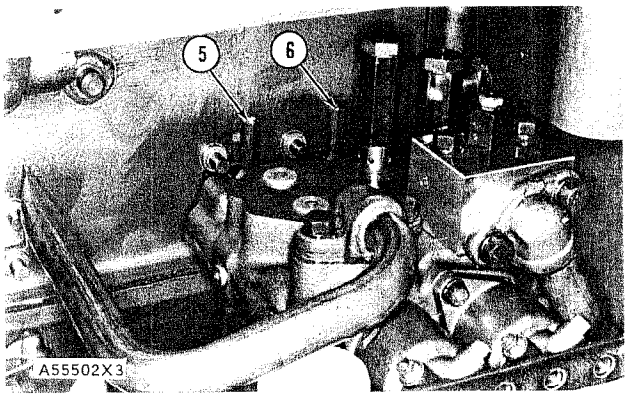
INSTALL LIFT AND TILT CONTROL LEVER HOUSINGS 5100-12

1. Put the gaskets, lift control lever housing (2) and tilt control lever housing (3) in position on the back of the hydraulic tank. Install the bolts to hold the housings.



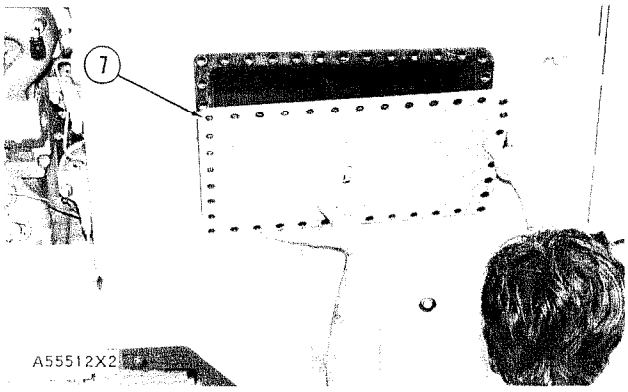
2. Connect lift linkage (1) to the lift control lever housing (2). Connect tilt linkage (4) to tilt control lever housing (3).

3. Lower the seat to its original position.



4. Install bolts (5) and (6) to connect the linkage to the control valve spools. Tighten the bolts to a torque of 14 ± 2 lb.ft. (19 ± 3 N·m).

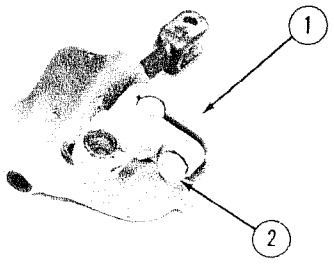
5. Install the gasket and cover (7) on the hydraulic tank.



6. Fill the hydraulic system with oil to the correct level.

DISASSEMBLE LIFT AND TILT CONTROL LEVER HOUSINGS 5100-15

start by:
a) remove lift and tilt control lever housings



1. Loosen bolt (2) and remove lever (1), the key and washer from the shaft.

LIFT AND TILT CONTROL LEVER HOUSINGS

2. Loosen the screw that holds the lever to shaft (4) inside the housing.

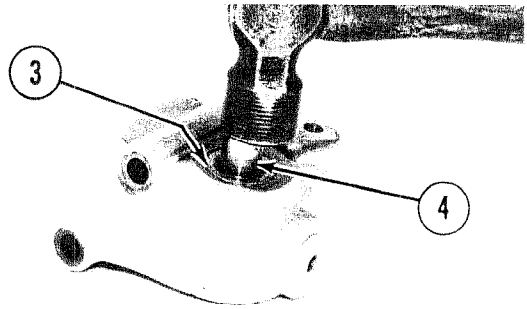
3. Remove shaft (4) and the bearing from the side opposite of seal (3).

4. Remove the bearing and key from shaft (4).

5. Remove lever (5) and link (8) from housing (7).

6. Remove pin (6) that holds lever (5) and link (8) together.

7. Remove seal (3) and the bearing from housing (7).



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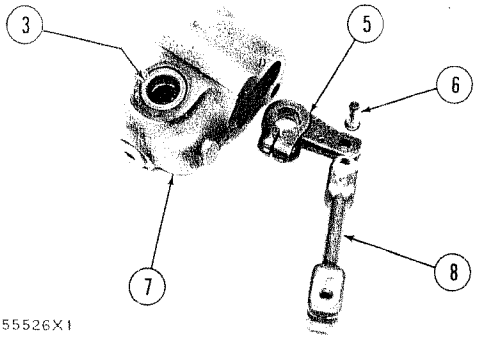
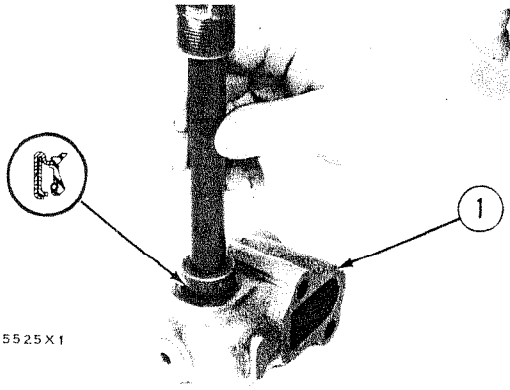


A55526X1

ASSEMBLE LIFT AND TILT CONTROL LEVER HOUSINGS 5100-16

	Tools Needed	A
1P510	Driver Group	1

1. Use tool group (A) and install the bearing and lip type seal in housing (1). Make sure the lip of the seal is toward the inside as shown.

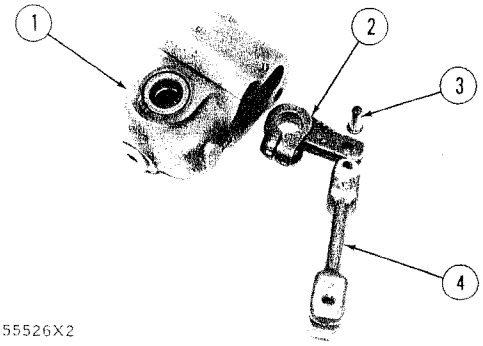


A55525X1

2. Connect lever (2) and link (4) together with pin (3).

NOTE: When lever (2) is installed in the housing the head of pin (3) must be toward the lip type seal for the lift control. The head of pin (3) must be toward the opposite side of housing (1) for the tilt control.

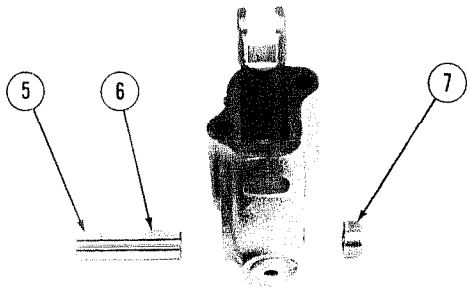
3. Install lever (2) and link (4) in housing (1).



A55526X2

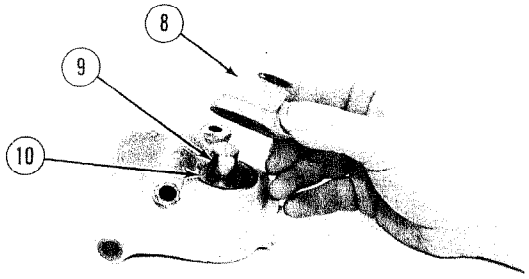
LIFT AND TILT CONTROL LEVER HOUSINGS

4. Install bearing (7) in the housing.



A55527X1

5. Install key (6) in shaft (5) and install shaft (5) in the housing with key (6) in alignment with the opening in the lever. Tighten the screw that holds the lever to shaft (5).



A55528X1

6. Install washer (10), key (9) and lever (8) on the shaft. Tighten the bolt that holds lever (8) to the shaft.

end by:
a) install lift and tilt control lever housings

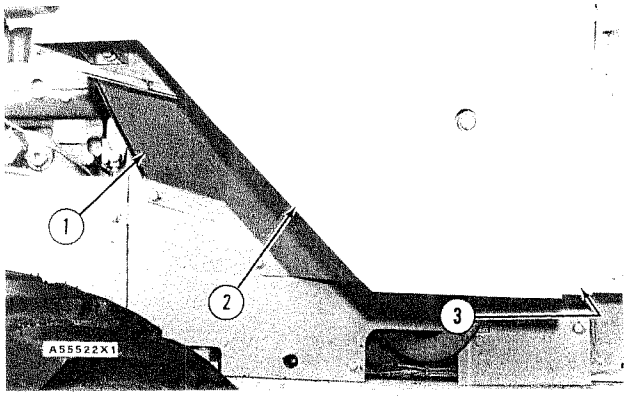
HYDRAULIC TANK

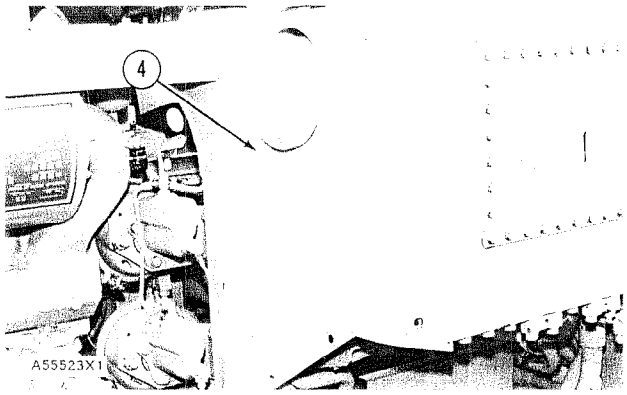
REMOVE HYDRAULIC TANK 5056-11

start by:
a) remove cab

⚠ WARNING

Stop the engine, lower the bucket to the ground, move the control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.

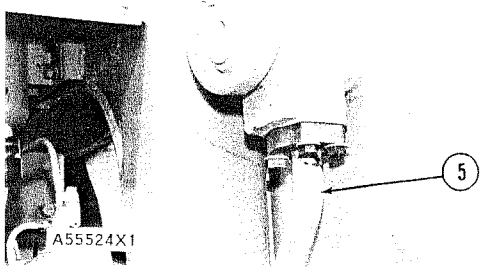




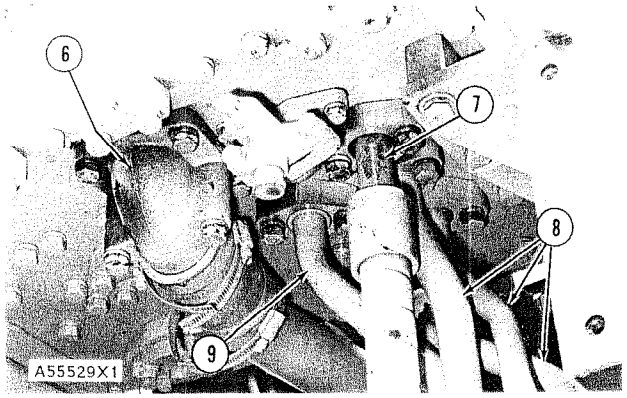
1. Drain the oil from the hydraulic tank. The capacity of the system is:
   920-17.5 U.S. gal. (66 litre)
   930-19.5 U.S. gal. (74 litre)

2. Remove cover (1), fender (2) and cover (3) from the machine.

3. Remove cover (4) from the hydraulic tank.



4. Disconnect tube assembly (5) from the oil filter housing.

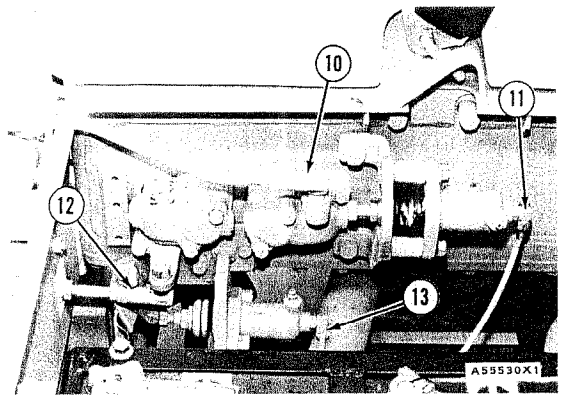


5. Disconnect elbow (6), oil lines (7), (8) and (9) from the bottom of the hydraulic tank.

6. Tilt the seat back.

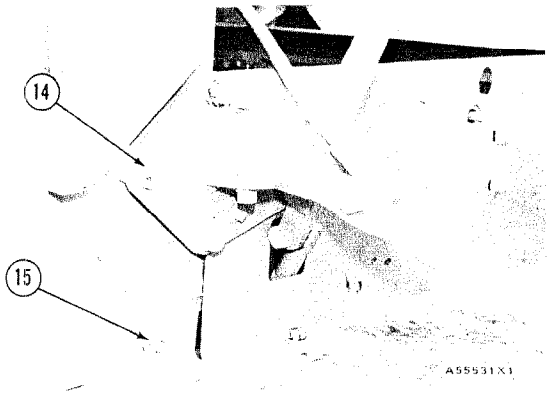
HYDRAULIC TANK

7. Disconnect linkages (10) and (12) from the lift and tilt control lever housings.



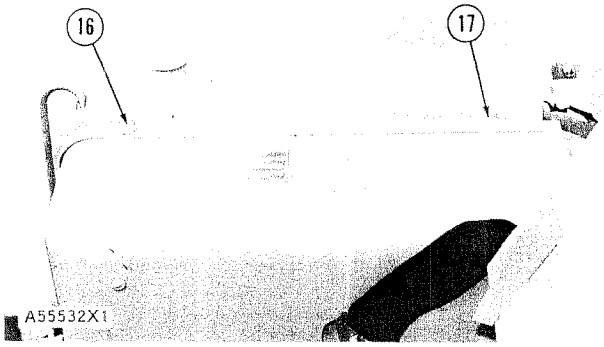
8. Disconnect oil lines (11) and (13) from the lift kickout and bucket positioner slave cylinders.

