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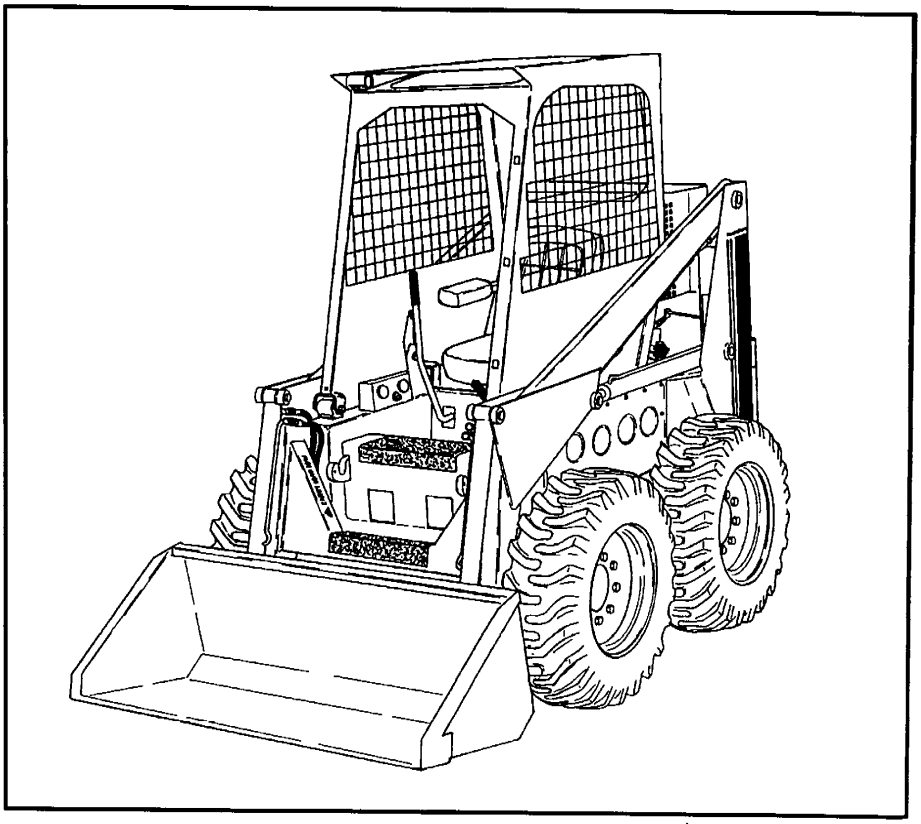
620

Service Manual



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INGERSOLL-RAND
6549846 (9–75)
Printed in U.S.A.

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MAINTENANCE SAFETY

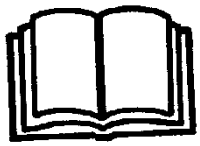
WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

W-2003-0903

Safety Alert Symbol: This symbol with a warning statement, means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.

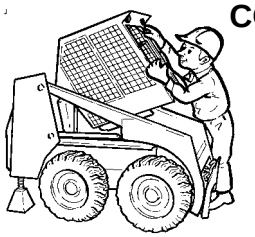
CORRECT



B-10731a

Never service the Bobcat Skid-Steer Loader without instructions.

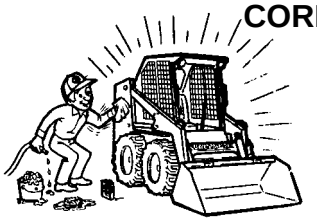
CORRECT



B-12365

Use the correct procedure to lift or lower operator cab.

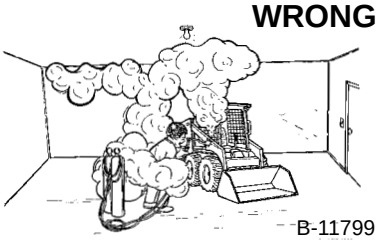
CORRECT



B-7469

Cleaning and maintenance are required daily.

WRONG



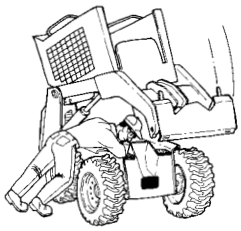
B-11799

Have good ventilation when welding or grinding painted parts.

Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.

Avoid exhaust fume leaks which can kill without warning. Exhaust system must be tightly sealed.

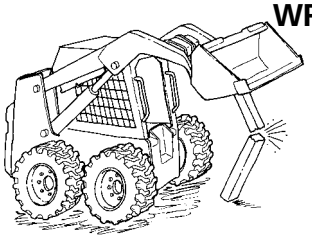
WRONG



B-15231

Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop. Do not go under lift arms when raised unless supported by an approved lift arm support device. Replace it if damaged.

WRONG

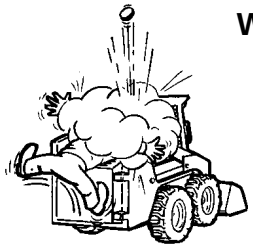


B-15280

Never work on loader with lift arms up unless lift arms are held by an approved lift arm support device. Replace if damaged.

Never modify equipment or add attachments not approved by Bobcat Company.

WRONG



B-6590

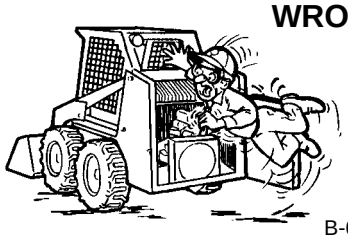
Stop, cool and clean engine of flammable materials before checking fluids.

Never service or adjust loader with the engine running unless instructed to do so in the manual.

Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate the skin or eyes.

Never fill fuel tank with engine running, while smoking or when near open flame.

WRONG



B-6580

Keep body, jewelry and clothing away from moving parts, electrical contact, hot parts and exhaust.

Wear eye protection to guard from battery acid, compressed springs, fluids under pressure and flying debris when engines are running or tools are used. Use eye protection approved for type of welding.

Keep rear door closed except for service. Close and latch door before operating the loader.

WRONG

B-6589

Lead-acid batteries produce flammable and explosive gases.

Keep arcs, sparks, flames and lighted tobacco away from batteries.

Batteries contain acid which burns eyes or skin on contact. Wear protective clothing. If acid contacts body, flush well with water. For eye contact flush well and get immediate medical attention.

Maintenance procedures which are given in the Operation & Maintenance Manual can be performed by the owner/operator without any specific technical training. Maintenance procedures which are **not** in the Operation & Maintenance Manual must be performed **ONLY BY QUALIFIED BOBCAT SERVICE PERSONNEL. Always use genuine Bobcat replacement parts.** The Service Safety Training Course is available from your Bobcat dealer.

MSW01-0805


Bobcat®

1–1 INTRODUCTION

1–1.1 SYMBOLS

The safety symbol is an identification of warning for important safety items in this manual. When this symbol is shown, look for the possibility of danger to personnel when doing a specific job. Carefully read and follow the instruction that follows this symbol.

WARNING

The warning symbol is an identification for warning of the possibility of damage to equipment when doing work on a specific part of the machine. Carefully read and follow the instruction that follows this symbol.

1–1.2 SERIAL NUMBER IDENTIFICATION

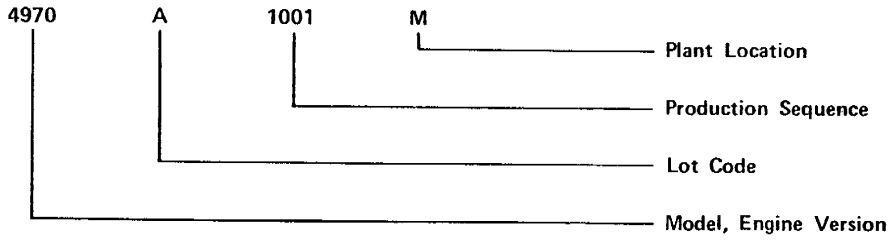
It is important to make correct reference to the serial number of the loader when making repairs or ordering parts. Early or later made models (identification made by "Lot") some times use different parts, or it may be necessary to use a different procedure in doing a specific job.

Fig. 1–1 Loader Serial Number Plate

1–1.3 LOADER SERIAL NUMBER

The loader serial number plate location is in front of and below the operators seat (Fig. 1–1).

The serial number is made up as follows:



ENGINE SERIAL NUMBER

The location of the engine serial number is on the air housing (Fig. 1–2).

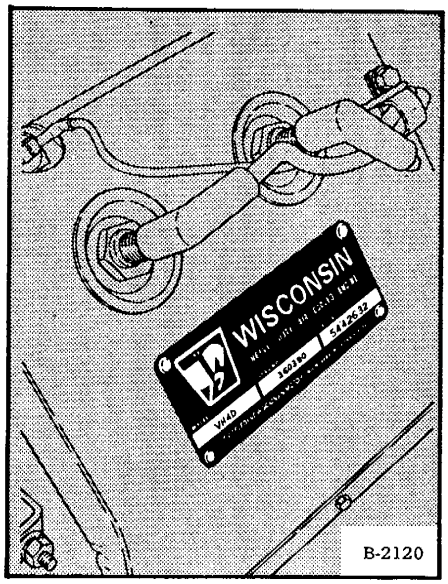


Fig. 1–2 Engine Serial Number Plate

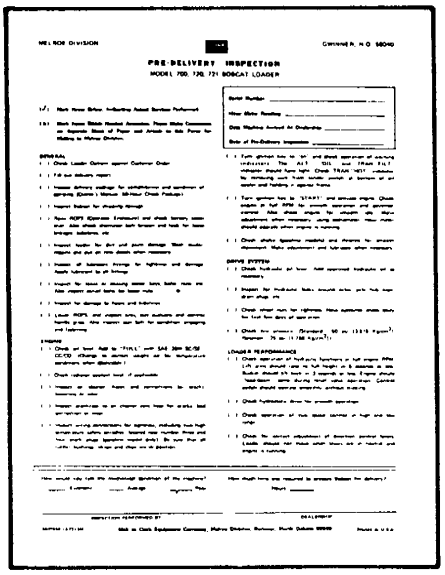
PRE–DELIVERY INSPECTION

The purpose of the pre-delivery inspection is to make sure that the loader is in correct operating condition when it comes to the dealer and before it is delivered to the customer.

The pre-delivery inspection also lets the factory know when something is wrong with the loader so that action can be taken to prevent the problem from happening in the future.

All items on the inspection for (Fig. 1–3) must be completed according to specifications in this manual.

One copy of the completed form is to be mailed to the attention of Quality Control, Melroe Division.



PRE-DELIVERY INSPECTION
MODEL 700, 720, 721 BOBCAT LOADER

Fig. 1–3 Pre-Delivery Inspection Form

50 HOUR INSPECTION

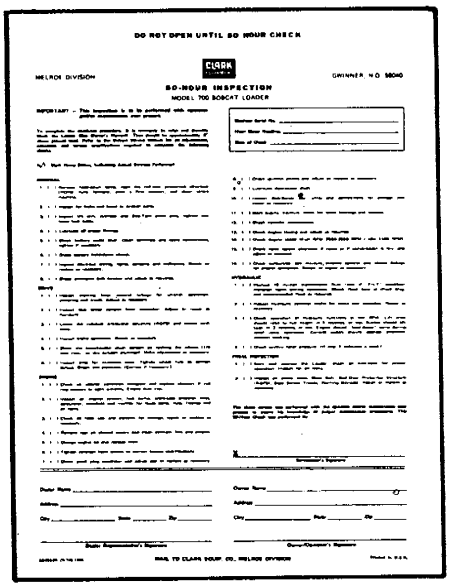
The 50 hour inspection must be completed soon after the first 50 hours of loader operation.

The purpose of the 50 hour inspection is as follows:

(1) For adjustment and inspection after first work period.

(2) To correct wrong maintenance and operating methods.

(3) For demonstration of correct service procedures to customer.



DO NOT OPEN UNTIL 50 HOUR CHECK

50-HOUR INSPECTION
MODEL 700 BOBCAT LOADER

Fig. 1–4 50 Hour Inspection Form

All items on the 50 hour inspection form (Fig. 1–4) must be completed by the mechanic, according to specifications in this manual.

When the 50 hour inspection has been completed, the form must be signed by the mechanic completing the inspection, dealer person and owner or operator.

One copy of the completed form is for the owner of the loader. Another copy is to be sent to the attention of Service Department, Melroe Division. The remainder copy is for the Dealer.

1–2 PREVENTIVE MAINTENANCE

Maintenance work must be done regularly. Failure to do so will result in damage to the machine or its engine. The service schedule has been prepared as a guide to proper maintenance of the Bobcat loader. Do not depart from this schedule unless it is to shorten the intervals due to extremely hot, cold, dusty or corrosive operating conditions.

1–3 620 BOBCAT SERVICE SCHEDULE

ITEM	SERVICE REQUIRED	HOURS				
		8	50	200	500	1000
Engine Air Cleaner	Empty dust cap, check hose, replacement of element if needed, check condition of system.	■				
Engine Oil	Check and add as necessary.	■				
Engine Cooling System	Check and clean as needed.	■				
Tires	Check for damage and correct tire pressure.	■				
All Pivot Points	Add lubricant to all fittings (12).	■				
Wheel Nuts	Check tightness.	■				
Engine Oil and Filter	Oil and filter replacement.		■			
Battery	Check water level. Add water if needed.		■			
Transmission Fluid	Check level. Add fluid if needed.		■			
Alternator Belt	Check condition and make adjustment as needed.		■			
Distributor	Add 3 - 5 drops of oil to cap.		■			
Control Pedals and Steering	Add lubricant to all fittings.		■			
Final Drive Chains	Check for loose chains.			■		
Brakes	Check condition. Repair as needed.			■		
Engine Valve Tappets	Adjustment of valve tappets.			■		
Engine Ignition System	Check points and timing. Replacement of plugs.			■		
Engine Air Shrouding	Remove and clean shrouding and cooling fins.			■		
Engine Cylinders	Check compression: if over 90 psi (620 kPa) - remove carbon.			■		
Engine Starting Motor	Remove and clean as needed.				■	
Engine Fuel Filter	Element replacement is needed.				■	
Hydraulic Fluid Reservoir	Remove water as often as needed.				■	
Hydraulic System	Replacement of fluid and both filters.					■

1–4 AIR CLEANER SYSTEM (Fig. 1–5)

Correct maintenance of this system will increase the engine life.

