

SERVICE MANUAL

80G-170G

Non-Revolution Clamps

Number 6828871-R1

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corporation**

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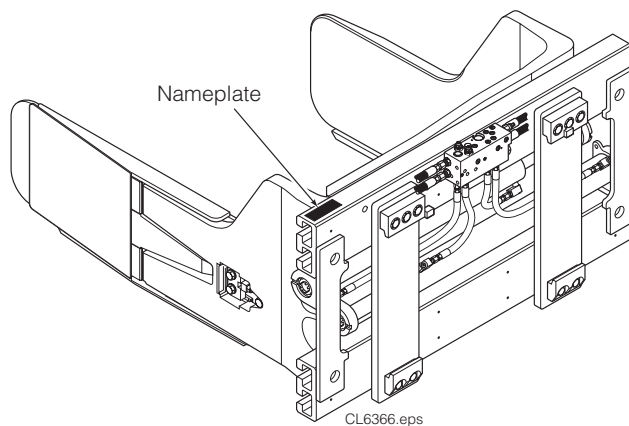
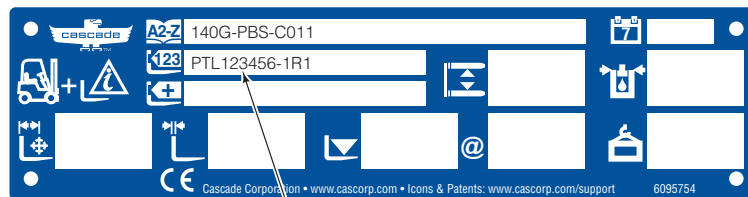
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1.1 Introduction

This manual provides the Periodic Maintenance, Troubleshooting, Service and Specifications for Cascade 80G–170G Non-Revolving Clamps.

In any communication about the attachment, refer to the product catalog and serial numbers stamped on the nameplate. If the nameplate is missing, the numbers can be found stamped on the frame where the plate was mounted.

IMPORTANT: Tubing connection and supply fitting types vary depending on end-user. Specifications are shown in Metric. All fasteners have a torque value range of $\pm 10\%$ of stated value.



1.2 Special Definitions

The statements shown appear throughout this manual where special emphasis is required. Read all **WARNINGS** and **CAUTIONS** before proceeding with any work. Statements labeled **IMPORTANT** and **NOTE** are provided as additional information of special significance or to make your job easier.



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.



WARNING: After completing any service procedure, always test the attachment through five complete cycles. First test empty, then test with load to make sure attachment operates correctly before returning it to the job.

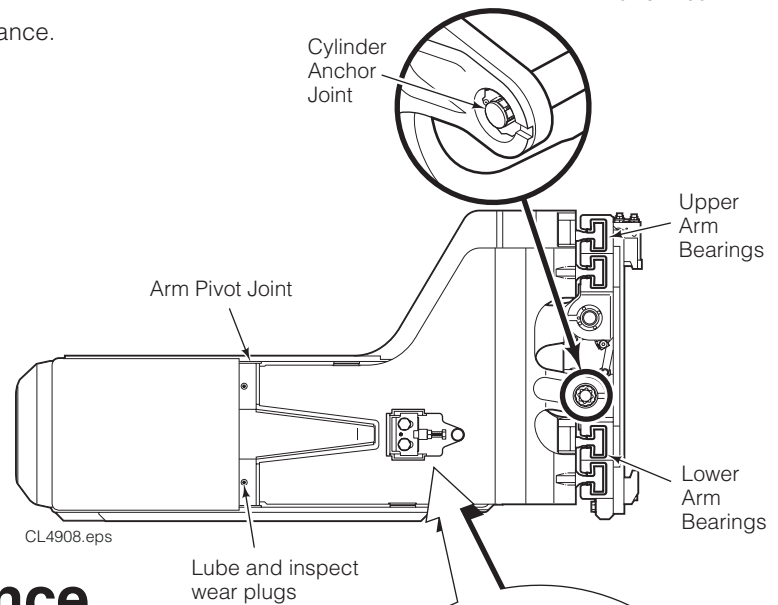
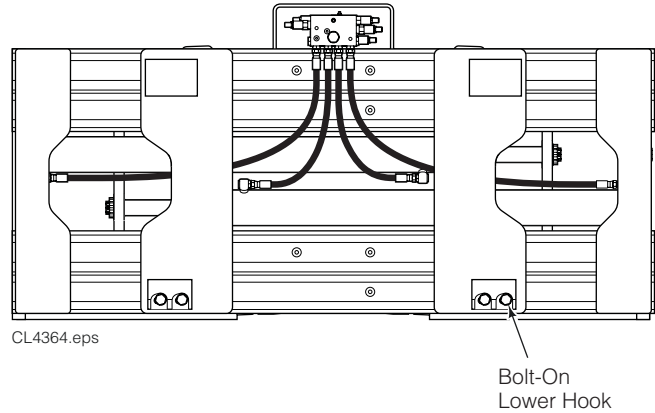
2.1 100-Hour Maintenance

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

- Check for loose or missing bolts, worn or damaged supply hoses and hydraulic leaks.
- Inspect cylinder anchor joint for lubrication and correct hold.

NOTE: Anchor joint operates with a loose clearance. Lubricate with wheel bearing grease.

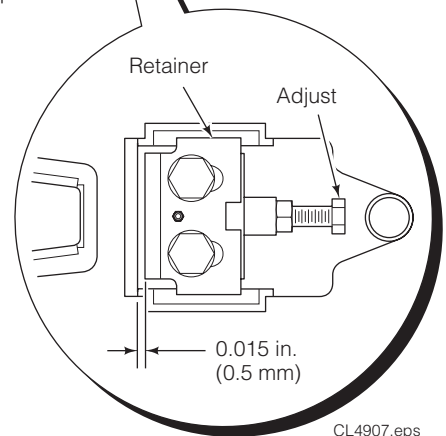
- Check for equal movement of arms.
- Check decals and nameplate legibility.



2.2 500-Hour Maintenance

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

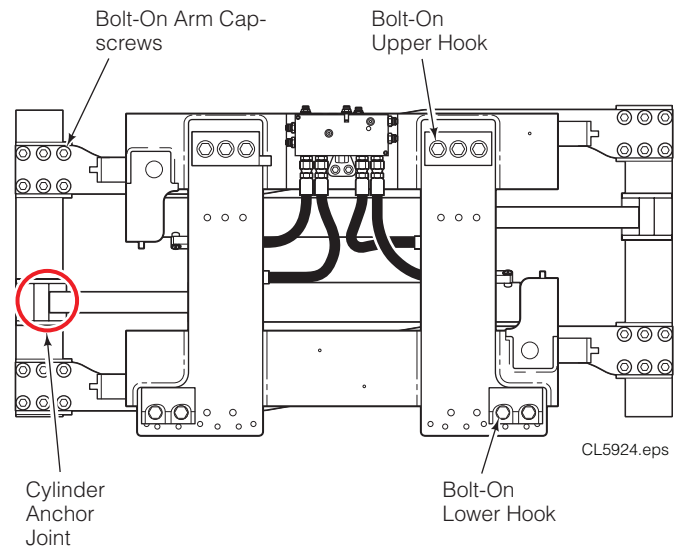
- Inspect arm bearings for wear and damage. If bearings are worn in any area to less than 0.06 in. (1.5 mm) thickness, replace bearings.
- Check lower mounting hooks for engagement. Hooks should be tight against lower carriage. If adjustment is necessary, refer to Installation Instructions 6526543, Step 6.
- Tighten lower hook capscrews to:
 - Class III** – 165 ft.-lbs. (225 Nm)
 - Class IV** – 190 ft.-lbs. (260 Nm)
- **Bolt-On Upper Hooks** – Tighten upper hook capscrews to 320 ft.-lbs. (435 Nm).
- **Articulating Arms** – Lubricate arm pivot joint zerk fittings with chassis grease.
- **Articulating Arms** – Inspect the arm pivot wear plugs. If either plug is worn to less than 0.12 in. (3 mm), replace both wear plugs.
- **Articulating Arms** – Loosen retainer capscrews, adjust retainer to wear pad clearance to 0.015 in. (0.5 mm). Tighten retainer capscrews to 320 ft.-lbs. (435 Nm).



2.3 1000-Hour Maintenance

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

- **Bolt-On Arms** – Tighten bolt-on arm capscrews to a torque of 680 ft.-lbs. (924 Nm).



**Attachments with Bolt-On Forks
Back (Driver's) View**

2.4 4000-Hour Maintenance

After each 4000 hours of truck operation, in addition to the 100, 500 and 1000-hour maintenance, perform the following procedures:

- Due to normal mechanical wear and component service life, cylinder seals should be replaced to maintain performance and safe operation.

3.1 General Procedures

3.1-1 Truck System Requirements

- Truck hydraulic pressure should be within the range shown in Specifications, Section 5.1. **PRESSURE TO THE ATTACHMENT MUST NOT EXCEED:**

Model	Maximum
80G-140G	
Low Pressure	1455 psi (100 bar)
High Pressure	2760 psi (190 bar)
170G	2465 psi (170 bar)

- Truck hydraulic flow should be within the range shown in Specifications, Section 5.1.
- Hydraulic fluid supplied to the attachment must meet the requirements shown in Specifications, Section 5.1.

3.1-2 Tools Required

In addition to a normal selection of mechanic's hand tools, the following are required:

- In-line Flow Meter Kit:
10 GPM (37 L/min.) – Cascade Part No. 671476.
OR
20 GPM (75 L/min.) – Cascade Part No. 671477.
- Pressure Gauge Kit:
5000 psi (345 bar) – Cascade Part No. 671212.
- Assorted fittings, hoses, and quick-disconnect couplers as required.

3.1-3 Troubleshooting Chart

Determine All The Facts

It is important that all the facts regarding the problem are gathered before beginning service procedures. The first step is to talk to the equipment operator. Ask for a complete description of the malfunction. Guidelines below and on the following pages can then be used as a starting point to begin troubleshooting.

Clamp Circuit

- Attachment drops load after it has been picked up.
- Attachment will not carry load up to its rated capacity.
- Attachment arms have uneven travel.
- Attachment arms travel slowly.
- Attachment arms will not move.

To correct these problems, see Section 3.3

Sideshift Circuit

- Attachment drops load while sideshifting.
- Attachment drops load at end of sideshift stroke.
- Attachment sideshifts left and right at different speeds.
- Attachment will not sideshift

To correct these problems, see Section 3.4.



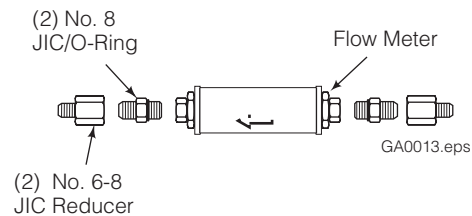
WARNING: Before servicing any hydraulic component, relieve pressure in the system. Turn the truck off and move the truck auxiliary control valves several times in both directions.

After completing any service procedure, test the attachment through several cycles. First test the attachment empty to bleed any air trapped in the system to the truck tank. Then test the attachment with a load to be sure it operates correctly before returning to the job.

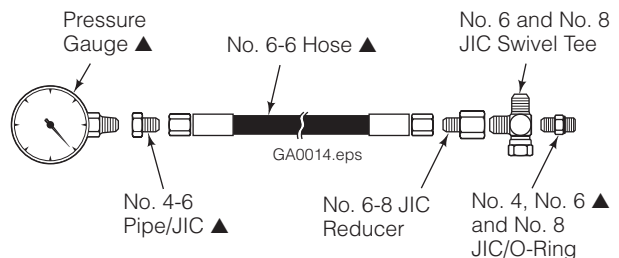
Stay clear of the load while testing. Do not raise the load more than 4 in. (10 cm) off the floor while testing.

Flow Meter Kits

671476 – 10 GPM (37 L/min.)
671477 – 20 GPM (75 L/min.)



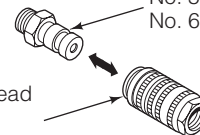
Pressure Gauge Kit 671212



Quick-Disconnect Couplers

Male Straight Thread O-Ring Coupler:

- No. 4 (Part No. 212282) ▲
- No. 5 (Part No. 210378)
- No. 6 (Part No. 678592)



Female JIC Thread Coupler:

- No. 4 (Part No. 210385) ▲ AC0127.eps
- No. 6 (Part No. 678591)

▲ **NOTE:** Diagnostics Kit 394382 includes items marked.

3.2 Plumbing

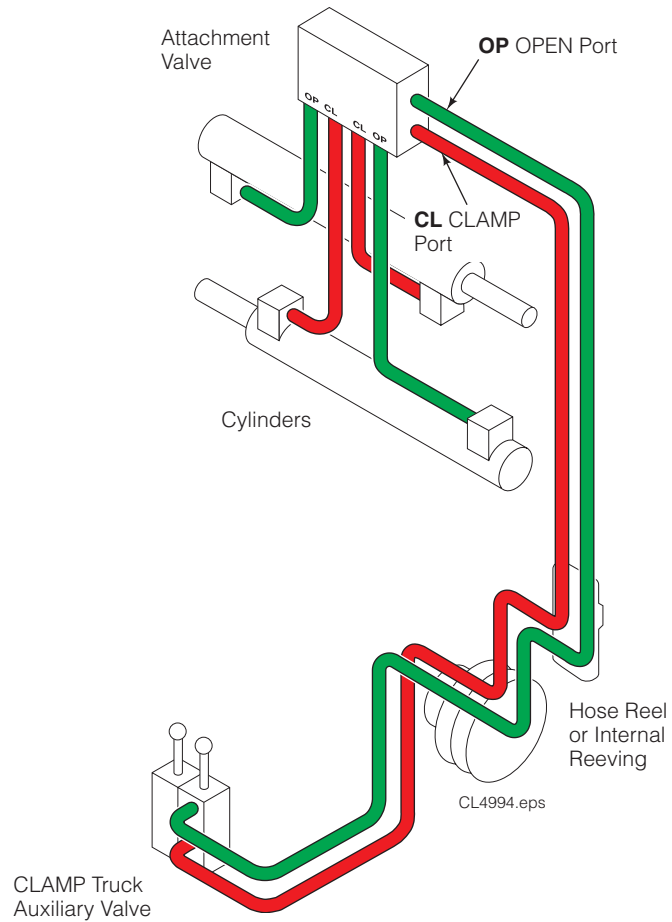
3.2-1 Hosing Diagram

CLAMP CIRCUIT

CLAMP ARMS

PRESSURE 
RETURN 

NOTE: For **OPEN ARMS**,
reverse the colors shown.