9. Remove the three bolts (14) from the control lever bracket. Remove bolt (15).

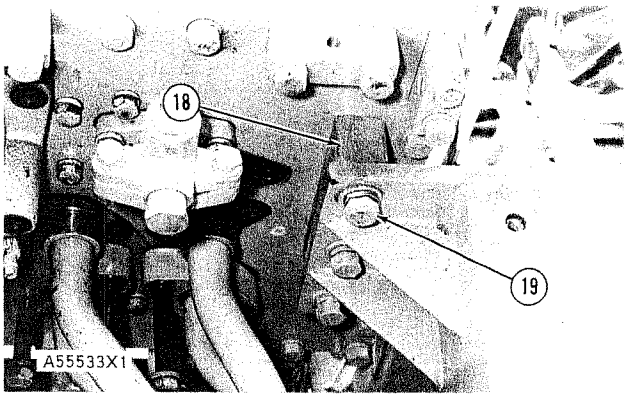


10. Remove bolts (16) and (17) from the top of the hydraulic tank and install two 3/8''-16 NC forged eyebolts in their place.

11. Fasten a hoist to the hydraulic tank.



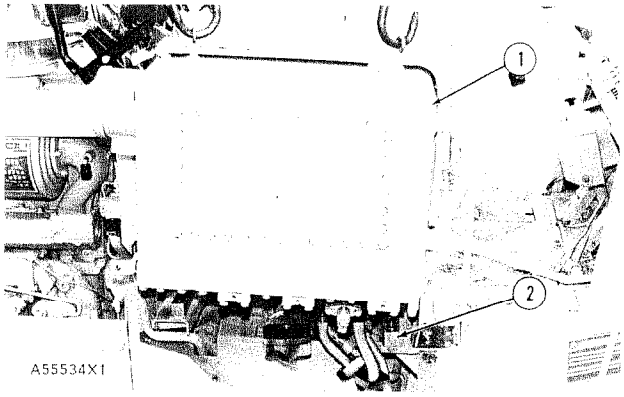
12. Remove bolts (19) from each side of the hydraulic tank. Remove the tank. The weight of the tank is 380 lb. (171 kg).



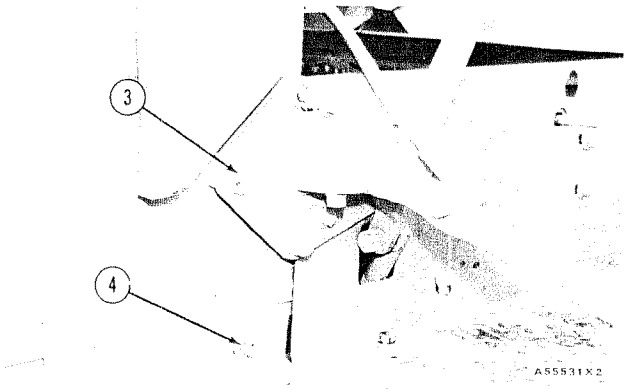
13. Remove blocks (18) from the frame.

HYDRAULIC TANK

INSTALL HYDRAULIC TANK 5056-12

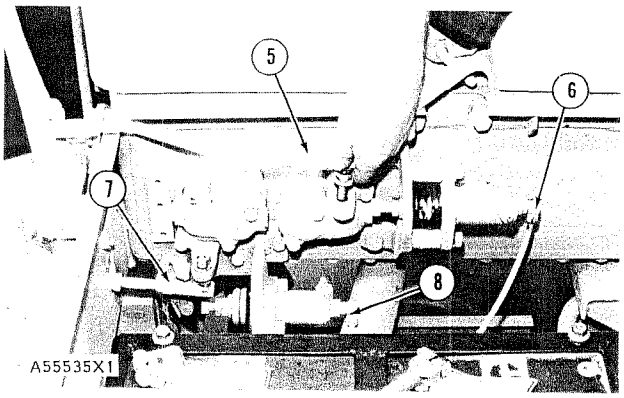


1. Install two 3/8''-16 NC forged eyebolts in the top of the hydraulic tank and fasten a hoist to it.

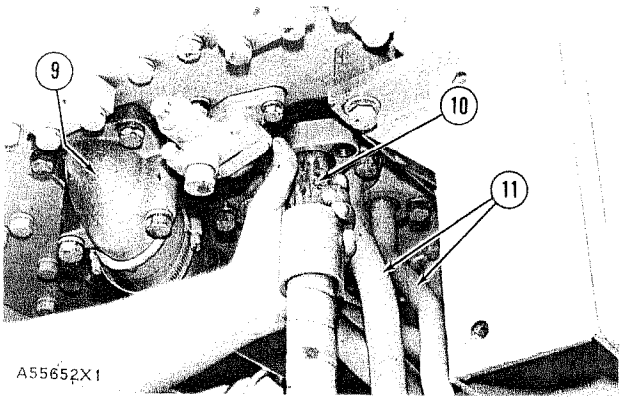


2. Put blocks (2) in position on the frame. Put hydraulic tank (1) in position and install the bolts to hold it to the frame.

3. Install bolt (4) and the three bolts (3) in the bracket for the control levers.



4. Connect oil lines (6) and (8) to the lift kickout and bucket positioner slave cylinders.

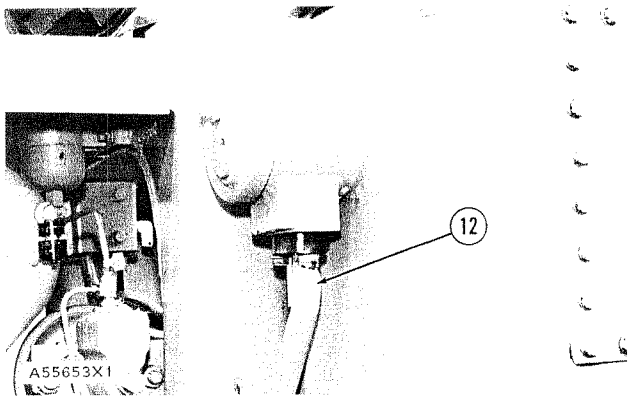


5. Connect linkages (5) and (7) to the lift and tilt control lever housings.

6. Put clean hydraulic oil on the O-ring seals. Connect elbow (9), hose assembly (10) and the four tube assemblies (11) to the bottom of the hydraulic tank.

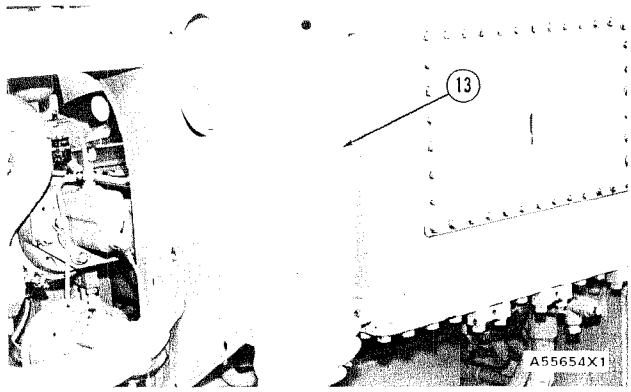
HYDRAULIC TANK

7. Put clean hydraulic oil on the O-ring seal and connect tube assembly (12) to the oil filter housing.

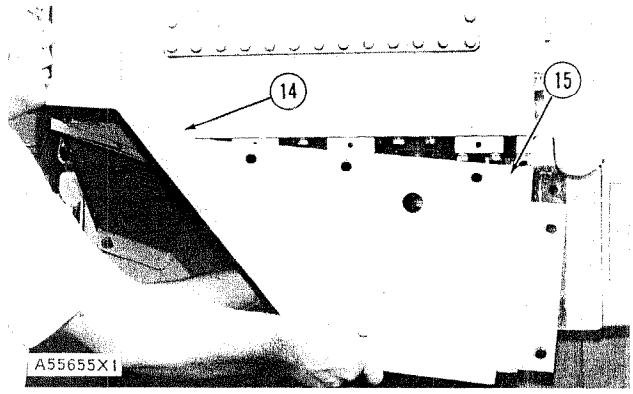


8. Install cover (13) on the hydraulic tank.

9. Install fender (14), cover (15) and the bottom cover on the hydraulic tank.



10. Fill the hydraulic system with oil to the correct level.



11. Remove (bleed) the air from the lift kickout and bucket positioner systems. See Install Bucket Positioner Master Cylinder for this procedure.

end by:
a) install cab

HYDRAULIC PUMP

REMOVE HYDRAULIC PUMP 5055-11

⚠ WARNING

Stop the engine, lower the bucket to the ground, move the control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.

1. Drain the oil from the hydraulic tank. The capacity of the system is:
   920-17.5 U.S. gal. (66 litre)
   930-19.5 U.S. gal. (74 litre)

2. Remove access cover (1) and fender (2) as a unit from the machine. Remove access cover (3).

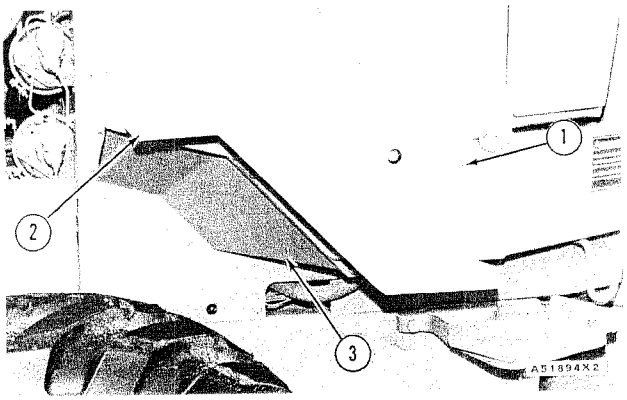
3. Remove access cover (4) from the machine.

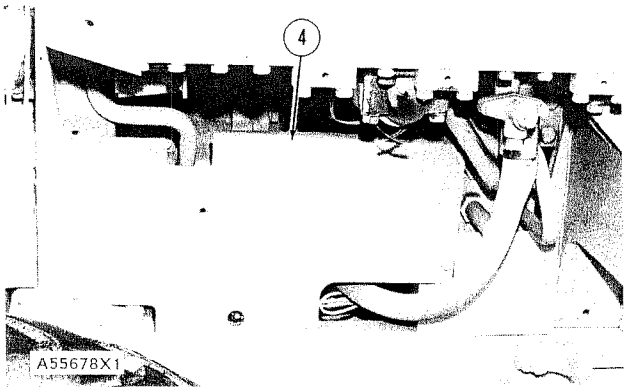
4. Remove elbow (5) and tube assembly (6) as a unit.

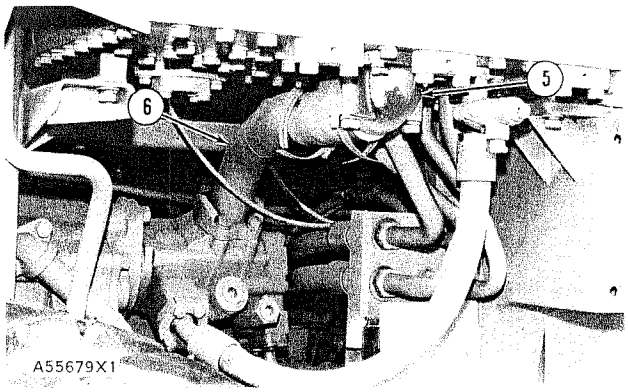
5. Disconnect hose assemblies (9) and (10). Remove tee (7) and tube assembly (8) from the hydraulic pump.

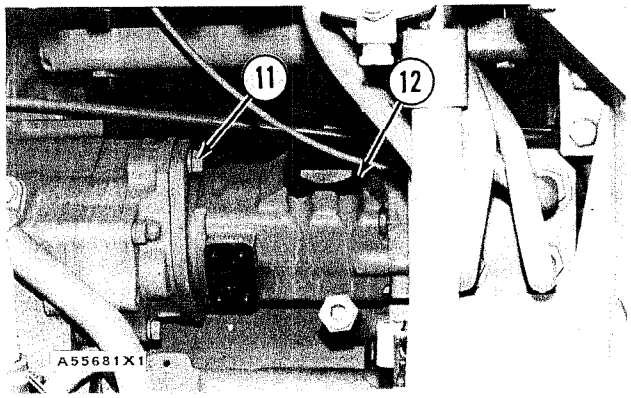
NOTE: Tee (8) can not be removed until the bolts that hold the pump in position are loosened.