The following service is needed:

(1) Remove dirt from the dust cap as often as needed.

(2) Remove the element only when it needs replacement. (When the red ring shows on the indicator.) (Fig. 1–6).

(3) When changing the element, be sure to remove dirt from the housing. Check that the gasket is in place.

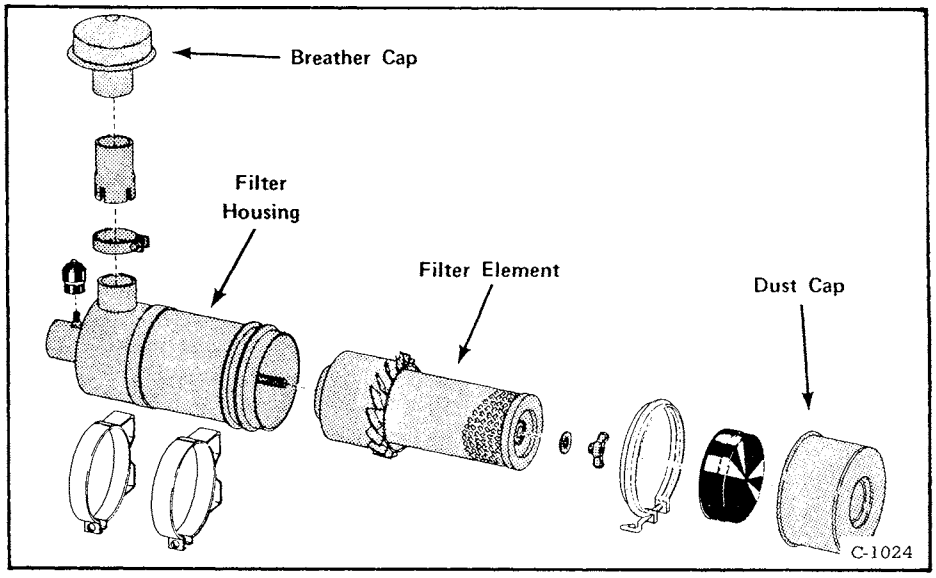


Fig. 1–5 Air Cleaner Breakdown

(4) If the air cleaner has been damaged, inspect and make replacement of parts as needed.

(5) Inspect condition of system:

1. Run engine at idle.

2. Hold hand tightly over the inlet hole (Fig. 1–7). The red ring must show on the condition indicator. If it does not, the system has a leak. Make replacement of the parts to correct the leak.

NOTE: The leak can be in the air cleaner hose or the crankcase breather hose (Fig. 1–8).

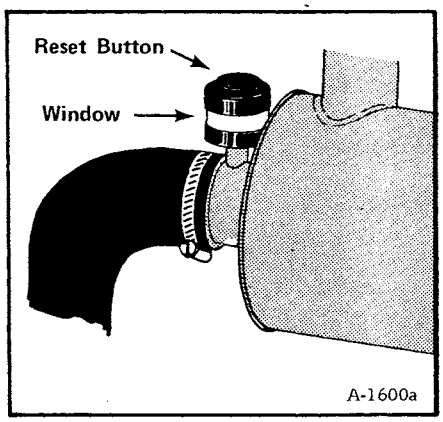


Fig. 1–6 Condition Indicator

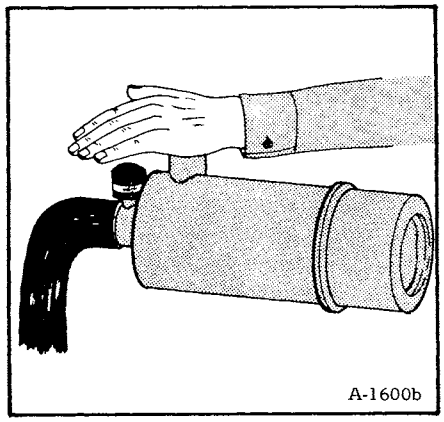


Fig. 1–7 Checking System

1–5 ENGINE FUEL SYSTEM

There is an inline fuel filter at the rear of the Bobcat. To check the filter, remove it and blow in the direction of the arrow. Install the filter with the arrow pointing toward the engine (Fig. 1–9).

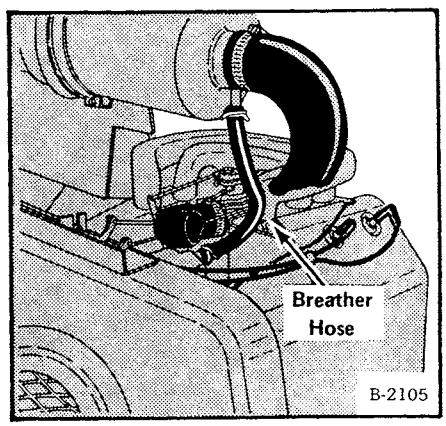


Fig. 1–8 Crankcase Breather Hose

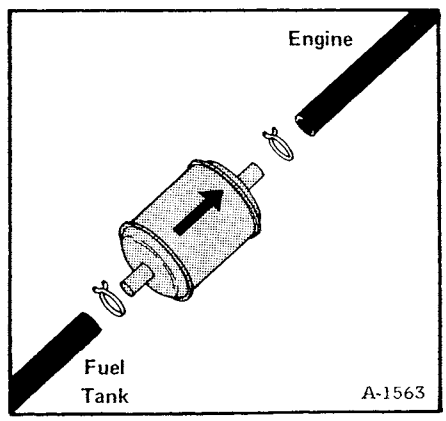


Fig. 1–9 Inline Fuel Filter

1–6 ENGINE OIL AND FILTER REPLACEMENT

Engine oil and filter on the Wisconsin engine must have replacement made every 50 hours, or more often under dirty or difficult starting conditions.

To remove oil, first run the engine a few minutes until oil is warm. Remove the access door from under the machine (Fig. 1–10). Remove plug (Fig. 1–11). To let out oil, leave plug out for at least five minutes.

When installing filter, be sure to wipe filter base clean, and put oil on the filter gasket. Filter must be installed hand-tight only. Run engine a few minutes and check filter for leaks.

See page 8–1 for oil specifications. Engine oil capacity is four quarts.

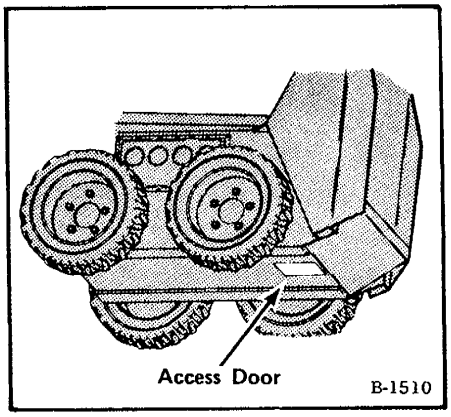


Fig. 1–10 Belly Pan

1–7 CLEANING ENGINE COOLING SYSTEM

The 620 needs regular cleaning of engine air cooling fins to prevent overheating and to get maximum engine life.

Remove engine cooling shrouding. Clean dirt, oil, etc., from cooling fins. Use a wire brush or scraper to remove hard deposits (Fig. 1–12).

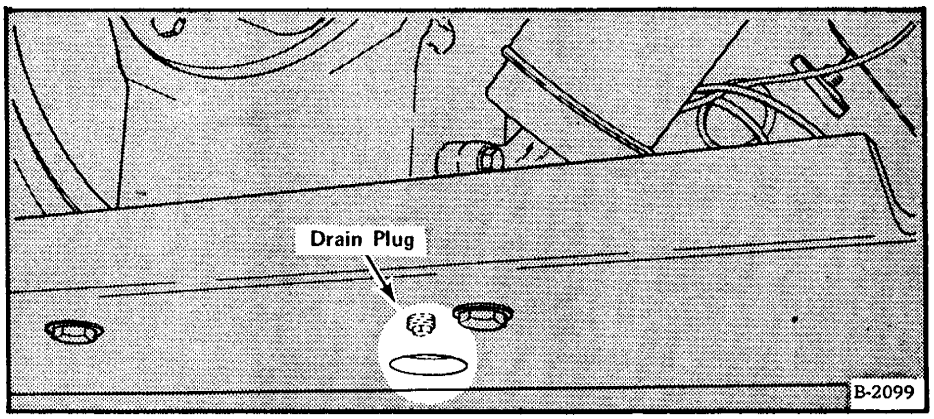


Fig. 1–11 Engine Oil Drain

TIRES

The Bobcat must be equipped with the correct tires for its application, or it will not operate correctly.

Tire Rotation: When two tires are worn more than the other two, put the worn tires on the same side. When two new tires are installed new, put both on the same side.

Tire Maintenance: Check tires regularly for damage and correct pressure.

When flotation tires are used on hard surfaces, the tire pressure can be increased to 50 PSI (345 kPa). This will make the Bobcat turn better.

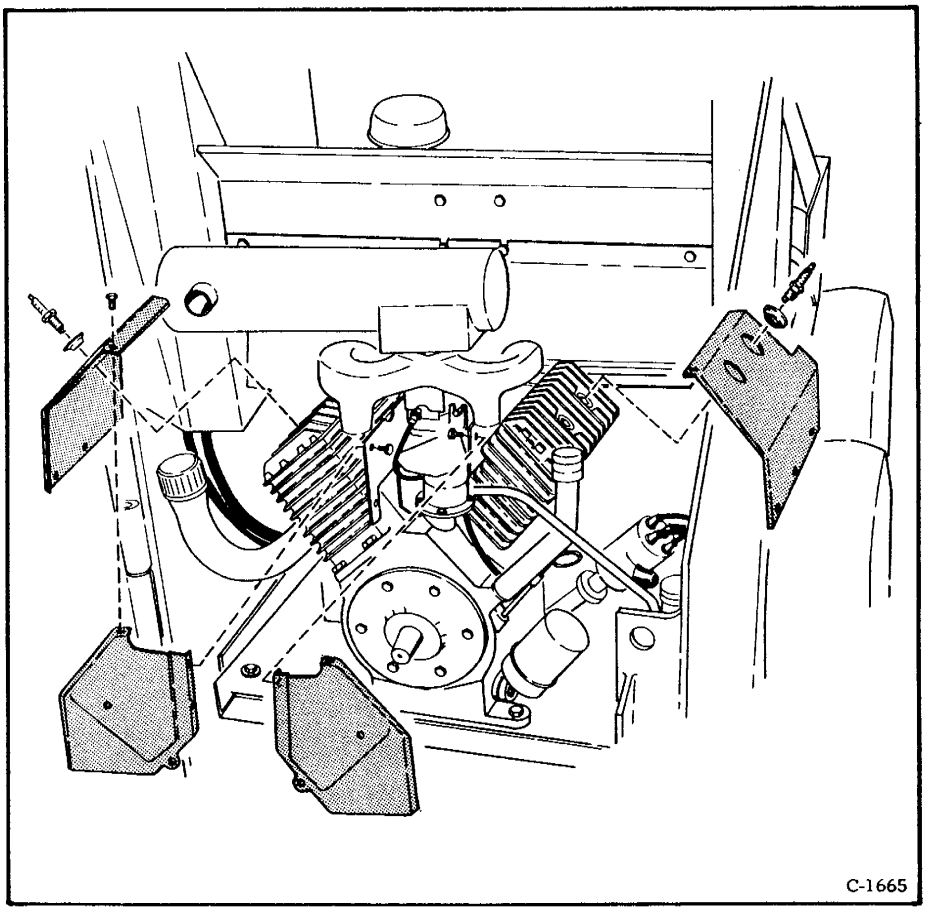


Fig. 1–12 Removal of Cylinder Head Covers & Shrouding

WARNING

Do not put fluid in the tires!

1–9 LOADER LUBRICATION

Fig. 1–13 shows the location of lubricant fittings on the loader.

There are 22 fittings (25 with 2nd Auxiliary). Also, put lubricatant on the cab tilting assembly, seat adjustment rails, and the rollers on the steering levers.

Use a good quality lithium grease for lubrication of the Bobcat.

Do not put oil on throttle, choke or governor linkage. Oil will cause tightening of linkage pivots as a result of dirt deposits.