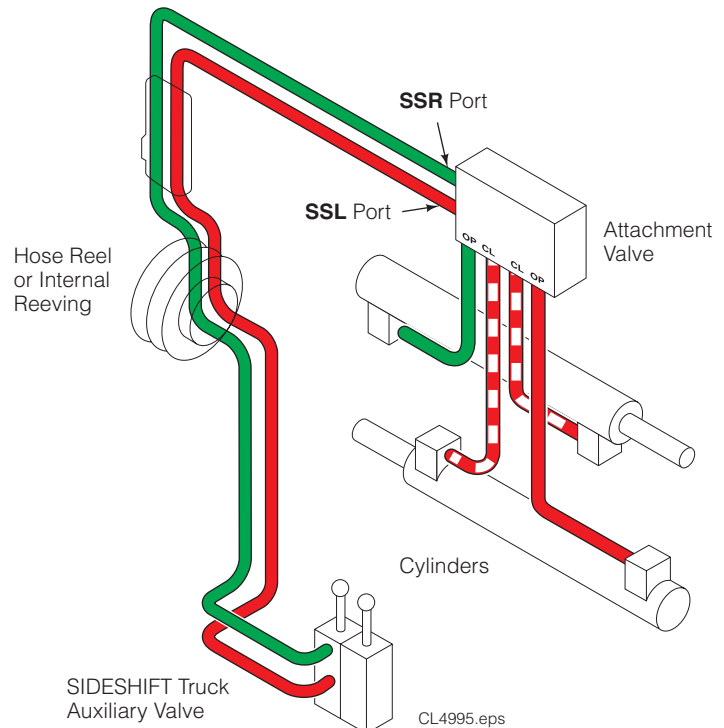


SIDESHIFT CIRCUIT

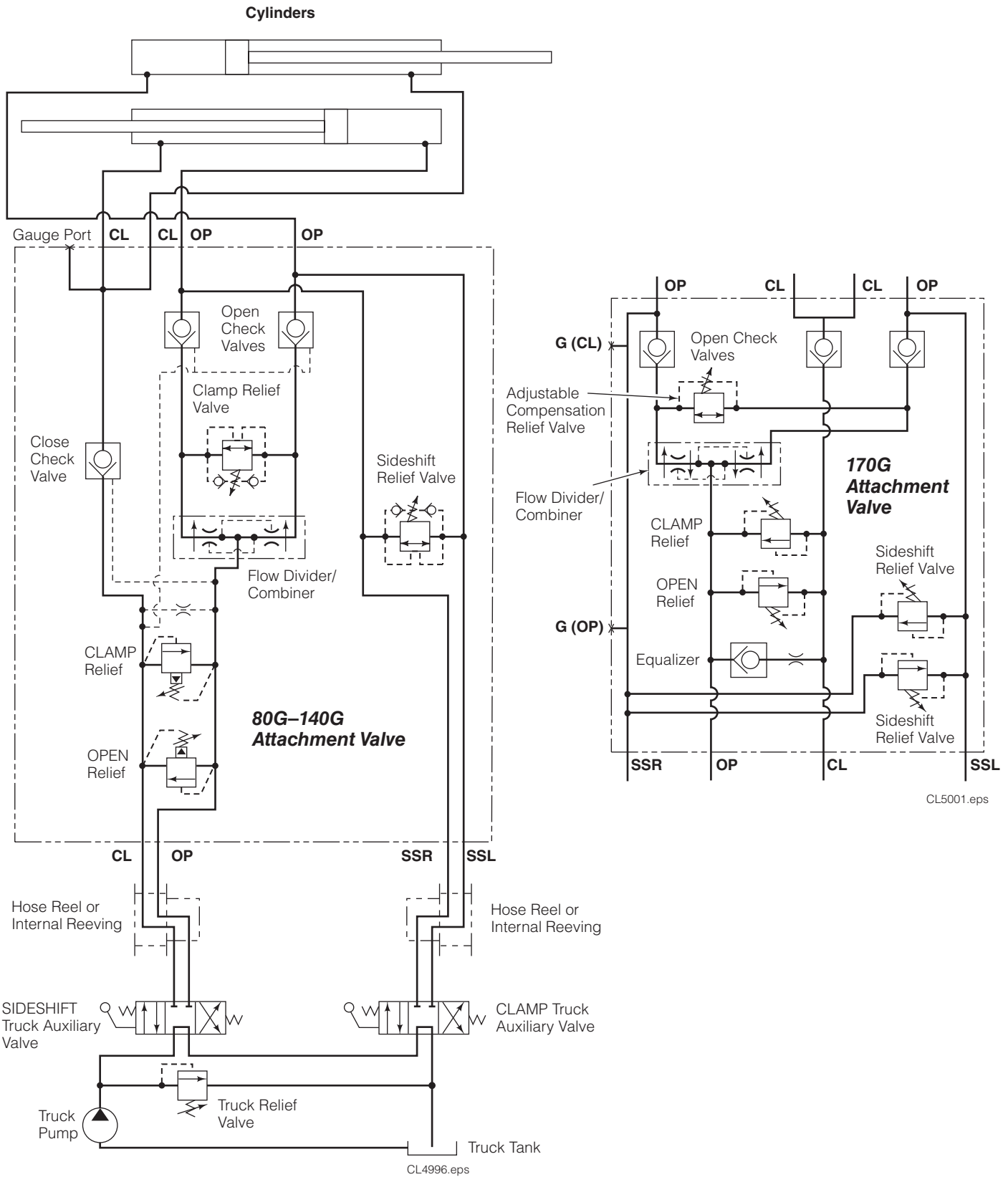
SIDESHIFT LEFT

PRESSURE 
RETURN 
SLAVE 

NOTE: For **SIDESHIFT RIGHT**,
reverse the pressure and return
colors shown.



3.2-2 Hydraulic Circuit



3.3 Clamp Function

There are five potential problems that could affect the CLAMP function:

- Incorrect load handling. Refer to the Operator's Guide for suggested procedures.
- Incorrect hydraulic pressure or flow from the lift truck.
- External leaks.
- Defective solenoid coil or valve (if equipped).
- Worn or defective cartridge valves or cylinder seals.



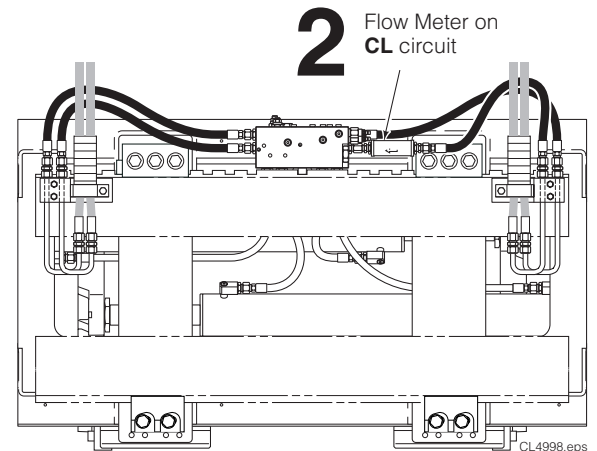
WARNING: Before removing hydraulic lines or components, relieve pressure in the hydraulic system. Turn truck off and open the truck auxiliary control valve(s) several times in both directions.

3.3-1 Supply Circuit Test

- 1 Check the pressure supplied by the truck at the carriage hose terminal. Pressure must be within the range shown in Specifications, Section 5.1. See nameplate on the attachment and sticker on valve. **PRESSURE TO THE ATTACHMENT MUST NOT EXCEED:**

Model	Maximum
80G-140G	
Low Pressure	1455 psi (100 bar)
High Pressure	2760 psi (190 bar)
170G	2465 psi (170 bar)

- 2 Check the flow volume at the carriage hose terminal. Flow must be within the range shown in Specifications, Section 5.1.
- 3 Fully close the arms, holding the lever in the CLAMP position for a few seconds. Release the lever and check for external leaks at fittings, hoses and valve.



3.3-2 Clamp Circuit Test

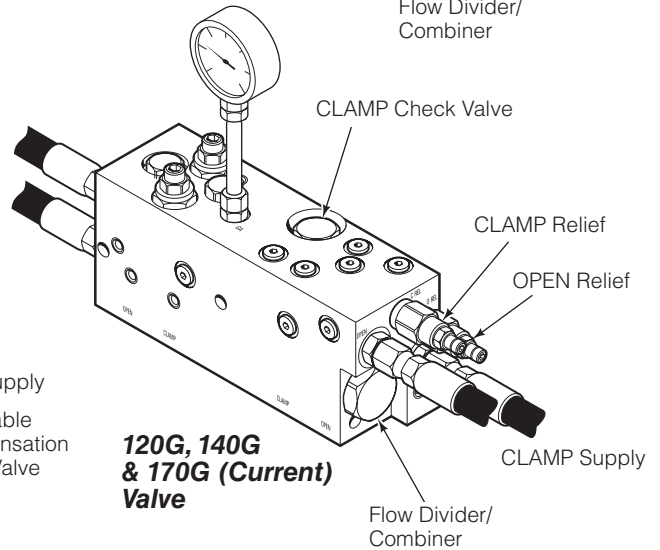
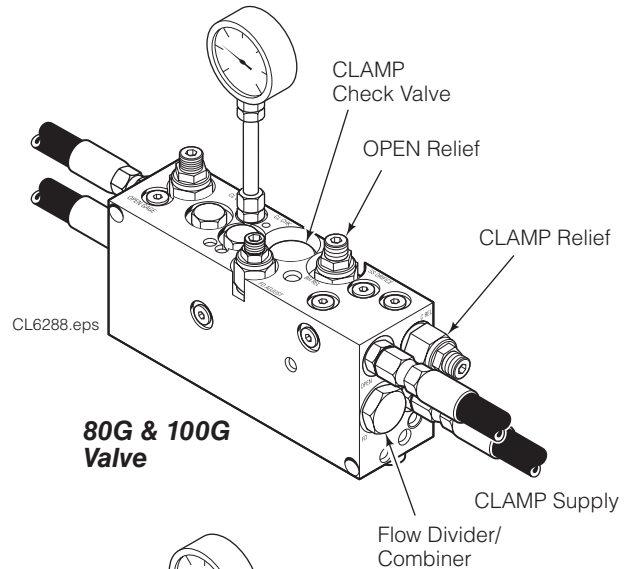
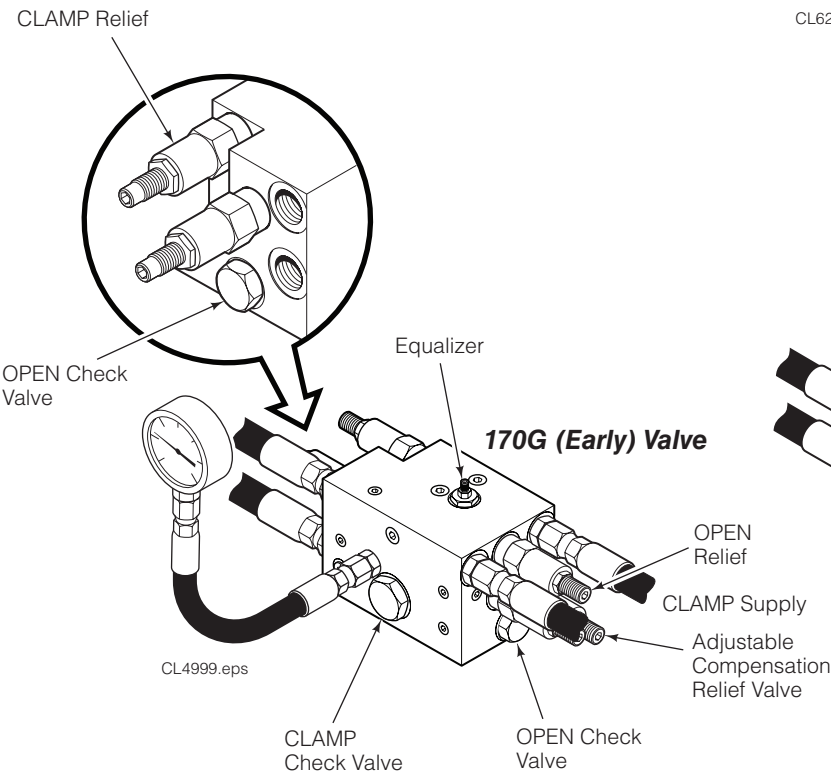
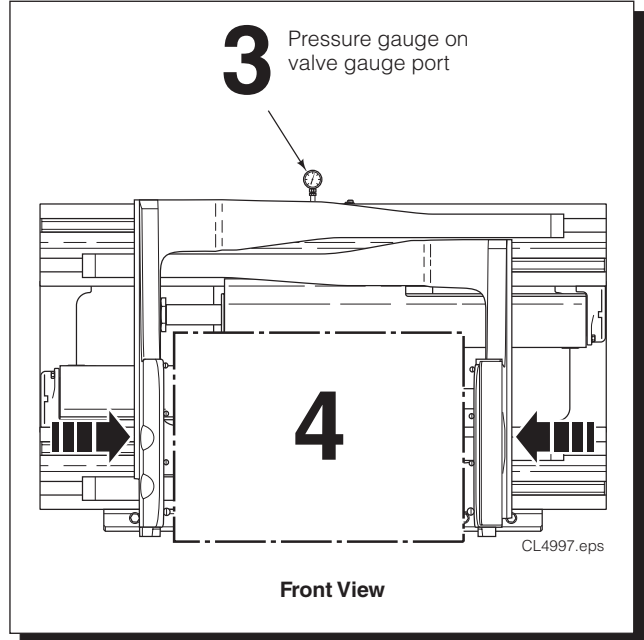
- 1 **Solenoid equipped** – Press the solenoid button. Listen for a 'click' at the solenoid valve. If no sound is heard, first check the fuse, wiring and coil. Make sure that the valve is not jammed. Refer to Section 4.5.

IMPORTANT: Solenoid-operated valves must be plumbed so that the solenoid is **energized** during the CLAMP function.

