Service Manual

Carton Clamps and Appliance Clamp

Manual Number 667451

cascade® corporation

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Contents

Section 1 Introduction

This manual provides the installation instructions, periodic maintenance requirements, troubleshooting procedures, and service guides for Cascade Carton Clamp models 20C, 35C and 60C and the Cascade Appliance Clamp, model 20C.

1.1 Truck System Requirements

Pressure:
Clamps with conventional check valve assembly: Your lift truck should supply sufficient hydraulic pressure to handle the heaviest load. PRESSURE MUST NOT EXCEED 2000 PSI.

Clamps with Hi-Ball valve assembly: Your lift truck **must** supply no less than 1700 psi. PRESSURE MUST NOT EXCEED 2000 PSI.

Volume:
20C Carton Clamp and Appliance Clamp with conventional check valve: 2-6 gpm

35C and 60C Carton Clamps with conventional check valve: 8-18 gpm

All Clamps with Hi-Ball valve: 3-7 gpm

1.2 Special Instructions Definitions

⚠WARNING

A statement preceded by **⚠WARNING** is information that should be acted upon to prevent **bodily injury.** A **WARNING** is always inside a ruled box.

CAUTION

A statement preceded by **CAUTION** is information that should be acted upon to prevent **machine damage.**

IMPORTANT

A statement preceded by **IMPORTANT** is information that possesses special significance.

NOTE

A statement preceded by **NOTE** is information that is handy to know and may make your job easier.

Section 2 Installation Instructions

WARNING: Rated capacity of the truck/attachment combination is a responsibility of the original truck manufacturer and may be less than that shown on the attachment nameplate. Consult the truck nameplate.

2.1 Truck System Requirements

- Truck relief valve setting:

  Clamps with conventional check valve assembly: 2000 psi maximum

  Clamps with Hi-Ball valve assembly: 1700 psi minimum, 2000 psi maximum

- Truck hydraulic system should provide the following rates of flow:

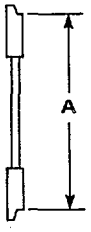
  20C Carton Clamp and Appliance Clamp with conventional check valve: 2-6 gpm

  35C and 60C Carton Clamps with conventional check valve: 8-18 gpm.

  All Clamps with Hi-Ball valve: 3-7 gpm

- Recommended hose and fitting size: No. 8 (1/2 inch ID) with minimum fitting orifices of 13/32 inch.

- Truck carriage must conform to the Industrial Truck Association (ITA) dimensional standards as shown in the following chart.



Mounting	Dimension A (in.)	
	Min.	Max.
Class II (20C, 35C)	14.94	15.00
Class III (60C)	18.68	18.74

- Make sure the truck carriage is clean and the notches are undamaged.

2.2 Prior to Installation

1. Install the hydraulic hoses to the **truck junction blocks** using the correct Cascade Attachment Installation Kit. The part numbers are as follows:

   Carton Clamps with a conventional valve: C-663587

   Carton Clamps with a Hi-Ball valve: C-663586

   Appliance Clamp with a conventional valve: C-663639

   Appliance Clamp with a Hi-Ball valve: C-663640

   OR,

   use hoses and fittings as shown in Figure 1, 2, 3, or 4. Be careful not to pinch, twist, or otherwise damage the hoses.

IMPORTANT

In order to conform to industry standard practice, the hoses should be connected to the truck auxiliary valves as indicated by the following chart.

Function, in order of location from operator	Attachment Movement	Motion of the operator's hand
Sideshift	Sideshift Right	Rearward or Up
	Sideshift Left	Forward or Down
Clamp	Clamp (close)	Rearward or Up
	Release (open)	Forward or Down

CAUTION:

2. Flush the hoses as follows to prevent damage to the attachment check valve assembly and the cylinders. Refer to the appropriate plumbing diagram.

   a. Connect the hoses from each junction block together.

   b. Start the truck and actuate the truck control valves in both directions for about 30 seconds to carry any debris left in the hoses to the truck hydraulic tank and filter.

NOTE: The Junction Blocks on your Truck may be Reversed from those Shown.

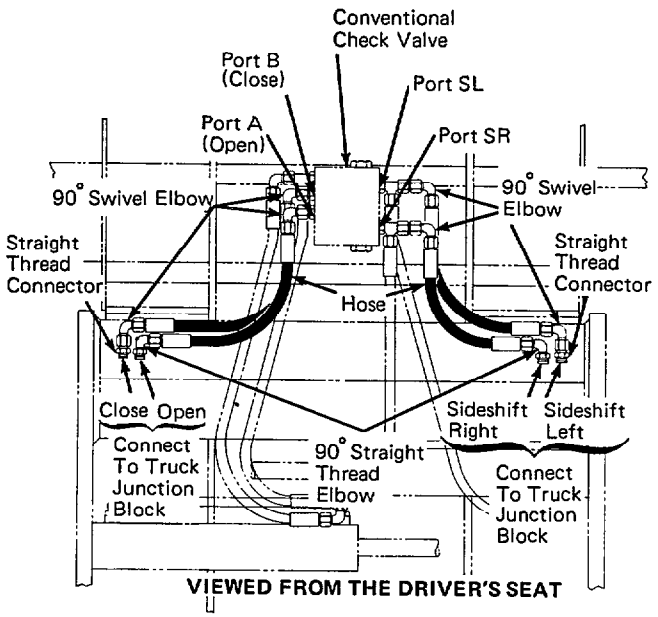
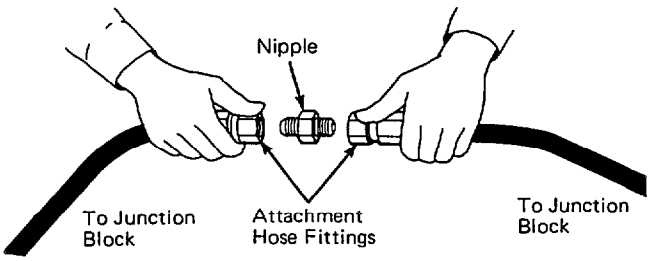


Figure 1. Plumbing Diagram, Carton Clamps with a Conventional Valve



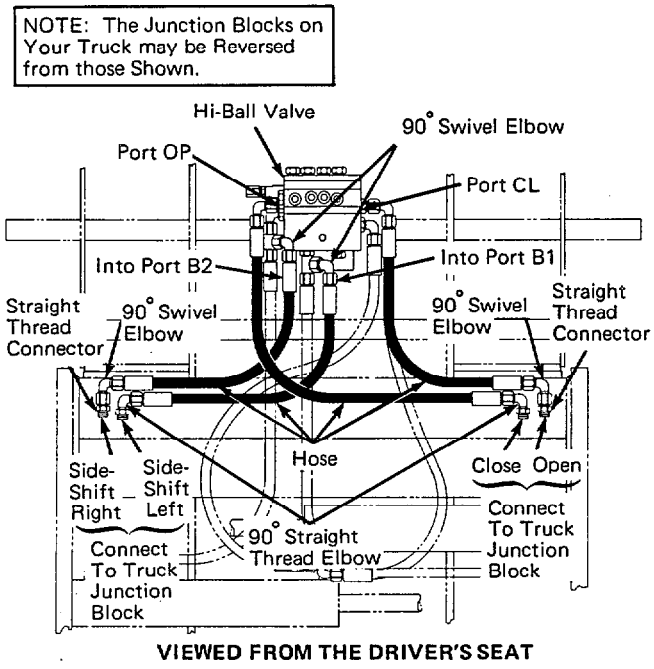


Figure 2. Plumbing Diagram, Carton Clamps with a Hi-Ball Valve

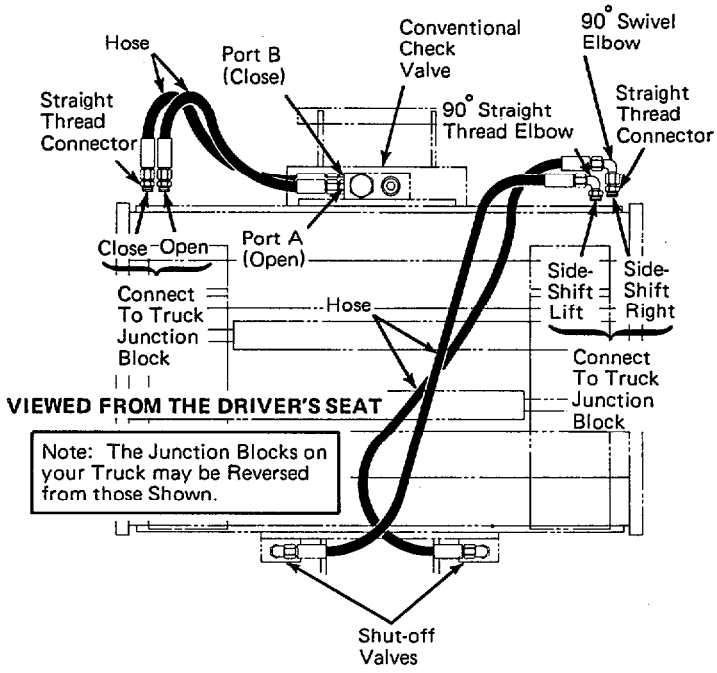


Figure 3. Plumbing Diagram, Appliance Clamp with a Conventional Valve

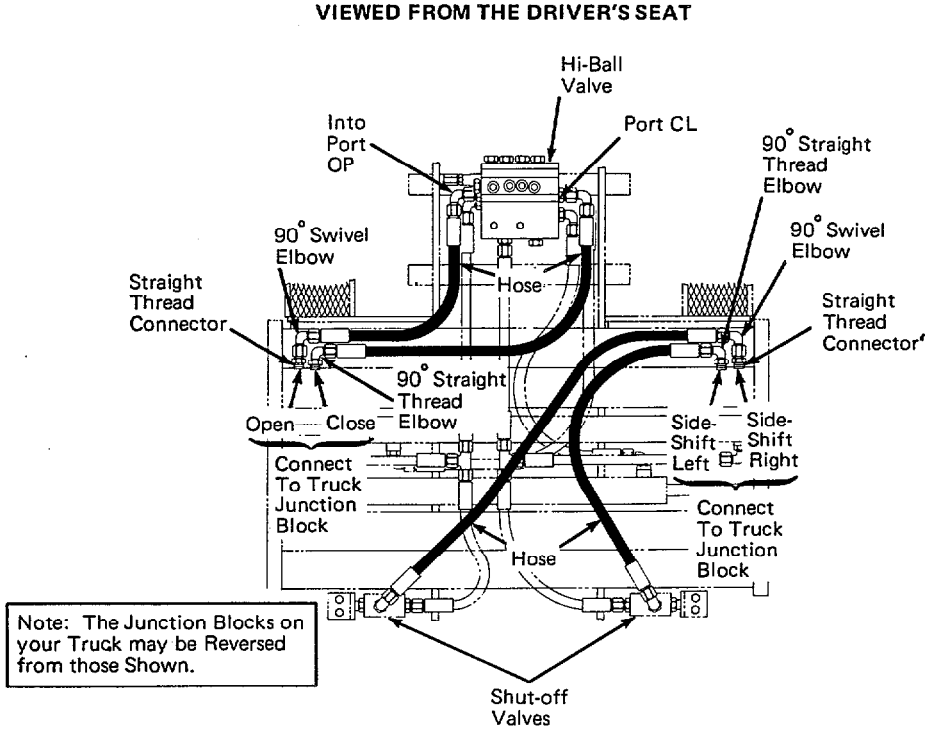


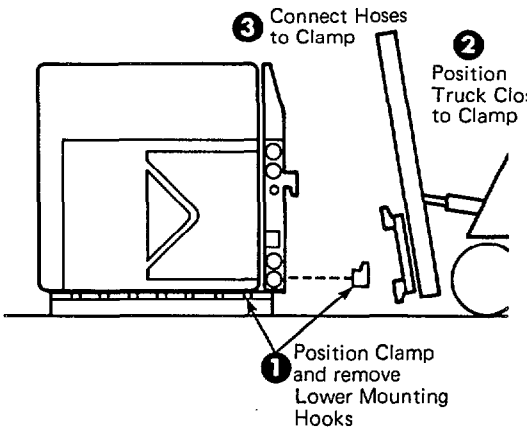
Figure 4. Plumbing Diagram, Appliance Clamp with a Hi-Ball Valve

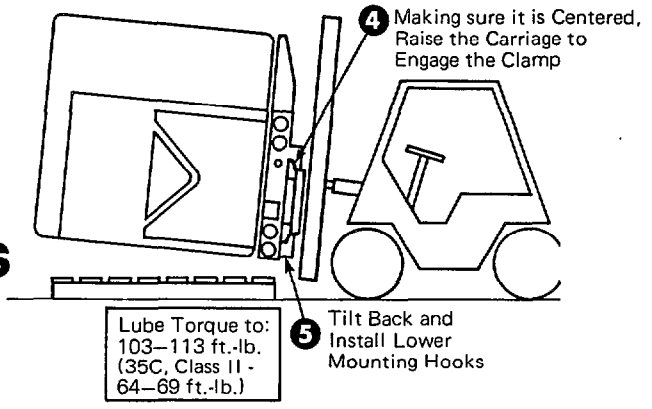
Section 2 Installation Instructions

2.3 Installation

1. Using a suitable hoist and chain, position the clamp as shown and remove the lower mounting hooks.
2. Position the truck close enough so the hoses on the junction blocks can be connected to the attachment.
3. Connect the hoses to the attachment as shown in the appropriate plumbing diagram.
4. Raise the truck carriage and engage the attachment upper mounting hooks. Make sure the centering block on the attachment aligns with the center notch on the carriage.

   IMPORTANT: Some models have a positioning block welded to the inside of the upper mounting hook. Center the attachment on the carriage, making sure the positioning block is engaged in a notch on the carriage.
5. Tilt the mast back and install the lower mounting hook. Lube-torque the capscrews to 103-113 ft.-lb. (35C, Class II—64-69 ft.-lb.).

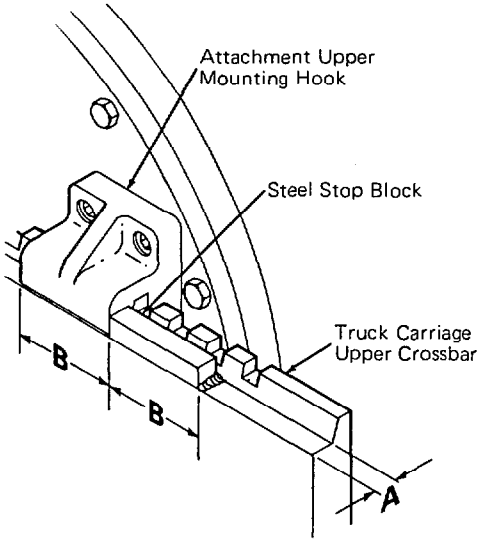




2.4 Attachment Stop Blocks

Cascade recommends that a steel block be permanently welded on each side of the truck carriage upper crossbar adjacent to each attachment upper mounting hook. To perform the installation:

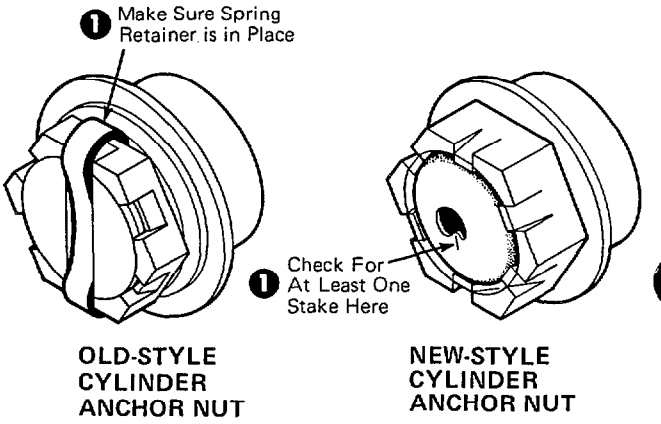
1. Select square steel stock with a width about equal to the flat of the carriage upper crossbar (dimension A).
2. Cut two blocks from the stock, each about as long as the width of the attachment upper mounting hook (dimension B).
3. Position the blocks adjacent to the upper mounting hooks. The blocks should not extend behind the flat of the carriage upper crossbar (dimension A).
4. Weld the blocks in place. Make sure you protect adjacent hoses and hydraulic components from weld splatter.



2.5 Prior to Operation

1. Check the cylinder anchor nuts to make sure they are secure. If your clamp has old-style anchor nuts, make sure the spring retainer is in place. If you have new-style anchor nuts, make sure they are properly staked.
2. Before picking up a load, operate the attachment through several cycles to force any air from the system to the truck hydraulic tank. Check for leaks.
3. Pick up a maximum load and operate the clamp. If the clamp does not function correctly, recheck the plumbing. If the clamp drops the load, contact Cascade's Service Department, telephone 800-547-5266 (toll-free), or, in Oregon, call 666-1511.

WARNING: Make sure there are no people in the vicinity of the attachment when picking up a load.



