REPAIR MANUAL

250
255

Publication No. 49903
April, 2005

THOMAS

THOMAS EQUIPMENT LIABILITY WARRANTY

THE WARRANTY IS THE ONLY OBLIGATION OF THOMAS OR A THOMAS DEALER TO THE PURCHASER OR ANYONE ELSE CONCERNING A PRODUCT, ITS SERVICE, ITS USE OR PERFORMANCE OR ITS LOSS OF USE OR FAILURE TO PERFORM. NEITHER THOMAS NOR A THOMAS DEALER HAVE MADE AND NEITHER WILL MAKE ANY OTHER EXPRESSED OR IMPLIED REPRESENTATION, WARRANTY OR AGREEMENT CONCERNING A PRODUCT. NEITHER THOMAS NOR A THOMAS DEALER HAVE MADE OR WILL MAKE ANY REPRESENTATION, WARRANTY OR AGREEMENT CONCERNING A PRODUCTS MERCHANTABILITY OR OTHER QUALITY, ITS SUITABILITY FOR PURCHASER'S PURPOSE (EVEN IF A PURCHASER HAS INFORMED THOMAS OR A THOMAS DEALER OF THAT PURPOSE), ITS DURABILITY, PERFORMANCE OR OTHER CONDITION.

EVEN IF THOMAS OR A THOMAS DEALER WAS ADVISE OF THE POSSIBILITY OF SUCH LOSS, NEITHER THOMAS NOR A THOMAS DEALER WILL BE LIABLE TO PURCHASER OR ANYONE ELSE FOR ANY INDIRECT, INCIDENTAL CONSEQUENTIAL, PUNITIVE, ECONOMIC, COMMERCIAL, OR SPECIAL LOSS WHICH IS IN ANY WAY ASSOCIATED WITH A PRODUCT. THIS INCLUDES ANY LOSS OF USE OR NON-PERFORMANCE OF A PRODUCT, ANY REPLACEMENT RENTAL OR ACQUISITION COST, ANY LOSS OF REVENUE OR PROFITS, ANY FAILURE TO REALIZE EXPECTED SAVINGS, ANY INTEREST COSTS, ANY IMPAIRMENT OF OTHER GOODS, ANY INCONVENIENCE OR ANY LIABILITY OF PURCHASER TO ANY OTHER PERSON.

PURCHASER MAY NOT ATTEMPT TO ENLARGE ITS RIGHTS UNDER THE WARRANTY BY MAKING A CLAIM FOR INDEMNITY, FOR BREACH OF CONTRACT, FOR BREACH OF COLLATERAL WARRANTY, FOR A TORT (INCLUDING NEGLIGENCE, MISREPRESENTATION OR STRICT LIABILITY) OR BY CLAIMING ANY OTHER CAUSE OF ACTION.

THE WARRANTY IS A CONDITION OF SALE OF THE PRODUCT TO PURCHASER AND WILL THEREFORE APPLY EVEN IF PURCHASER ALLEGES THAT THERE IS A TOTAL FAILURE OF THE PRODUCT.

*N.B. Read and practice your **Thomas** operating and servicing instructions. Failure to do this may void your warranty.*

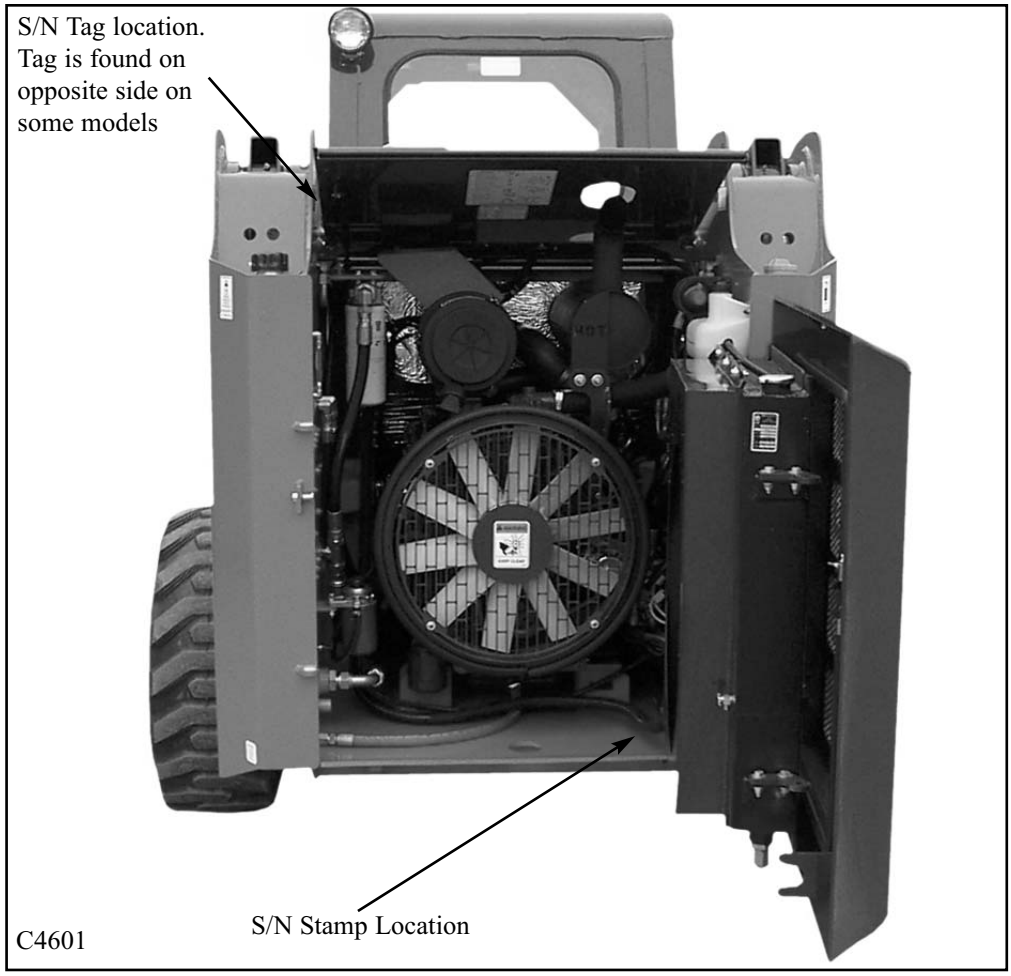
Publication Number 49903

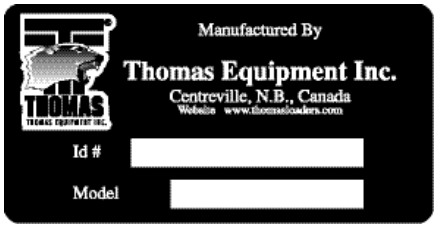
TABLE OF CONTENTS

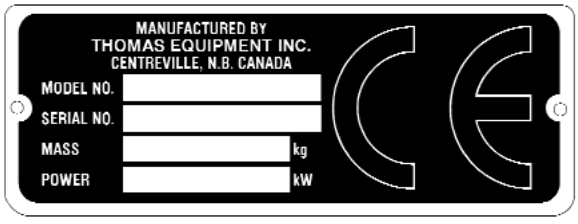
TABLE OF CONTENTS

SERIAL NUMBERS

It is important when ordering replacement parts or making a service inquiry to provide both the model number and serial number of your Thomas loader. The serial number plate is located at the rear of the machine on the left hand side hydraulic tank. In the event that the serial number plate is missing, the model number and serial number are both stamped into the main frame inside the rear door, next to the hydraulic control valve.







SAFETY PRECAUTIONS

Practically all Service work involves the need to drive the loader. The Owner's / Operator's Manual, supplied with each loader, contains safety precautions relating to driving, operating and servicing that loader. These precautions are as applicable to the service technicians as they are to the operator and should be read, understood and practiced by all personnel.

Prior to undertaking any maintenance or repair operations, make the necessary safety precautions to prevent possible personal injury to yourself, or to bystanders.

PERSONAL CONSIDERATIONS

* CLOTHING
  The wrong clothing or carelessness in dress can cause accidents. Check to see that you are suitably clothed. Some jobs require special protective equipment.

* SKIN PROTECTION
  Avoid long term contact with used motor oil. Follow work practices that minimize the amount of skin exposed and length of time used oil stays on your skin.

* EYE PROTECTION
  Injury can be avoided by wearing eye protection when engaged in chiseling, grinding, welding, painting and any other task that involves airborne matter.

* BREATHING PROTECTION
  Fumes, dust and paint spray are unpleasant and harmful. These can be avoided by wearing respiratory protection.

* HEARING PROTECTION
  Loud noise may damage your hearing and the longer the exposure the greater the risk of hearing damage. Always wear hearing protection when working around loud machinery.

* HAND PROTECTION
  It is advisable to use a protective cream before work to prevent irritation and skin contamination. After work, clean your hands with soap and water. Solvents such as white spirits, paraffin, etc. may harm the skin.

* FOOT PROTECTION
  Substantial or protective footwear with reinforced toecaps will protect the feet from falling objects.

* SPECIAL CLOTHING
  For certain work it may be necessary to wear flame or acid resistant clothing.

CAUTION

Avoid injury through incorrect handling of components. Make sure your are capable of lifting the object. If in doubt, get help.

EQUIPMENT CONSIDERATIONS

* MACHINE GUARDS
  Before using any machine, check to ensure that the machine guards are in position and serviceable. These guards not only prevent parts of the body or clothing coming in contact with the moving parts of the machine but also ward off objects that might fly off the machine and cause injury.

* LIFTING APPLIANCES
  Always ensure that lifting equipment, such as chains, slings, lifting brackets, hooks and eyes are thoroughly checked before use. If in doubt, select stronger equipment. Never stand under a suspended load or raised implement.

* COMPRESSED AIR
  The pressure from a compressed air line is often as high as 100 psi (6.9 bar). Any misuse may cause injury.

  Never use compressed air to blow dust, filing dirt, etc. away from your work area unless the correct type of nozzle is fitted.

  Compressed air is not a cleaning agent. It will only move dust etc. from one place to another. Look around before using an air hose as bystanders may get grit into their eyes, ears and skin.

SAFETY PRECAUTIONS

* HAND TOOLS

Many cuts, abrasions and injuries are caused by defective tools. Never use the wrong tool for the job as this leads either to injury or to a poor job.

Never Use:

A hammer with a loose or split handle.
Spanners or wrenches with spread or worn jaws.
Wrenches or files as hammers, drills, clevis pins or bolts as punches.

For removing or replacing hardened pins use a copper or brass drift.

For dismantling, overhaul and assembly of major and sub-components always use the Special Service Tools recommended. These will reduce the work effort, labor time and the repair cost.

Always keep tools clean and in good working order.

* ELECTRICITY

Electricity has become so familiar in day to day usage that it's potentially dangerous properties are often overlooked. Misuse of electrical equipment can endanger life.

Before using any electrical equipment, particularly portable appliances, make a visual check to ensure that the cable is not worn or frayed and that the plugs, sockets etc.are intact. Make sure you know where the nearest isolating switch for your equipment is located.

GENERAL CONSIDERATIONS

* SOLVENTS

Use only cleaning fluids and solvents that are known to be safe. Certain types of fluids can cause damage to components such as seals, etc. and can cause skin irritation. Solvents should be checked that they are suitable not only for the cleaning of components and individual parts but also that they do not affect the personal safety of the user.

* HOUSEKEEPING

Many injuries result from tripping or slipping over, or on, objects or materials left lying around by a careless worker.

Prevent these accidents from occurring. If you notice a hazard, don't ignore it, remove it.

A clean hazard free place of work improves the surroundings and daily environment for everybody.

* FIRE

Fire has no respect for persons or property. The destruction that a fire can cause is not always fully realized. Everyone must be constantly on guard.

- Extinguish matches, cigars, cigarettes etc. before throwing them away.
- Work cleanly, disposing of waste material into proper containers.
- Locate all the fire extinguishers and ensure all personnel know how to operate them.
- Do not panic, warn those near and sound the alarm.
- Do not allow or use an open flame near the loader fuel tank, battery or component parts.

* FIRST AID

In the type of work that mechanics are engaged in, things such as dirt, grease, fine dust etc. all settle upon the skin and clothing. If a cut, abrasion or burn is disregarded it may be found that a septic condition has formed in a short time. What appears at first to be trivial could become painful and injurious. It only takes a few minutes to have a fresh cut dressed but it will take longer if you neglect it.

* CLEANLINESS

Cleanliness of the loader hydraulic system is essential for optimum performance. When carrying out service and repairs, plug all hose ends and components connections to prevent dirt entry.

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficiency and working life of a component and lead to costly replacement. Use of a high pressure washer or steam cleaner is recommended.

SAFETY PRECAUTIONS

OPERATIONAL CONSIDERATIONS

* Stop the engine, if at all possible, before performing any service.

* Place a warning sign on loaders which, due to service or overhaul, would be dangerous to start. Disconnect the battery leads if leaving such a unit unattended.

* Do not attempt to start the engine while standing beside the loader or attempt to bypass the safety starting system.

* Avoid prolonged running of the engine in a closed building or in an area with inadequate ventilation as exhaust fumes are highly toxic.

* Always turn the radiator cap to the first stop to allow pressure in the system to dissipate when the coolant is hot.

* Never work beneath a loader which is on soft ground. Always take the unit to an area which has a hard working surface, preferably concrete.

* If it is found necessary to raise the loader for ease of maintenance, make sure that safe and stable supports are installed beneath the main frame before commencing work.

* Use footsteps or working platforms when servicing those areas of the loader that are not within easy reach.

* Before loosening any hoses or tubes, switch off the engine, remove all pressure in the lines by operating the foot pedals several times. This will remove the danger of personal injury by oil pressure.

* Prior to pressure testing, make sure all the hoses and connectors on both the loader and on the test machine are in good condition and tightly sealed. Pressure readings must be taken with the gauges specified. The correct procedure should be rigidly observed to prevent damage to the system or the equipment and to eliminate the possibility of personal injury.

* To avoid personal injury, service the loader with the arms down and the bucket or attachment on the ground. If it is necessary to service the loader with the boom arms raised , be sure to engage the boom supports. Never work under or around a loader with raised boom arms without boom supports engaged.

* If high lift attachments are installed on a loader, beware of overhead power and telephone lines when travelling. Drop attachment near to ground level to increase stability and minimize risks.

* Do not park or attempt to service a loader on an incline. If unavoidable, take extra care and block the wheels.

* Escaping hydraulic / diesel fluid under pressure can penetrate the skin causing serious injury. Do not use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks. Stop the engine and relieve pressure before connecting or disconnecting lines. Tighten all connections before starting the engine or pressurizing the lines. If any fluid is injected into the skin, obtain medical attention immediately.

* Prior to removing wheels and tires from a loader, check to determine whether additional ballast (liquid or weight) has been added. Seek assistance and use suitable equipment to support the weight of the wheel assembly.

* When inflating tires beware of over inflation; constantly check the pressure. Over inflation can cause tires to burst and result in personal injury.

* Safety precautions are very seldom the figment of someone’s imagination. They are the result of sad experience where most likely someone has paid dearly through personal injury.

* Heed these precautions and you will protect yourself accordingly. Disregard them and you will duplicate the sad experiences of others.

SAFETY PRECAUTIONS

SERVICE TECHNIQUES

A. SERVICE SAFETY

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This shop manual provides general directions for accomplishing service and repair work with tested effective techniques. Following them will help assure reliability.There are numerous variations in procedures, techniques, tools and parts for servicing vehicles as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that he or she compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

B. SERVICE TECHNIQUES

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficient working life of a component and lead to costly replacement.

Use cleaning fluids which are known to be safe. Certain types of fluid can cause damage to O- rings and cause skin irritation. Solvents should be checked that they are suitable for the cleaning of components and also that they do not risk the personal safety of the user.

Time spent on the preparation and cleanliness of working surfaces will pay dividends in making the job easier and safer and will result in overhauled components being more reliable and efficient in operation.

Replace O rings, seals or gaskets whenever they are disturbed. Never mix new and old seals and O rings, regardless of condition. Always lubricate new seals and O rings with hydraulic oil before installation.

When replacing component parts use the correct tool for the job.

C. HOSES AND TUBES

Always replace hoses and tubes if the end connections are damaged. Be sure any hose installed is not kinked or twisted.

When installing a new hose, loosely connect each end and make sure the hose takes up the designed position before tightening the connection. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

The hoses are the arteries of the unit. Be sure they are in good condition when carrying out repairs or maintenance. Otherwise the machines output and productivity may be affected.
After hose replacement to a moving component, check that the hose does not foul by moving the component through the complete range of travel.

Hose connections which are damaged, dented , crushed or leaking, restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original swaged position have failed and will ultimately separate completely.

A hose with a chafed outer cover will allow water entry. Concealed corrosion of the wire reinforcement will subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which results in oil restriction, a reduction in the speed of operation and ultimate hose failure.

Free moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

D. PRESSURE TESTING

Prior to pressure testing, be sure all hoses are in good condition and all connections tight. Pressure readings must be taken with gauges of specified pressure readings.

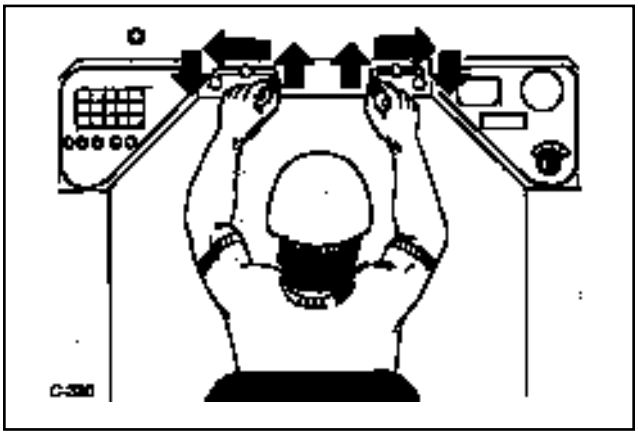
The correct procedure should be rigidly observed to prevent damage to the system or the equipment and to eliminate the possibility of personal injury.

SAFETY PRECAUTIONS

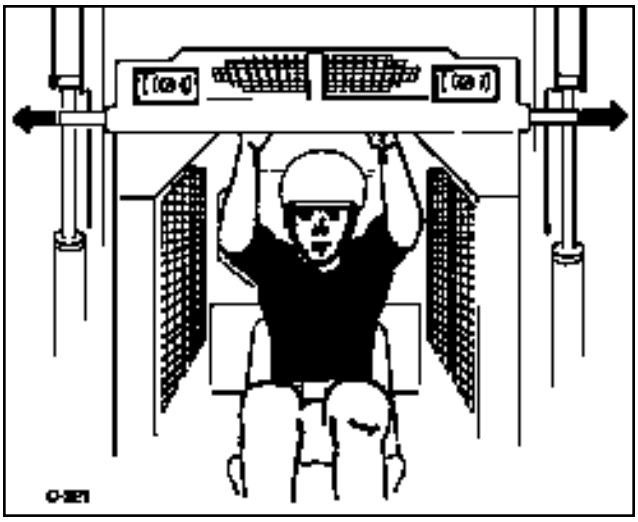
E. BEARINGS

Bearings which are considered suitable for further service should be cleaned in a suitable solvent and immersed in clean lubricating oil until required.

Installation of a bearing can be classified into two (2) ways:
press fit on rotating parts such as shafts and gears,
push fit into static locations such as reduction gear houses.
Where possible, always install the bearing onto the rotating components first. Use the correct tools or a press to install a bearing or bushing. In the absence of the correct tools or press, heat the bearing and / or casing in hot oil to assist the installation of the bearing.



When bearings or bushings are removed, always carefully check that the bearing is free from discoloration and signs of overheating. Also check for mechanical damage such as excessive clearance, nicks and scuffing. If in doubt, replace the bearings or bushings.



Bearings should never be removed unless absolutely necessary. Always use the recommended puller to reduce the risk of bearing or related component failure.

These bearings and bushings are subjected, in normal operation, to high working loads and adverse conditions.

Be sure during normal routine servicing, maintenance or repair that bearings are given the right attention and are installed with care.

F. BOOM SUPPORTS
For safety while performing regular service or maintenance work, the loader is equipped with boom supports.

The boom supports, when extended, prevent the boom arms from dropping if hydraulic pressure is relieved or the foot control pedals are accidentally cycled.

To operate the boom supports, first remove any bucket or attachment from the quick - tach; raise the boom arms to full height and shut off the engine. Raise the boom handles up and push out toward the boom arms to extend the boom supports.

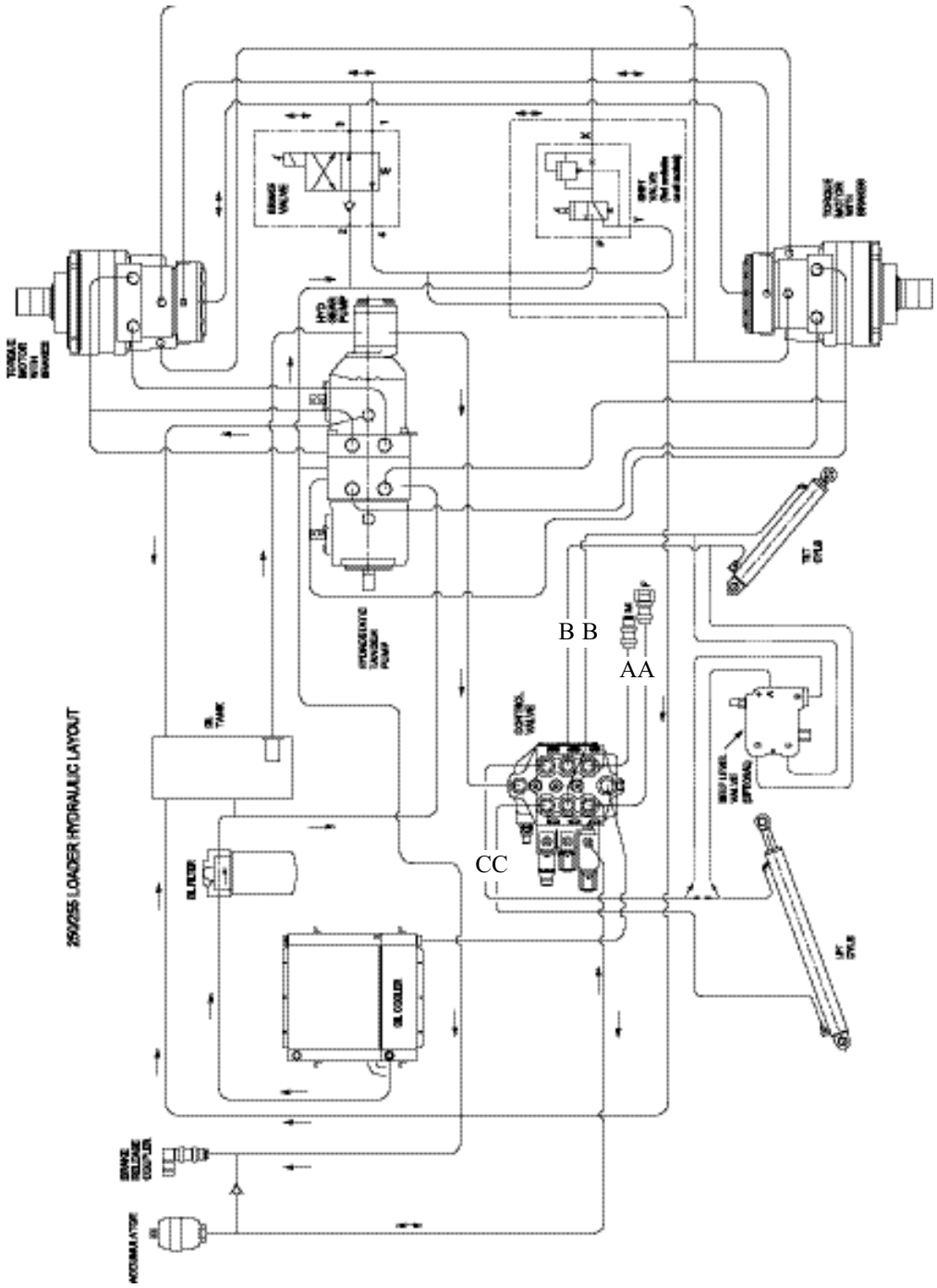
WARNING

To avoid personal injury, service the loader with the arms down and the bucket or attachment on the ground. If it is necessary to service the loader with the boom arms raised be sure to engage the boom supports. Never work under or around a loader with raised boom arms without boom supports engaged.

SECTION 1 HYDRAULIC SYSTEM

HYDRAULIC CIRCUIT 1.1

1

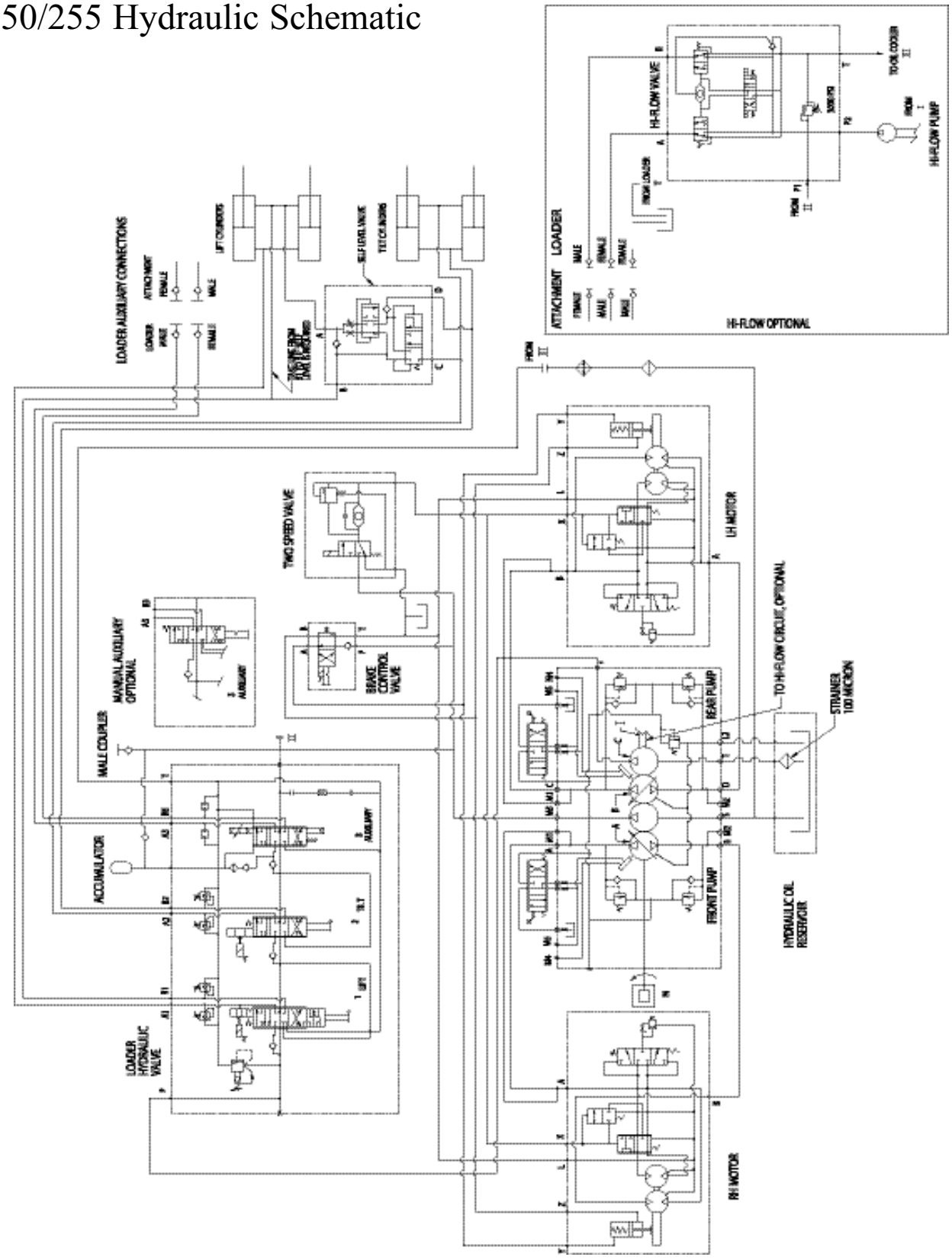


C3962

A Auxiliary Circuit
B Tilt Circuit
C Lift Circuit

HYDRAULIC CIRCUIT 1.1

250/255 Hydraulic Schematic



C4602

HYDRAULIC CIRCUIT 1.1

1

Hydraulic Specifications

Pump Type . . . . . .Gear, 1.77 cu in (29 cc)
Pump Brand . . . . . Sauer Danfoss
Pump Capacity . . . . . 21 gal/min (79.6 l/min)
Control Valve . . . . . Series Type
Main Relief Pressure . . . . . 3000 psi (206.8 bar) @ Zero Flow
Reservoir Capacity . . . . . 35 US gallons (133 liters)
Fluid Type . . . . . 10W30 API SJ Oil
Reservoir Filtration . . . . . 100 Micron
System Filtration . . . . . 5 Micron
Oil Cooler . . . . . 1250 BTU

	250		**255, 250CE, 250AU**	
Cylinders .....Lift	Tilt		Lift	Tilt
Qty- per Mach 2	2		2	2
Bore Dia ..... 2.5 in.	2.5 in.		3 in.	3 in.
Rod Dia ..... 1.5 in.	1.5 in.		2 in.	2 in.
Stroke..... 27.9 in.	15.5 in.		27.9 in.	15.5 in.
Cycle Times ..... 3.65 Up	1.45 Up		5.3 Up	2.08 Up
..... 2.65 Dn	2.00 Dn		2.96 Dn	2.88 Dn

Allowable Drop, Measured at the Cylinder Rod, Engine Off,
@ Rated Capacity and Operating Temperature . . . . . 1.5” (38mm) / 3 Minutes

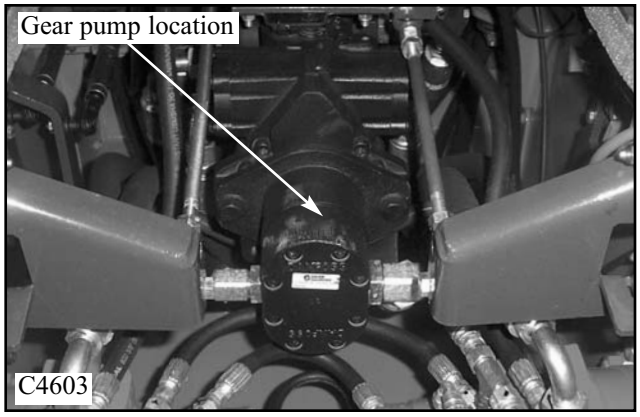
Maintenance Schedule . . . . . First (HRS) . . . . Every (HRS)

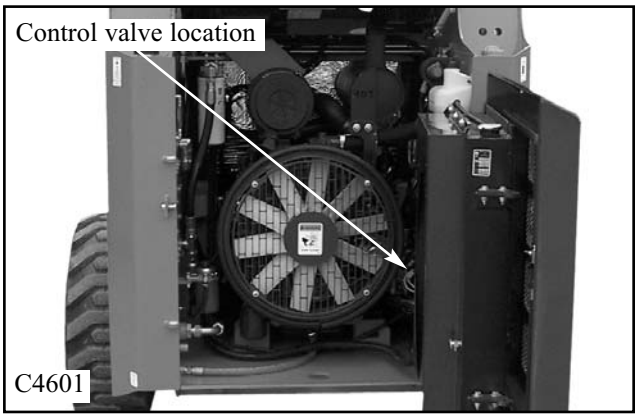
Oil level check 8 8
Oil filter change 50 150
Oil cooler clean 8 8
General system check
(leaks etc.) 8 8
Cylinders, lubricate 8 8
Control valve relief filter 500 1000
Reservoir filters change 1000 1000
Hydraulic oil change 1000 1000

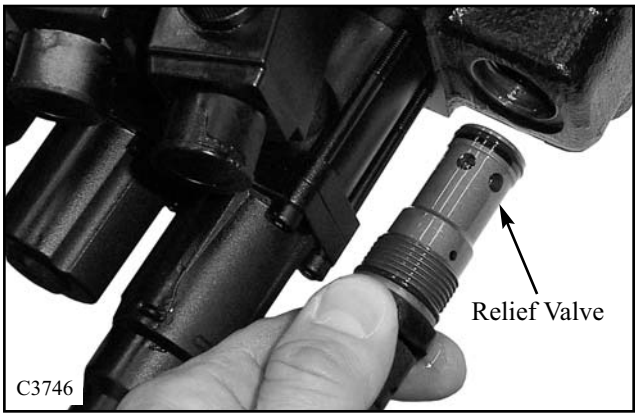
GEAR PUMP 1.2

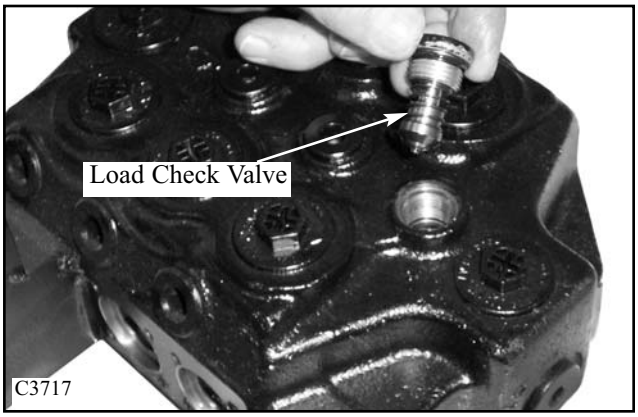
General Information

Refer to figure C3962 on page 1-2.
Oil is drawn from the hydraulic oil reservoir through a 100 micron element. From there it travels to the main hydraulic pump.
•The hydraulic pump is a gear type which is coupled through the hydrostatic drive pump at engine speed. The oil then flows from the gear pump to the hydraulic control valve.
•The hydraulic control valve is equipped with an adjustable relief valve which is adjusted to 3000 psi (206.8 bar). The control valve is a series type with 3 spools (banks). The various spools activate the boom, bucket and auxiliary hydraulic functions.
When the spools are in neutral, oil flows from the hydraulic gear pump, through the control valve and returns to the hydraulic cooler, to the 5 micron hydraulic filter. From the hydraulic filter, the fluid flows to charge the tandem hydrostatic pump and pressurize the hydraulic brake release system and then back to the hydraulic reservoir. As a spool is moved, oil is directed to one of the valve ports and oil flows out to operate a function. The return oil coming back from this operation is ported to the next valve section which allows operation of more than 1 function at the same time. This is a series type valve function.
Each spool end contains a centering spring which returns the spool to neutral when the foot pedal, or control handle, is released.
•The boom section, on foot control operated loaders, has a detent mechanism to hold the spool in the float position. The auxiliary section is operated by foot pedal operation, or may have an optional electrical solenoid operated control, and may be engaged momentarily by the control lever mounted switch, forward or reverse, or by engaging the dash mounted toggle switch for constant power in the forward direction only.
The system relief valve operates when ever a hydraulic function has been restricted or overloaded (fig. C3746). To protect against excessive pressure build up, the relief valve opens and allows oil to return to the return outlet. The system relief valve is adjustable, and is preset at 3000 psi. (206.8 bar)
•Load check valves are located between the ports of each spool circuit. The function of the load check valve is to hold the boom arms or bucket in position during initial spool movement (fig. C3717).









GEAR PUMP 1.2

1

Replacement

Start the gear pump removal procedure by removing any attachment, raising the boom arms and engaging the boom support pins. Shut off the engine.

WARNING

To prevent personal injury do not work under the boom arms without the boom supports engaged.

1 Remove the seat and hydrostatic shield.

2 Attach a vacuum system to the hydraulic oil reservoir filler location. (fig. C4604) Drain the oil reservoir if a vacuum is not available. If the drain plug is removed, seal the threads with teflon tape or a liquid form of pipe sealant before reinstalling.

3 Disconnect the hydraulic hoses from the gear pump. (fig. C4605) Remove the pump fittings. Cap all open hoses to prevent contamination. After capping all ends, you may unhook vacuum system from oil reservoir.

4 Remove the 2 bolts holding the gear pump to the hydrostatic tandem section. (fig. C4607) Remove the gear pump.

5 Install a new O-ring on the seal area of the new gear pump unit.

IMPORTANT

If gear pump replacement is being done because of failure, the hydraulic system and oil should be checked for contamination.

6 Replace gear pump in reverse order. Torque the bolt nut combination to 51~62 ft lbs (70~84Nm).

7 If the hydraulic system has been contaminated by the pump or other failure you must follow the cleaning procedure outlined in section 2.7.

WARNING

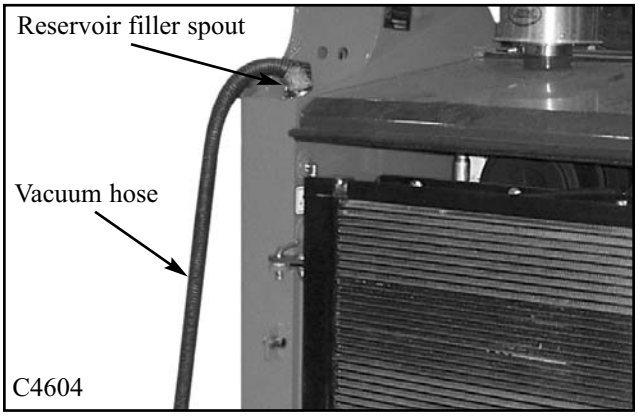
Use caution when dealing with hydraulic fluid under pressure. Escaping fluid under pressure can penetrate the skin and cause serious injury.

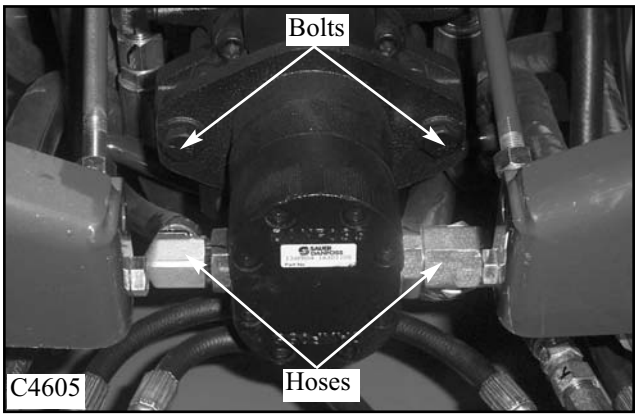
8 Start the engine and check for leaks. Do not use your hands to find leaks.

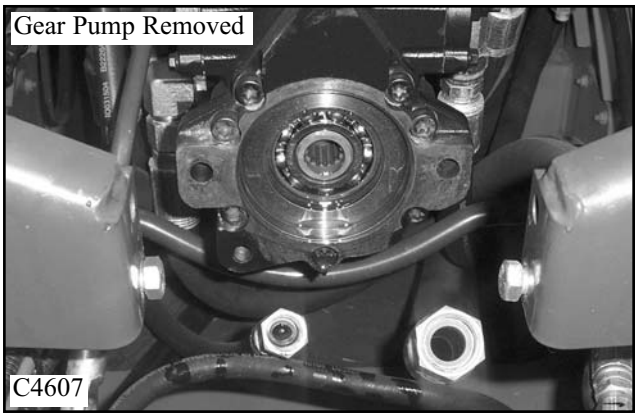
9 Check the fluid level in the hydraulic oil reservoir and replenish as required. (fig. C4606)

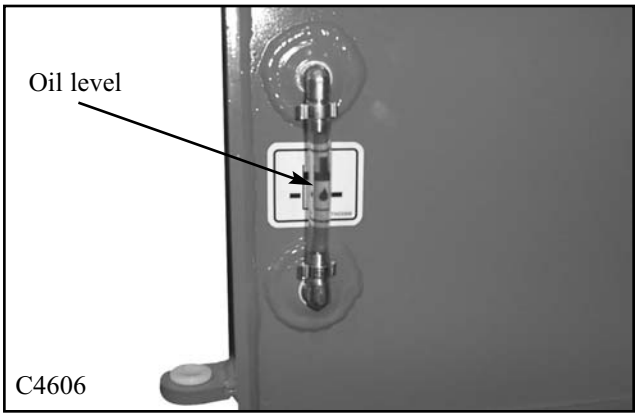
IMPORTANT

When making repairs to the hydraulic system, keep the work area and parts clean. Use caps and plugs on all open lines and ports.









GEAR PUMP 1.2

Disassembly

1. General

The following is a detailed procedure for the disassembly and assembly of the gear pump. Prior to proceeding it may be necessary to prepare some sub-assembly separately. The details for preparing each sub-assembly are given in the following section, as well as some general recommendations.

2. Cleanliness

Cleanliness is the primary factor for reliable pump performance. Wash the outside of the pump thoroughly before disassembly and all pieces prior to assembly. Cleaning parts with clean shop solvent and air drying is usually adequate.

3. Lubrication Of Moving Parts

During assembly, it is imperative to provide lubrication with clean hydraulic oil to all the running parts of the pump. It is also necessary to coat the seals with grease. The absence of lubrication during assembly can cause the unit to seize after a few minutes of running.

4. Care Of Surface Treatment

Be careful when handling all the internal surfaces, especially bearings, gears, and body faces. Do not touch or score them with metal tools or cutting edges.

5. Marking The Parts

Mark the parts before completely disassembling a pump. The marks allow components to be reassembled in the same relative position. This action should be applied to the body, bearings, and gears. Scribing, bluing, or using a felt pen to mark the outside of the body on the inlet side is suggested to indicate the relative position of the front flange and the rear cover to the body. DO NOT scribe internal surfaces.

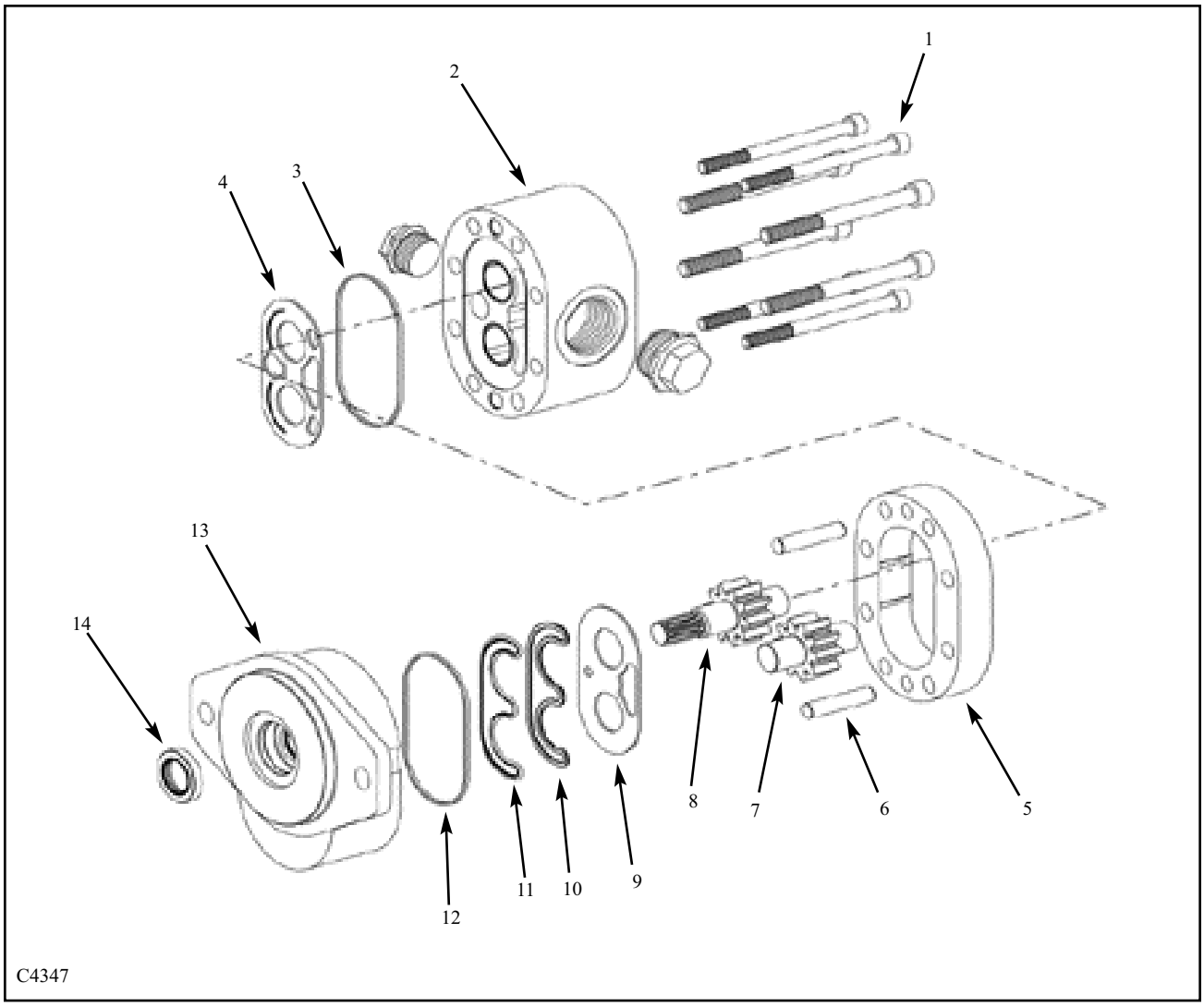
IMPORTANT

Mark all pieces during disassembly so that the unit can be reassembled correctly. Installing components incorrectly could severely damage the unit and/or cause it to not function properly.