- 2 Fully open and close the arms. Refer to illustration on next page for cartridge location. Observe clamping and opening as follows:
 - While closing, if arms move slowly or not at all, the CLAMP relief cartridge may be faulty or need adjustment.
 - While opening, if arms move slowly or not at all, the OPEN relief cartridge may be faulty or need adjustment. Replace or adjust cartridge(s).
 - If arms move unequally, the flow divider cartridge (80G–140G) or equalizer cartridge (170G) cartridge may be faulty. Replace cartridge. Refer to Section 4.3.

3.3-2 Clamp Circuit Test (Continued)

- 3 Position the arms to mid-stroke. Turn the truck off and connect a 5000 psi (345 bar) pressure gauge to the gauge port on the valve.
 - 4 Start the truck and clamp on a rigid load or clamp force indicator. Hold the lever in the CLAMP position for a few seconds.
 - 5 Release the lever and watch the pressure gauge:
 - If the pressure drop **is less** than 140 psi (10 bar) initially, and additional drop does not exceed 30 psi (2 bar) per minute, the problem is not hydraulic. Refer to Section 3.3.
 - If the pressure drop **is more** than 140 psi (10 bar) initially, and additional drop exceeds 30 psi (2 bar) per minute, the CLAMP check valve cartridge may be faulty. Replace the cartridge. Refer to Section 4.3.
- NOTE:** 170G (Early) Valves – The OPEN check may be faulty. Replace cartridge. Refer to Section 4.3.
- 6 Fully close the arms. Hold the lever in the CLAMP position for a few seconds. If the pressure still drops (refer to step 5), one of the cylinders is faulty and must be serviced. Refer to Section 4.4.



3.4 Sideshift Function

There are six potential problems that could affect the sideshift function:

- Incorrect load handling. Refer to the Operator's Guide for suggested procedures.
- Incorrect hydraulic pressure or flow from the lift truck.
- External leaks.
- Defective solenoid coil or valve (if equipped).
- Worn or defective cartridge valves or cylinder seals.
- Bent or damaged arms, frames or bearing.



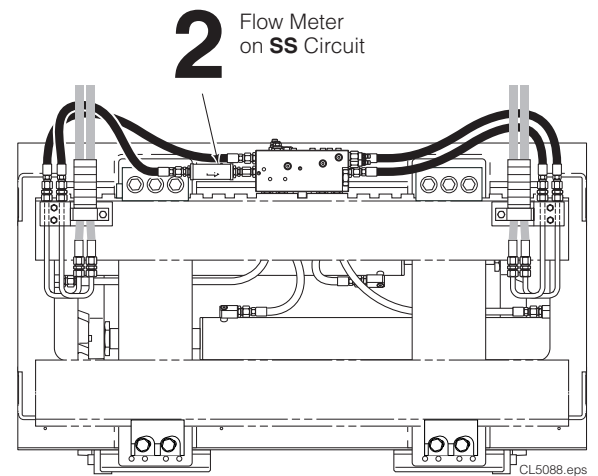
WARNING: Before removing hydraulic lines or components, relieve pressure in the hydraulic system. Turn truck off and open the truck auxiliary control valve(s) several times in both directions.

3.4-1 Supply Circuit Test

- 1 Check the pressure supplied by the truck at the carriage hose terminal. Pressure must be within the range shown in Specifications, Section 5.1. See nameplate on the attachment and sticker on valve. **PRESSURE TO THE ATTACHMENT MUST NOT EXCEED:**

Model	Maximum
80G-140G	
Low Pressure	1455 psi (100 bar)
High Pressure	2760 psi (190 bar)
170G	2465 psi (170 bar)

- 2 Check the flow volume at the carriage hose terminal. Flow must be within the range shown in Specifications, Section 5.1.
- 3 Fully sideshift left or right. Hold the lever in the SIDESHIFT position for a few seconds. Release the lever. Check for external leaks at fittings, hoses, and valve.



Back (Driver's) View

3.4-2 Sideshift Circuit Test

NOTE: Perform CLAMP circuit test first to make sure cylinders are operating properly. Refer to Section 3.3-2.

1 Solenoid equipped – Press the solenoid button. Listen for a 'click' at the solenoid valve. If no sound is heard, check fuse, wiring and coil. Make sure that the valve is not jammed. Refer to Section 4.5.

IMPORTANT: Solenoid-operated valves must be plumbed so that the solenoid is **not energized** during the SIDESHIFT function.

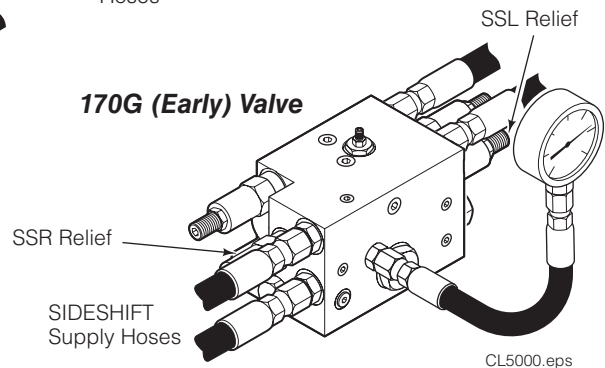
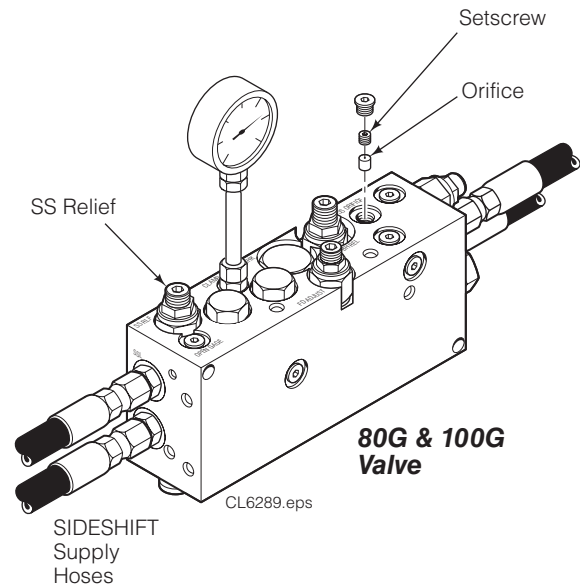
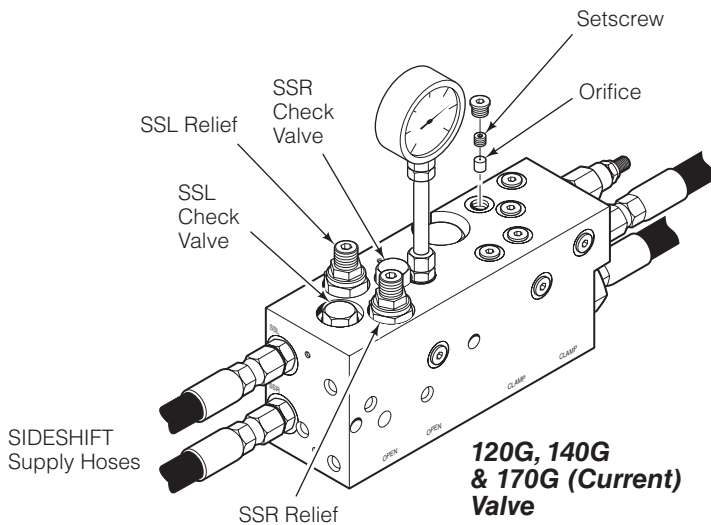
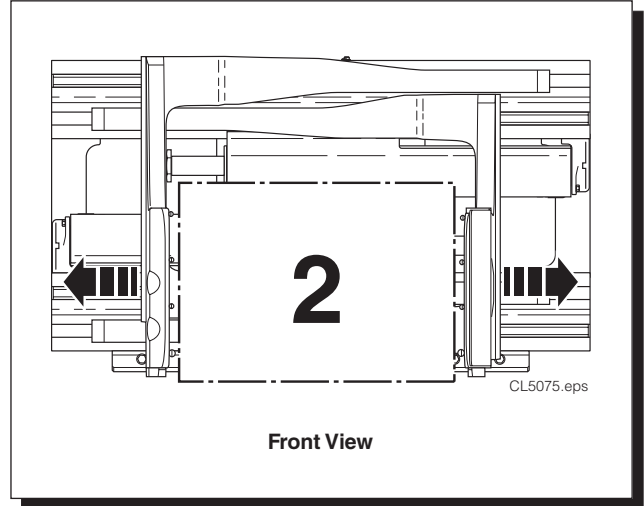
2 Clamp a maximum load. Sideshift LEFT and RIGHT observing sideshifting movement:

- For each direction, if there is little or no movement, adjust SSL (or SSR) relief clockwise (CW) until attachment sideshifts. Then adjust counterclockwise (CCW) 1/4 turn increments until sideshift speed slows (relief opening). Finish by adjusting cartridge clockwise (CW) 1/4 turn.
- If the attachment will not sideshift after attempted relief adjustment, go to Step 3.

3 120G, 140G & 170G (Current) – Remove the setscrew (4 mm allen socket) and equalization plug located in the port on top of the valve, as shown. Re-adjust SSL and SSR relief per Step 2.

4 If the attachment sideshifts at the proper speed in one direction but not the other, the SSL and SSR relief setting can be assumed OK, but the SSL or SSR check valve may be faulty. Swap or replace check valve cartridge(s).

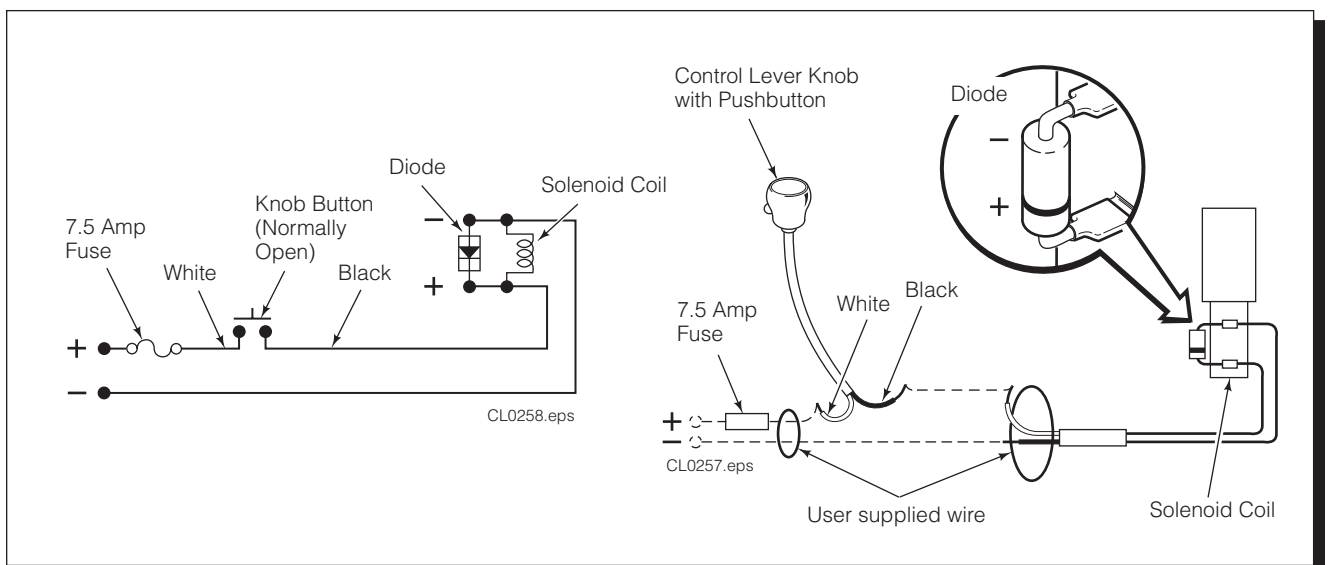
- If the attachment still sideshifts improperly in one or both directions, problem is not hydraulic. Refer to Section 3.4.



3.5 Electrical Circuit (Solenoid-equipped attachments)

Use the schematic shown and follow the steps below.

- 1 Check the control knob circuit fuse. Replace if necessary.
- 2 Check for loose electrical connections at the truck ignition switch, control knob button, solenoid coil terminals and diode.
- 3 Remove the diode from the solenoid coil terminal. Test with an ohmmeter for high resistance in one direction and no resistance in the other direction. If there is no resistance in both directions, replace the diode.
NOTE: When replacing the diode, the banded (+) end must be connected to the coil and wiring as shown.
- 4 Use a voltmeter to determine if correct voltage is present at the electrical leads when the button is pressed.
 - If there is **no** voltage to the solenoid, troubleshoot the electrical circuit for shorts or open circuits.
 - If there is **insufficient** voltage to the solenoid, check the circuit for excessive voltage drop.
 - If there is **sufficient** voltage to the solenoid, test for coil continuity. Continue to Step 5.
- 5 Test the coil continuity by placing an ohmmeter test lead on each solenoid coil terminal (ohmmeter on Rx1 scale).
 - If there is an ohmmeter reading, the coil is good.
 - If the coil is good, but the solenoid does not 'click' when the control knob button is pressed, the solenoid cartridge may be jammed. Refer to Section 4.5.
 - If there is no ohmmeter reading, the coil is defective and should be replaced. Refer to Section 4.5.