Section 3 Periodic Maintenance

3.1 100 Hour Maintenance

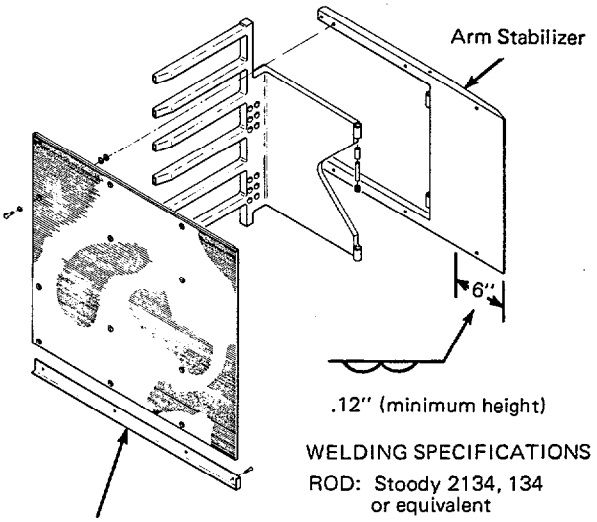
Every time the lift truck is serviced or every 100 hours of truck operation, whichever comes first, complete the following maintenance procedures.

☐ Check the cylinder anchor nuts for security.

Carton Clamps Only

☐ Check the hard facing on the bottom of each arm stabilizer. If there is visible wear, or if your attachment has an old-style wear shoe along the lower edge of the arm, build up the surface with weld as shown.

IMPORTANT:
After completing any service procedure, always test each function through 5 complete cycles. First test the clamp empty to bleed excess air trapped in the system. Then test each function with a load to make sure the clamp operates correctly before returning it to the job.



3.2 500 Hour Maintenance

After each 500 hours of lift truck operation, in addition to the 100-hour maintenance procedures, perform the following procedure.

☐ Retorque the mounting capscrews. Use the torque specifications shown in Section 2.

3.3 1000 Hour Maintenance

After each 1000 hours of lift truck operation, in addition to the 100-hour and 500-hour maintenance procedures, perform the following procedure.

☐ Check the arm bushings. If they are worn, marred, or deeply scratched, replaced the bushings.

3.4 2000 Hour Maintenance

After each 2000 hours of lift truck operation, in addition to the 100-hour, 500-hour, and 1000-hour maintenance procedures, perform the following procedure.

☐ Replace all sliding arm bushings.

Section 4 Troubleshooting

4.1 General Procedures

> **WARNING:** Before servicing any hydraulic component, relieve pressure in the system. Open the arms 1 or 2 inches, turn the truck off, and open the truck auxiliary valves several times in both directions.
>
> After completing any service procedure, always test the unit through several cycles. First test the attachment empty to bleed air trapped in the system to the truck system. Then test the attachment with a load to be sure it operates correctly before returning it to the job.
>
> Stay clear of the load while testing. Do not raise the load more than 3 inches off the floor while testing.

4.1-1 Truck System Requirements

Pressure: In addition to conforming to the following requirements, your lift truck must supply sufficient hydraulic pressure to handle the heaviest load.

Clamps with a conventional check valve assembly
Pressure to the attachment MUST NOT EXCEED 2000 PSI.

Clamps with a Hi-Ball valve assembly
Pressure to the attachment should be no less than 1700 psi and MUST NOT EXCEED 2000 PSI. If your truck output does not conform to these tolerances, the attachment will not operate correctly.

Volume:

Clamps with a conventional check valve assembly
20C Carton Clamp and Appliance Clamp: 2-6 gpm
35C and 60C Carton Clamps: 8-18 gpm

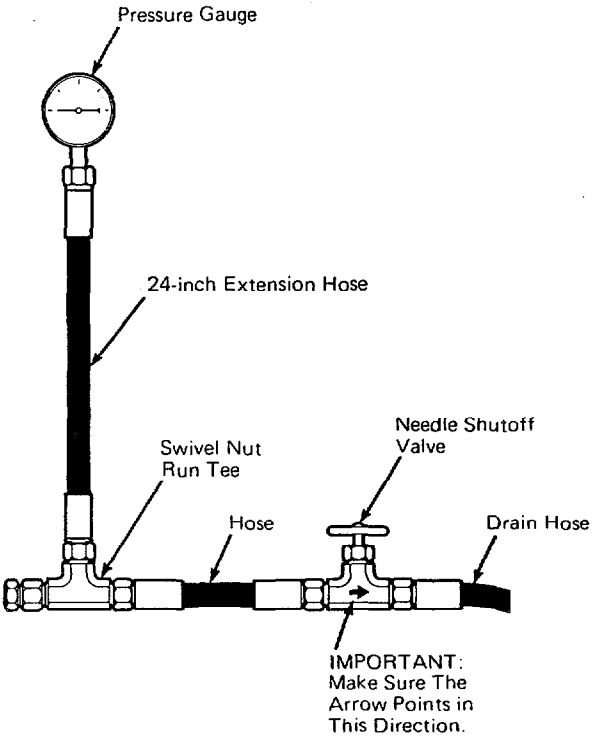
Clamps with a Hi-Ball valve assembly
Minimum: 3 gpm
Maximum: 7 gpm

IMPORTANT: HI-BALL ATTACHMENTS ONLY. If clamping pressure **must** be reduced below 1700 psi, an auxiliary relief valve (Cascade part number C-660412) must be plumbed into the circuit. See the appropriate Hydraulic Schematic (Paragraph 4.2-6 and 4.2-8). The relief setting must be no less than 1000 psi and the truck pump volume output must not exceed 6 gpm.

4.1-2 Tools Required

In addition to a normal selection of hand tools, you will need one each of the following for attachments with a conventional valve and two each for attachments with a Hi-Ball valve.

- Pressure gauge capable of measuring pressures to 2500 psi.
- No. 8 swivel nut run tee (37° JIC) suitable for mounting gauges.
- Needle shutoff valve, rated for 2500 psi service, minimum. (Recommended supplier for needle shutoff valve: Marsh Instrument Co., Skokie, Ill.)
- Hose with female ends for use as a drain line.
- No. 8 JIC cap for cylinder port.
- No. 8 JIC plug for hose end.
- No. 8 O-ring-to-JIC straight adapter fitting.
- Hose, 24 inches long.
- APPLIANCE CLAMP WITH CONVENTIONAL CHECK VALVE ONLY. Two steel sleeves as shown by the accompanying illustration.

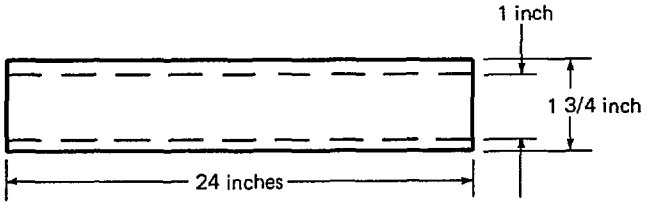


4.1-3 Get All The Facts Before You Begin Working On The Clamp

It is important that you gather all the facts regarding the problem before you begin service procedures. The best way is to talk with the operator. Ask for a complete description of the malfunction. The following guidelines will help you decide where to begin your troubleshooting procedures.

- Clamp arm(s) won't operate properly. If you encounter this problem, refer to Paragraph 4.3.
- Clamp drops the load **only** when sideshifting. If you encounter this problem, refer to Paragraph 4.4.
- Clamp drops the load after it has been gripped.
- Clamp will not carry loads up to the rated capacity of the clamp.

If you encounter one of these problems, refer to the following appropriate Paragraph.
Carton Clamps with a conventional check valve: Paragraph 4.5
Appliance Clamps with a conventional check valve: Paragraph 4.6
Any attachment with a Hi-Ball valve: Paragraph 4.7



STEEL SLEEVE
(For Appliance Clamps With Conventional Valve Only)

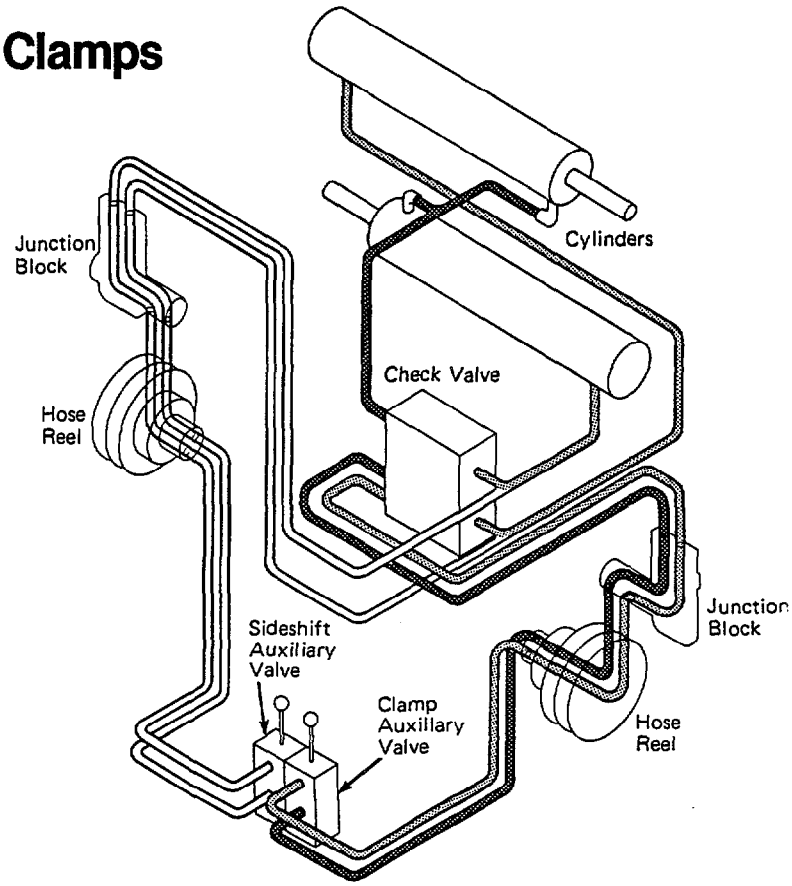
4.2 Plumbing

4.2-1 Hosing Diagram, Carton Clamps with Conventional Valve

ARMS CLOSING

PRESSURE

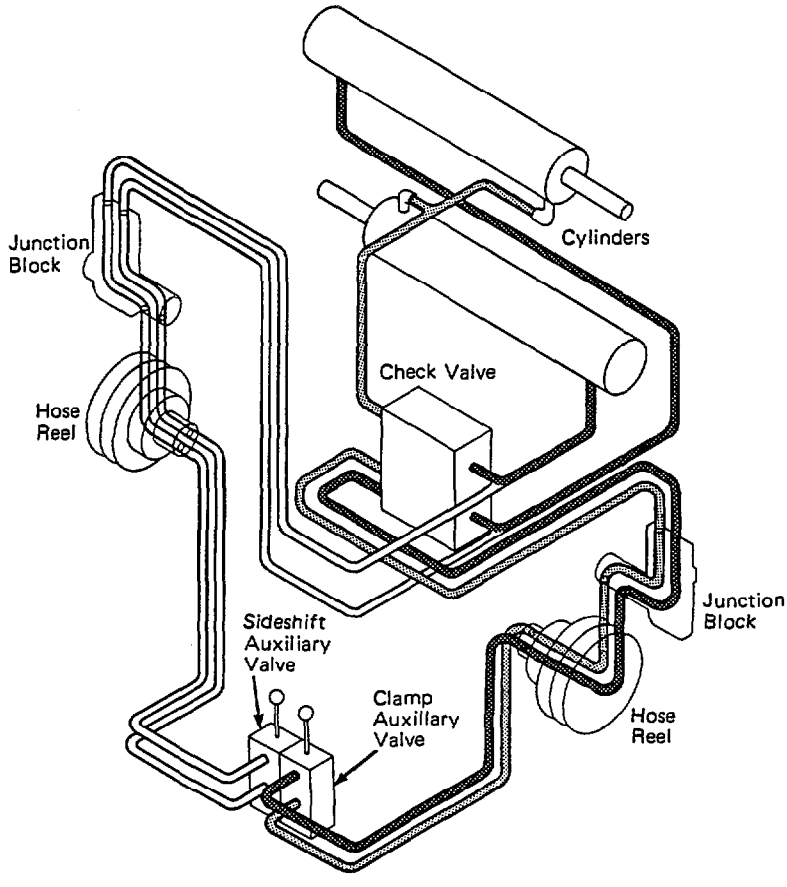
RETURN



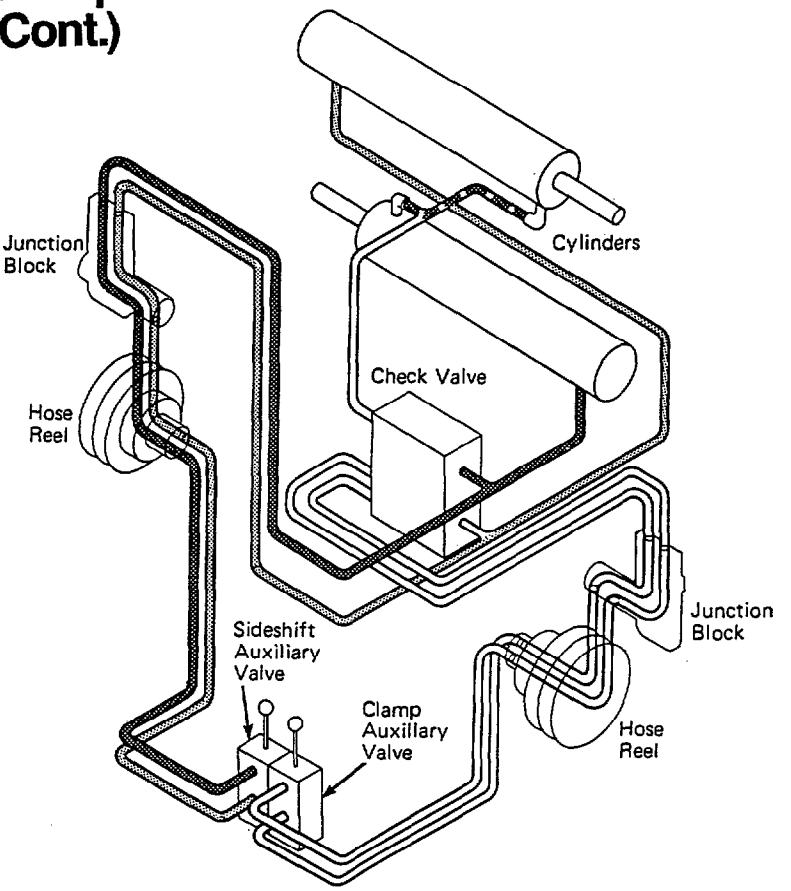
ARMS OPENING

PRESSURE

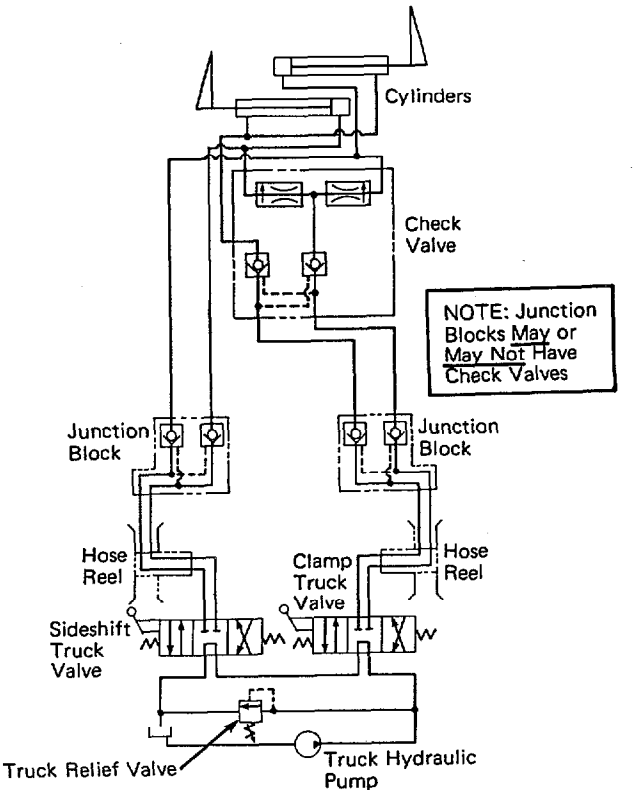
RETURN



4.2-1 Hosing Diagram, Carton Clamps with Conventional Valve (Cont.)