GEAR PUMP 1.2

1

Disassembly 250/255

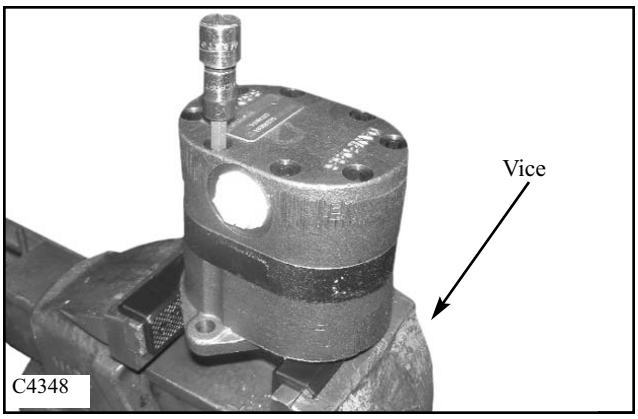


1. Screws
2. Cover Assembly
3. Seal Ring
4. Wear Plate
5. Gear Plate
6. Dowel Pin
7. Idler Shaft
8. Drive Shaft
9. Wear Plate
10. Load Ring
11. Preload Ring
12. Seal Ring
13. Body Assembly
14. Shaft Seal

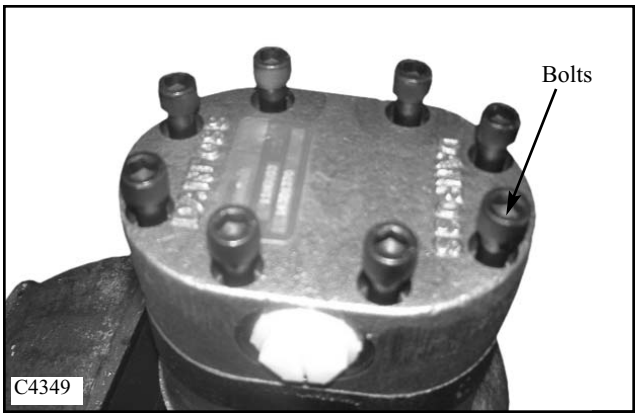
Disassembly 250/255

6. Procedure

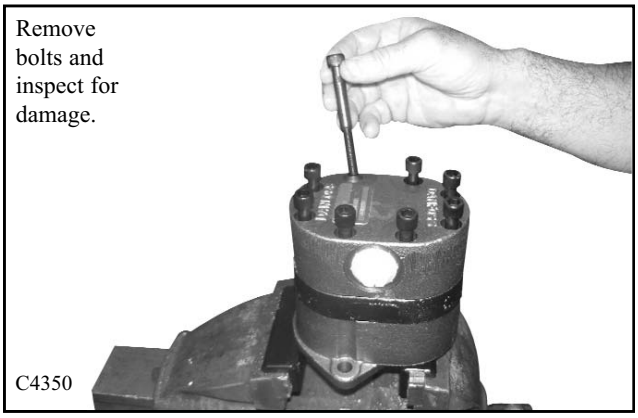
1. Clamp the unit in a vice from the flange side (fig. C4348). Make sure the vice jaws are clean and have smooth surfaces to prevent damage to the pump. Caution must be used when using a vice to avoid distorting any parts or damaging the mounting pilot.

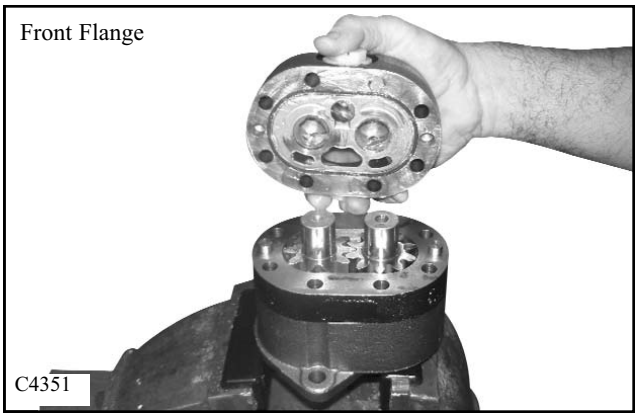


2. Use a Allen head socket wrench to loosen the bolts on the cover assembly (fig. C4349). Next completely unscrew the bolts and remove them. Inspect the threads for damage (fig. C4350).



3. Slowly remove the cover assembly (fig. C4351). Note, some units have a shaft seal and others do not. Should your unit have the shaft seal, be careful not to damage it when removing the cover assembly.



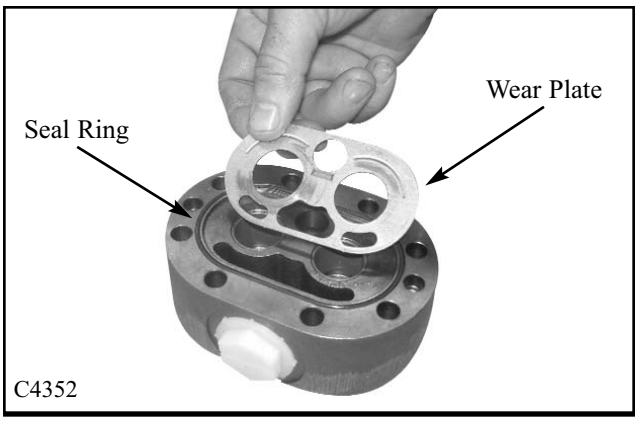


GEAR PUMP 1.2

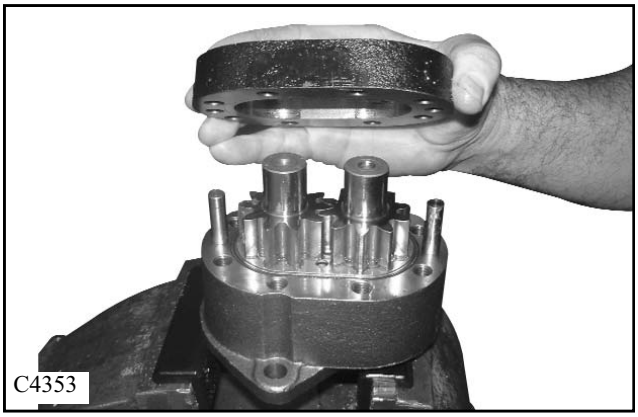
Disassembly 250/255 (cont'd)

6. Procedure

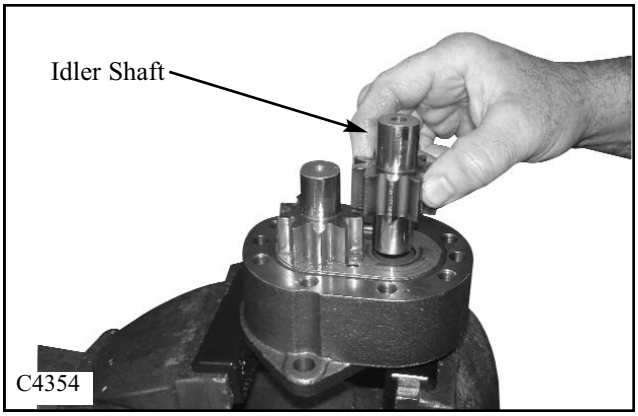
4. Place the cover assembly on the work bench (fig. C4352). Inspect the wear plate for evidence of extrusion or marks caused by overheating. Replace if necessary. Remove the wear plate and seal ring on the cover assembly. Do not use tools with sharp edges to remove the seal, as damage to the housing may result.

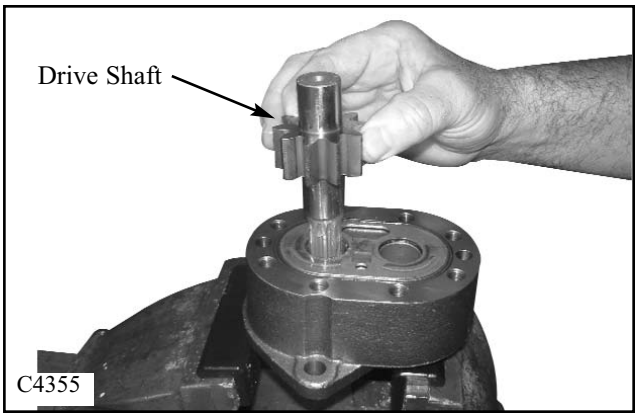


5. While disassembling the unit, you need to mark the relative positions of the gear mesh (drive gear tooth and idler gear tooth) and the body so they can be reassembled in the same position. Carefully remove the gear plate (fig. C4353). Remove the dowel pins and place in the gear plate.



6. Remove the idler shaft and drive shaft from it's bearing bore. Inspect the journals and the flat faces top and bottom of the gears. Ensure these surfaces are free from burrs or scratches. If scratches are found, clean them with a flat stone and/or a very fine emery cloth. Rewash the gears with light oil after this operation.





Disassembly 250/255 (cont'd)

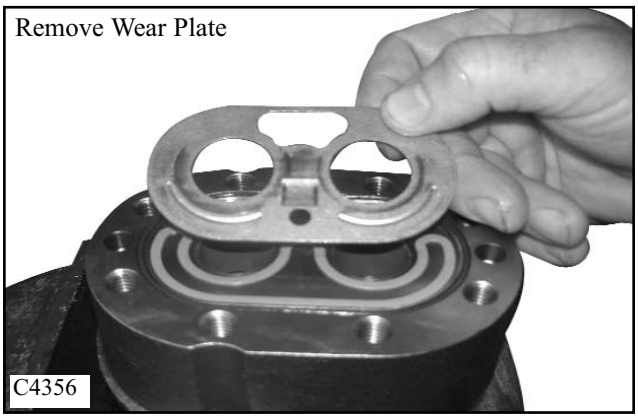
6. Procedure

7. Inspect the wear plate for evidence of extrusion, or marks caused by overheating. Remove the wear plate from the body assembly. (fig C4356) Replace if necessary. Remove the load ring, pre-load ring and seal ring. (fig C4357) Do not use tools with sharp edges to remove the seals, as damage to the housing may result. Dispose of any damaged seals.

8. Remove the shaft seal in the body assembly (if applicable). Place the flange on the work surface. Using internal snap ring pliers, remove the snap ring. Check the seal quality and remove it if necessary. To remove, pry the bottom of the shaft seal and force it out while rotating the flange to lift it out evenly. Do not use the flange pilot to gain leverage as damage may result. Use a plastic rod or wooden dowel as a fulcrum. After removal, dispose of the damaged seal.

9. Complete dissembled unit. (fig C4358)

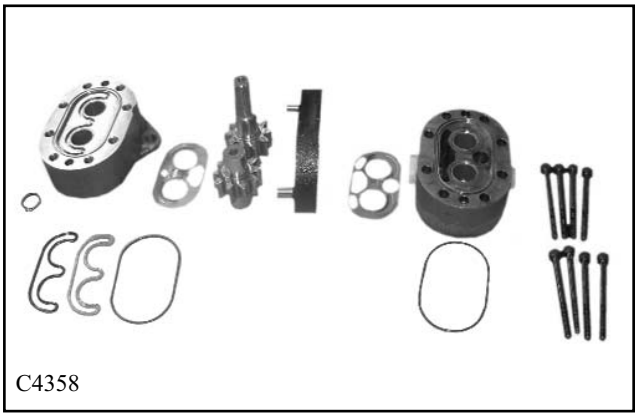
Remove Wear Plate



C4356

Remove seals

C4357



C4358

GEAR PUMP 1.2

1

Assembly 250/255

1. Have the entire seal kit available and layed out neatly on the table (fig. C3980). Compare the old seal kit to the new one to ensure you have the correct one. Lightly coat all seals with seal grease. The grease is needed to adhere the seals in their grooves. DO NOT INSTALL DRY SEALS!

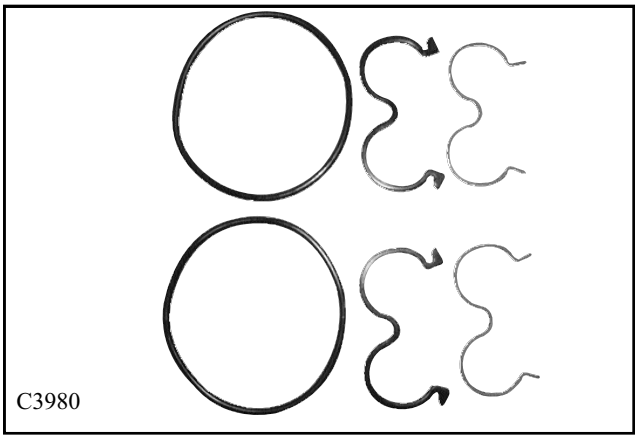
2. Prepare the body by cleaning it. Inspect the internal and mating surfaces. Ensure the surfaces are free of burrs and scratches.

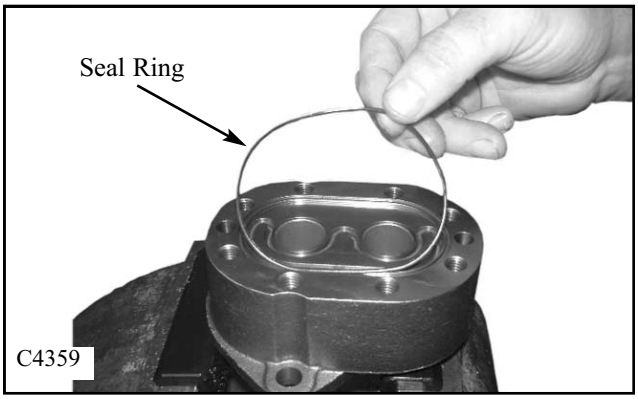
3. Install the shaft seal into the body assembly (if applicable). Prepare the body and shaft seal by lightly lubricating with grease. Seat the seal in the body assembly by hand. Then, using a shaft seal installation tool press the seal until the tool stops on the flange. This will insure the seal is inserted to the proper depth.

3. Place the body assembly, with the E- ring seal grooves facing up, into a vice with soft jaws. Caution must be used when using a vice to avoid distorting or damaging the mounting pilot.

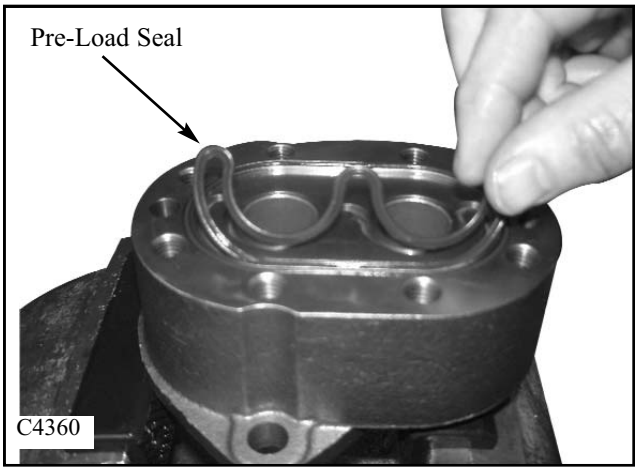
4. Place the rubber seal ring in the body groove. (fig. C4359)

5. Place the pre-load seal (black rubber E-ring) into the body E-ring groove. (fig. C4360)


C3980



C4359

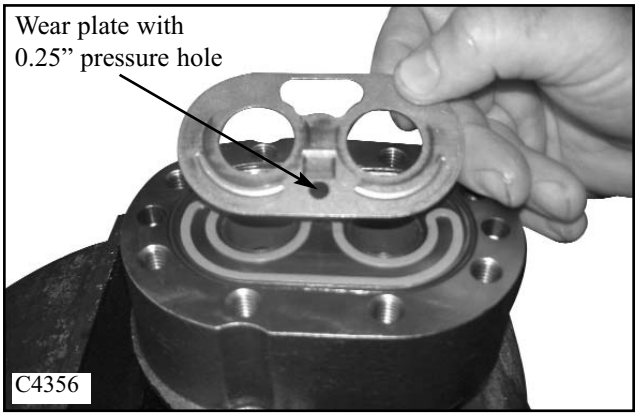


C4360

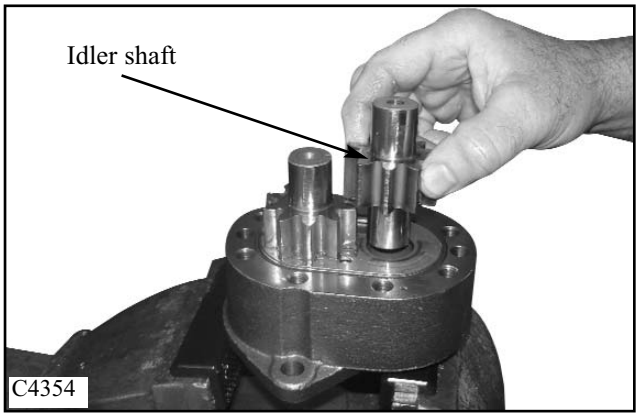
Assembly 250/255 (cont'd)

6. Place the load seal directly on top of the pre-load seal (blue E-ring).

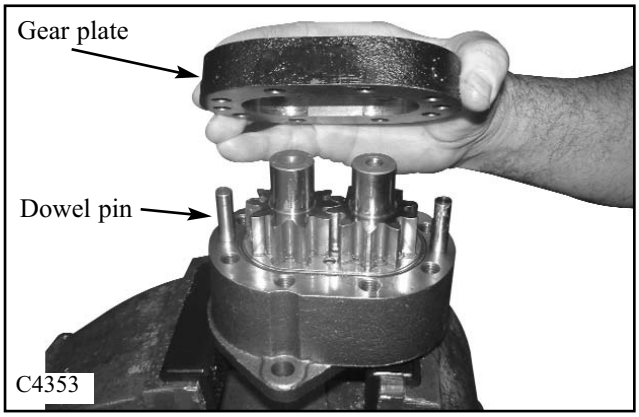
7. Find the wear plate with a 0.25" diameter pressure hole and No oblong holes on the inlet side. Place the wear plate on top of the load ring with the bronze side facing up towards the gears. The 0.25" pressure hole is to be positioned on the E-ring side of the body. (fig C4356)

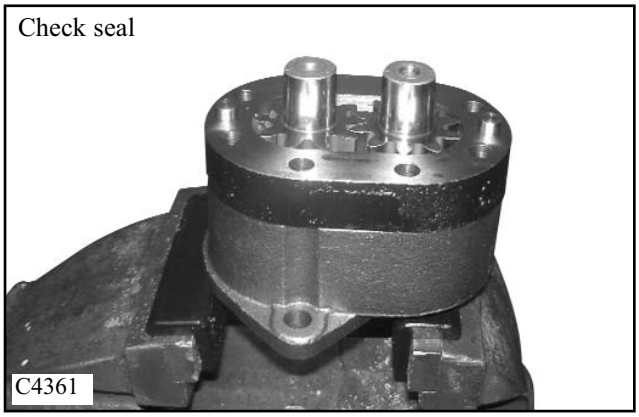


8. Lubricate the spline end of the drive shaft with Aerolube grease. Insert the drive shaft in the correct bearing bore. Align the idler shaft with the assembly marks to ensure assembly is installed with the same orientation as before assembly. Place the idler shaft in the correct bearing bore into the body (fig. C4354). Inspect gear teeth for alignment. Misaligned gear teeth may increase operating noise. Lubricate the complete gearset using clean light oil.



9. Insert the two dowel pins into the body assembly. Place the gear plate over the dowel pins and lightly tap making sure it contacts the body. (fig. C4353)
Check to make sure the gear plate is seated properly with no foreign material pinched between these surfaces.





GEAR PUMP 1.2

Assembly 250/255 (cont'd)

10. Place the cover assembly on a bench with the machined surface facing up. Place the rubber seal ring in the cover seal ring groove. (fig C4362)

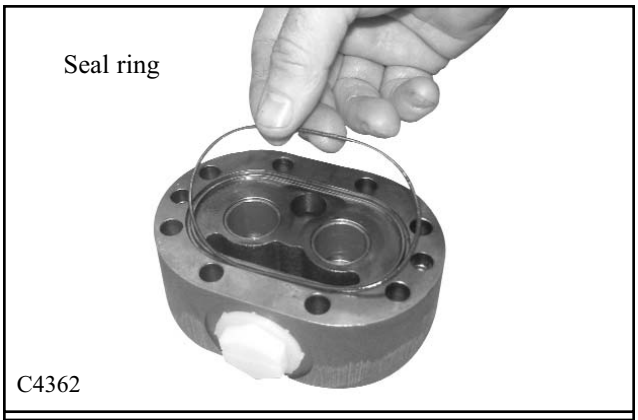
11. Find the wear plate with the 0.625" diameter pressure hole and two oblong holes on the inlet side. Position the wear plate in the cover with the bronze side facing up (towards gears) and the 0.625" pressure hole located over the circular holes in the cover. (fig. C4352)

12. Line up the cover assembly with the shaft journals and dowel pins (fig. C4351). Lightly tap the back of the cover until dowel pins are completely engaged. Check the seal making sure it is seated properly with no foreign material pinched between the surfaces.

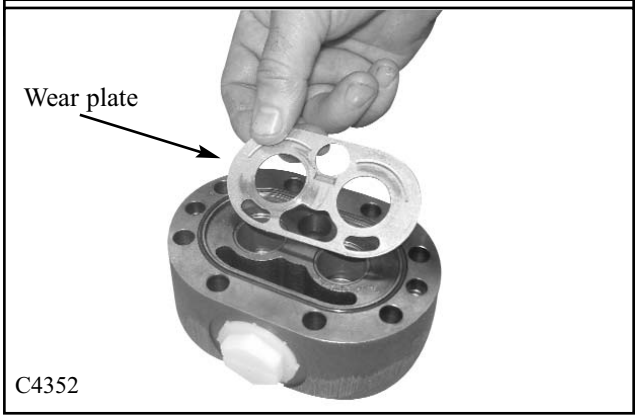
13. Place the screws in the cover holes and turn until the treads engage. Use care so that cross threading does not occur.

14. Torque the 8 bolts by criss crossing back and forth a little at a time until you reach the final torque of 47 ft lbs (64 Nm). (fig. C4363)

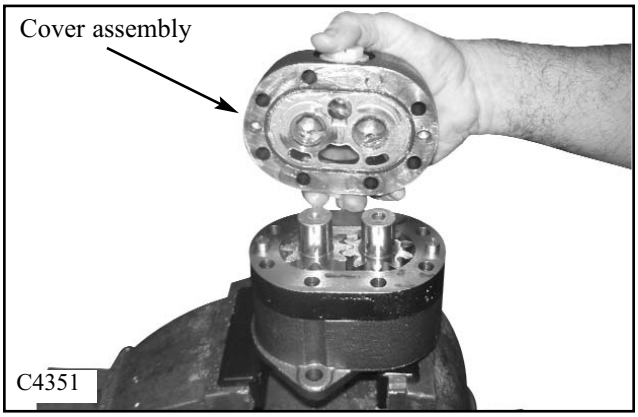
15. After the pump has been disassembled and reassembled it it suggested that the pump be run in and tested on an appropriate test stand. This is done to verify the volumetric efficiency and the integrity of the unit.



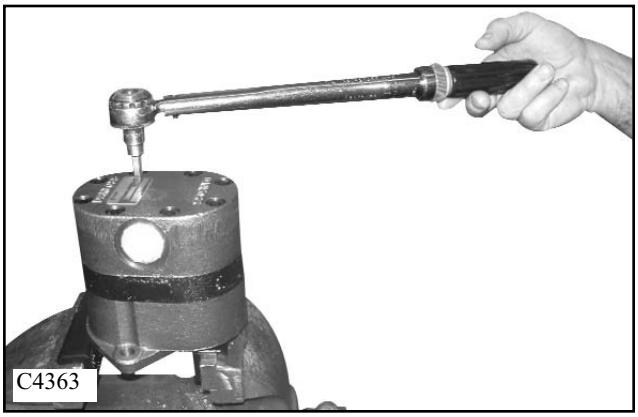
C4362



C4352



C4351


C4363

CONTROL VALVE 1.3

Testing and Adjusting the Relief Valve Pressure

Hoses and gauges required for this test must be capable of withstanding 5000 psi (345 bar) continuous pressure, and hydraulic flow meter capable of measuring 30 gallons per minute. (113 l/min) (fig. C3432) **This test also checks the status of the gear pump capacities.** Pressure fluctuations may be caused by restricted oil flow through the relief valve. The relief valve may need replaced when its filter is contaminated.

1 Install the flow meter / pressure tester to the auxiliary hydraulic quick couplers. (fig. C3432) The female coupler attached to the loader provides the power out when the auxiliary control is engaged. (fig, C4608) Connect the flow meter and pressure gauge inlet side to match the power out of the female auxiliary coupler to prevent meter and gauge damage. Be sure to connect a return line to the male auxiliary hydraulic quick coupler. (fig. C4609)

2 Start the engine and engage the auxiliary hydraulic system. Increase the engine speed to full operating rpm. (See Section 7 for checking and adjusting engine speed)

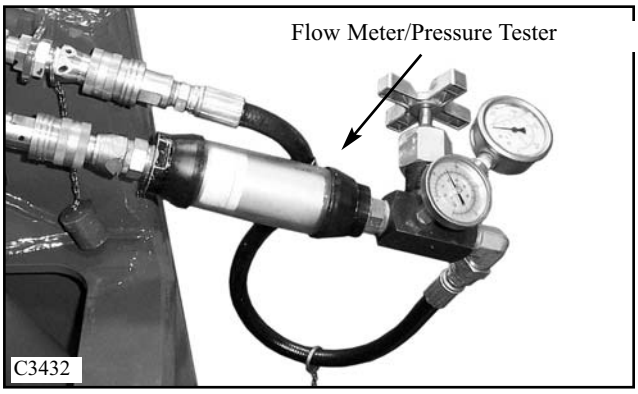
CAUTION

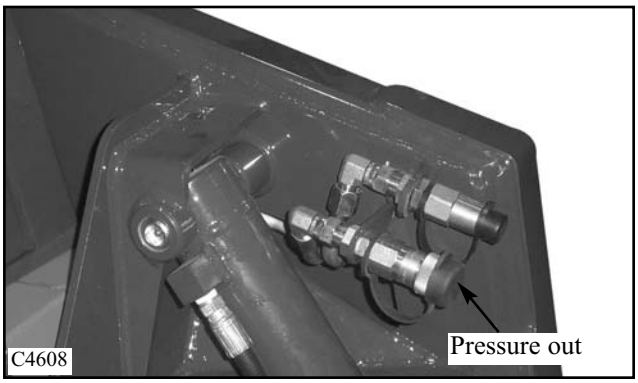
Adjusting the relief valve setting too high may cause damage to the gear pump.

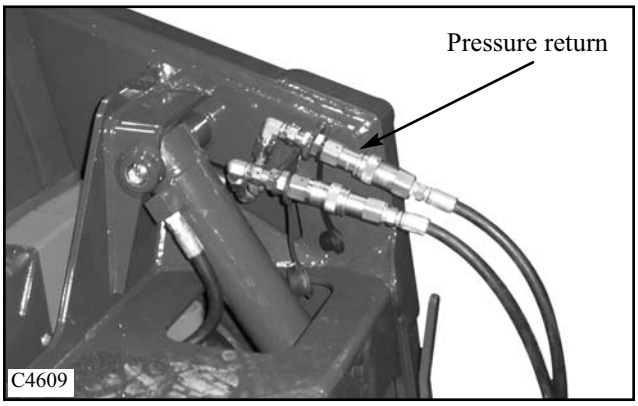
3 Turn the flow control valve on the flow meter to restrict the oil flow down to 2 gal / min. (7.5 l/min) As you are turning the flow control valve, watch the pressure gauge and make sure it does not go over 5000 psi.(345 bar) Stop further adjustment immediately if the reading goes over this setting. Shut off the auxiliary hydraulic system and shut off the engine. Move to step 6 to make initial setting.

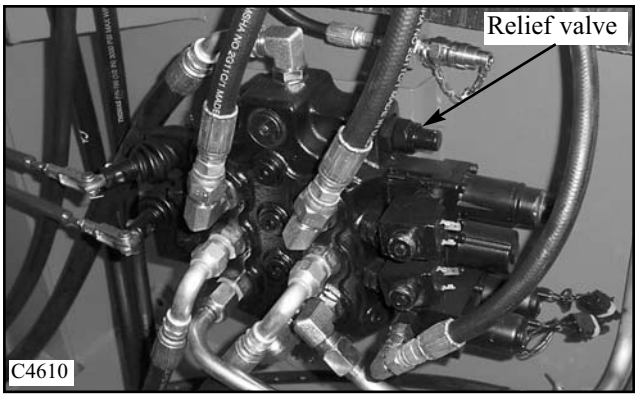
WARNING

To prevent personal injury or damage to the loader, do not adjust the relief valve while the engine is operating.









CONTROL VALVE 1.3

4 Repeat steps 2 and 3 if necessary. Allow the loader to operate at this setting until the oil temperature has increased to 160° F (71ºC), operating temperature.
5 Turn the flow control valve further to restrict the oil flow to no flow. (Zero) Correct pressure setting is 3000 psi +/- 100 psi. (207 bar, +/-6.9 bar)
6 If adjustment is necessary, shut down the auxiliary hydraulic system, shut off the engine and return the flow control valve to the open position. Locate the control valve in the engine compartment.
7 Loosen the jam nut on the relief valve adjusting screw and turn the screw clockwise, counting the turns, until the screw bottoms out. (fig. C4611)
8 Turn the screw back. Reduce the number of turns that you turned in to increase the pressure, increase the number of turns to decrease the pressure.
9 Retake the pressure readings by performing steps 2 through 5. If necessary make further adjustments by repeating steps 6 through 9.

NOTE: If adequate pressure and / or flow is not available, the gear pump could be failing, the intake to the gear pump is restricted, or the filter in the relief valve is clogged.

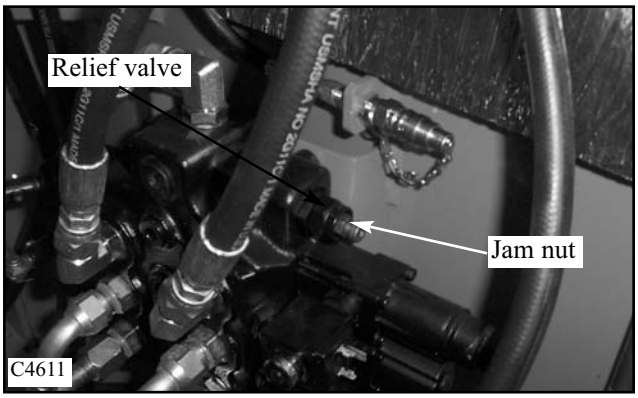
Control Valve Replacement

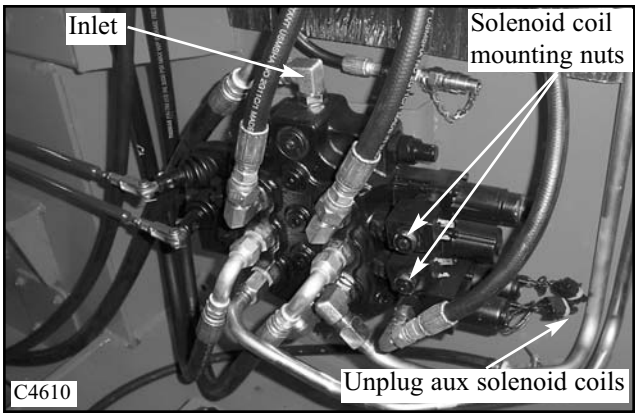
1 Remove any attachment and shut off the engine. Turn the key on with the safety devices activated so the pedals can be moved. Slowly jog both pedals and press the electric auxiliary switch. This will take any pressure out of the system. Open the rear door and remove the pins for the radiator / cooler assembly.

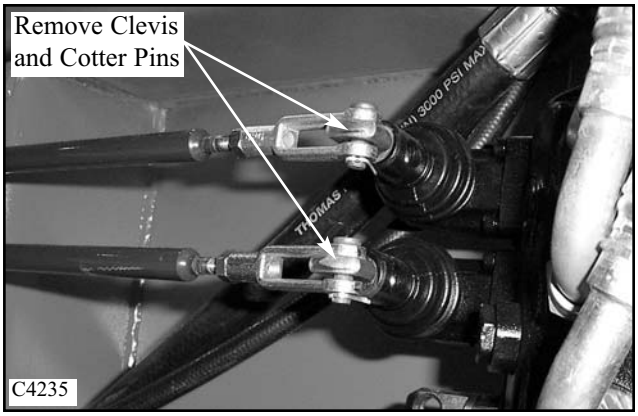
IMPORTANT

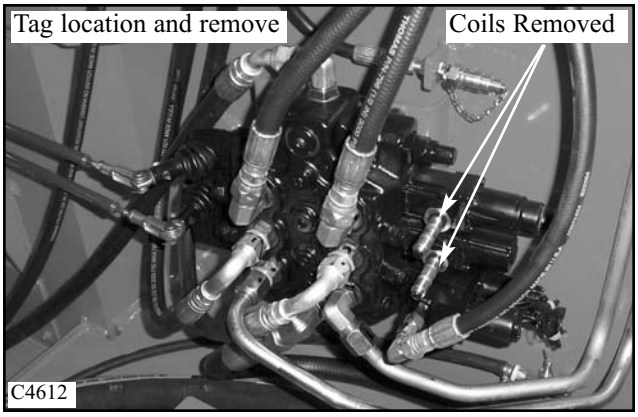
Clean the work area prior to repair. Cap all open lines, fittings and ports to prevent contamination.

2 Disconnect the control cables, electrical solenoid spool locks, and electrical auxiliary solenoid wiring connectors if equipped. (fig. C4235, C4612)
3 Disconnect the inlet hose coming from the gear pump. Cap the hose and fitting and remove the hydraulic fitting in the control valve. (fig. C4610)
4 Disconnect the 4 hoses going to the boom and bucket, disconnect the tubing going to auxiliary circuits. Marking the hoses and tubing as you remove them is recommended to ease re-assembly and ensure the circuits are functioning properly at restart.(fig. C4610)
5 Disconnect the accumulator line from the electric auxiliary circuit and remove the adapter fittings. Plug and cap all open ports and hose ends.









CONTROL VALVE 1.3

6 Disconnect the return line from the control valve and remove the adapter fitting. Plug and cap all open ports and hose ends. (fig. C4610)
7 Remove the 3 bolts holding the control valve to the mount and remove the control valve. (fig. C3438)
8 Remove any fittings left in the control valve. Cap all open ports to prevent contamination. Place these fittings in the new or repaired control valve. Be sure to check all fitting flares and o -rings for damage and replace as required.

IMPORTANT

Follow the hydraulic fitting torque chart in Section 1.10 when connecting fittings and lines.

9 Assemble the control valve to the loader in the reverse order above. Torque the bolts holding the control valve to the mount at 15 ft lbs. (20.4 Nm)
10 After all connections have been made, including the control valve electrical connections, check the oil level in the hydraulic reservoir and top off if necessary. (fig. C4506)

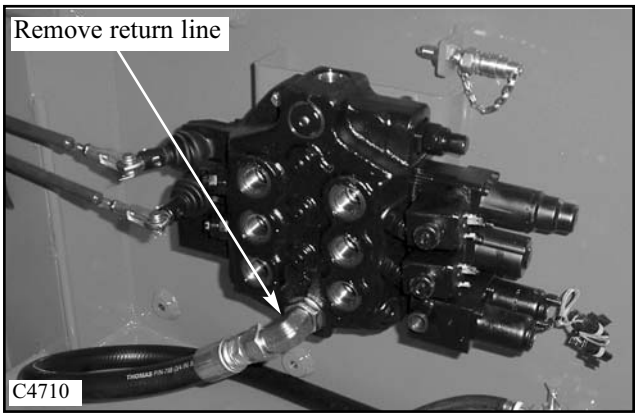
WARNING

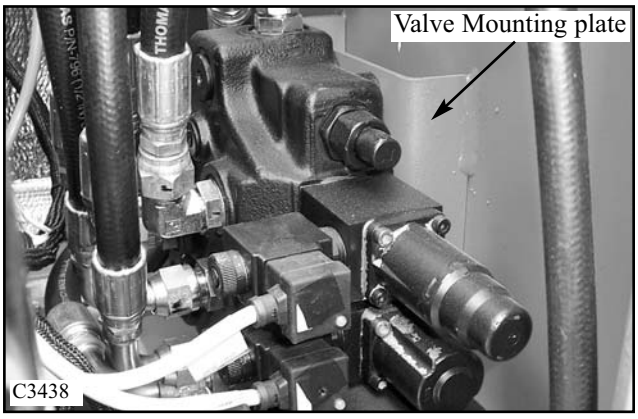
Use extreme caution when checking the hydraulic system for leaks. Fluid under pressure can penetrate the skin and cause serious injury.

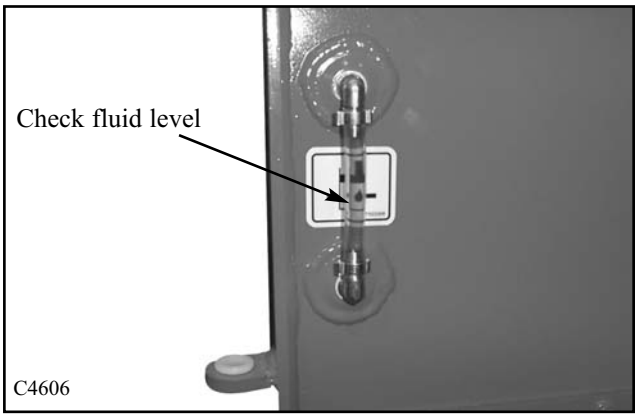
11 Start the engine and cycle the various hydraulic functions to check for leaks. Make sure the control valve lock system is functioning properly. Do not use your hands to check for leak locations, fluid under operating pressure can penetrate the skin and cause serious personal injury.
12 After checking for leaks, you must retest the relief valve setting as outlined on page 1-15 Testing and adjusting.

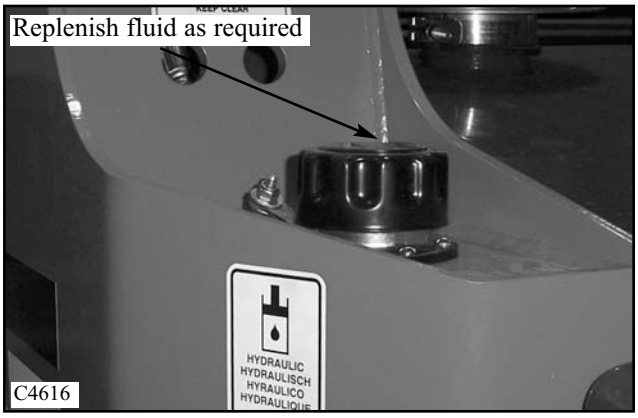
WARNING

All safety switches must be connected and functioning to prevent possible operator injury.









CONTROL VALVE 1.3

1

Control Valve Disassembly 250/255

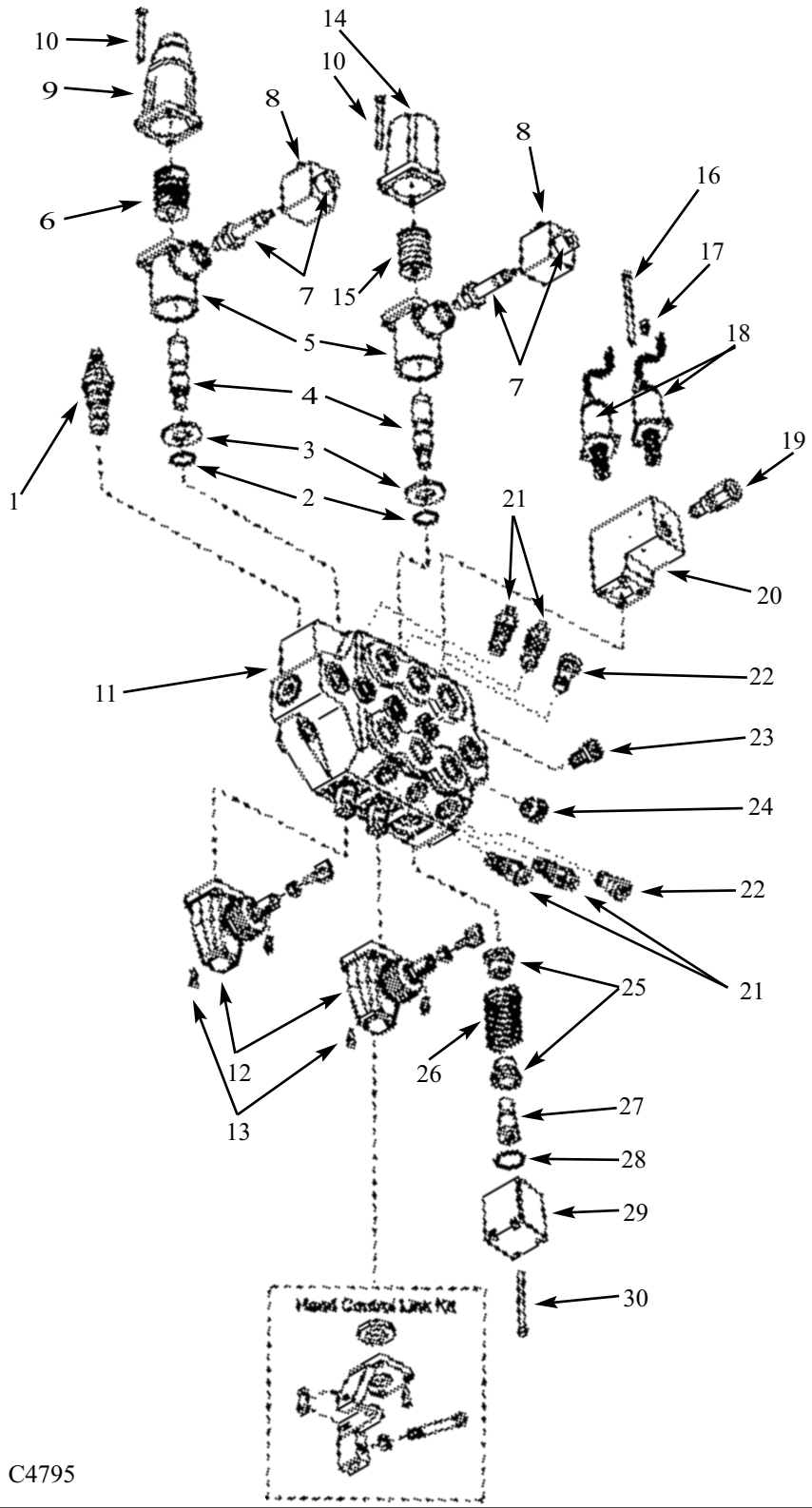


Diagram Legend

1. Main relief valve
2. O ring seal
3. Ring
4. Positioner kit joint
5. Positioner kit spacer
6. Lift positioner kit
7. Lock assembly
8. 12 VDC coil
9. Lift endcap kit
10. M5 x 65mm screw
11. Valve body
12. Lever box
13. M5 x 20mm screw
14. Tilt endcap kit
15. Tilt positioner kit
16. M5 x 80 mm screw
17. M4x 10 mm screw
18. 12 VDC pressure reducing solenoid valve
19. Joint
20. Control body
21. Anti cavitation valve
22. Port blanking plug
23. Load check valve
24. SAE 12 plug
25. Control bushing
26. Control spring
27. Control screw
28. O-Ring seal
29. Control endcap
30. M5 x 65 mm screw

Disassembly / Repair

Before disassembling the hydraulic control valve, clean the body with a suitable solvent and dry with compressed air. (fig. C3696)

WARNING

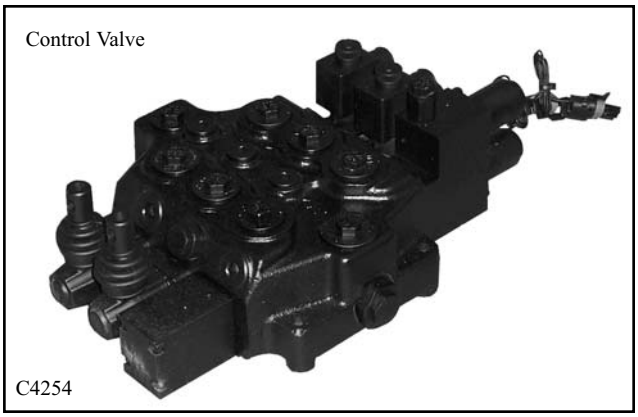
To avoid eye injury, use safety goggles when cleaning with compressed air.