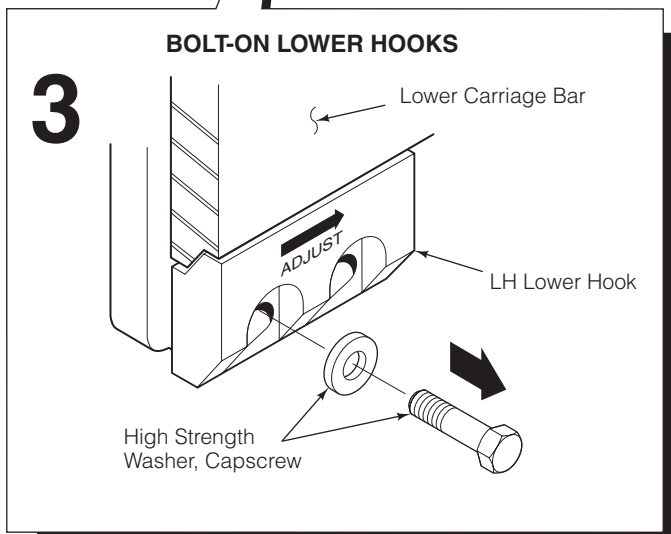
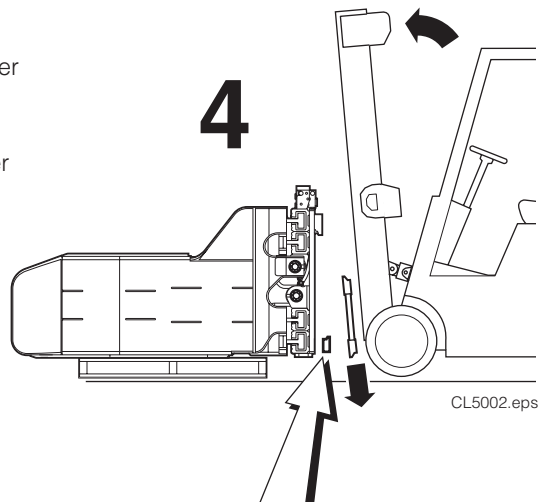
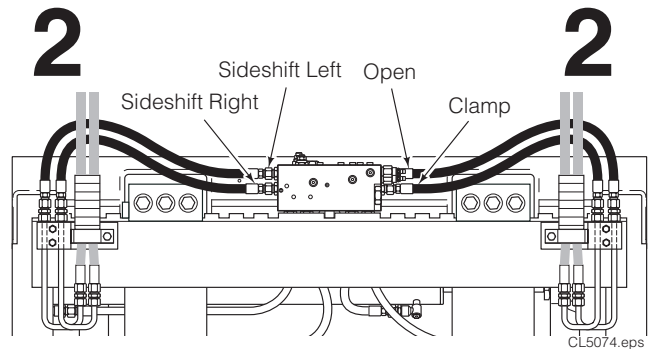
4.1 Attachment Removal

- 1 Position the attachment arms to frame width.



WARNING: Before removing hydraulic lines, relieve pressure in the hydraulic system. Turn the truck off and open the truck auxiliary control valves several times in both directions.

- 2 Disconnect and plug the hydraulic supply hoses to the attachment. Tag hoses for reassembly.
- 3 Remove the capscrews and lower mounting hooks. For reassembly, tap the hooks tight against the carriage bar and tighten the capscrews to:
 - CL III** – 165 ft.-lbs. (225 Nm)
 - CL IV** – 320 ft.-lbs. (435 Nm)
- 4 Lower the attachment onto a pallet. Tilt the mast forward and lower the carriage to disengage the upper hooks.
- 5 For attachment installation, reverse the above procedures. For complete installation procedure, refer to Installation Instructions 6526543.



4.2 Arms

4.2-1 Arm Assemblies – Removal and Installation

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


- 1 Position the arms to frame width and lower the attachment arms 0.50 in. (13 mm) above the floor.
- 2 **Spherical End Cap** – Remove capscrews and cap from cylinder rod to the arm lug. Remove split ring keepers. For reassembly, tighten the end cap capscrews to 80 ft.-lbs. (110 Nm).

Spherical End Nuts – Remove the cotter pin, locking cap and nut retaining the cylinder rod to the arm lug. For reassembly, tighten nut to:

- 80G, 100G – 310 ft.-lbs. (420 Nm)
- 120G–170G – 250 ft.-lbs. (340 Nm)

To prevent the rod from turning by using a wrench on the hex washer. Tighten against hex washer. Nut will not be tight against the arm lug.

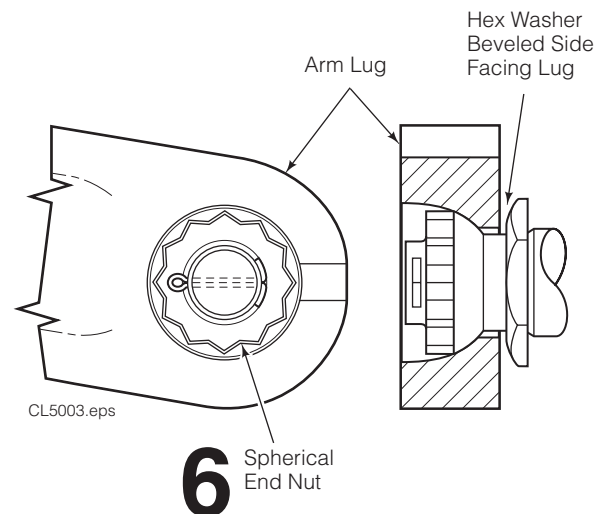
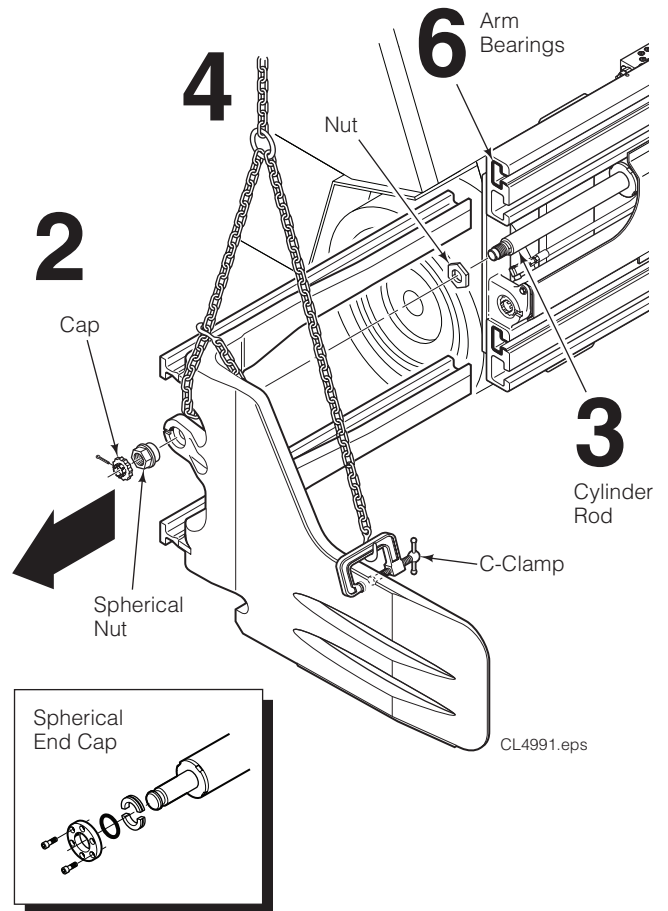
- 3 Fully retract the cylinder rods.



WARNING: Check the attachment weight (located on the nameplate) to make sure the overhead hoist and chains or straps are at least the rated capacity of the attachment.

- 4 Attach an overhead hoist to the arm assembly. Position the chain clear of the arm bearing surfaces.
- 5 Slide the arm assembly out of the frame. Do not damage the bearings when removing the arm.
- 6 For reassembly, reverse the above procedures with the following exceptions:

- Cascade recommends upgrading cylinders with spherical end caps to the latest spherical nut. Refer to Installation Instructions 6818485.
- Inspect the upper and lower bearings for wear. Bearing thickness should not be less than 0.06 in. (1.5 mm) on any part of the bearing. Install new bearings as a complete set as required.
- Lubricate the bearing portion of the arm bars with a thin film of chassis grease.
- **Spherical End Nuts** – Lubricate the cylinder rod threads, nut threads and spherical portion of the nut with wheel bearing grease. Install hex washer on the rod end with the beveled side facing the arm lug.



4.2-2 Custom Arm Bases (80G – 120G)

Attachments without arms are supplied with two arm bases. Special forks can be welded directly to the arm bases or they can be used as a base to fabricate custom built arms.



WARNING: Cascade requires that a qualified or certified welder experienced in this type of fabrication be used for best quality.

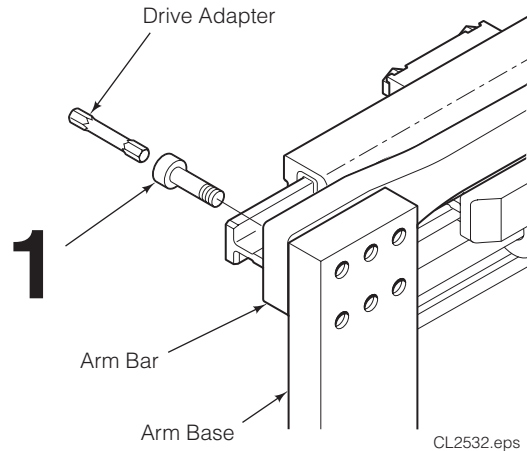
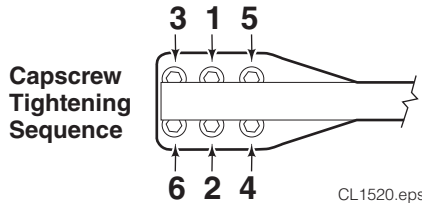
CAUTION: Weld fabricated arms to the **arm bases** only. do not weld or bolt special built arms or forks directly to the **arm bars**.

The arm base material is AISI C-1020 HR with the following specifications:

- TENSILE STRENGTH – 61,000 psi (420 mPa min.)
- YIELD STRENGTH – 43,000 psi (300 mPa min.)
- CARBON CONTENT – 23% max.

CAUTION: The surface flatness of the arm base must remain within 0.010 in. (0.25 mm) in capscrew area and arm must slide manually.

- 1 Fasten the arm bases to the arm bars. Tighten the capscrews to 680 ft-lbs. (924 Nm) with a drive extension tool 676218 (0.75 in., 19 mm), required to clear the arm bar.



Model	A	B	C	D
80G-120G	0.75 in. (19 mm)	0.5 in. (13 mm)	0.75 in. (19 mm)	5.0 in. (127 mm)

IMPORTANT: Be careful not to damage the arm bar. Premature bearing failure will occur.

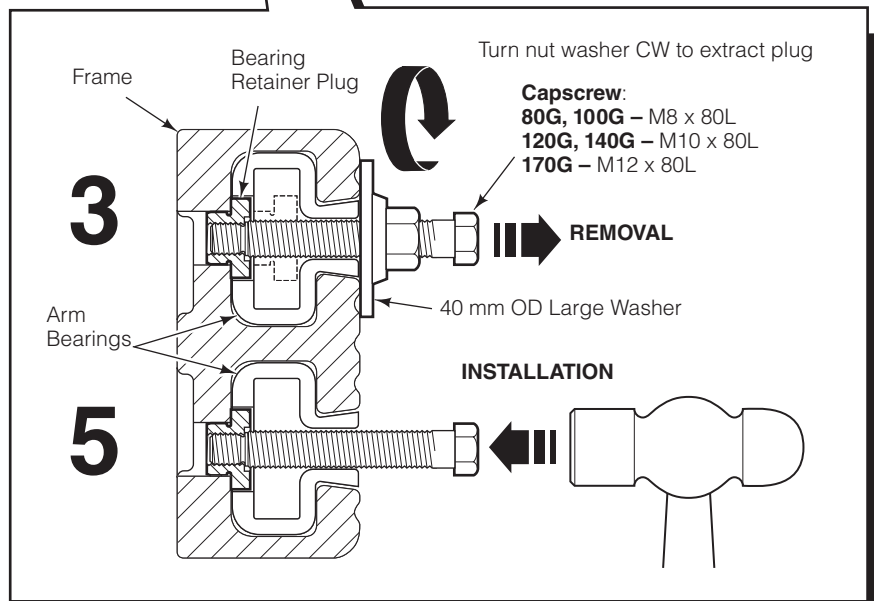
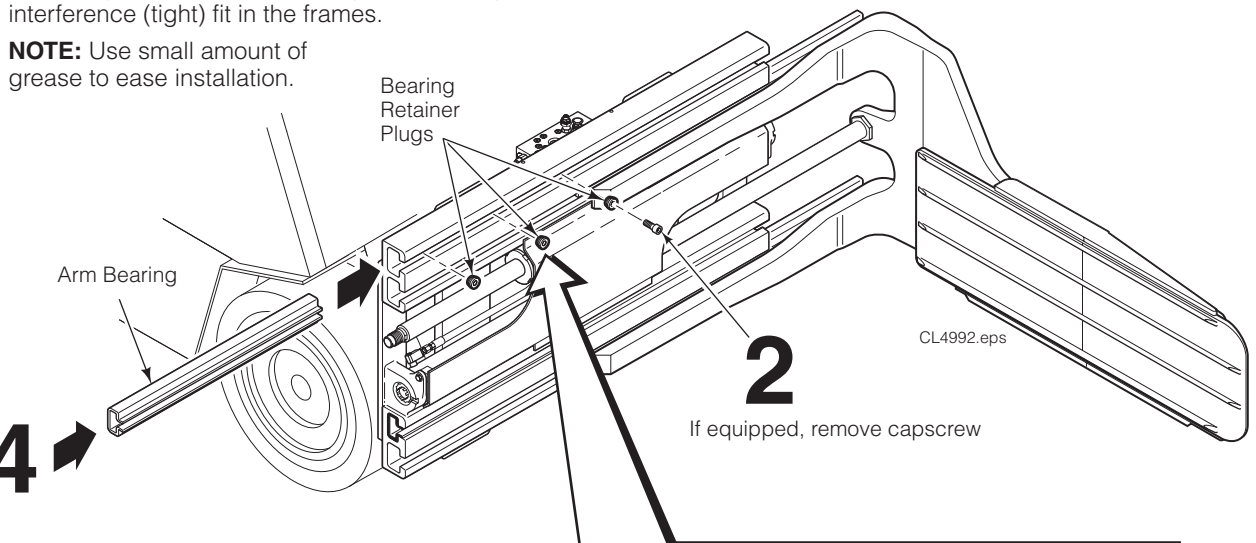
Drive extension tool dimensions are provided to fabricate the tool from an Allen wrench. Do not use mild steel hex stock which will not withstand the torque value required.

- 2 Lubricate the cylinder rod threads, nut threads and spherical portion of the nut with wheel bearing grease.
- 3 Install the hex washer on the rod end with the beveled side facing the lug.
- 4 Engage the rod end into the lug.
- 5 Tighten the rod end nut to a torque of:
 - 80G, 100G** – 310 ft.-lbs. (420 Nm)
 - 120G** – 250 ft.-lbs. (340 Nm)
- 6 Install the locking cap and cotter pin.
- 7 Lubricate the bearing portion of the arm bars with a thin film of chassis grease, if required.