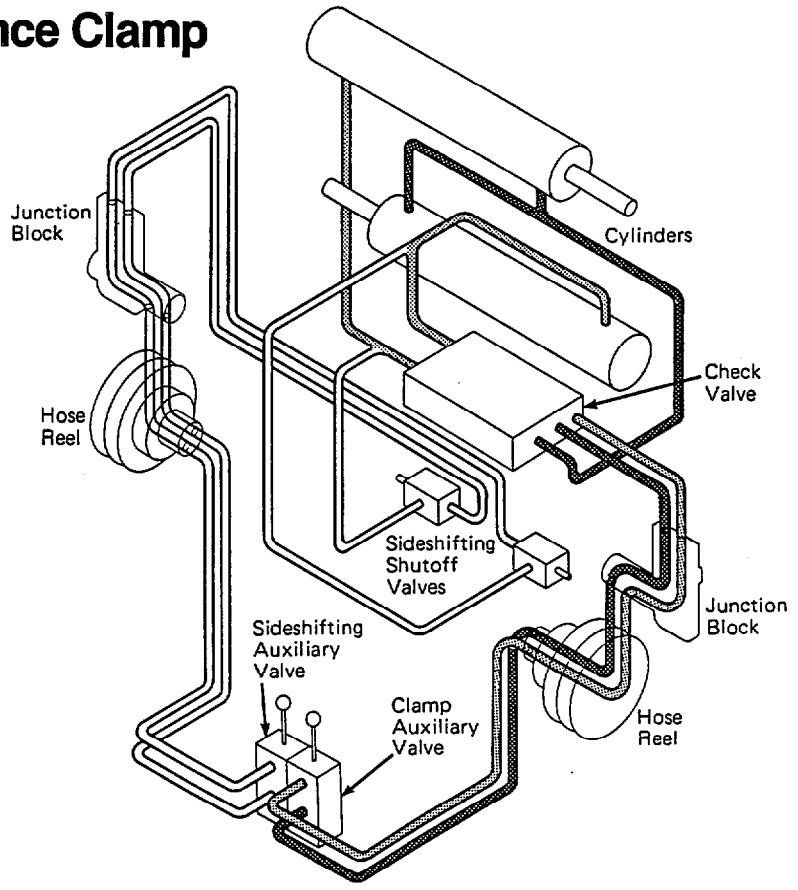
4.2-2 Circuit Schematic, Carton Clamps with Conventional Valve



4.2-3 Hosing Diagram, Appliance Clamp with Conventional Valve

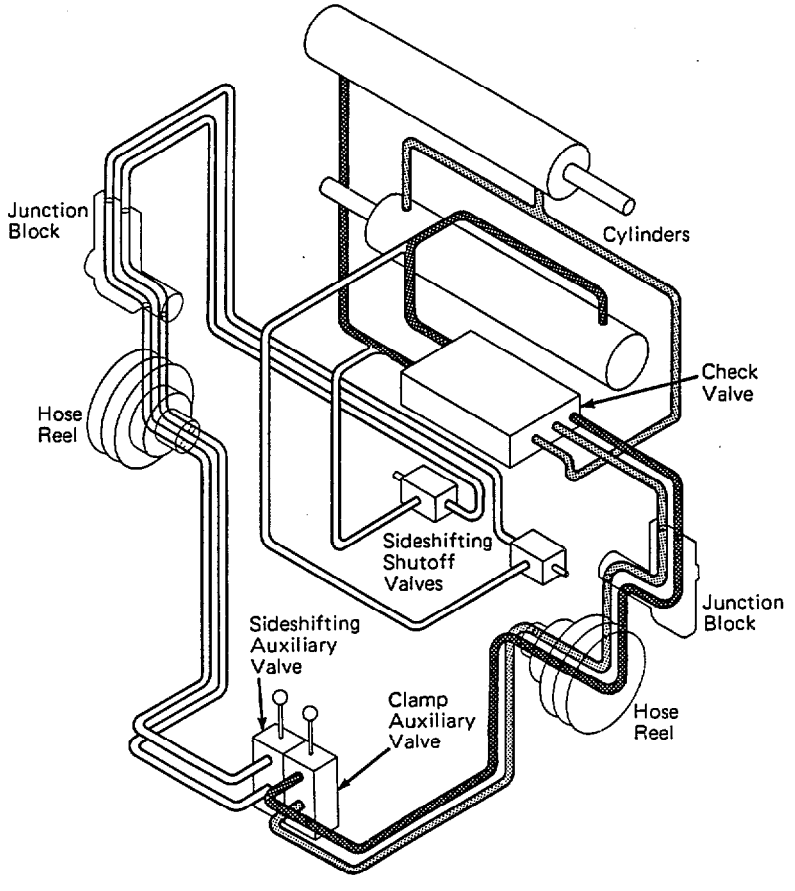
ARMS CLOSING

PRESSURE
RETURN

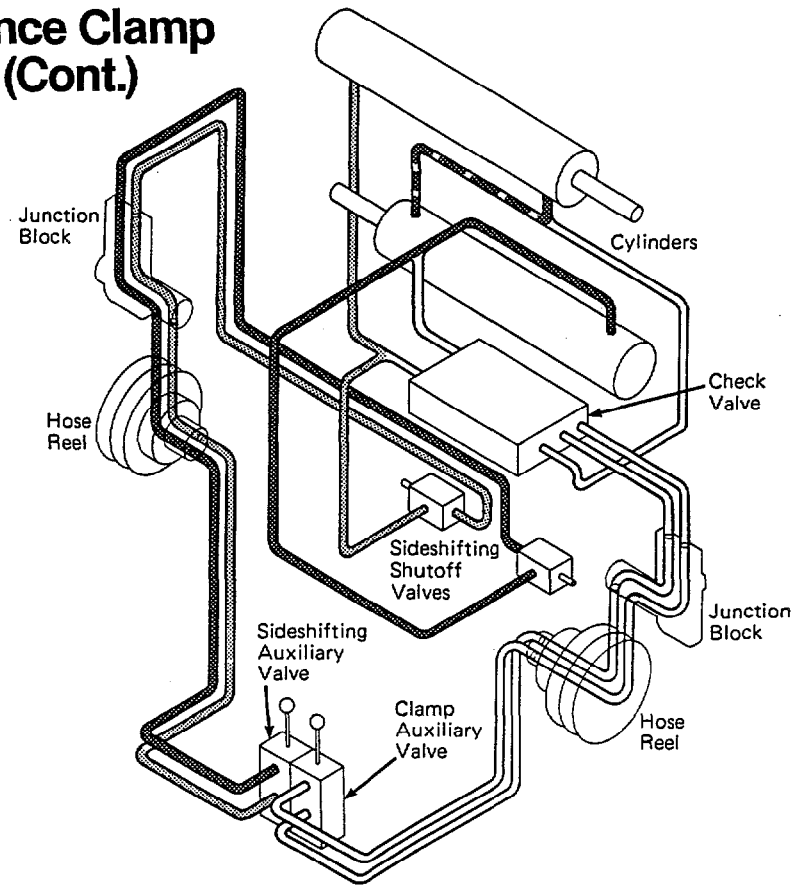


ARMS OPENING

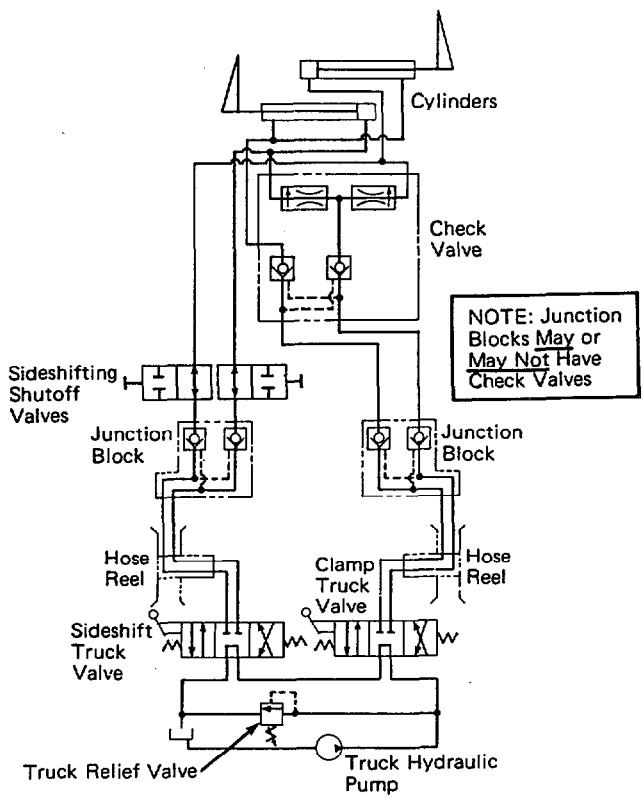
PRESSURE
RETURN



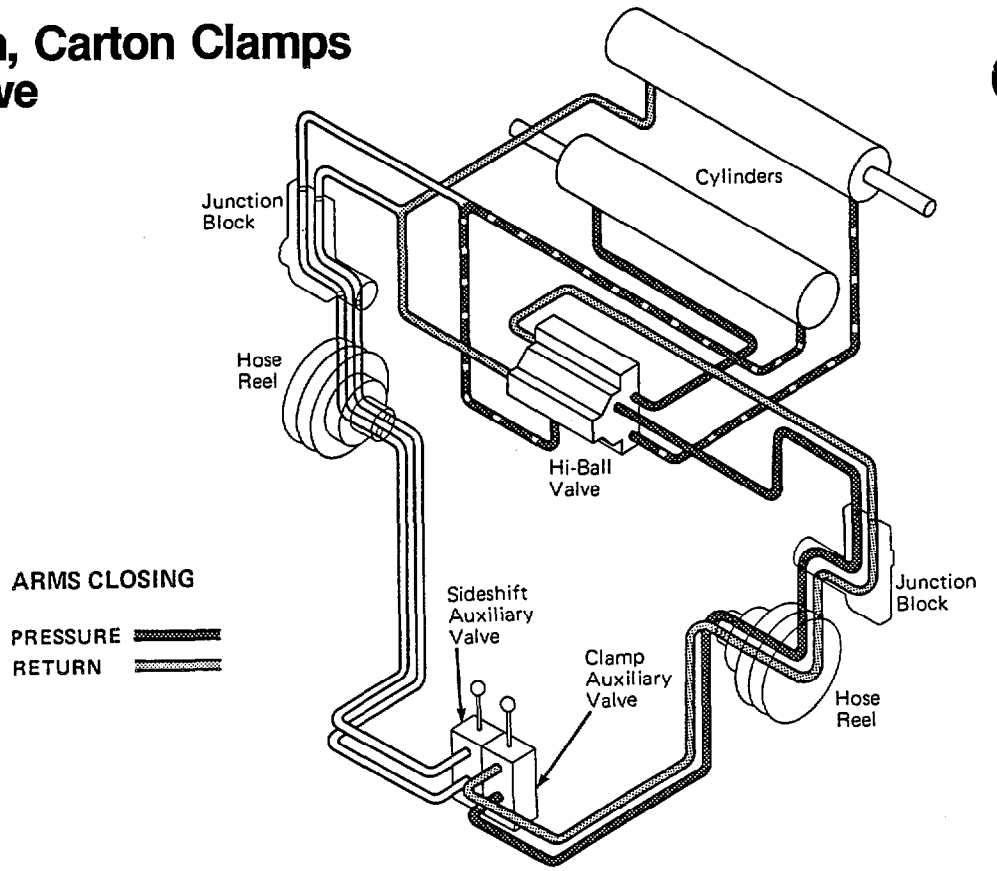
4.2-3 Hosing Diagram, Appliance Clamp with Conventional Valve (Cont.)



4.2-4 Circuit Schematic, Appliance Clamps with Conventional Valve



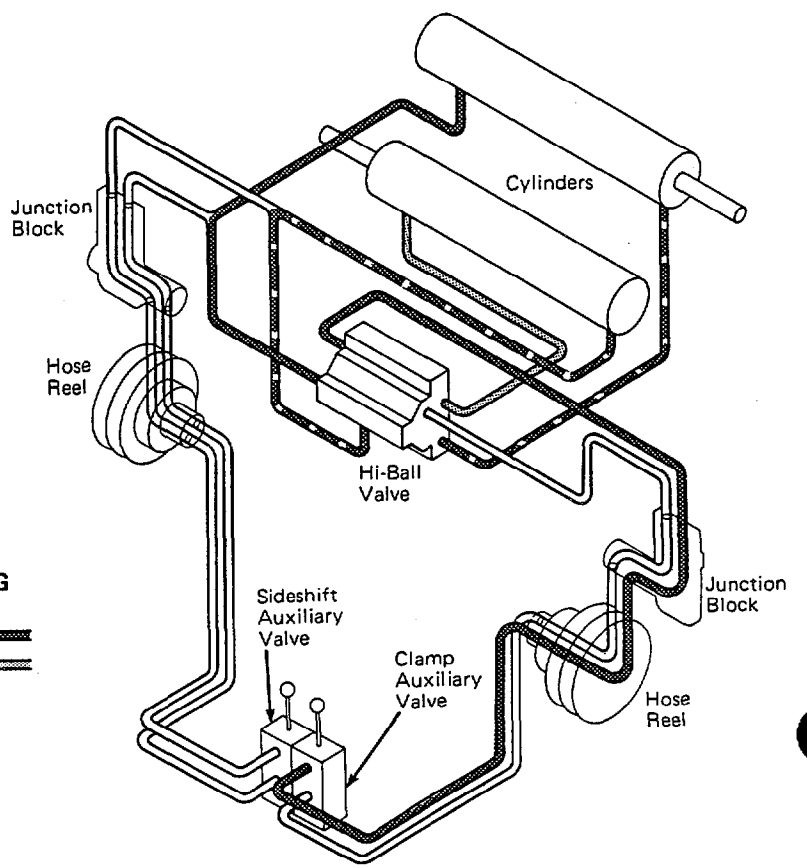
4.2-5 Hosing Diagram, Carton Clamps with Hi-Ball Valve