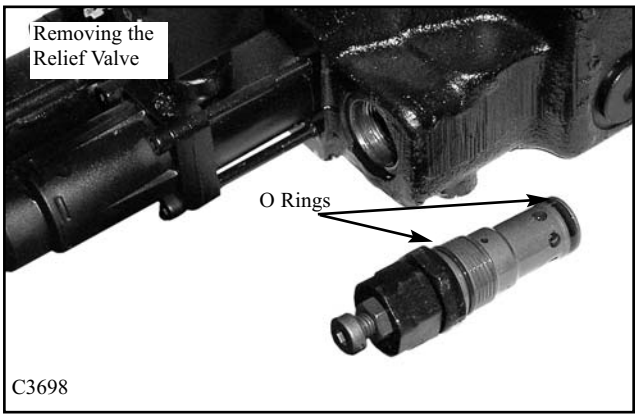
Ensure all openings are plugged to prevent solvents and dirt from contaminating the control valve assembly.

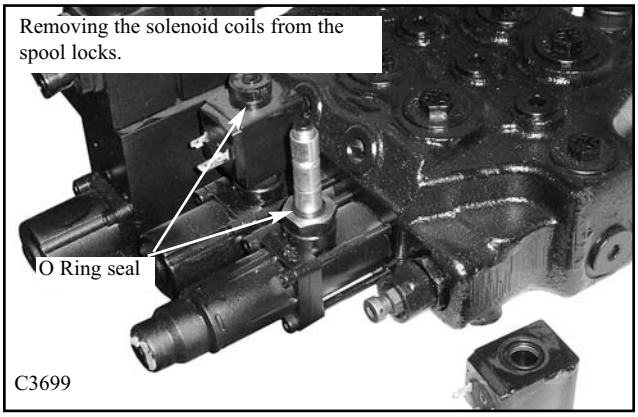
1. Remove the pressure relief valve. Discard the O-rings. (fig. C3698)

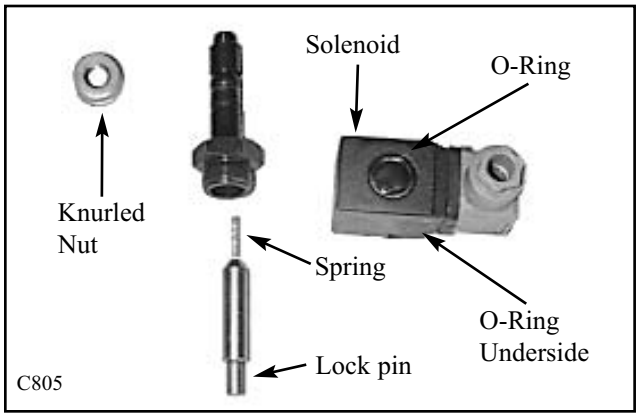
2. Remove the solenoid coils and locking pin from the valve lock block. (fig. C3699, C805) There are 2 O-ring seals located on either side of the solenoid coils.

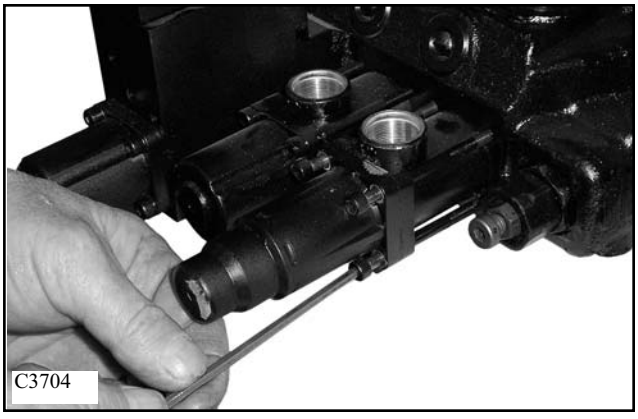
3 Remove the spring return detent kit and spring center cap locks. (fig. C3704, C3706)





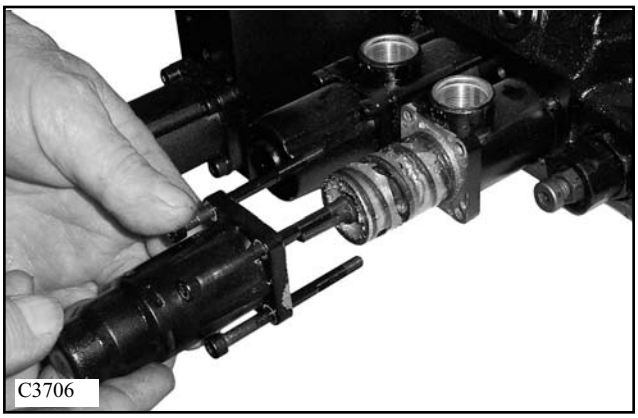




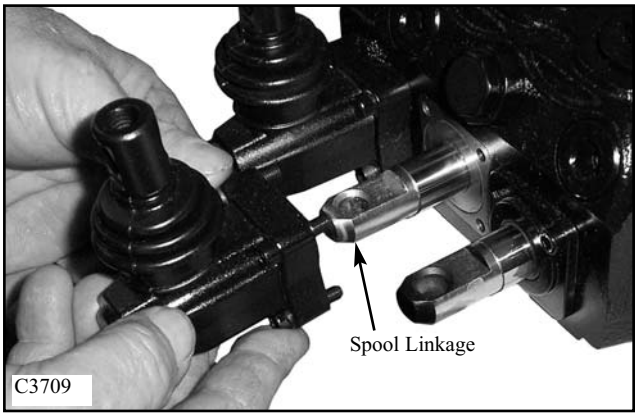


CONTROL VALVE 1.3

Disassembly / Repair (cont'd)

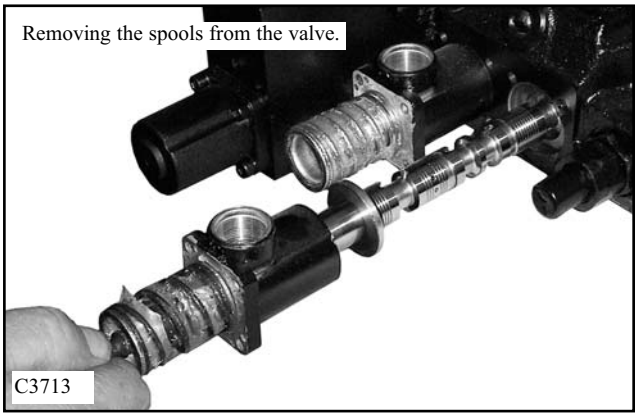

C3706

4 Remove the control box from the spool linkage end. (fig. C3709) The box needs to be tilted upward towards the valve to release the hardened ball from the hole in the spool end, and then pull away from the valve.

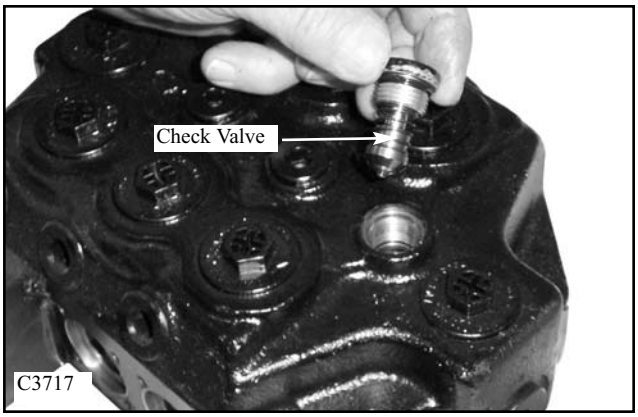


C3709

5 Pull out the spool. (fig. C3713) As you pull out the spool, note it's smooth action as it comes out of the valve body. The spool should move freely and smoothly in the bore of the valve body. Check the control valve spool and bore for scuff marks or abnormal wear. Replace the spool and or control valve if signs of wear are present.


Removing the spools from the valve.
C3713

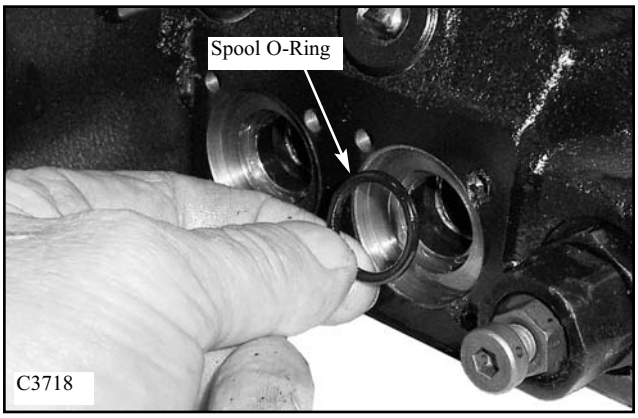
6 Remove the check valves from control valve body. (fig. C3717) They are located between the ports of each section. Check the seat and poppet of the valve body and check valve.



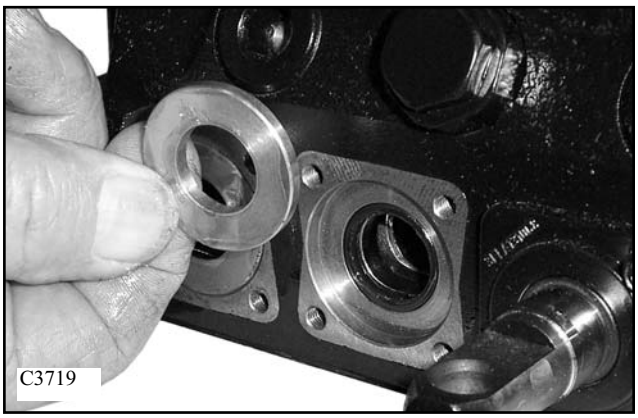
C3717

Disassembly Repair (cont'd)

7 When replacing the spool to the control valve, use new O-ring seals and apply system oil to the O-rings and spools. (fig. C3718).



8 Fit the seal washer to the control valve with the beveled side of the washer facing the control valve. (fig. C3719) Fit the spool to the control valve now if repairs are not needed to the detent or spring return mechanism. Use system oil to lubricate the spool before inserting to the control valve.

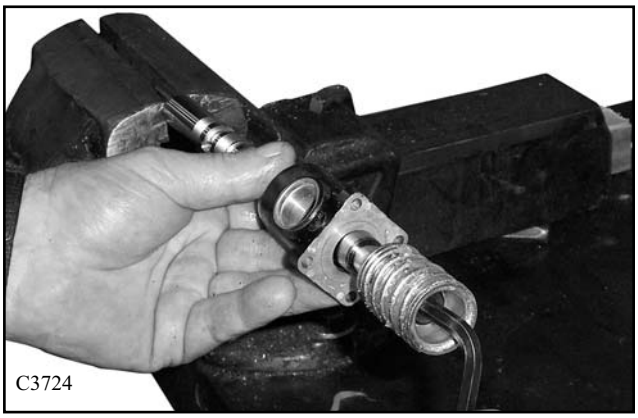


9 Place the cable end of the spool in a vice, or insert a screw driver through the clevis pin holes, to keep it from turning. The detent is threaded to the spool and can be removed for inspection or repairs.(fig. C3724)

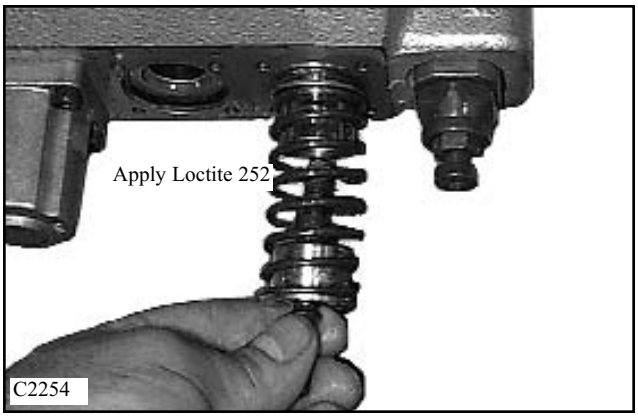
Replace broken springs, worn detents and / or damaged detent balls with a new detent kit.

Apply Loctite 542 to the threads of the detent when installing to the spool.

Apply Castrol "Spheerol" TN grease to the inside of the spring cover.



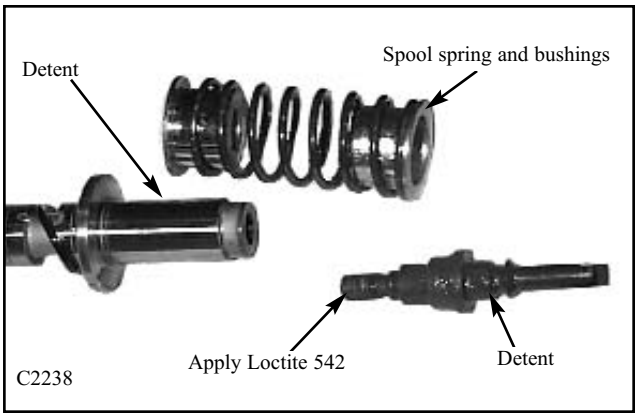
10 When installing the detent to the control valve spool, apply Loctite type (542) to the threads. Tighten the detent to the spool at 17 ft lbs (24 Nm). (fig. C2254)



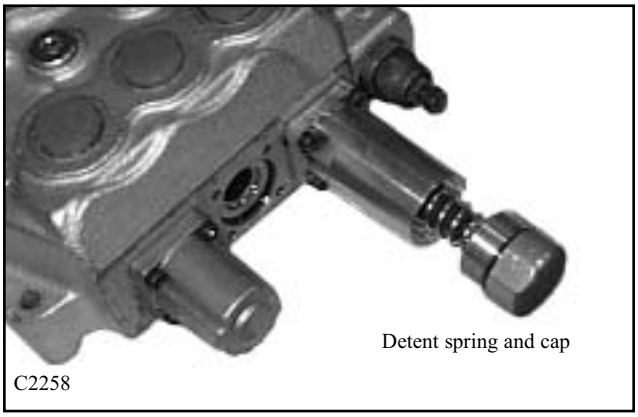
CONTROL VALVE 1.3

Disassembly / Repair (cont'd)

11 Install the spring return / centering cover and tighten the mounting screws evenly to 5 ft lbs (6 Nm). Install the end cap to the cover and tighten to 7 ft lbs (9.8 Nm). (fig. C2258)

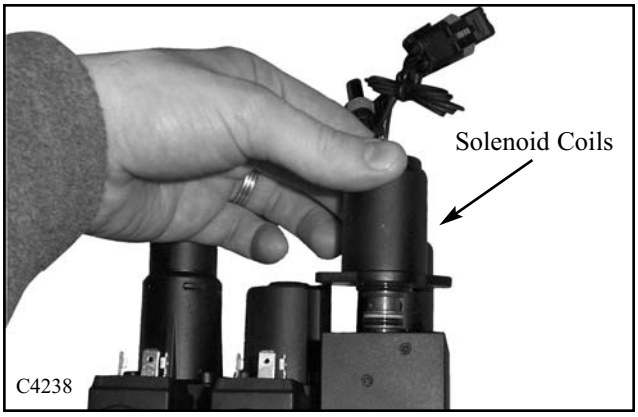


12 Install the spring return / centering cover and tighten the mounting screws evenly to 5 ft lbs (7 Nm). Install the end cap to the cover and tighten to 7 ft lbs (10 Nm). (fig. C2258)

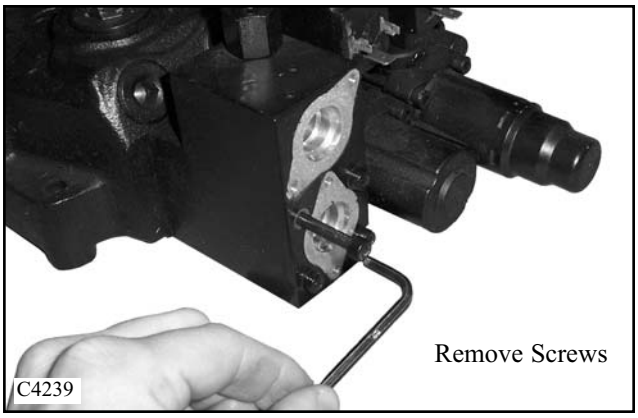


Solenoid Controlled Auxiliary

1 Remove the screws retaining the solenoid coil. Remove the12 VDC solenoid coils. (fig. C4238)
2 Inspected the O ring on the solenoid coils for damage. Replace if necessary.

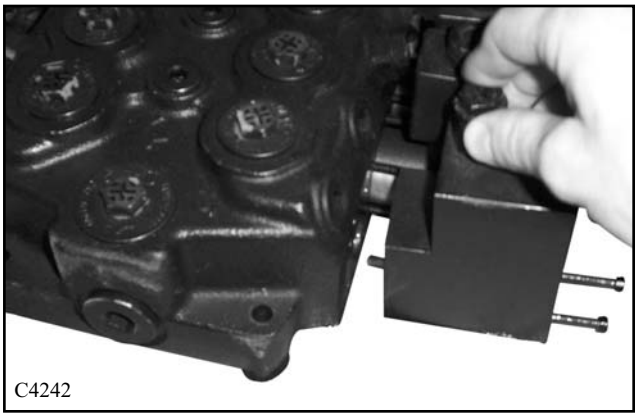


3 Remove the screws retaining the solenoid assembly to the control valve. (fig. C4239). Upon assembly tighten the screws to 5 ft lbs (7 Nm).

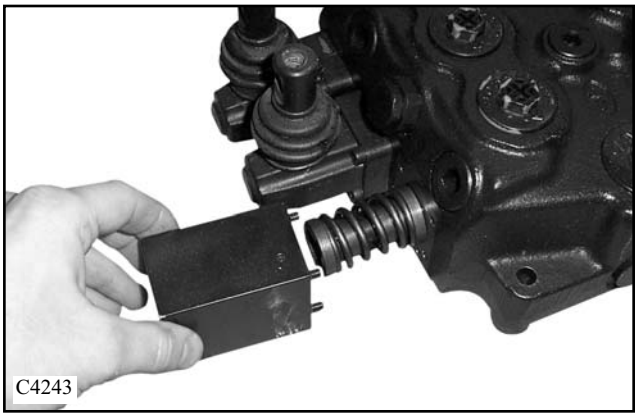


Disassembly / Repair (cont'd)

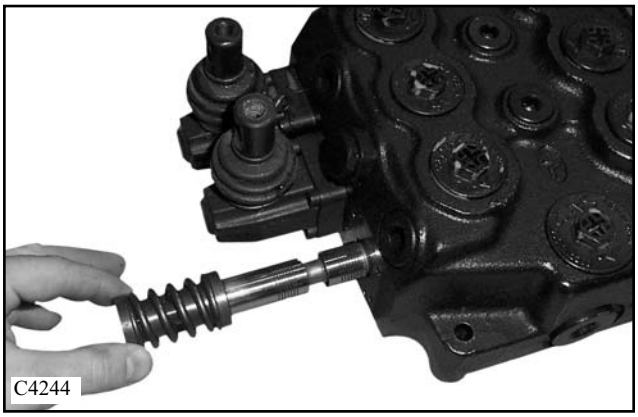
4 Remove the solenoid assembly from the control valve. (fig. C4242)


C4242

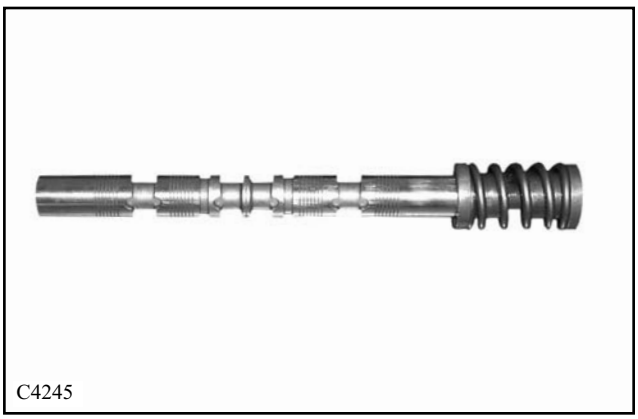
5 Remove the screws and the bottom end cap from auxiliary section.(fig.4243) Upon assembly torque the screws to 5 ft lbs (7 Nm)


C4243

6 Remove the solenoid spool assembly from the control valve. (fig. C4244) Note the effort required to remove the spool from the spool bore. It should come out smoothly without binding or "snagging" throughout it's travel.


C4244

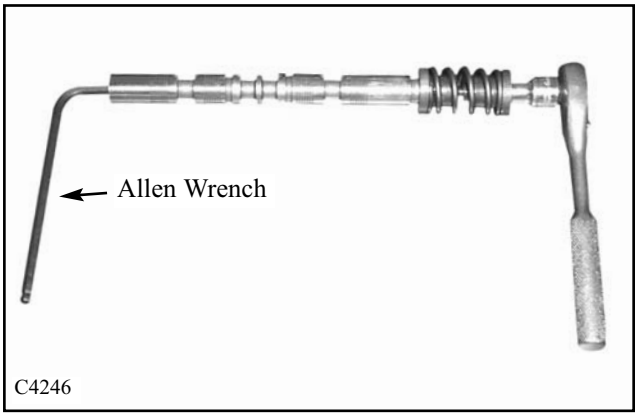
7 Inspect the spool and spool bore for abnormal wear. (fig. C4245) Replace the spool and / or the control valve if large scratches or indentations are present in the spool or spool bore. Minor scratches can be removed from the spool with extra fine emery cloth.


C4245

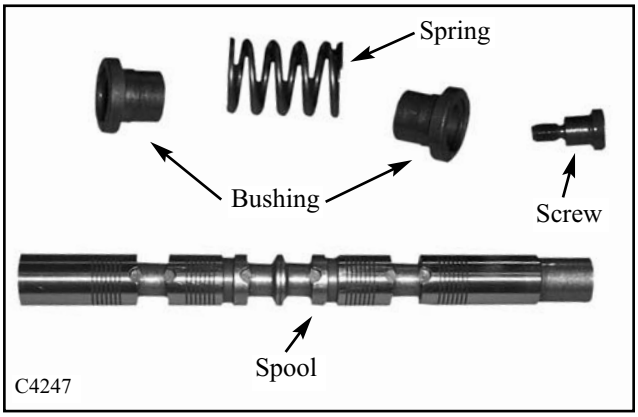
CONTROL VALVE 1.3

Disassembly / Repair (cont'd)

8 Hold the spool with a Hex allen wrench while removing retaining screw. (fig. C4246) Remove the spring and spring bushings from the spool assembly. (fig. C4247) When installing the spring assembly to the spool, apply Loctite 542 to the threads and tighten the screw to 18 ft lbs (24 Nm).

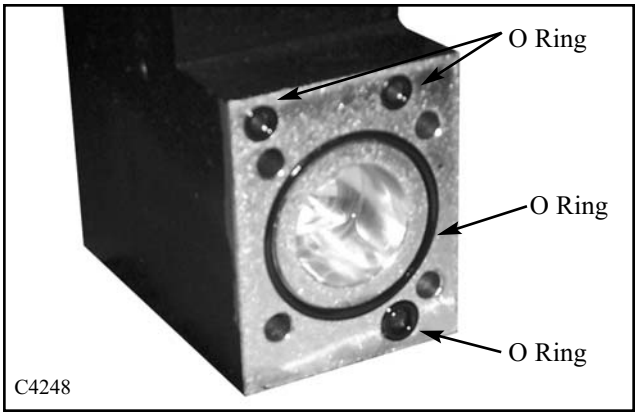


C4246

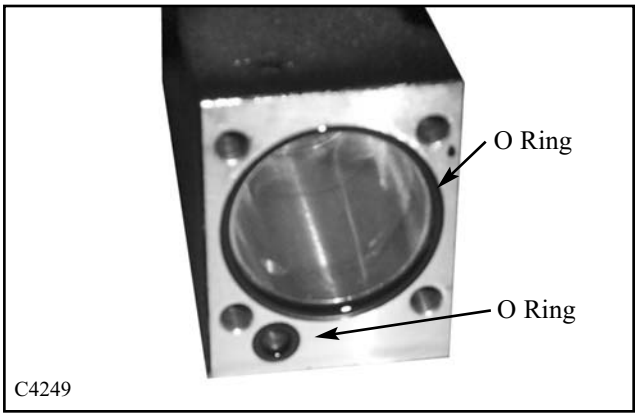


C4247

9 Upon assembly, use new O-ring seals. (fig. C4248) Don't over look the small O-ring seal between the cylinder and valve body. (fig. C4249) Lubricate the spool O-ring seals with system oil. Apply Castrol "Spheerol" grease to the inside of the spring covers.



C4248

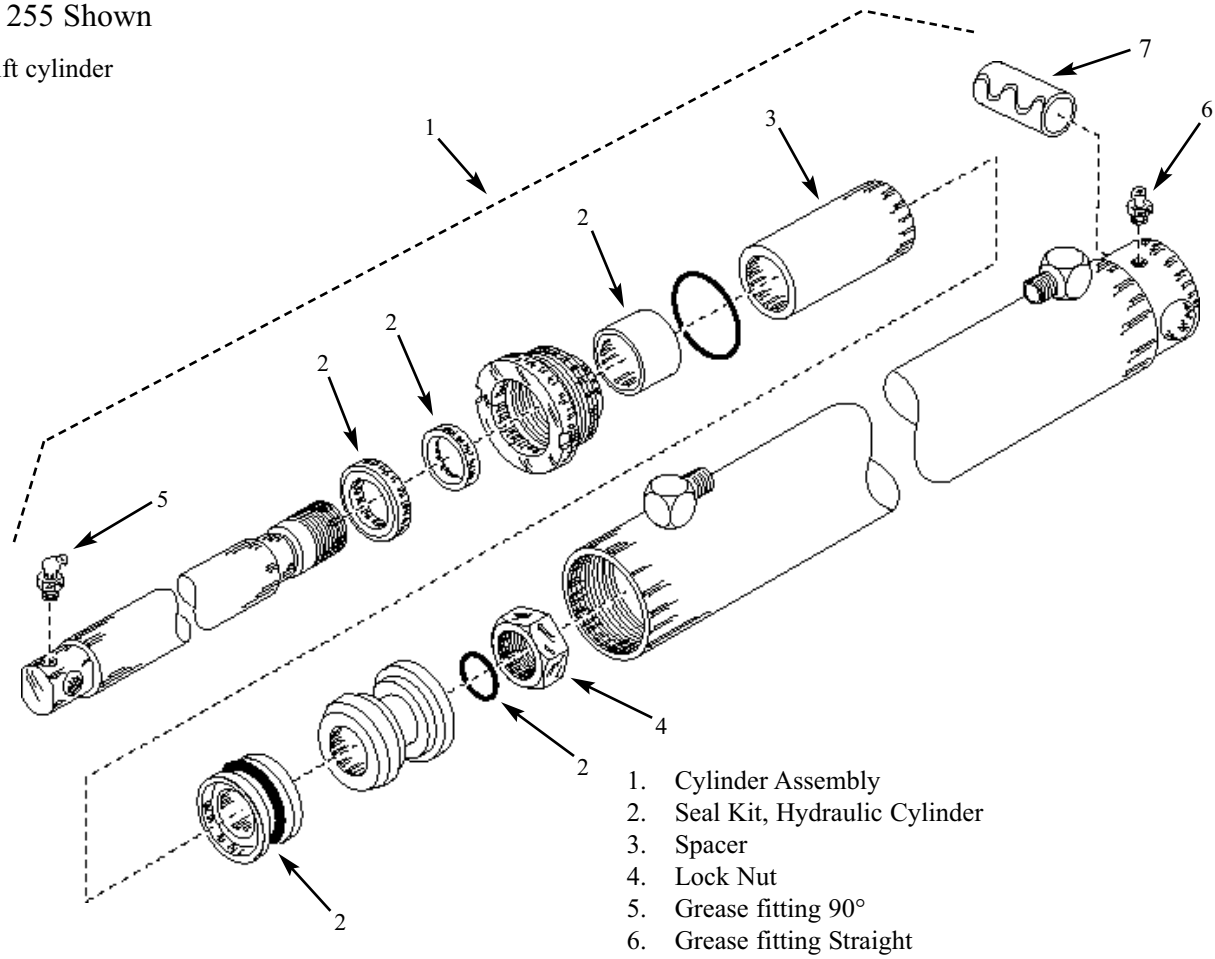


C4249

HYDRAULIC CYLINDERS 1.4

T 255 Shown

Lift cylinder



C2783

1. Cylinder Assembly
2. Seal Kit, Hydraulic Cylinder
3. Spacer
4. Lock Nut
5. Grease fitting 90°
6. Grease fitting Straight
7. Hardened Bushing

General Information

All cylinders are a double acting, designed to extend and retract under pressure.

The piston rods, which are made of high strength distortion free material, are precision ground and hard chrome plated. The cylinder barrels are micro honed to close tolerance,straightness and smooth finish for long piston packing seal life.

All cylinders have a 2 piece piston assembly made of ductile iron and a polypac seal arrangement consisting of a piston seal and 2 wear rings.

The rod seal is a “U” cup design, with the “U” facing the pressurized oil.The rod wiper keeps foreign matter from entering the cylinder by wiping the rod clean as the cylinder retracts.

The gland nut seal is of an “O” - ring design. This seal keeps the oil from leaking around the gland nut and cylinder barrel threads.

Certain cylinders have spacers in them. These spacers are used to limit the stroke of the rod.

Some cylinders also have replaceable hardened bushings in the pivot areas that can be serviced when worn out.

Lift Cylinder Removal

WARNING

To prevent personal injury never repair or tighten hydraulic hoses while the engine is operating or the system is under pressure.

The following procedure will assist you in cylinder removal.
For removal of the boom cylinders:

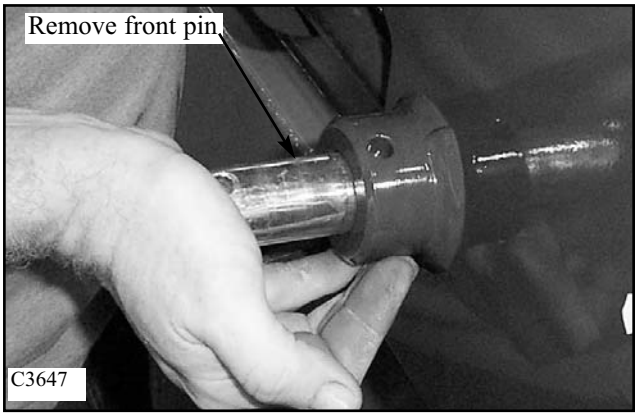
IMPORTANT

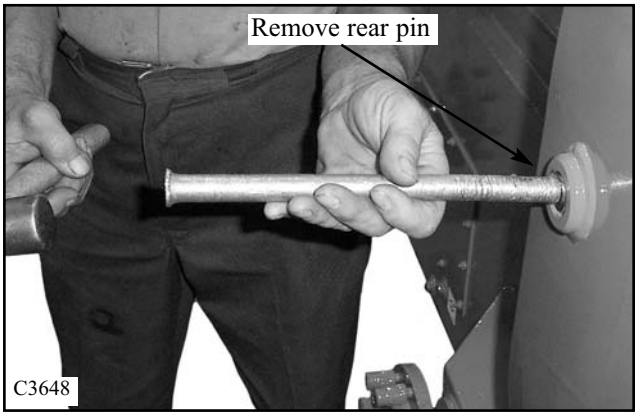
Cap all open lines and ports to prevent contamination.

1 Lower the boom arms, stop the engine and cycle the controls to relieve any hydraulic back pressure in the system. Lock the control in the float or detent position.
2 Remove the hydraulic hoses from the cylinder. (fig. C4613) Cap all open ports and lines to prevent contamination.
3 Remove the nylok nut and bolt from both mounting pins.
4 Remove the front pivot pin by pushing the pin out from behind the boom arm, out toward you. (fig. C3647)
5 Remove the rear pin using the appropriate punch and hammer to prevent brooming of the pin. (fig. C3648) Brooming the pin makes it difficult to remove.
6 Remove the cylinder from the loader.
7 Upon replacement, inspect the pivot pins and cylinder bushings for any wear. Replace if necessary. Reverse order above for installation.
8 Upon start up, check for system leaks and replenish the hydraulic reservoir as required.

WARNING

Use extreme caution when checking the hydraulic system for leaks. Fluid under pressure can penetrate the skin and cause serious injury.





Tilt Cylinder Removal

For tilt cylinder removal:

1 Lower the boom arms, remove any attachment and extend the tilt cylinders. Shut off the engine and cycle the controls to relieve excessive back pressure in the hydraulic system.(fig. C3649)

2 Loosen or remove the hydraulic clamps on the hoses under the boom arm step. (fig. C3441) Loosen the hoses under the boom arm step. Use a container to catch any waste oil to prevent environmental contamination.

3 Remove the hydraulic hoses from the tilt cylinder. Plug and or cap all open ports or lines to prevent contamination. (fig. C4615)

4 Remove the nylok nuts from the bolts retaining the pivot pins to the loader and remove the bolts.

5 Remove the pivot pins by tapping out with a brass drift pin. (fig. C3646)

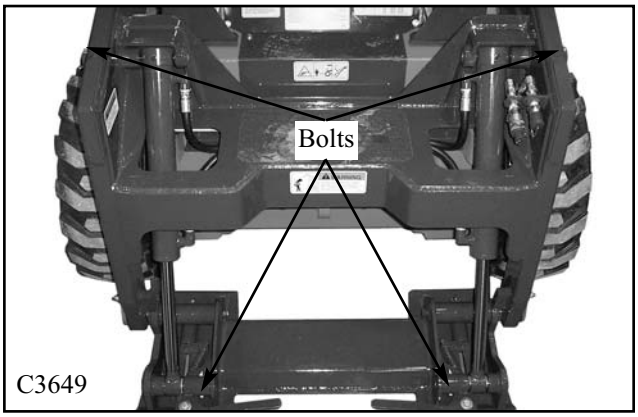
6 Remove the cylinder from the loader.

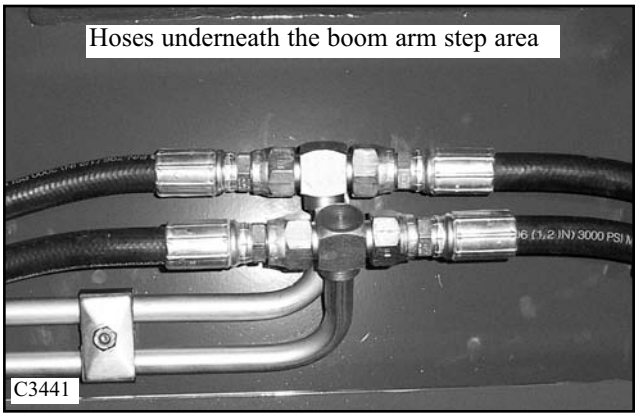
7 Upon reassembly, inspect the pivot pins and bushings for wear and replace as required. Reverse order for cylinder installation.

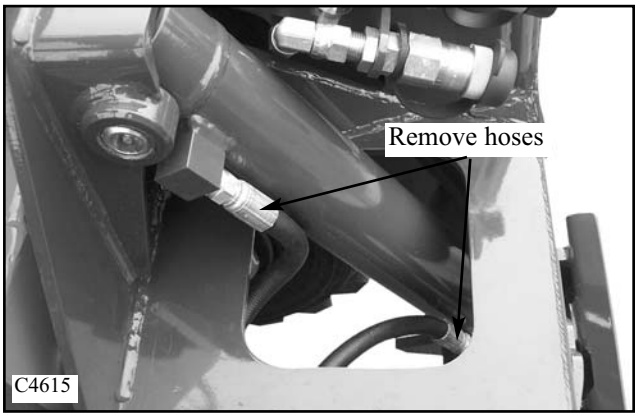
8 Upon start up, check for system leaks and replenish the hydraulic oil reservoir as required.

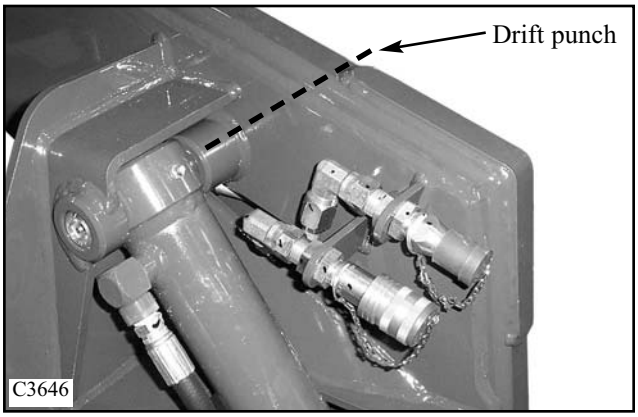
WARNING

Use extreme caution when checking the hydraulic system for leaks. Fluid under pressure can penetrate the skin and cause serious injury. Never tighten or repair hydraulic lines while the engine is operating.









Testing the Piston Seals

Before performing this test, ensure the control linkages are not binding and the hydraulic control valve spools are centering in the neutral position. Check the hydraulic circuit for external leaks. These conditions will give the same symptoms as a worn piston seal. If the cylinders under pressure are sluggish or stop functioning, this would indicate that oil is leaking by the cylinder piston seal. The following test can be performed to check the cylinder piston seal.

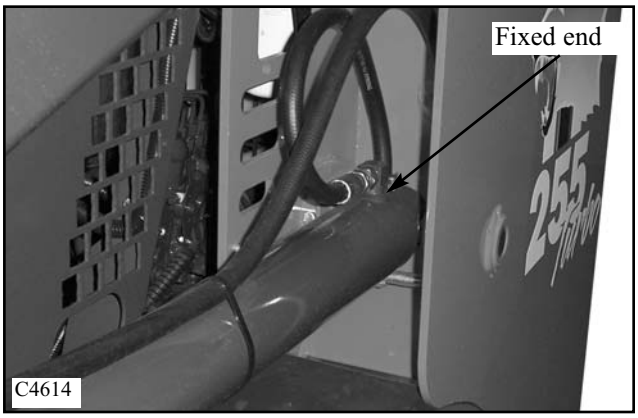
IMPORTANT

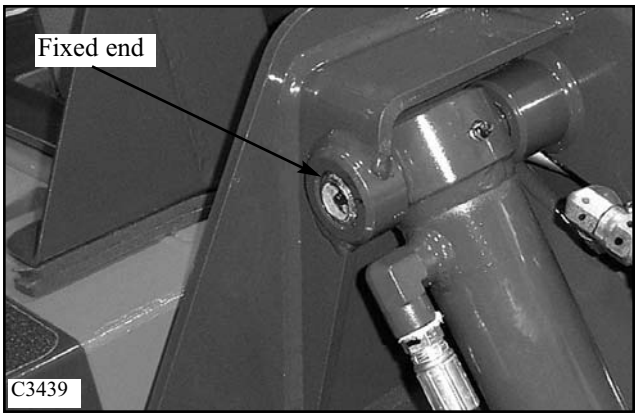
Allowable boom or bucket cylinder drop: 1.5" in 3 minutes, @ loaded rating and operating temperature.

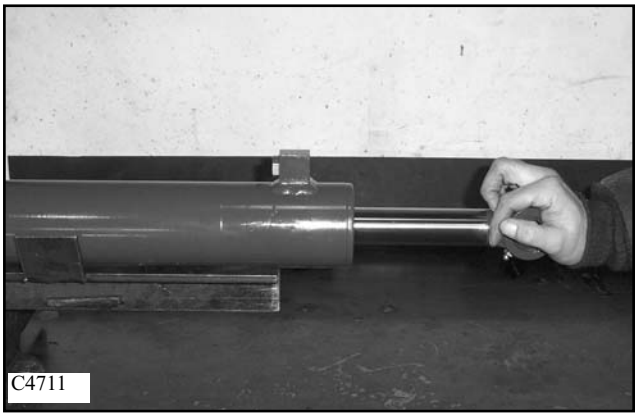
WARNING

Use extreme caution when checking the hydraulic system for leaks. Fluid under pressure can penetrate the skin and cause serious injury.

1 Retract the cylinder(s) to be tested. Shut off the engine and cycle the controls to release the hydraulic pressure. Have a container can ready to catch any waste oil to prevent environmental contamination.
2 Disconnect the hoses from the cylinder to be tested. Cap the hose with a plug to prevent contamination.
3. Disconnect the cylinder to be tested as outline on page 1-26 or 1-27.
4. Place the base or fixed end of the cylinder in a vice or support to hold the cylinder.
5. Extend the cylinder ram about 6 ~ 8". Fill the fixed end cylinder port with hydraulic oil using a funnel.
6. Cap both ports with a 3/4 JIC steel cap to prevent system pressure from escaping.
7. Apply pressure using your hand to the ram.
8. Monitor the movement of the ram. If the ram slowly retract back to it original position, then the seals are bad and need replacement. If the cylinder stays extended then you may need to check the load check valves or spool wear in the hydraulic control valve.
9. Repeat for all both pairs of cylinders.



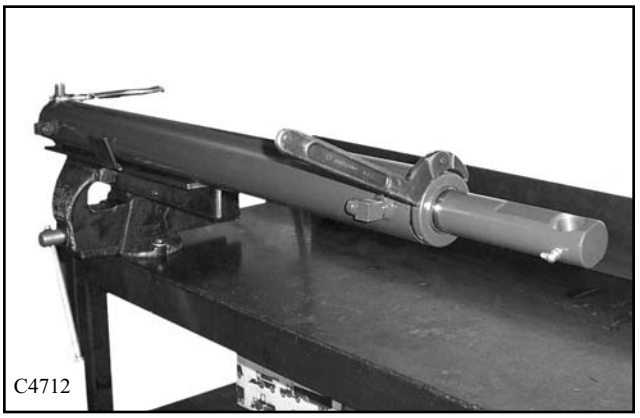


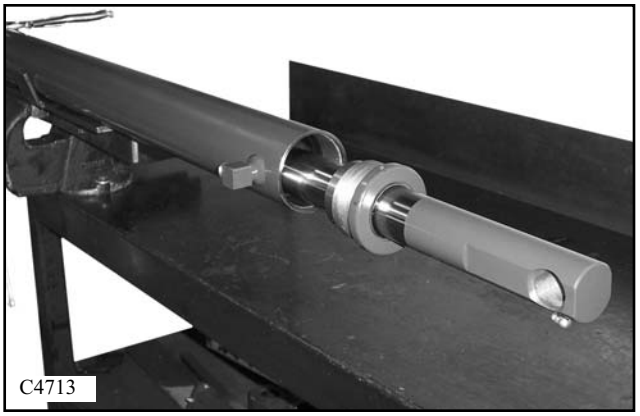


Cylinder Disassembly

Before Attempting repairs to the hydraulic cylinder, clean the body with a suitable solvent. Ensure all openings are plugged to prevent solvent from entering the cylinder.