4.2-3 Arm Bearings – Removal and Installation

NOTE: Replace all arm bearings if wear exceeds 0.06 in. (1.5 mm) thickness on any surface. Arms must be removed to install new bearings as follows:

- 1 Remove attachment arms as shown in Section 4.2-1.
- 2 If equipped, remove capscrews with M10 allen wrench. For reassembly, tighten capscrew to 24 ft.-lbs. (32 Nm).
- 3 Remove the bearing retainer plugs using a 40 mm OD large washer and one of the following:
 - 80G, 100G** – M8 x 80L capscrew
 - 120G, 140G** – M10 x 80L capscrew
 - 170G** – M12 x 80L capscrew
- 4 Drive new bearings into the frame, displacing the old bearing.
- 5 For reassembly, reverse the above procedures with the following exceptions:
 - Install new retainer plugs by using tool capscrew to drive plug in. Make sure bearing retainer plugs are an interference (tight) fit in the frames.



4.3 Valve

4.3-1 Valve Removal and Installation

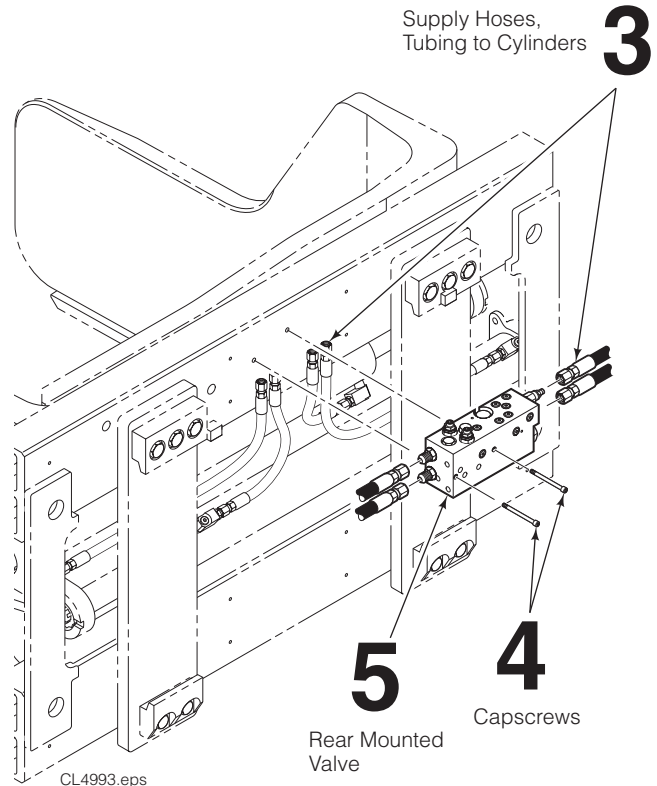
The following procedures can be performed with the attachment mounted on the truck:

- 1 Raise the attachment 2 ft. (60 cm) so the valve is accessible from behind. Do not reach or work through the mast.
- 2 Remove valve guards or bumpers (if equipped).



WARNING: Before removing hydraulic components, relieve pressure in the hydraulic system. Turn the truck off and move the auxiliary control valves several times in both directions.

- 3 Disconnect all hydraulic supply hoses and cylinder tubing at the Valve. Plug the hose/tubing ends and tag for reassembly.
- 4 Remove the capscrews fastening the valve to the attachment and remove the valve. For reassembly, tighten the capscrews to:
 - 80G, 100G** – 14 ft.-lbs. (19 Nm)
 - 120G, 140G** – 6 ft.-lbs. (8 Nm)
 - 170G** – 30 ft.-lbs. (40 Nm)
- 5 For reassembly, reverse the above procedures with the following exceptions:
 - Service the valve as described in Section 4.3-2.
 - Make sure all flareless hydraulic connections are assembled using new seals.
 - If required, adjust relief cartridges as described in Section 4.3-3 (80G–140G) or 4.3-4 (170G).



4.3-2 Valve Service

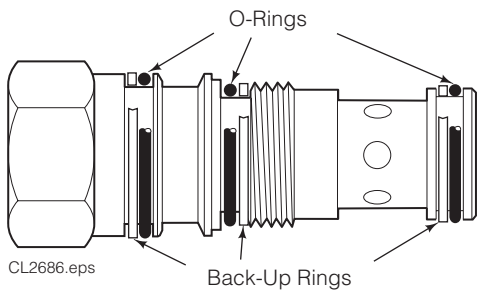
IMPORTANT: Service the valve in a clean work area. Service procedures are the same for all valves:

- 1 Remove the valve from the attachment as described in Section 4.3-1.
- 2 Remove the cartridges from the valve.
- 3 Remove the remaining threaded plugs and fittings. Valve body must be completely stripped for proper cleaning. Refer to illustrations on following page.
- 4 Remove the O-rings and back-up rings from the cartridges.
- 5 Clean all parts with cleaning solvent.

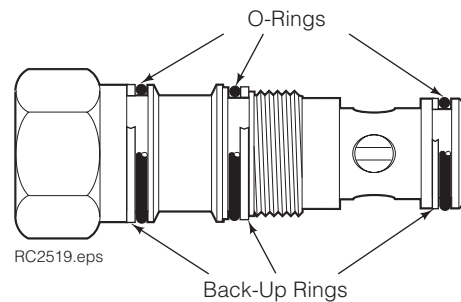
6 For reassembly, reverse the above procedures with the following exceptions:

- Replace O-rings and back-up rings on cartridges as shown in illustration below.
- Lubricate cartridges, fittings and plugs with O-ring lube or petroleum jelly prior to installation.

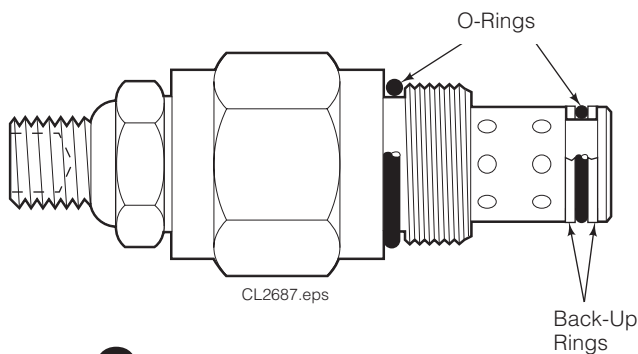
CAUTION: Make sure cartridges are installed in correct port location in valve body. Refer to the illustrations on following pages and stampings on valve body.