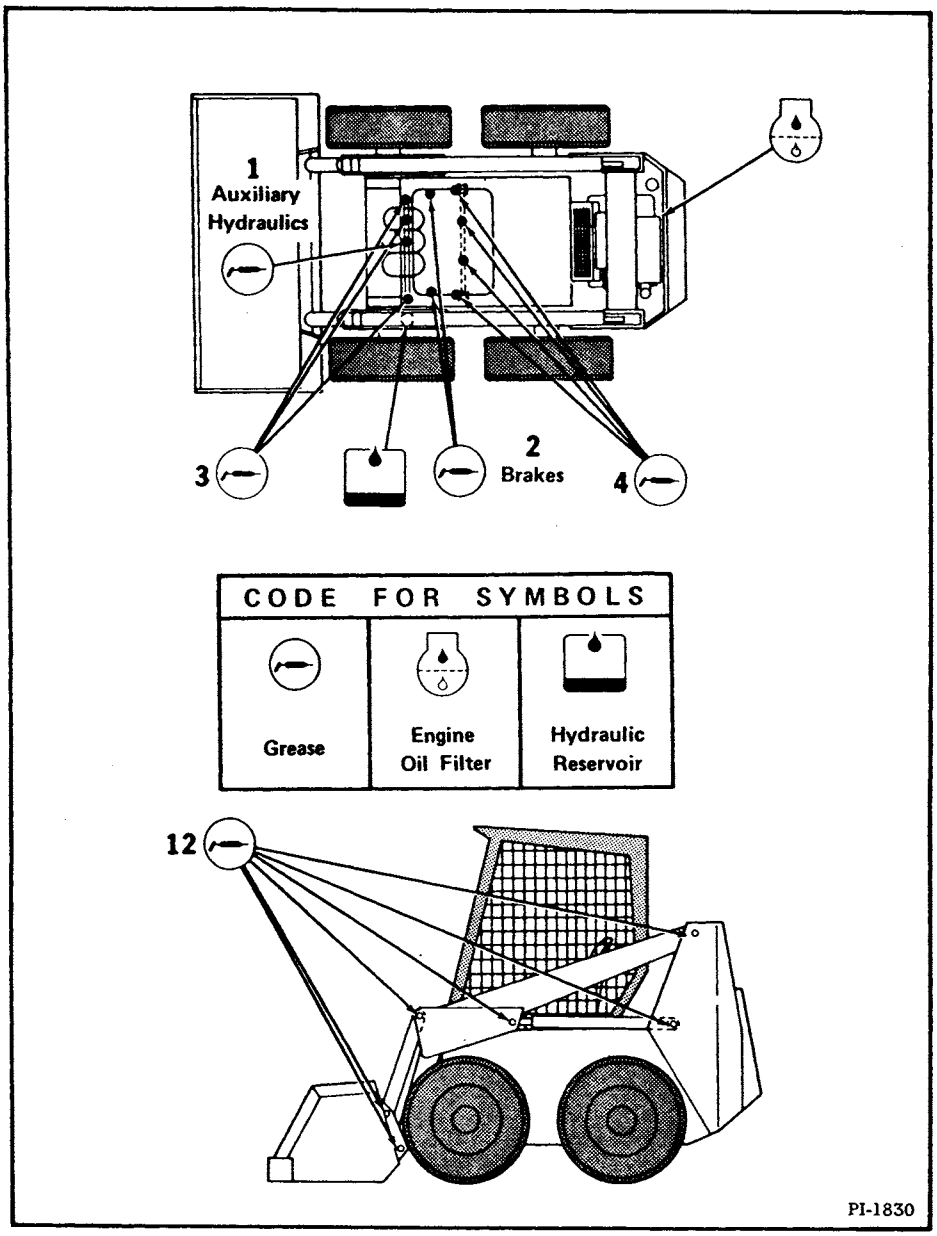


Fig. 1–13 Lubrication Points

1–10 SEAT AND SEAT BELTS

The seat is mounted on two sliding rails for adjustment. Add lubricant to rails (Fig. 1–14) to make easy movement of the seat.

Inspect condition of seat belts and buckles. Be sure the belts are tightly fastened with bolts and not damaged.

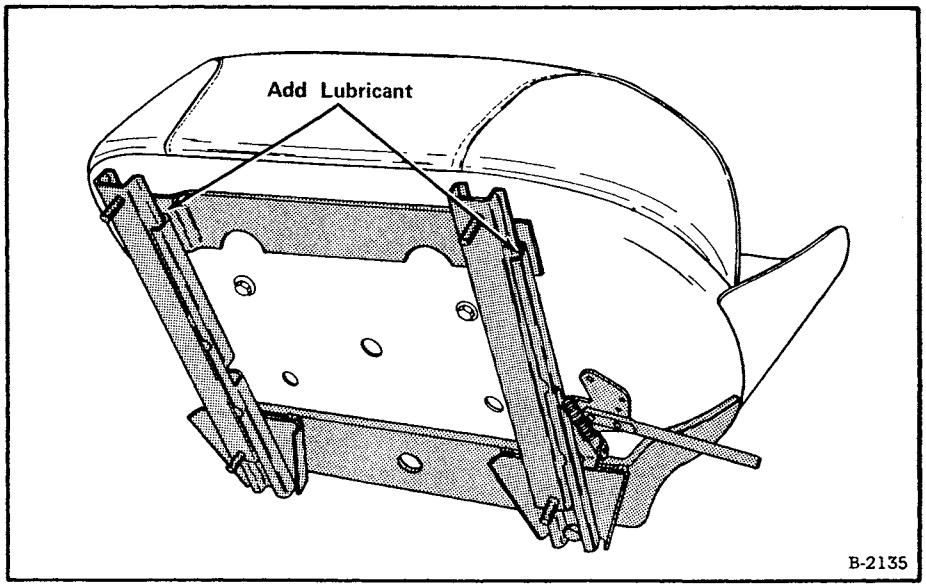


Fig. 1–14 Seat Sliding Rails

1–11 ROLL-OVER PROTECTIVE STRUCTURE

The cab tilting assembly is used to tilt the cab for maintenance of the transmission area (Fig. 1–15). If needed, the cab can be tilted fully forward, and held on a support for more working room in the transmission area (Fig. 1–16). Be sure that cab cannot fall off the support or it will break the tilt cylinder fittings.

1–12 CONTROLS

Steering linkage. Correct steering linkage adjustment must be made or the machine will move when the levers are in neutral. Refer to page 3–6 for adjustment.

Foot Pedal Adjustment. Correct pedal adjustment must be made to fit operator and to permit full movement of the valve spools.

To make adjustment: (Fig. 1–17)

(1) Remove the pins from the clevis.

(2) Turn the clevis until the adjustment is correct.

(3) After the pedal is connected to the clevis, push the pedal with the heel. There must be 1/4" (6.5 mm) minimum clearance between the bottom edge of the pedal and the floor plate.

1–13 CHOKE LINKAGE ADJUSTMENT

(1) Loosen the adjustment screw at the engine (Fig. 1–18).

(2) Hold the choke control knob about 1/8" (3 mm) from full-choke position.

(3) Hold the choke on the carburetor completely closed, then tighten the screw.

1–14 THROTTLE ADJUSTMENT

See engine section for adjustment of the governor and throttle.

WARNING

Operating the engine beyond specification for RPM will cause damage to the engine and hydrostatic system.

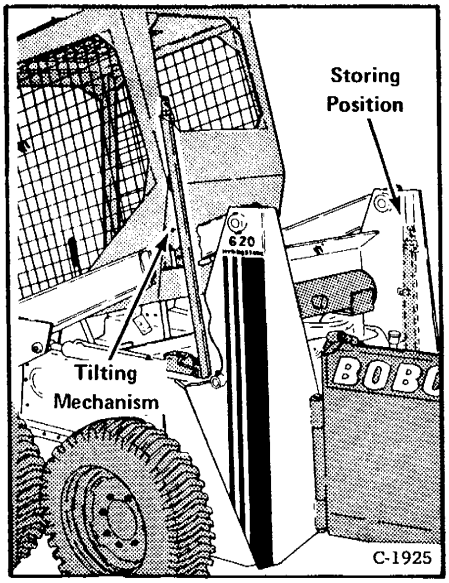


Fig. 1–15 Cab Raising Assembly

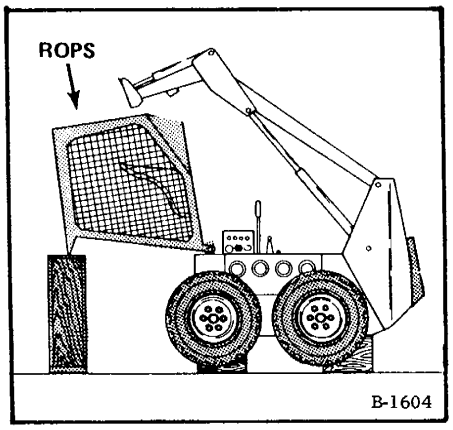


Fig. 1–16 ROPS Guard Support

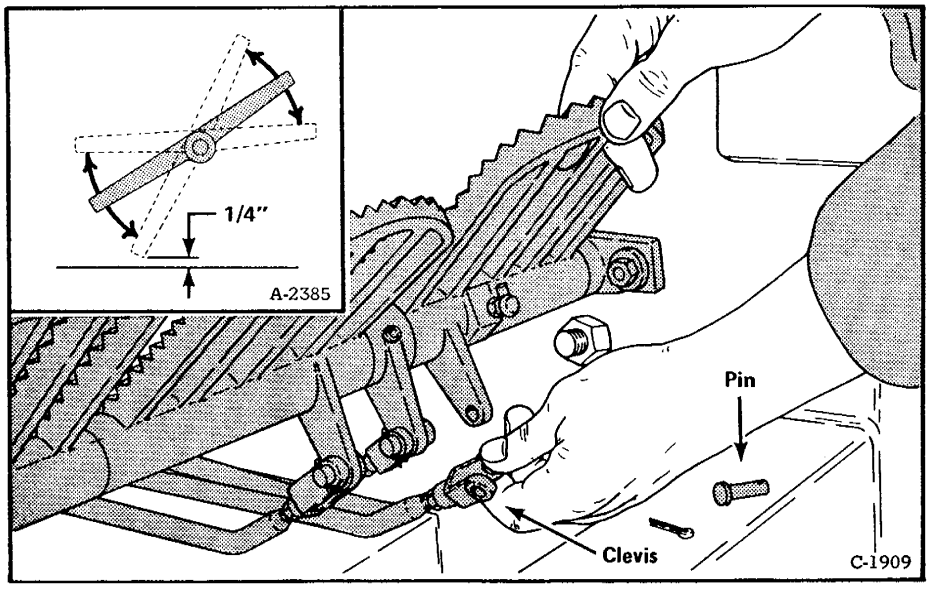


Fig. 1–17 Pedal Angle Adjustment

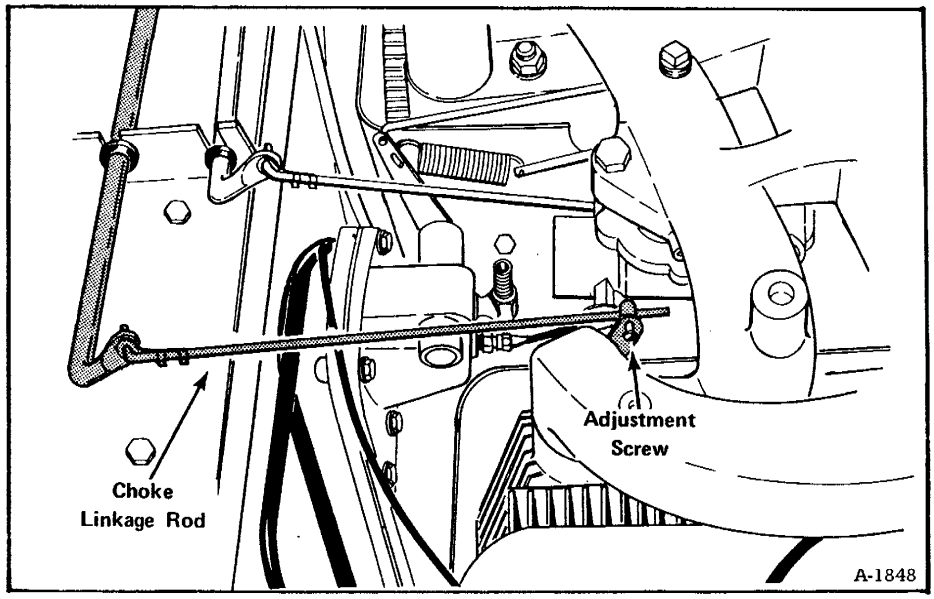


Fig. 1–18 Choke Adjustment

1–15 ELECTRICAL SYSTEM

Preventive maintenance of the electrical system is:

(1) Check battery water level.

(2) Inspect condition of battery terminals.

(3) Check condition and adjustment of generator belt.

(4) Inspect the wiring harness for damage.

(5) Check the indicator lights.

See "Electrical System Section" for adjustment and replacement of generator drive belt.

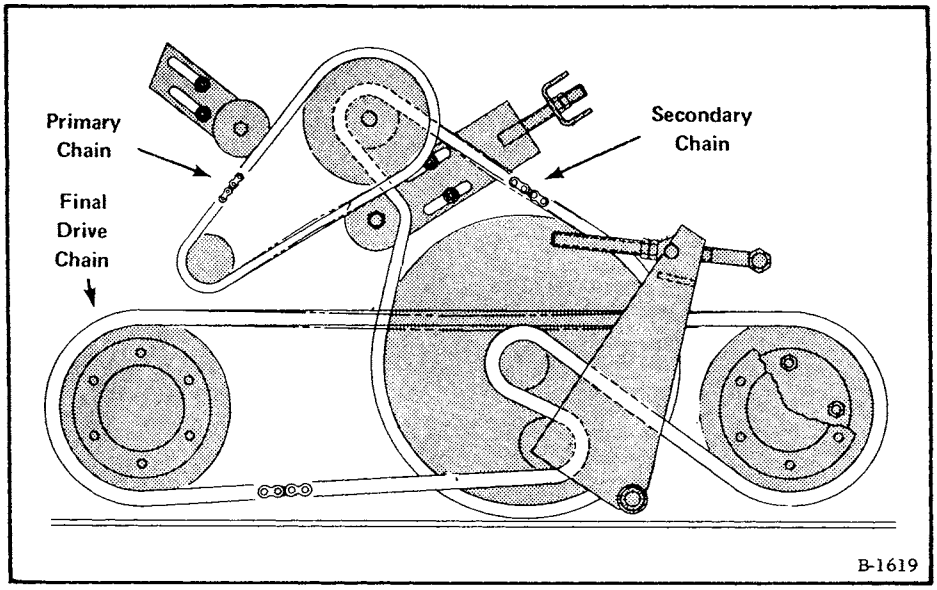


Fig. 1–19 Reduction Chain Routing

1–16 CHAIN ADJUSTMENT (Fig. 1–19)

NOTE: **There can be tight places on the chain during drive system rotation. Turn the sprockets and check chain adjustment when the chain is in tightest position. Lift the Bobcat and put it on blocks first. Use about 1 pound of force to check chain play.**

Final Drive Chain: Loosen the lock nut on the idler adjustment rod. Turn the adjustment nut until there is 1/2" (13 mm) total movement at the middle of the chain. Tighten the lock nut and check the adjustment.