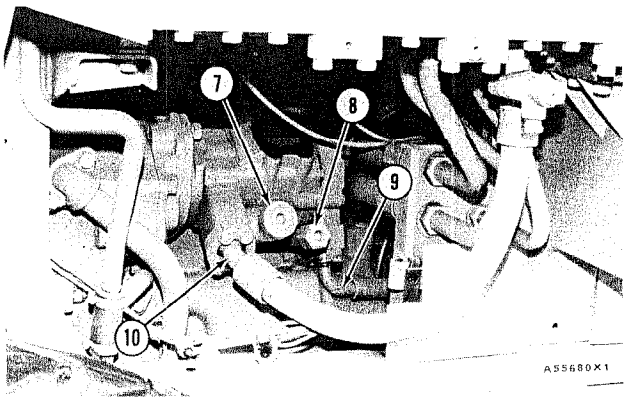
6. Remove the two bolts (11) and remove pump (12). The weight of the pump is 50 lb. (23 kg).











HYDRAULIC PUMP

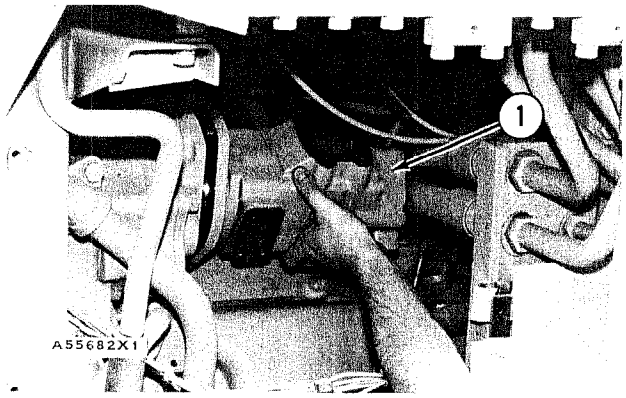
INSTALL HYDRAULIC PUMP 5055-12

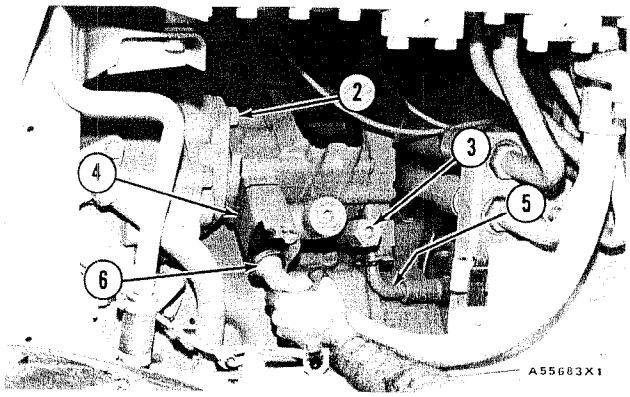
NOTE: Put clean hydraulic oil on all O-ring seals.

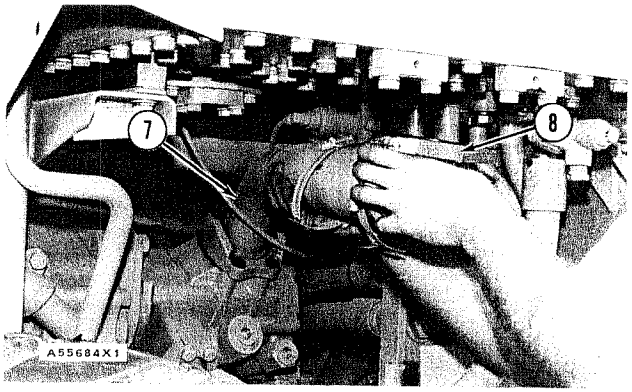
1. Put the O-ring seal on pump (1) and install the pump on the machine.

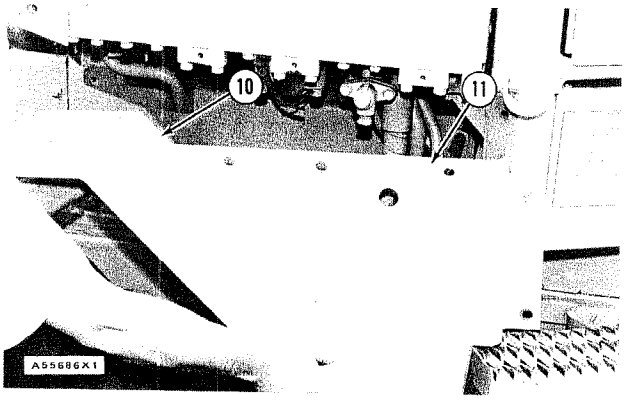
NOTE: Do not tighten bolts (2) until tube assembly (3) is installed.

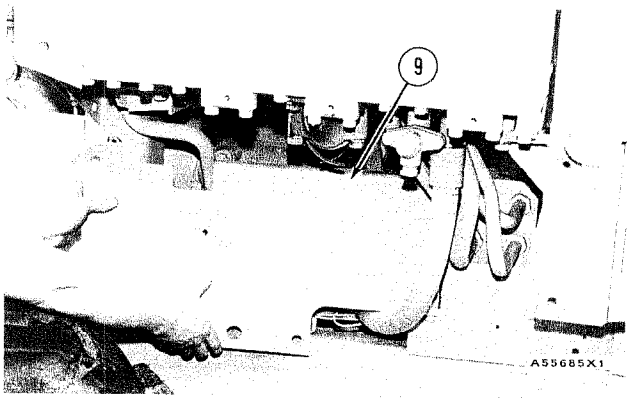
2. Install bolts (2) to hold the hydraulic pump in position.
3. Put the O-ring seal and tube assembly (3) in position. Install the back flange and two bolts that hold hose assembly (5).
4. Tighten bolts (2).
5. Put the O-ring seal in hose assembly (5) and connect hose assembly (5) to the pump.
6. Put the O-ring seals in position and install tee (4). Connect hose assembly (6) to the tee.
7. Install tube assembly (7) and elbow (8) as a unit.
8. Install access cover (9) on the machine.
9. Install access cover (11) and fender (10) on the machine as a unit.
10. Install the access cover on the bottom of the hydraulic tank.
11. Fill the hydraulic system with oil to the correct level.









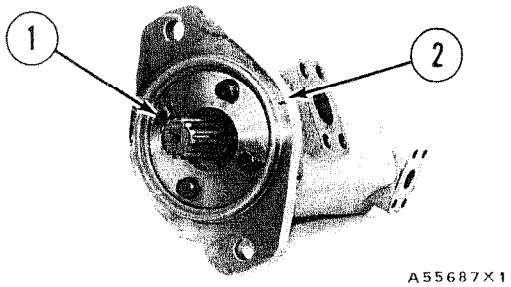


HYDRAULIC PUMP

DISASSEMBLE HYDRAULIC PUMP 5055-15

	Tools Needed	A
1P1859	Pliers	1

start by:
a) remove hydraulic pump



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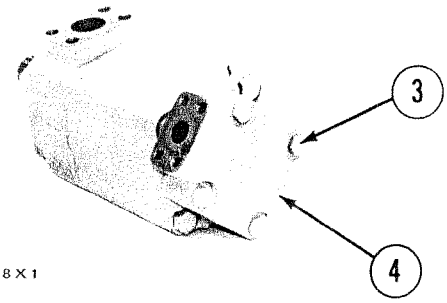
NOTE: Put marks across the adapter, body and covers for correct alignment when the pump is assembled.

1. Remove bolts (1), adapter (2) and the O-ring seal from the pump body.



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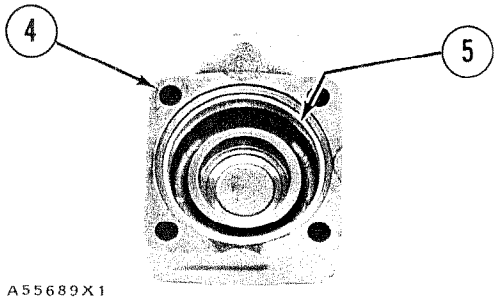
2. Remove bolts (3) and cover (4) from the pump cover. Remove the two O-ring seals and the back-up ring from the cartridge assembly.

3. Remove the two seal rings (5) from cover (4).

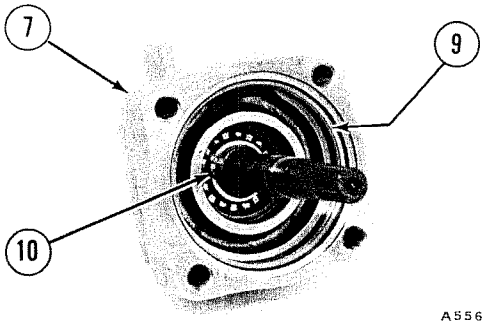


A55689X1

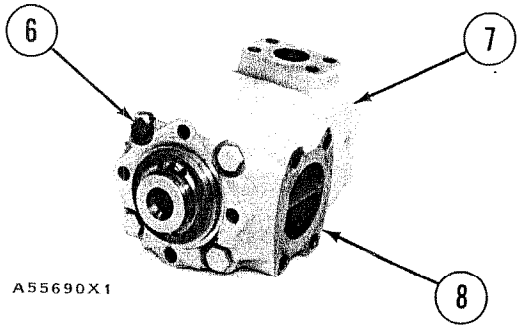
4. Remove bolts (6) and body (7) from cover (8). Remove the two O-ring seals and back-up ring from the cartridge assembly.

5. Remove the two seal rings (9) from body (7).

6. Use tool (A) to remove ring (10) from the shaft.



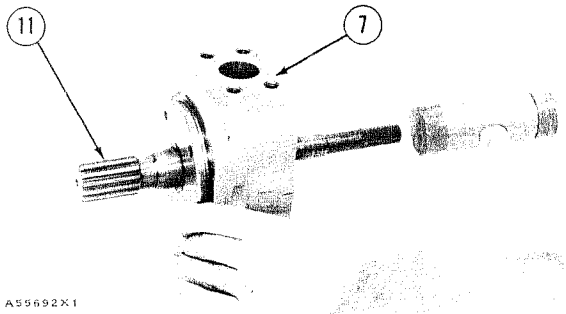
A55691X1



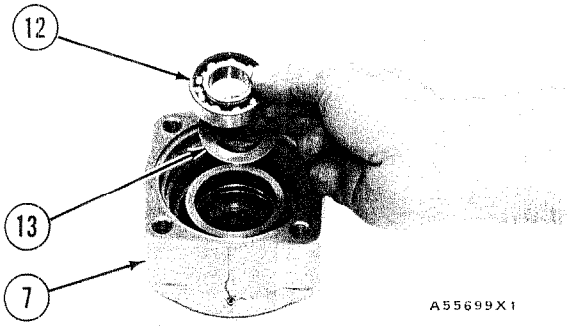
A55690X1

HYDRAULIC PUMP

7. Remove shaft (11) from adapter end of body (7).

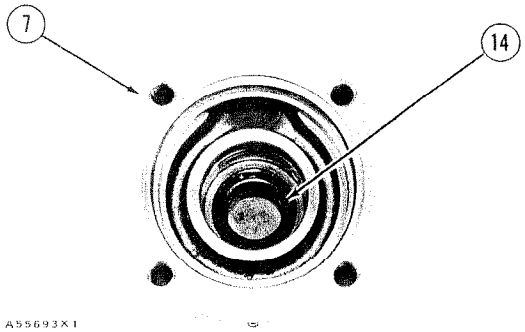


8. Remove the ring that holds bearing (12) in body (7). Remove bearing (12) and washer (13).

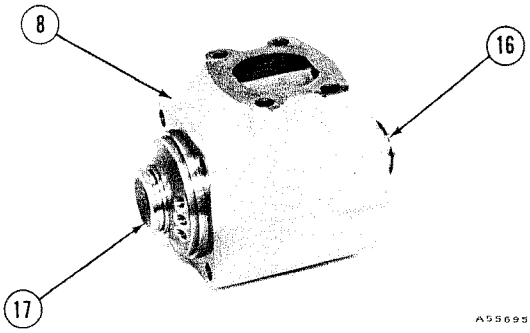


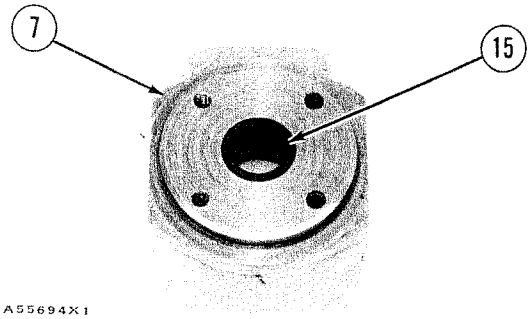
9. Remove seal (14) from the inside of body (7).