ARMS CLOSING

PRESSURE

RETURN

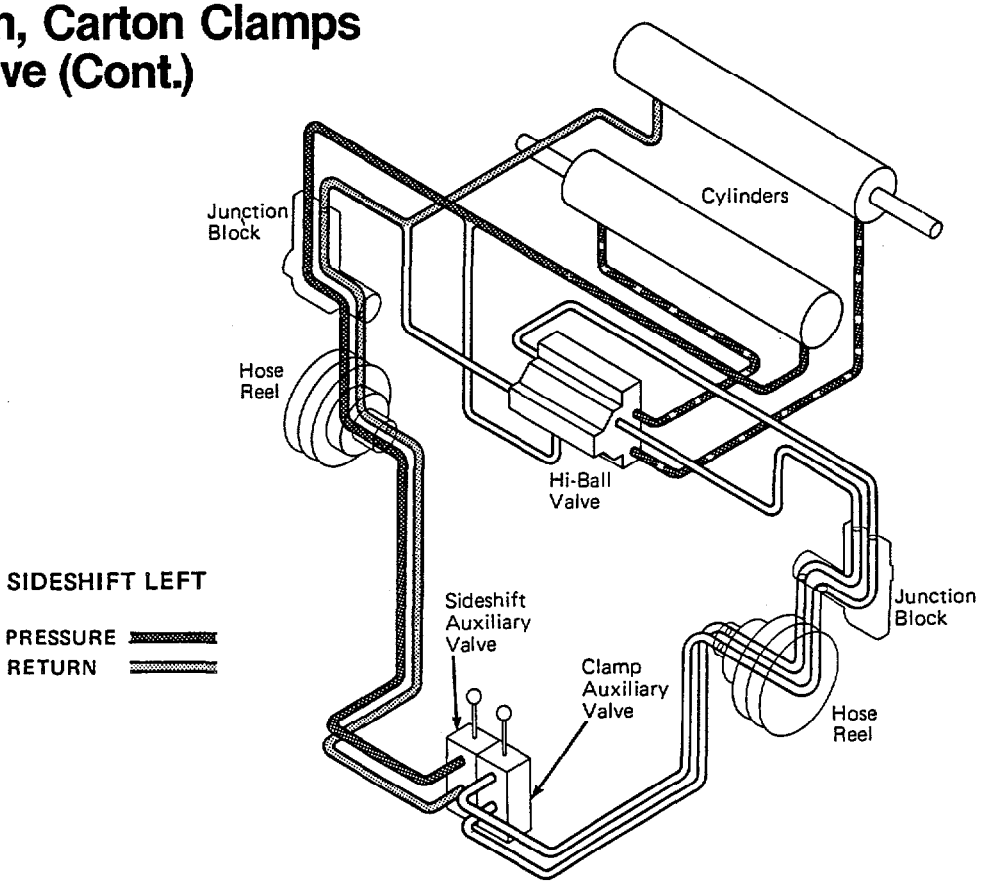


ARMS OPENING

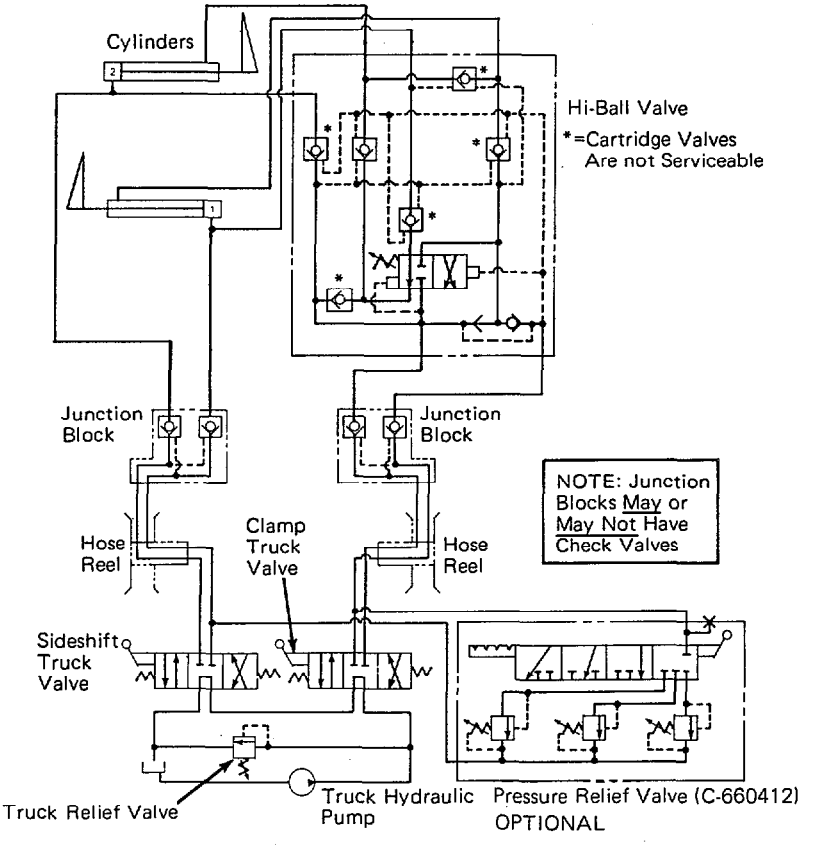
PRESSURE

RETURN

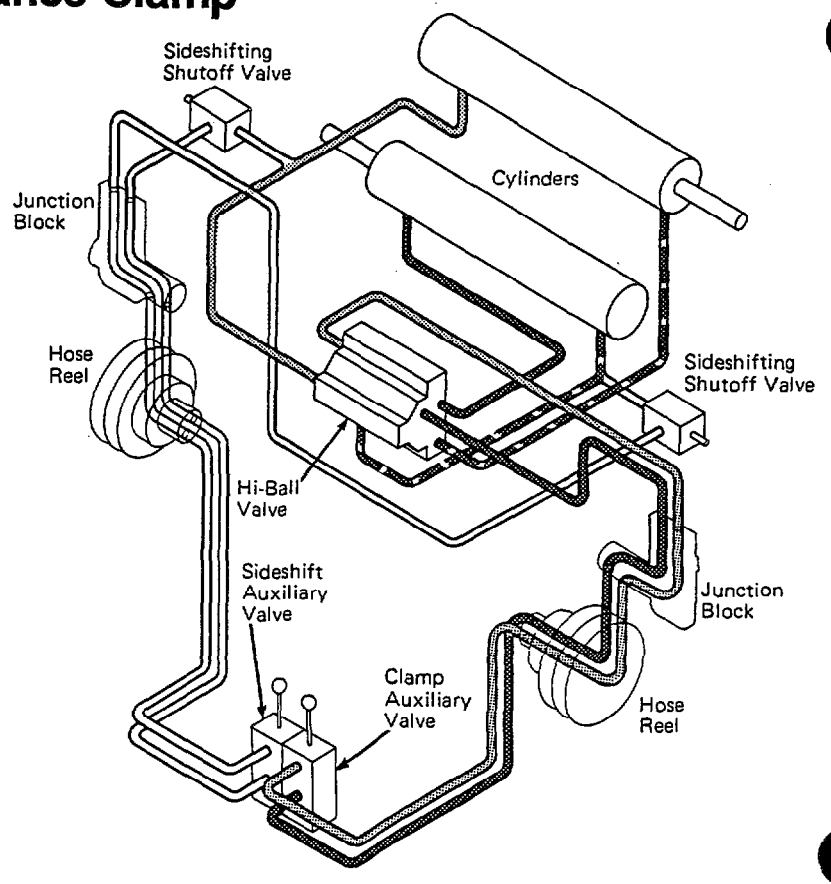
4.2-5 Hosing Diagram, Carton Clamps with Hi-Ball Valve (Cont.)



4.2-6 Circuit Schematic, Carton Clamps with Hi-Ball Valve

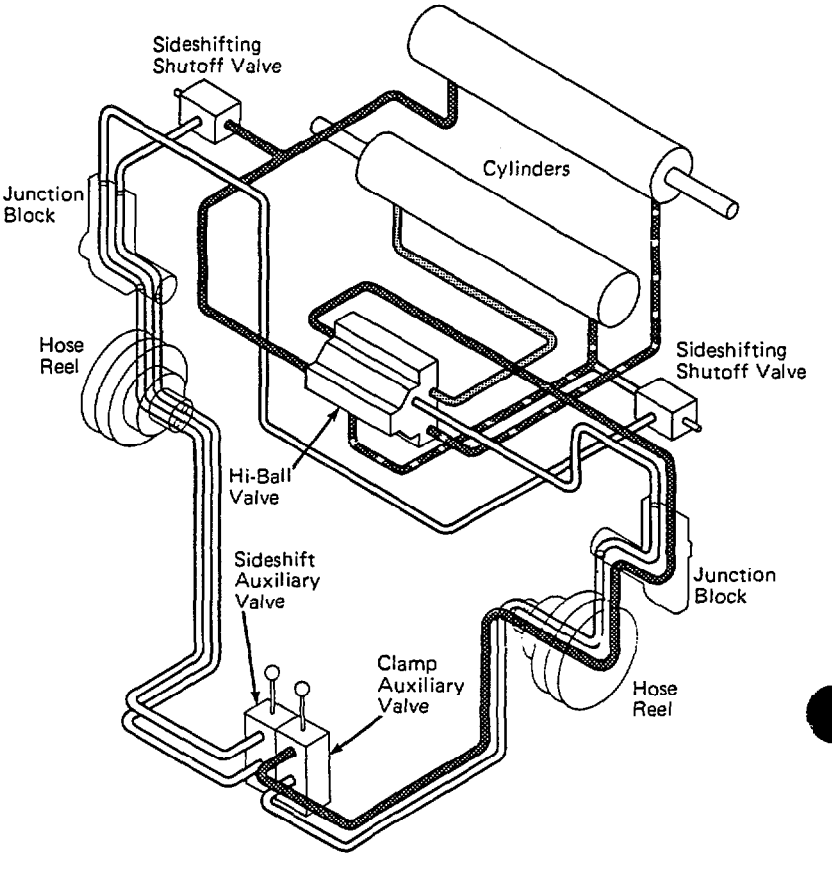


4.2-7 Hosing Diagram, Appliance Clamp with Hi-Ball Valve



ARMS CLOSING

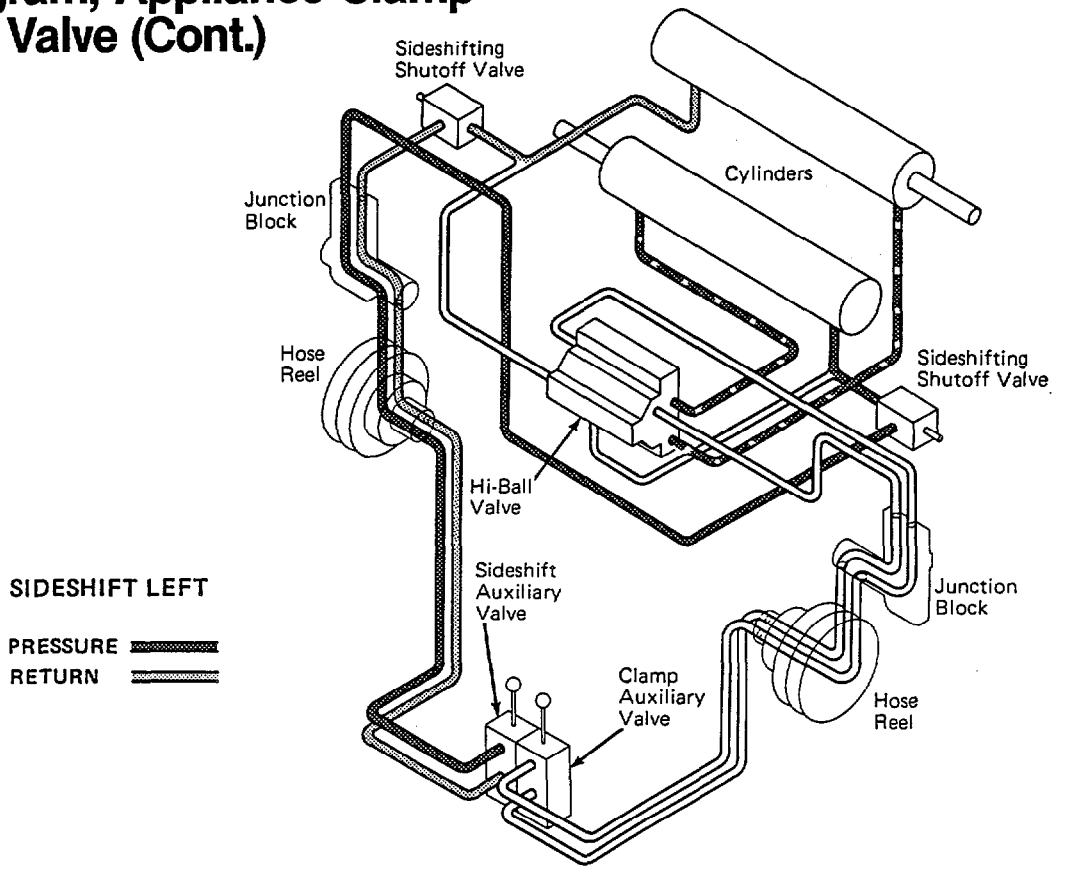
PRESSURE
RETURN



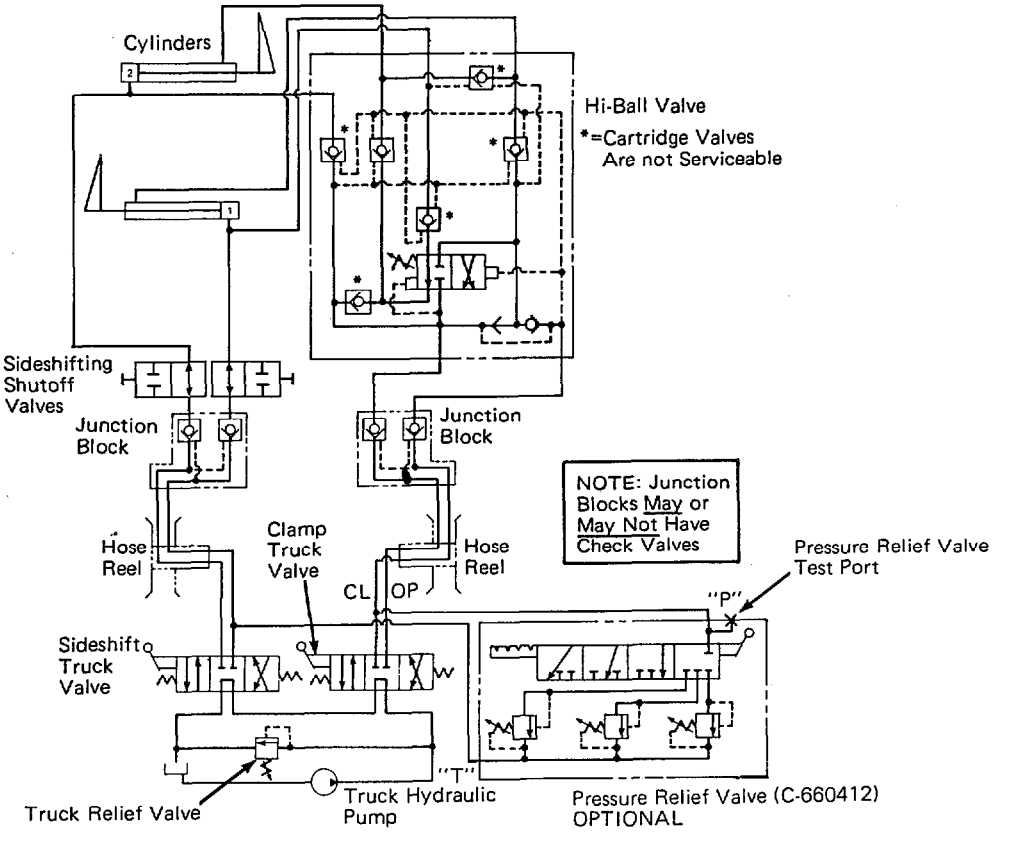
ARMS OPENING

PRESSURE
RETURN

4.2-7 Hosing Diagram, Appliance Clamp with Hi-Ball Valve (Cont.)



4.2-8 Circuit Schematic, Appliance Clamp with Hi-Ball Valve



4.3 Checking Truck Output

If the clamp arm(s) won't operate properly, make sure the truck system output conforms to the Truck System Requirements (Paragraph 4.1-1) before performing pressure tests on the attachment.

Correct volume output (gpm) is especially important on clamps with a Hi-Ball valve. You should check for the specified output with an accurate flow meter **at the truck carriage** (junction block). If output is not as specified, your truck system may have to be adjusted or modified accordingly. If your truck will not achieve the specified output and you have a clamp with a Hi-Ball valve, your attachment may have to be modified to use a conventional valve.

Contact Cascade's Service Department if you have any questions.

4.4 Clamp Drops the Load Only When Sideshifting

If you encounter this problem with your clamp, check the following before performing pressure tests on the attachment.

4.4-1 Appliance Clamp

Make sure the sideshifting shutoff valves are secure and adjusted properly. The valve mounting should be adjusted so the plunger is fully depressed by the trailing arm (right arm when sideshifting left and vice versa) **just before** that arm reaches the end of its stroke.

4.4-2 Carton Clamps

If you are handling relatively narrow loads, the trailing arm (right arm when sideshifting left and vice versa) may be reaching the end of its stroke before the leading arm. If possible, arrange your handling process to allow sideshifting the other direction. If this is not practical, contact Cascade's Service Department.

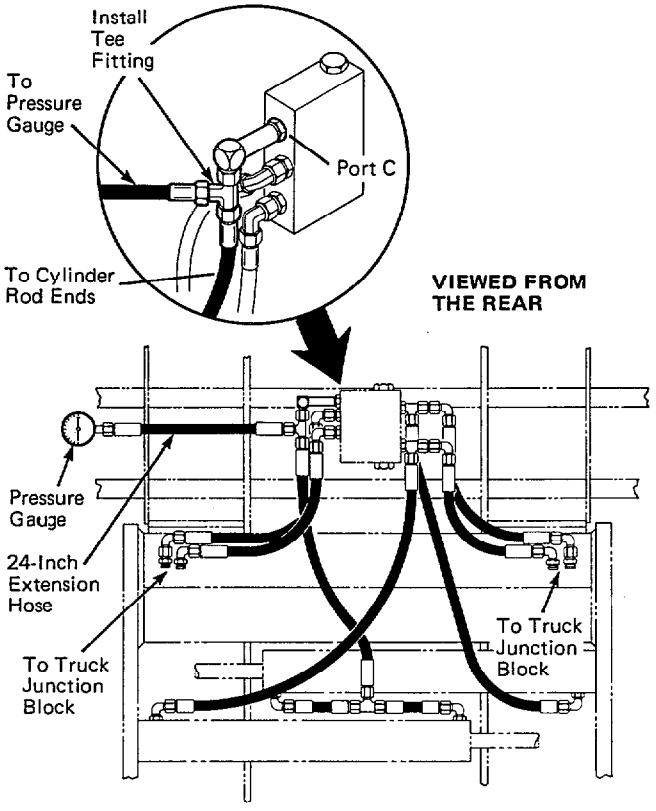
4.4-3 Clamps Controlled with One Auxiliary Valve and a Solenoid Valve

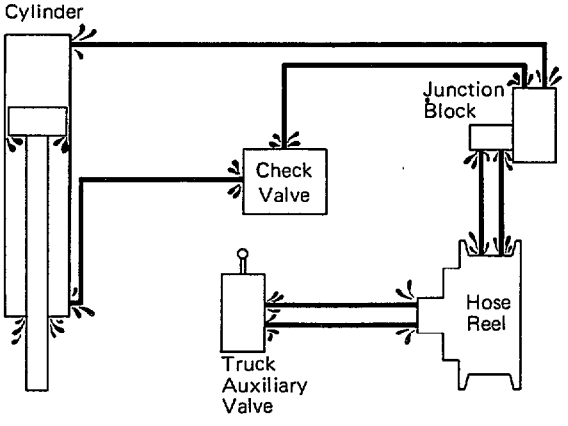
If your unit is plumbed to "sideshift" when the solenoid valve is energized, replumb the circuit so the "clamp" function operates when the solenoid valve is energized.