Secondary Drive Chain: Loosen the two nuts which hold the idler to the tank wall and loosen the nut on adjustment rod. Turn the adjustment nut until there is 1/4" (6.5 mm) total movement at the middle of the chain. Tighten nuts on side tank and the lock nut, and check adjustment of chain.

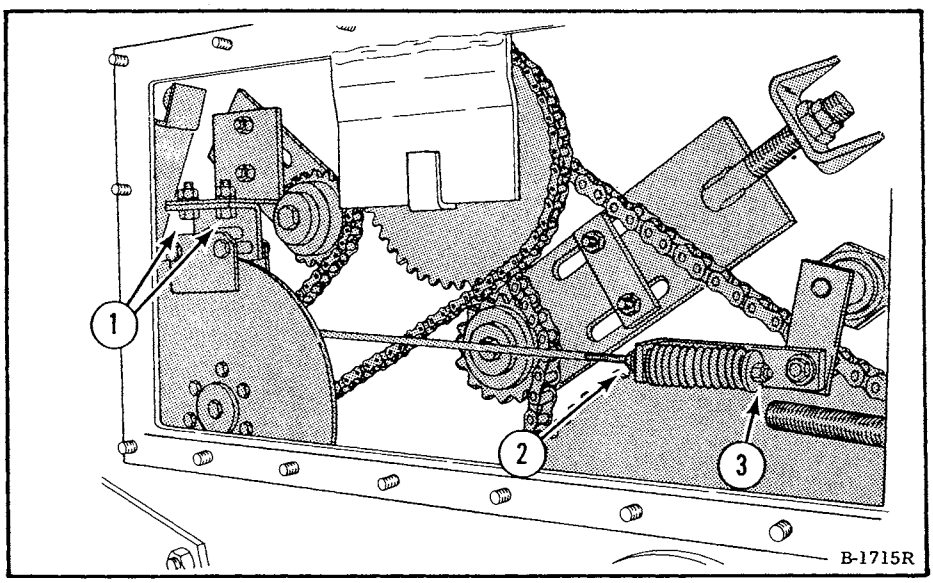


Fig. 1–20 Drive System with Brake Linkage

Primary Chain: Loosen the two nuts on the side tank. Move the idler until there is 1/4" (6.5 mm) total movement at the middle of the chain. Tighten the nuts, and check the adjustment.

1–17 BRAKE ADJUSTMENT (Fig. 1–20)

For adjustment of brakes on 620 Loader, use this method:

(1) Loosen nuts which hold the caliper assembly (Item 1).

(2) Pull brake handle into engaged position to center calipers on brake disc.

(3) Tighten nuts for holding caliper assembly (Item 1).

(4) Release brake handle and check to make sure calipers are free on brake disc.

(5) Engage brake handle again and check spring compression length. The spring must have a compression length of 2.00 to 2.15 inches (54.6 mm). Loosen nut (Item 2) and tighten nut (Item 3) until spring length is correct. After making adjustment, tighten nut (Item 2).

(6) Release brake and check to make sure calipers are free on brake disc.

1–18 HYDRAULIC/HYDROSTATIC SYSTEM SERVICE

WARNING

When servicing the hydraulic/hydrostatic system, keep all parts and area clean.

1–18.1 Hydraulic/Hydrostatic Transmission Fluid

The hydraulic system capacity is 20 gallons. The capacity of the reservoir is 17 gallons when filled to the upper check plug at the left side of the machine.

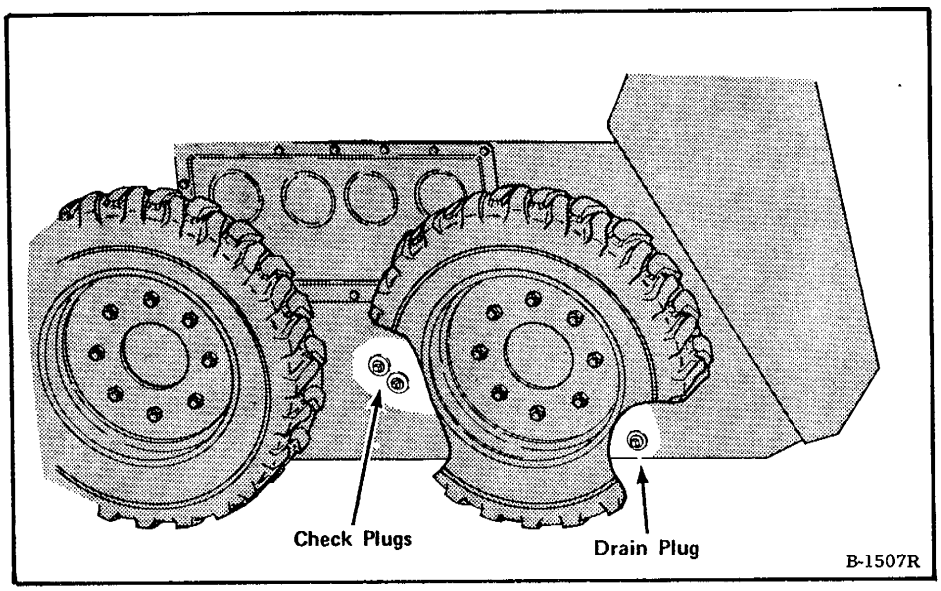


Fig. 1–21 Reservoir Check & Drain Plug

See Section 8 for oil specifications.

In very cold temperature conditions, the loader must be kept in a warm place. Extra warm-up time must be taken each time the loader is started during very cold temperature conditions. Cold oil becomes thick and will not flow easily. This can cause pump failure. Lack of oil flow to hydrostatic transmission pump (indicated by glowing "FILT" light) will cause serious damage in less than 60 seconds.

1–18.2 Checking, Adding or Changing Fluid

Fluid level is checked by removing the lower check plug at the left side of the machine. If oil does not flow from this outlet, install the plug and add fluid until it runs out the upper check outlet (Fig. 1–21). Overfilling the reservoir a small amount will not effect the operation of the machine.

The fluid and filters must be changed every 1000 hours or more often when:

(1) Operating under dirty conditions.

(2) There has been a drive system failure.

(3) The fluid is light gray in color (water in fluid).

1–18.3 Water in Reservoir

Water must be removed from the hydraulic reservoir.

(1) Lift and block the front of the Bobcat higher than the rear and leave for a few hours.

(2) Loosen the plugs at the rear of the machine on both sides (Fig. 1–21). Let the water run out, and then tighten the plugs.

1–18.4 Replacement of Suction (25 Micron) Filter (Fig. 1–22)

(1) Lift the rear of the Bobcat about 4 inches (100 mm) higher than the front and put on safe blocks.

(2) Remove access door from under the machine. Use a filter wrench to remove the filter. Remove the old gasket.

(3) Put oil on both sides of new gasket and install gasket and new filter element. Tighten hand tight.

(4) Install the access door, lower the Bobcat to the ground and drive it. Operate the hydraulic controls for about 15 minutes. If hydraulic action is still rough after this time, check the filter for air leaks.

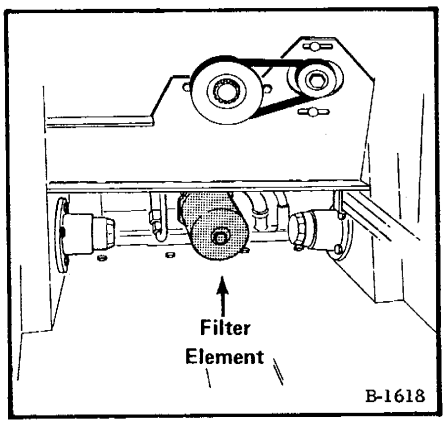


Fig. 1–22 25 Micron Filter

1–18.5 Replacement of the 10 Micron Filter (Fig. 1–23)

(1) Tilt the ROPS.

(2) Clean the area around the filter thoroughly.

(3) Remove the old filter.

(4) Put oil on the gasket and install the new filter. Tighten only about 1/2 turn. Do not over-tighten.

(5) Lower the ROPS and start the Bobcat. Check the filter for leaks after operation.

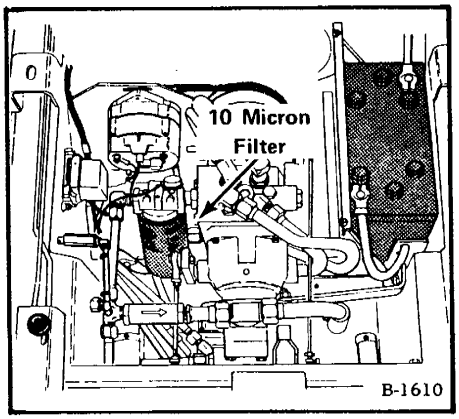


Fig. 1–23 10 Micron Filter

WARNING

If the filter light comes on and there is loss of drive or hydraulic action, stop the Bobcat. The system has lost its charge (See Section 2).


bobcat

2 LOADER HYDRAULIC SYSTEM

2–1 OPERATION OF THE HYDRAULIC SYSTEM (Fig. 2–1)

The two side tanks on the Bobcat are connected by a manifold pipe, and make up the hydraulic oil reservoir. The engine drives the vane pump through a universal joint. Hydraulic fluid circuit is as follows: From the reservoir to the 25 micron filter. From the filter to the vane pump. From the vane pump to the control valve.

When a control pedal is activated, fluid goes to the cylinders. When the cylinders come to the end of their travel, the system relief valve opens in the control valve (Fig. 2–2).

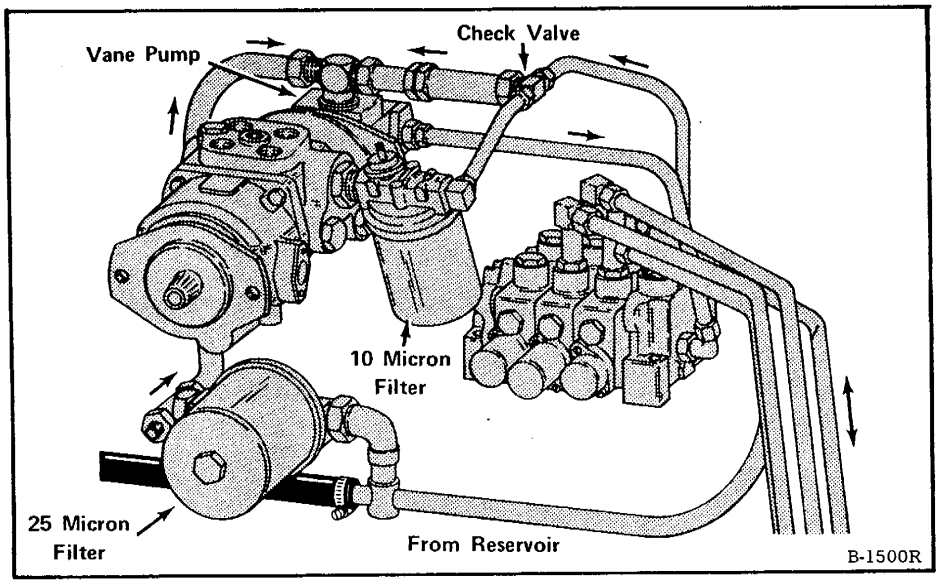


Fig. 2–1 Hydraulic System

Fluid returns from the control valve to the inlet of the vane pump through a check valve. The by-pass valve keeps back pressure on the returning oil. This makes a supply of oil for the hydrostatic system.

2–2 GENERAL INFORMATION

2–2.1 Clean Area

When making repairs on the 620 hydraulic/hydrostatic system, be careful to keep dirt from the system. If the filter replacement is done correctly, dirt can only enter when fittings are disconnected. When there is a failure in the system, always clean the connecting tubes, valves, etc., to keep dirt out of the replacement parts. When a component failure lets foreign material into the system, or when metal particles are produced in the component system, both hydraulic filters must have replacement made.

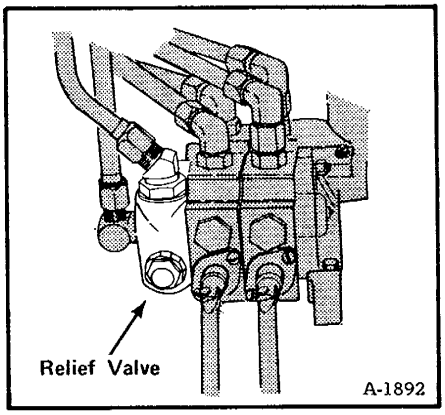


Fig. 2–2 Control Valve

2–2.2 AIR LEAKS

When the loader hydraulic/hydrostatic system becomes noisy or operation is rough, air is entering the system. The loader must be stopped and the cause for air leakage corrected. Air leaks can cause transmission damage if not repaired.

2–2.3 Tubelines, Hoses, Fittings

Correct installation of hydraulic connections can prevent damage to the Bobcat and loss of fluid.