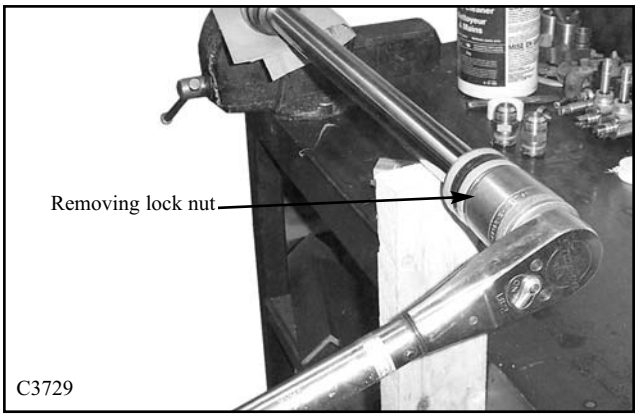
1 Remove the cylinder as outlined previously.
2 Place the base end of the cylinder in a vise or on a pin held in the vice and support the front end of the body. Remove the plugs from the hose ports. (fig. C4712)
3 Loosen the gland nut from the cylinder barrel using a spanner wrench. The gland nut threads are coated with loctite bonding agent at time of assembly. It may be necessary to apply heat to the gland nut and cylinder barrel threaded area, with a torch, to ease removal. (fig. C4713)


C4712


C4713

4 Remove the gland nut, rod and piston seal assembly from the barrel. (fig. C3726)

5 Place the cylinder rod bushing end in a vise or on a pin held in a vice and remove the lock nut from the rod. (fig. C3729)

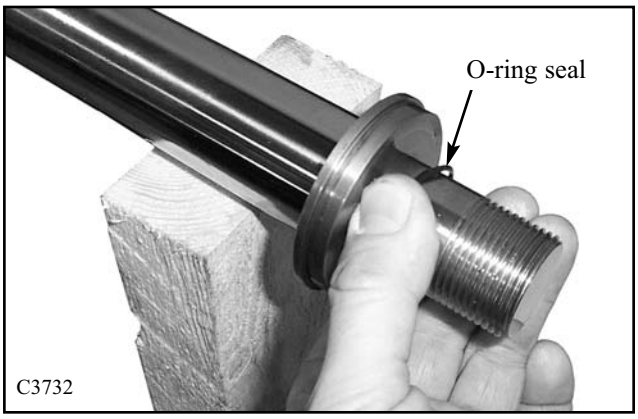


C3729

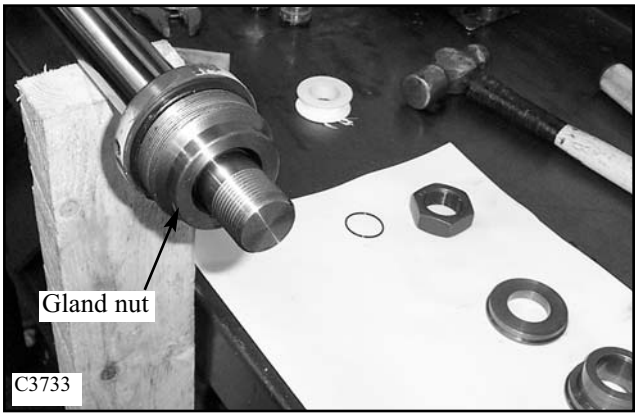
6 Remove the 2 piece piston assembly from the rod. (fig. C3731)
7 NOTE: Some piston assemblies rear piston parts are threaded onto the rod. You will need to use a spanner wrench to remove this type of rear piston.


C3731

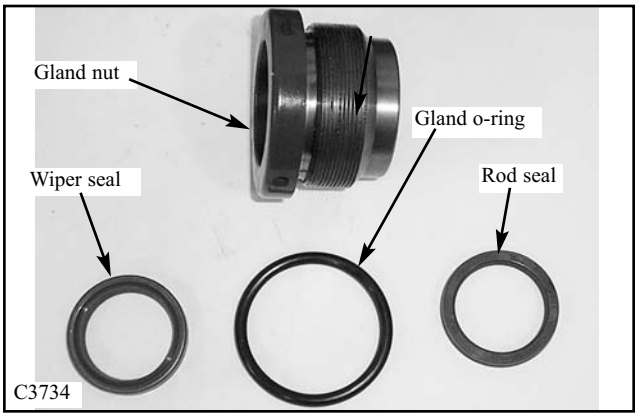
8 Depending on the design of the rear piston, non threaded type, remove and discard the o-ring seal from the end of the cylinder rod. (fig. C3732)



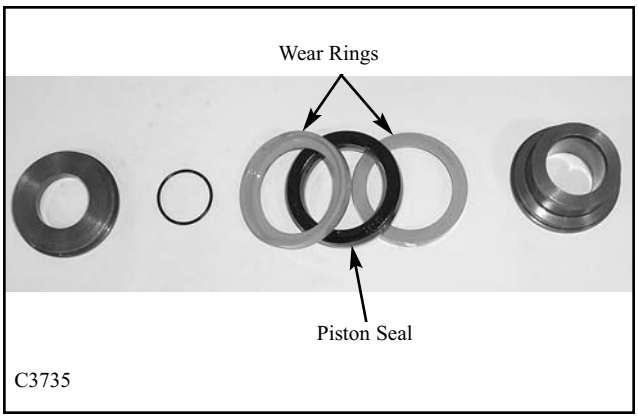
9 Remove the gland nut assembly from the cylinder rod. (fig. C3733)



10 Remove and discard the wiper seal, rod seal and o-ring seals and teflon back up washer, (if used), from the gland nut assembly. (fig. C3734) NOTE: Some seal designs may vary from illustration



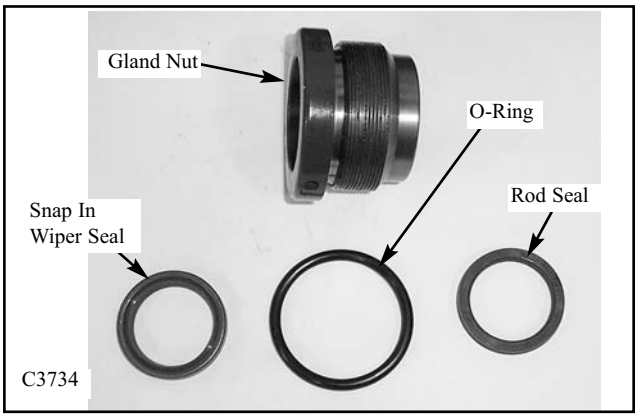
11 Remove and discard the wear rings and piston seal from the piston assembly. (fig. C3735)



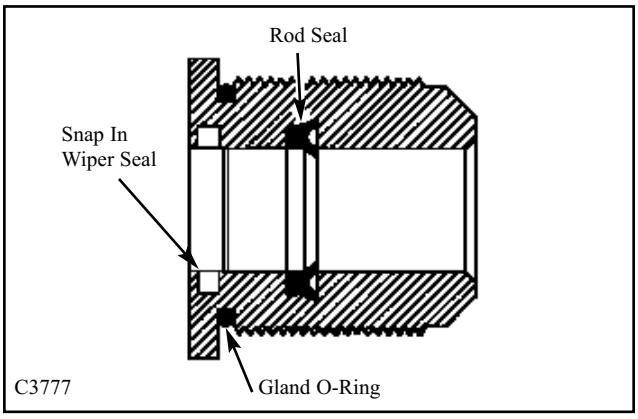
Cylinder Inspection

1 Inspect the cylinder rod for scratches, dents and other damage. Minor rod damage may be repaired using a fine abrasive. Major scratches or dents are not repairable and the rod must be replaced. The chrome surface must be intact to provide a rust resistant surface. Blemishes on the rod will damage the rod seal and wiper and will cause leaking after a short period of use.
2 Inspect the cylinder rod threads. The threads must be in good condition to withstand the high torque required to secure the piston assembly to the rod.
3 Inspect the gland nut for nicks, burrs or other damage. Minor damage may be repaired using a fine abrasive.

Smooth down edges that could damage seals and cause leakage.



4 Inspect the gland nut threads for damage.
5 Inspect the piston assembly for damage. Remove minor scratches or damage with a fine abrasive.
6 Using a suitable light, inspect the cylinder barrel bore for scratches, dents, burrs or any other damage. Replace the cylinder barrel if there is any evidence of damage.
7 Inspect the cylinder barrel threads for damage. The threads must be in good condition to withstand the high torque required to secure the gland nut assembly to the cylinder barrel.



Cylinder Assembly

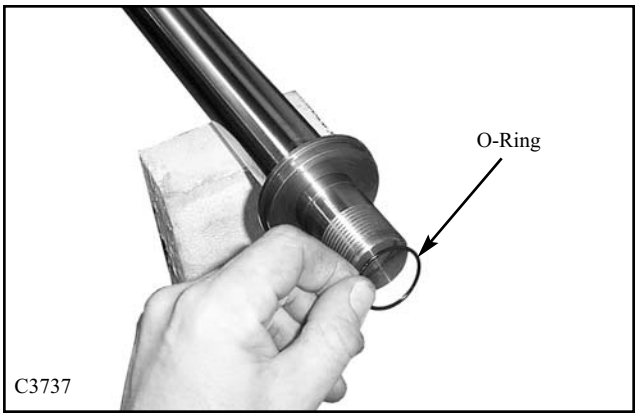
1 Install a new gland nut rod seal. Form the seal into an oval shape and place it into the gland nut, with the “U” side of the seal facing the barrel end, and slip the seal into the groove. (fig. C3734)

2 Install a new wiper seal in the gland nut. (fig. C3734, C3777)
3 Install a new gland nut o-ring seal. (fig. C3734, C3777)

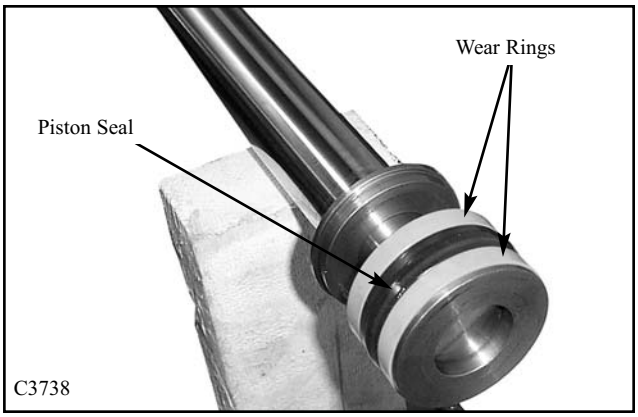
4 Apply system oil to the cylinder rod and assemble the gland nut assembly to the rod. (fig. C3736)

1

5 Install a new o-ring seal on the cylinder rod (if used). Some cylinder rods are fully threaded to accommodate a threaded type rear piston part.
(fig. C3737)

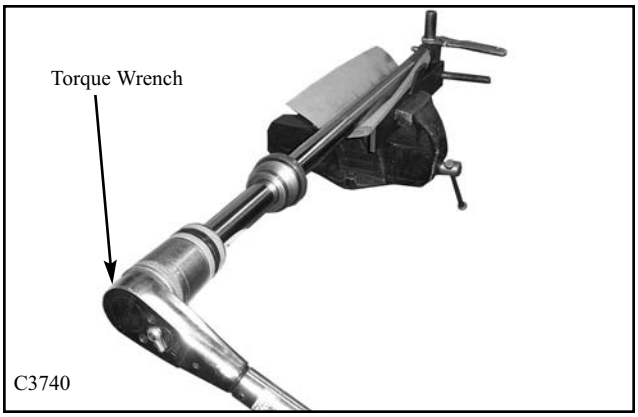


6 Install new wear rings and piston seal to the the 2 piece piston assembly. (fig. C3738)



7 Install the piston assembly to the cylinder rod. Some rear piston assemblies are threaded onto the cylinder rod. Use a spanner wrench to install the rear piston part to the cylinder rod. Torque the lock nut to the rod at 250-275 ft lbs (339-373 Nm). (fig. C3740)

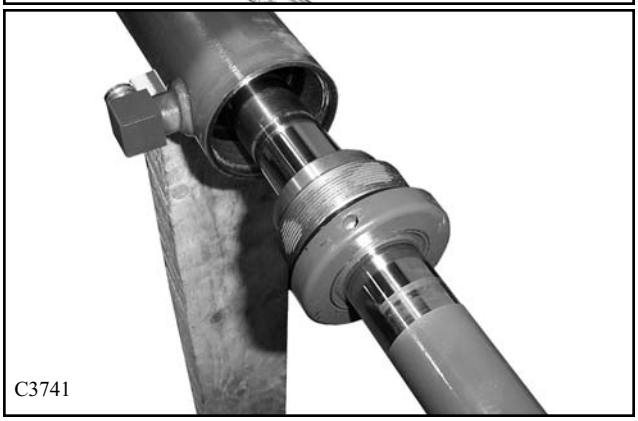
8 Make sure the inside bore of the cylinder barrel is clean. Lubricate the inside of the barrel with system oil. Do not get oil into the threaded area of the barrel.



9 Lubricate the piston seal assembly with system oil and install the cylinder rod and piston assembly to the cylinder barrel. (fig. C3741)

10 Apply loctite 242 to the gland nut threads and tighten the gland nut using a spanner wrench. Tighten the gland nut as much as you can using the spanner wrench. Make sure the threaded area of the gland nut and cylinder barrel are free of oil before applying the loctite bonding adhesive.

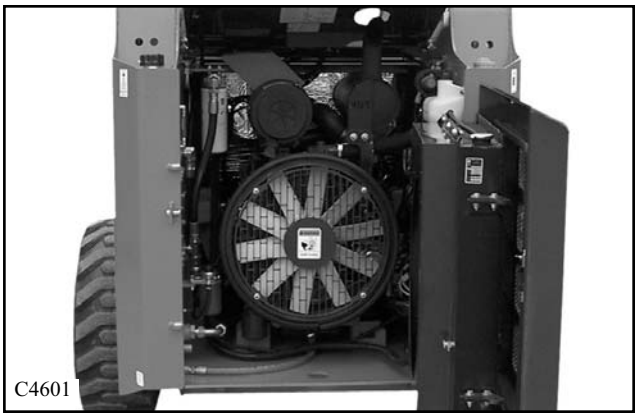
11 Assemble the cylinder to the loader.



HYDRAULIC OIL FILTER 1.5

General Information

The hydraulic oil filter is located in the engine compartment. Access the filter by opening the rear door, remove the pins from the engine cooler and open the cooler. Then lift the engine compartment cover open. The filter is mounted on the left side, on the hydraulic oil reservoir.
All oil returning from the control valve is cooled and then filtered before being used up by the hydraulic system. The hydraulic oil filter is a spin on type with a 5 micron rating. The filter material is a synthetic media which features an accordion pleated design to provide maximum filtration area. Only Thomas approved filters should be used.
The filter mounting head has a built in bypass valve that diverts oil around the filter when more than 25 psi (1.7 bar) differential pressure is required to force oil through the filter.


C4601


C3785

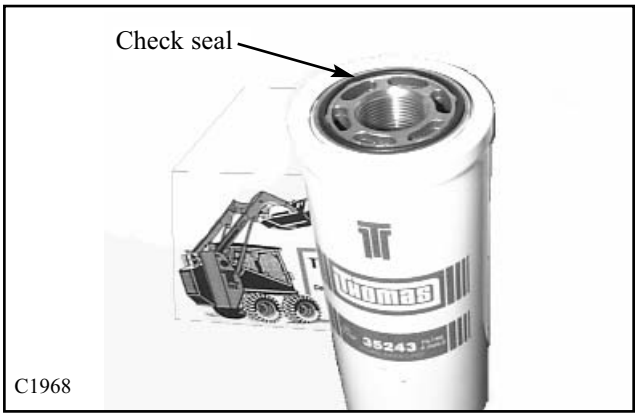
Filter Replacement

The hydraulic oil filter must be changed after the first 50 hours of operation and every 150 hours thereafter.

WARNING

Never repair or tighten hydraulic lines while the engine is operating or the system is under pressure.

1 Lower the boom arms, shut off the engine and engage the parking brake.
2 Open the rear door, engine cooler and raise the engine compartment cover to gain access to the hydraulic filter. (fig. C4601, C3785)
3 Clean the area of excess dirt if necessary to prevent contaminating the new filter when installing.
4 Remove the hydraulic oil filter using a proper sized filter wrench. Check to make sure the o-ring seal has come off with the used filter. (fig. C1968)
5 Lubricate the new filter seal with clean system oil.
6 Install the filter and fit hand tight.
7 After start up, check the system for oil leaks. Replenish the oil reservoir as required with API 10W30 class SJ. (fig. C4606, C4616)



C1968

C4606

C4616

HYDRAULIC OIL COOLER 1.6

1

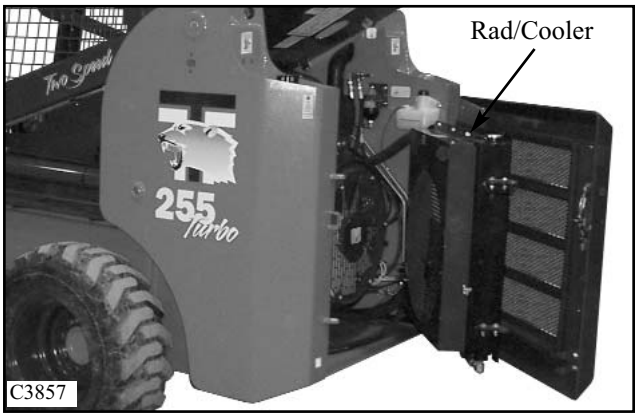
General Information

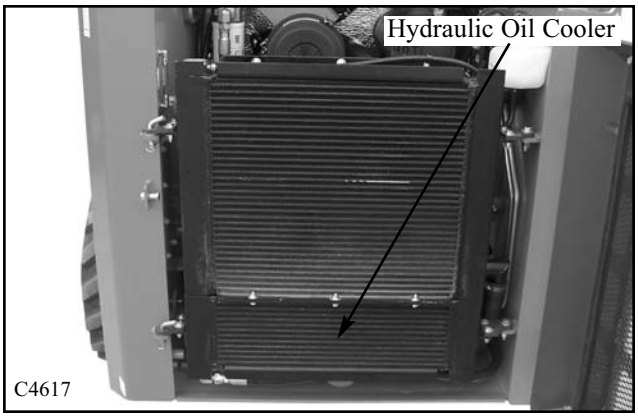
The hydraulic oil cooler is mounted to the rear of the loader frame (fig. C3857). The top section of the cooler is designed to cool the engine. The bottom section is designed to cool the hydraulic oil (fig C4617). The cooler will swing open towards the rear door to gain access to the engine shroud and most of the engine compartment. Oil returning from the control valve is circulated through the oil cooler before being sent on to other parts of the hydraulic system. An engine driven cooling fan drives air through the oil cooler when the rear door is closed. A combination of the cooler size and air flow gives the cooler a rating at 1250 BTU / minute.

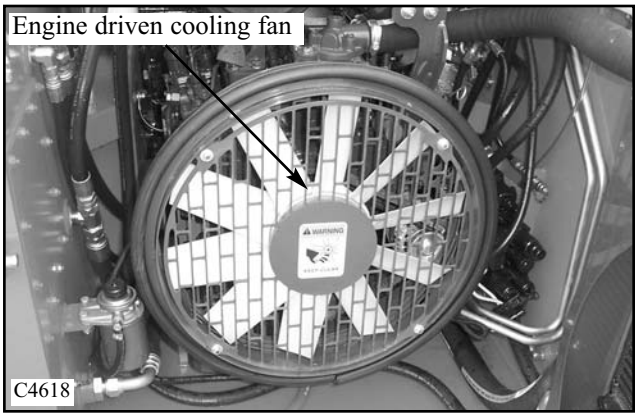
WARNING

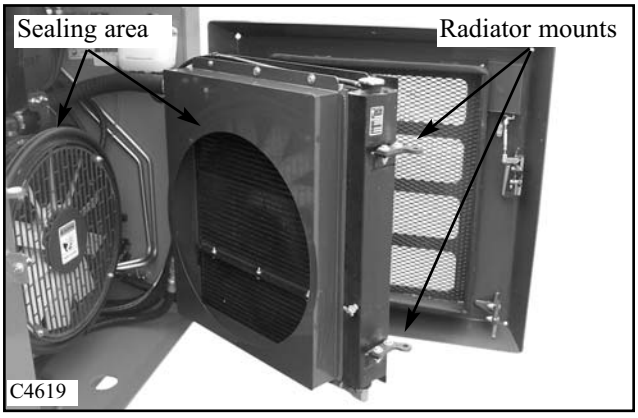
To avoid eye injury, always use safety goggles when cleaning with compressed air.

The oil cooler should be checked daily for dirt build up on the cooling fins. If air flow is restricted through the cooling fins, over heating of the hydraulic system may occur. Clean any dirt build up with compressed air. Flush with water if necessary. The oil cooler is surrounded by a shroud. The outer edge of the fan guard utilizes a sealing trim that presses against the engine shroud when the rear door is closed. This directs the air, driven by the engine cooling fan (C4618), through the engine cooler. The sealing trim should be checked at every service interval to ensure the proper seal. The shroud seal to radiator can be adjusted by loosening the two upper and two lower radiator mounting and moving the radiator back or forward. (fig. C4619).









HYDRAULIC OIL COOLER 1.6

Cooler Replacement

1 Lower the boom arms, engage the parking brake and shut off the engine.
2 Open the rear door, remove the cotter pins and rad pin in the upper and lower rad mounts. Swing open the rad/cooler to service the hydraulic oil cooler. (fig. C3857)
3 Loosen the 6 bolts for the engine shroud. Carefully remove the engine shroud making sure the sealing foam stays intact. (fig. C4619) It is important to keep a tight seal so the air from the cooling fan is directed through the cooler.

WARNING

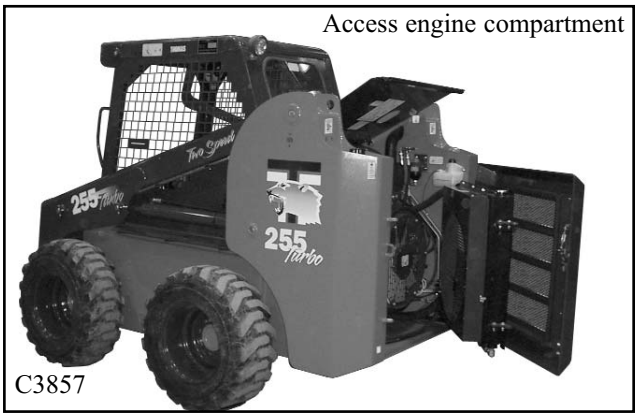
To prevent personal injury, do not attempt to lift heavy objects without assistance.

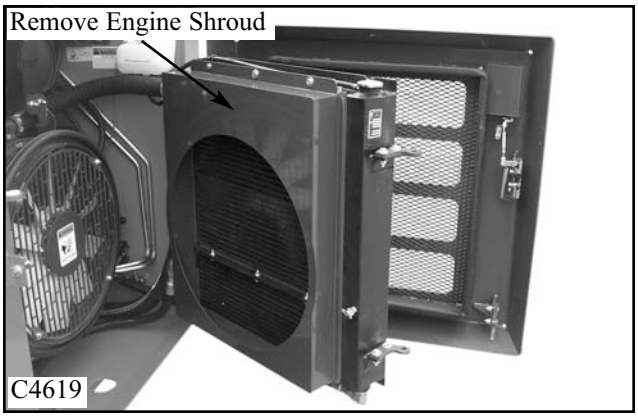
4 The rad / cooler is heavy (approx. 100 lbs) and will need some form of mechanical aid, such as a over head hoist to help service. Connect the hooks of the over head hoist in the top bolt holes. This will help support the upper rad while the oil cooler can be remove. (fig. C4620)
5 Connect a vacuum system to the oil reservoir filler location. Drain the hydraulic oil reservoir if a vacuum is not available. If the drain plug is removed, seal the threads with teflon tape or a liquid form of pipe sealant before reinstalling. Be prepared to contain 35 gal of fluid (133 liters). Use clean containers if the oil is to be reused.

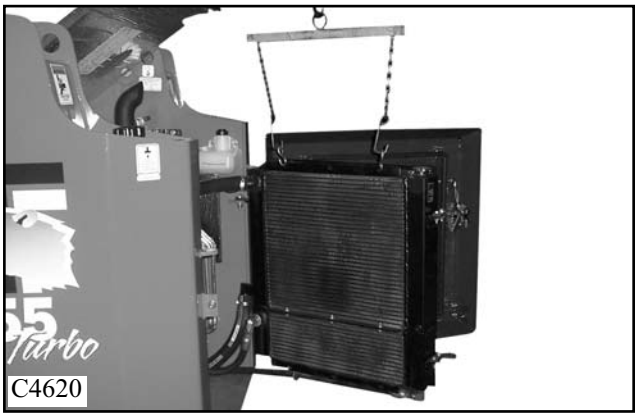
IMPORTANT

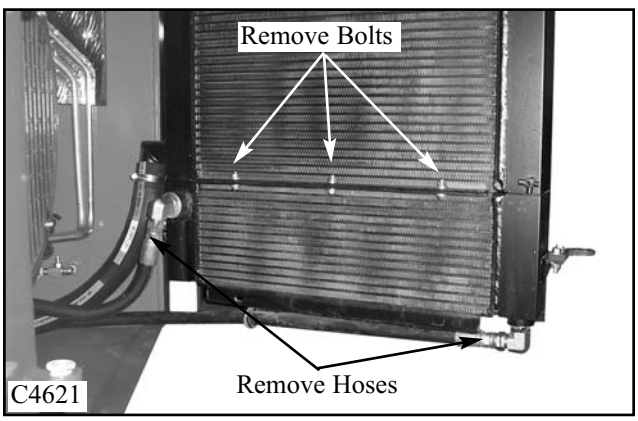
Cap all open lines and ports to prevent contamination.

4 Tag all hose locations and take note of the hose routing. Remove the cooler hoses. Plug the open hoses and cooler ports to prevent contamination. (fig. C4621)
5 Remove the 2 lower rad mounts the oil cooler.
6 Loosen the 6 bolts on the oil cooler. Support the oil cooler then carefully remove bolts and oil cooler. (fig. C4621)
7 Inspect the fitting o-rings for damage and replace if necessary.
8 Install the lower rad mounts, replace the fittings into the new or repaired oil cooler following the torque chart on section 1.10. Be sure to support the cooler as the fittings are tightened to prevent damaging the cooler.
9 Replace the cooler, cooler lines and cooler shroud. Replace the hose clamps for the bottom cooler hose and the overflow hose. Follow the torque chart on section 1.10 when tightening the hydraulic hoses.







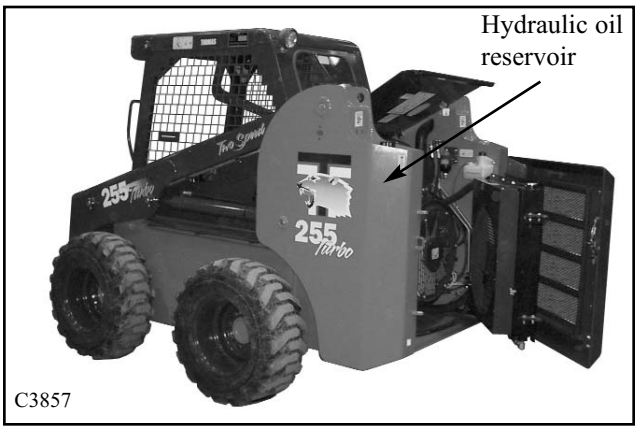


HYDRAULIC OIL RESERVOIR 1.7

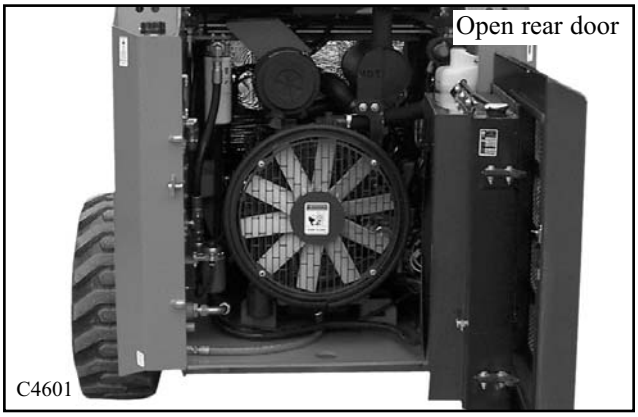
1

General Information

The hydraulic oil reservoir is located at the rear of the loader on the left hand side. (fig. C3857) The reservoir is completely separated from all chain and gear drives to eliminate contamination. A magnetic drain plug is installed in the bottom of the reservoir, and a magnet is attached to the 100 micron suction filter, to assist in removing metal particles from the oil.
Oil level is checked through a site gauge located just inside the engine compartment, left hand side, on the oil reservoir. The proper fill level is marked by a line and should be checked daily. (fig. C4606)
The oil reservoir fill cap is located at the top of the reservoir. (fig. C4616) The oil fill cap assembly has a 10 micron screen to catch larger particles of contaminant before entering the reservoir, but **always use oil filtered through a 5 micron min. filter for replenishing the hydraulic reservoir.** The oil fill cap is also a reservoir vent, or breather, and contains a 10 micron filter to remove air borne particles.



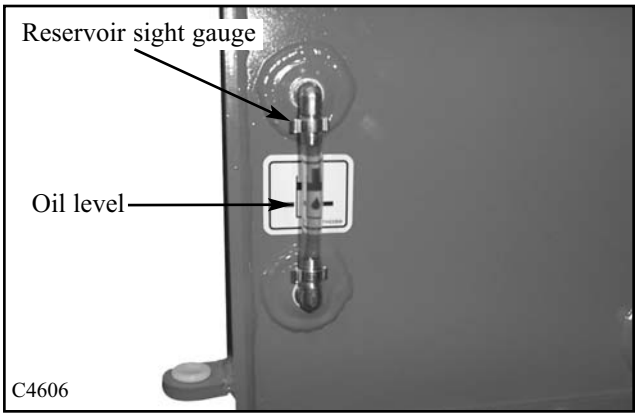
C3857



C4601

Checking The Oil Level

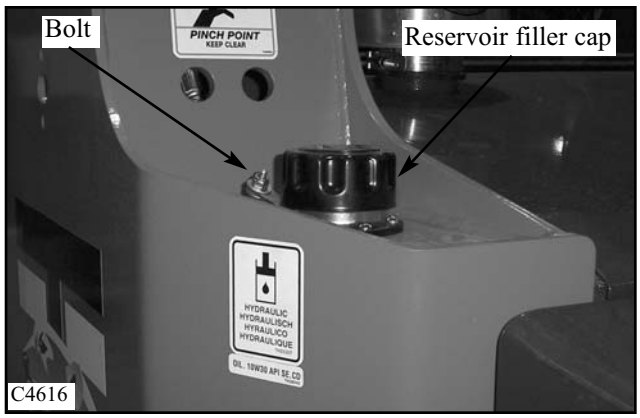
1 Check the reservoir oil level with the loader on level ground.
2 Lower the boom arms, retract the cylinders and engage the parking brake. Shut off the engine.
3 Open the rear door. Remove the cotter pins and rad pins in the upper and lower radiator mounts. Swing open the rad cooler to access the engine compartment (fig. C4601)
4 Check the oil level in the sight gauge. (fig. C4606)
5 If oil is visible approximately mid way in the sight gauge, the level is correct. The correct level is marked with a line from the factory.



C4606

Adding Oil

1 Remove the bolt, or lock, on the reservoir filler cap.
2 Open the filler cap. (fig. C4616)
3 Inspect the filler screen in the filler neck for damage. If the filler screen is damaged, replace it.
4 Using a clean container, add 10W30 API class SJ.
5 Replace the filler cap and replace the bolt, or padlock, in the cap to prevent vandalism.



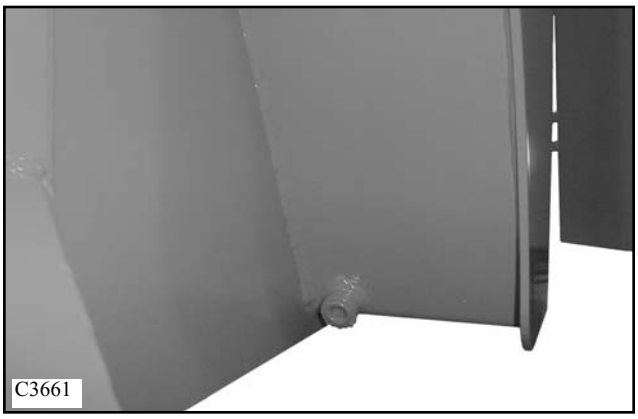
C4616

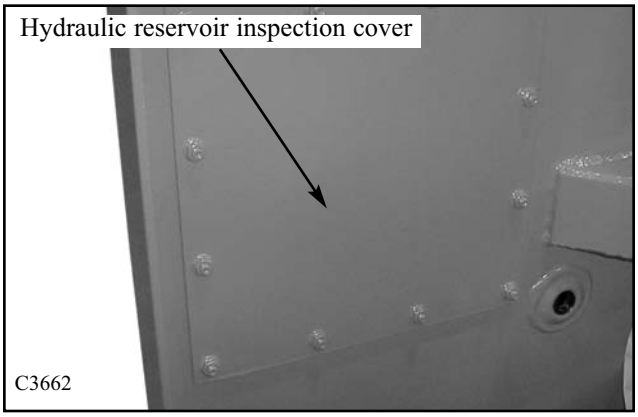
HYDRAULIC OIL RESERVOIR 1.7

Servicing The Oil Reservoir

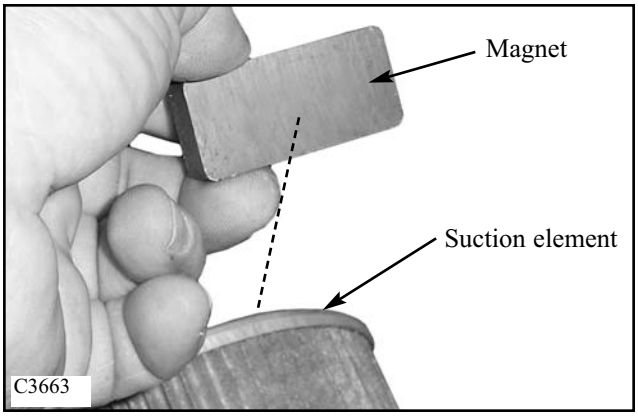
Change the hydraulic oil, change the suction screen element and clean the magnet in the tank after every 1000 operating hours or if the oil has become contaminated or after any major hydrostatic drive system repair.

1 Lower the boom arms, shut off the engine and engage the parking brake.
2 Remove the magnetic drain plug located at the bottom of the hydraulic oil reservoir. Clean any metal particles that may be attached to the magnet. (fig. C1034) Have containers ready to hold approximately 35 gallons (133 liters) of fluid. Replace the drain plug using teflon sealing tape or liquid type sealant on the plug threads.
3 Access the suction screen element in the hydraulic reservoir by removing the inspection cover on the reservoir, located in the engine compartment. (fig. C1871) Clean the sealing area on the reservoir and cover.
4 Remove the suction screen element from the reservoir by turning counter clockwise. (fig. C3663, C3664)
5 Remove and clean the magnet attached to the suction element. (fig. C3663)
6 Install the magnet onto a new suction element and install the suction element.
7 Seal the inspection hole and install the inspection cover to the reservoir. Do not over tighten the mounting nuts. Maximum torque is 15 ft lbs (20 Nm).
8 Fill the reservoir to the proper level with 10W30 API classification SJ oil, approximately 35 gallons (133 liters).

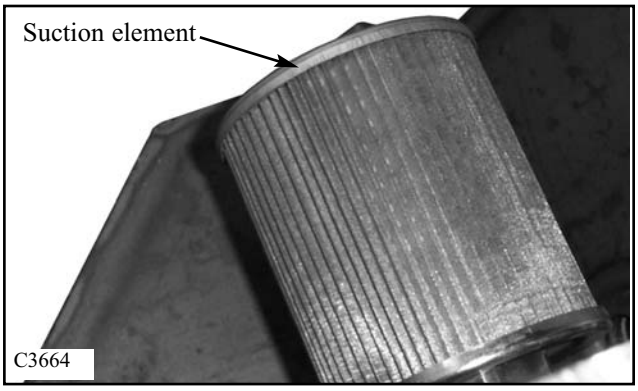

C3661



C3662



C3663



C3664

TROUBLE SHOOTING 1.8

1

Problem	Cause	Corrective Action	Section
Loss of hydraulic power (no flow from the gear pump).	Reservoir low on oil.	Check for leaks. Fill the reservoir to the proper level.	1.7
	Adapter kit between engine and tandem pump failure.	Inspect and replace the damaged parts as required. Check for proper alignment.	7
	Gear pump not functioning.	Inspect and replace damaged parts.	1.2 / 2.9
	Splined coupling failure in the hydrostatic pump	See the Sauer Sundstrand Repair Manual BLN 9989.	2.11
Loss of hydraulic power (full flow from gear pump).	Control linkage disconnected or binding	Inspect, adjust, or replace parts	4
	Auxiliary hydraulics engaged.	Disengage the switch.	
	Relief valve failure or out of adjustment.	Check pressure. Adjust or repair as required.	1.3
Hydraulic action jerky.	Reservoir low on oil.	Check for leaks. Fill the reservoir to the proper level.	1.7
	Control linkages loose or worn.	Inspect, adjust or replace parts.	4
	Air in hydraulic system.	Check for leaks between the oil reservoir and pump.	
	Load check valve not functioning.	Inspect and replace damaged parts.	1.3
	Control valve spool spring return mech-anism not functioning	Inspect and replace damaged parts.	1.3
Boom raises slowly at full rpm	Reservoir low on oil.	Check for leaks. Fill the reservoir to the proper level.	1.7
	Control linkages loose or worn.	Inspect, adjust or replace parts.	4
	Auxiliary hydraulics engaged.	Disengage the switch.	
	Lifting more than rated capacity.	Reduce the load.	
	Engine rpm too low.	Check engine rpm and reset.	
	Relief valve failure or out of adjustment.	Check pressure. Adjust or repair as required.	1.3
	Cylinder seal(s) failure.	Check seals.	1.4
	Internal leakage in the control valve.	Inspect the control valve and repair as required.	1.3
	Limiter on control cross shaft misadjusted	Inspect, adjust or replace parts.	4-2
Hydraulic cylinders will not support a load. (leak down)	Control valve spools not centering.	Check control linkage and control valve spool spring centering devise.	
	Cylinder seal(s) failure	Check seals.	1.4
	Load check valve not functioning.	Inspect and replace damaged parts.	1.3
	External leak between control valve and cylinders	Inspect and repair.	

TROUBLE SHOOTING 1.8

Problem	Cause	Corrective Action	Section
Hydraulic oil overheating.	Reservoir low on oil.	Check for leaks and replenish as required.	1.8
	Oil cooler plugged or dirty.	Clean the cooling fins.	1.7
	Auxiliary hydraulics engaged.	Disengage.	5-11
	Cooling fan damaged or inoperative	Check fan and drive belt	1.7
	Engine rpm too low.	Check engine RPM and reset.	
	Temperature sender defective.	Replace.	8
	Relief valve failure or out of adjustment.	Check pressure, adjust or replace.	1.4
	Wrong type of hydraulic fluid.	Replace.	1.8

TORQUE CHART 1.9

Torque Chart

NOTE: all torques are in ft / lbs. (Multiply by 1.36 = N.m.)

HOSE SIZE	37º JIC FITTINGS	HOSE SIZE	ORB FITTINGS
1/4	9 to 10	1/4	14 to 16
5/16	15 to 16	5/16	18 to 20
3/8	20 to 22	3/8	24 to 26
1/2	30 to 33	1/2	50 to 60
5/8	40 to 44	5/8	72 to 80
3/4	70 to 77	3/4	125 to 135
7/8	82 to 90	7/8	160 to 180
1	55 to 60	1	200 to 220
1 1/4	120 to 132	1 1/4	210 to 280
1 1/2	131 to 144	1 1/2	270 to 360
2	300 to 330		

The following torque specifications are for steel ORB fittings into aluminum.			
HOSE SIZE	ORB FITTINGS	HOSE SIZE	ORB FITTINGS
1/4	5 to 7	3/4	40 to 45
5/16	8 to 10	7/8	50 to 55
3/8	10 to 12	1	90 to 99
1/2	21 to 24	1 1/4	80to 90
5/8	27 to 30		

CONVERSION CHART 1.10

CONVERSION FACTORS

Metric To Imperial

	MULTIPLY	BY	TO OBTAIN
Area:	sq. meter	10.763 91	square foot
	hectare	2.471 05	acre
Force:	newton	0.224 809	pound force
Length:	millimeter	0.039 370	inch
	meter	3.280 840	foot
	kilometer	0.621 371	mile
Mass:	kilogram	2.204 622	pound
Mass/Energy:	gm/kW-h	0.001 644	lbs/hp-h
Mass/Volume:	kg/cubic meter	0.06243	lb/cubic ft.
Power:	kilowatt	1.341 02	horsepower
Pressure:	kilopascal	0.145 038	lb/sq.inch
	bar	14.50385	lb/sq.inch
Temperature:	degree C	1.8 x C + 32	degree F
Torque:	newton meter	8.850 748	inch pound
	newton meter	0.737 562	foot pound
Velocity:	kilometer/hr.	0.621 371	miles/hr.
Volume:	cubic centimeter	0.061 024	cubic inch
	cubic meter	35.314 66	cubic foot
	cubic meter	1.307 950	cubic yd.
	millimeter	0.033 814	ounce (US fluid)
	litre	1.056 814	quart (US liquid)
	litre	0.879 877	quart (Imperial)
	litre	0.264 172	gallon (US liquid
	litre	0.219 969	gallon (Imperial)
Volume/Time:	litre/min.	0.264 172	gallon/min. (US liquid)
	litre/min.	0.219 969	gallon/min. (Imperial)

CONVERSION CHART 1.10

CONVERSION FACTORS

Imperial To Metric

	MULTIPLY	BY	TO OBTAIN
Area:	sq. foot	0.092 903	square meter
	acre	0.404 686	hectare
Force:	pound force	4.448 222	newton
Length:	inch	25.4	millimeter
	foot	0.304 8	meter
	mile	1.609 344	kilometer
Mass:	pound	0.453 592	kilogram
	ounce	28.35	gram
Mass/Energy:	lb/hp-h	608.277 4	gm/kW-h
Mass/Volume:	lb/cubic ft.	16.0185	kg/cubic meter
Power:	horsepower	0.745 700	kilowatt
Pressure:	lbs/sq.in.	6.894 757	kilopascal
	lbs/sq.in.	0.069	bar
	lbs/sq.in.	0.070 303	kg/sq.cm
Temperature:	degree F	0.5555 x (F - 32)	degree C
Torque:	inch pound	0.112 985	newton meter
	foot pound	1.355 818	newton meter
Velocity:	miles/hr.	1.609 344	kilometer/hr.
Volume:	cubic inch	16.387 06	cubic centimeter
	cubic foot	0.028 317	cubic meter
	cubic yard	0.764 555	cubic meter
	ounce (U.S. fluid)	29.573 53	milliliter
	quart (U.S. liquid)	0.946 353	litre
	quart (Imperial)	1.136 523	litre
	gallon (U.S.)	3.785 412	litre
	gallons (Imperial)	4.546 092	litre
Volume/Time:	gallon/min.	3.785 412	litre/min.