10. Remove seal (15) from the adapter end of body (7).



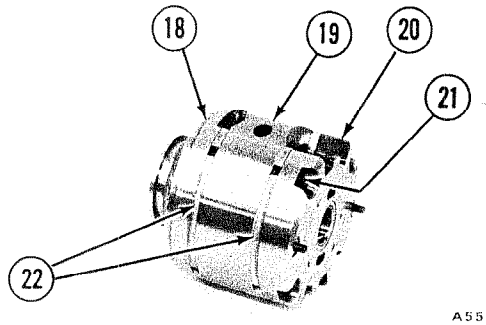
11. Remove cartridge assemblies (16) and (17) from pump cover (8).





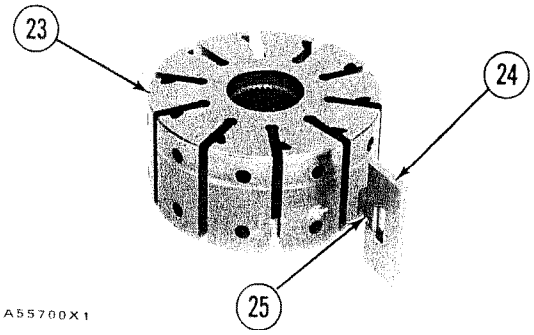
HYDRAULIC PUMP

12. Disassemble both cartridge assemblies as follows:



A55696X1

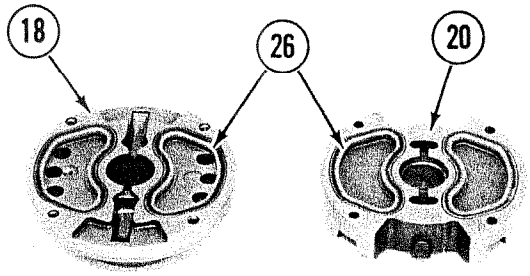
a) Remove screws (21) and make a separation of plate (18), ring 19), plate (20) and plates (22).



A55700X1

b) Remove rotor (23) from ring (19).

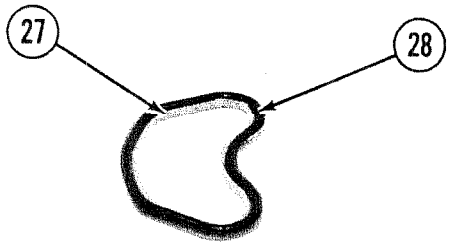
c) Remove vanes (24) and inserts (25) from rotor (23).



A55697X1

d) Remove the seal and retainer assemblies (26) from plates (18) and (20).

e) Remove seals (28) from retainers (27).



A55698X1

13. Check all of the parts of the pump for damage (scratches, nicks and burrs). If the parts have damage, use new parts for replacement. See DIAGNOSING HYDRAULIC PUMP FAILURES FORM NO. SEBD0501.

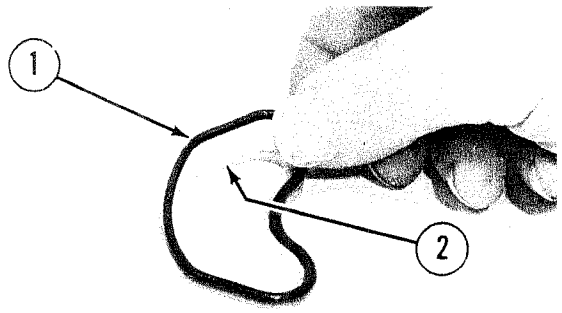
HYDRAULIC PUMP

ASSEMBLE HYDRAULIC PUMP 5055-16

	Tools Needed	A	B
1P510	Driver Group	1	
1P1859	Pliers		1

CAUTION

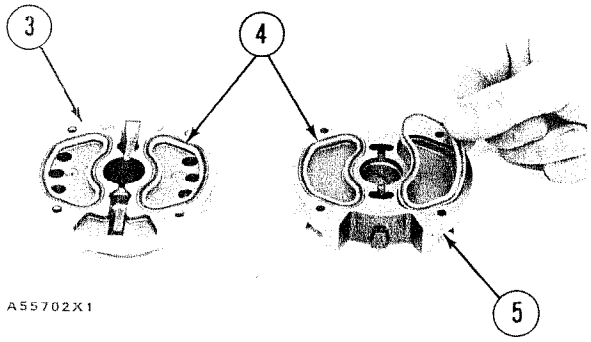
All parts must be kept clean and free of damage (scratches, nicks and burrs). Use clean solvent to clean all metal parts of the pump. Put clean hydraulic oil on all parts of the pump at assembly.



A55701X1

1. Install O-ring seals (1) in each retainer (2).

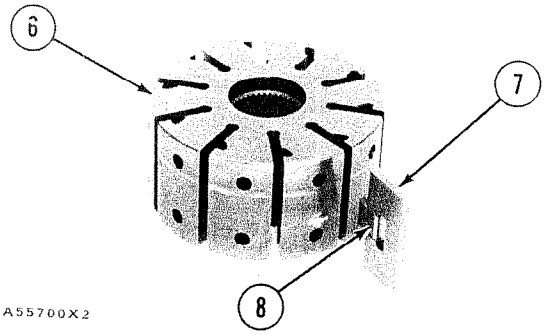
2. Install the seal and retainer assemblies (4) in end plates (3) and (5) with the O-ring seal toward the end plates as shown.



A55702X1

3. Install inserts (8) in vanes (7). Install the vane assemblies in rotor (6) with the sharp edge of the vanes toward the direction of the arrow (direction of rotation) as shown.

4. Install rotor (6) and the vane assemblies in ring (10). Make sure the arrow on rotor (6) is in the same direction as the arrow on the chamfer of ring (10).

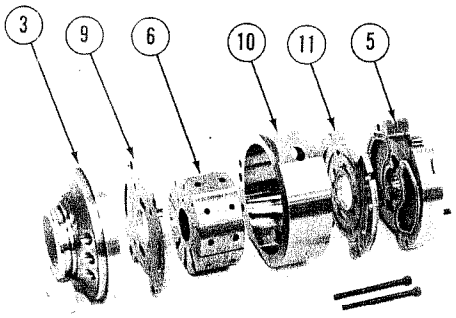


A55700X2

5. Install plates (9) and (11) on each side of ring (10). Make sure the bronze side of the plates are next to rotor (6).

6. Put end plates (3) and (5) with the seal and retainer assemblies in position on the plates.

7. Make sure the notches on outside diameters of plates (3), (9), (11) and (5) are in alignment. Make an alignment of these notches with the chamfers on ring (10) and install the two screws that hold the cartridge assembly together.



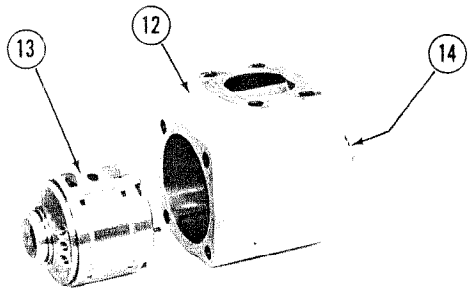
A55703X1

NOTE: Make sure the end of ring (10) that has the arrow on its chamfer is assembled toward end plate (3) before the screws are tightened.

8. Do Steps 1 through 7 for the other cartridge assembly.

HYDRAULIC PUMP

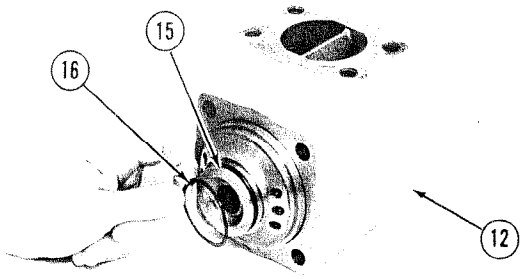
9. Install cartridge assemblies (13) and (14) in pump cover (12) until the dowels of the cartridge assemblies are in their bores in the cover.



A55704X1

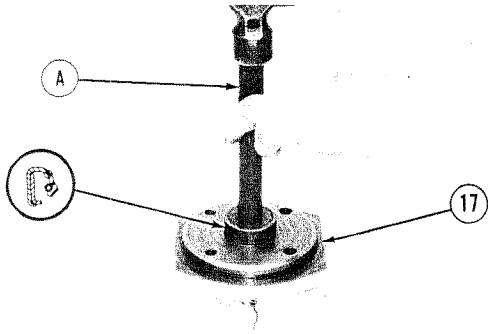
10. Put O-ring seals (15) on both cartridge assemblies and install back-up rings (16). Make sure the O-ring seals are toward cover (12).

11. Install the lip type seal in the outside counterbore of pump body (17) with tool group (A). Make sure the lip of the seal is toward the inside as shown.



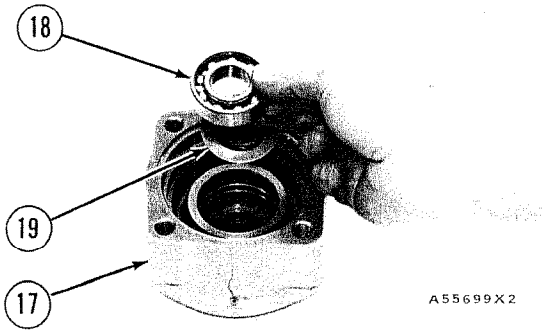
A55705X1

12. Use tool group (A) to install the lip type seal in the inside of pump body (17). Make sure the lip of the seal is toward the inside as shown.

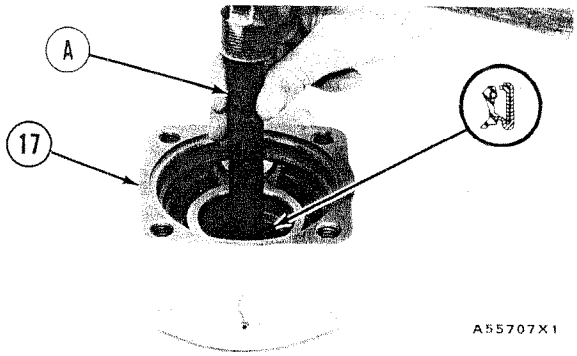


A55706X1

13. Install washer (19) and bearing (18) in pump body (17). Install the ring that holds bearing (19) in position.



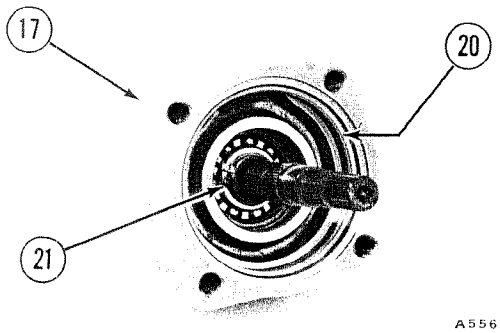
A55699X2



A55707X1

HYDRAULIC PUMP

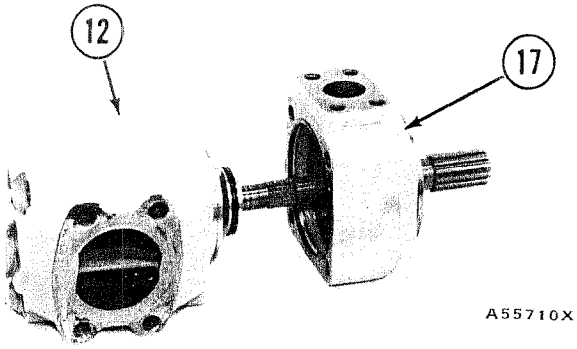
14. Install the shaft in pump body (17). Use tool (B) to install ring (21) in the groove of the shaft.



A55691X2

15. Install the two seal rings (20) in pump body (17).

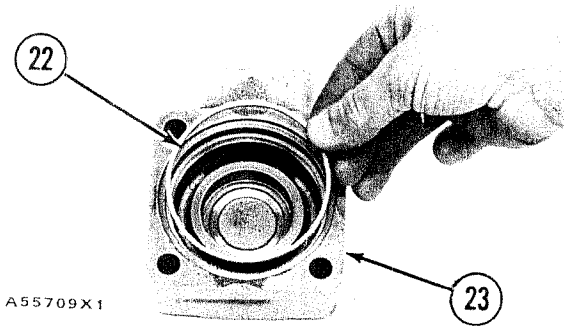
16. Put the O-ring seal in position on the cartridge assembly. Install pump body (17) and the shaft on cover (12). Tighten the bolts that hold body (17) to a torque of 70 ± 5 lb.ft. (95 ± 7 N·m).



A55710X1

17. Install the two seal rings (22) in cover (23).

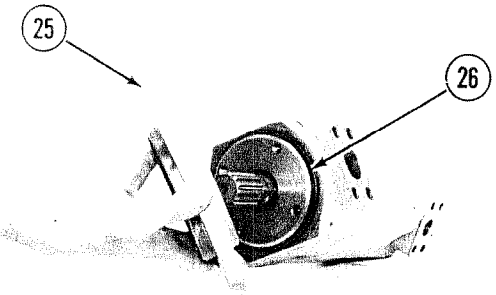
18. Install O-ring seal (24) on the cartridge assembly. Put cover (23) in position and tighten the bolts that hold it to a torque of 45 ± 5 lb.ft. (60 ± 7 N·m).