2–2.4 37° Flare Connections

These are the most common in use in the system. Most leaks on flare fittings are caused by loose connections. To tighten flared fittings, use this method:

(1) Tighten the nut until it makes contact with the seat.

(2) Make a line from the nut to the adapter (Fig. 2–3).

(3) See the chart to find correct tightening for fitting.

Fitting Size	Rotate No. of Hex Flats
1/2"	2
5/8"	1-1/2 – 2
3/4"	1
7/8"	3/4 – 1
1"	3/4 – 1

(4) Use a wrench to turn the fitting to the correct amount shown in chart.

(5) If this does not correct the leak, remove the fitting and inspect for damage.

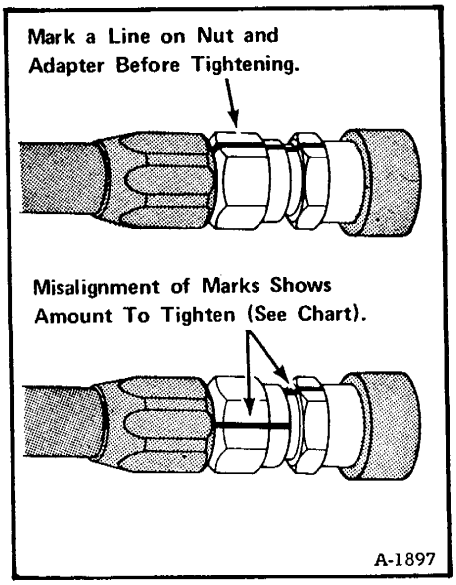


Fig. 2–3 Tightening Flared Fittings

2–2.5 Straight Thread O-ring Connections

These connections seal by compression of the O-ring. To tighten O-ring fittings, use this method:

(1) Loosen the nut and slide the washer and O-ring against the thread (Fig. 2–4. Put oil on the O-ring.

(2) Tighten the fitting in place, by hand. If the fitting is an elbow, turn it to line up with the tubeline or hose.

(3) Hold the fitting with a wrench. Use another wrench to tighten the lock nut (Fig. 2–5). The ring will fit into the space as shown.

(4) If the fitting is not turned in far enough, the O-ring will be damaged and the fitting will leak (Fig. 2–6).

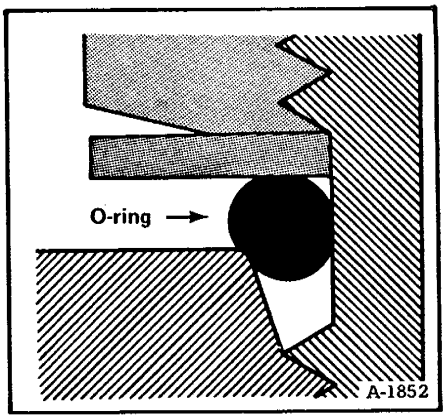


Fig. 2–4 Straight Thread Seal

2–2.6 Pipe Thread Connections

These leak at high pressure more than other connections. Put sealant on the male thread to avoid leaks. Be sure the threads are clean and not damaged.

2–2.7 Tubelines and Hoses

Bent tubelines must have replacement made or there will be restriction to flow. This will cause heat and slow hydraulic action. Exchange hoses when they show wear or damage. If not exchanged, there can be loss of oil or an accident. Be sure to use correct clamps to hold hoses and tubelines in place.

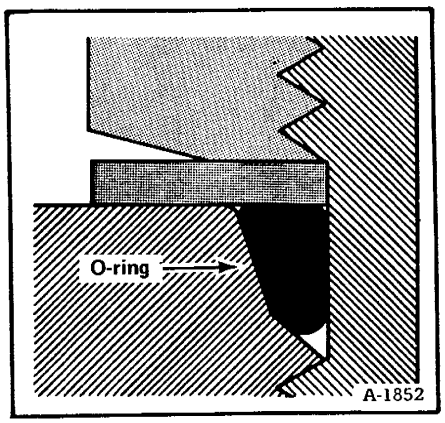


Fig. 2–5 Seal In Place

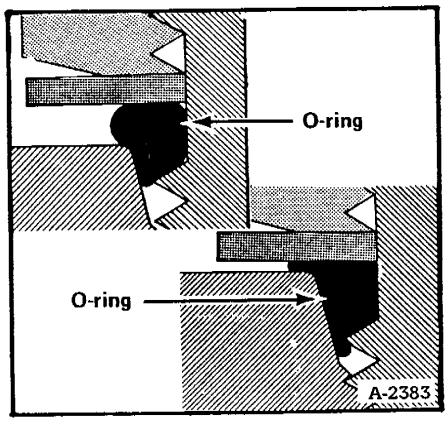


Fig. 2–6 Wrong Installation

2–3 TROUBLESHOOTING CHART FOR HYDRAULIC SYSTEM

PROBLEM	SEE CHART #	PROCEDURE
No hydraulic action.	A	System precheck.
Hydraulic action is rough.	A	System precheck.
Slow hydraulic action.	B	Check pump release pressure, check control valve.
Rough control pedal action.	None	Lubricate pedals, check for tight spool in valve bore (See Note A).
Cylinders move when pedals are in neutral position	None	Check for pedals moving freely (See Note A).

NOTE A: If the spool is tight in the valve, two items may be checked before valve replacement:

(1) Disconnect the control pedal linkage and rotate the valve spool 180° and check its operation again.

(2) Loosen the four bolts which hold the valve together, then tighten the bolts evenly to 20 ft.-lbs. (27 Nm).

CHART A

ROUGH ACTION OR NO ACTION OF HYDRAULIC CYLINDERS

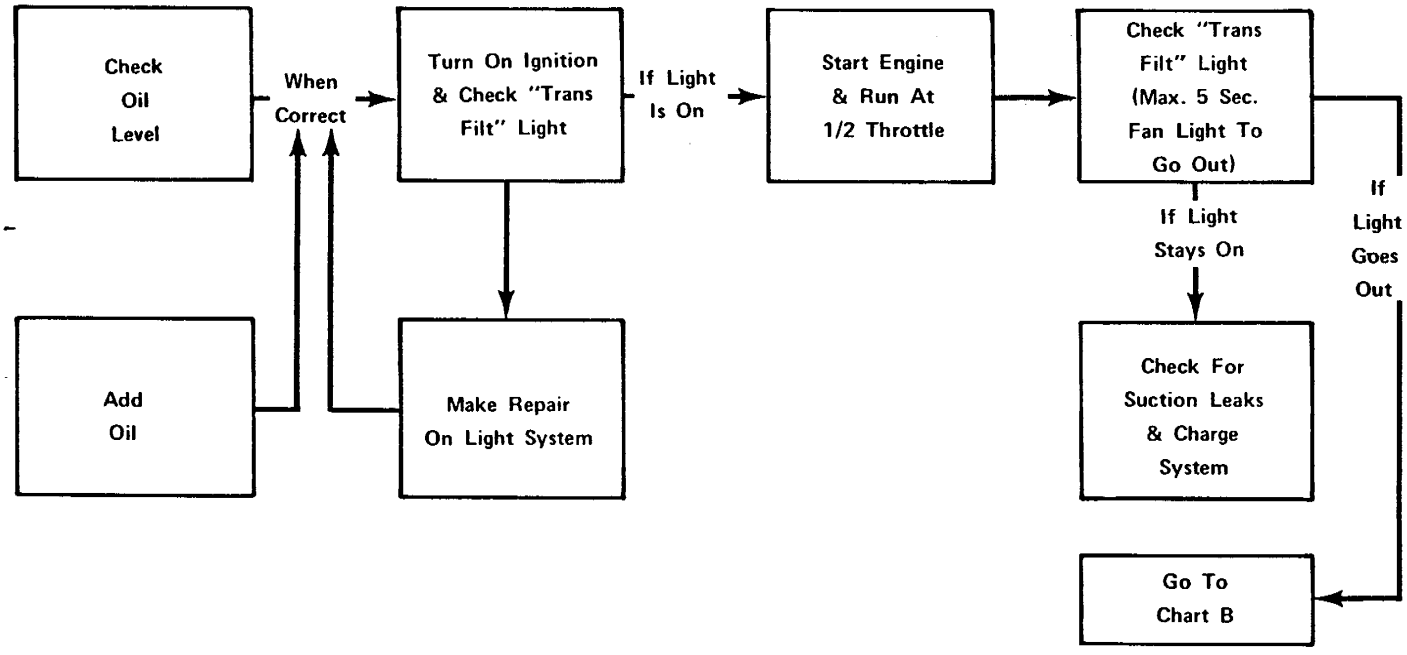
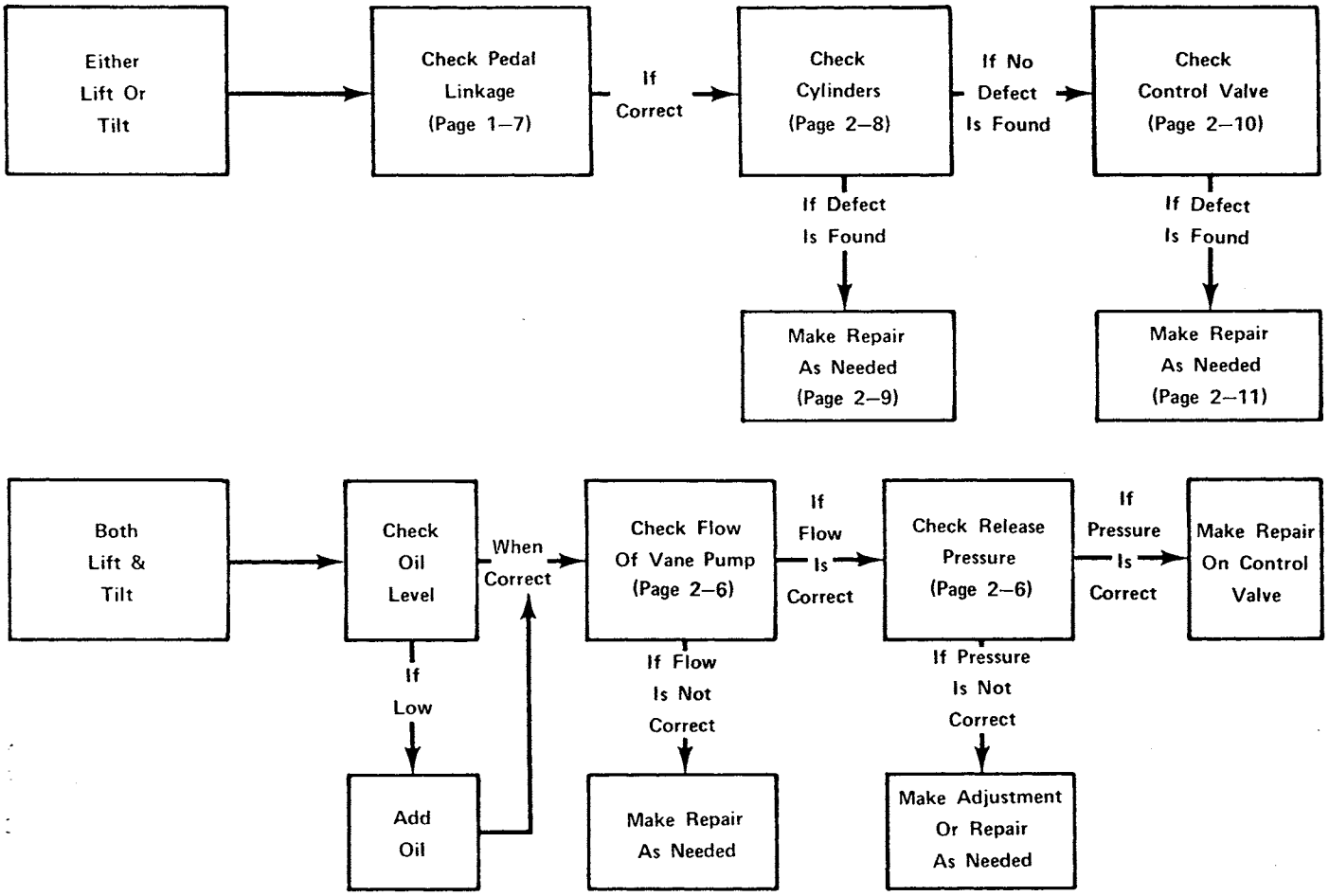


CHART B

SLOW HYDRAULIC ACTION



2–5 CHARGING THE VANE PUMP AND CHECKING FOR SUCTION LEAKS

If the hydraulic pump looses its charge, or the hydraulic action is rough, put air pressure in the reservoir as follows:

(1) Install pipe plugs in the reservoir vents (See Fig. 2–7).

(2) Connect a pressure hose and regulator to the reservoir fill hole. Put 10 - 15 PSI (70 - 100 kPa) of pressure in the reservoir.

WARNING Do not go over 15 PSI (100 kPa)!

(3) Loosen fitting at the top of the pump (Fig. 2–8, Item 7). When fluid begins to flow out, tighten the fitting.

(4) While the reservoir is under pressure, check the eight areas shown (Fig. 2–8). See if hydraulic oil is leaking from any of those areas. If it is, correct the cause of leak and check again.

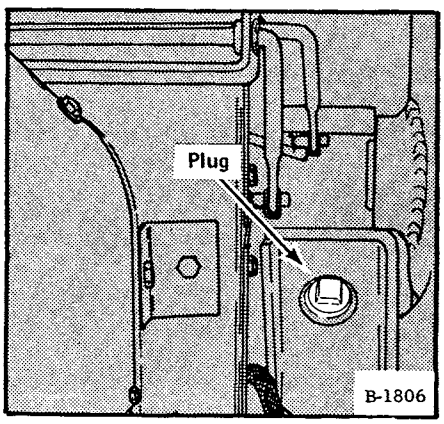


Fig. 2–7 Reservoir Vent Plug

NOTE: This procedure may also be followed to check for leaks around axles, axle seals, etc.