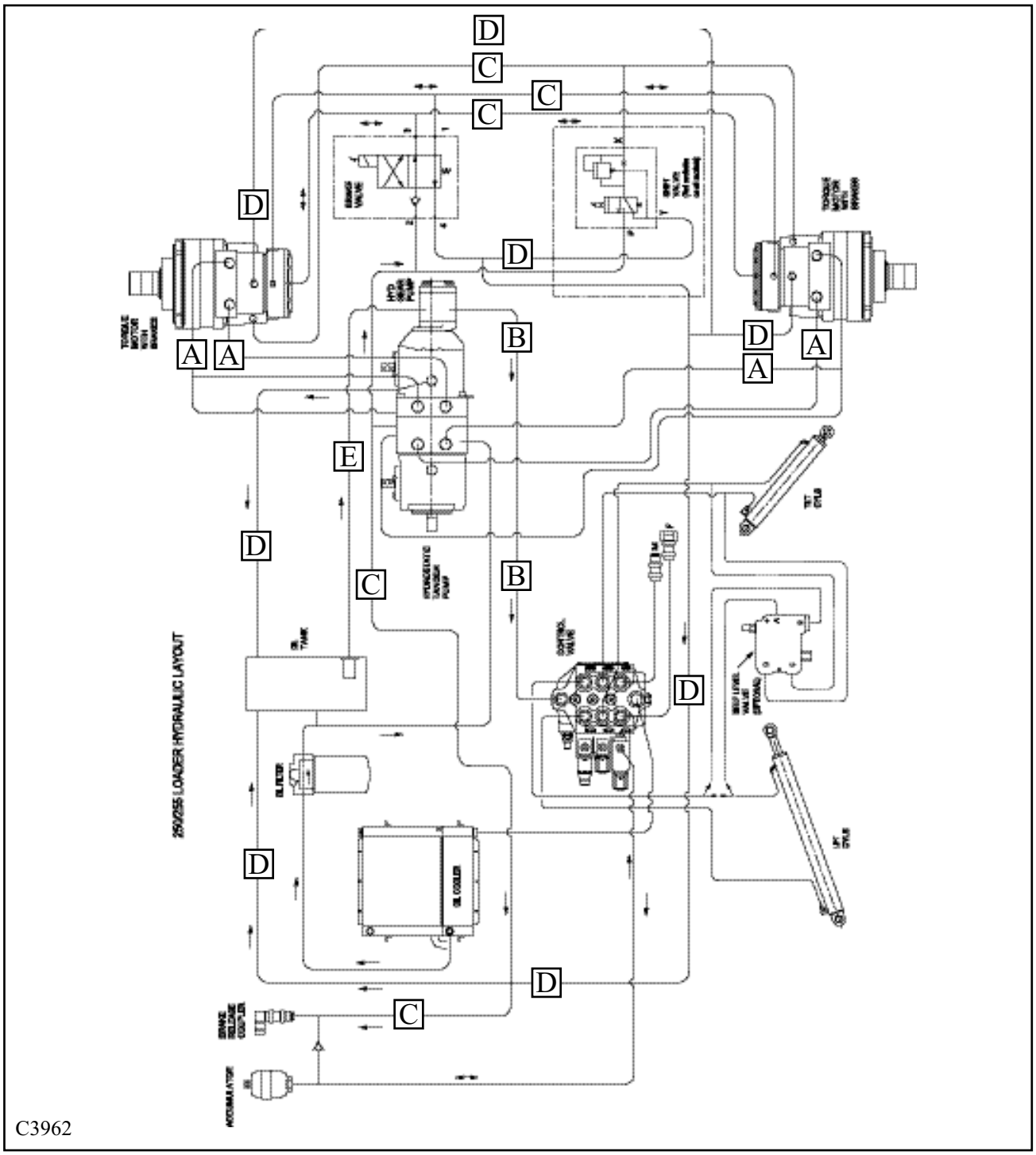
NOTES

SECTION 2
HYDROSTATIC DRIVE SYSTEM

HYDROSTATIC CIRCUIT 2.1

Hydrostatic Circuit and System Pressure Schematic

- [A] High Pressure Relieved at 5000 psi (345 bar)
- [B] Aux. Press. Relief Set at 3000 psi (207 bar)
- [C] System Charge Pressure 400 psi Minimum (27.4 bar)
- [D] Return Pressure
- [E] Suction Line (Vacuum) 4 - 6 Hg @ 160ºF (71ºC)



C3962

SPECIFICATIONS 2.2

Hydrostatic Tandem Pump 250/255

Pump Type . . . . . Variable Displacement, Reversible Piston
Brand Name of Pump . . . . . Sauer Danfoss
Series Type 40
No. Of Drive Pumps . . . . . 2 (two)
Mounting . . . . . Tandem
Rotation (viewed from shaft end) . . . . . Clockwise
Operating Speed . . . . . 2700 rpm (+ / - 25 rpm)
Operating Speed CE . . . . . 2500 rpm (+ / - 25 rpm)
Pump Displacement . . . . . 2.8 in^3 (46cm^3)
Minimum Pump Output (flow) . . . . . 17.1 gal (63.2 l) / Min @ 2500 rpm
No. Of Relief Valves . . . . . 2 (two)
Relief Valve Setting . . . . . 5000 psi (345 bar)
Max. Allowable Case Pressure . . . . . 75 psi (1.7 bar)
Charge Pump Type . . . . . External: Gear Pump / Sauer-Danfoss
Charge Pressure . . . . . 400 psi Min. (27.4 bar)
Hydrostatic Repair Manual . . . . . Thomas P / N 49994
. . . . . Sauer Danfoss P / N BLN-9989

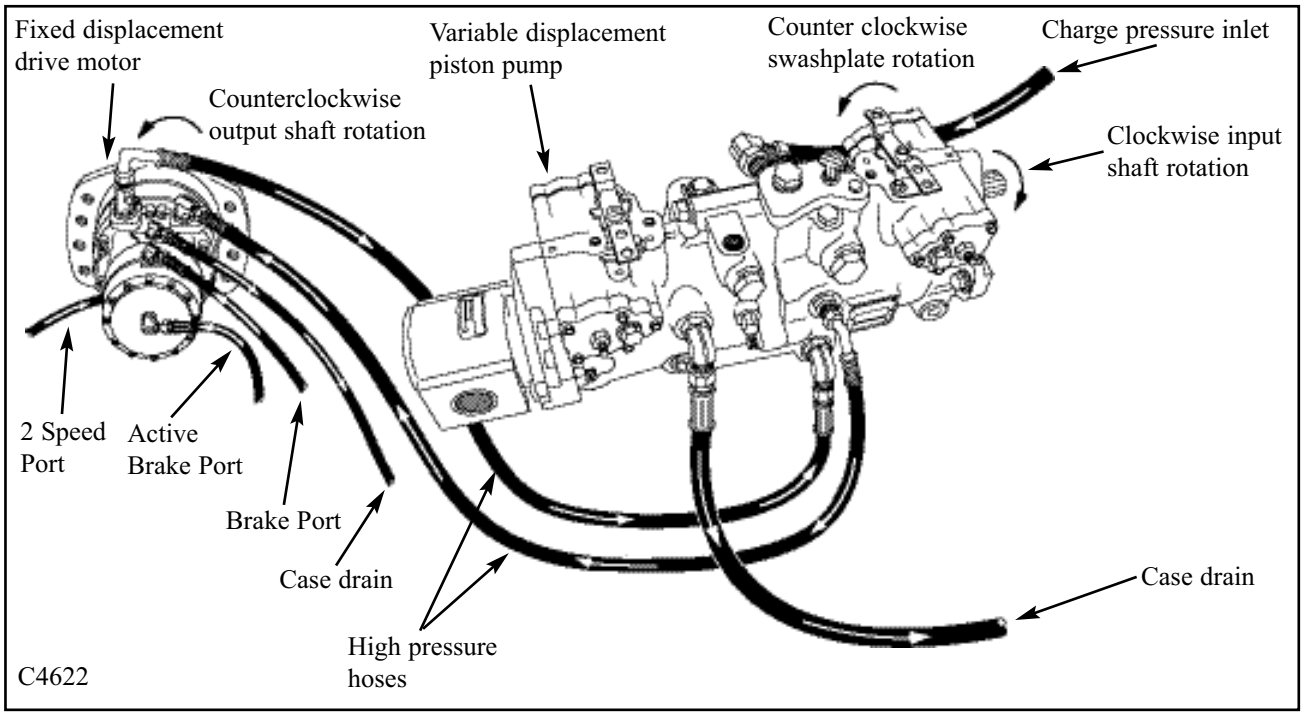
Hydraulic Drive Motor

Drive Motor Type . . . . . Radial Piston Motor With Brake
Brand Name . . . . . Rexroth
Series Type MCR5A
Rotation . . . . . Dual
No. Of Drive Motors . . . . . 2 (two)
Drive Motor Displacement (250) . . . . . 41.5 in^3 (523 cm^3)
(255 Low Speed) . . . . . .45.8 in^3 (750 cm^3)
(255 High Speed) . . . . . .24.9 in^3 (408 cm^3)
Max. Case Pressure . . . . . 145 psi (10 bar)

Reservoir

Fluid Type . . . . . 10w30 API Class SJ Oil
Reservoir Filtration . . . . . One 100 micron Screen Element
Hydraulic Oil Filtration . . . . . One 10 micron Element
Hydraulic Element . . . . . P / N 35243

GENERAL INFORMATION 2.3



The drive shaft of the piston pump is rotated by the engine. The piston block which is splined to the drive shaft also turns. The piston block, rotating group, consists of 9 piston assemblies which have free swiveling shoes swagged on the ball end of each piston assembly. The shoe end of the piston rides against the smooth machined surface of the swashplate. With the swashplate in the neutral position, the piston assemblies do not reciprocate in the piston block, but are rotating. No oil is drawn into or discharged from the pump. The pump is in a zero displacement position and the loader remains stationary.

With the swashplate in the neutral position the pressure of the charge oil, which ranges from 350 to 400 psi (24 - 27.4 bar), is able to unseat both check valves and supply oil to both sides of the pump because of the balance in pressure. Very little charge oil volume is required in the neutral position so the excess oil is bypassed over the charge pressure relief valve and recirculated back to the reservoir. The oil that leaks internally in the pump and motor collects in their body housings and is returned to the reservoir by external case drain in the pump and motors. This leakage oil is the only oil the charge check replenishes. This makes the design a closed loop system.

As the steering lever is moved forward, or reverse, the loader starts a directional movement. As the swashplate begins to move, the piston assemblies start to reciprocate in the piston block. As the steering lever continues further movement the cam angle increases, the pistons reciprocate further, more oil is pumped and the speed of the loader is increased.

When the swashplate begins to move the check valve on the discharge, or pressure, side seats because of the higher pressure differential. The other check valve remains open on the intake or low pressure side to continue supplying the closed loop system with charge oil.

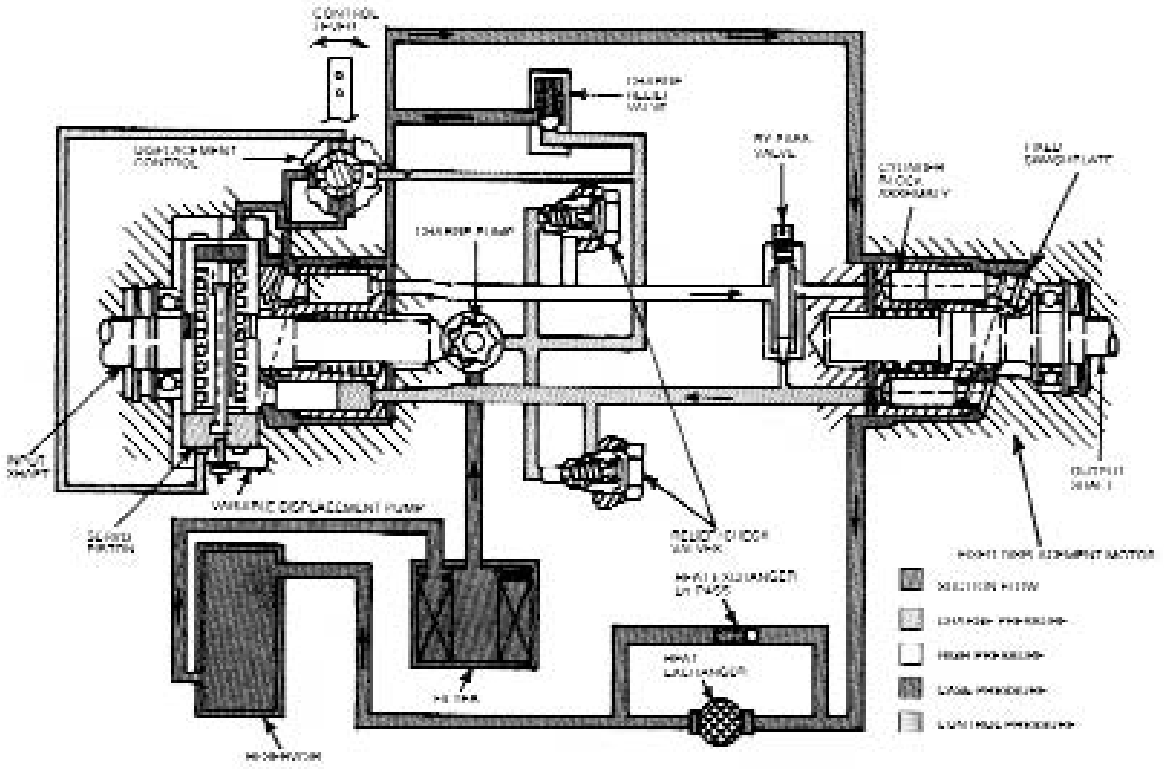
The drive motor, which is a fixed displacement type, delivers a constant output torque for a given pressure throughout the speed range of the motor.

The movement of the pump swashplate, forward or reverse, controls the direction of the drive motor rotation.

The function of the pressure relief valve is to relieve the pressure side of the system of excessive high pressure when the loader encounters a heavy load or stalls out. When the relief valve senses an over load it unseats, allowing excess pressure and volume to flow into the low pressure side of the pump. A small volume of oil starts to flow across to the other relief valve. This relief valve is exposed to the low pressure on the intake side of the pump and is seated by the spring tension within the relief valve body.

The small volume of oil being bypassed is enough to unseat the relief valve and let it recirculate back into the inlet side of the pump. As the pressure continues to build on the pressure side, a larger volume of oil flows and at a greater speed through the drilled orifice in the relief valve cartridge, causing a pressure drop inside the relief valve. The surrounding pressure is now able to unseat the relief valve and bypass maximum volume of oil. The system reliefs function the same for both sides of the system.

GENERAL INFORMATION (SERVO PUMP) 2.3



C2889 **Typical Series 40 - M46 Medium Duty Variable Pump (Fixed Motor Transmission Schematic)**

The M46 Medium Displacement pumps can be applied separately or combined in a system to transfer and control power. When combined in such a system, these units provide an infinitely variable speed range between zero and maximum, in both forward and reverse modes of operation.

The M46 variable displacement pumps use the parallel axial piston/slipper design in conjunction with a tiltable swashplate to vary the pump's displacement. Reversing the direction of tilt of the swashplate reverses the flow of oil from the pump and thus reverses the direction of the motor output rotation.

The M46 variable displacement pump and tandem pump are controlled by a compact responsive hydro-mechanical, closed loop control system.

A charge relief valve and check valves are included in the pump end cap to control the makeup and cooling oil flow for the system. The charge check valves also incorporate the high pressure relief valve function into their design.

The fixed and variable displacement motors also incorporate the parallel axial piston/slipper design. Fixed displacement motors utilize a fixed swashplate angle. The variable displacement motors use a variable angle swashplate with a hydraulic control system, designed to provide two positions of the swashplate: maximum and minimum displacement. Refer to Figure: (C2889).

M46 pumps have their own hydraulic support system which is:

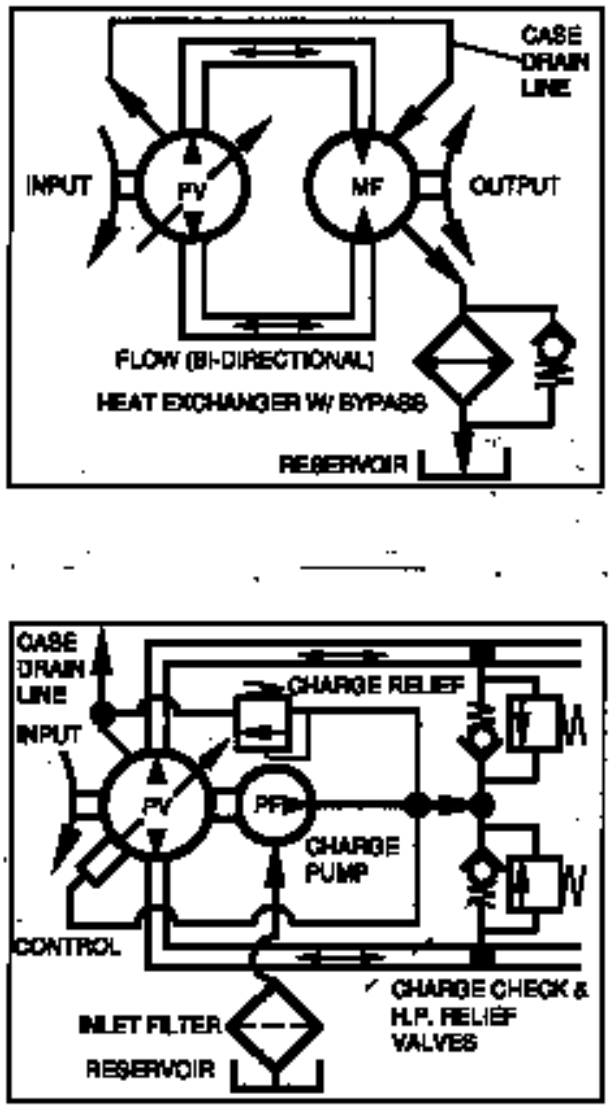
Basic Closed Circuit:

The main parts of the pump are connected by hydraulic lines to the main ports of the motor. Fluid flows in either direction, from the pump in this closed circuit. Either of the hydraulic lines can be under high pressure. The direction and speed of the fluid flow (and the motor output shaft rotation) depends on the position of the pump swashplate. The system pressure is determined by the machine load. Refer to figure (C2888) page 2-6.

Case Drain & Heat Exchange:

The pump and motor require drain lines to remove the hot fluid from the system. The pump case should be drained from its upper drain port to insure the case remains full of fluid. The pump case drain is then connected to the lower drain port on the motor housing. The upper motor housing drain port is the connected to the reservoir. A heat exchanger, with a bypass valve, may be required to cool the case drain fluid before it returns to the reservoir. When operating the pump near rated speed, some case flow may have to be diverted around the motor to ensure the pump case pressure remains within recommended limits

GENERAL INFORMATION (SERVO PUMP) 2.3



C2888

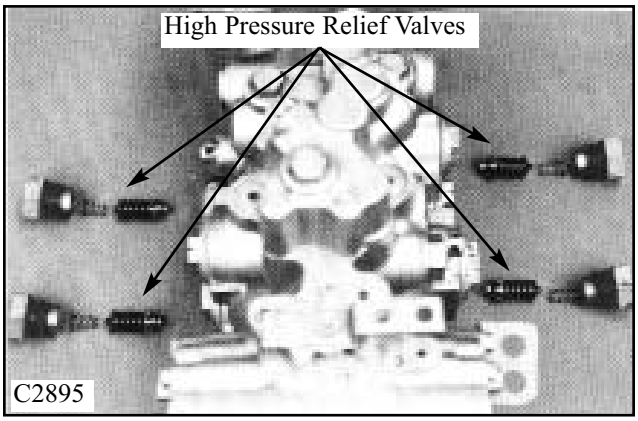
Charge System and Inlet Filter:

The charge pump supplies cool fluid to the system and keeps the closed loop charged to prevent cavitation. The charge pump draws its fluid from the system reservoir. Since either of the main hydraulic lines can be high pressure, two (2) charge check valves are used to direct the charge supply into the low pressure line.
These check valves are incorporated into the high pressure relief valves in the pump end cap. Any charge flow not being used for the closed circuit is discharged over a direct operating charge relief valve, through the pump and motor housings and back to the system reservoir.
Refer to figure (C2888).

If the charge pressure is low, the charge relief valve should be inspected. Inspect for foreign material holding the poppet open, and for scoring or wear on the poppet and seat in the housing.

High Pressure Relief Valves:

Two (2) combination check/high pressure relief valves are provided in the pump end cap. The system check/relief valves have dual purposes of providing make-up oil during by-directional rotation and providing protection from system over pressure. These cartridge type relief valves are factory set and are not field adjustable. When problems occur in one direction only, interchange the check/relief valves to see if the problems changes to the other direction. If so , one check/relief valve cartridge is malfunctioning. Refer to figure (C2895).



C2895

CAUTION

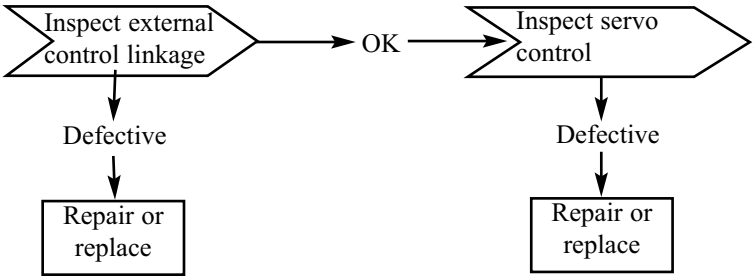
The relief valves are factory set and should not be tampered with except for replacing the entire cartridge. Disassembly may change the setting and cause erratic unit operation or premature failure.

CAUTION

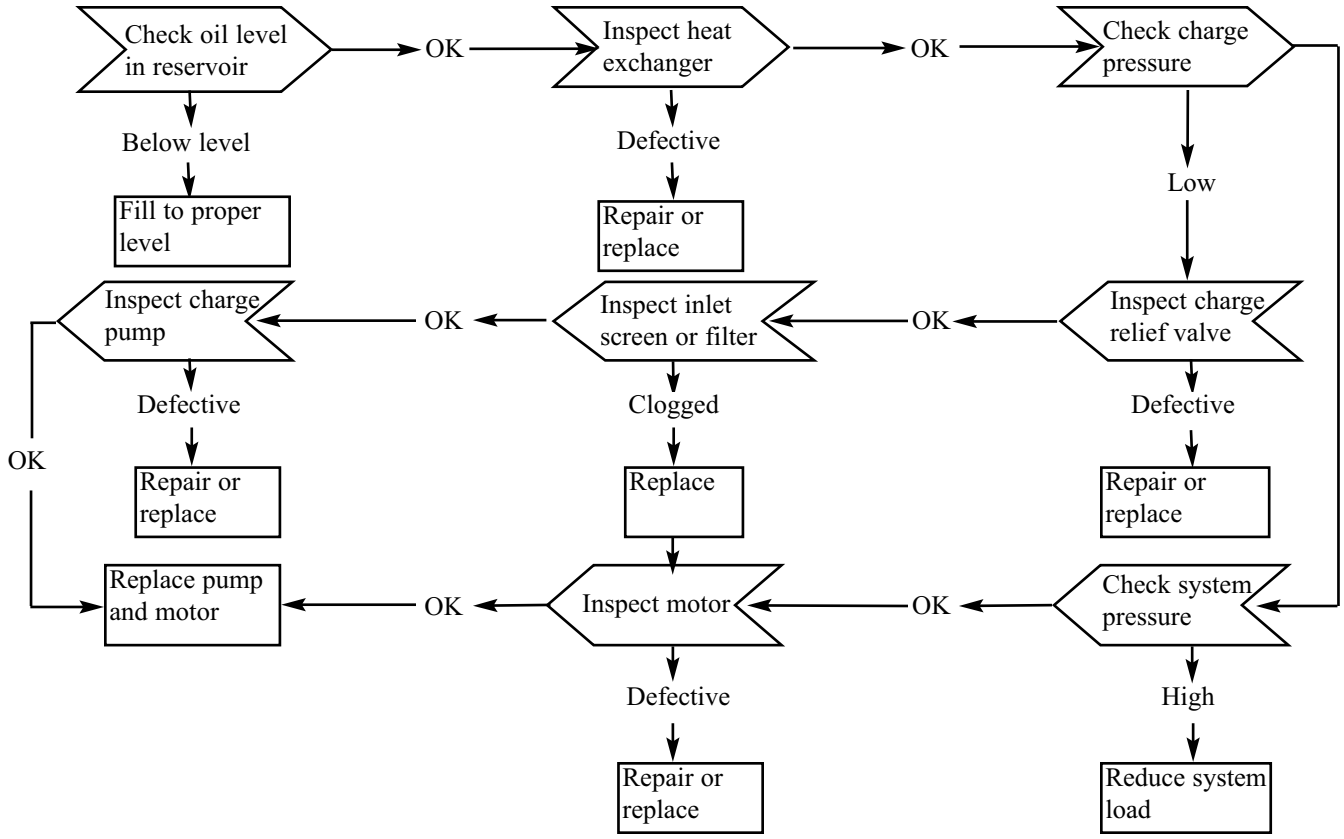
Charge Pressure must not be less than 400 psi (27.4 bar) for satisfactory operation. Pressure less than this may result in premature unit failure or loss of control.

TROUBLE SHOOTING 2.4

Symptom: Neutral Difficult Or Impossible To Find



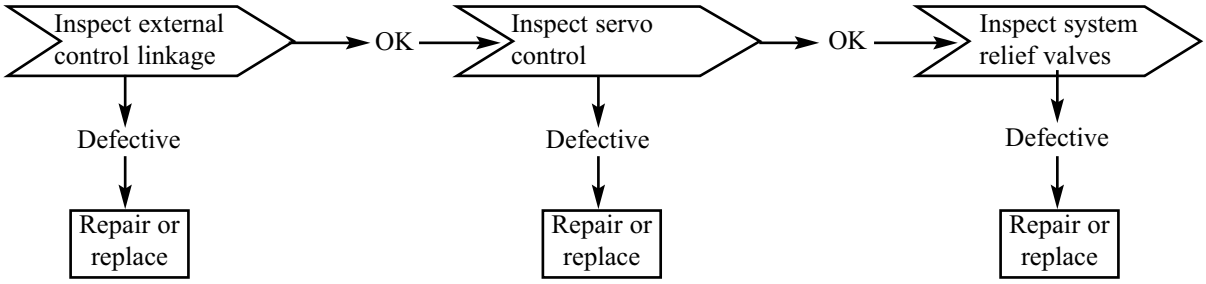
Symptom: System Operating Hot



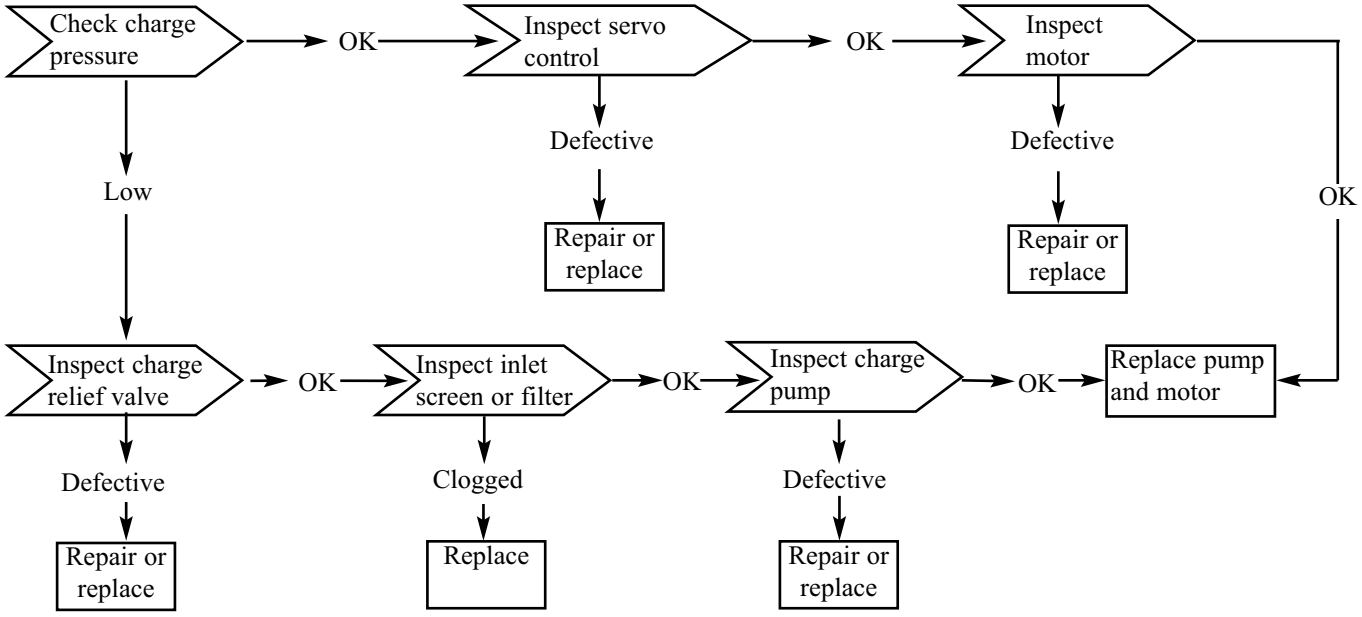
TROUBLE SHOOTING 2.4

2

Symptom: Operates In One Direction Only

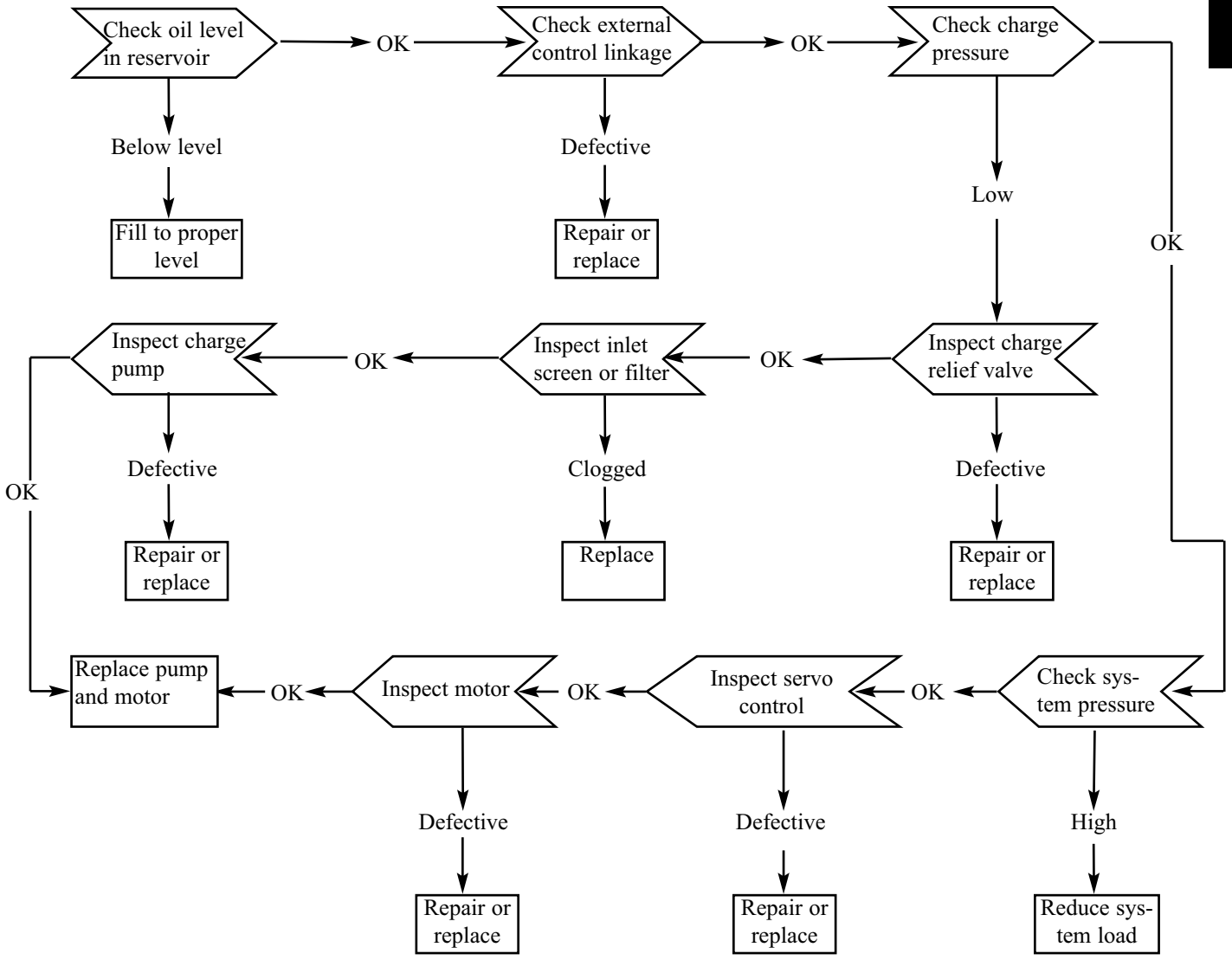


Symptom: System Response Sluggish



TROUBLE SHOOTING 2.4

Symptom: System Will Not Operate In Either Direction



TROUBLE SHOOTING 2.4

System Diagnosing Steps And Special Tools

2

1 Check oil level in reservoir:
a .fill to proper level as marked on site tube.

2 Inspect external control linkage for:
a. misadjustment or disconnection
b. binding, bending or breakage
c. misadjusted, damaged or broken hydroback

3 Inspect servo control valve for: (if used)
a. proper inlet pressure
b. misadjusted or damaged neutral return spring
c. galled or stuck control spool
d. galled or stuck servo piston

4 Inspect heat exchanger for:
a. obstructed air flow
b. improper plumbing (inlet to outlet)
c. obstructed fluid flow

5 Inspect inlet filter or screen for:
a. plugged or clogged screen or filter
b. obstructed inlet or outlet
c. open inlet to charge pump (open line)

6 Check charge pressure:
a. follow test procedures section 2.5

7 Inspect charge relief valve for:
a. poppet held off seat
b. damaged or broken spring
c. damaged valve seat
d. improper charge relief setting

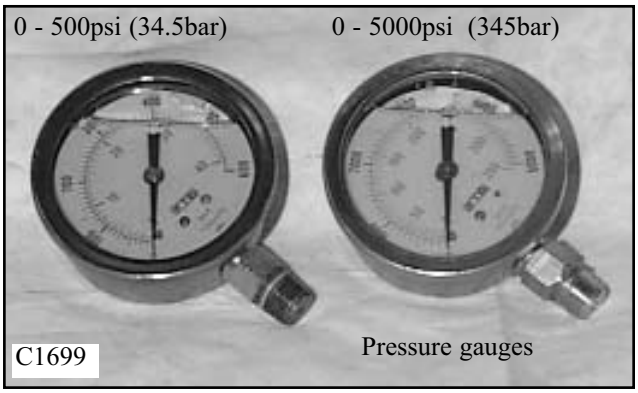
8 Inspect charge pump for:
a. broken or missing drive coupling
b. damaged or missing o-rings
c. galled or broken geroter set

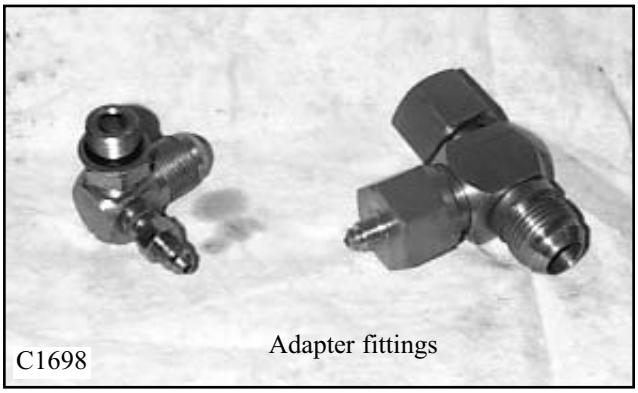
9 Inspect system relief valves for:
a. damaged or broken springs
b. valve held of seat
c. damaged valve seat
d. improper pressure relief settings

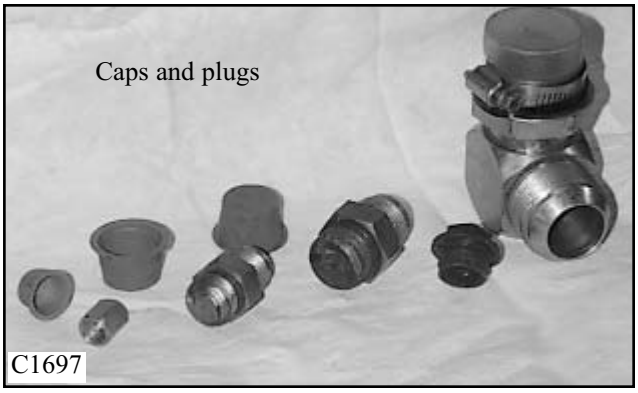
10 Check system pressure:
a. follow test procedures section 2.5

11 Inspect hydraulic motor for:
a. disconnected coupling

Photographs in the right hand column show some of the special tools that may be required to diagnose and repair the hydrostatic system.







PRESSURE TESTS 2.5

The following photos show the various port locations available on the hydrostatic tandem pump for checking system pressure.
Completing these pressure tests will diagnose any mechanical problem in the hydrostatic system.

WARNING

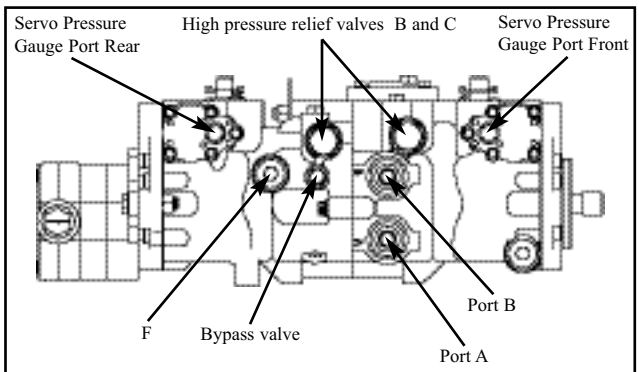
Use caution when dealing with hydraulic fluid under pressure. Escaping fluid under pressure can penetrate the skin and cause serious injury.

Installing a gauge into the system gauge port 'A', 'B', 'C' or 'D' will verify the status of the high pressure relief valves.
Checking the pressure at the charge pressure port gauge port will give accurate charge pressure reading. (fig C4625) The charge pressure can also be obtained by placing a gauge on the quick coupler in the engine compartment.
Checking the pressure at port 'F' will verify case drain pressure.

Gauge Information		
A B	System Pressure Gauge	10,000 psi gauge (690 bar) 9/16 - 18 O-Ring Fitting
C D	System Pressure Gauge	10,000 psi gauge (690 bar) 9/16 - O-Ring Fitting
E	Charge Pump Inlet Port	1000 psi Gauge (34.5 bar) 7/8 - 14 O-Ring fitting
F	Case Drain Port	1000 psi Gauge (34.5 bar) 1 - 1/16 - 12 O-Ring Fitting
F	Servo Pressure Port	1000 psi gauge (60 bar) 9/16 - O-Ring Fitting - Later Units 7/16 - O-Ring Fitting - Later Units
F	Servo Pressure Port	1000 psi gauge (60 bar) 9/16 - O-Ring Fitting - Later Units 7/16 - O-Ring Fitting - Later Units

Tandem pump flow can also measure pump performance.
1 Connect a flow meter between the high pressure ports, one section at a time.
2 Start the engine and increase operating speed between 1775 ~ 1800 rpm.
3 Restrict the flow to show 2000 psi (137.8 bar) over charge pressure inlet.
Example: Charge pressure = 220 psi (15.2 bar) Gauge pressure reading would need to be 2220 psi (153 bar).
4 Minimum flow reading should be 13.5 gal / min. (51 l / min).

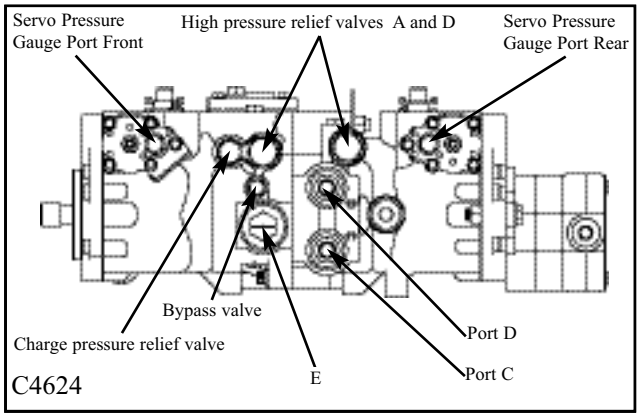
LH Side View



C4623

NOTE: Internal charge pump model shown

RH Side View

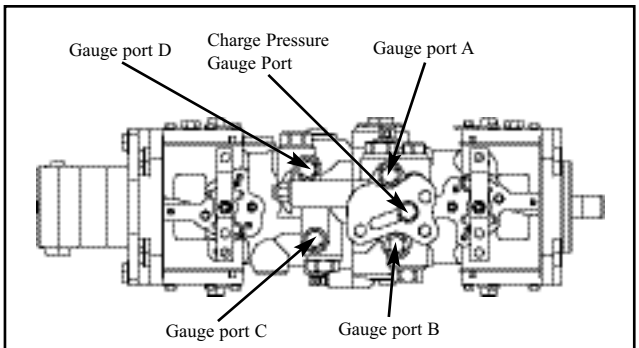


C4624

WARNING

Raise the machine securely from the ground before performing system checks to prevent sudden movement.

Top View



C4625

TOWING 2.6

2

Towing Procedure

In an event the loader has malfunctioned or failed, the loader may be moved a short distance by following the procedure below.

WARNING

Failure to follow the proper towing procedure may cause damage to the hydrostatic drive system.

1 Remove the seat and hydrostatic shield.

2 Manually open the pumps bypass valve located on the both sides of the pump housing. This is accomplish by turning the bypass valve nut (fig. C4626) counter-clockwise two (2) revolutions. **Do not unscrew the valve past two (2) turns maximum.** When open, the valve connects both sides of the pump/motor circuit and allows the motor to turn at low speeds without the engine running.

3 The loader parking brake system is released by hydrostatic pressure. To release the parking brake when the unit has failed you must pressurize the brake system manually. A service override for the brake valve has been incorporated for use by Thomas Dealers. The normal position of the plunger is down and turned into the locked position. To release the brake, turn the release plunger counter clockwise. (fig. C4627) Next, access the engine compartment and locate the small quick connector located next to the hydraulic control valve. (fig. C4610) . Use a port -a - power to pressurize the brake release quick coupler to 218 psi (15 bar). This will release the motor brakes for towing.

WARNING

Be sure to return the brake valve plunger to the normal position after servicing the loader.

4 Use the front frame mounted tie downs to attach pulling device. (fig. C3447) Use the rear tie downs to pull the loader backwards. (fig. C3446)

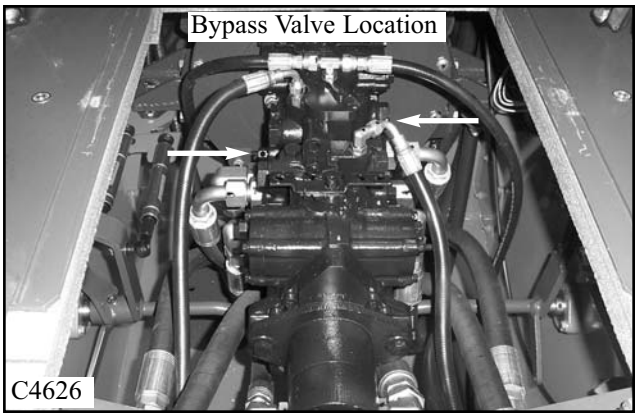
CAUTION

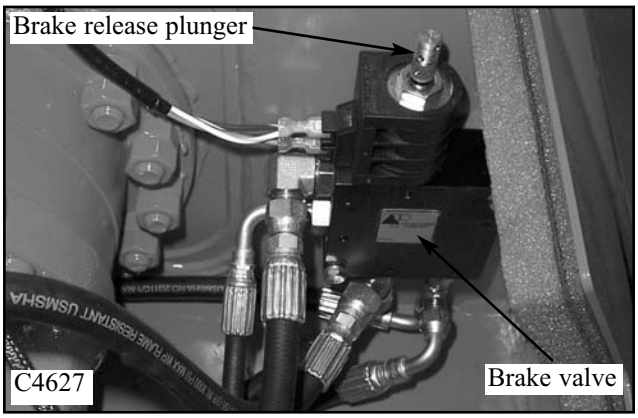
To prevent damage to the drive motors, do not exceed speed of 1 MPH.