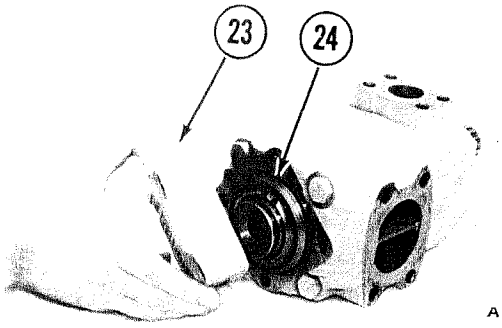
A55709X1

19. Install O-ring seal (26), adapter (25) and the bolts to the pump body.

end by:
a) install hydraulic pump



A55712X1

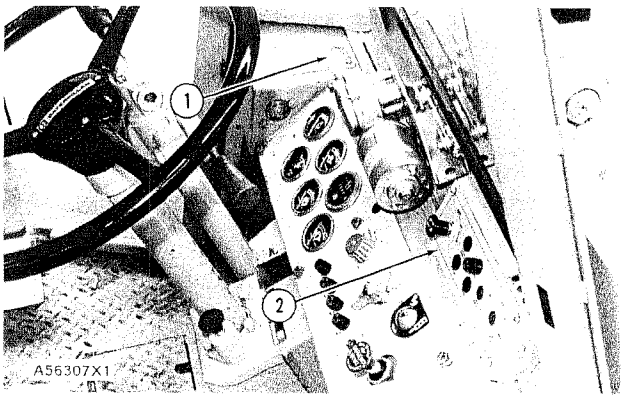


A55711X1

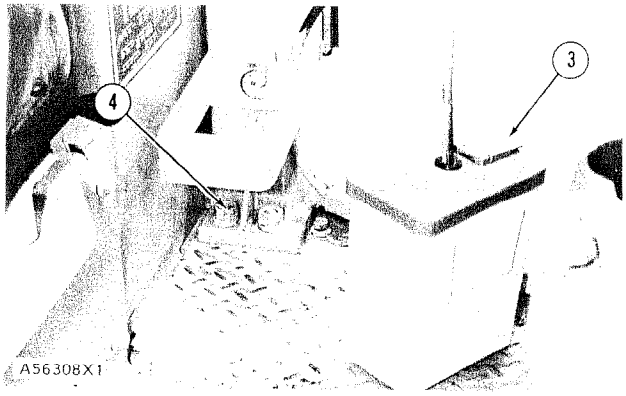
CAB

REMOVE CAB 7325-11

1. Disconnect washer hose (1) from the nozzle assembly.

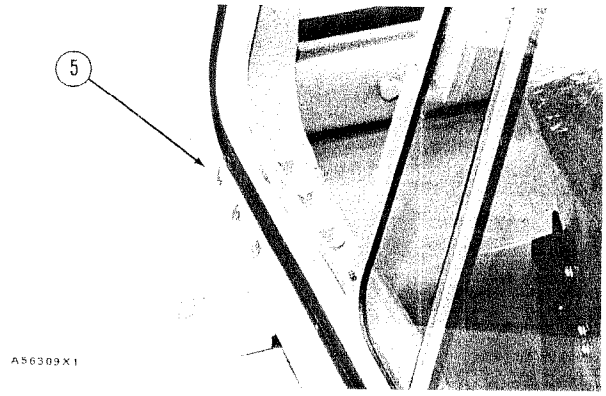


2. Remove panel (2) and disconnect the wire for the windshield wiper motor.



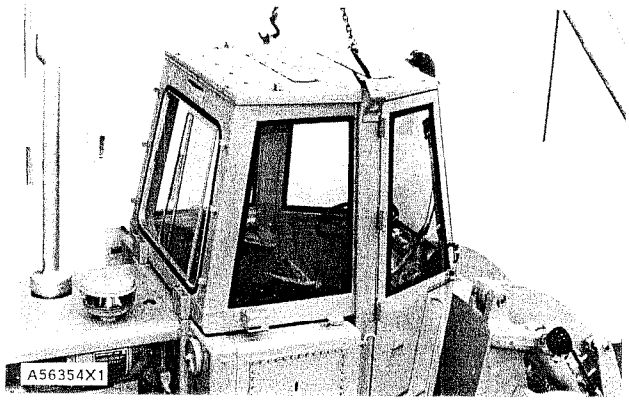
3. Remove windshield washer reservoir (3) from the bracket on the left side of the cab.

4. Remove bolts (4) and the nuts from under each side of the cab.



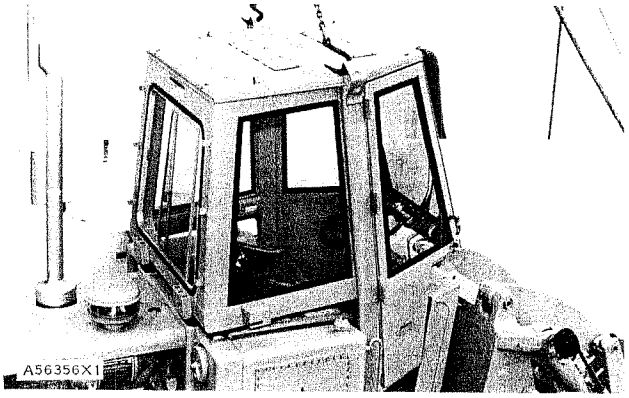
5. Remove the twelve bolts (5) that hold the back of the cab.

6. Fasten a hoist and remove the cab from the machine. The weight of the cab is 850 lb. (388 kg).

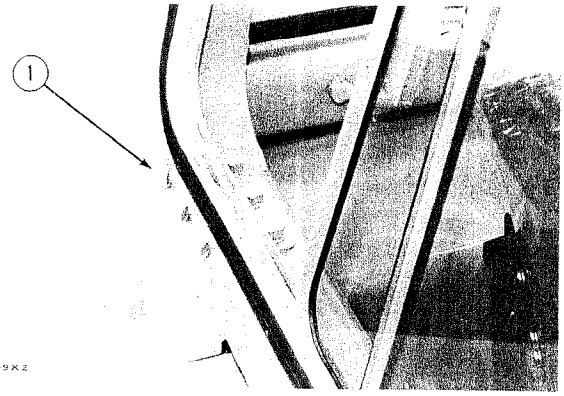


CAB

INSTALL CAB 7325-12

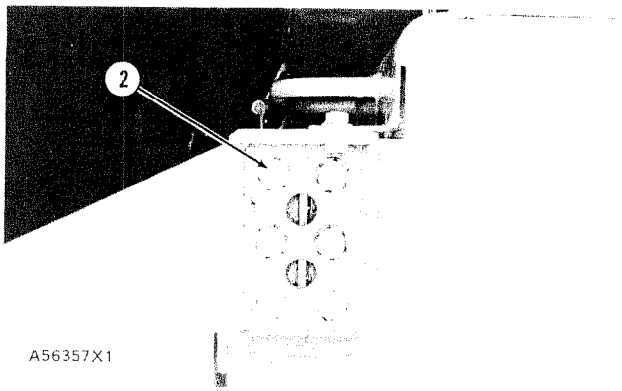


1. Fasten a hoist and put the cab in position on the machine.



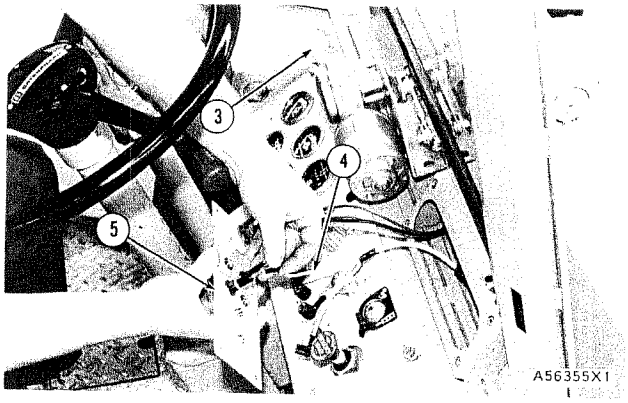
2. Install the twelve bolts (1) that hold the back of the cab.

3. Install the twelve bolts (2) and four nuts that hold the front of the cab in position.



4. Put the windshield washer reservoir in its bracket on the left side of the cab.

VIEW FROM UNDER MACHINE



5. Connect windshield washer hose (3) to the nozzle assembly.

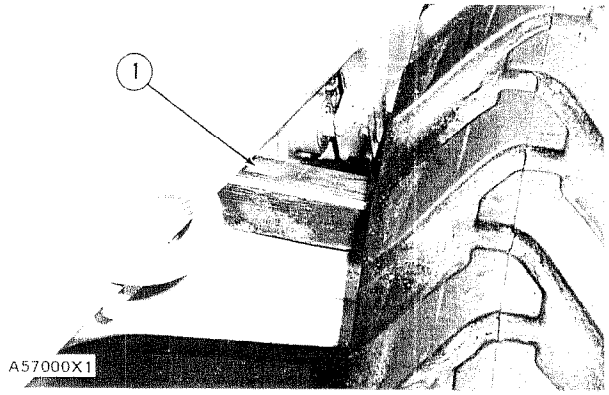
6. Connect wire (4) for the windshield wiper motor to panel (5). Install panel (5).

LOADER MAIN FRAMES

SEPARATION OF LOADER MAIN FRAMES

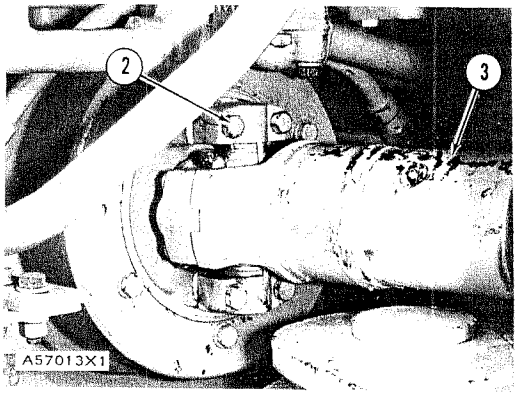
	Tools Needed	A	B
2B9886	Hydraulic Jack	3	
8B7554	Bearing Cup Puller Attachment		1
1S5188	Leg		2

1. Put blocks in front and behind the front tires.
2. Install a block (1) between the rear frame and axle housing on each side of the machine to prevent side movement of the rear frame.

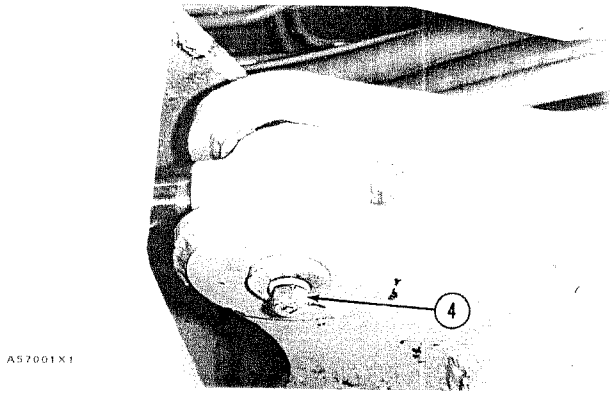


⚠ WARNING

Stop the engine, lower the bucket to the ground and move the control levers backward and forward to release the pressure in the hydraulic system. Slowly loosen the cap to release any pressure in the hydraulic tank. Let the hydraulic oil become cool before any lines are disconnected in the hydraulic system.

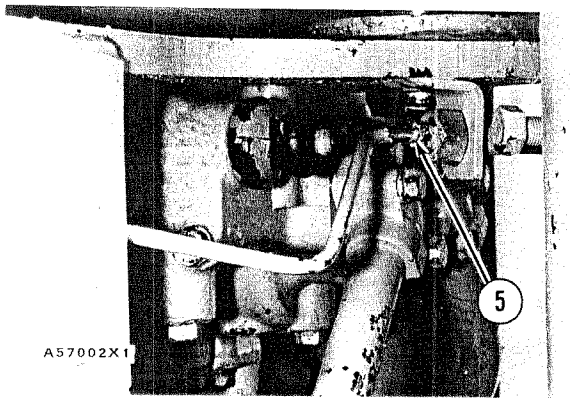


3. Drain the oil from the hydraulic tank. The capacity of the system is:
   920-17.5 U.S. gal. (66 litre)
   930-19.5 U.S. gal. (74 litre)
4. Remove bolts (2) from each end of intermediate drive shaft (3) and remove the drive shaft.
5. Remove bolts (4) and the washers. From the top of the front frame remove the pins that hold the steering cylinder rods.
6. Disconnect the brake chamber rod end from the emergency and parking brake. See Remove Emergency and Parking Brake for this procedure.