(5) Install the filler plug and reservoir vents.

(6) Start the loader and run at 3/4 throttle. Operate the hydraulic controls and drive the machine for about 15 minutes. If the hydraulic action is still not smooth, repeat steps 1, 2 and 4. If no leaks can be found, make replacement of the 25 micron filter element.

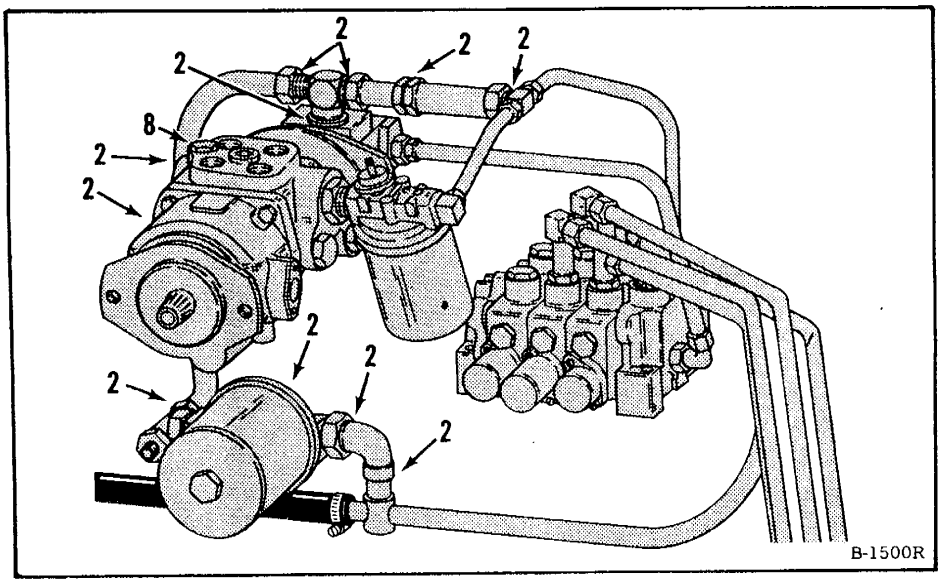


Fig. 2–8 Hydraulic System

2–5.1 Charging the Pump When No Source of Air Pressure is Available

(1) Disconnect the high pressure tube from the side of the vane pump. Disconnect the suction tube from the top of the vane pump (Fig. 2–9).

(2) Use a funnel to pour clean hydraulic fluid into the top opening. Pour until fluid flows out the side opening. Connect the tubelines to the pump.

(3) Start the engine and run at 3/4 throttle. Operate the hydraulic controls and drive the machine for about 15 minutes. If the hydraulic action is still not smooth, check the system for air leaks.

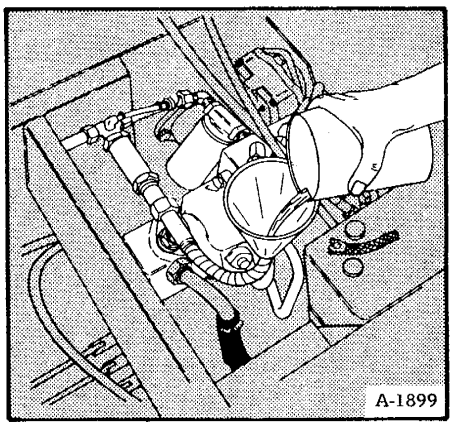


Fig. 2–9 Charging Hydraulic Pump

2–5.2 Another Method to Check the System for Air Leaks

(1) Remove the plug from the top of the valve plate (Fig. 2–8, Item 8).

(2) Put a fitting in the valve plate and connect a clear hose to the end of the fitting. Put the other end of the hose in the reservoir filler pipe.

(3) Start the engine and operate at 3/4 throttle. Operate the hydraulic controls and drive the machine for about 15 minutes, while looking at the clear hose. If air bubbles can be seen in the hose after 15 minutes, there is an air leak. Check the places shown (Item 2) for loose or damaged connections. Repair as necessary and check again. If no leaks can be found and hydraulic action is not smooth, make replacement of the 25 micron filter.

2–6 CHECKING RELEASE PRESSURE

NOTE: Hydraulic checks are made using a hydraulic tester. The tester gives an indication of flow and pressure, and has a flow control valve.

The Bobcat must be lifted off the floor and put on safe blocks during tests.

There must be no suction leaks when testing the system.

2–6.1 Machines Without Auxiliary Hydraulics

(1) Activate the pedals with the engine stopped. This will release pressure from the system.

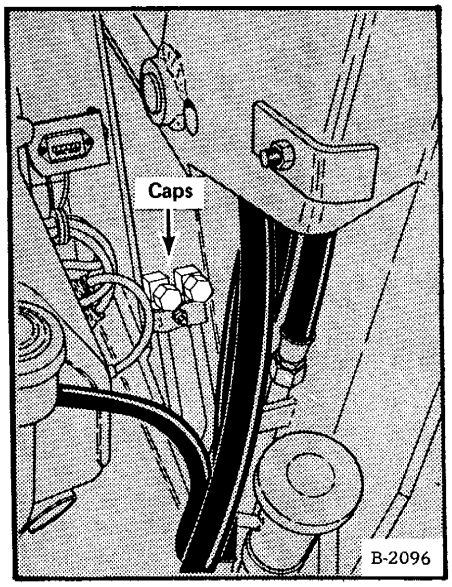


Fig. 2–10 Caps On Fittings

(2) Open the grill. Disconnect the two hoses on each side, which go to the lift cylinders. Put covers on the hoses to keep dirt out of the system.

(3) On one side, put caps on the tube openings (Fig. 2–10). On the other side, connect the hydraulic tester (Fig. 2–11). Turn the control knob on the tester fully counterclockwise.

(4) Start the engine and run at full throttle. Push the heel of the left pedal down. If there is no reading on the flow gauge, push the toe of the pedal.

(5) Turn the control knob on the tester fully clockwise. The release pressure must be within the specification (See Section 8).

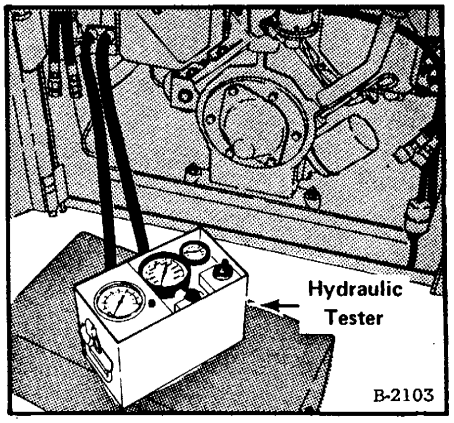


Fig. 2–11 Checking Hydraulic System

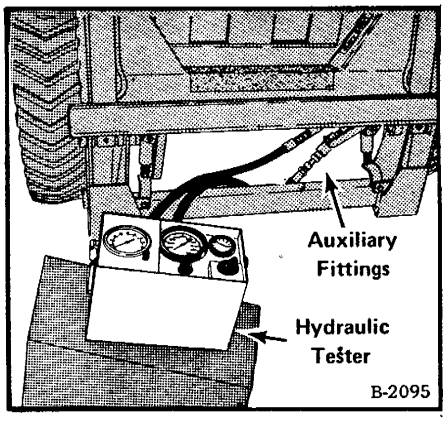


Fig. 2–12 Checking Auxiliary Hydraulics

2–6.2 Machines With Auxiliary Hydraulics

(1) Connect the tester to the auxiliary fittings (Fig. 2–12). Turn the control knob fully counterclockwise.

(2) Start the machine and run at full throttle.

(3) Push the toe of the auxiliary pedal. If there is no flow indication press the heel of the pedal.

(4) Turn the control valve on the tester full clockwise. Read the release pressure on the gauge (See Section 8 for pressure specifications).

2–7 CHECKING THE CONDITION OF THE VANE PUMP

Checking Vane Pump (Fig. 2–13)

(Loader must be lifted off the floor in safe blocks).

(1) Remove the tubeline from outlet of vane pump.

(2) Connect hose from hydraulic tester inlet to vane pump outlet.

(3) Connect hose from hydraulic tester outlet to the pressure tubeline.

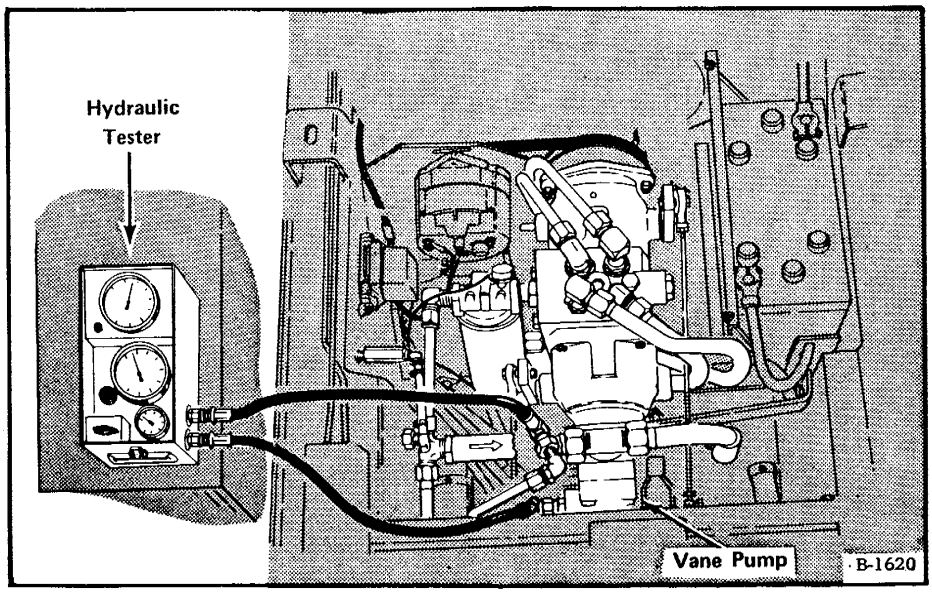


Fig. 2–13 Checking Vane Pump

(4) Turn the pressure control on hydraulic tester fully counterclockwise (out).

(5) Start the loader engine and run it at idle RPM.

NOTE: Since the hydraulic tester is between the pump and the pressure relief valve, be careful when turning the pressure control on tester. Do not let pressure go above 2200 PSI (15.160 kPa) or the vane pump will be damaged.

(6) Increase engine to full throttle and read the flow meter on hydraulic tester. The flow meter will read 10 gpm (38 litre/min.).

(7) Turn the pressure control valve on hydraulic tester very slowly clockwise until pressure is at 2100 PSI (14480 kPa). If the pressure will not come up, make a replacement of the 25 micron filter, and inspect for suction leaks.

(8) If the pressure comes up to 2100 PSI but the flow drops below 9 gpm (34 l/pm), the pump has defect.

If the pump output check shows that the pump is good, but release pressure is low, the relief valve should be removed and checked for foreign material in the valve seat or a broken spring. Disassemble and clean the valve (Page 2–10).

When installing the relief valve, use a new O-ring. Oil the O-ring before installing.

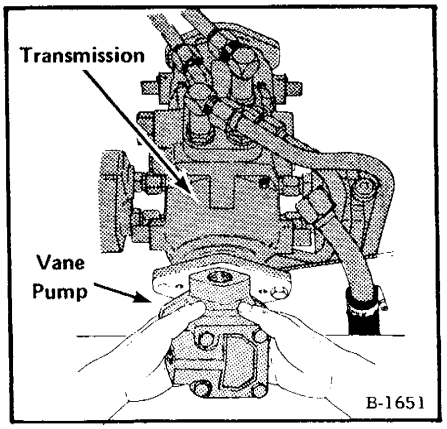


Fig. 2–14 Removing Vane Pump

2–8 VANE PUMP SERVICE

2–8.1 To Remove the Vane Pump

(1) Disconnect the tubelines from the pump.

(2) Remove the two bolts which hold the pump to the transmission, and lift the pump out. (Hit with a soft hammer, if necessary, to loosen.) (Fig. 2–14).

2–8.2 Disassembly

(1) Hold the pump body in a vise (not over tightened) with the cover end up, and remove the four bolts. Note the position of the cover (outlet) port to the body port before lifting off the cover and O-ring (Fig. 2–15).

(2) Remove the pressure plate and spring. (Make a mark on the side of the pump as a guide in assembly.) Lift off the ring and remove the locating pins and O-ring.

(3) Remove the vanes and the rotor (Item 1).

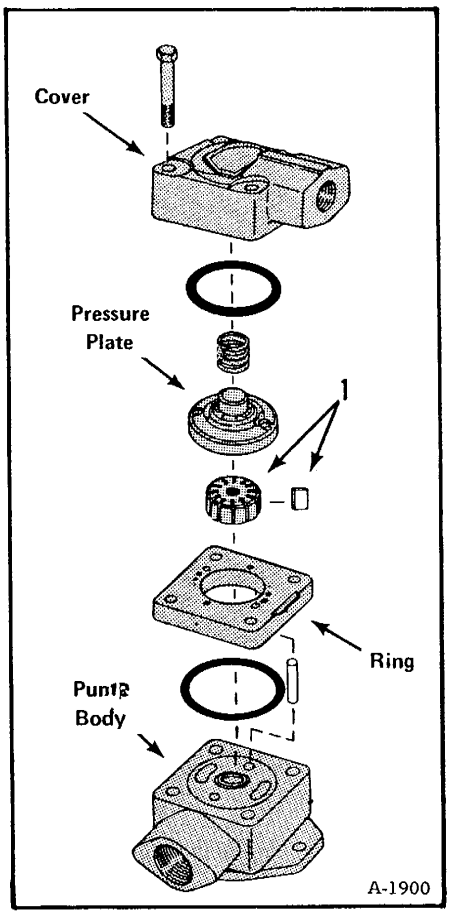


Fig. 2–15 Vane Pump Breakdown

2–8.3 Inspection and Service

NOTE: The only parts available for the vane pump are the spring and O-rings. If there is any wear, make a replacement of the complete pump.