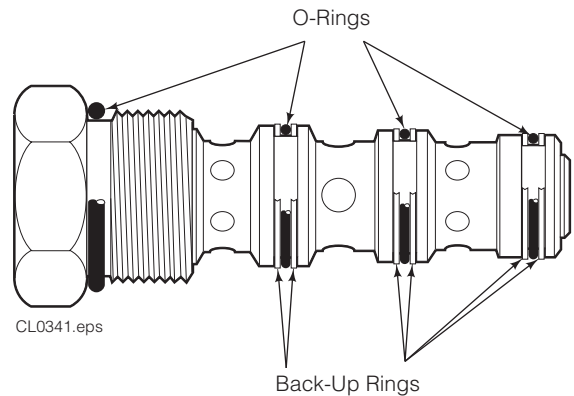
A PO Check Valve Cartridge



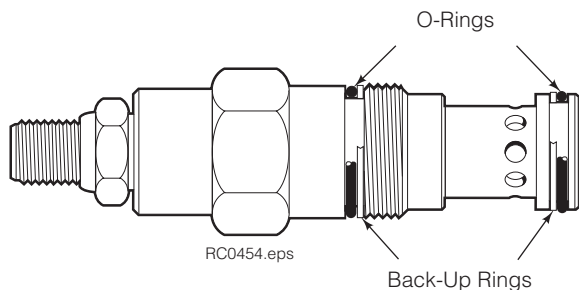
B PO Check Valve Cartridge



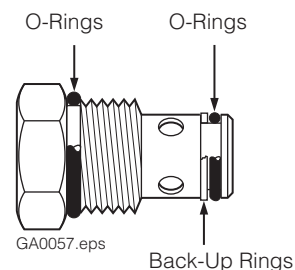
C Adjustable Relief Cartridge



D Flow Divider / Combiner Cartridge

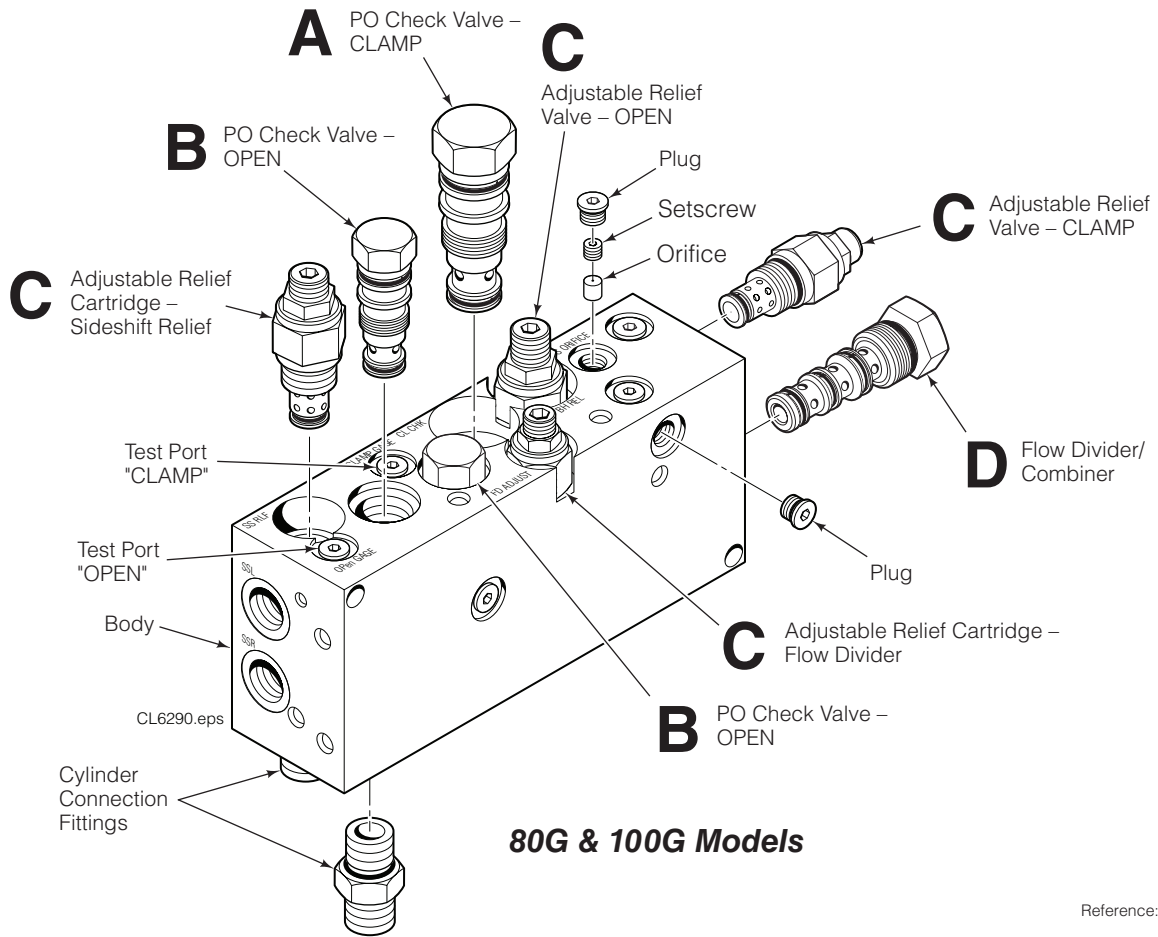


E Relief Cartridge



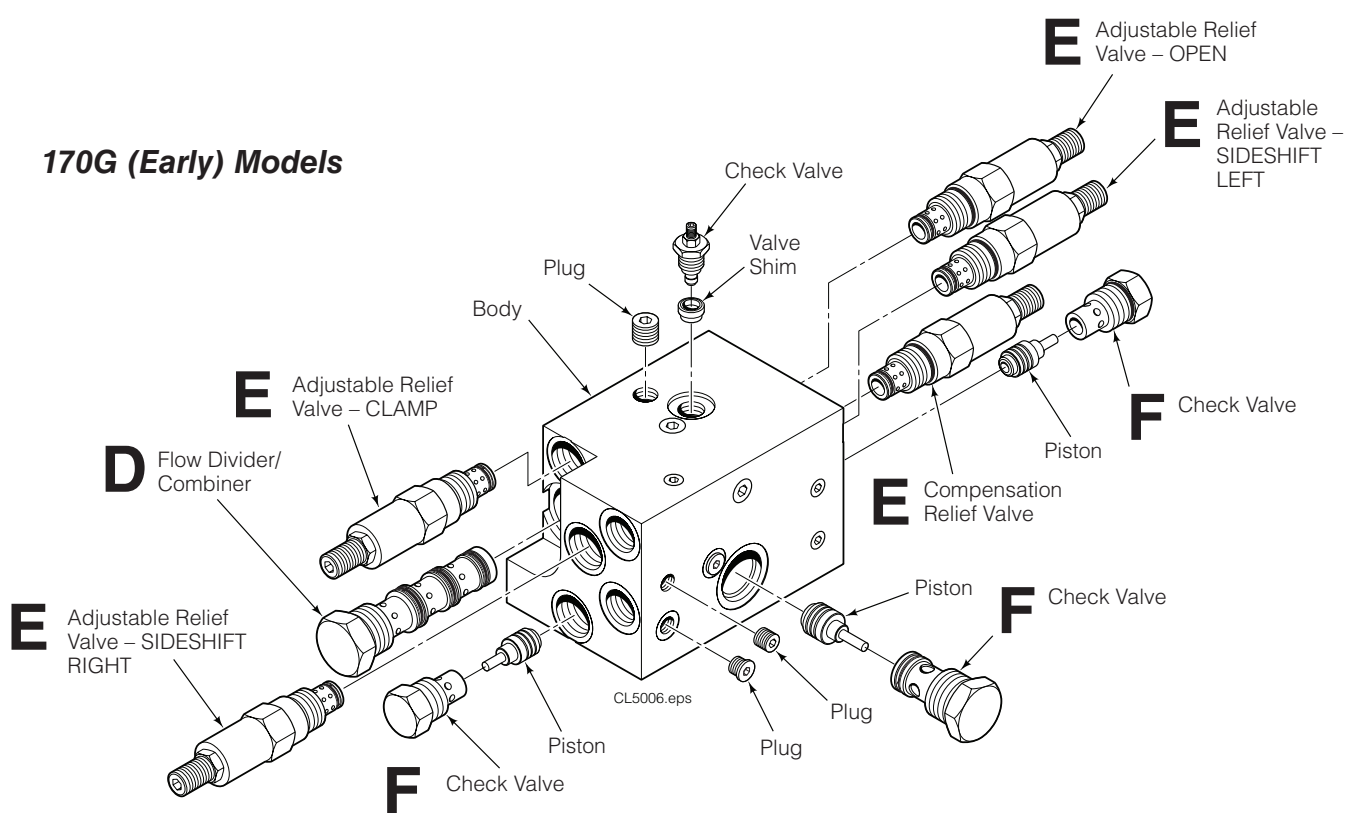
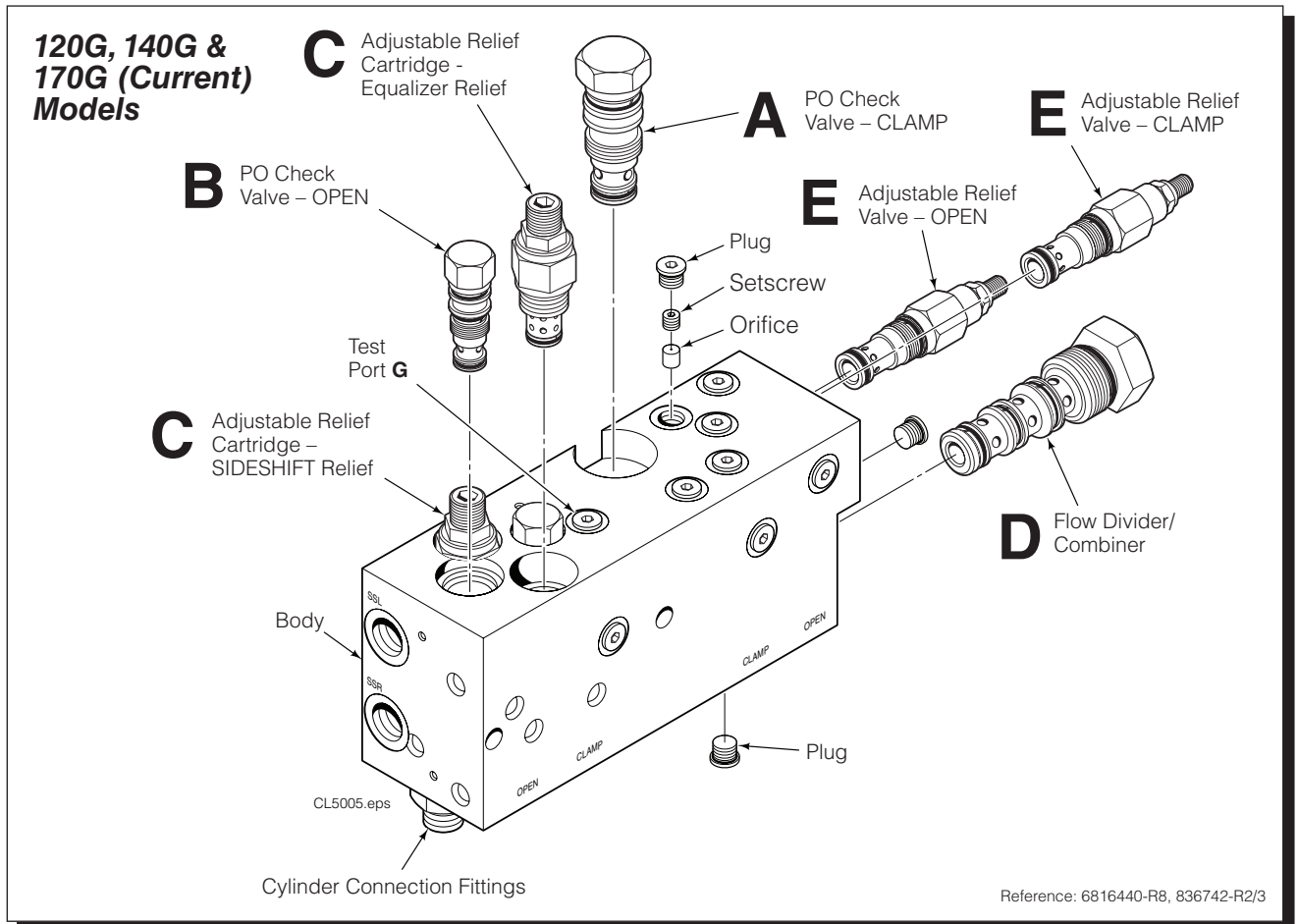
F Check Valve

4.3-2 Valve Service (Continued)



Reference: 6862870-R1

4.3-2 Valve Service (Continued)



4.3-3 Valve Relief Adjustments – 80G–140G & 170G (Current) Valve

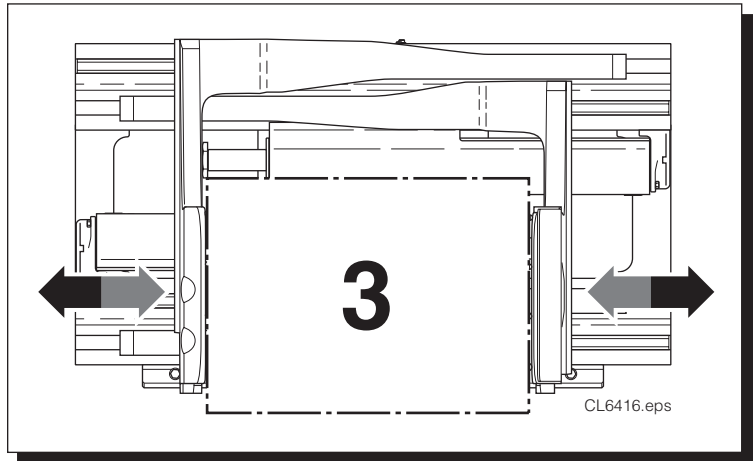
To avoid over clamping or slow sideshifting speed, relief cartridges should be adjusted. Check nameplate and decal on the valve for correct circuit hydraulic pressure settings.

NOTE: Attachments used for fork positioning requires no CLAMP relief adjustment. Contact Cascade before making any adjustments.

CLAMP Circuit

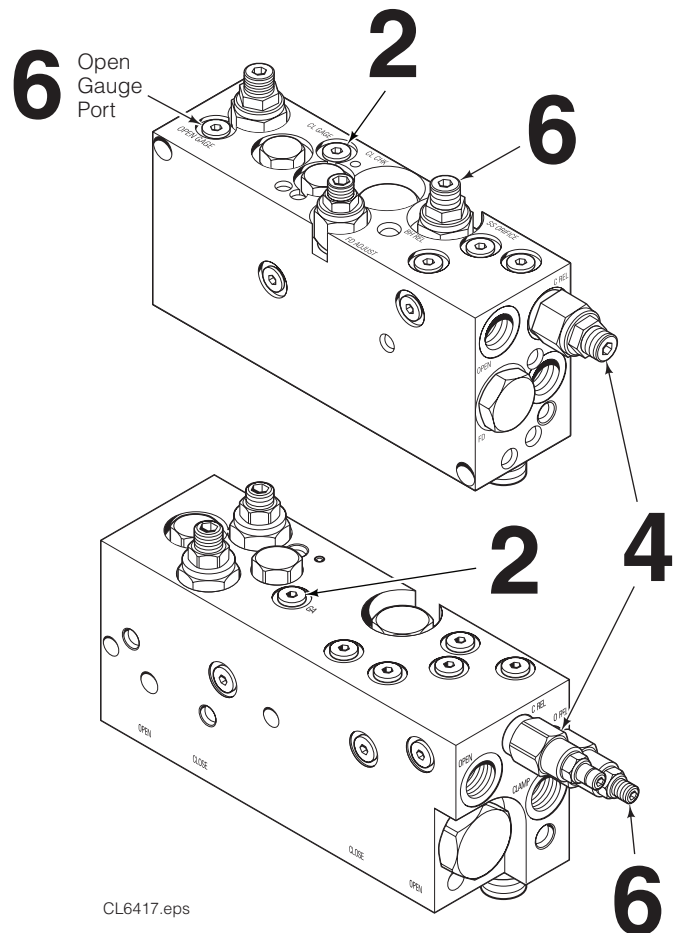
- 1 Confirm that TRUCK pressure delivered to the attachment valve is within the range shown on the attachment nameplate.
- 2 Install a 5000 psi (345 bar) pressure gauge (with a No. 4 O-ring fitting) to the valve CLAMP gauge port.
- 3 Fully open and close arms at normal speed to clamp a rigid load (or clamp force indicator). Release truck handle and read pressure gauge.
- 4 Adjust the valve CLAMP relief cartridge to show a maximum setting (refer to valve decal). Tighten the jam nut.
- 5 Repeat steps 3 and 4 to confirm setting.
- 6 If OPEN (or backhand) circuit requires adjustment, loosen jam nut on the relief cartridge. Adjust the relief cartridge to no higher than 1450 psi (100 bar), recommended. Clamp and release a load. If the arms do not open, increase the pressure. Tighten jam nut.

NOTE: If equipped with OPEN gauge port, a pressure gauge can be installed into the port to aid with OPEN relief adjustment.



Relief Cartridge Adjustment:

Inward (CW) = Increase pressure
Outward (CCW) = Lower pressure

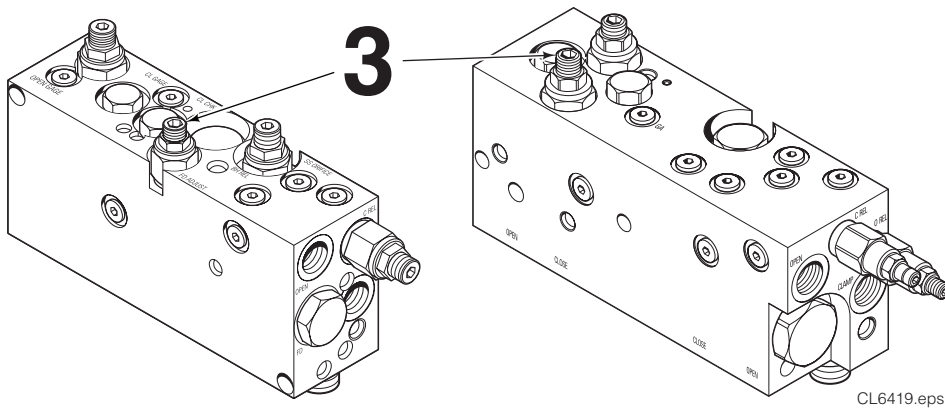
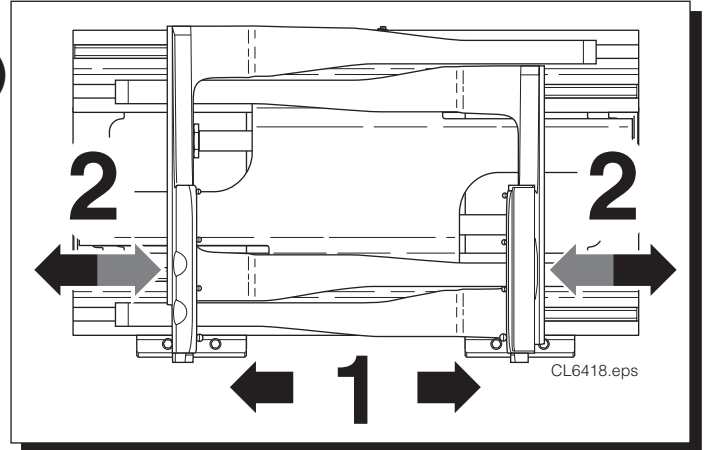


4.3-3 Valve Relief Adjustments – 80G–140G & 170G (Current) Valve (Continued)

SIDESHIFT Circuit

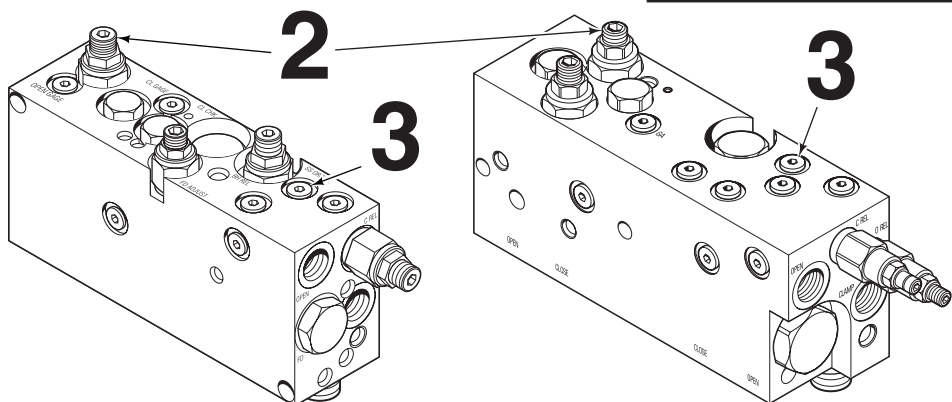
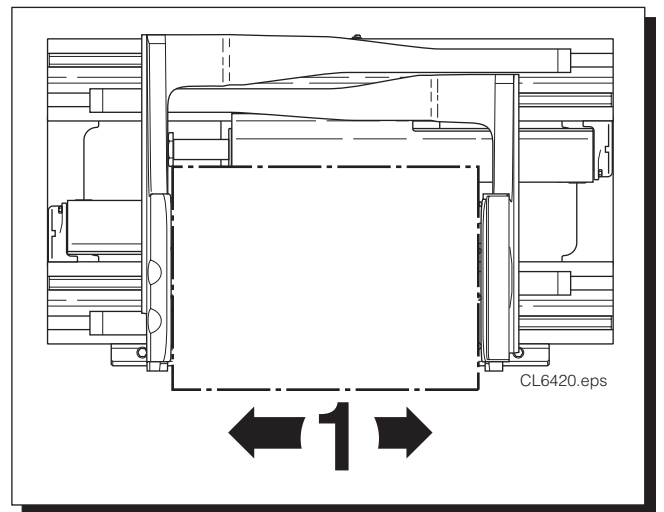
Arm Synchronization

- 1 Open arms to half way and sideshift the attachment.
- 2 Open and close the arms until one arm bottoms or is fully open.
- 3 Adjust the flow divider relief cartridge in 1/4 turn increments until the desirable synchronization is met. Tighten jam nut.