4.5 General Pressure Test, Carton Clamps with a Conventional Valve Only

- ☐ Open the arms completely to gain access to the check valve ports.
- ☐ Locate and identify Port C on the check valve and disconnect the cylinder hose from the elbow. Install the gauge and tee into the elbow as shown, then reconnect the cylinder hose to the open end of the tee.
- ☐ Close the arms completely. Make sure the gauge assembly does not interfere with the closing arms.
- ☐ Pull the control handle to the "clamp" position and hold for a few seconds.
- ☐ Return the handle to neutral. The gauge should register within 100 psi of specified truck pressure. If it does not, check the pressure delivered by the truck. Refer to the truck service manual. Adjust and repair as necessary. TRUCK PRESSURE MUST NOT EXCEED 2000 PSI. Recheck cylinder pressure.

- If the truck system is OK, watch the gauge. If it registers a drop of more than 100 psi in one minute, check for hydraulic leaks in the system. Refer to the accompanying diagram. Repair the leaks and recheck the pressure.
- If the truck system is OK and the gauge **does not** drop more than 100 psi in one minute and you are having trouble picking up or carrying a load, the problem is not hydraulic. Refer to the Arm Service section, Paragraph 5.2-2 or 5.2-3, or call Cascade's Service Department.
- If there are no leaks and the gauge **does** drop more than 100 psi in one minute, complete the following additional test to locate the source of the problem (page 6-19).

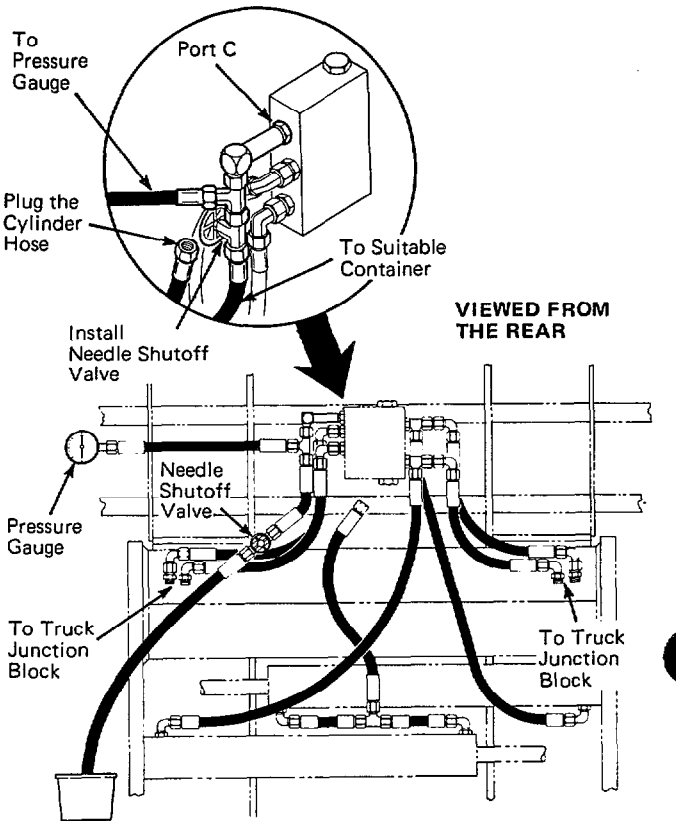




POTENTIAL LEAK POINTS

4.5 General Pressure Test, Carton Clamps with a Conventional Valve Only (Cont.)

- ☐ Open the arms fully.
- ☐ Disconnect the hose to the gauge tee and plug the hose.
- ☐ Install the needle valve and drain line to the open end of the tee. Put the drain line in a suitable container.
- ☐ Open the needle valve no more than 1/2 to 1 turn.
- ☐ Start the truck and let it idle. Put the truck clamp lever to the "clamp" position and hold for 4 or 5 seconds to allow oil to flow to the container.
- ☐ While holding the clamp valve open, close the needle shutoff valve. Keep holding the truck valve open until the gauge reaches within 100 psi of truck relief pressure.
- ☐ Return the truck clamp valve to neutral and watch the gauge.
- If the gauge **does not** drop more than 100 psi in one minute, one or both cylinders require service. Refer to Section 5, Paragraph 5.3.
- If the gauge **does** drop more than 100 psi in one minute, the check valve is faulty and requires service. Refer to Section 5, Paragraph 5.6.
- ☐ After making the necessary corrections, reconnect the hoses. Cycle the clamp 4 or 5 times without and with a load before returning it to service.



Call Cascade's Service Department

If you have carefully and accurately completed this check list and you still have not solved the problem, call us. Our Service Department is open from 10:00 AM to 8:00 PM **Eastern time.**

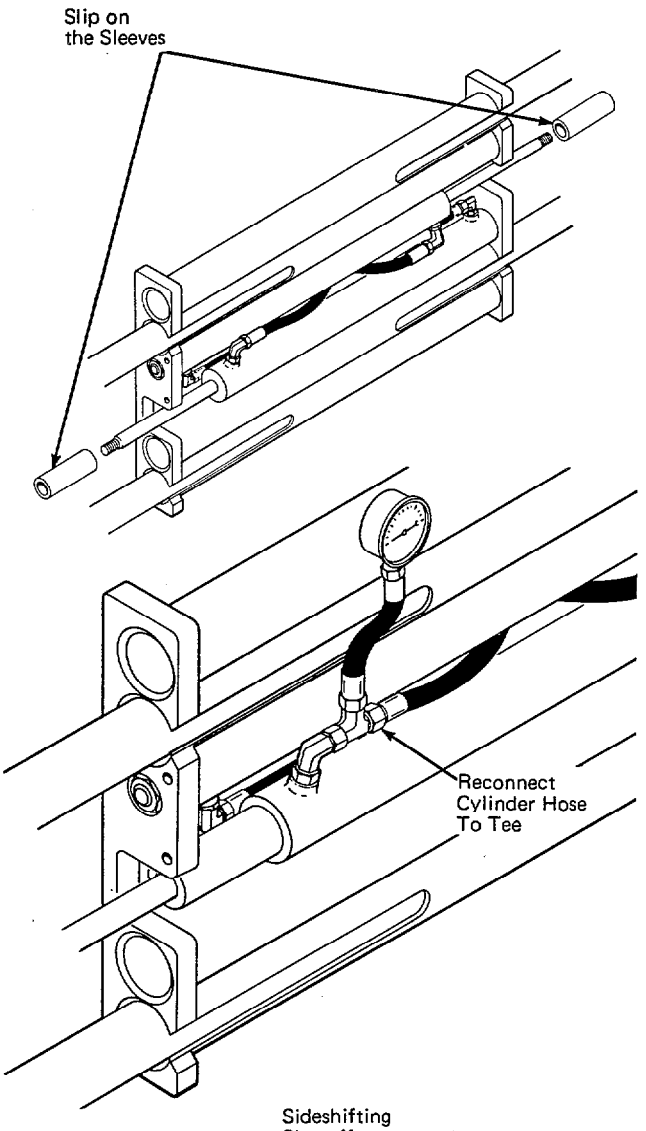
Call 800-547-5266 (toll free)
In Oregon, 666-1511

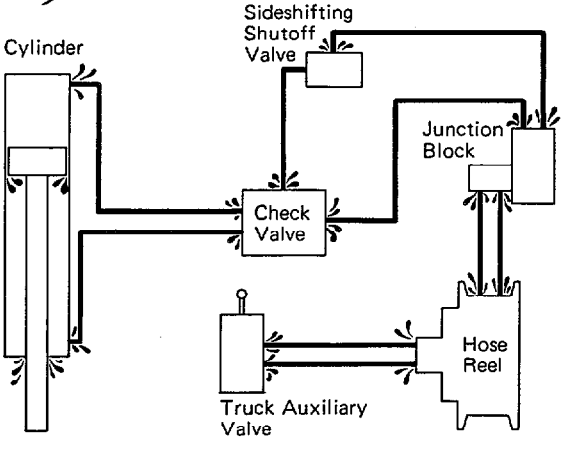
4.6 General Pressure Test, Appliance Clamps with a Conventional Valve Only

- ☐ Open the arms completely.
- ☐ Disconnect the cylinder rod ends from the arms.

  IMPORTANT: Refer to the procedures described in Section 5, Paragraph 5.2-1, Step 2.
- ☐ Retract the cylinders far enough to slip the steel sleeves over the cylinder rods.
- ☐ Extend the cylinders and reconnect the rods to the arms with the sleeves in place. It is not necessary to "lock" the nuts or install the keepers.
- ☐ Remove the supply hose to the rod end port of one cylinder. Install a gauge into the open port, then reconnect the cylinder supply hose to the gauge tee.
- ☐ Slowly retract the cylinders (arms moving together) until the sleeves contact the cylinder end. Make sure the gauge assembly does not interfere with the closing arms. The cylinders are now blocked partially open.
- ☐ Pull the clamp control handle to the "clamp" position and hold for a few seconds.
- ☐ Return the handle to neutral. The gauge should register within 100 psi of specified truck pressure.

- If it does not, check the pressure delivered by the truck. Refer to the truck service manual. Adjust and repair as necessary. TRUCK PRESSURE MUST NOT EXCEED 2000 PSI. Recheck cylinder pressure.
- If the truck system is OK, watch the gauge. If it registers a drop of more than 100 psi in one minute, check for hydraulic leaks in the system. Refer to the accompanying diagram. Repair the leaks and recheck cylinder pressure.
- If there are not external leaks, test the check valve as follows (page 6-21).

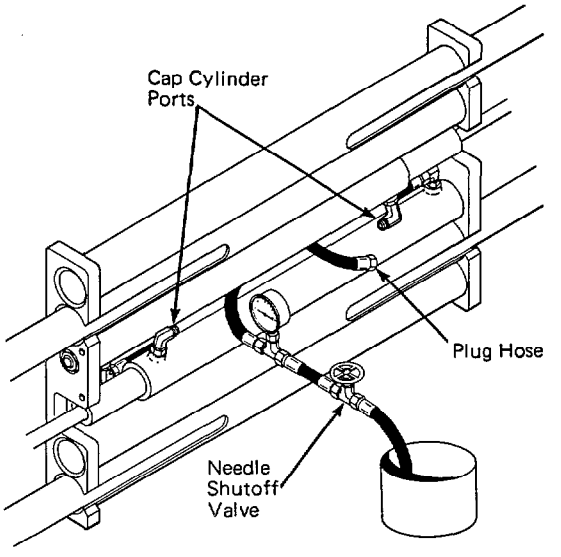




POTENTIAL LEAK POINTS

4.6 General Pressure Test, Appliance Clamps with a Conventional Valve Only (Cont.)

- ☐ Remove the gauge tee from the cylinder rod end port but keep it connected to the hose.
- ☐ Remove the hose to the rod end port of the other cylinder. Cap both cylinder ports and plug the hose that does not have the gauge connected.
- ☐ Connect a needle shutoff valve and drain line to the gauge tee. Put the drain line into a suitable container.
- ☐ Open the needle valve no more than 1/2 to 1 full turn.
- ☐ Start the truck and let it idle. Put the truck clamp lever to the "clamp" position and hold for 4 or 5 seconds to allow oil to flow to the container.
- ☐ While holding the clamp lever open, close the shutoff valve. Keep holding the truck valve open until the gauge reaches within 100 psi of truck relief pressure.
- ☐ Return the truck clamp valve to neutral and watch the gauge.
  - If the gauge **does not** drop more than 100 psi in one minute, one or both cylinders require service. Refer to Section 5, Paragraph 5.3.
  - If the gauge **does** drop more than 100 psi in one minute, the check valve is faulty and requires service. Refer to Section 5, Paragraph 5.6.
- ☐ After making the necessary corrections, remove the cylinder rod sleeves and reconnect all hoses. Make sure the cylinder anchors are secure. Refer to Section 5, Paragraph 5.2-1, Step 6 for special instructions regarding cylinder anchor nuts.
- ☐ Cycle the attachment 4 or 5 times without and with a load before returning the attachment to service.



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4.7 Troubleshooting Tests, Clamps with a Hi-Ball Valve Only

4.7-1 Operational Tests

If you are having trouble with a clamp equipped with a Hi-Ball valve, check the following before performing the General Pressure Test (Paragraph 4.7-2).

- Make sure the truck hoses are the same size as those used on the attachment. They must be No. 8 with minimum fitting orifices of 13/32 inch. A flow divider can be used to reduce the volume delivered to the attachment.
- Make sure the attachment is plumbed to the truck correctly. Refer to the Hosing Diagram or Circuit Schematic (Paragraph 4.2) for your system.
- Make sure the truck pump supplies the specified volume to the attachment **at the carriage** (junction block). 3 gpm minimum; 7 gpm maximum. If a pressure regulator is used, volume to the attachment must not exceed 6 gpm.

  NOTE: If your truck output **exceeds** the specified maximum, a flow divider may be installed to provide the correct output.
- Make sure there are no hydraulic leaks in the system.

If these conditions are met, check for proper operation of the Hi-Ball valve according to the following procedures.

1. Open the attachment arms and install a pressure gauge and tee into valve Port CL as shown.
2. Making sure the gauge assembly does not interfere, operate the attachment several times and watch the arms to be sure the valve is operating properly.

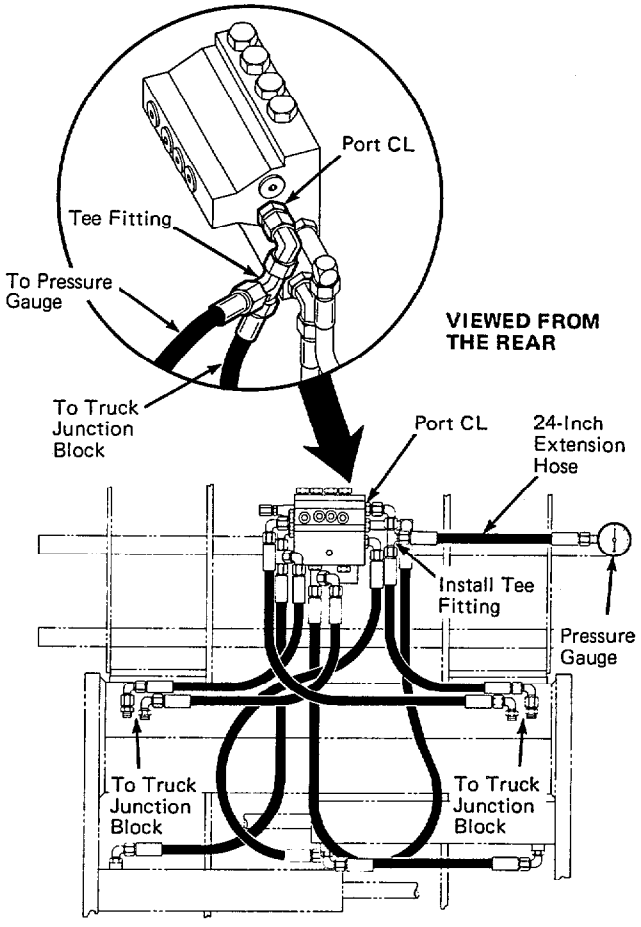
   IMPORTANT: "Feather" the control valve instead of operating at full speed so you can more easily observe the movement of the arms.

The following should happen when the arms are closing from the fully-open position.

- Both arms should begin closing simultaneously. The right arm should complete its travel first.
- The left arm should hesitate before completing its final 4-6 inches of travel.
- As soon as the right arm reaches the end of its travel and **immediately before the left arm continues to move,** the system pressure should increase to approximately 1650 psi (warm oil). If it does not, lift truck pressure must be adjusted to 1700 psi minimum. DO NOT EXCEED 2000 PSI.
- The pressure should then drop as the left arm completes its final 4-6 inches of travel.