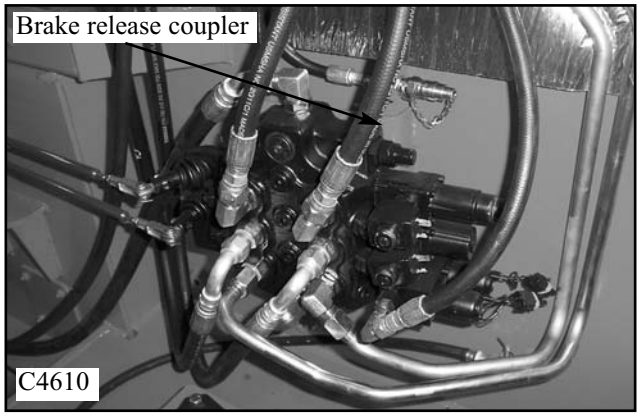
WARNING

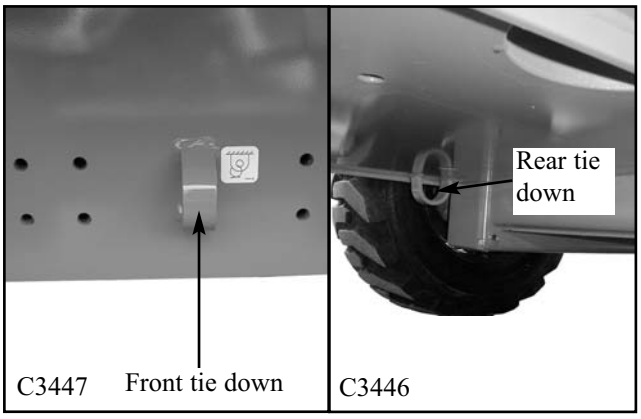
Use chains or cables rated a minimum of 1 and 1/2 times the gross vehicle weight.

5 The bypass valve must be fully closed for normal operations. Torque the valve to 7-10 ft lbs. **Damage to the unit may result from over-torquing the bypass valve.**









-FLUSHING THE HYDRAULIC SYSTEM 2.7-

General Information

Contamination in the hydraulic system is a major cause of component failure. Contamination can enter the hydraulic system in any of the following ways.

1 When draining the hydraulic system.
2 When disassembling components.
3 Making auxiliary connections with dirty couplers.
4 Normal component wear.
5 Component failure

The best way to remove contaminates from the hydrostatic drive system is to disassemble each component and flush and clean thoroughly.

The hydraulic control circuits may be cleaned by attaching a suitable hydraulic filter to the auxiliary couplings and circulating the fluid through it.

Contamination Types

There are 2 types of contamination, microscopic, or non visible, and visible. Microscopic contamination is suspended in the fluid and moves freely through the hydraulic circuits. Examples of problems caused by microscopic contaminates include the following:

1 Cylinder rod seal leaks.
2 Control valve spools do not return to neutral.
3 Hydraulic system has a high operating temperature.
4 Components wear rapidly.

Visible contamination is foreign material that can be found by sight, touch or odor. Some examples of visible contamination include the following:

1 Particles of metal or dirt in the oil.
2 Air in the oil.
3 Odor of burned oil.
4 Water in the oil.

FLUSHING THE HYDRAULIC SYSTEM 2.7

Cleaning The System

The first step in cleaning the hydraulic system is to determine if you have visible or microscopic contamination.

•If the contamination is visible, do the following steps:

1 Change the hydraulic oil by removing the drain plug in the bottom of the hydraulic oil reservoir. (fig. C3661) Be prepared to contain approximately 35gallons (133 liters) of fluid.

2 Check the extent of the contamination by disassembling 1 each of the hydraulic cylinders. Check the cylinders for damage. Repair or replace the cylinders as required. If you determine the damage was caused by severe contamination and is not the result of normal wear, it will be necessary to remove, clean and repair all valves, pumps, lines, cylinders, etc.

3 Replace all hydraulic filters.

•If the contamination is determined to be microscopic, perform the following steps:

1 Change the hydraulic oil by removing the plug in the bottom of the oil reservoir. (fig. C3661) Be prepared to contain approximately 35 gallons 133 liters of fluid.

2 Replenish the hydraulic oil with 10W30 API SJ

3 Connect an external 10 micron filtering system, capable of sustaining minimum of 2000 psi (138 bar) and has a back pressure gauge, to the auxiliary couplings. (fig. C1687, C1688)

4 Start the engine and let it idle at approximately half

WARNING

Be sure to use a filtering system capable of handling the pressure of the hydraulic system.

throttle.

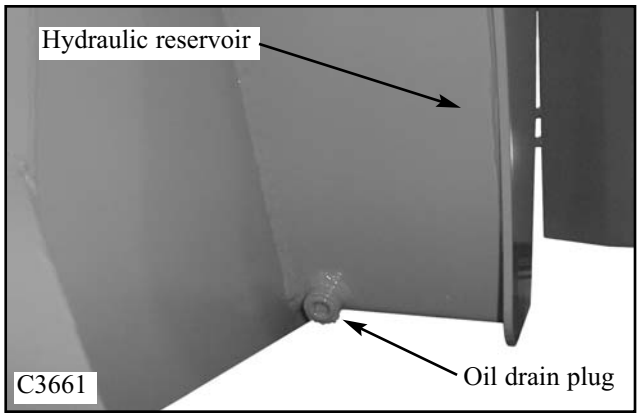
5 Engage the auxiliary circuit. Check to make sure the filtering system is not over taxed by the loaders hydraulic system pressure. Adjust engine idle accordingly to match the filtering systems capacity. This may vary as the filter becomes dirty, you may need to decrease engine rpm. Circulate the oil through filter for 30 minutes.

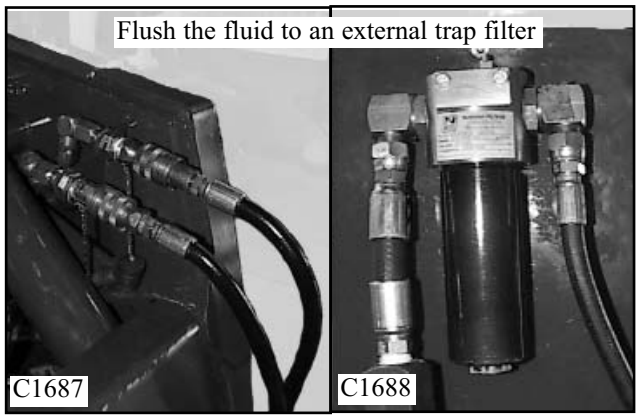
6 As the oil is being circulated through the auxiliary circuit, raise the liftarms up and down in full stroke cycles. Repeat this exercise for 15 minutes.

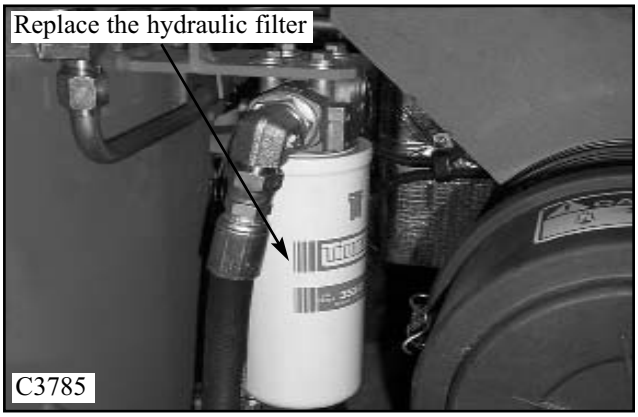
7 Cycle the bucket tilt cylinders in the same manner as above. Repeat the exercise, in full extension and retraction, for 15 minutes.

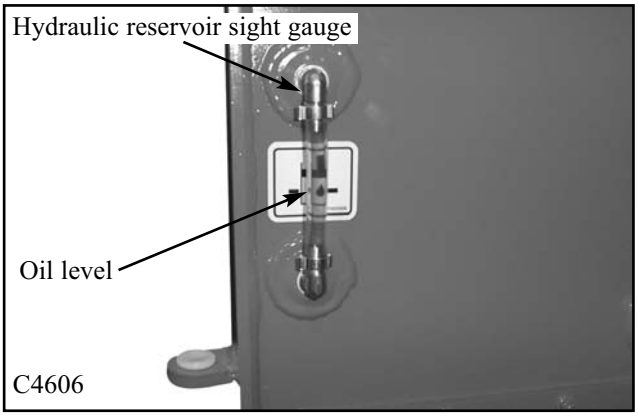
8 Install new hydraulic oil filters. (fig. C3785)

9 Start the engine and check for leaks. Replenish the hydraulic oil reservoir as required. (fig. C4606)









FLUSHING THE HYDRAULIC SYSTEM 2.7

For flushing water from the hydraulic system, perform the following procedures:

IMPORTANT

Be sure attachments are removed and liftarm are in the lowered position.

1 Remove any attachment.
2 Make sure all cylinders are fully retracted.
3 Change the hydraulic fluid. (fig. C3661)
4 Change the hydraulic filter. (fig. C4628)
5 Disconnect the hydraulic lines from one set of cylinders. (fig. C4613, C1336)
6 Start the engine and set to the lowest idle.

WARNING

Use caution when dealing with hydraulic fluid under pressure. Escaping fluid under pressure can penetrate the skin and cause serious injury.

7 Have someone hold the open hydraulic lines into a container. Stroke the foot pedals, or hand operated, controls slowly. Continue to repeat this cycle until the oil comes out clear. Repeat for opposite set of cylinders.

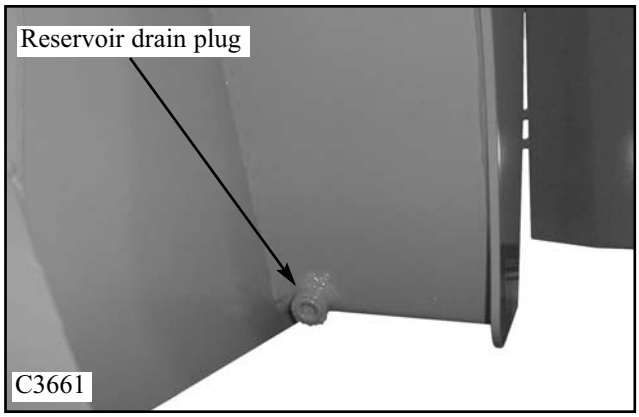
IMPORTANT

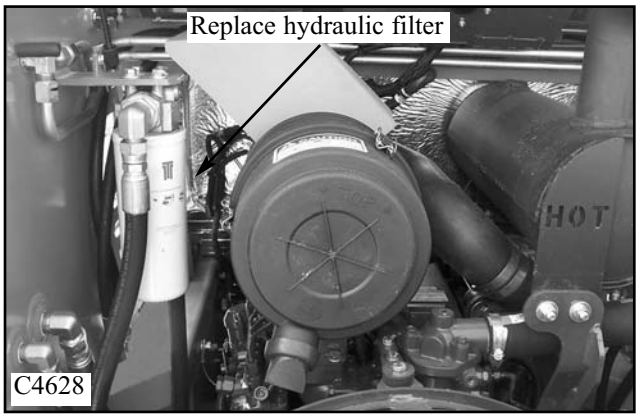
Check the hydraulic oil frequently during this procedure. Replenish as required.

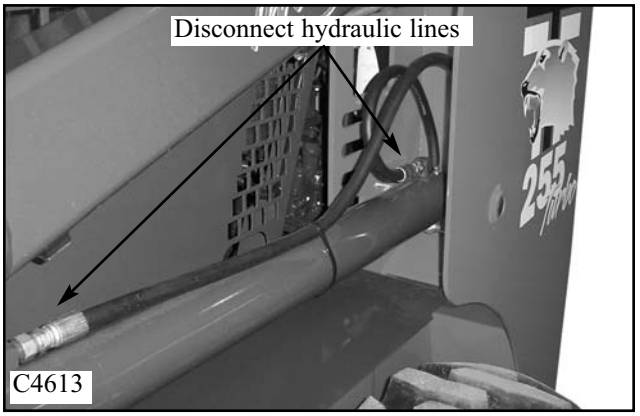
8 Attach a hose and couplings to the auxiliary circuit. Engage the auxiliary hydraulics, forward and reverse, until the oil flows clear.
9 Connect 1 hose each, on each cylinder, to the fixed end of the cylinder barrel.
10 Move the foot pedal or control lever to extend the cylinder rods. This will flush the oil from inside the cylinder barrels. Be prepared to contain the waste oil.
11 Stop the engine.
12 Connect the hydraulic hoses to the rod end of the cylinder barrel.
13 Replenish the hydraulic oil as required.

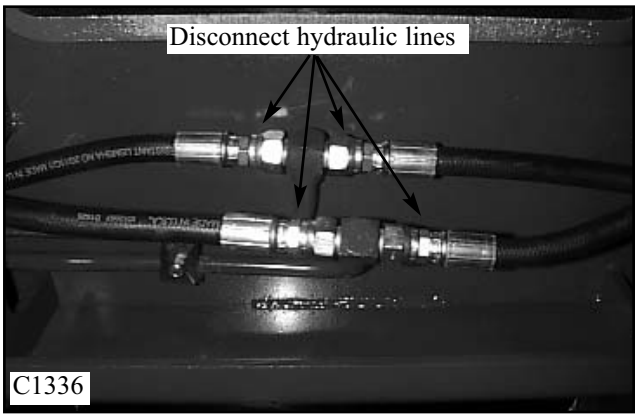
IMPORTANT

Please contain and dispose of waste oil in an environmentally friendly manner.









START-UP PROCEDURE 2.8

2

The following start-up procedure should always be adhered to when starting up a new installation or when restarting after pump repairs have been made.

WARNING

This start-up procedure must be made with the loader securely raised off the ground.

1 Fill the hydraulic oil reservoir to the proper level. (fig. C1878)

2 Check inlet and pressure hoses and fittings for proper tightness prior to starting. Make sure all line are free of restrictions and air leaks.

3 The pump must be filled prior to start-up with filtered oil. Fill the pump by pouring oil into the charge pump inlet port. (fig. C4629 location "E") In the case of this loader, the inlet hose is filled by gravity from the tank. The fitting should be loosen to double checked that there is oil present.

4 Disconnect the engine stop solenoid wiring, or remove the fuse connected to the red wire. (fig. C4630, C1692)

5 Turn the engine over by engaging the starter. Repeat this step, turning the engine over in 15 second interval, 5 or 6 times. This will fill the rest of the hydraulic hoses.

6 Reconnect the engine stop solenoid or replace the fuse.

WARNING

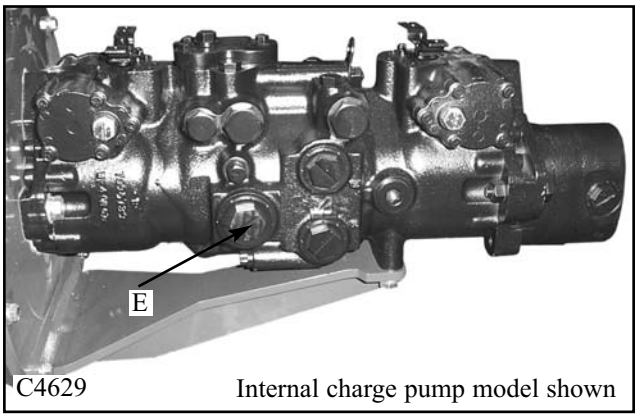
Use caution when dealing with hydraulic fluid under pressure. Escaping fluid under pressure can penetrate the skin and cause serious injury.

7 Place a gauge on the charge pressure port gauge to monitor the charge pressure during start up. Start the engine and let idle at lowest possible setting. The charge pressure should establish itself to 400 psi (27.4 bar). Excess air may be bleed from the high pressure lines through the high pressure gauge ports if required.

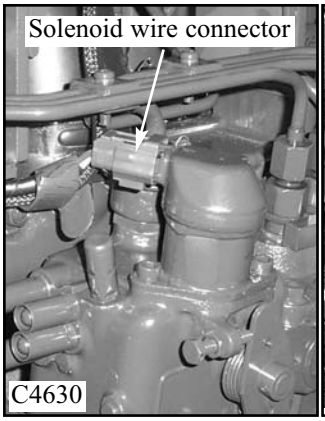
8 Check for leaks and make adjustments as required. Do not use your hands to check for leaks while the engine is operating.

9 Increase the rpm to half throttle. Bring the hydraulic fluid up to operating temperature. Check the pump for operation on the drive circuit in both forward and reverse operation. Stop the engine and remove the gauge on the quick coupler if the charge pressure is established to 400 psi (27.4 bar).

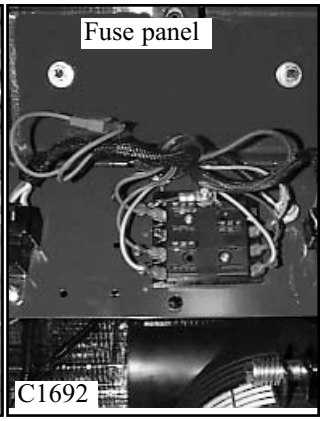
10 Replenish the hydraulic oil reservoir as required. (fig C4616, C4606) Adjust the controls as required. See section 4.



C4629 Internal charge pump model shown

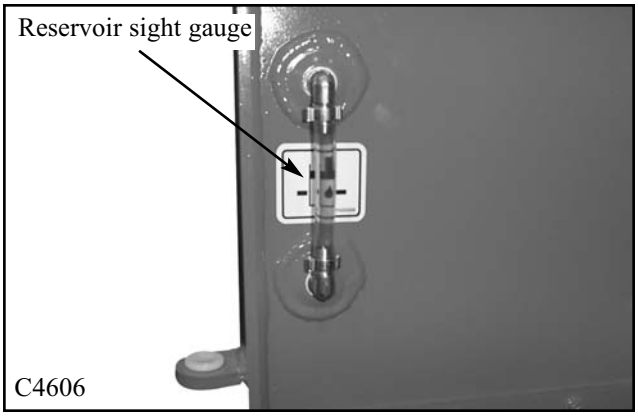


C4630



C1692

C4616



C4606

GEAR PUMP REPLACEMENT 2.9

Start the gear pump removal procedure by removing any attachment, raising the boom arms and engaging the boom support pins. Shut off the engine.

WARNING

To prevent personal injury do not work under the boom arms without the boom supports engaged.

1 Remove the seat and hydrostatic shield.

2 Attach a vacuum system to the hydraulic oil reservoir filler location. (fig. C4604) Drain the oil reservoir if a vacuum is not available. Seal the threads on the drain plug with teflon tape or a liquid form of pipe sealant before re - installing.

3 Disconnect the hydraulic hoses from the gear pump. (fig. C4605) Remove the pump fittings. Cap all open hoses to prevent contamination. After capping ends you may unhook vacuum system from oil reservoir.

IMPORTANT

When making repairs to the hydraulic system, keep the work area and parts clean. Use caps and plugs on all open lines and ports.

4 Remove the 2 bolts holding the gear pump to the hydrostatic tandem section. (fig. C4605) Remove the gear pump.

5 Install a new O ring on the sealing area of the gear pump unit.

6 Replace gear pump in reverse order. Torque the bolt / nut combination to 51~62 ft lbs (70~84 Nm)

IMPORTANT

If gear pump replacement is being done because of failure, the hydraulic system and oil should be checked for contamination.

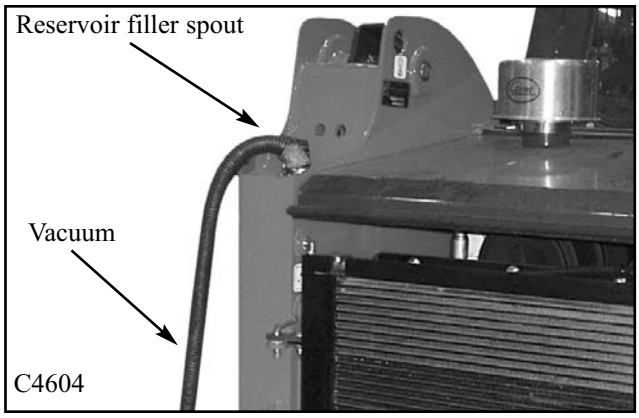
7 If the hydraulic system has been contaminated by pump or other failure you must follow the cleaning procedure outlined in section 2.7.

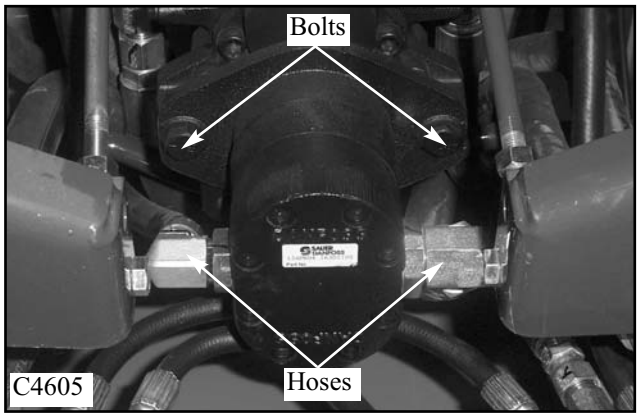
8 Start the engine and check for leaks. Do not use your hands to find leaks.

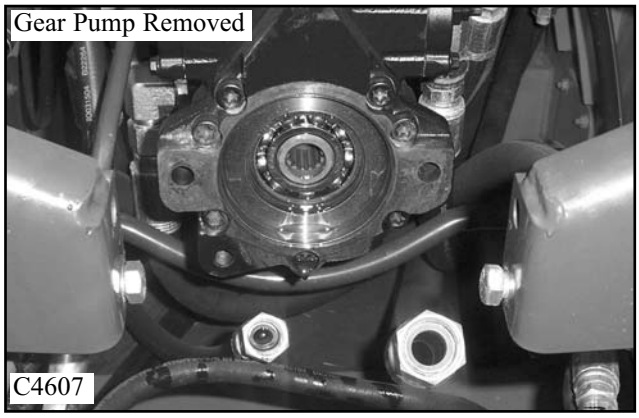
9 Check the fluid level in the hydraulic oil reservoir and replenish as required. (fig. C4606)

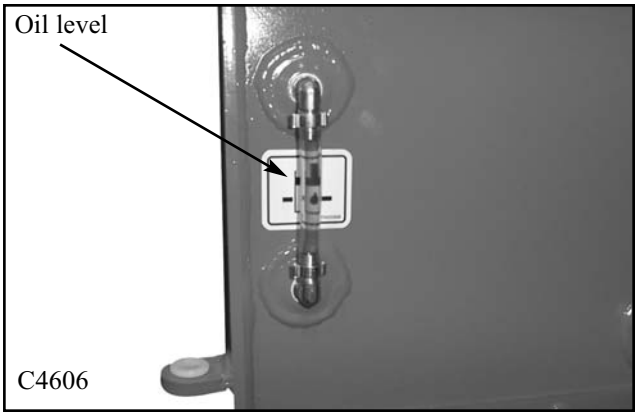
WARNING

Use caution when dealing with hydraulic fluid under pressure. Escaping fluid under pressure can penetrate the skin and cause serious injury.









TANDEM PUMP REPLACEMENT 2.10

2

Begin the pump removal by removing any attachment, raise the boom arms and engage the boom support pins. Shut off the engine.

WARNING

To prevent personal injury do not work under the boom arms without the boom supports engaged.

1 Remove the seat and hydrostatic shield.

2 Attach a vacuum system to the hydraulic oil reservoir filler location, (fig.C4604) Drain the oil reservoir if a vacuum is not available . Seal the threads on the drain plug with teflon tape or a liquid form of pipe sealant before re-installing.

3 Remove the pintal levers from the manual displacement levers on the pump. Remove the steering lever linkage from the control levers. (fig. C4631) Refer to section 4 for removal and replacement information.

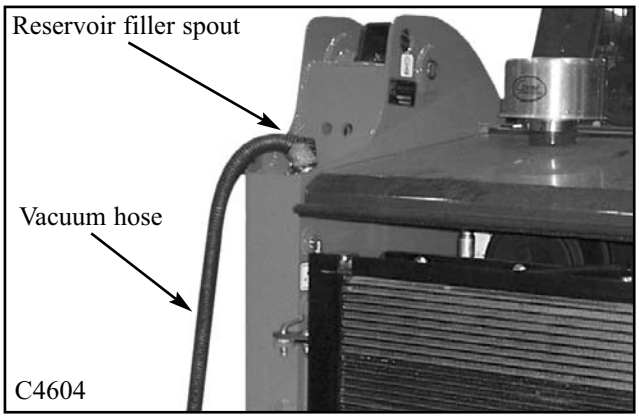
IMPORTANT

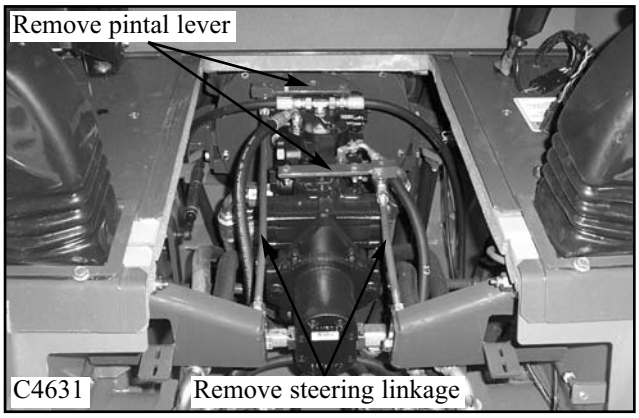
When making repairs to the hydraulic system, keep the work area and parts clean. Use caps and plugs on all open lines and ports.

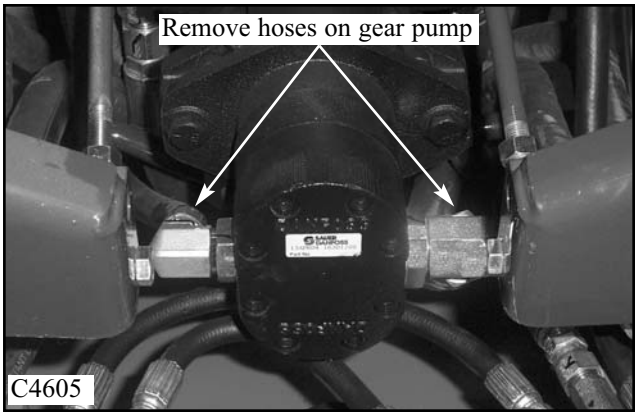
4 Disconnect both hydraulic hoses to the gear pump. (fig. C4605) Mark hose and fitting location if necessary to ease re-assembly. Remove the fittings from the gear pump and keep the fittings in a clean area. Inspect fittings and o-rings for damage, replace as required. Cap all open lines and ports.

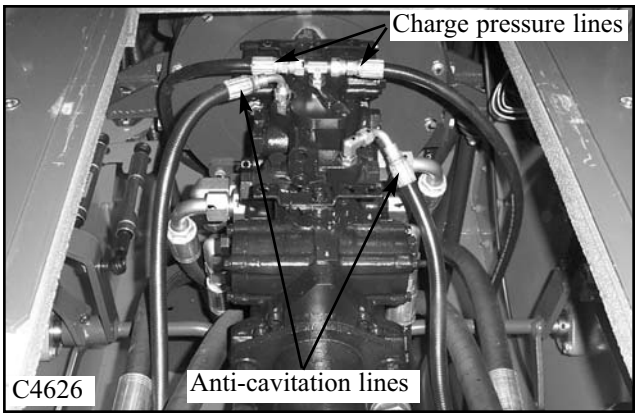
5 Remove the 2 hoses from the tee fitting located on the charge pressure gauge port of the pump. (fig. C4626) Mark the hoses if necessary to ease re-assembly. Remove the tee fitting from the pump and keep in a clean area. Inspect the fitting and o-ring for damage, replace as required. Cap all open ports and lines.

6 Remove the 2 anti-cavitation hoses from the fittings located on the top 2 system pressure gauge port of the pump. (fig. C4626) Mark the hoses if necessary to ease re-assembly. Remove the fittings from the pump and keep in a clean area. Inspect fittings and o-rings for damage, replace as required. Cap all open ports and lines.









TANDEM PUMP REPLACEMENT 2.10

7. Remove the hose from the charge pump inlet and the 2 high pressure hoses for the LH torque motor. (fig. C4632) Mark the hoses if necessary to ease re-assembly. Remove the fittings from the pump and keep in a clean area. Inspect the fittings and o-ring for damage, replace as required. Cap all open ports and lines.

8. Remove the hose from the case drain and the 2 high pressure hoses for the RH torque. (fig. C4633) Mark the hoses if necessary to ease re-assembly. Remove the fitting from the pump and keep in a clean area. Inspect the fittings and o-ring for damage, replace as required. Cap all open ports and lines.

IMPORTANT

When making repairs to the hydraulic system, keep the work area and parts clean. Use caps and plugs on all open lines and ports.

9. Remove the 2 bolts in the bottom of the pump mount support. (fig. C4634)

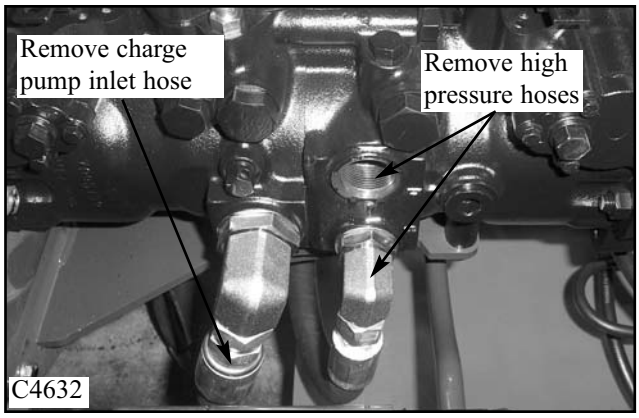
10. Remove the 2 bolts from the rear pump mount located on the front of the engine. (fig. C4635) Inspect the bolts and the matching threads in the pump mount assembly for damage, repair or replace if required.

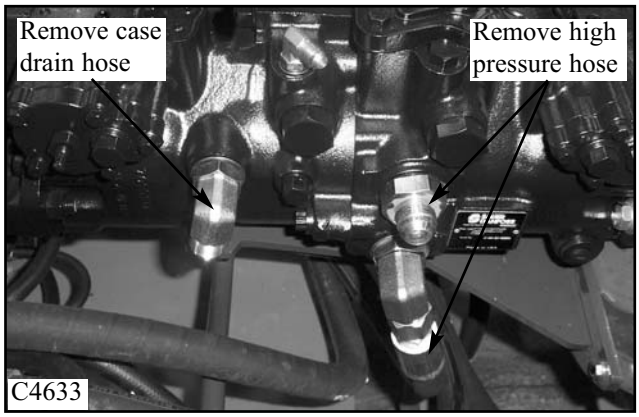
CAUTION

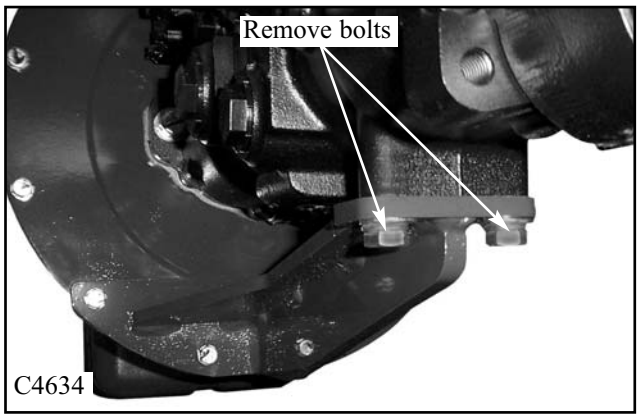
To prevent possible personal injury, do not attempt to lift heavy objects without assistance.

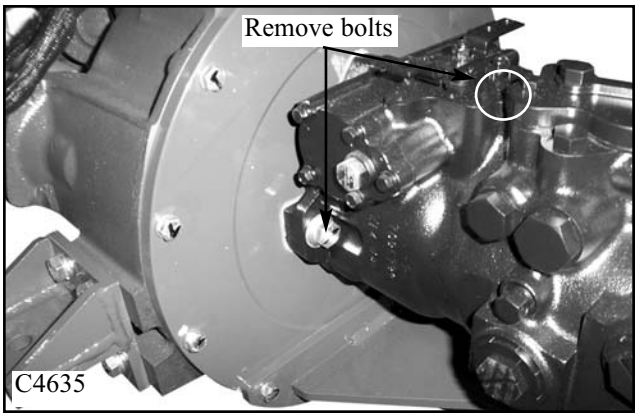
11. Attach a lifting device to the tandem pump using the lifting lug on the pump. The pump is fairly heavy, approximately 130 lbs (59 kg). It is highly recommended to use a mechanical lifting device to assist the removal of the tandem pump.

12. Use the mechanical lifting device to take the weight off the tandem. Slide the tandem pump splined shaft out of the adapter coupling on the engine. Remove the pump from the loader.









—TANDEM PUMP REPLACEMENT 2.10—

2

Upon reassembly, inspect the outside area of the tandem pump housing for damage that may have occurred in transit or handling.

1 Attach a lifting device to the tandem pump. Use the lifting lug that is bolted on the tandem. (fig. C4636)

WARNING

To prevent personal injury, do not attempt to lift heavy objects without assistance.

2 Inspect the coupler on the engine for signs of wear. Apply coupling grease to the spline of the pump and the coupler. Line up the tandem pump input splined shaft with the coupler as you guide the pump into it's mounting location. (fig. C4637)

3 Install the 2 rear mounting bolts.

4 Line up the bottom pump mount holes and install the bolts. (fig. C4634)

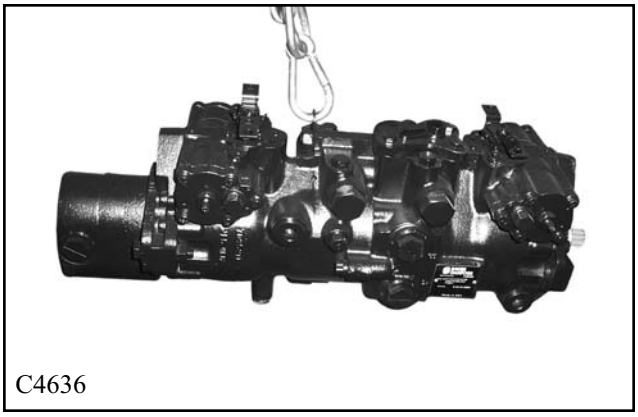
5 Remove the lifting device. Torque the 4 mounting bolts to 80 ft lbs (109 Nm).

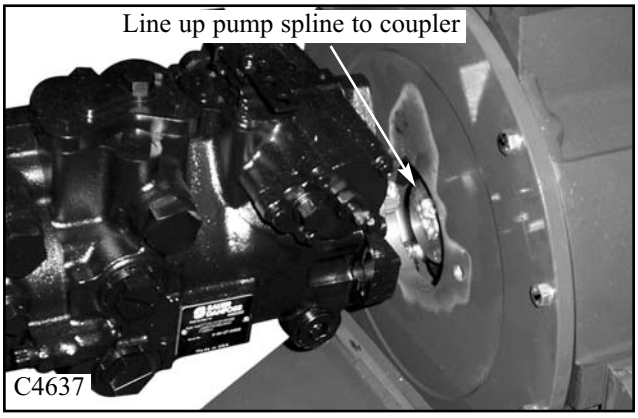
IMPORTANT

When making repairs to the hydraulic system, keep the work area and parts clean. Use caps and plugs on all open line and ports.

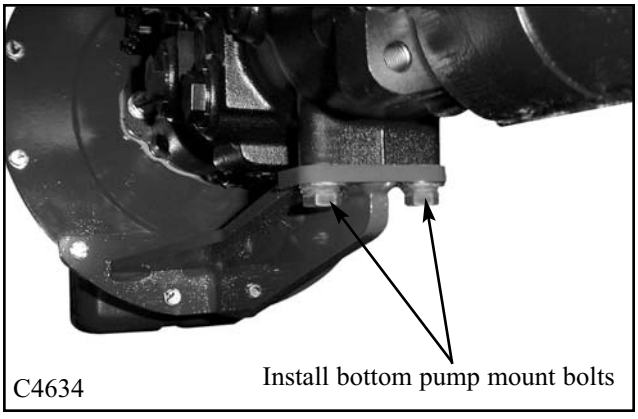
6 Connect the charge inlet hose to the tandem pump from the tee to tank / oil filter. Torque the fittings and hoses according to the Torque Chart in Section 2.13.

7 Connecting the bottom high pressure drive hose and fittings to the tandem pump from the front port on the LH drive motor. Connect the top high pressure drive hose and fitting to the tandem pump from the rear port on the LH drive motor. Follow the Torque Chart in Section 2.13, page 2- 33 when tightening fittings and hoses.

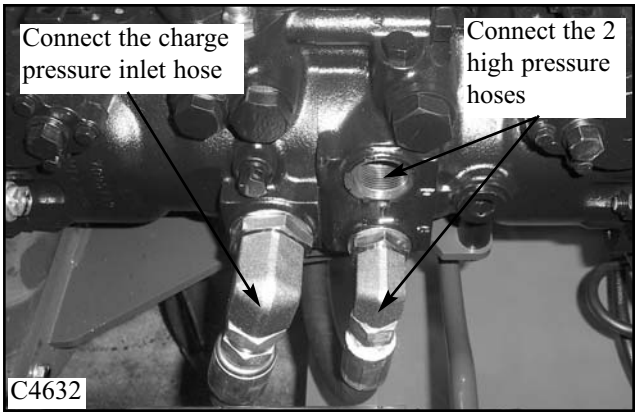

C4636



C4637



C4634



C4632

—TANDEM PUMP REPLACEMENT 2.10—

8 Connect the tandem pump case drain fitting and hose. (fig. C4633) Torque the fittings and hoses to the specifications listed in the Torque Chart in Section 2.13 page 2 - 33.

9 Connecting the bottom high pressure drive hose and fittings to the tandem pump from the front port on the RH drive motor. Connect the top high pressure drive hose and fitting to the tandem pump from the rear port on the RH drive motor. Follow the Torque Chart in Section 2.13, page 2 - 33 when tightening fittings and hoses.

IMPORTANT

Inspect fitting o-rings and flares for marks or damage. Replace if necessary.

10 Connect the auxiliary gear pump outlet fittings and hoses to the gear pump. (fig. C4605) Follow the Torque Chart in Section 2.13 page 2 - 33 when tightening fittings and hoses.

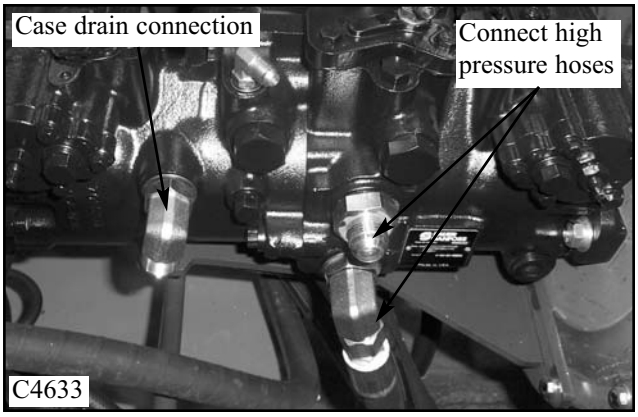
11 Connect the inlet fitting and hose to the auxiliary gear pump. (fig. C4605b) Torque the fittings and hoses to the specifications listed in the Torque Chart Section 2.13.

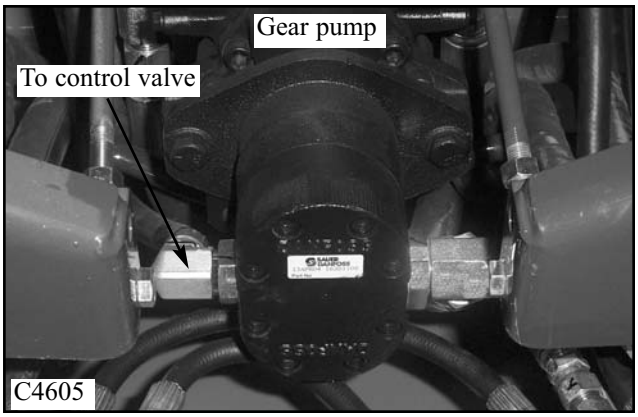
IMPORTANT

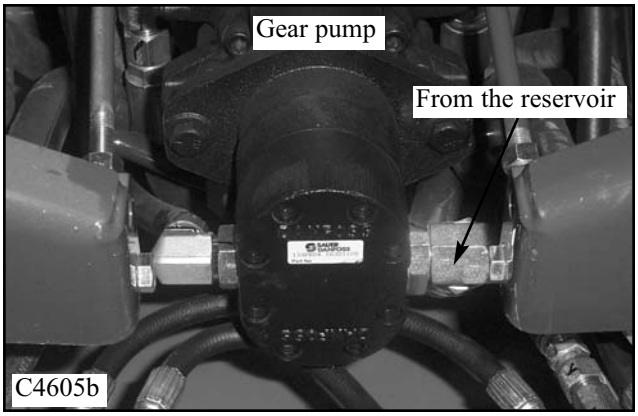
Follow the Torque Chart In Section 2.13 when tightening fittings and hoses.

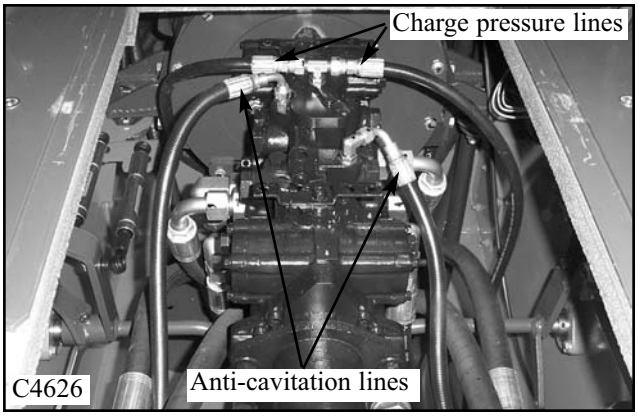
12 Connect tee fitting to the charge pressure gauge port of the tandem pump. Connect the hose from the quick coupler and the hose to the brake valve to the tee. (fig. C4626) Torque the fittings and hoses to the specifications listed in the Torque Chart Section 2.13 page 2-33

13 Connect the fitting to the system pressure gauge port "A" of the pump. Connect the hose from the tee on the RH torque motor. Connect the fitting to the system pressure gauge port "C" of the pump. Connect the hose from the tee on the LH torque motor. Torque the fittings and hoses to the specifications listed in the Torque Chart Section 2.13 page 2-33.









TANDEM PUMP REPLACEMENT 2.10

2

14 Reinstall the pintal levers and steering control linkages outlined in Section 4. (fig. C4631)
15 Fill the hydraulic oil reservoir to the proper level.

IMPORTANT

Follow the start up procedure outlined in section 2.8 upon restarting after pump repairs or replacement.

16 Follow the start up procedure outlined in section 2.8 page 2-16 before attempting to start the loader.

WARNING

This start-up procedure must be made with the loader securely raised off the ground.

17 The start up must be made with the loader raised securely from the ground. Changing the pumps and the steering control linkages has affected the neutral adjustment. Failure to raise the loader clear of the ground may result in the loader engaging in motion and possibly causing serious injury.

WARNING

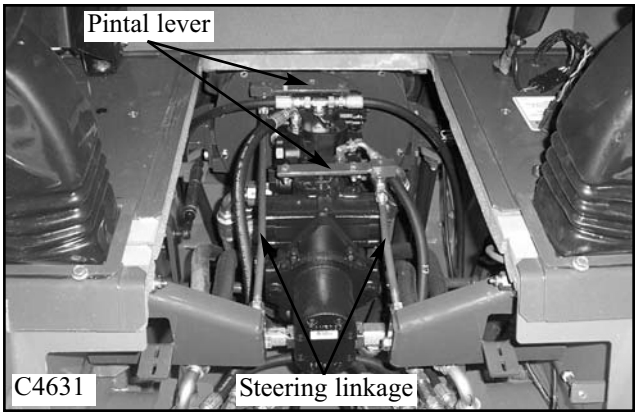
To prevent personal injury never make repairs to the hydraulic system while the engine is operating.