Arm Speed

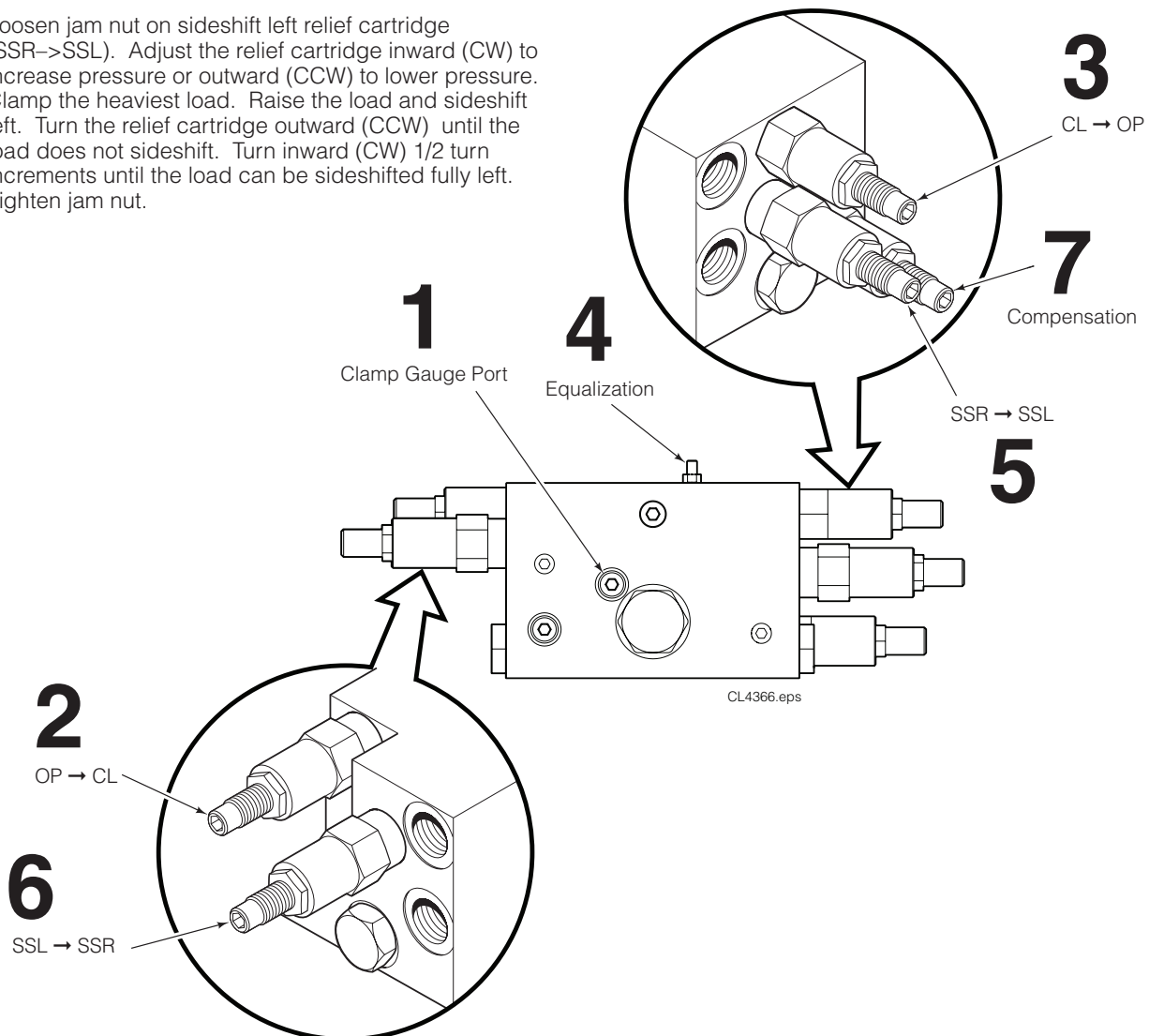
- 1 Clamp a maximum load and sideshift LEFT and RIGHT observing sideshifting movement.
- 2 If the attachment will not sideshift or sideshifts slowly, adjust sideshift relief clockwise (CW) until the attachment sideshifts. Then adjust the relief cartridge counterclockwise (CCW) 1/4 turn increments until sideshift speed slows (relief opening). Finish by adjusting cartridge clockwise (CW) 1/4 turn. Tighten jam nut.
- 3 If the attachment will not sideshift after relief adjustment, remove the setscrew plug from the equalization orifice located in a port on top of the valve. Both plug and orifice are 5/32 in. (4 mm) allen hex socket. Repeat the sideshift relief adjustment in Step 2.



4.3-5 Relief Adjustments – 170G (Early) Valve

To avoid over clamping or slow sideshifting speed, relief cartridges should be adjusted. Check nameplate and decal on the valve for correct CLAMP hydraulic pressure settings.

- 1** Install pressure gauge into CL (clamp) test port.
- 2** Loosen jam nut on clamp relief cartridge (OP→CL). Adjust the relief cartridge inward (CW) to increase pressure or outward (CCW) to lower pressure. Clamp a load and check gauge pressure. Readjust as required. Tighten jam nut. Remove pressure gauge and plug port.
- 3** Loosen jam nut on open relief cartridge (CL→OP). Adjust the relief cartridge inward (CW) to increase pressure or outward (CCW) to lower pressure. Clamp and release a load. If the arms do not open, increase the pressure. Tighten jam nut.
- 4** Clamp the heaviest load. Raise the load and sideshift. If the load does not sideshift, loosen the jam nut and turn the equalization cartridge screw out until the load will sideshift. Tighten jam nut.
- 5** Loosen jam nut on sideshift left relief cartridge (SSR→SSL). Adjust the relief cartridge inward (CW) to increase pressure or outward (CCW) to lower pressure. Clamp the heaviest load. Raise the load and sideshift left. Turn the relief cartridge outward (CCW) until the load does not sideshift. Turn inward (CW) 1/2 turn increments until the load can be sideshifted fully left. Tighten jam nut.
- 6** Loosen jam nut on sideshift right relief cartridge (SSL→SSR). Adjust the relief cartridge inward (CW) to increase pressure or outward (CCW) to lower pressure. Clamp the heaviest load. Raise the load and sideshift right. Turn the relief cartridge outward (CCW) until the load does not sideshift. Turn inward (CW) 1/2 turn increments until the load can be sideshifted fully right. Tighten jam nut.
- 7** If the arm movement is unequal or stalled during clamping, loosen the jam nut on the adjust compensation relief valve. Adjust relief cartridge inward (CW) to increase pressure or outward (CCW) to lower pressure. Clamp the heaviest load. Raise the load and sideshift. Increase (CW) for inaccurate arm movement or decrease (CCW) for a stalled arm. Tighten jam nut.



4.4 Clamp Cylinder

4.4-1 Removal and Installation

NOTE: The following procedures can be performed with the attachment mounted on the truck and the arms remaining on the attachment.

- 1 Extend the arms outside the width of the frame.
- 2 If equipped, remove the bumper capscrews and remove the bumper.



WARNING: Before disconnecting hydraulic lines, relieve pressure in the attachment hydraulic system. Turn the truck off and move the auxiliary control levers several times in both directions.

- 3 Disconnect the hose/tube ends from the cylinder ports. Plug the hoses and cap the cylinder ports. Tag hoses for reassembly.
- 4 Disconnect cylinder rod end from arm lug.

Spherical End Cap – Remove both cylinder rod end retaining rings. Extend the cylinder rods outward to expose the split ring keepers. Remove the keepers. For reassembly, tighten the end cap capscrews to 80 ft.-lbs. (110 Nm).

Spherical End Nuts – Remove the cotter pin, locking cap and nut retaining the cylinder rod to the arm lug. For reassembly, tighten nut to:

80G, 100G – 310 ft.-lbs. (420 Nm)
120G–170G – 250 ft.-lbs. (340 Nm)

To prevent the rod from turning by using a wrench on the hex washer. Tighten against hex washer. Nut will not be tight against the arm lug.

- 5 Disconnect cylinder rod end from frame lug.

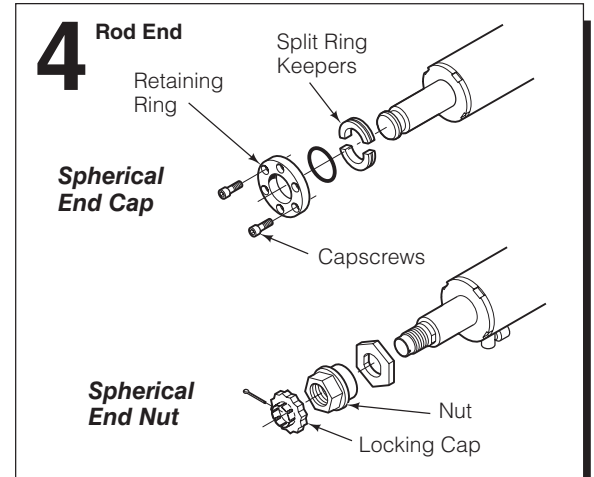
Spherical End Cap – Disconnect the cylinder base ends by removing the snap ring, sliding the collar outward and removing the split ring keepers.

Spherical End Nuts – Remove the cotter pin, locking cap and nut retaining the cylinder base end to base unit. For reassembly, tighten nut to:

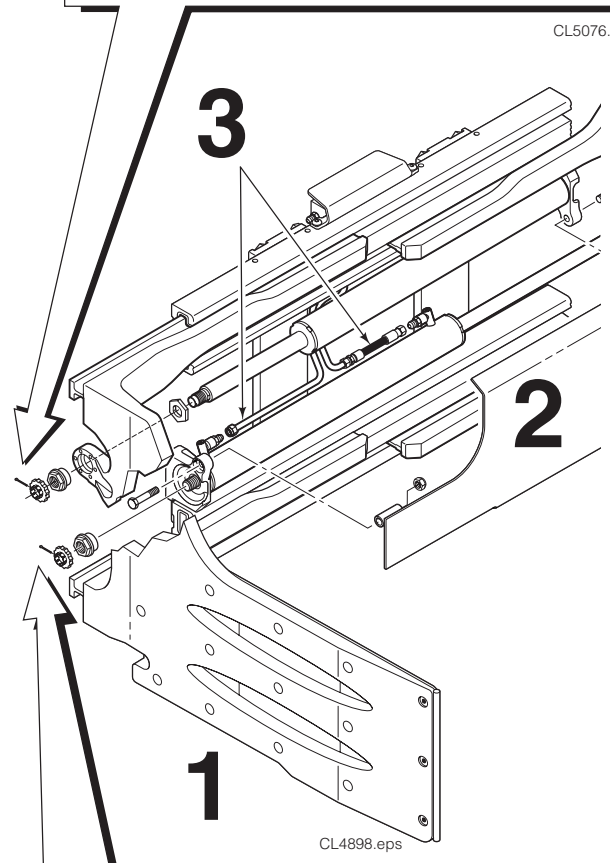
80G, 100G – 310 ft.-lbs. (420 Nm)
120G–170G – 250 ft.-lbs. (340 Nm)

Disengage the cylinder from it's mounting lug and lift away from the frame.

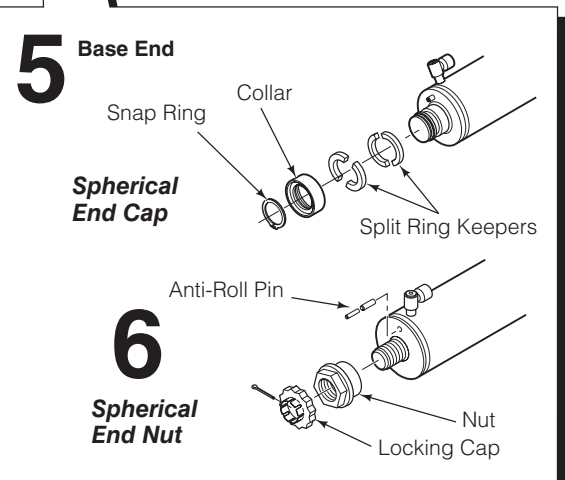
- 6 For reassembly, reverse the above procedures with the following exceptions:
 - **Spherical End Caps** – Cascade recommends upgrading cylinders with spherical end caps to the latest spherical nut. Refer to Installation Instructions 6818485.
 - **Spherical End Nuts** – Lubricate the cylinder rod threads, nut threads and spherical portion of the nut with wheel bearing grease. Install hex washer on the rod end with the beveled side facing the arm lug.
 - Make sure anti-roll pin is installed in cylinder base end.
 - Cycle attachment through 5 complete cycles to remove entrapped air from cylinders.



CL5076.eps



CL4898.eps

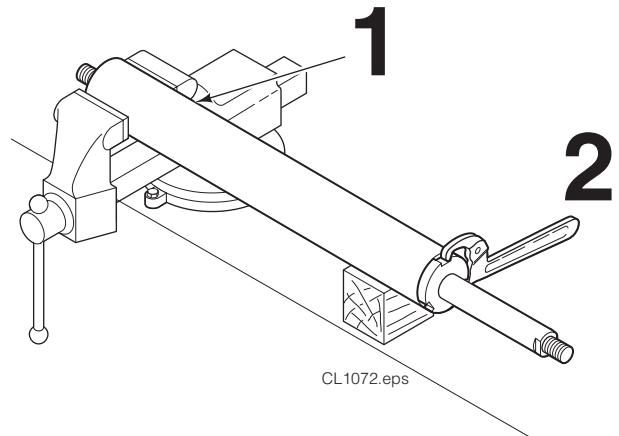


CL5077.eps

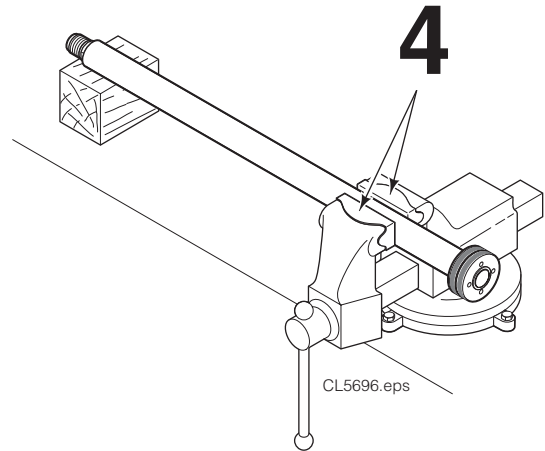
4.4-2 Cylinder Disassembly

- 1 Clamp the cylinder in a soft-jawed vise at the extreme base end only. Do not clamp on the shell.
- 2 Unscrew and remove the retainer using a claw-type spanner wrench (Cascade Part No. 678598), as shown.
- 3 Remove the piston/rod assembly from the cylinder.
- 4 Clamp the piston/rod or retainer in a soft-jawed vise. Remove the seals. Piston is a shrink-fit on the rod and not removable. Pry the seals or O-rings up with a brass seal removal tool (Cascade Part No. 674424) and cut the seals to remove them.