⚠ WARNING

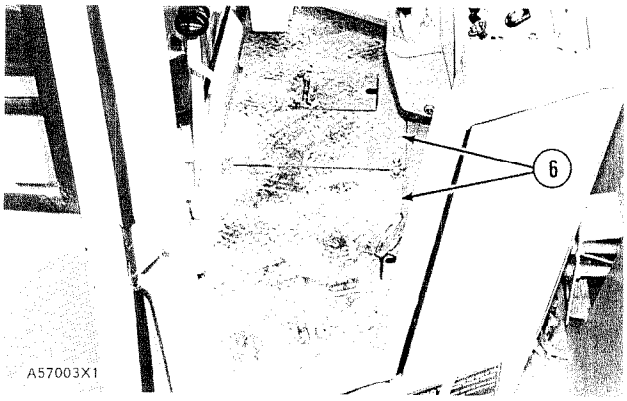
Open the drain valve on the air tank and remove the air pressure from the system before any brake or air lines are disconnected.



7. Disconnect brake line (5) from the front frame.

LOADER MAIN FRAMES

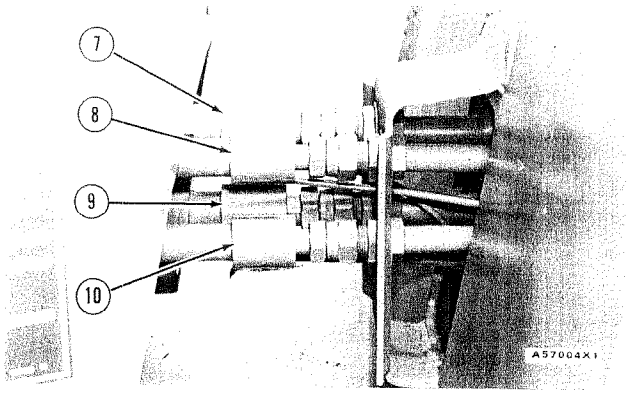
8. Remove floor plates (6).



9. Put identification on hydraulic hose assemblies (7), (8), (9) and (10) for correct installation. Disconnect the hose assemblies from the front frame.

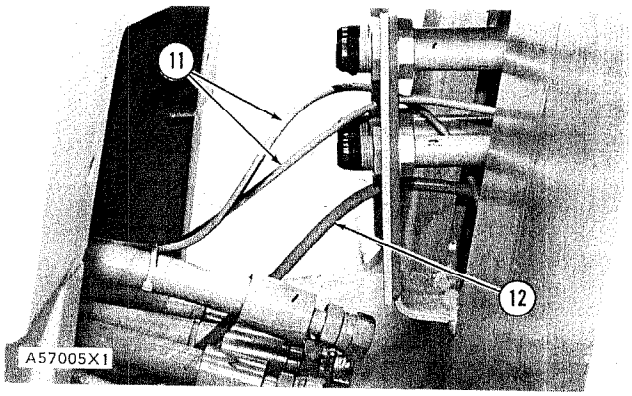
10. Disconnect air line (12) from the horn valve and pull it to the front frame.

11. Put identification on oil lines (11) for correct installation. Disconnect oil lines (11) from the lift kickout and bucket positioner slave cylinders (the slave cylinders are found under the operators seat).



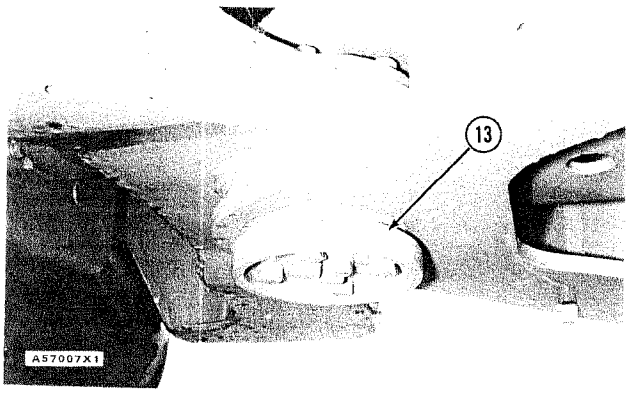
12. Install two of tooling (A) under the front frame for support.

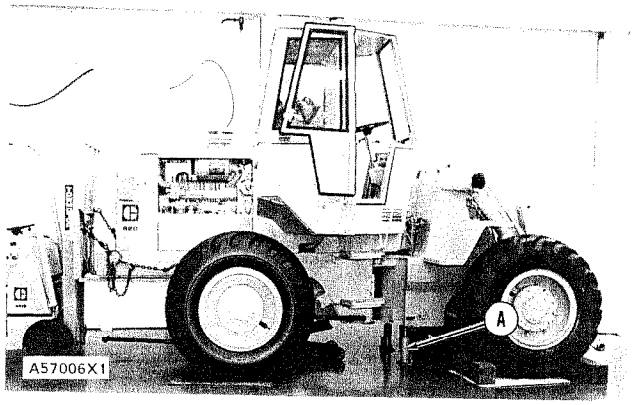
13. Put a floor jack in position under the output transfer gear case.



14. Fasten a lift truck to the rear frame as shown.

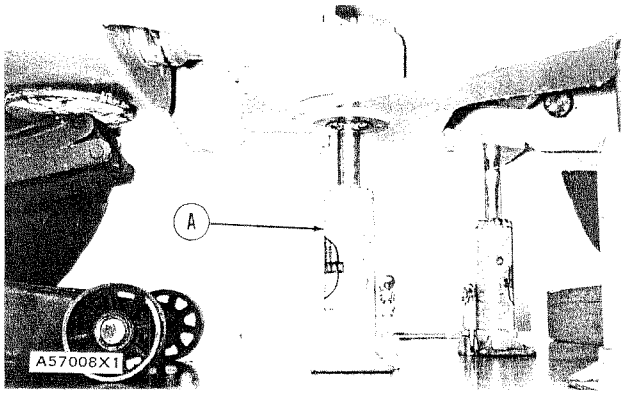
15. Remove plate (13) and the shims from the bottom of the front frame.





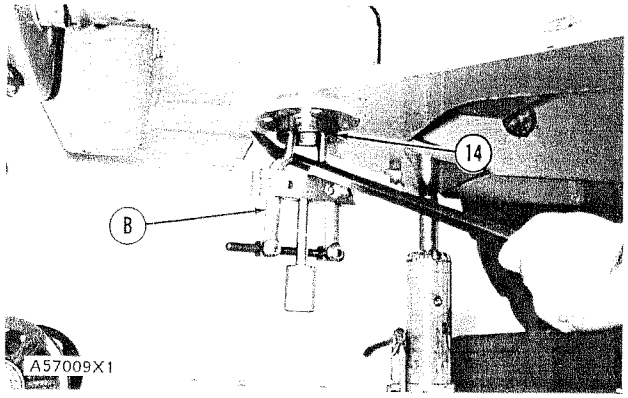
LOADER MAIN FRAMES

16. Use one of tooling (A) to push the lower pivot pin out of the frames.



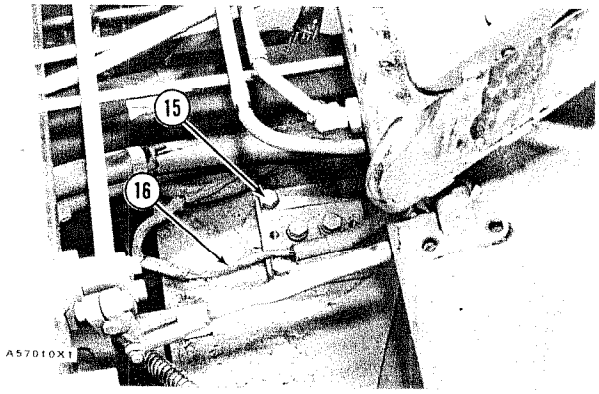
17. Use tooling (B) to remove spacer (14) as shown. The spacer must be removed before separation of the frames can be made.

18. Remove the bolt that holds wire assembly (16) and move the wire assembly from the upper pivot pin plate. Install the bolt in the pivot pin plate.



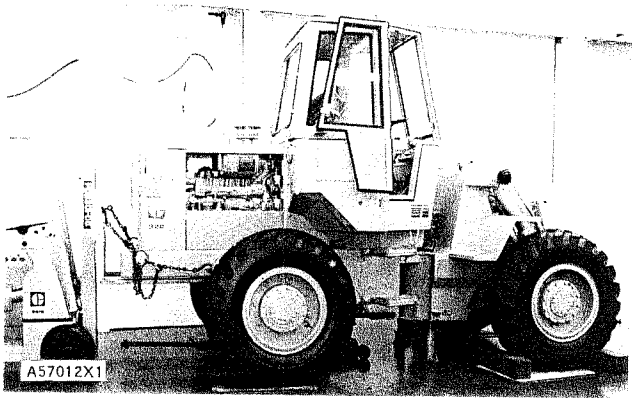
19. Remove the four bolts (15) that hold the pivot pin plate to the frame.

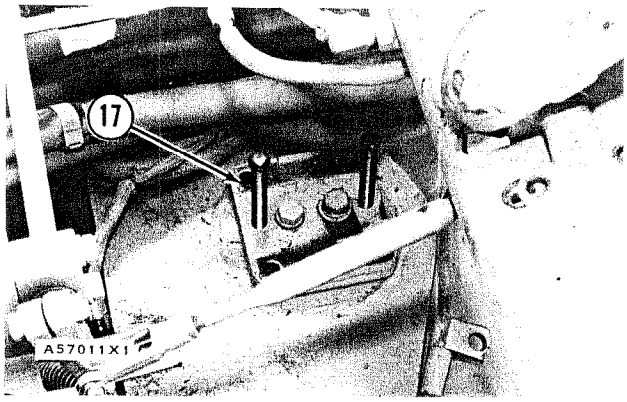
20. Install two ½"-13 NC forcing screws in pivot pin plate (17) and remove the upper pivot pin.



21. Use the lift truck and floor jack to pull the rear frame from the front frame.

22. Put blocks under the front of the rear frame for support. Remove the floor jack and lift truck from the rear frame.



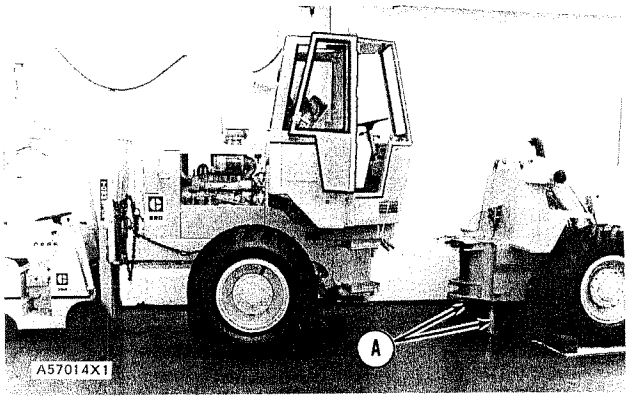


LOADER MAIN FRAMES

CONNECTION OF LOADER MAIN FRAMES

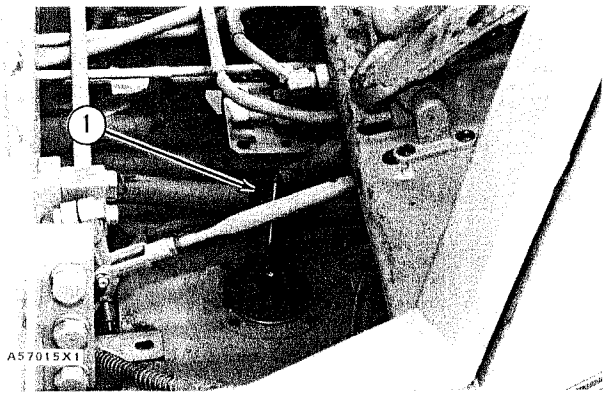
	Tools Needed	A	B	C
2B9886	Hydraulic Jack	2	1	
5P7304	Spacer		1	
9S9149	Wrench			1

1. Fasten a lift truck to the back of the rear frame.



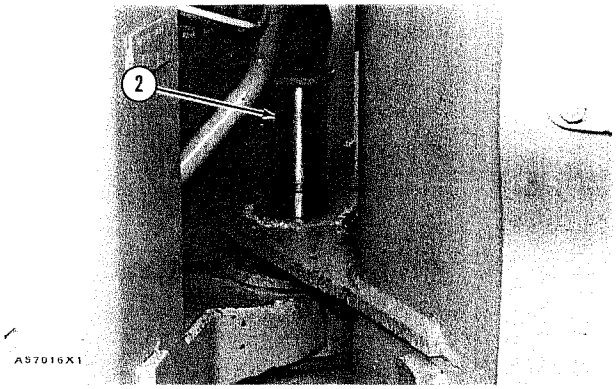
2. Put a floor jack in position under the output transfer gear case. Remove the blocks used for support from under the front of the rear frame.

3. Make sure the blocks are in position in front and behind the front tires and the weight of the front frame is on tooling (A).