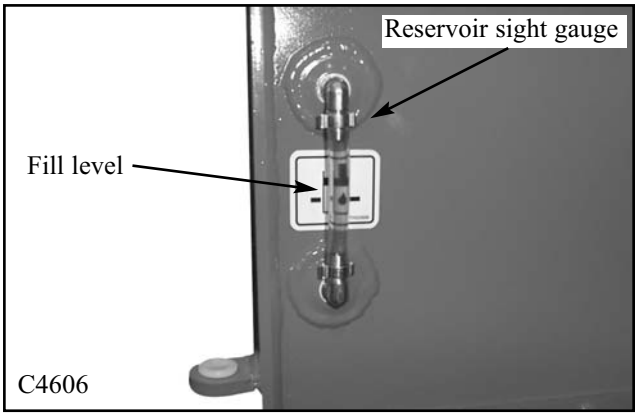
18 Start the loader and check for leaks. Make repairs as necessary and replenish the hydraulic oil reservoir. (fig. C4606) Never use your hands to check for hydraulic leaks.

WARNING

Use caution when dealing with hydraulic fluid under pressure. Escaping fluid under pressure can penetrate the skin and cause serious injury.

19 Make adjustments to the steering controls as required. Follow the procedures for control adjustments in Section 4



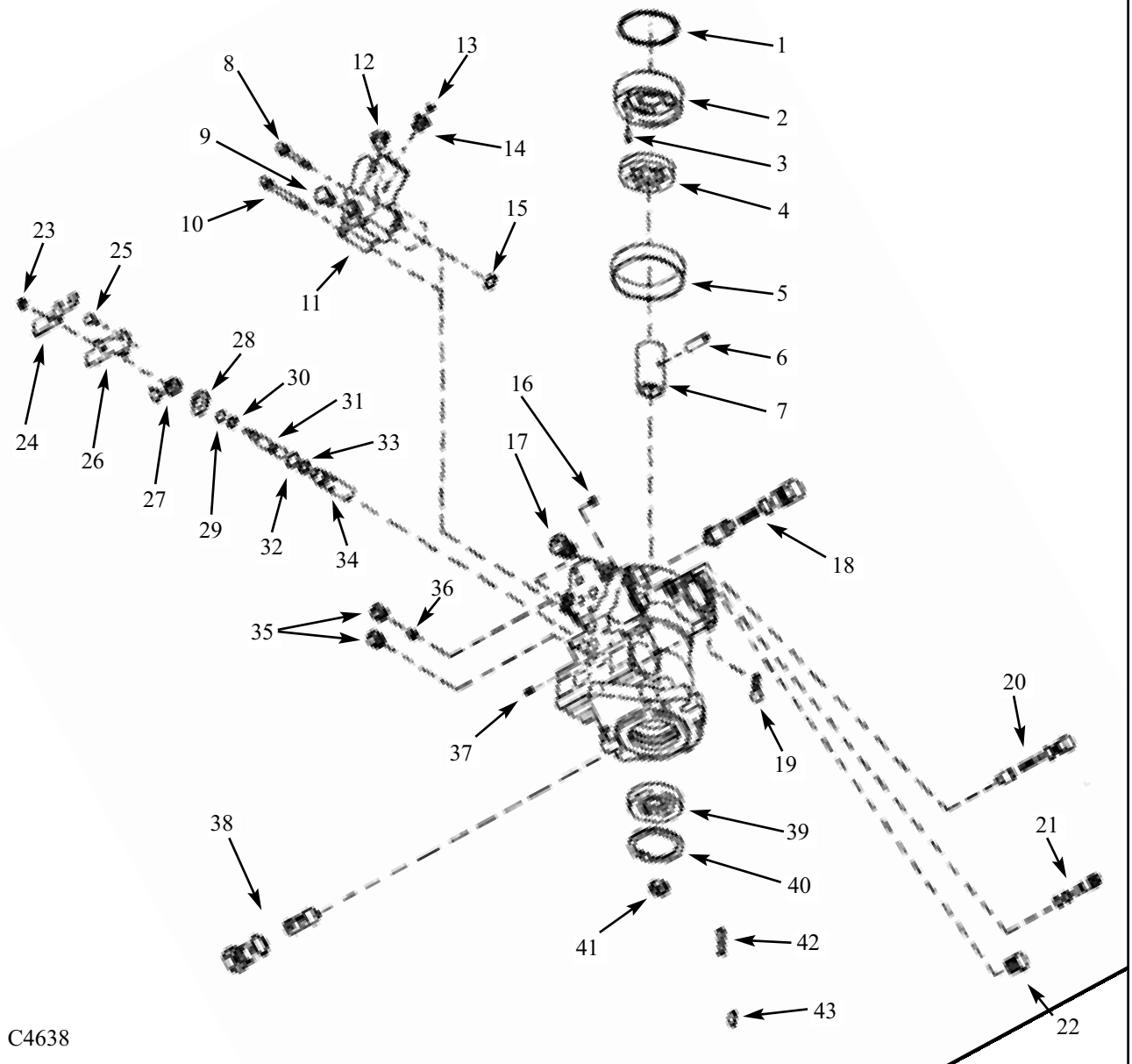


NOTE:

The 250/ 255 use a Sauer Danfoss M46 Tandem Pump.

—TANDEM PUMP PARTS DIAGRAM 2.11—

Danfoss series M46 Tandem Front Pump (Minor Repair)



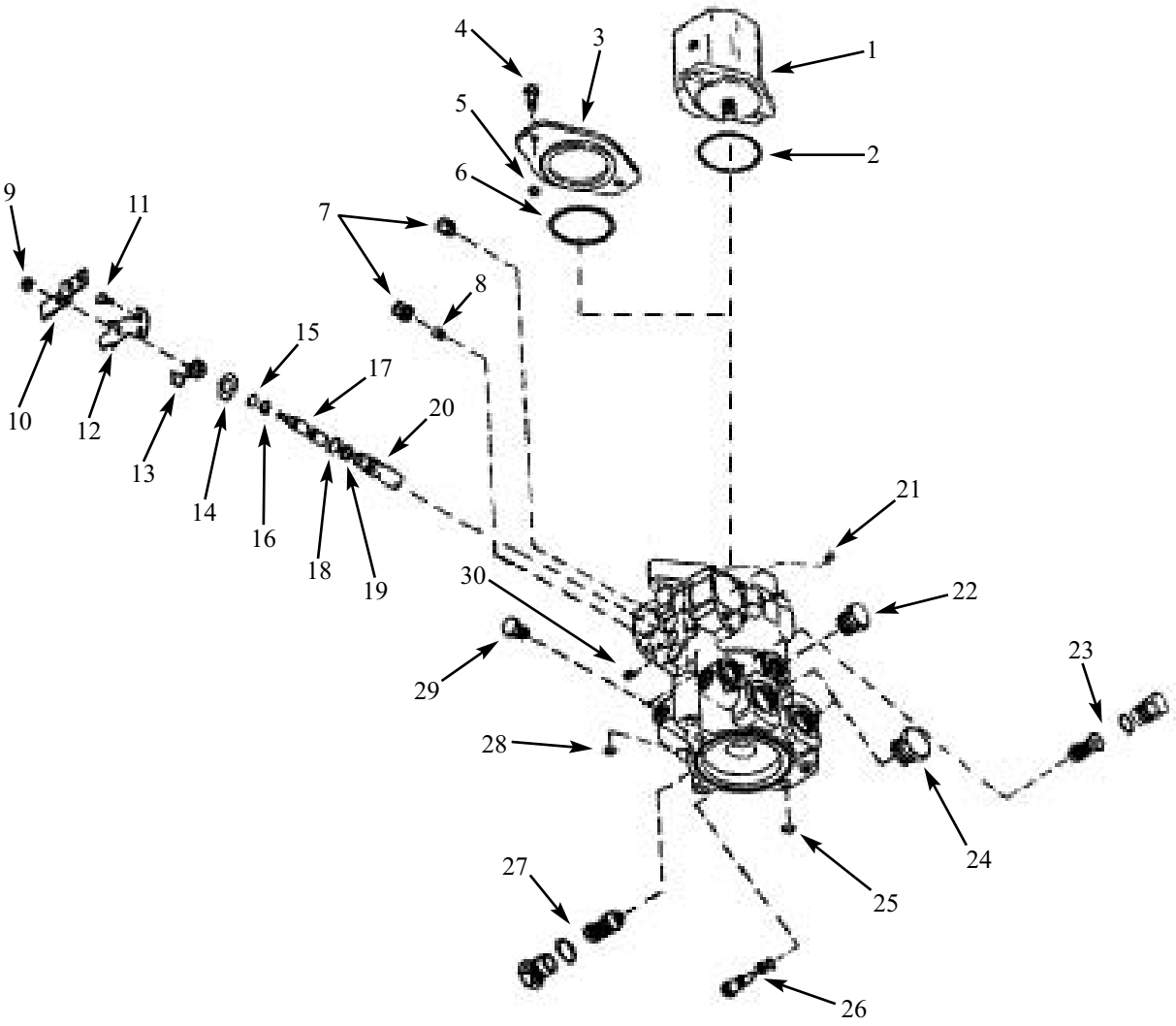
C4638

General Parts Identification

1	O-Ring	12	Plug STD THD	23	Nut special	33	O-ring MDC
2	Gerotor cover	13	Pipe plug	24	Handle control valve	34	Sleeve control valve
3	Pin	14	Plug STD THD	25	Screw Hex HD	35	Plug
4	Gerotor assy	15	O-Ring	26	Bracket neutral return	36	Plug orifice/screen
5	Ring pilot	16	Plug orifice	27	spring neutral valve	37	Plug orifice
6	Pin	17	Plug STD THD	28	Washer special	38	Relief valve kit 345 bar
7	Coupling	18	Relief valve kit 345 bar	29	Ring back up	39	seal lip front pump
8	Screw	19	Screw 12 PT	30	O-Ring MDC	40	Ring
9	Plug STD THD	20	Charge Relief valve kit	31	Spool ROT valve	41	Nut slotted
10	Screw	21	Bypass valve kit		MDC	42	Key
11	Adapt suction filter inlet	22	Plug	32	Ring back up	43	Key

—TANDEM PUMP PARTS DIAGRAM 2.11—

Danfoss series M46 Tandem Rear Pump (Minor Repair)



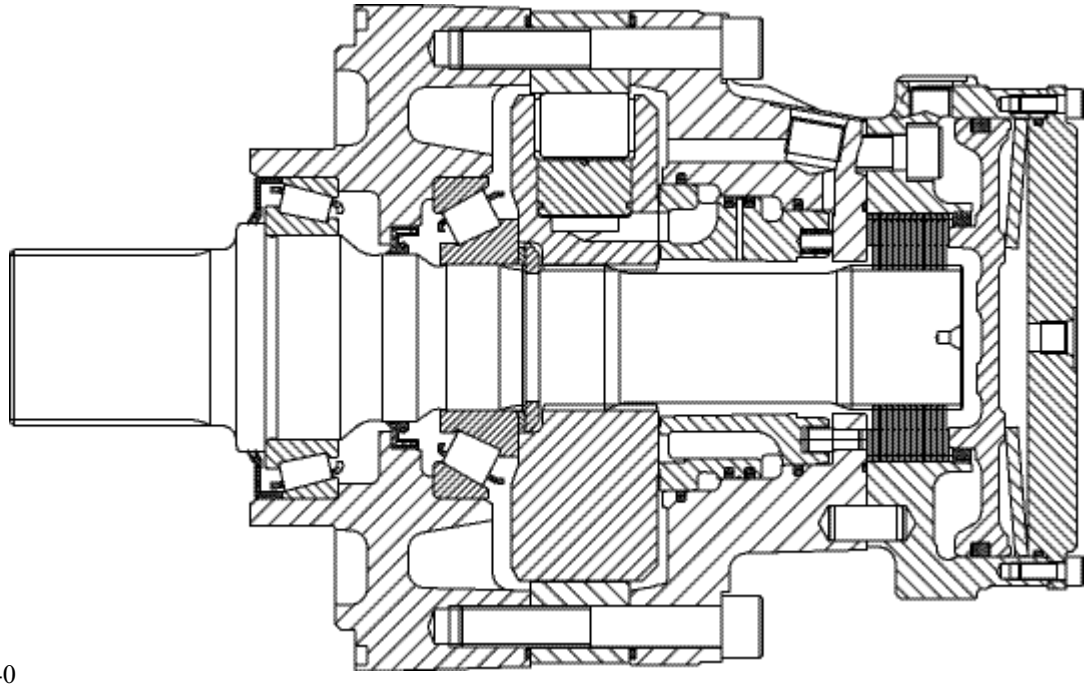
C4639

General Parts Identification

1 Gear pump
2 O-Ring
3 Cover plate
4 Screw Hex HD
5 Nut “B” flange
6 O-Ring
7 Plug
8 Plug orifice/screen
9 Nut special
10 Handle control valve
11 Screw Hex HD
12 Bracket neutral return
13 Spring neutral return
14 Washer special
15 Back up ring
16 O-Ring
17 Spool ROT valve
18 Back up ring
19 O-Ring MDC
20 Sleeve control valve
21 Plug orifice
22 Plug ST THD
23 Relief valve kit 345 bar
24 Plug
25 O-Ring
26 Bypass valve
27 Relief valve kit 345 bar
28 O-Ring
29 Plug STD THD
30 Plug orifice

DRIVE MOTOR 2.12

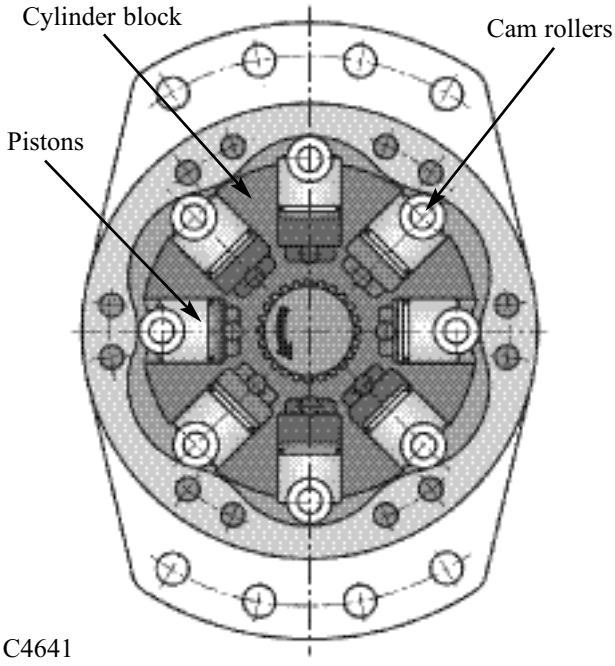
General Information



C4640

The basic radial piston design uses a combination of mechanical and hydraulic principles that are utilized in the high torque, low speed motors.

The hydraulic motors in the 250/255 are type MCR5 motor which has a rotating shaft and a stationary housing. The cylinder block is mounted in fixed roller bearing in the housing and is connected to the shaft by means of a spline. An even number of pistons are radially located in bores inside the cylinder block. The control section directs incoming and outgoing oil to and from the working pistons. Each piston is working against a cam roller. When hydraulic pressure is applied, the cam rollers are pushed against the slope on the cam ring that is rigidly connected to the case. This produces torque which is proportional to the pressure applied. (fig. C4641)



C4641

DRIVE MOTOR 2.12

2

The following gives a detailed description of how the radial piston motor functions.(fig. C4642) Fluid is forced into the cylinder bore containing piston 1. The piston moves outward since the liquid cannot be compressed. This causes the cylinder block to rotate in a clockwise direction. The shaft of the drive motor also rotates clockwise where the cylinder block and shaft are connected by means of a spline. The cylinder block causes piston 2 to start to rotate and approach the position of piston 3. The piston 2 becomes the working stroke and moves the cylinder block The fluid is exhausted as Piston 1 moves inward. The piston is easily moved in it contact with the cam ring. Fluid is easily forced out of the cylinder to the reservoir. Piston 3 then becomes the working piston and rotates the cylinder block. The direction of the motor is changed by reversing the flow of the fluid to the motor.

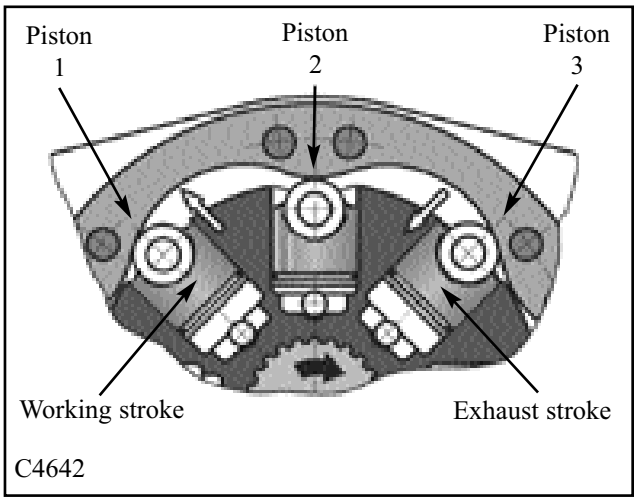
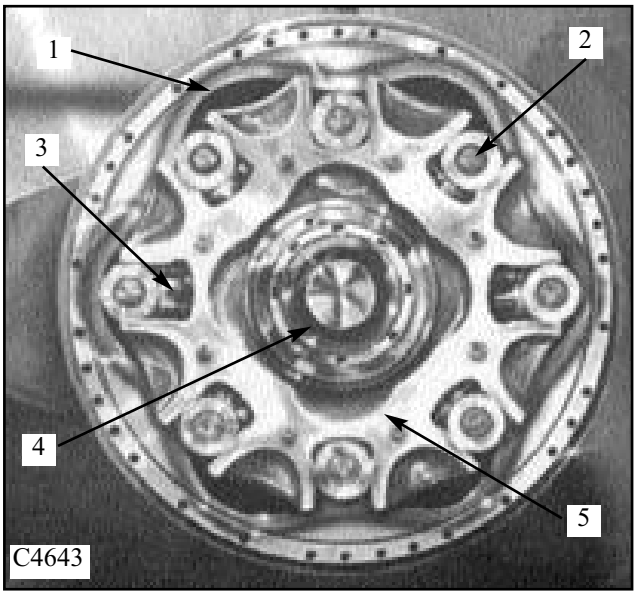


Figure C4643 shows a torque motor disassembled so the rotating parts can be identified.

1 Cam Ring
2 Cam roller
3 Piston
4 Shaft coupling
5 Cylinder block

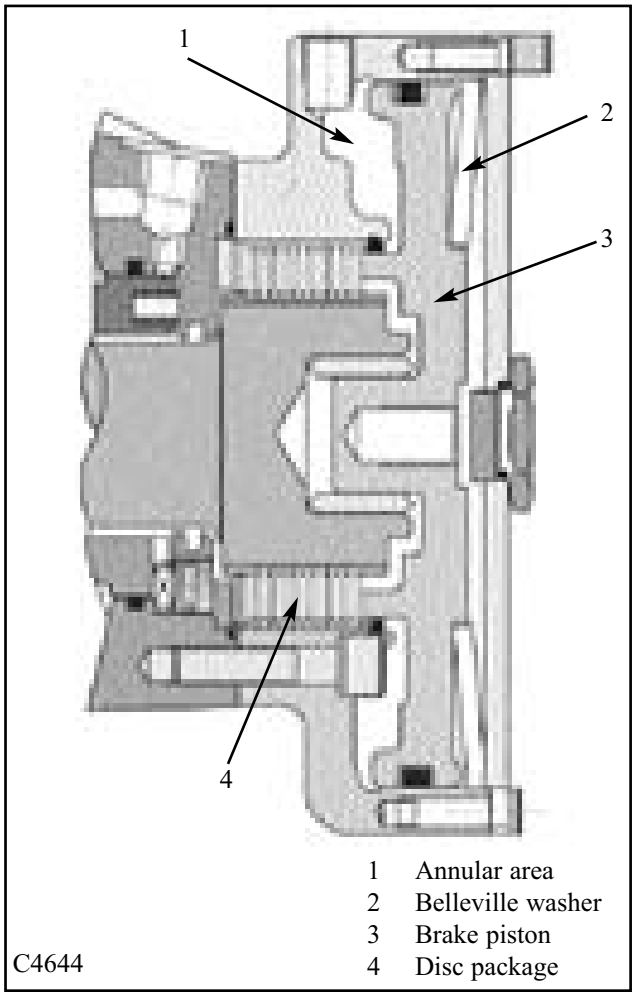


Multi-disc Parking brake

The MCR5 torque motor uses a multi-disc parking brake system. Each motor contains a set of clutch pack type friction disc that are spring loaded in the engaged position. Figure C4644 shows the components of braking system. The brake system functions when hydraulic pressure in the annular area exceeds 210 psi (15 bar). The brake piston is pushed against the belleville washer and the load is taken off the multi-disc package. The holding brake is released. If the pressure in the annular area does not exceed 210 psi (15 bar), the belleville washer will compress the brake piston and hold the multi-disc package.

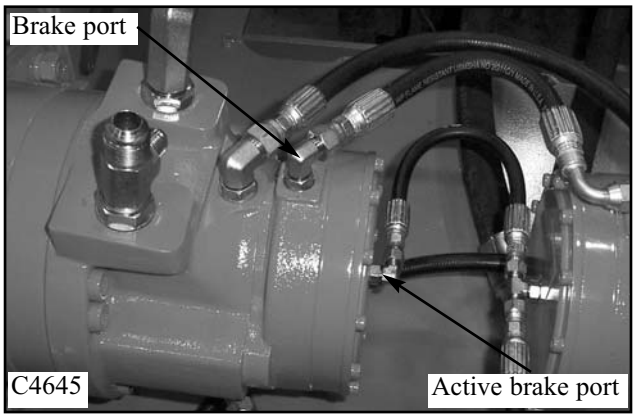
There are 2 brake ports on the MCR5 with each providing a different holding setting. (fig. C4645) The park brake is capable of holding 2200 Nm when the loader is not running and is parked safely. The active brake is capable of holding 5500 Nm when the loader hydraulic system is operating but the operator has raised the restraint bar to activate the park brake. The hydraulic charge pressure provided from the pump, is applied to the active brake port of the torque motor and compresses the brake spring disc to give the system more holding capability.

The park brake will only release when the engine is running, the operator is seated with the seat belt fastened and the restraint bar is in the lowered position. The brake system required 210 psi (15 bar) to release or separate the clutch packs in the drive motors.



C4644

1 Annular area
2 Belleville washer
3 Brake piston
4 Disc package



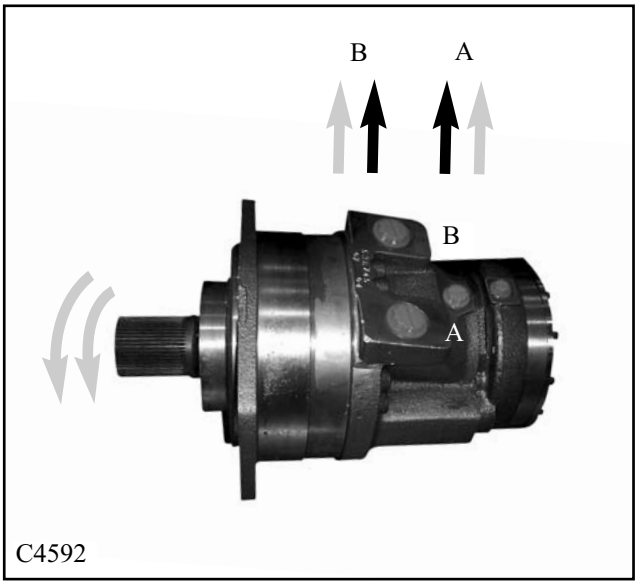
C4645

DRIVE MOTOR 2.12

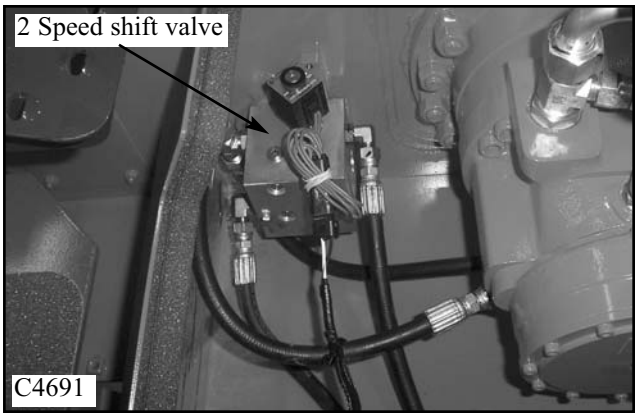
Two Speed Option

Some models of the 255 can operate in 2 different speeds. The radial piston motor has an option where halving the displacement is possible. This means that during the working stroke, only half the pistons are supplied with fluid by way of a valve in the control system. The control valve is integrated into the rear case assembly. The remaining pistons are connected to the outlet side of the motor. When the internal valve is connected, the motor will run at twice the speed but at half the torque.

A shift valve is located in the hydrostatic compartment, in front of the RH torque motor. (fig. C4691) The shift valve is controlled by a switch in the LH steering control lever. Pressing the switch will activate the Hi-speed function. Pressing and releasing the switch a second time will return the loader to the Low-speed function. When the ignition is turned to the "off" position, the two speed control returns to the Low-speed function. See section 5-12 for electrical connection.



C4592



C4691

DRIVE MOTOR 2.12

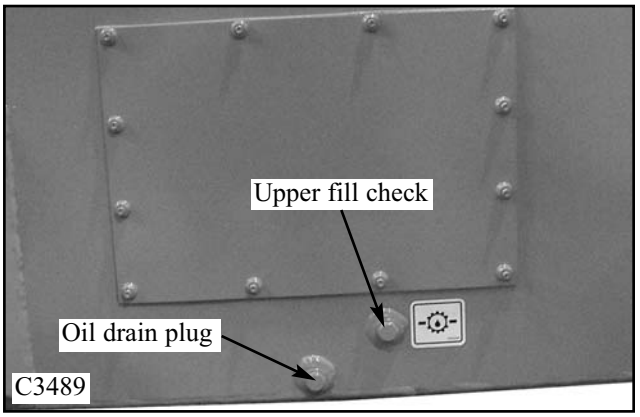
Removal

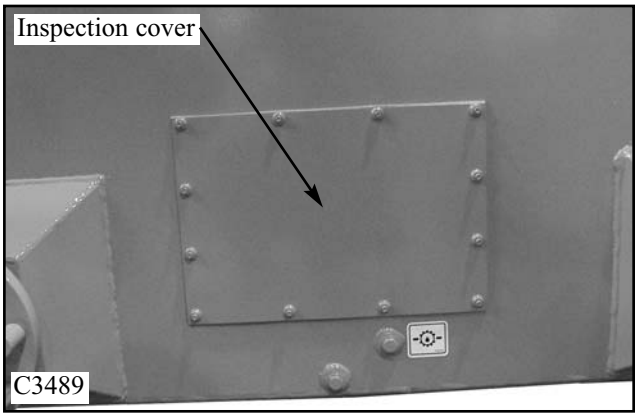
1 Remove any attachment, raise the boom arms and engage the boom support pins. Shut off engine.

WARNING

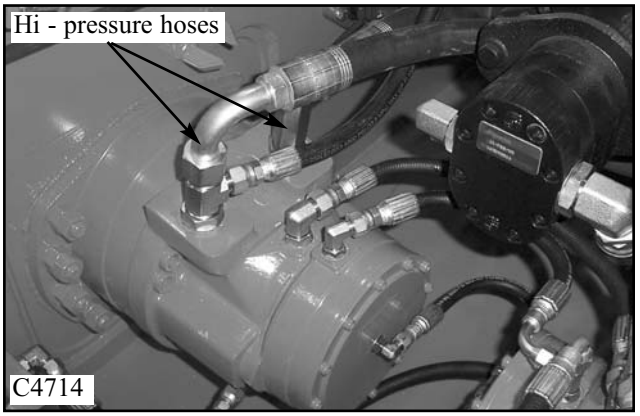
To prevent personal injury do not work under the boom arms without the boom supports engaged.

2 Raise the loader securely off the ground.
3 Remove the wheels on the side to be repaired.
4 Drain the oil from the final drive housing. Be prepared to contain approximately 4.5 gal (17 l) of fluid. (fig. C3489)
5 Remove the seat and hydrostatic shield.
6 Remove the final drive inspection cover located between the axles of the final drive housing.(fig. C3489)
7 Disconnect the chain as outlined in Section 3.





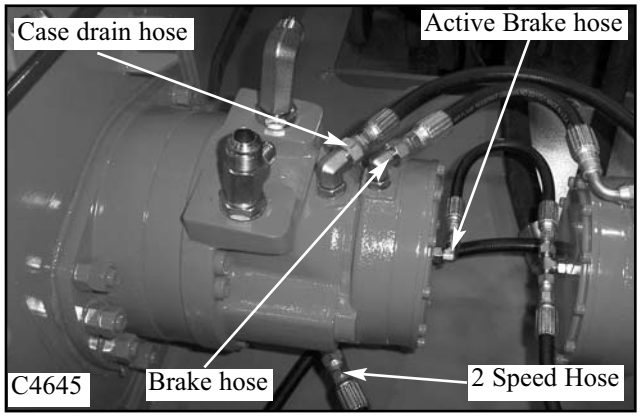
8 Remove the 2 high pressure hoses from the drive motor. (fig. C4714) Cap the open hose ends and fittings to prevent contamination.



IMPORTANT

When making repairs to the hydraulic system, keep the work area and parts clean. Use caps and plugs on all open line and ports.

9 Disconnect the brake line hose, 2 speed hose and the case drain hose from the drive motor. Cap the hoses and open lines in the drive motor. (fig. C4645)
10 Remove the adapter fittings from the drive motor. Plug the open ports in the drive motor to prevent contamination.



DRIVE MOTOR 2.12

Removal

11 Remove the drive motor sprocket by loosing the bolt located in the center of the shaft. Visually inspect the drive motor sprocket. Check for worn or damaged teeth on both the outside of the sprocket, and the inside spline (fig. C4646).

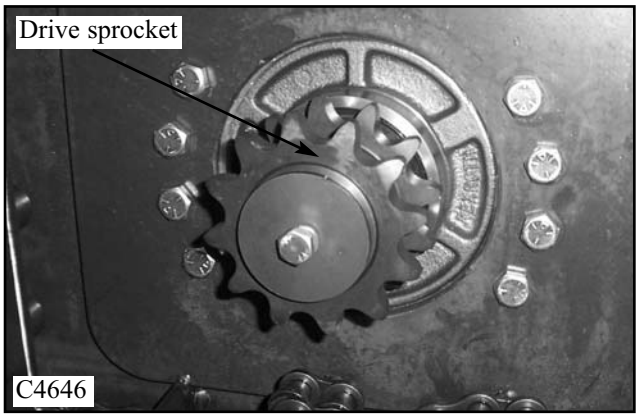
12 Remove the jam nuts, mounting nuts and lock washers from the 8 mounting bolts retaining the drive motor to the final drive housing. Hold the head of the bolts from inside the final drive housing. (fig. C4648) Take note that the top rear mounting bolt is shorter so it does not interfere with the cable for a hand controls.

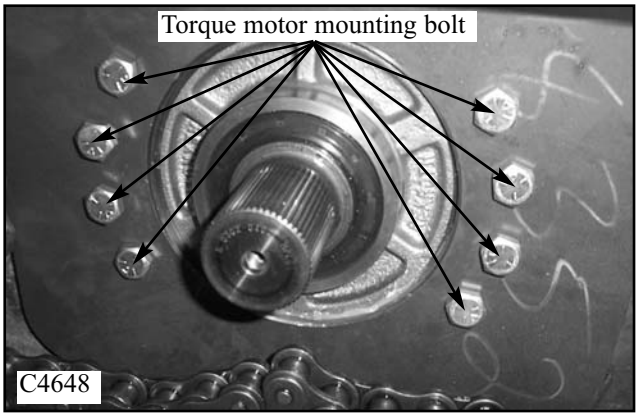
WARNING

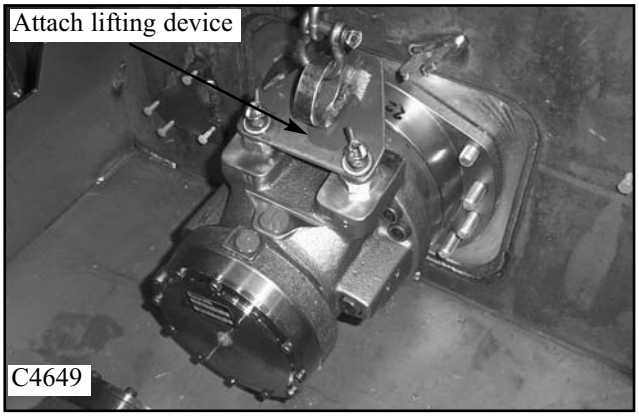
To prevent personal injury, do not attempt to lift heavy objects without assistance.

13. Attach a lifting device on the torque motor (fig. C4649) The toque motor is fairly heavy, approximately 75 lbs (34 kg). It is highly recommended to use a mechanical lifting device to assist the removal of the torque motor and avoid personal injury.

14 If the drive motor replacement is being performed because of major parts failure, such as internal damage, the hydraulic system must be checked for contamination and flushed if necessary as outlined in Section 2.7.







DRIVE MOTOR 2.12

Replacement

1 Clean the torque motor mounting areas thoroughly that need to be sealed with silicone (fig. C4650) Clean the sealing area around the inspection cover.

2 Install the mounting bolts in the holes on the mounting plate. Remember the short bolt is installed on the rear upper corner.

3 Apply a bead 1 / 4 of an inch thick around the drive motor bearing retainer and around each mounting hole. (fig. C4651)

4 Attach a lifting device on the torque motor. The torque motor is fairly heavy, approximately 75 lbs (34 kg). It is highly recommended to use a mechanical lifting device to assist the removal of the toque motor.

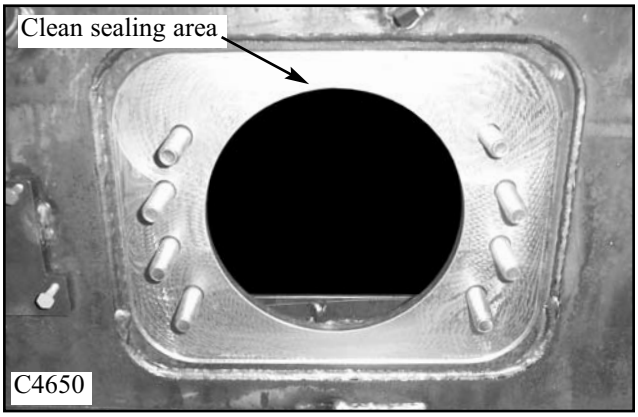
5 Careful set the torque motor in it's mounting location so the silicone seal is not damaged.(fig. C4649) Install the mounting nuts and torque to 100 ~110 ft lbs (136 ~ 149 Nm.)

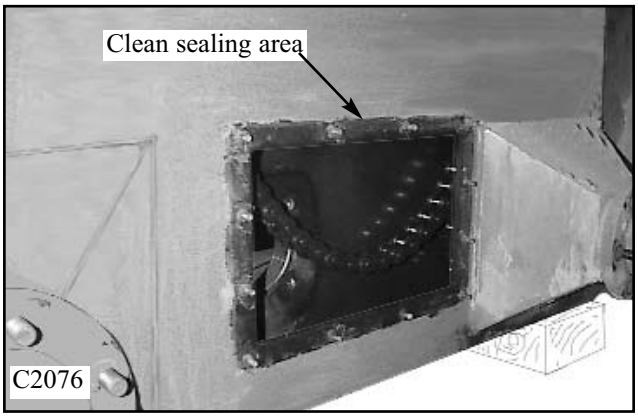
6 Install the 8 jam nuts. Torque the jam nuts to 100 ~ 110 ft lbs (136 ~ 149 Nm.)

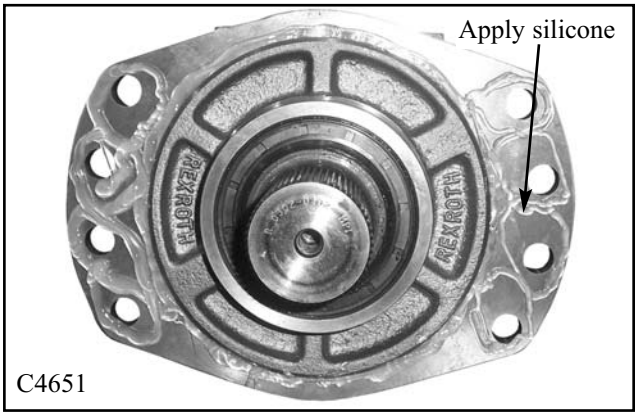
7 Install the drive motor sprocket on the spline of the torque motor. Reinstall the machine washer and bolt. Apply Loctite 242 (blue) to the drive sprocket bolt and torque to 40 ft lbs (54Nm)

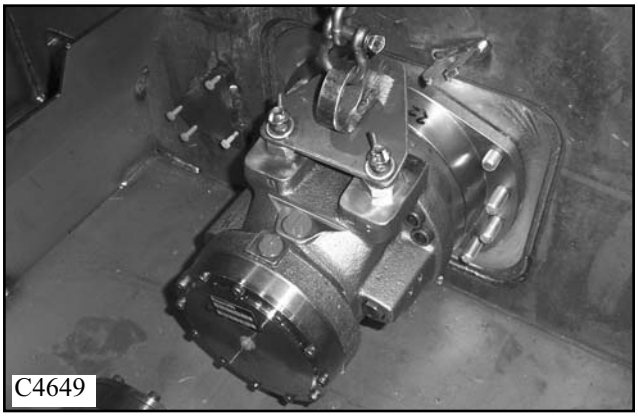
8 Replace the master link in the dive chain. Section 3. shows chain replacement procedure.

9 Add oil to the final drive housing unit it trickles out the upper check plug hole. This will require approximately 4.5 gal (17 liters) of 10w30 API SJ oil.









DRIVE MOTOR 2.12

2

IMPORTANT

When making repairs to the hydraulic system, keep the work area and parts clean. Use caps and plugs on all open line and ports.

IMPORTANT

Inspect fitting o-rings and flares for marks or damage. Replace if necessary.

9 Install the high pressure adapter fittings to the drive motor ports.

WARNING

Use caution when dealing with hydraulic fluid under pressure. Escaping fluid under pressure can penetrate the skin and cause serious injury.

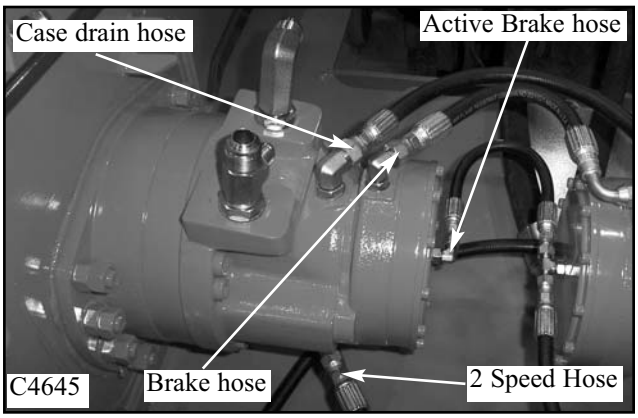
10 Install the adapter fitting to the brake lines and case drain. Connect the hoses to the brake line, case drain and 2 speed (if applicable) on the toque motor.(fig. C4645) Torque the fittings and hoses according to the toque chart in section 2.13 page 2-33.

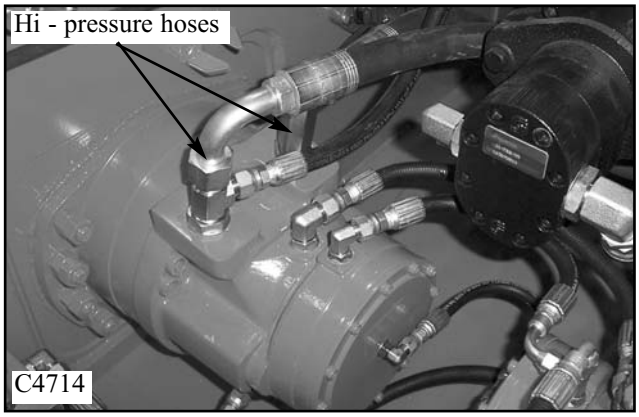
WARNING

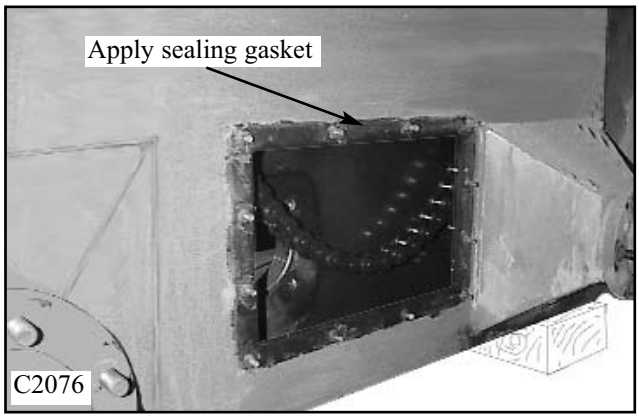
To prevent personal injury never make repairs to the hydraulic system while the engine is operating.

11 Install the high pressure drive hoses. (fig. C4714) Torque the fittings and hoses according to the torque chart in section 2.13 page 2-33.

12 Clean the final drive housing and inspection cover thoroughly before sealing the transmission. Apply the gasket seal to the transmission. (fig. C2076)
13 Install the inspection cover. When installing the nuts, do not over tighten. The mounting torque should not exceed 15 lbs ft. (20 Nm)
14 Start the engine and check for hydraulic leaks. Do not use your hands to trace hydraulic leaks. Shut off the engine and inspect each fitting for proper torque.
15 Install the wheels and torque the nuts at 100 to 110 ft lbs. (136 to 149 Nm.)(fig, C3497)
16 Install shields and seat, let loader down to ground and test drive to check performance.







TORQUE CHART 2.13

NOTE: all torque specifications are in ft lbs. (Multiply by 1.36 = Nm)

Hydraulic Fittings

HOSE SIZE	37º JIC FITTINGS	HOSE SIZE	ORB FITTINGS
1/4	9 to 10	1/4	14 to 16
5/16	15 to 16	5/16	18 to 20
3/8	20 to 22	3/8	24 to 26
1/2	30 to 33	1/2	50 to 60
5/8	40 to 44	5/8	72 to 80
3/4	70 to 77	3/4	125 to 135
7/8	82 to 90	7/8	160 to 180
1	55 to 60	1	200 to 220
1 1/4	120 to 132	1 1/4	210 to 280
1 1/2	131 to 144	1 1/2	270 to 360
2	300 to 330		

The following torque specifications are for steel ORB fittings into aluminum.