Clean the metal parts in solvent, and put them in a clean place. Check for wear in the places shown (Fig. 2–16).

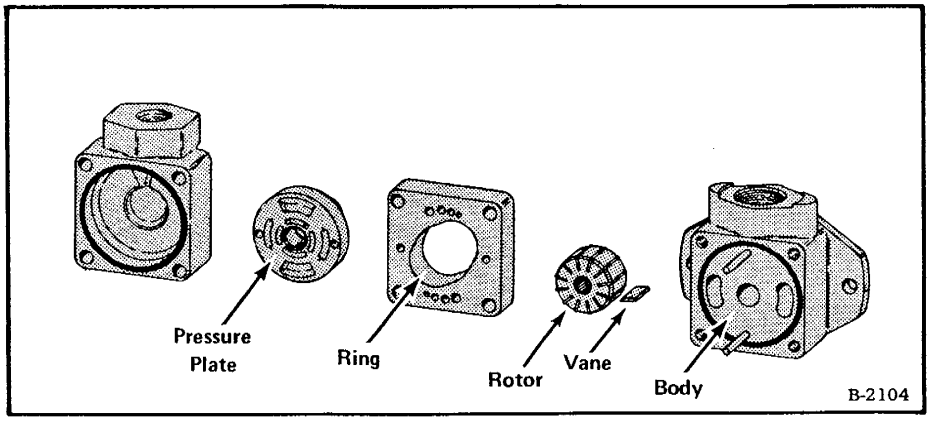


Fig. 2–16 Vane Pump Wear Areas

2–8.4 Assembly

(1) Put hydraulic fluid on all parts during assembly to hold O-rings in place.

(2) Install the new O-rings in the body and cover.

(3) Install the ring location pins in the body and put the ring over the pins.

(4) Install the rotor in the ring. Put the vanes in the rotor slots so that the round edge of each vane is toward the cam ring (Fig. 2–17).

(5) Put the pressure plate on the location pins and against the ring. Install the spring on the pressure plate.

(6) Carefully install the cover with the outlet in the correct position. Tighten the cover bolts.

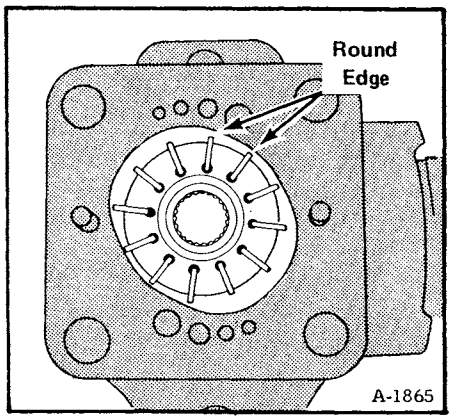


Fig. 2–17 Vane Location

2–8.5 To Install the Vane Pump

(1) Install the new O-ring on the transmission flange and install the pump. Tighten the two fastening bolts.

(2) Charge the pump with oil before starting (See Paragraph 2–5.1).

2–9 CONTROL VALVE AND HYDRAULIC CYLINDER CHECKS

Wear in control valve spools, O-rings or load check valve will cause the lift arms or bucket to operate slowly and not hold position after the pedal is released.

To see if the problem is in the control valve or in the cylinder, make the following checks:

2–9.1 Checking the Lift Cylinders

(1) Check the condition of each lift cylinder piston seal by fully lowering the lift arms. Open the grill and remove the hose next to the engine, which connects to the base (rear) fitting of the cylinder. Install a 7/8" 37° flare SAE-M cap on the elbow. Use an open reservoir to catch fluid, if any flows from the hose line.

(2) Start the engine and run at idle.

(3) Press the toe of the left (Lift) pedal. Look for fluid flowing at the open end of the hose.

(4) If there is fluid flowing when the pedal is pressed, the piston seal is bad and needs replacement. A very small leak here is acceptable.

(5) If there is no leak or only a small leak, the problem is probably in the control valve.

2–9.2 Checking the Tilt Cylinders

(1) Check the condition of each tilt cylinder piston seal by tilting the Bob-Tach or bucket all the way back and removing the hose line connected to the base (top end) of the cylinder. Leave the other hose (connected to the rod end of the cylinder) connected. Plug the hose fitting with a 7/8" 37° flare SAE-M plug.

(2) Start the engine and run at idle.

(3) Press the heel of the right (tilt) pedal. Look for a leak at the cylinder opening.

(4) If fluid flows from the opening, the piston seal is bad and needs replacement. A very small leak here is acceptable.

If fluid leaks from the rod end of the cylinder, it is an indication of a bad head (rod) seal.

(5) If there is no leak or only a very small leak, the problem is probably in the control valve.

2–10 HYDRAULIC CYLINDER REPAIR

There are several conditions which can cause hydraulic cylinder failure. They are:

(1) Damage marks on the cylinder rod. Inspect the complete rod. Carefully remove small marks with a stone (Fig. 2–18).

(2) Small holes caused by defective welding. Use an arc welder to fill holes. Use care to prevent damage to seals and cylinder rods. Do not put the ground clamp on the cylinder rod when welding the case.

(3) Damage to cylinder case. Disassemble the cylinder and make parts replacement as needed.

(4) Dirt in the cylinder causing wear. Use care when disconnecting fittings and during filter replacement to prevent dirt from getting into the system.

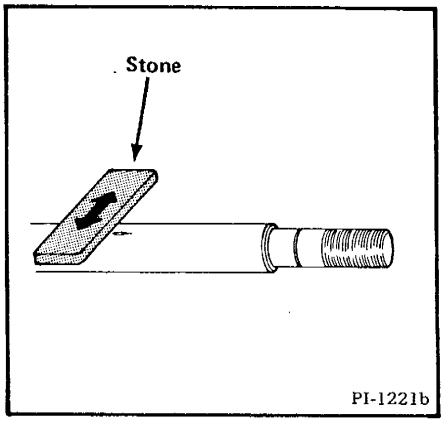


Fig. 2–18 Removing Marks

2–10.1 Removing Cylinders

(1) Activate the pedals to release pressure from the lines.

(2) Remove the 3/8 cross bolts from the cylinder pivot ends (See Fig. 2–19).

(3) Push the pivot pins out.

(4) Disconnect the hoses from the cylinder. Put covers on hoses to keep dirt out of the system.

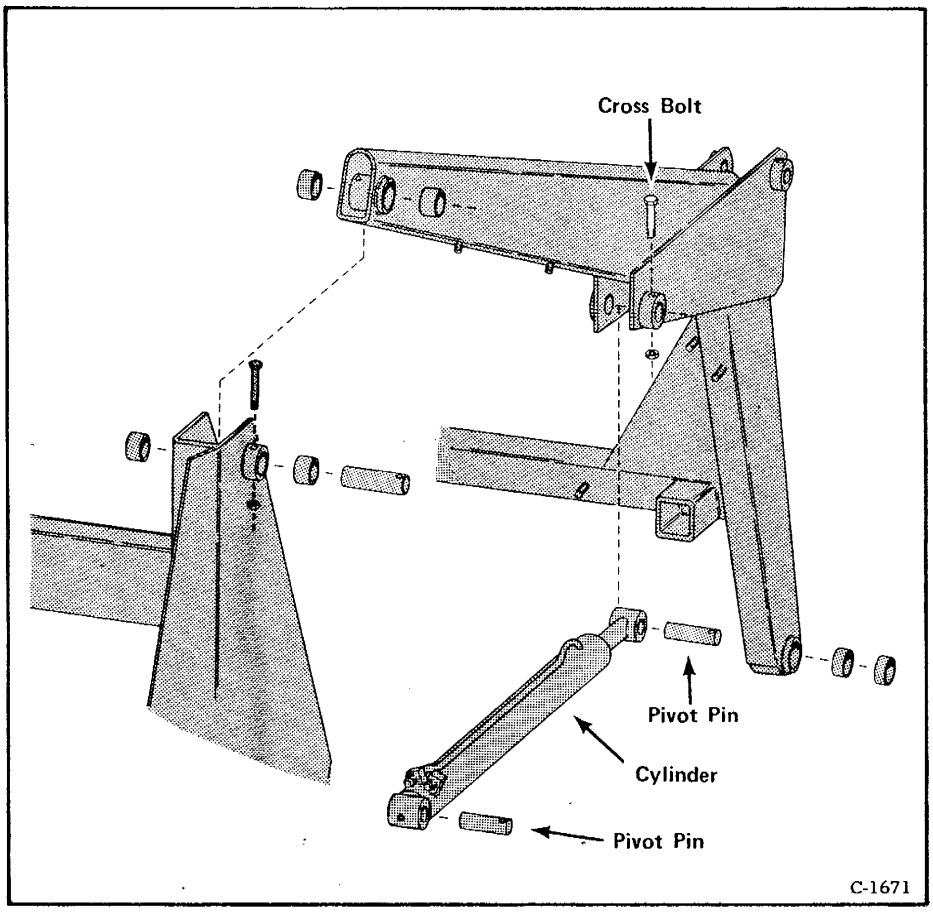


Fig. 2–19 Removing Cylinders

2–10.2 To Disassemble a Hydraulic Lift or Tilt Cylinder

(1) Remove the cylinder from the machine.

(2) Use a spanner wrench to remove the head from the cylinder (Fig. 2–20).

(3) Pull the rod and piston assembly from the cylinder case.

2–10.3 To Replace the Cylinder Seals

(1) Put a small bevel on the shoulder at the piston end of the cylinder rod (Fig. 2–21). This will let the seals slide over the shoulder without damage. Remove all marks from the rod (Fig. 2–18). Do not use a power grinder or file to remove marks.

(2) Heat the teflon piston seal in warm oil or water for several minutes before installing it. This will make it softer and easier to install.

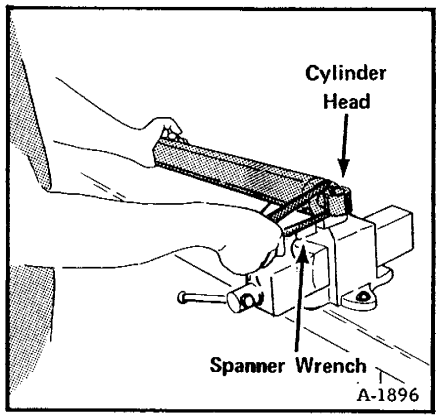


Fig. 2–20 Cylinder Spanner Wrench

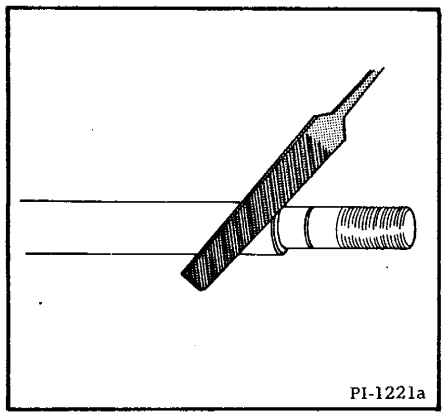


Fig. 2–21 Beveling the Shoulder

2–10.4 To Assemble the Hydraulic Cylinder

(1) Install the cylinder head seals and put the cylinder head carefully onto the cylinder rod (Fig. 2–22).

(2) Install the spacer onto the rod (lift cylinder only).

(3) Install the piston seals and put the piston onto the end of the cylinder rod.

(4) Install the piston locking nut and tighten it.

(5) Install the rod and piston into the cylinder case. Use caution to prevent damage to the O-ring.

(6) Install the cylinder head and tighten with the spanner wrench.

(7) Install the cylinder on the machine. Install pivot pins and cross bolts. Tighten 3/8" cross bolts to 20 ft.-lbs. torque. (To install the lift cylinder, connect the hydraulic hoses first. Then, install the pivot pins.)

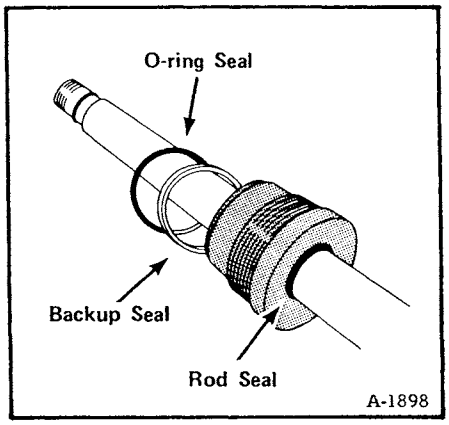


Fig. 2–22 Installing Cylinder Head

2–11 CONTROL VALVE REPAIR

2–11.1 Relief Valve Repair

The relief valve can be removed and disassembled for inspection and cleaning. Remove the relief valve from the control valve assembly first. Put the relief valve in a vise and remove the cap nut, with a wrench (Fig. 2–23). Inspect the spring and valve parts for condition. If any parts have defect, make replacement of the complete relief valve.

The relief valve can be cleaned and used again if the internal parts are good. Always use new O-rings when installing the relief valve.