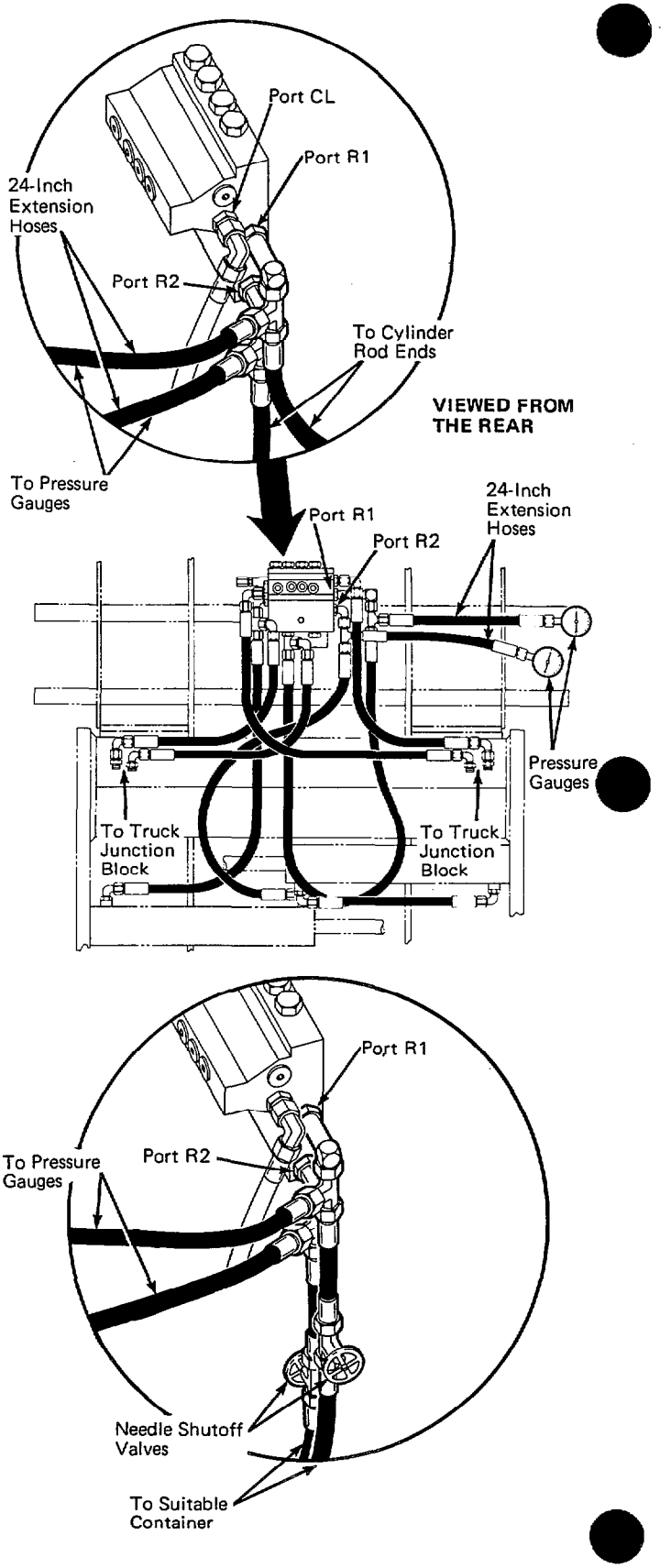
If the system **does not** pass these tests, the Hi-Ball valve is faulty and should be replaced.

If the system **does** pass these tests and the clamp will not handle the load, remove the gauge from Port CL and perform the following General Pressure Test.



4.7-2 General Pressure Test

- ☐ Open the arms completely to gain access to the check valve ports.
- ☐ Install pressure gauges with tees in Ports R1 and R2 of the Hi-Ball valve as shown.
- ☐ Close the arms completely. Make sure the gauge assemblies do not interfere with the closing arms.
- ☐ Pull the control handle to the "clamp" position and hold for a few seconds after the left arm has completed its travel to pressurize the clamp circuit.
- ☐ Return the valve handle to neutral and watch the gauges.
- • If the gauges drop **no more** than 100 psi in one minute and the attachment still fails to operate correctly, the problem may be due to incorrect application of the attachment or an auxiliary relief valve may be set too low to handle your loads.
- • If either or both gauges **do** drop more than 100 psi in one minute, continue testing as follows to isolate the problem.
- ☐ Open the arms and disconnect the hoses from the gauge tees that lead to the cylinder rod end ports.
- ☐ Attach needle valves and drain lines to the gauge tees. Open both needle valves no more than 1/2 to 1 full turn and put the drain lines in a suitable container.
- ☐ Move the control handle to the "clamp" position to cause a flow of oil at the drain hoses.
- ☐ Continue holding the control handle and close both needle valves tightly. Hold the control handle to "clamp" until the circuit is fully pressurized.
- ☐ Return the handle to neutral and watch the gauges.
- • If either or both gauges drop more than 100 psi in one minute, the Hi-Ball valve is faulty and must be replaced.
- • If neither gauge drops more than 100 psi in one minute, one or both cylinders require service. See Section 5, Paragraph 5.3.
- ☐ After making the necessary corrections, remove the gauges and reconnect the hoses. Cycle the attachment 4 or 5 times without and with a load before returning it to service.



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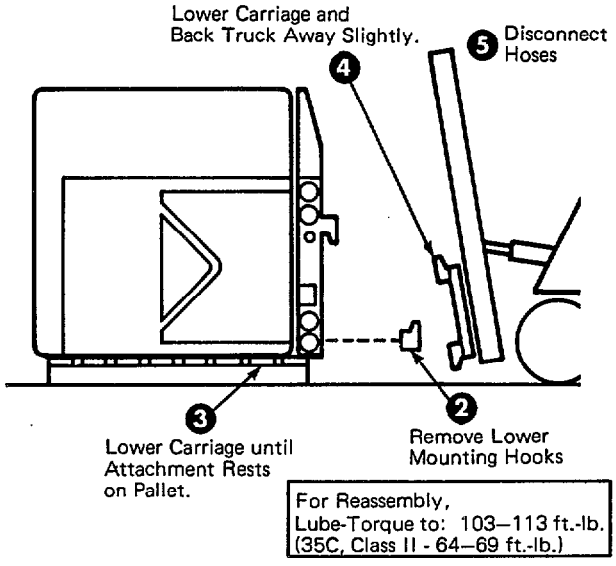
5.1 Clamp Removal and Installation

1. Open the clamp arms completely.
2. Remove the lower mounting hooks. For reassembly, lube-torque the lower mounting hook capscrews to 103-113 ft.-lb. (35C, Class II—64-69 ft.-lb.).
3. Position wooden blocks or a shipping pallet under the attachment. Lower the mast carriage until the attachment is resting on the blocks.
4. Continue lowering the mast carriage enough to clear the upper mounting hooks. Back the truck away a few inches to gain access to the hoses to the attachment.

> **WARNING:** Before removing any hoses, relieve pressure that might be present in the hydraulic system. With the truck off, open the truck auxiliary control valves several times in both directions.

5. Disconnect and cap the hoses to the attachment. Tag the hoses for ease in reconnecting.
6. For reinstallation, reverse the above procedures, or consult the Installation Instructions, Section 2.



5.2 Arms

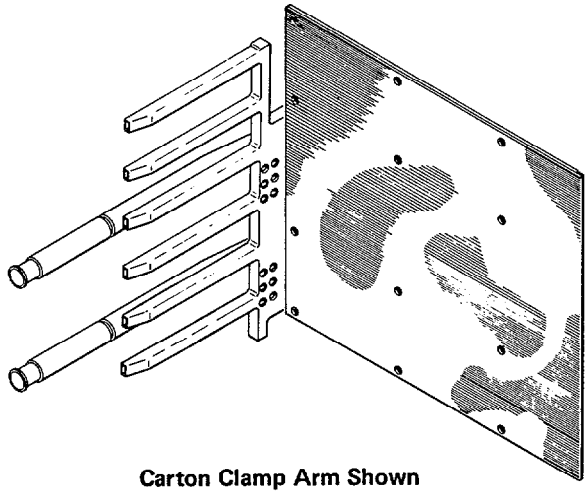
5.2-1 Arm Removal and Installation

Contact pads, contact plates, and equalizers on Carton Clamps can be removed without removing the arm carriers from the attachment. However, the rubber pads on Appliance Clamp arms are not replaceable. Remove arm carriers according to the following procedures.

1. Open the arms past the clamp frame.
2. Remove the nuts retaining the cylinder rods to the arm lugs. On old-style retaining nuts, first remove the spring washer.

   IMPORTANT: A new style retaining nut has a cone-shaped locking washer swaged to the threads of the nut. Locking is achieved when the washer is "dimpled" into the groove in the end of the cylinder rod. To "unlock" the nut, insert a punch or chisel into the hole in the center of the cone-shaped washer and pry up the dimple. If you're careful, the nut may be reused several times.

   NOTE: Pressurizing the cylinders outward will increase friction between the cylinder rod and the lug and may make loosening the nuts easier.



Carton Clamp Arm Shown

5.2-1 Arm Removal and Installation (Cont.)

3. Secure the arms with a suitable overhead hoist and chain.

> **WARNING:** Make sure your overhead hoist has a rated lifting capacity of at least 1000 pounds.

4. Retract the cylinder rods until they come out of engagement with the arm lugs.
5. Pull the arms out of the clamp frame.

   IMPORTANT: Each time the arms are removed, inspect the arm guide tubes for scoring. Minor scoring can be removed with a hone. If the guide tubes are badly damaged, the frame must be replaced. Before installing arm carriers, make sure the guide tubes are clean and free of metal projections.

6. For reassembly, reverse the above procedures, except for the following special instructions for cylinder anchor nuts.

   NOTE: When tightening cylinder anchor nuts, pressurizing the cylinders outward will increase friction between the cylinder rod and the lug and may make tightening easier.

   a. OLD-STYLE ANCHOR NUTS. Install the washer onto the cylinder rod, then fit the cylinder rod into the arm carrier. Install the sleeve, then thread on the nut. Tighten the nut until the sleeve bottoms against the washer. Back the nut off until it aligns with the slot in the cylinder rod. Install the spring retainer. The clearance between the lug and the washer should be about 5/32 inch.

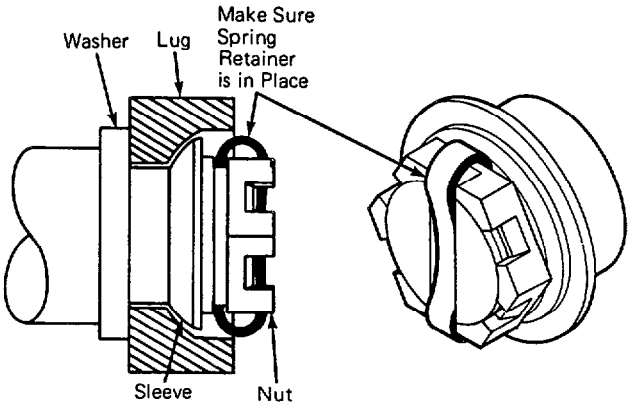
   CAUTION: Do not attempt to remove the looseness or damage to the assembly could result.

   b. NEW-STYLE ANCHOR NUTS.

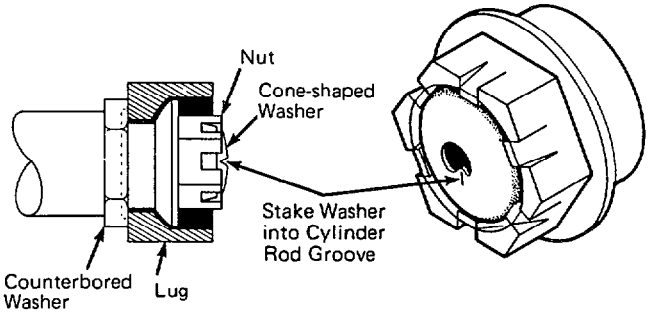
   NOTE: Service replacements for old-style anchor nuts are of the new-style configuration.

   Install the washer onto the cylinder rod with the counterbore-side facing outward (toward the nut), then fit the cylinder rod into the arm carrier. Restrain the washer with a wrench and torque the nut to: **20C and 35C**—55-65 ft.-lb.; **60C**—130-150 ft.-lb. Lock the nut by staking the cone-shaped washer with a case-hardened chisel. Be sure the washer is driven into the slot in the end of the cylinder rod.

   CAUTION: Always use the hex-style washer with the new-style anchor nut. DO NOT use the old-style castellated nut with the hex-style washer.



OLD-STYLE CYLINDER ANCHOR NUT



NEW-STYLE CYLINDER ANCHOR NUT

5.2-2 Arm Disassembly, Service, and Reassembly, Carton Clamps

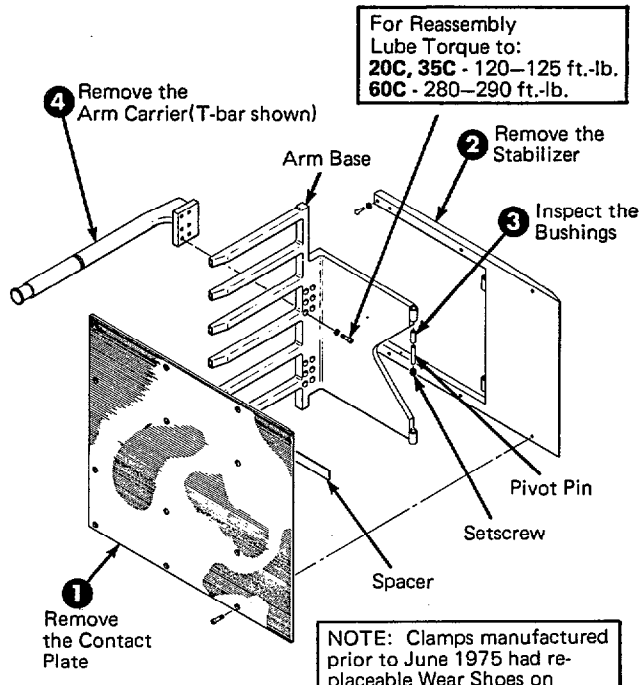
The following procedures can be performed with the arms on the attachment and with the attachment on the truck.

NOTE: The contact plate does not have replaceable pads. If a pad is completely worn, the contact plate must be replaced.

1. Remove the contact plate from the stabilizer.
2. Remove the stabilizer by removing the two pivot pins that secure it to the arm base.
3. Inspect the stabilizer pivot bushings. If the non-metallic coating is worn through or if the bushing ID is worn, replace the bushing.

   CAUTION: Use a bushing driver to replace the bushings. Do not damage the bushing ID.
4. Remove the arm carrier (either T-bar or integral).
5. Reassembly is a reverse of disassembly.

   NOTE: The camber of the contact plates can be adjusted by removing the top spacer between the contact plate and the stabilizer. If even more camber is required, combine the top spacer with the bottom spacer.

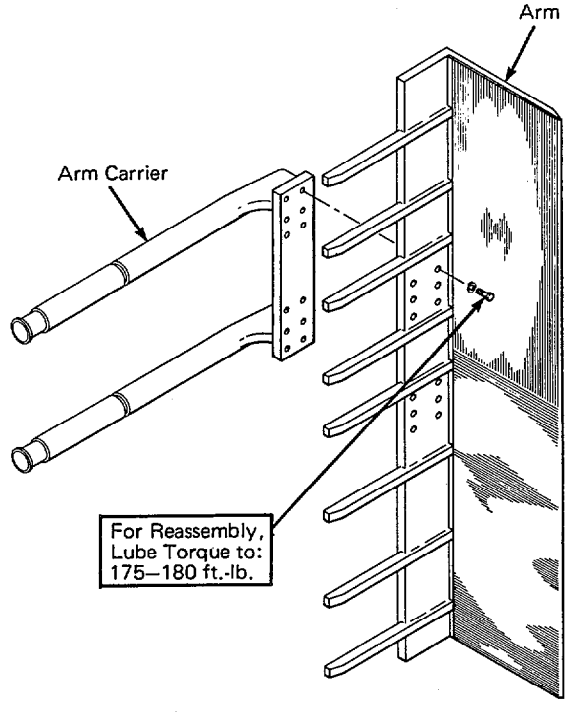


NOTE: Clamps manufactured prior to June 1975 had replaceable Wear Shoes on bottom of the Contact Plates. These Shoes have been replaced by a Hard Facing which is Welded to all Replacement Stabilizers. Refer to the Periodic Maintenance Section, Paragraph 3.1 for procedures for Field installation of the Facing.

5.2-3 Arm Disassembly and Reassembly, Appliance Clamp

The rubber pads on Appliance Clamps are not replaceable. If the pad is worn or if the arm is damaged, the complete arm assembly must be replaced. The left hand and right hand arms are **not** interchangeable.

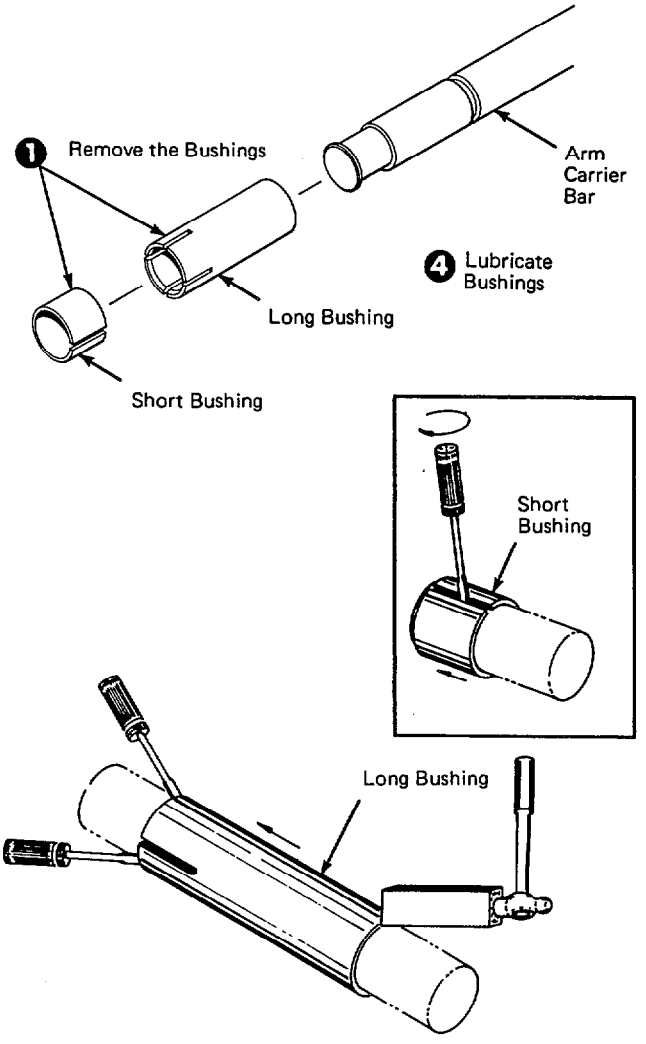
The arm carrier can be removed and reinstalled in the same manner as Carton Clamps.