4. Push the rear frame into position on the front frame with the lift truck.

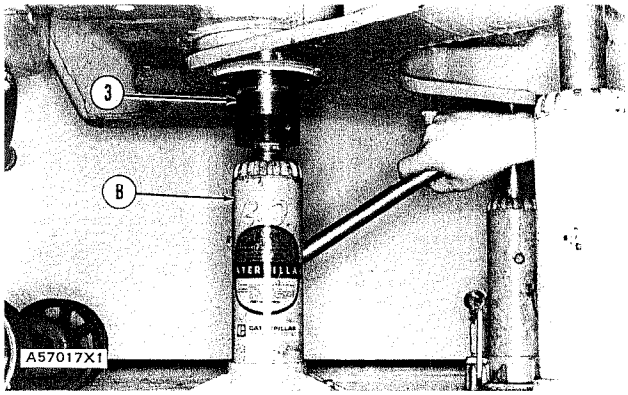
5. Make an alignment of the bores in the main frames and install upper pivot pin (1). Tighten the four bolts (in a sequence of two opposite corners at a time) that hold the upper pivot pin plate. After the pivot pin is in the correct position the bolts must be tightened to a torque of 50 ± 25 lb.ft. (70 ± 35 N·m). Bend the locks on the bolts.



6. Remove one of the center bolts from the upper pivot pin plate. Move the wire assembly and clip in position over the plate and install the bolt.

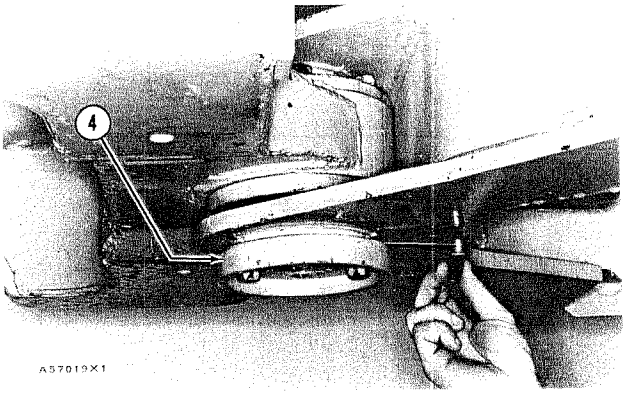
7. Install lower pivot pin (2) as shown.

8. Use tooling (B) to install spacer (3) for the lower pivot pin.



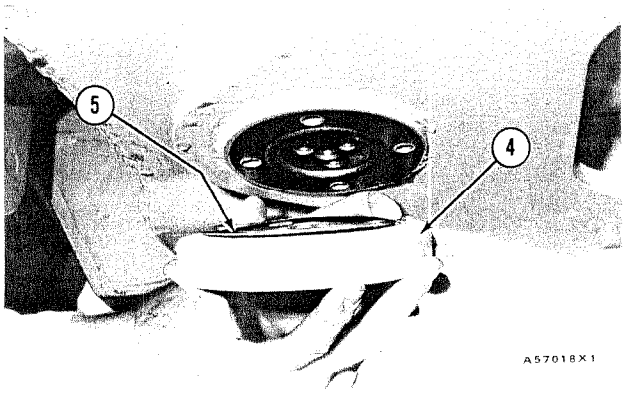
LOADER MAIN FRAMES

9. Put plate (4) in position on the machine and install two of the bolts that hold it 180° apart. Tighten the bolts to a torque of 15 lb.ft. (20 N·m).



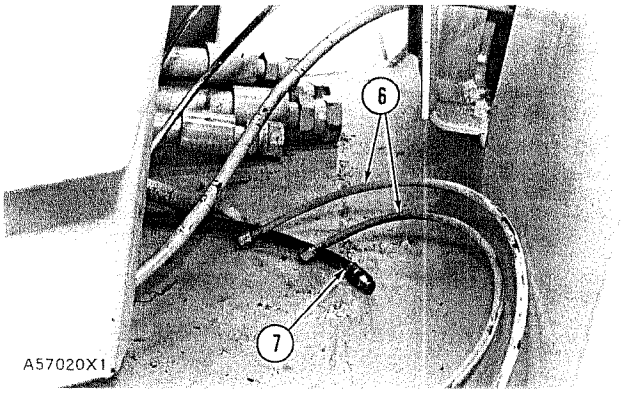
10. Measure the distance between plate (4) and the frame (360° around the plate) with a feeler gauge. Make a note of the minimum measurement.

11. Remove plate (4) and install shims (5) that have a thickness of the minimum measurement taken in Step 10 minus .010 in. (.25 mm). Install the plate and tighten the seven bolts.

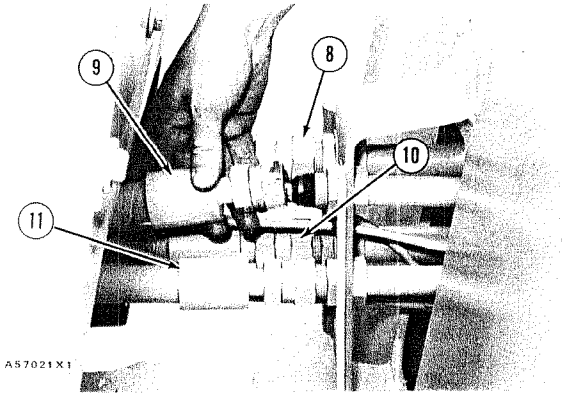


12. Connect oil lines (6) to the lift kickout and bucket positioner slave cylinders.

13. Connect air line (7) to the horn valve.

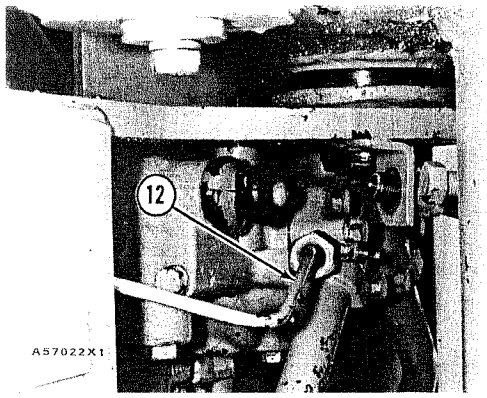


14. Connect hose assemblies (8), (9), (10) and (11) to their correct location on the front frame.



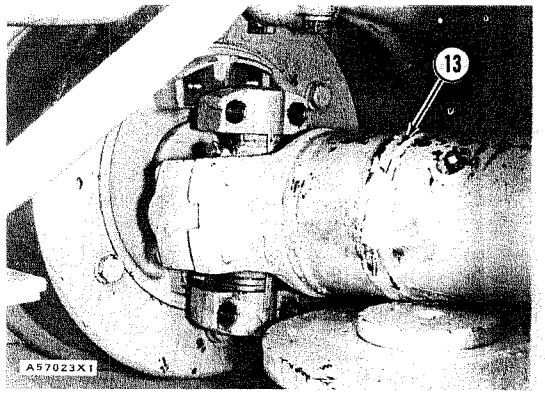
LOADER MAIN FRAMES

15. Connect brake line (12) to the front frame.



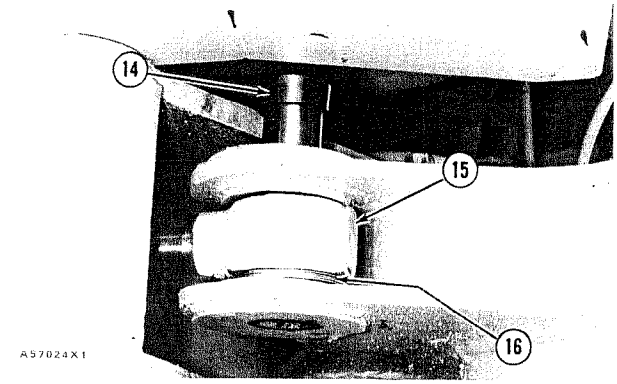
16. Put intermediate drive shaft (13) in position and install the bolts to hold it. Tighten the bolts to a torque of 45 ± 5 lb.ft. (60 ± 7 N·m) with hardened washers.

17. Put both steering cylinder rods (15) in position with washers (16) on each side of the rods to make the steering cylinders level. Install pin (14), the bolts and washers.



18. Install the two floor plates on the machine.

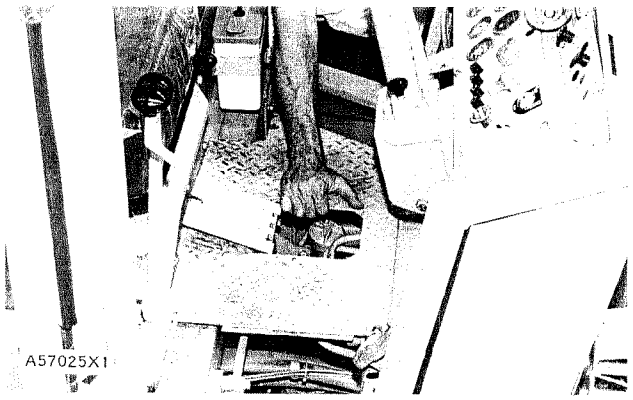
19. Remove the lift truck, tooling (A) and the blocks between the axle housing and rear frame.



20. Fill the hydraulic system with oil to the correct level.

21. Use tool (C) and remove (bleed) the air from the brake system. See HYDRAULIC BRAKE SYSTEM SERVICING in TESTING AND ADJUSTING.

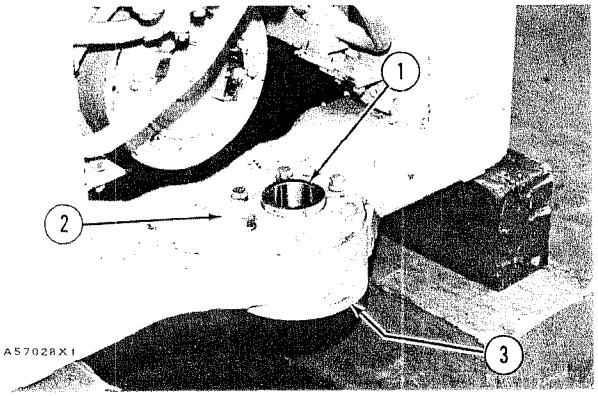
22. Remove (bleed) the air from the lift kickout and bucket positioner systems. See REMOVE AND INSTALL LIFT KICKOUT MASTER CYLINDER for this procedure.

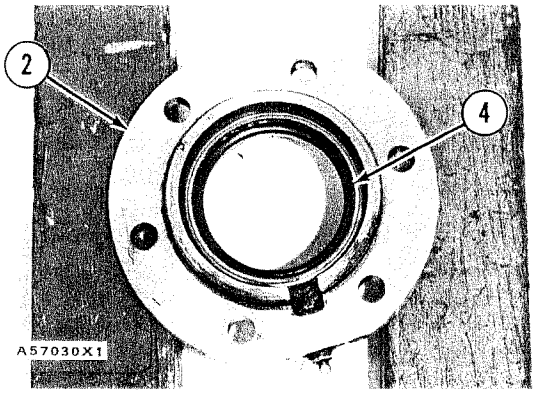


PIVOT PIN BEARINGS

REMOVE PIVOT PIN BEARINGS 7057-11

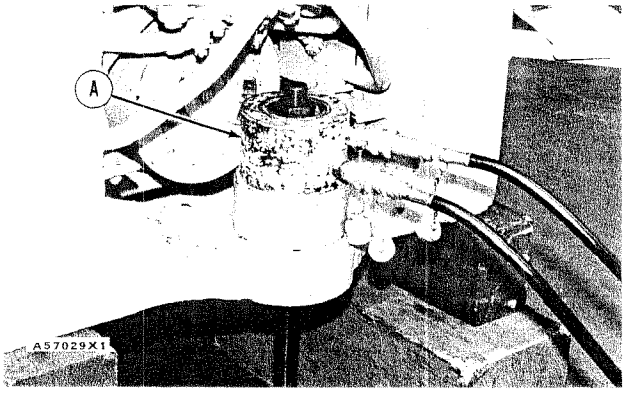
	Tools Needed	A	B	C	D
5P2997	Hydraulic Puller Assembly	1		1	
9F4918	Ring Compressor	1		1	
5P4184	Stud	1		1	
7H7539	Nut (1 1/4"-12 NF Hardened)	1		1	
4K684	Washer (1 1/4" Inside Diameter)	1		1	
1P1840	Bearing Puller Adapter	1			
5P3100	Pump Group	1	1	1	1
7F9540	Hydraulic Puller		1		1
6H1627	Spacer (part of 6H3202 Adapter Assembly)		1		
5F4776	Stud		1		1
5F7351	Nut (part of 8B7548 Puller Assembly)		1		1
5F7353	Washer (part of 8B7548 Puller Assembly)		1		1
1P1834	Bearing Puller Adapter		1		1
1P1835	Bearing Puller Adapter			1	
5F7693	Spacer (part of 5F7334 Spacer Group)				1



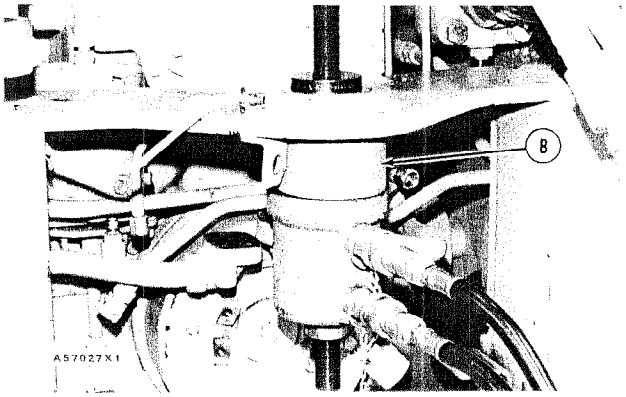


start by:

a) separation of main frames



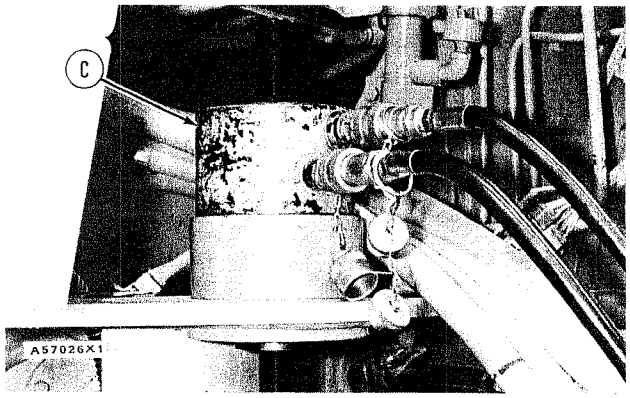
1. Remove the lower pivot pin bearings from the rear frame as follows:
   a) Remove spacer (1) from upper cap (2).
   b) Remove the bolts to remove lower cap (3), upper cap (2) and the shim from the rear frame.
   c) Remove the lip type seals (4) from upper cap (2) and the lower cap.
   d) Use tooling (A) to pull the two bearings out of the rear frame.