HOSE SIZE	ORB FITTINGS	HOSE SIZE	ORB FITTINGS
1/4	5 to 7	3/4	40 to 45
5/16	8 to 10	7/8	50 to 55
3/8	10 to 12	1	90 to 99
1/2	21 to 24	1 1/4	80to 90
5/8	27 to 30		

Tandem Pump

Description	Qty.	Specification
Bottom Support	2	80 (+/- 2)
Rear Mounting	2	80 (+/- 2)
Trunion Seal Carrier	4	20 (+/- 2)
Trunion Seal Cover	4	20 (+/- 2)
Relief Valve	4	40 (+/- 10)
Charge Relief Cap	1	40 ~ 100
Tandem Section	4	40 (+/- 5)
Gear Pump	2	51 ~ 62

SECTION 3 FINAL DRIVE

SPECIFICATIONS & MAINTENANCE 3.1

Specifications

Chain Size ..... ANSI RS 100H
Approved Chain Manufacturer ..... Tsubaki
Lubricating Oil ..... 10W30 API Classification SJ
Oil Capacity (each) ..... 4.5 gal (17 Liters)
Torque Specifications:
Motor Sprocket Bolt ..... 40 ft lbs (54 Nm)
Wheel Nuts ..... 100 - 110 ft lbs (135 - 149 Nm)
Tire Pressure ..... 45 ~ 50 psi (310 ~ 345 kPa)

3

Maintenance — Initial Check (hrs) — Check Every (hrs)

Maintenance	Initial Check (hrs)	Check Every (hrs)
Tire Pressure	8	8
Wheel Nut Torque	8	8
Lubrication Oil	50	150 (*)
Motor Mounting Nuts	50	150
Axle Bearing Pre-load	50	150

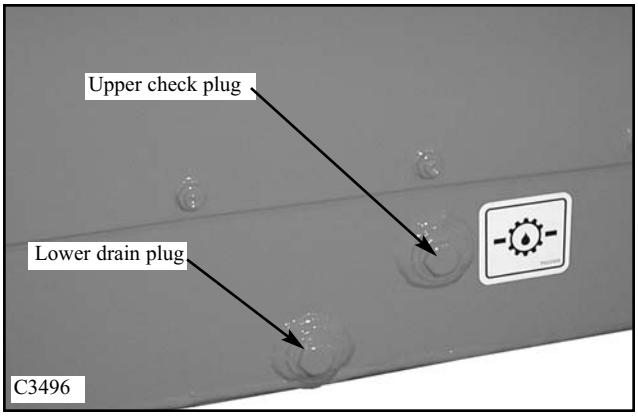
(*) Change every 1000 hours.

LUBRICATION 3.2

Checking The Oil Level

The loader has 2 independent final drive housings. When checking the oil level ensure the loader is on a level surface.

1 Remove the top (upper) check plug located between the 2 tires at the side of the loader. (fig. C3496)
The oil level should be at the top of the check hole with a little to trickle out.

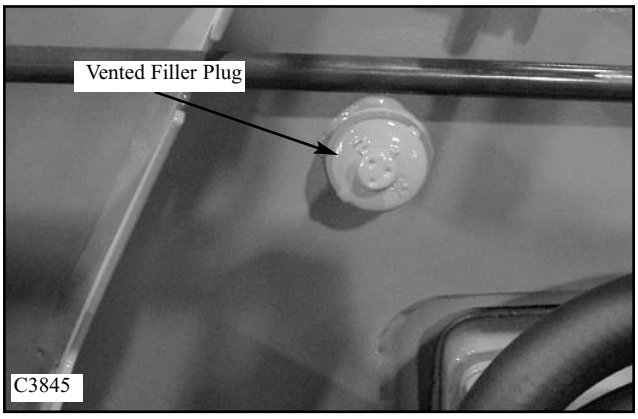


WARNING

Never work under a raised boom arm without the boom supports engaged and the engine shut off.

Adding Oil

Oil should be added with the loader on a level surface.
1 Remove any attachment, raise the boom arms and engage the boom support pins. Shut off the engine.
2 Remove the oil level check plug as outlined above. (fig. C3496)
3 Remove the seat plate and hydrostatic shield.
4 Remove the vented filler plug. (fig. C3845)
5 Add 10W30 API classification SJ oil until it begins to flow out the upper check hole. Total final drive housing capacity per side is 4.5 gal (17 liters).
6 Replace all plugs.

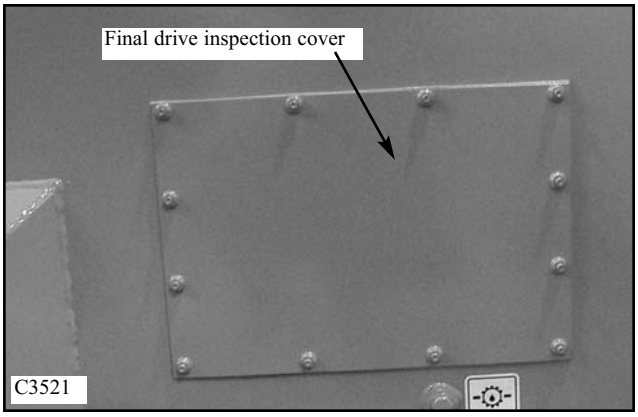


IMPORTANT

Check the final drives closely for damaged seals or other leaks if the oil level is excessively low.

Changing The Oil

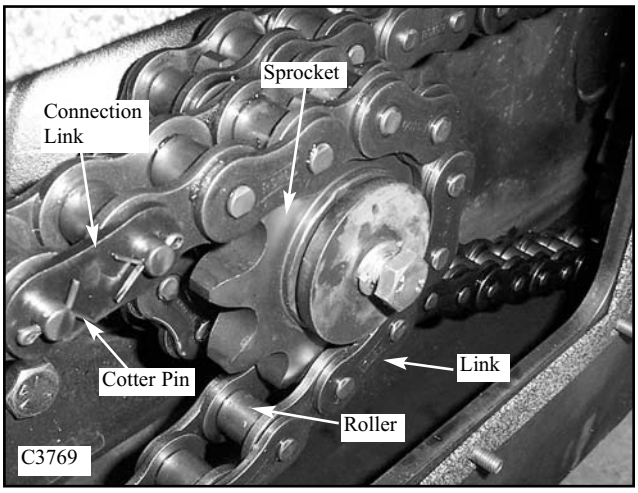
Ensure the loader is on a level surface before changing the oil.
1 Shut off the engine.
2 Slide a drain pan under one of the lower drain plugs located at the side of the loader, between the wheels. (fig. C3496) Be prepared to contain 4.5 gal (17 liters) of oil.
3 Remove the drain plug. Allow the oil to drip completely out of the final drive housing. Replace the drain plug . Dispose of the waste oil in an environmentally friendly manner. If the oil is contaminated, remove the side inspection cover to flush the housing. (fig. C3521)
4 Replenish the oil as outlined above in Adding Oil with 10W30 API classification SJ oil.



DRIVE CHAIN 3.3

Chain Inspection

The drive chains should be inspected for wear or damage after the first 50 hours of operation and every 150 hours thereafter, or at any time the final drive inspection cover is removed. If the chain shows any sign of wear or damage replace it. (fig. C3769) Inspect as follows:

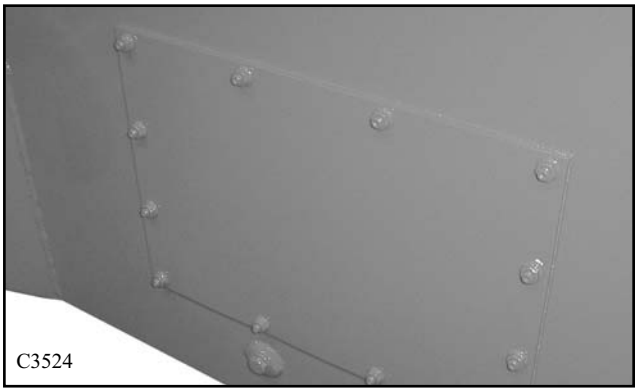


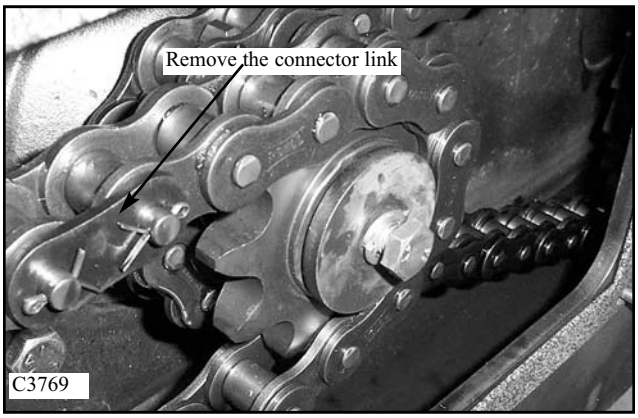
1. Inspect the chain for excessive roller wear
2. Inspect the chain for excessive wear on the link plates
3. Inspect the connection link cotter pins for wear or damage caused by interference.
4. Check the sprocket for excessive wear or damage such as broken teeth or sharp/rounded teeth.
5. If the chain is removed from the loader, check for stiffness caused by wear between the pins and bushings.
6. If the chain is removed from the loader, check that when laid out it runs straight and not to one side, indicating misalignment.

DRIVE CHAIN 3.3

Chain Removal

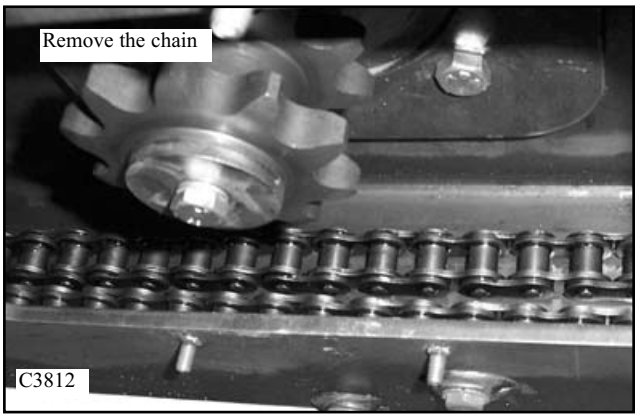
1 Remove any attachment, raise the boom arms and engage the boom support pins. Shut off the engine.
2 Block the loader securely with all 4 wheels clear of the ground.
3 Remove the wheels from the side of the loader the chain is to be removed.
4 Clean the excess dirt from the final drive housing. Drain the plug area and the inspection cover area located between the 2 axle towers. (fig. C3524)
5 Remove the lower drain plug and drain the oil. Refer to Section 3.2 page 3-3.
6 Remove the final drive inspection cover. (fig. C3524)
7 Rotate the chains, if necessary, to locate the master connecting link by starting the engine and engaging the steering control. Be sure the loader is securely raised clear of the ground. Shut off the engine.


C3524



C3769

8 Remove the cotter pins from the master connecting link and remove the connecting link. (fig. C3769) The connecting link is a press fit type and will need to be supported as you drive the link pins through the link plate.



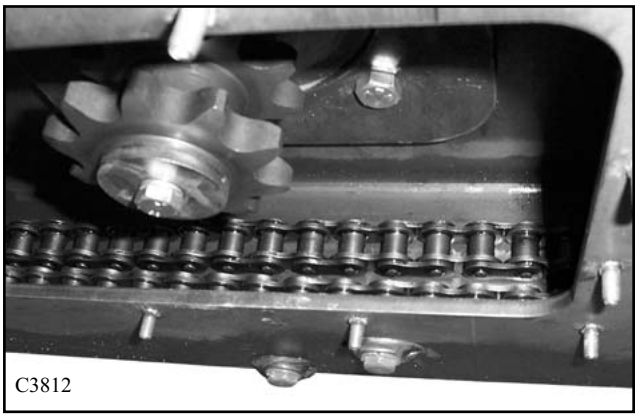
C3812

9 Remove the front or rear chain from the housing by turning the axles by hand and pulling the slack chain out the inspection cover area. (fig. C3812)

DRIVE CHAIN 3.3

Chain Installation

1 Install the wrapped chain into the final drive housing. (fig. C3812)


C3812

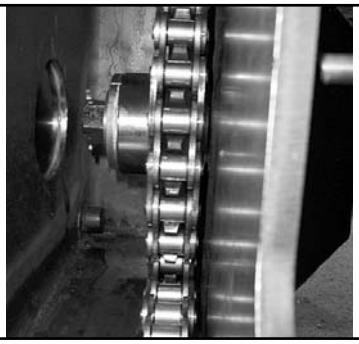
3

2 Place one end of the front chain over the top of the front axle sprocket. Rotate the axle and bring the chain along the bottom of the final drive housing to approximately the center. (fig. C3809) Wrap the other end of the chain around the motor sprocket teeth closest to the motor.


C3809

3 Place the ends together and install the new connecting link so that the cotter pins face away from the inspection cover. (fig. C3810). Bend the ends of the cotter pins at least 90 degrees.

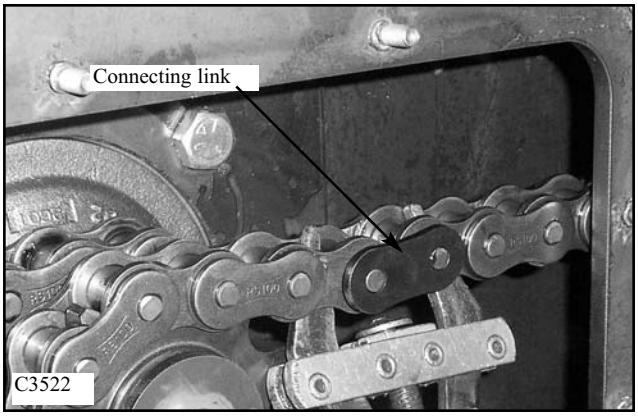
4 Wrap the rear chain over the rear axle sprocket. Rotate the axle and chain around the bottom of the final drive housing and around the bottom of the motor sprocket closest to the inspection cover opening until the ends of the chain meet together.


C3810

5 Install a new connecting link. (fig. C3522) Place the connecting link into the chain so the cotter pins face the inspection cover hole. Bend the ends of the cotter pins at least 90 º apart.

6 Replace the inspection cover using the gasket. Do not over tighten the inspection cover nuts. 15 ft lbs maximum. (20 Nm)

7 Replace the wheels and torque the wheel nuts to 100 to 110 ft lbs. (136 to 149 Nm).



C3522

DRIVE MOTOR SPROCKET 3.4

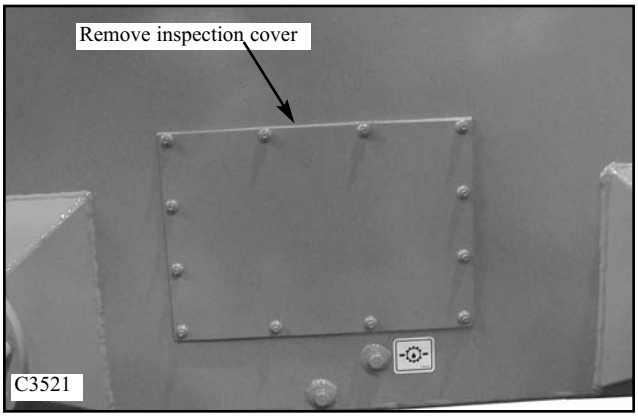
Replacement

The torque motor drive sprocket can be removed from the loader without removing the drive motor from the final drive housing.

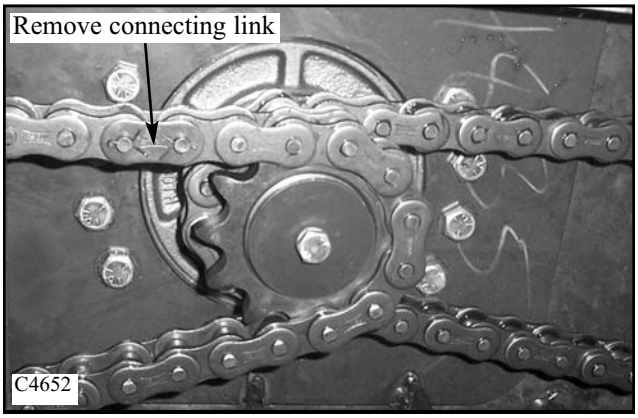
1 Place the loader on a level surface, engage the parking brake and shut off the engine.

2 Raise the loader securely from the ground and remove the wheels on the side to be worked on.

3 Remove the inspection cover located between the axle assemblies. (fig. C3521)

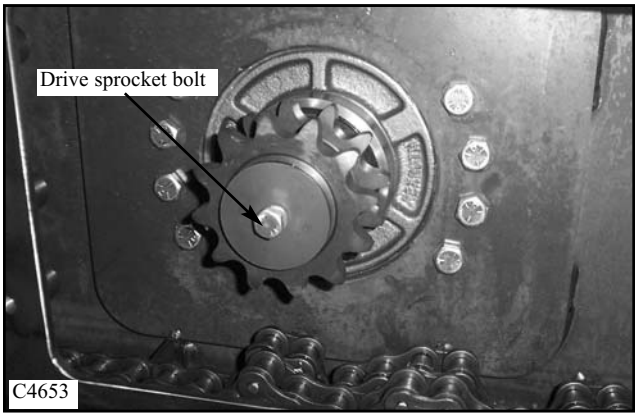


4 Remove the connector link from the front and rear chains. (fig. C4652)



5 Remove the bolt retaining the drive sprocket to the drive motor. (fig. C4653)

6 Slide the sprocket off the drive motor shaft. (fig. C4653 & C4654)

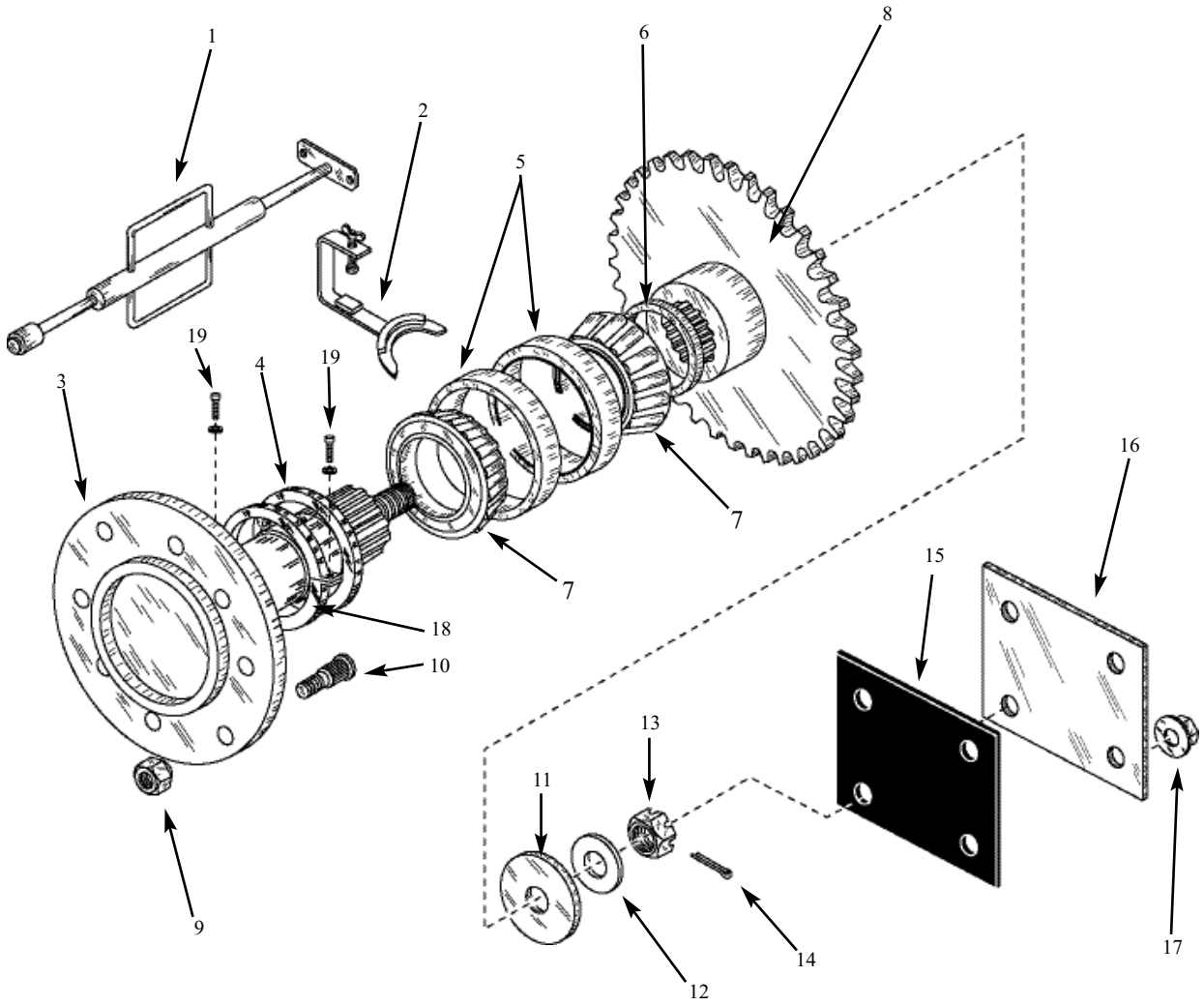


7 Replace the drive sprocket in the reverse order above. Apply Loctite 242 (blue) to the drive sprocket bolt and torque the bolt to 40 ft lbs (54 Nm).

AXLE ASSEMBLY 3.5

3

Axle Assembly C4151

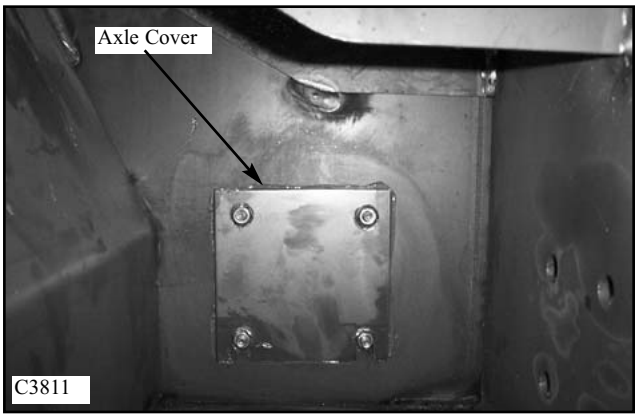


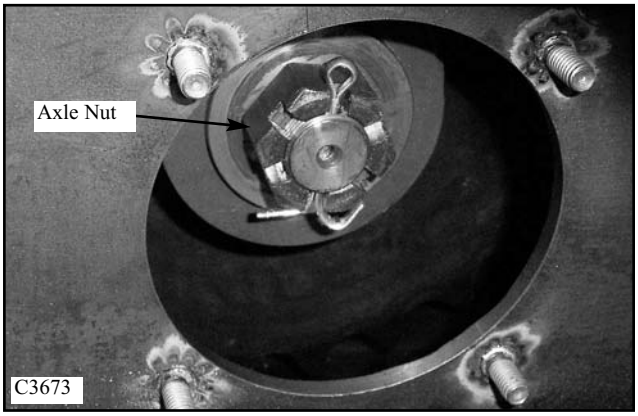
1. Axle Puller
2. Seal Installation Tool (2)
3. Axle Ass'y
4. Seal
5. Bearing, Cup
6. Plate, Axle Spacer
7. Bearing, Cone
8. Sprocket
9. Wheel Nut
10. Wheel Stud
11. Plate, Axle Washer
12. Washer, Axle
13. Castle Nut
14. Cotter Pin
15. Gasket, Transmission Axle Cover
16. Sheet, Rear Cap
17. Nut, Hex Flange
18. Plate, Axle Seal Protector (optional)
19. Screw Cap 1/4" UNC (Optional)

AXLE ASSEMBLY 3.5

Axle Removal

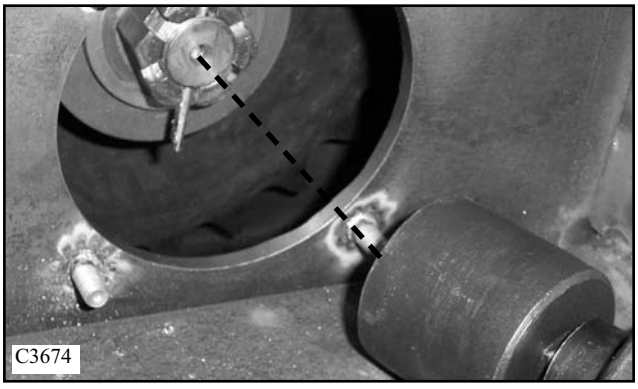
1 Remove any attachment, raise the boom arms and engage the boom support pins. Shut off the engine.
2 Block the loader securely with all 4 wheels clear of the ground.
3 Remove the wheels from the side of the loader the chain is to be removed.
4 Clean the excess dirt from the final drive housing drain plug area and the inspection cover area located between the 2 axle towers.
5 Drain the lubricating oil from the final drive housing. Refer to Section 3.2 page 3-3.
6 Remove the final drive inspection cover located between the 2 axles.
7 Remove the drive chain from the sprocket of the axle being replaced. Refer to Section 3.3 page 3-5.
8 **FRONT AXLE:** Remove the foot peal assembly if so equipped. Refer to Section 4.
9 Remove the inner axle cover plate from the final drive housing. (fig. C3811)
10 **REAR AXLE:** Remove the inner axle cover plate from the final drive housing.
11 Remove the split pin from the castle nut on the end of the axle. (fig. C3673)



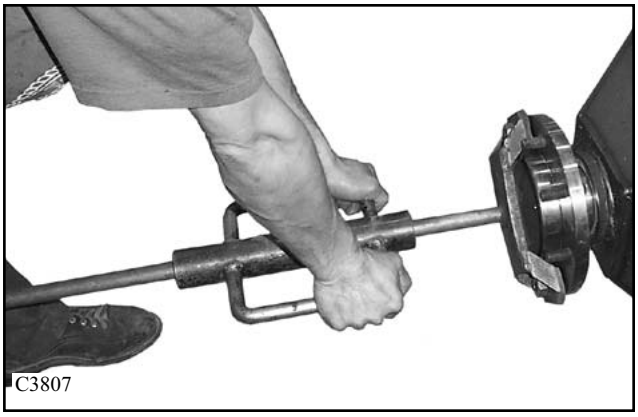


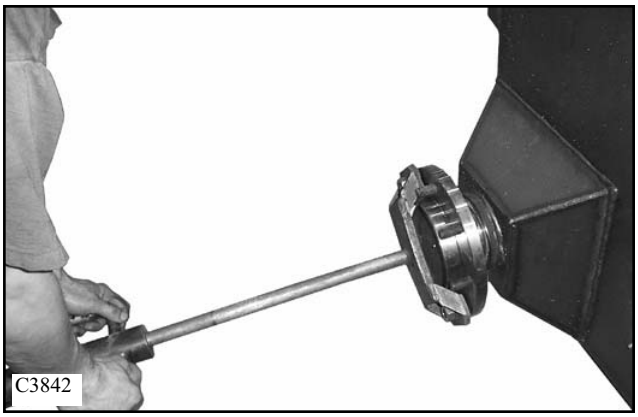
12 The axle may be held stationary by inserting a bar between the wheel studs.

13 Remove the rear castle nut and axle washer. (fig. C3674)



14 Attach a special axle puller tool, Thomas P/N 960475, to the axle flange wheel studs using the wheel nuts that are on the loader. (fig. C3807)
15 Using the slide hammer action of the special puller, remove the axle. The rear bearing and axle sprocket will remain in the final drive housing. (fig. C3842)
16 Remove the axle sprocket and bearing from the final drive housing through the inspection cover area.


C3807

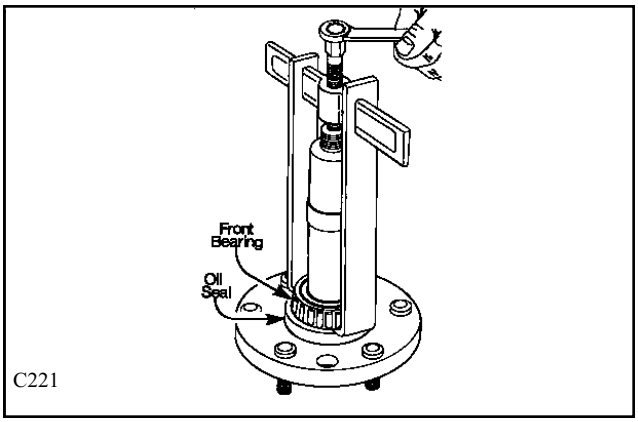

C3842

17 Using a bearing puller, remove the bearing still pressed in place on the axle. (fig. C221)
18 Remove and discard the axle oil seal.

Inspection

1 Inspect the seal surface area for scaring, pitting or nicks. Minor scratches may be removed using fine emery cloth. Replace the axle if worn excessively.
2 Inspect the axle threads for damage. Replace axle if the threads are non serviceable.
3 Inspect axle spline for wear and replace if neccessary.
4 Replace any axle studs as required (page 3-14)
5 Inspect the axle sprocket for abnormal tooth wear and inspect sprocket spline for wear. Replace the sprocket if necessary.
6 Inspect the bearing races in the final drive housing. Replace them if necessary using a brass drift punch and hammer. Cooling the replacement races in a freezer will aid in using this procedure.
7 Replace the bearings if new races are installed or if they are pitted or damaged.

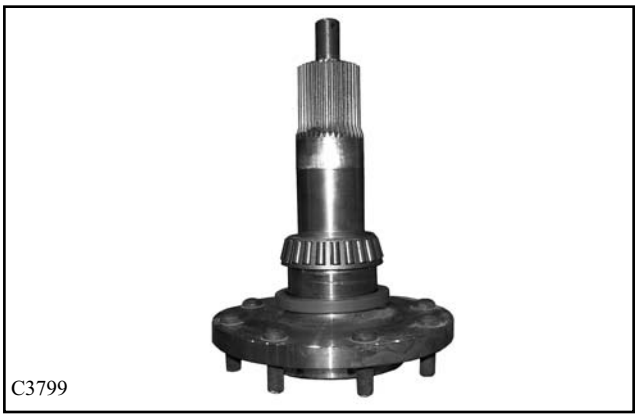

C3669

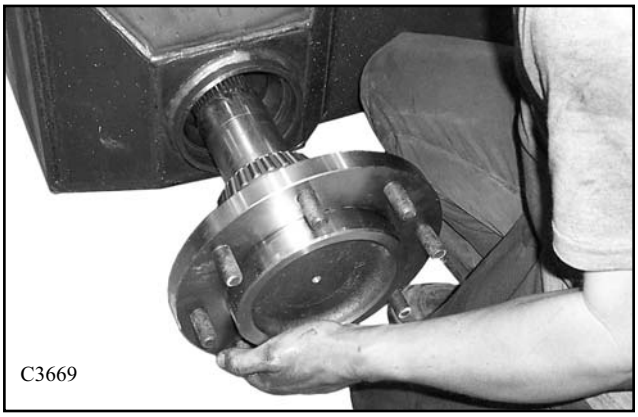


C221

Axle Installation

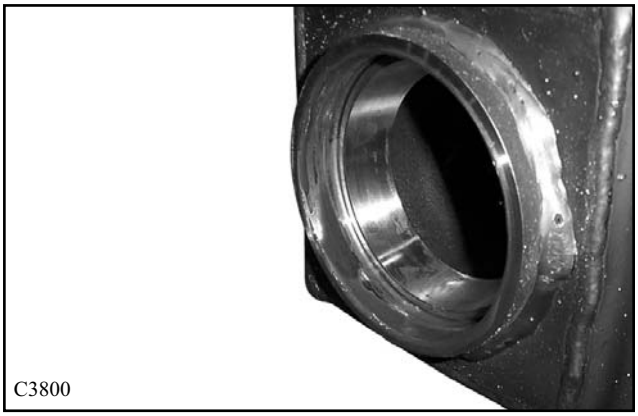
1 Check the axle seal surface area for damage. Minor scratches may be repaired using fine emery cloth.
2 Inspect the axle threads for damage. Replace axle if the threads are non serviceable.(fig. C3799)
3 Inspect the splined teeth for wear. Replace the axle if the splined teeth do not fit tightly into the sprocket spline.
4 Replace any axle studs as required.
5 Lubricate the axle oil seal with light grease.
6 Install the seal onto the axle. The seal part number stamping must face the flange side of the axle. (fig. C3799)
7 Using a press, install the front, or outer, bearing onto the axle. Be sure to support the axle up off the wheel studs to prevent damaging the wheel studs. (fig. C3799)


C3799

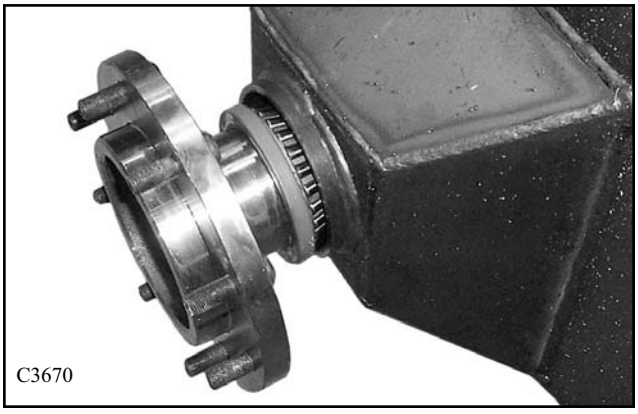

C3669

8 Place the front axle sprocket into the final drive housing with the hub facing toward the bearing race area. (outside) Note: The rear axle hub faces inside.

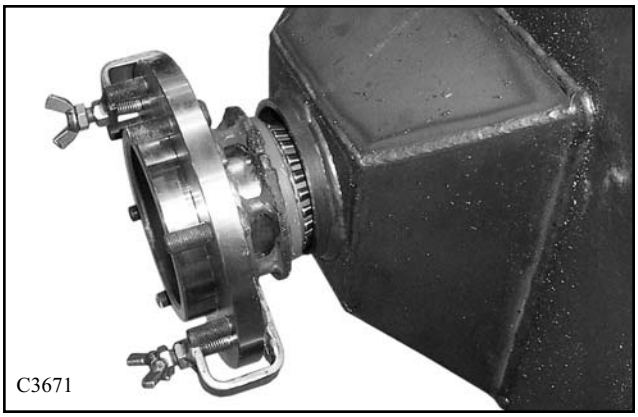
9 Apply gasket sealant to the outer edge of the final ass'y oil seal surface. (fig. C3800) Take care, make sure none gets on the bearing surface.


C3800

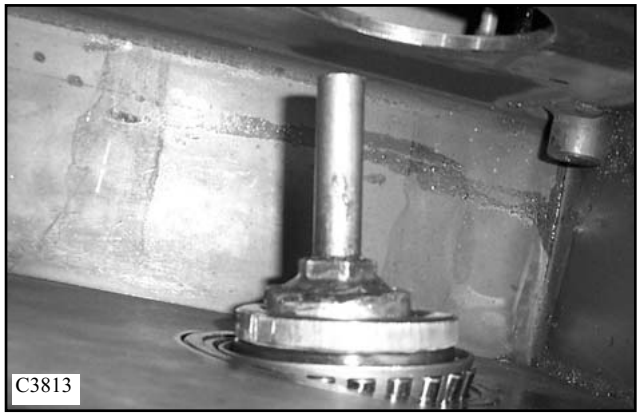
10 Guide the axle into the final drive housing. (fig. C3670)

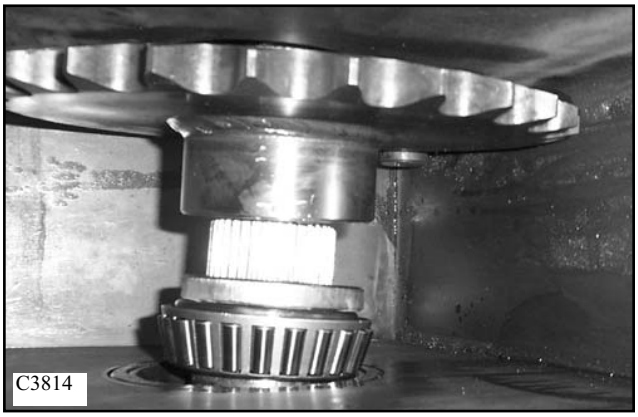

C3670

11 Place 2 seal installation tools, Thomas P/N 958674, equally spaced around the axle flange, behind the seal. (fig. C3671). This special tool must be used to properly locate the seal into the final drive housing.


C3671

12 Place the rear (inside) axle bearing onto the axle. (fig. C3813 & fig. C3814)


C3813

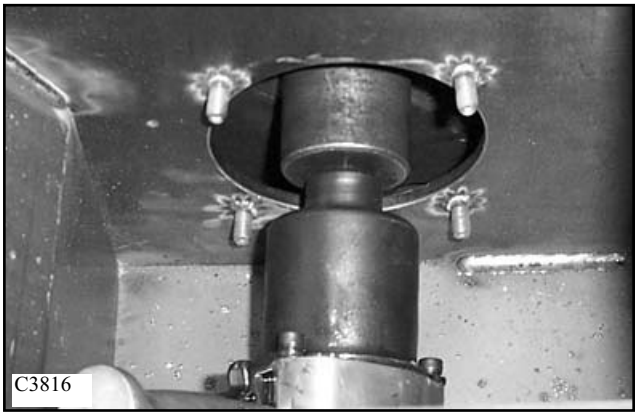

C3814

13 Start the axle into the drive sprocket. Place the small axle washer and castle nut onto the threaded end of the axle. (fig. C3815)


C3815

AXLE ASSEMBLY 3.5

14 Tighten the castle nut and guide the axle into the final drive housing as straight as possible to prevent damaging the seal. Tap the axle flange with a hammer if necessary to assist the installation.
As the castle nut is being tightened the rear (inside) bearing is being pressed into place and the axle oil seal is simultaneously pulled into the proper location into the final drive housing. (fig. C3816)


C3816

15 When the castle nut will not turn on any further tap the face of the flange with a hammer to ensure the seal and bearing has seated into place.

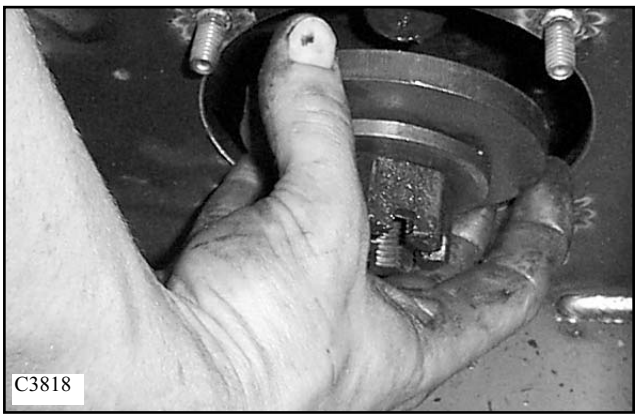
16 Remove the castle nut, remove the small washer and add the large axle washer. (fig. C3817 C3818)


C3817

17 Install the axle washer and castle nut. Tighten the castle nut to remove all axle bearing end play. (Zero preload) Continue tightening until the split pin hole in the axle will align with the castle nut.

18 Install the split pin. (fig. C3819) Bend the end of the split pin straight back against the axle washer.

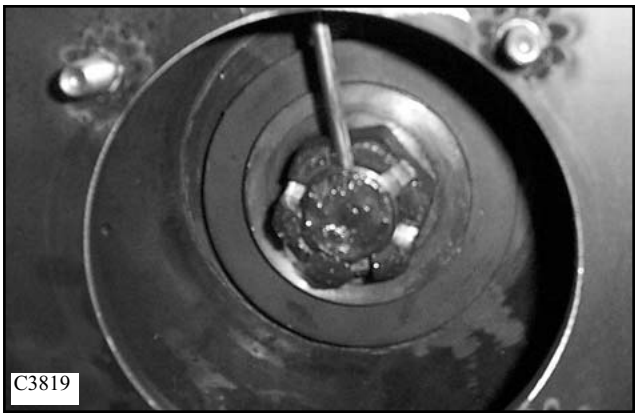
19 Install the axle cover using the gasket to seal the matting surfaces. Do not over tighten the retaining nuts. 15 ft lbs maximum. (20 Nm)


C3818

20 Install the drive chain. Refer to Section 3.3 page 3-7.

21 Fill the final drive housing to the correct level using 10W30 API classification SJ oil. Refer to Section 3.2 page 3-3 for procedure.

22 Install the inspection cover using the gasket to seal the matting surfaces. Do not over tighten the retaining nuts. 15 ft lbs maximum. (20 Nm)


C3819

23 Install the wheels. Torque the wheel nuts to 100 to 110 ft lbs. (135 to 149 Nm).

Axle Stud Replacement

1 Remove any attachment, raise the boom arms and engage the boom locks. Shut off engine.

2 Block the loader securely with all 4 wheels clear of the ground.

3 Remove the wheel from the axle the stud is to be replaced.

4 Strike the stud with a hammer to remove from the axle flange. (fig. C3820)

5 Place a new stud in position behind the axle flange. Line up the splines on the stud with the splines cut into the axle flange. (fig. C3822)

6. Apply a few drops of light oil on the stud spline. (fig. C3823)

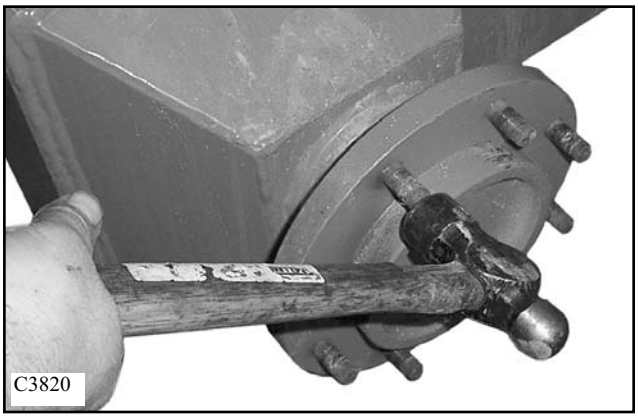
7 Place a wheel nut inverted on the stud. Tap the end of the stud with a hammer as you tighten the wheel nut. This will draw the stud into place in the axle flange. (fig. C3824 & C3821)

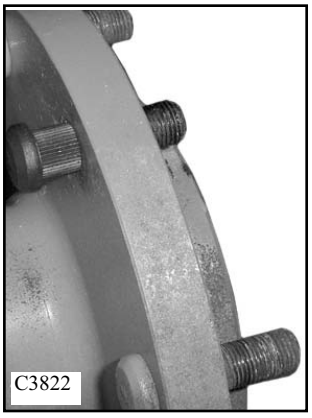
8 Remove the inverted wheel nut and discard. Replace with new wheel nut. (fig. C3497)

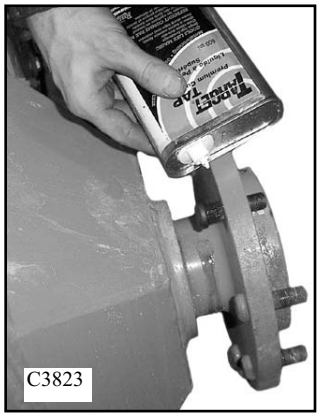
9 Replace the wheel and torque the wheel nuts to 100 to 110 ft lbs. (135 to 149 Nm)

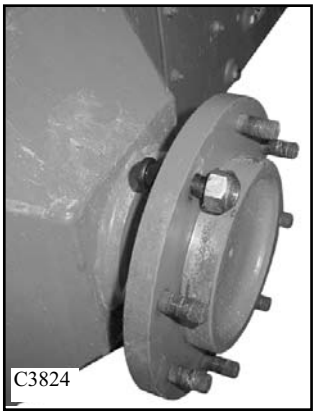
IMPORTANT

Torque the wheel nuts daily to prevent stud and/ or wheel damage.


C3820


C3822


C3823


C3824


C3821


C3497

TROUBLE SHOOTING 3.6

Problem	Cause	Corrective Action	Section
Final drive noisy.	No lubricating oil.	Check oil level. Add 10W30 SJ oil to correct level.	3.2
	Axle has too much end play. (Bearing pre-load)	Check and adjust the bearing pre-load on the axle bearings	3.5
No drive on one side.	Drive chain failure.	Inspect the drive chain and connecting link. Replace damaged parts.	3.3
	Drive motor sprocket failure	Inspect the drive sprocket and splines. Replace parts as required.	3.5 2-12
	Drive motor or hydrostatic system failure	Refer to the hydrostatic drive section. Diagnose and make repairs as required.	2-12
Lubrication oil leaking through the filler / breather cap.	Lubricating oil level too high.	Check the oil level.	3.2
	Drive motor shaft seal leakage.	Inspect and repair damaged parts.	2
Wheel studs shearing off.	Wheel nuts loose.	Replace the wheel studs. Check wheel nut torque daily. Torque wheel nuts at 100 to 110 ft lbs. (135 to 149 Nm)	3.5
Wheel stud threads stripped.	Wheel nuts over tightened.	Replace the wheel studs. Check wheel nut torque daily. Torque wheel nuts at 100 to 110 ft lbs. (135 to 149 Nm)	3.5