5.2-4 Sliding Arm Bushing Replacement, Two-piece Style

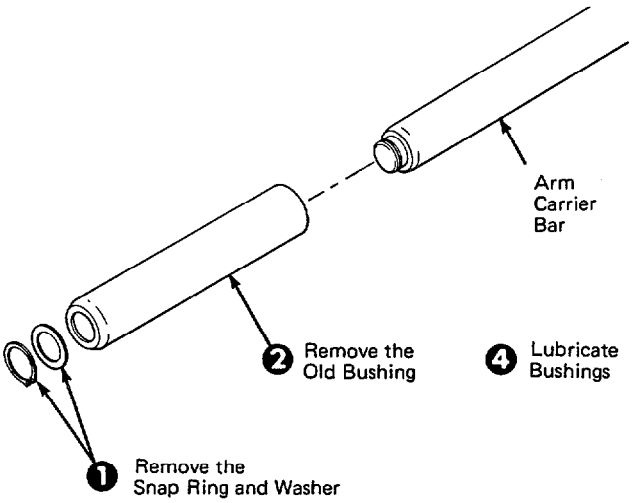
NOTE: An attachment with two-piece bushings may be converted to the new style, one-piece configuration by the installation of the appropriate One-Piece Bushing Conversion Kit. Contact Cascade Customer Service for information.

1. Remove and discard the old long and short bushings. To ease removal, spread the short bushing by inserting a screwdriver blade into the bushing slot. Similarly, insert two screwdrivers into two opposing slots in the long bushing to disengage the bushing retaining lip. It may be necessary to drive off the long bushing with a block and a hammer.
2. Install the long bushing. Spread the slots of the bushing with screwdrivers as during removal. If the bushing will not go over the arm carrier bar, heat it in boiling water for 3 or 4 minutes to soften it. Make sure the bushing retaining lip engages the groove in the arm carrier bar.
3. Install the short bushing. Spread the bushing to ease installation. Make sure the bushing fits into the outermost groove in the arm carrier bar.
4. Lubricate the bushings before assembling arm carriers onto the attachment.



5.2-5 Sliding Arm Bushing Replacement, One-piece Style

1. Remove the bushing retainer snap ring and washer from the end of the arm carrier bar.
2. Slide off the old bushing.
3. Slide the new bushing on and install the washer and retaining snap ring.
4. Lubricate the bushings before assembling arm carriers onto the attachment.



5.3 Cylinders, General Procedures

5.3-1 Cylinder Removal and Installation

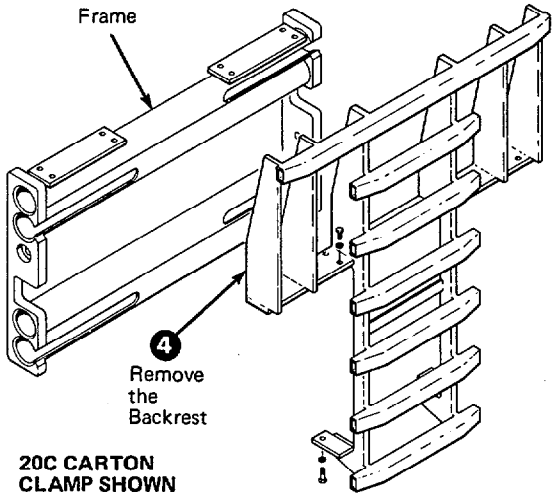
1. Extend the arms past the width of the frame.
2. Remove the cylinder rod anchor nuts.

   IMPORTANT: Refer to the procedures pertaining to cylinder anchor nuts as described in Paragraph 5.2-1, Step 2.
3. Retract the cylinder rods until they come out of engagement with the arm lugs.
4. Remove the backrest.

> **WARNING:** Before removing any hoses, relieve pressure that might be present in the hydraulic system. With the truck off, open the truck auxiliary control valves several times in both directions.

5. Remove and tag the hoses to the cylinders. Cap the hoses and the cylinder ports.
6. Remove the cylinder shell anchor nuts (Paragraph 5.2-1, Step 2).
7. Lift the cylinders away from the clamp frame.
8. Installation is a reverse of removal.

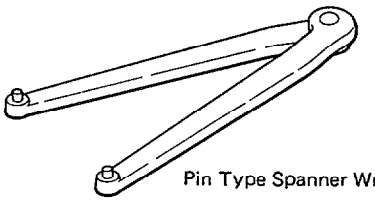
   IMPORTANT: Refer to the procedures pertaining to anchor nuts, Paragraph 5.2-1, Step 6.
9. Operate the attachment through several full cycles to force air in the system to the truck hydraulic tank. Check for leaks.



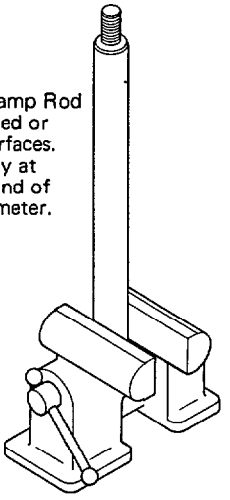
20C CARTON CLAMP SHOWN

5.3-2 Cylinder Disassembly

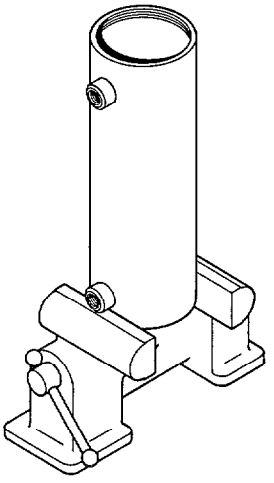
- Use a pin-type spanner wrench to remove cylinder retainers.
- When servicing a cylinder, clamp it in a soft-jawed vise. Clamp the cylinder and the rod on the major diameter at the extreme end only. **Never clamp the cylinder rod sealing surface.**
- V-seals will slide off the piston easily. To gain access to the rod seals, remove the self-adjusting brass bushing from the retainer after the retainer has been removed.
- To remove a U-cup seal from a piston, put the piston in a soft-jawed vise. Pry the seal up with a blunt tool such as a screwdriver, then cut the seal to remove it. Be careful not to scratch the seal groove.



Pin Type Spanner Wrench



Do Not Clamp Rod On Threaded or Sealing Surfaces. Clamp Only at Extreme End of Major Diameter.



Clamp Shell Only At Extreme Base End.

5.3-3 Cylinder Inspection

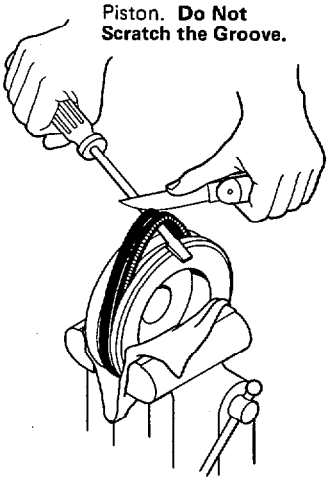
- Inspect the rod, piston, and retainer for nicks or burrs. If deeply gouged, replace the part. Minor nicks and burrs can be removed with an emery cloth.

  NOTE: A minor nick is one that will not cause a bypass of oil when the cylinder is operating.
- Inspect the inside of the cylinder shell and remove any minor nicks and burrs (see Note, above) with a butterfly hone. Replace the cylinder shell if it is deeply gouged.
- On cylinders with V-seals, inspect the self-adjusting brass bushing that fits inside the retainer. If the ID is scored, the bushing should be replaced.

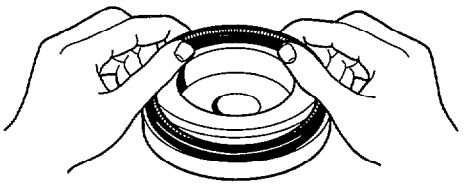
5.3-4 Cylinder Reassembly

- Lubricate all new seals before installing. Use a mixture of petroleum jelly and hydraulic oil on seals.
- Carefully note the direction of seals. If they are installed backwards, the seals will not seal properly. Refer to the illustration of the cylinder you are servicing.
- When installing U-cup seals onto a piston, hook one side of the seal in the groove and push it over the piston.

  NOTE: Polishing the chamfer angle will allow the seal to slide into the groove much easier.
- Always reassemble the rod assembly by sliding the retainer on first, then the piston assembly. Install and torque the piston retaining nut before sliding the rod assembly back into the shell.
- When reassembling a cylinder, always observe all torque values as shown on the appropriate illustration.



Remove Seal from Piston. **Do Not Scratch the Groove.**

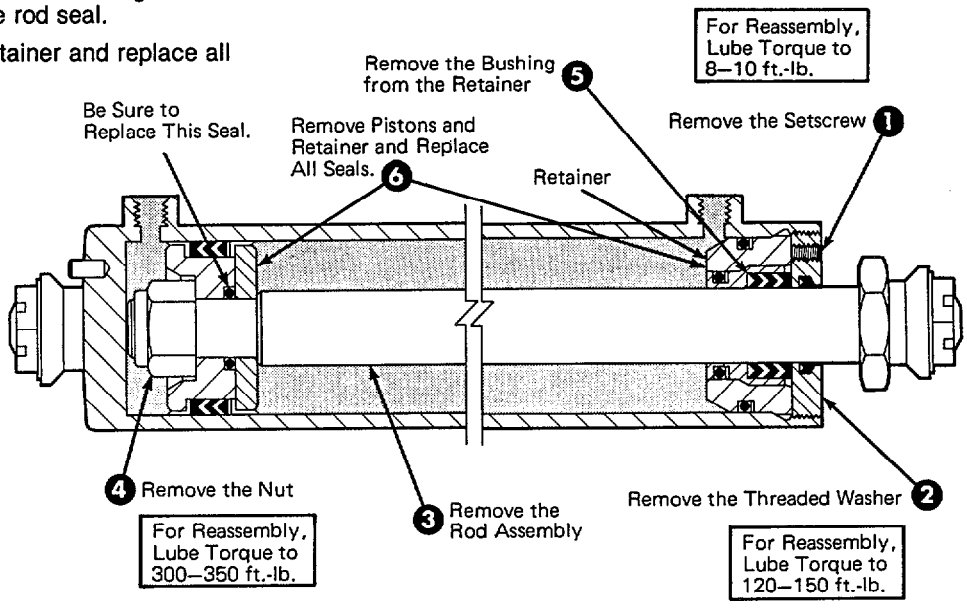


5.4 Cylinder Service

Read the General Procedures, Paragraph 5.3, before proceeding.

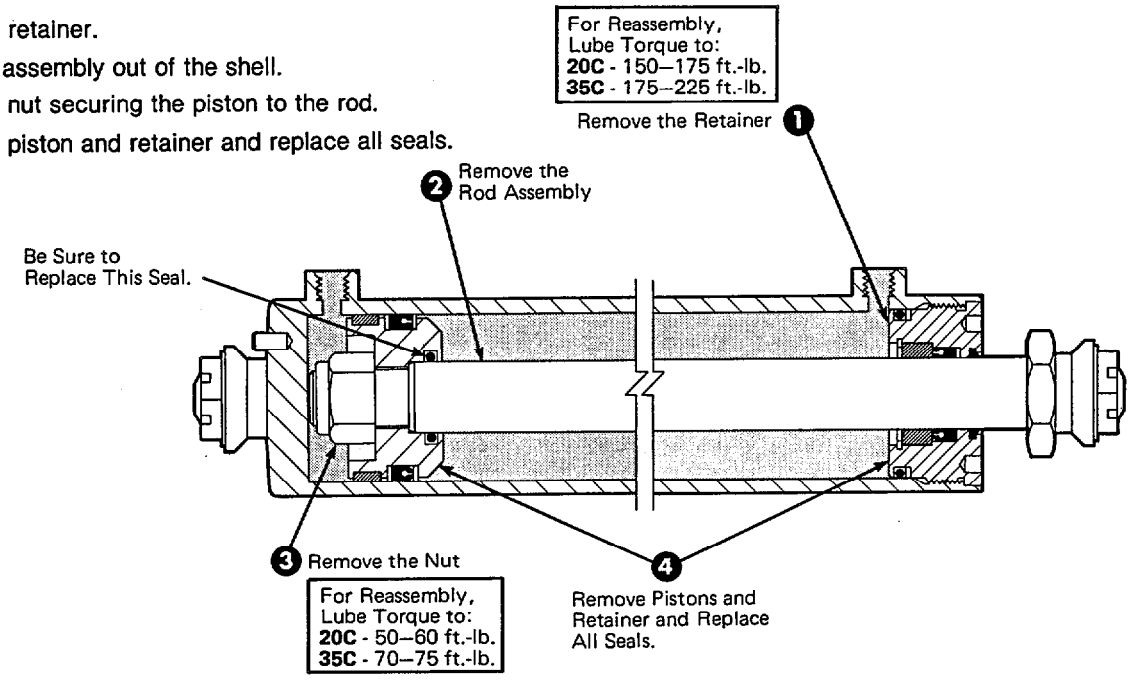
5.4-1 Cylinders with V-seals

1. Remove the setscrew from the threaded washer.
2. Remove the threaded washer.
3. Pull the rod assembly out of the shell.
4. Remove the nut securing the piston to the rod.
5. Remove the self-adjusting brass bushing from the retainer to gain access to the rod seal.
6. Remove the pistons and retainer and replace all seals.



5.4-2 Cylinders with U-cup Seals

1. Remove the retainer.
2. Pull the rod assembly out of the shell.
3. Remove the nut securing the piston to the rod.
4. Remove the piston and retainer and replace all seals.



5.5 Check Valves

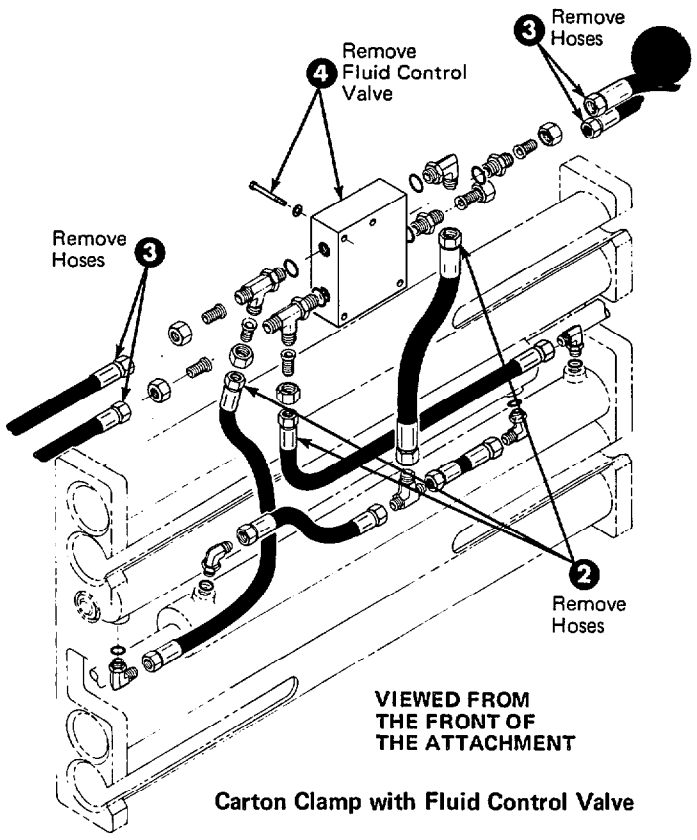
Standard Carton Clamps and Appliance Clamps have a sliding-spool fluid control valve that serves as a check valve and a flow divider. Hi-Ball attachments are equipped with a special Hi-Ball valve.

Appliance Clamps are additionally equipped with two sideshifting shutoff valves to control the flow of oil to the clamp cylinders at the end of the sideshifting stroke.