NOTE: **If the release pressure is low, extra shims can be added as shown (See Fig. 2–24). Shims from the 610 relief valve can be used. Each .010 (.254 mm) of shim added will increase the relief pressure approximately 100 PSI (690 kPa).**

The control valve must be removed from the loader before it can be disassembled for repair.

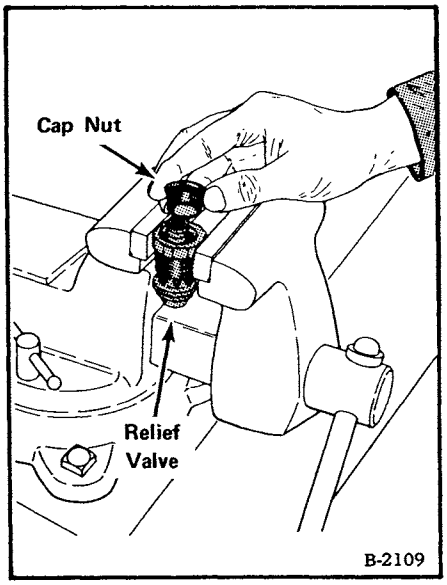


Fig. 2–23 Relief Valve Disassembly

2–11.2 To Remove the Control Valve

(1) With the engine shut off, activate the toe and heel of each pedal to release any pressure in the hydraulic lines. Let the lift arms and bucket tilt down fully.

(2) Raise the ROPS and hold it with a support.

(3) Disconnect the linkage rods from the pedals.

(4) Remove the nuts that hold the pedal assembly in place, and lift the pedal assembly out.

(5) Remove the floor plate and foot guard parts.

(6) Remove the control valve linkage rods from the control valve assembly.

(7) Disconnect the hydraulic lines from the control valve and put covers on the open ends.

(8) Remove the bolts which hold the control valve in place.

(9) Lift the control valve out through the front of the loader.

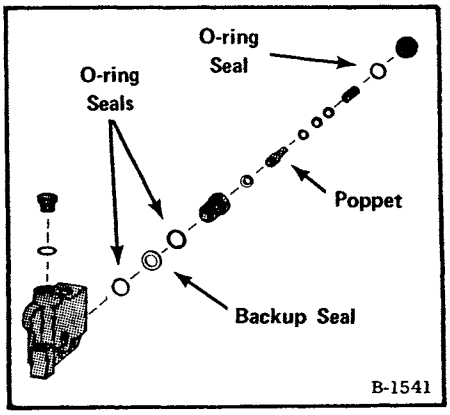


Fig. 2–24 Relief Valve Assembly

2–11.3 To Disassemble the Control Valve (Fig. 2–25)

(1) Clean the control valve assembly thoroughly with solvent. Put it on a clean surface for disassembly.

(2) Put a mark on each valve section (1, 2, 3, 4, etc.) to identify them for assembly.

(3) Remove the nuts from the three thru bolts which hold the valve sections together (Fig. 2–25).

(4) Remove each section by sliding it off the thru bolts. Use a soft hammer, if necessary, to break the seal between sections. Remove the O-rings. Clean the machined surface of each section.

(5) If a valve section is to be disassemble, put it in a vise. Be careful not to clamp the machined surface in the vise.

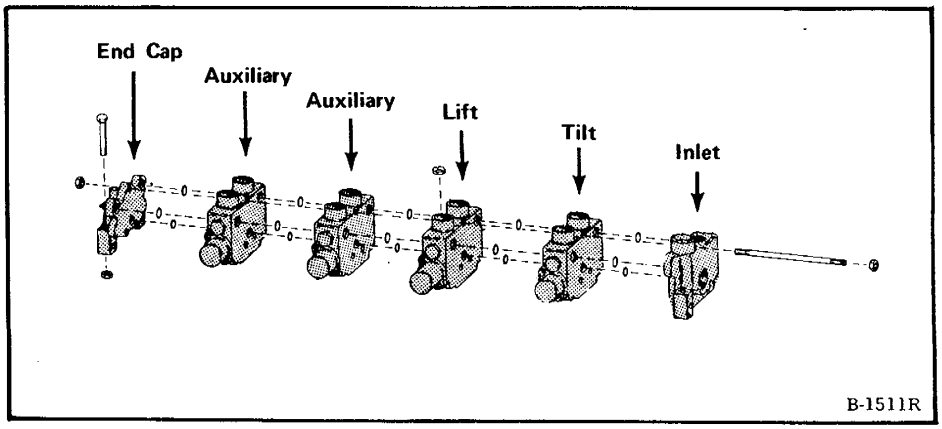


Fig. 2–25 Valve Bank Breakdown

NOTE: Only disassemble one valve section at a time to prevent the mixing of parts.

(6) Remove the bonnet from the back of the section (Fig. 2–26, Item 1).

NOTE: When disassembling the lift valve section, remove the snap ring from the float detent rod at the end of the bonnet before removing the bonnet. The detent rod must be in place with the spool assembly or the four steel balls will fall out of their holes. A restrictor is also located in the "B" (rear) tube line opening, on top of the valve section (Item 2).

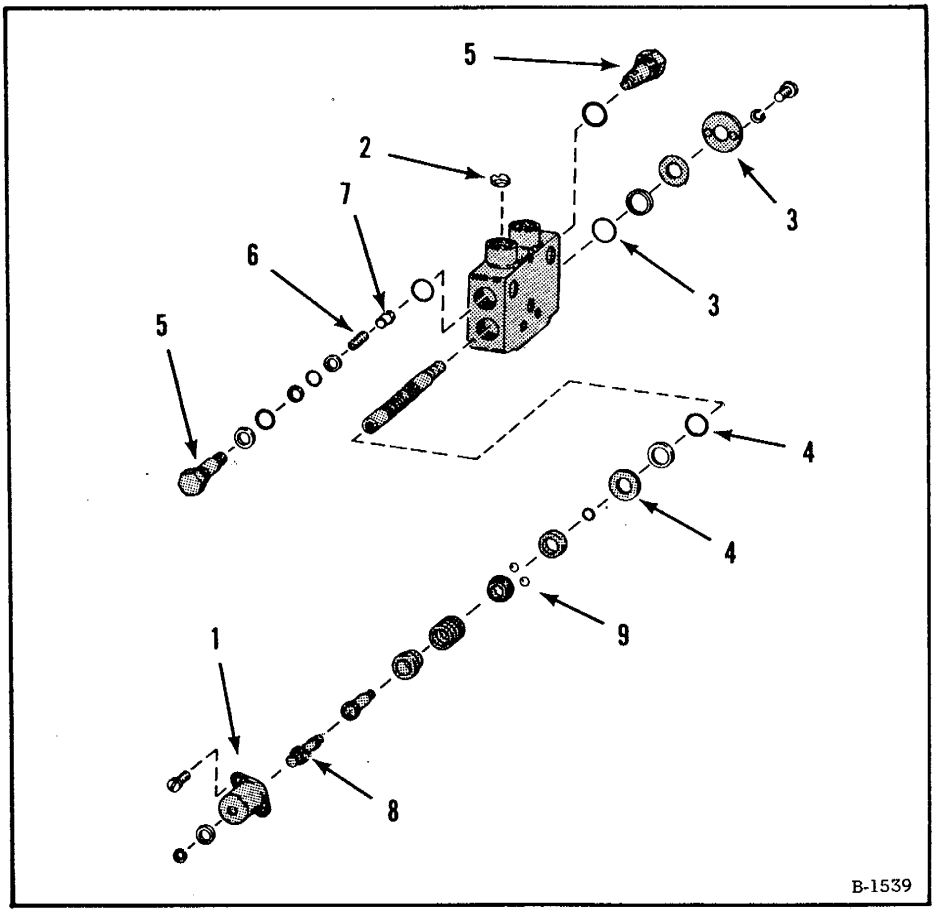


Fig. 2–26 Lift Valve Section with Detent

(7) Pull the spool out the rear of the valve section.

(8) Remove the front seal plate and O-ring (Item 3). Remove the rear seal retainer and O-ring (Item 4).

(9) Remove the large hex plugs (load check valves) (Item 5) located above the spool bore, on each end of the valve section. Carefully remove the springs and the poppets (Items 6 & 7).

(10) Wash all the parts in solvent and put them on a clean surface.

2–11.4 To Repair the Float Detent of the Lift Spool

(1) Remove the detent rod (Item 8) and hit the end of the spool on a hard surface. The 4 steel balls will fall out (Item 9).

(2) Hold the spool in a vise as shown, and use a large screw driver to remove the float detent sleeve (Fig. 2–27).

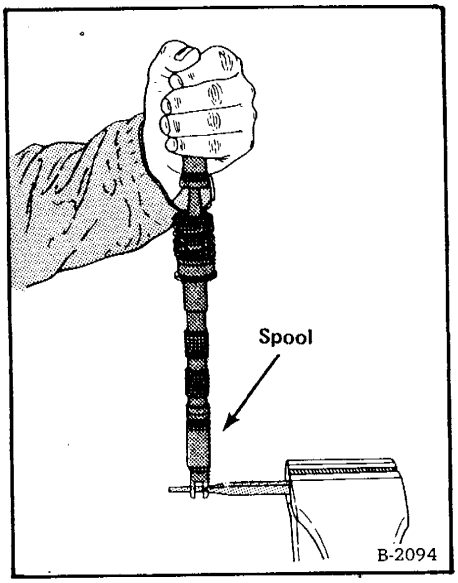


Fig. 2–27 Removing Detent Spring

2–11.5 To Assemble the Detent Assembly

(1) Use thick lubricant to hold the steel balls in their holes in the sleeve.

(2) Install the spring retainers, spring and sleeve and turn the sleeve into the spool end. Check to see that the steel balls are still in place. Install the detent rod.

2–11.6 Inspection, Repair and Assembly of Control Valve

(1) Inspect the spool and spool bore for damage and wear. Replacement of the spool or valve body cannot be made separately. If either is worn or damaged, complete replacement of the control valve section must be made.

(2) Make lubrication of the parts with oil and install in the valve body section.

NOTE: **Install the rear O-ring seals and seal retainer on the spool before installing it in the valve section. Push the spool into the rear of the valve section (Fig. 2–28).**

(3) Make lubrication of new O-rings with oil and press them into the seal grooves at each end of the valve section.

(4) Install the bonnet at the rear of the valve section (On lift section, install the snap ring on the detent rod.)

(5) Install the seal plate at the front end of the valve section.

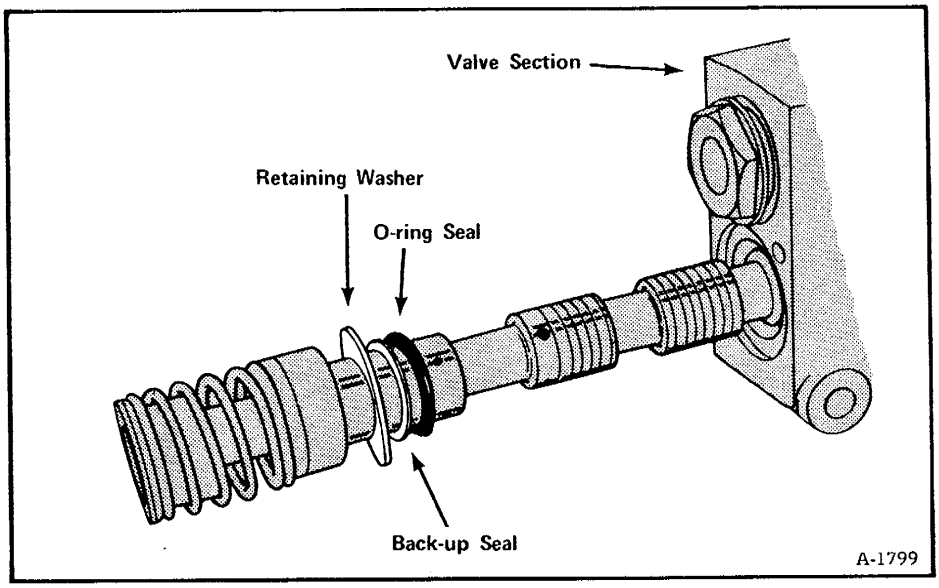


Fig. 2–28 Installing Valve Spools with Seals

(6) Install the load check valve parts, springs and hex plugs. Use new O-rings, lubrication made with oil, on the plugs.

(7) Install new O-rings into the counter bores on the sides of the valve sections.

(8) To help in assembly of all the valve sections, put the control valve inlet section on its side in a vise, so that the sections can be installed in their order of assembly (Fig. 2–29).

(9) After all the control valve sections have been assembled, install the thru bolts and the nuts. Tighten the nuts, evenly, to 20 ft.-lbs. (27.2 Nm) torque. Do not overtighten.

(10) With the control valve in a vise, check the operation of each spool for free movement and centering.

If any spool does not move correctly, try rotating the spool 180°. If this does not help, loosen the three thru bolt nuts and check spool movement. If spool movement is now normal, use care in tightening the thru bolt nuts.

To install the valve in the machine, reverse the removal procedure.

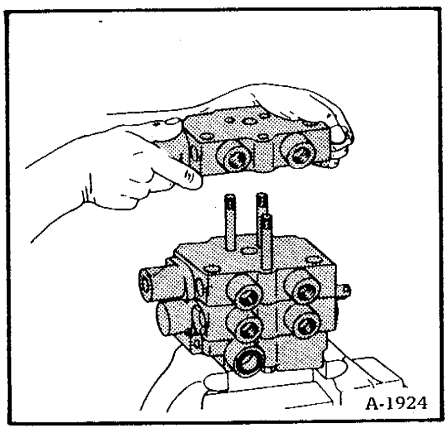


Fig. 2–29 Reassembly of Valve

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