2. Remove the middle pivot pin bearing from the rear frame as follows:
   a) See Remove Steering Control Valve to remove the steering control valve.
   b) Install tooling (B) and pull the bearing out of the rear frame.

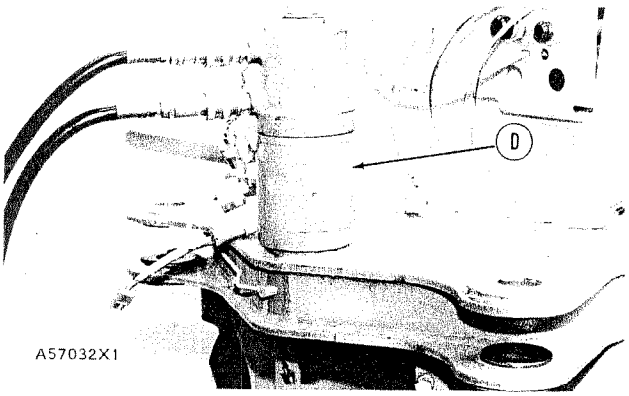
PIVOT PIN BEARINGS

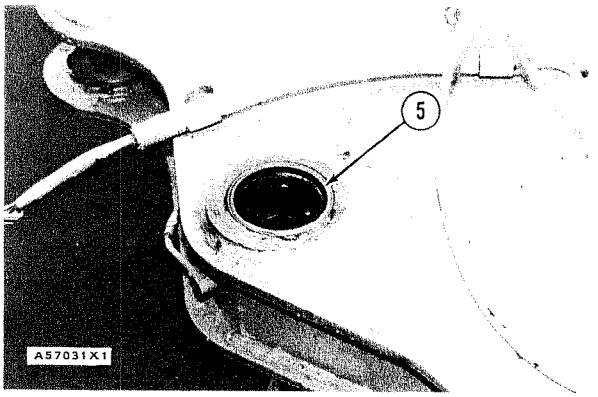
3. Use tooling (C) to pull the upper pivot pin bearing from the rear frame.



4. Remove the upper pivot pin bearing seals (5) from each side of the front frame.

5. Pull the upper pivot pin bearing from the front frame with tooling (D).



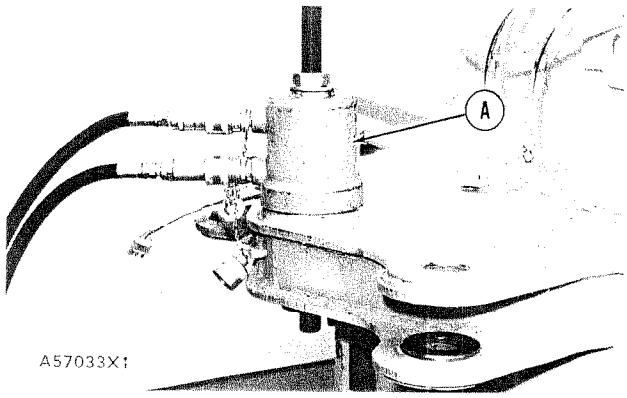


INSTALL PIVOT PIN BEARINGS 7057-12

	Tools Needed	A	B	C	D	E	F
5P3100	Pump Group	1				1	1
7F9540	Hydraulic Puller	1				1	
5P4776	Stud	1				1	
5F7351	Nut (part of 8B7548 Puller Assembly)	1				1	
5F7353	Washer (part of 8B7548 Puller Assembly)	1				1	
1P1834	Bearing Puller Adapter	1				1	
1P510	Driver Group		1				
1P520	Driver Group			1			
FT888	Adapter				2		
8S9089	Bolt (½"-13 NC x 4 ½" long)				1		
1D4719	Nut (½"-13 NC)				1		
4B4280	Washer (½" Inside Diameter)				1		
6H1627	Spacer (part of 6H3202 Adapter Assembly)					1	
5P2997	Hydraulic Puller Assembly						1
5P4184	Stud						1
7H7539	Nut (1 ¼"-12 NF Hardened)						1
4K684	Washer (1 ¼" Inside Diameter)						1
1P1836	Bearing Puller Adapter						1

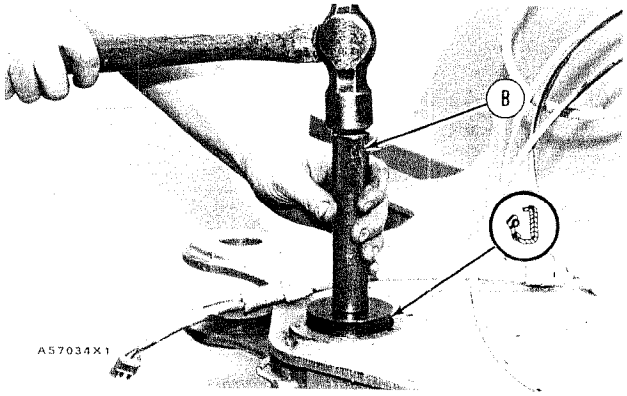
PIVOT PIN BEARINGS

1. Use tooling (A) and install the upper pivot pin bearing in the front frame. Install the bearing until it is in the center of its bore or .56 ± .02 in. (14.22 ± 0.51 mm) from the top surface of the frame.



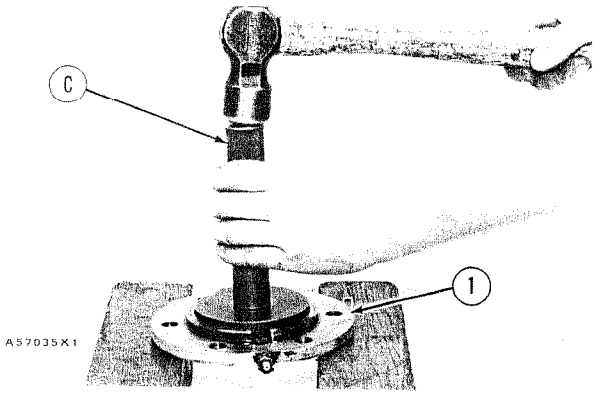
2. Use tool group (B) and install the seals in each side of the front frame until they make contact with the bearing. Make sure the lip of the seal is toward the outside of the frame as shown.

3. Install the seal in upper cap (1) for the lower pivot pin bearings with tool group (C). Install the seal until it makes contact with the counterbore in the cap and with the lip of the seal toward inside of the cap.



4. Install the seal in the lower cap for the lower pivot pin bearings with tool group (C). Install the seal until it makes contact with the counterbore in the cap and with the lip of the seal toward outside of the cap.

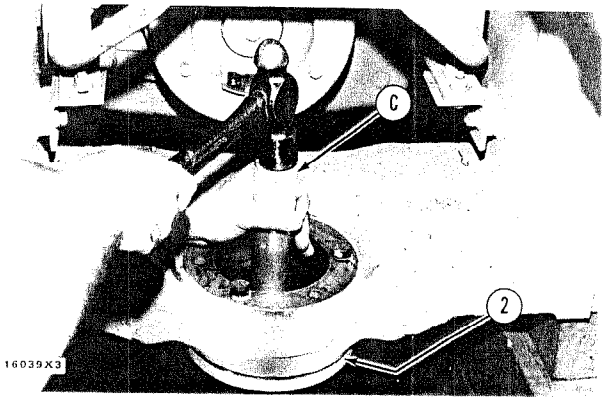
5. Put lower bearing cap (2) in position and install three of the bolts to hold it the same distance apart.



6. Lower the temperature of the lower bearing cup to −100°F ± 10°F (−73.3°C ± −23.3°C). Use tool group (C) and install the bearing cup until it makes contact with cap (2).

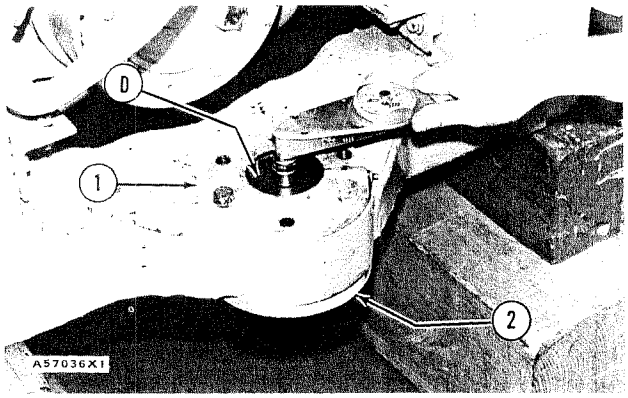
7. Put clean oil on the two bearing cones and install them in the lower pivot pin bore.

8. Lower the temperature of the upper bearing cup to −100°F ± 10°F (−73.3°C ± −23.3°C). Use tool group (C) and install the bearing cup until it makes light contact with the upper bearing cone.

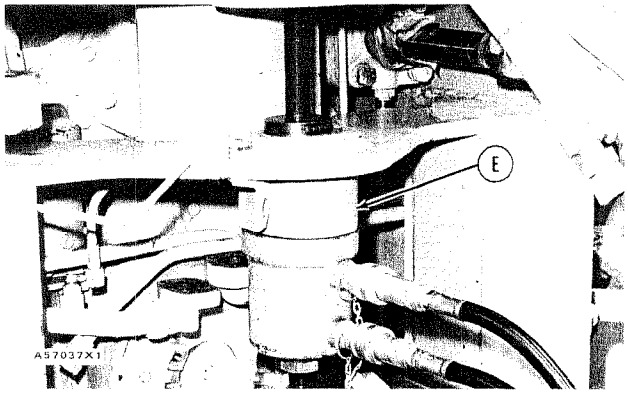


PIVOT PIN BEARINGS

9. Remove the three lower bearing cap bolts and install upper cap (1) and the shim. Install three bolts the same distance apart to hold caps (1) and (2).

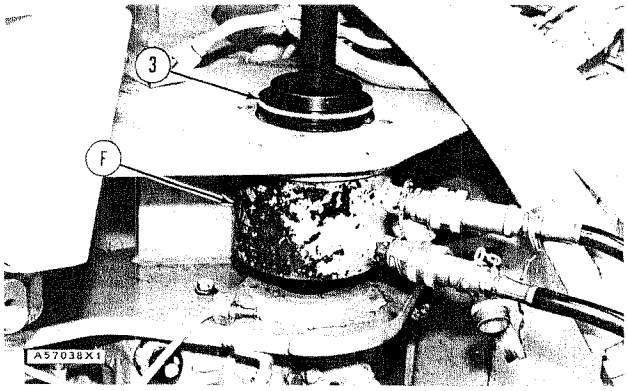


10. Connect tooling (D) to the bearing cones. Check the amount of torque needed to turn the bearing cones. Remove or install shims under cap (1) until the following torque is needed to turn the bearing cones:
920-20 to 75 lb.in. (2.3 to 8.5 N·m)
930-25 to 125 lb.in. (2.8 to 14.1 N·m)



11. Install the remainder of the bolts that hold the bearing caps.

12. Lower the temperature of the middle pivot pin bearing to −80°F ± 10°F (62.2°C ± −23.3°C). Use tooling (E) to install the bearing until it is even with the surface of the rear frame.



13. Install the steering control valve. See Install Steering Control Valve for this procedure.

14. Use tooling (F) to install upper pivot pin bearing (3) in the rear frame until the large outside diameter of the bearing is in contact with the counterbore of the frame.

end by:
a) connection of loader main frames