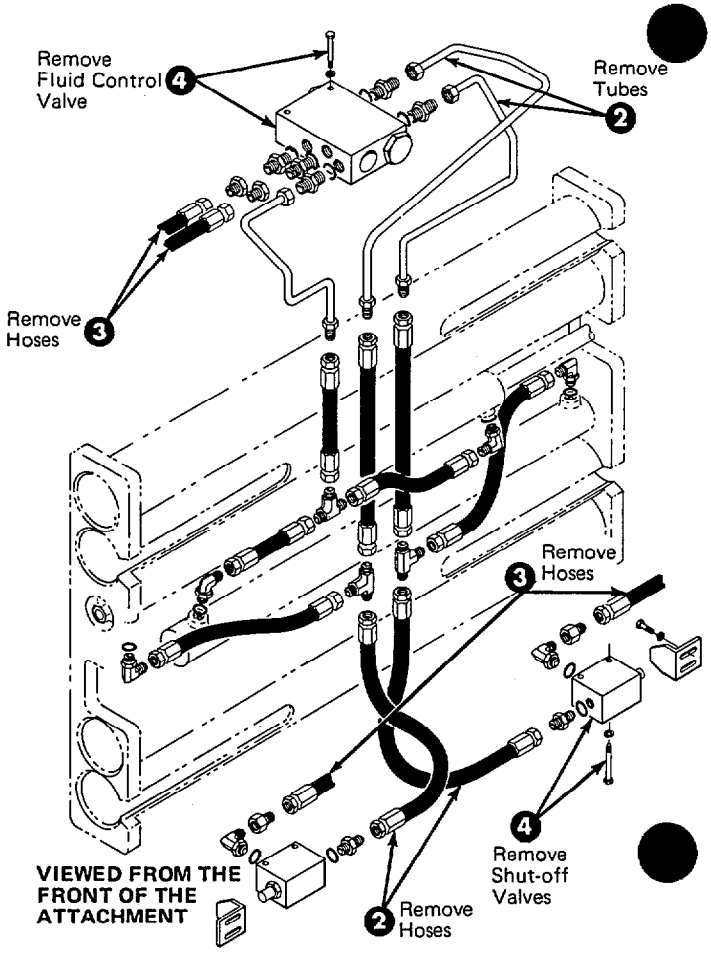
5.5-1 Check Valve (and Appliance Clamp Shutoff Valve) Removal and Installation

1. Remove the attachment from the truck as described in Paragraph 5.1.
2. Remove, cap, and tag the hoses or tubes to the check valve (and Appliance Clamp shutoff valves).
3. Remove, cap, and tag the truck hoses to the attachment.
4. Remove the check valve (and Appliance Clamp shutoff valves) by removing the capscrew(s) securing the valve to the attachment frame.
5. Installation is a reversal of removal.
6. Install the attachment onto the truck as described in Section 2.

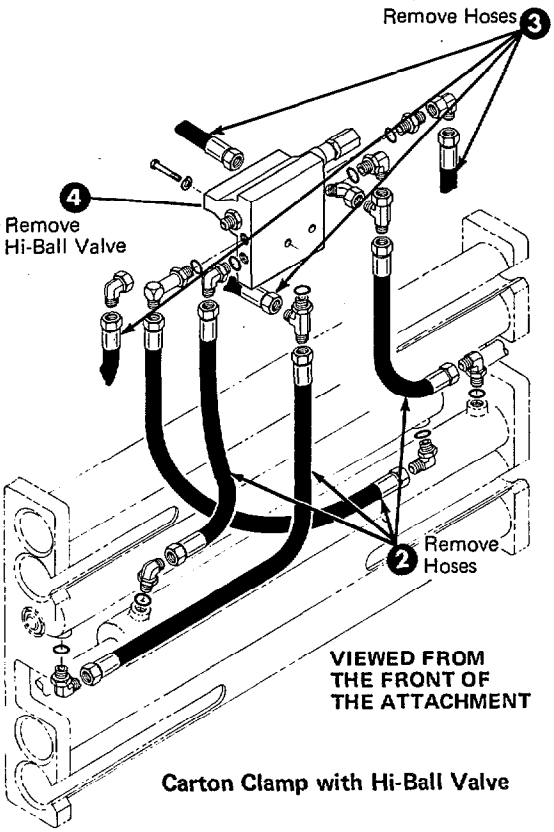
   IMPORTANT: APPLIANCE CLAMP SHUTOFF VALVES ONLY. When installing shutoff valves, make sure the adjustable stop leaves 0.20 inch of travel on the valve plunger when the arms are completely closed.



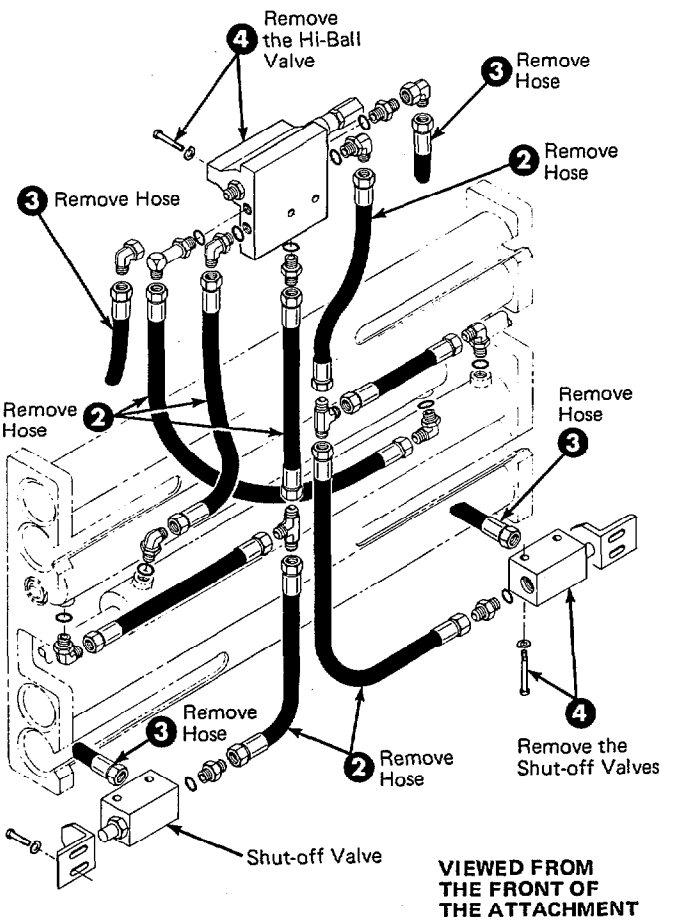
Carton Clamp with Fluid Control Valve



Appliance Clamp with Fluid Control Valve



Carton Clamp with Hi-Ball Valve



Appliance Clamp with Hi-Ball Valve

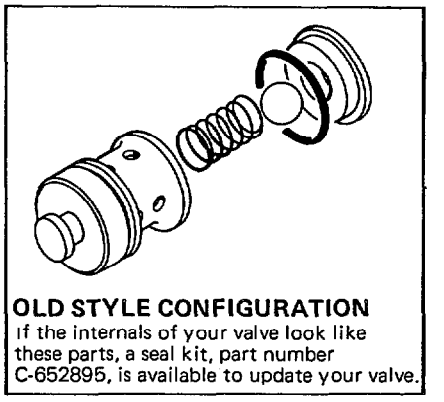
5.5-2 Check Valve Service

IMPORTANT: Service the fluid control valve in a clean work area.

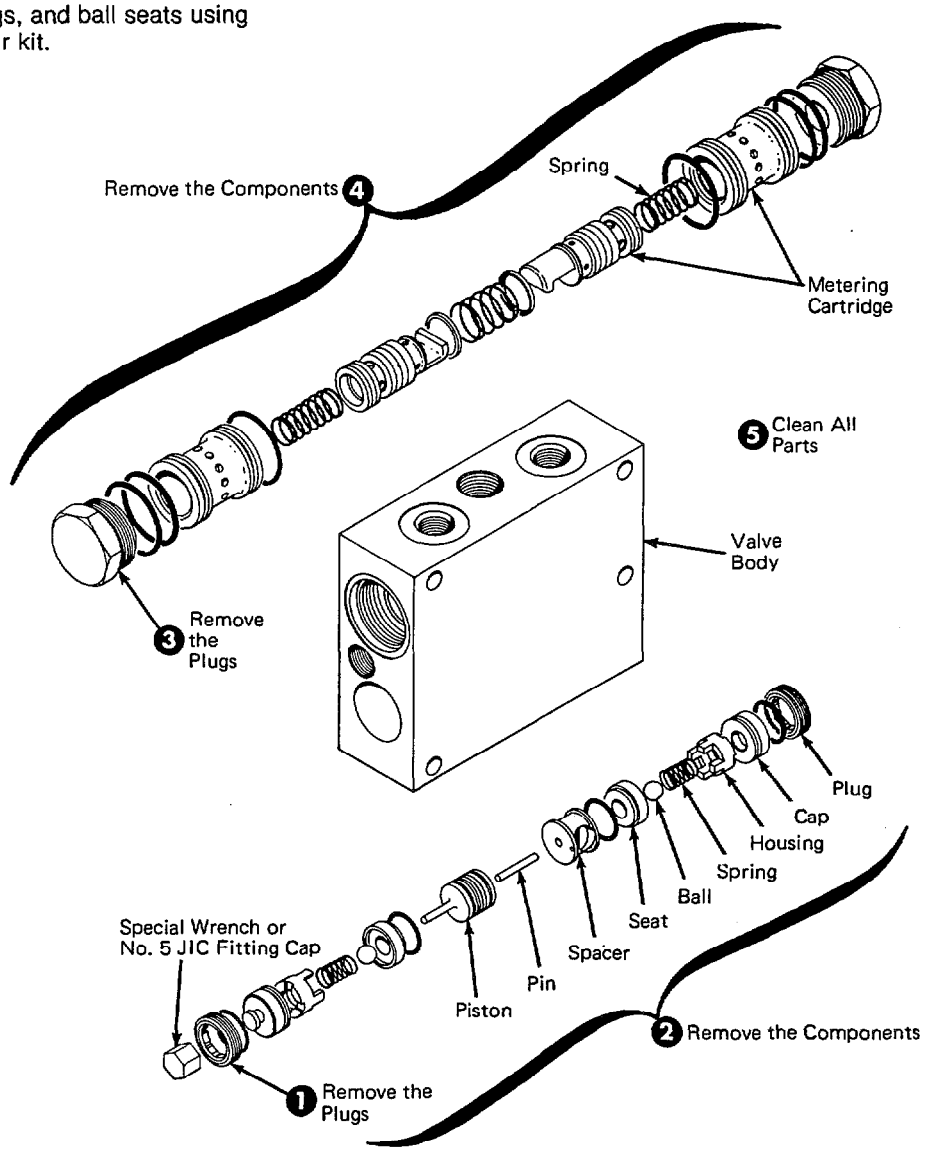
1. Using the special wrench (Cascade part number C-2645) provided with the valve seat repair kit, remove the allen-head plugs from both ends of the valve. If the special wrench is not available, use a No. 5 JIC fitting cap.
2. Carefully remove the internal parts and lay them out in the correct order on the work bench.

   CAUTION: The balls can become lodged in the internal ports during disassembly. Make sure the balls are removed before proceeding.
3. Remove the hex-head plugs from both ends of the valve.
4. Carefully remove the internal parts and lay them out in the correct order on the work bench.
5. Clean all internal parts with kerosene or cleaning solvent.
6. Replace the springs, O-rings, and ball seats using Cascade's valve seat repair kit.
7. Insert the piston, pin, and spacer (the end with the small hole goes in first into the valve body).
8. Coat both seat O-rings with Vaseline or equivalent. Insert each O-ring into its check cavity area, then insert the seat and press it in place.
9. Insert the remaining components in the order shown.

   CAUTION: Before inserting the spring, make sure the ball is properly seated.
10. Use the wrench cap to torque the allen-head plug to 10 ft.-lb.



OLD STYLE CONFIGURATION
If the internals of your valve look like these parts, a seal kit, part number C-652895, is available to update your valve.

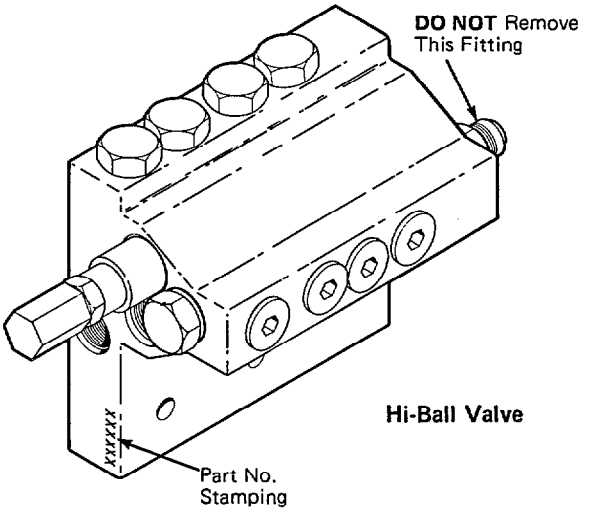


Fluid Control Valve Assembly

5.5-3 Hi-Ball Valve Service

The Hi-Ball valve is not a serviceable item and must be replaced as a complete assembly. Refer to Troubleshooting Section 4 for troubleshooting procedures. Order replacement valves using the assembly number stamped on the valve body. When installing a replacement valve, flush all supply hoses as described in the Installation Instructions, Paragraph 2.2, Step 2, before installing the attachment onto the lift truck.

IMPORTANT: Disassembly or repair of the Hi-Ball valve without factory authorization will result in loss of warranty.



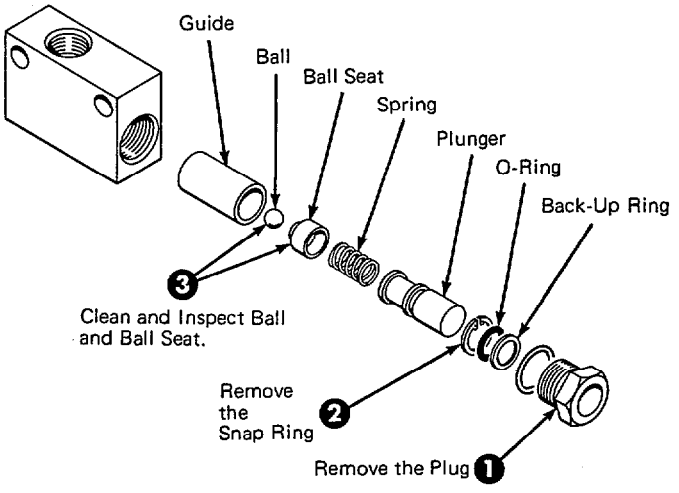
Hi-Ball Valve

5.5-4 Shutoff Valve Service (Appliance Clamps Only)

IMPORTANT: Service the shutoff valve in a clean work area.

1. Remove the hex-head plug and remove the plunger and ball assembly from the valve body. Remove the internal components.
2. Remove the snap ring and disassemble the plunger, guide, ball seat, ball, and spring.
3. Clean and inspect the ball and ball seat. Replace the valve body if the seat cannot be reconditioned. The ball can be reseated by tapping it into its seat with a brass punch. Replace the ball if it is nicked or scratched.
4. Reassembly is a reverse of disassembly.

Appliance Clamp Shut-Off Valve



Section 6 Standard Labor Times

6.1 Standard Labor Time is the average time required to perform each operation described in Section 5, Service. Each Standard Labor Time is identified by the Service Section paragraph number and title that corresponds to that operation.

The Standard Labor Times are based on the assumption a qualified serviceman is working on a reasonably clean attachment with adequate tools. We realize the actual time required to perform an operation may occasionally be greater than that listed, especially if a "first time" serviceman lacks the needed tools, or if a bolt is frozen. But considering all factors that can affect the job, Cascade can only honor warranty labor claims based on these carefully evaluated averages.

We strongly urge servicemen to read the applicable Service Sections of the manual before repairs are initiated. If problem diagnosis is difficult, call the Cascade Service Department at 1-800-547-5266 (toll free), or, in Oregon, call 666-1511.

To arrive at the total Standard Labor Time for a job, list each operation and add the times. As an example, to replace bushings, your list should look something like this:

5.1	Clamp Removal and Installation	0.8
5.2-1	Arm Removal and Installation	0.8
5.2-4	Arm Bushing Replacement	1.0
	Total Standard Labor Time	2.6

6.2 Standard Labor Times

Paragraph Number		Times
5.1	Clamp Removal and Installation	0.8
5.2-1	Arm Removal and Installation	0.8
5.2-2	Arm Disassembly, Service and Reassembly Carton Clamps	1.5
5.2-3	Arm Disassembly and Reassembly, Appliance Clamp	0.5
5.2-4	Sliding Arm Bushing Replacement, Two Piece Style	1.0
5.2-5	Sliding Arm Bushing Replacement, One Piece Style	1.0
5.3-1	Cylinder Removal and Installation	0.5
5.4-1	Cylinders with V-Seals	0.8
5.4-2	Cylinders with U-Cup Seals	0.8
5.5-1	Valve Removal and Installation	
	Carton Clamp and Appliance Clamp Check Valve	0.5
	Appliance Clamp Shutoff Valve	0.4
	Hi-Ball Valve	1.5
5.5-2	Check Valve Service	0.8
5.5-4	Shutoff Valve Service (Appliance Clamps Only)	0.5

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Do you have questions you need answered right now?

Dial Directline
800-547-5266
(toll free)

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Form 5191