CAUTION: Do not scratch the seal grooves.

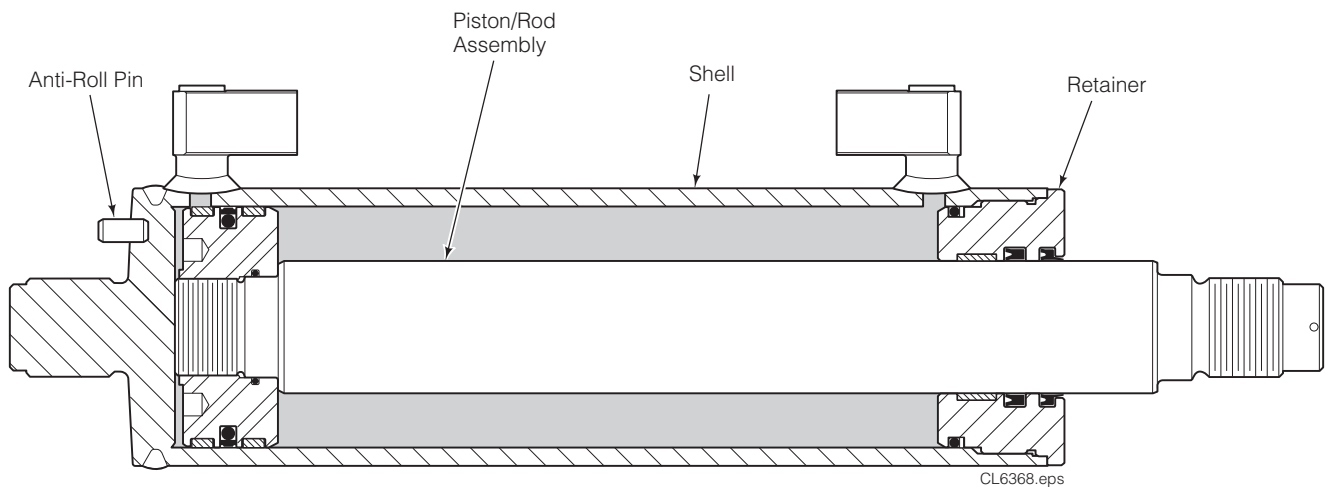


IMPORTANT: Clamp in Soft-Jawed Vice Only



4.4-3 Cylinder Inspection

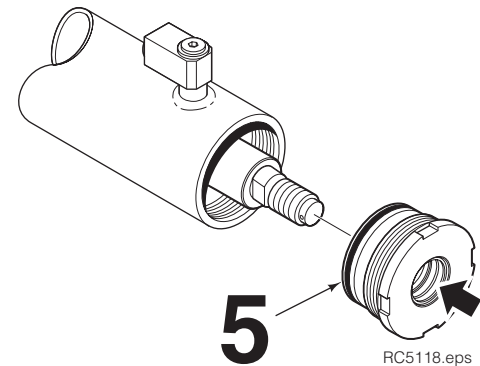
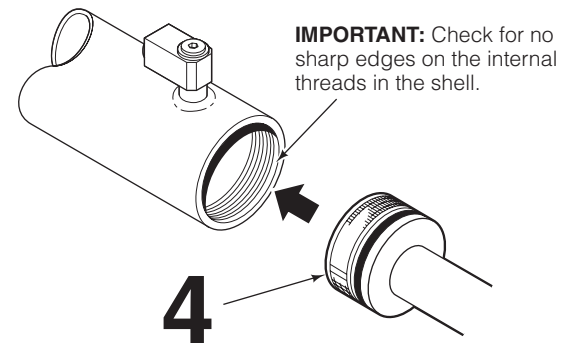
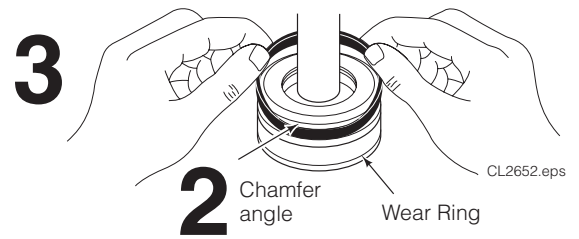
- Inspect the rod, piston and retainer for nicks or burrs. Minor nicks or burrs may be removed with 400-grit emery cloth. If they cannot be removed, replace the parts.
- Inspect the cylinder bore and remove any minor nicks or burrs with a butterfly hone. If they cannot be removed, replace the part.
- Inspect the outside of the shell for any deformities or cuts that could impair performance or cause leaks under pressure. If necessary, replace the part.
- Inspect the rod-end anchor parts for wear and replace as necessary.
- Inspect anti-roll pin for wear or looseness and replace as necessary.



4.4-4 Cylinder Reassembly

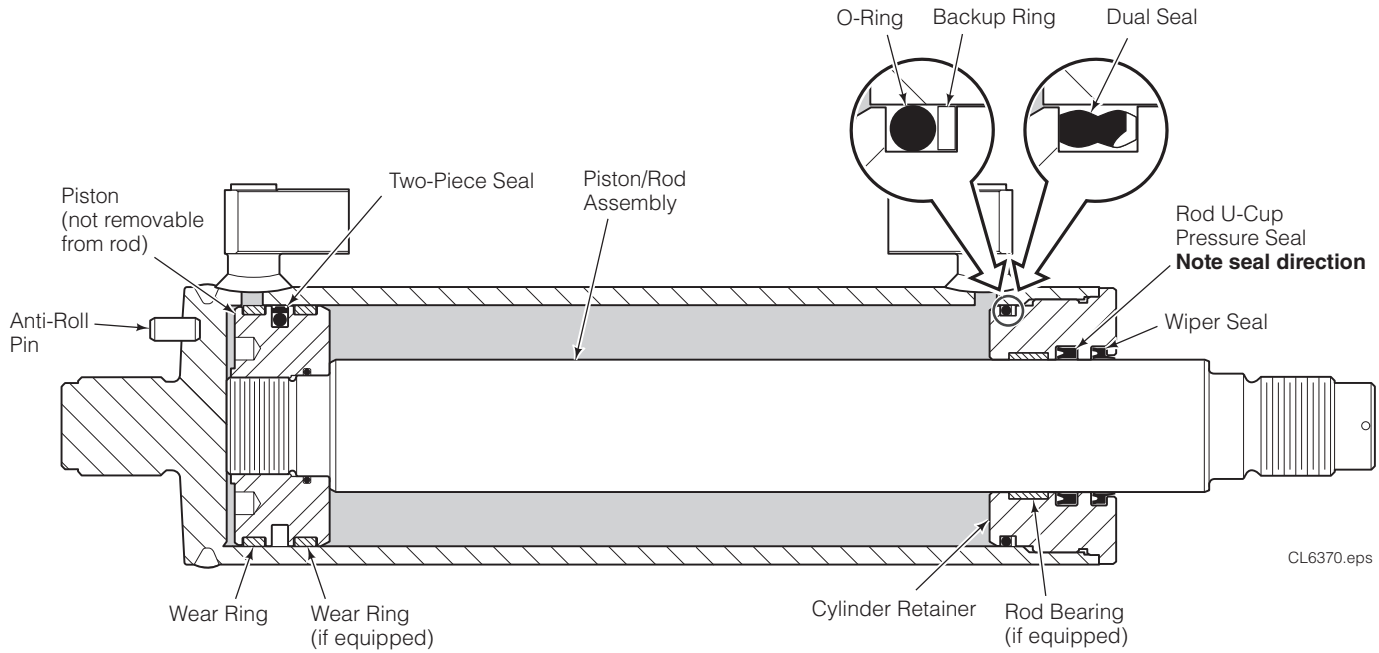
- 1** Polish the piston and retainer chamfer angle with emery cloth. This allows the seal to slide over the chamfer easier.
- 2** Lubricate all new seals and O-rings with O-ring lube or petroleum jelly.
- 3** Install the new seals on the piston and retainer.
 - Hook one side of the seal in the groove and push it over the piston or retainer as shown.
 - For two-piece seal on the piston, the inner O-ring (round or square-section) is installed in the bottom groove and composite outer ring on top.
 - Use internal seal installation tool (Cascade Part No. 599512) to ease installation. If installing by hand, form seal into 'kidney' shape and position into internal groove. Use finger pressure to smooth into groove.
- 4** Apply O-ring lube or petroleum jelly to the piston and shell. Carefully center the piston into the cylinder shell and using a soft-faced hammer drive the piston/rod assembly into the shell.

IMPORTANT: Prior to loading the piston into the shell, make sure that no sharp edges exist on the internal threads within the shell.
- 5** Apply petroleum jelly to the retainer ID and carefully slide onto the rod. Screw the retainer into the shell. Use a claw-type spanner wrench, tighten the retainer to 125 ft.-lbs. (170 Nm).
- 6** Make sure anti-roll pin fits tightly in place at cylinder base end. Replace if necessary (pin size: M8 x 20).

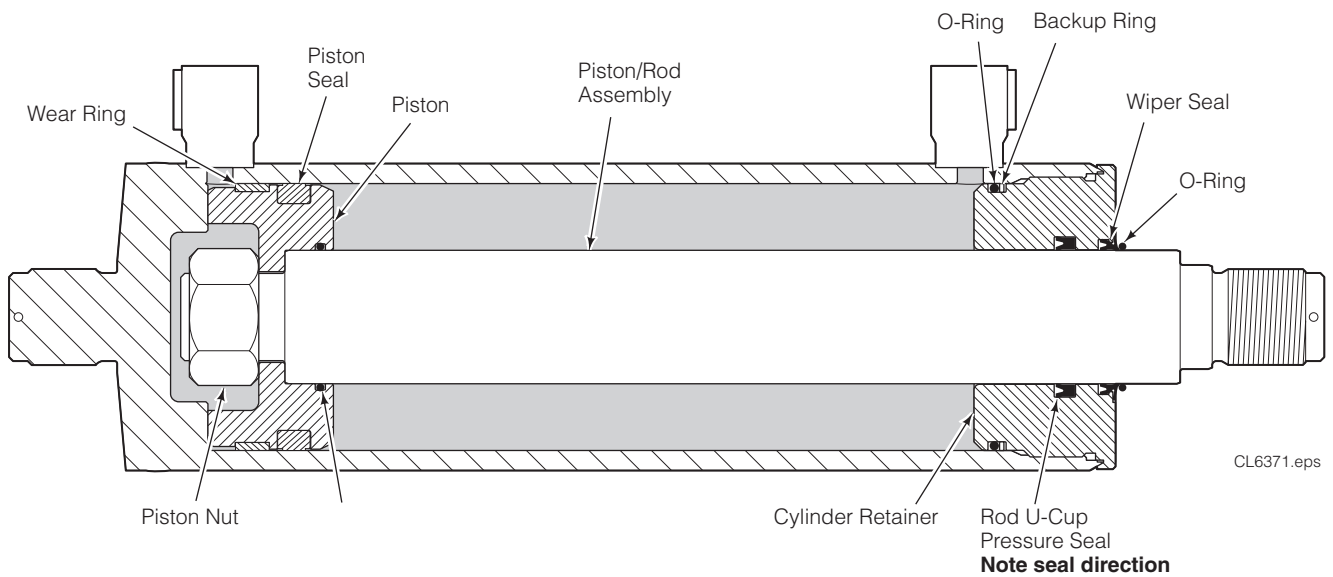


4.4-4 Cylinder Reassembly (Continued)

80G, 100G, 120G, 140G



170G



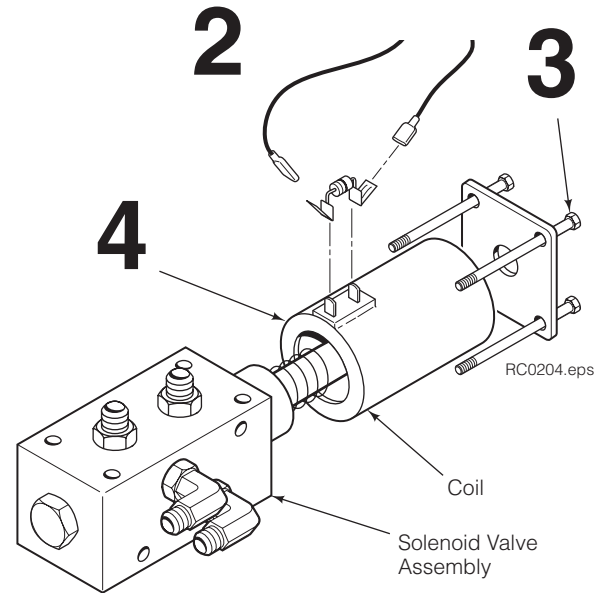
4.5 Solenoid Valve

4.5-1 Coil Service

- 1 Disconnect the wires and diode from the coil terminals.
- 2 Remove the end cover capscrews. Remove the end cover and coil.
- 3 Install the new coil and end cover. Make sure that the terminals are positioned correctly.
- 4 For reassembly, reverse the above procedures except as follows:
 - Refer to the electrical schematic in Section 3.5 for correct wire and diode installation.

4.5-2 Valve Service

Check the plunger within the valve body for freedom of movement. Press end button on coil to assure that valve is not jammed or damaged. If problems are found, replace the solenoid valve as a complete assembly.



5.1 Specifications

5.1-1 Hydraulics

Truck Relief Setting

80G-140G	170G
2245 psi (155 bar) – Min.	2245 psi (155 bar) – Min.
2755 psi (190 bar) – Max.	2465 psi (170 bar) – Max.

NOTE: The attachment valve has separate pressure relief control, see Installation Step 8 for adjustment.

Truck Flow Volume ^①

	Min. ^②	Recommended	Max. ^③
80G-100G	10 GPM (38 L/Min.)	15 GPM (57 L/Min.)	20 GPM (76 L/Min.)
120G-170G	10 GPM (38 L/Min.)	15 GPM (57 L/Min.)	23 GPM (90 L/Min.)

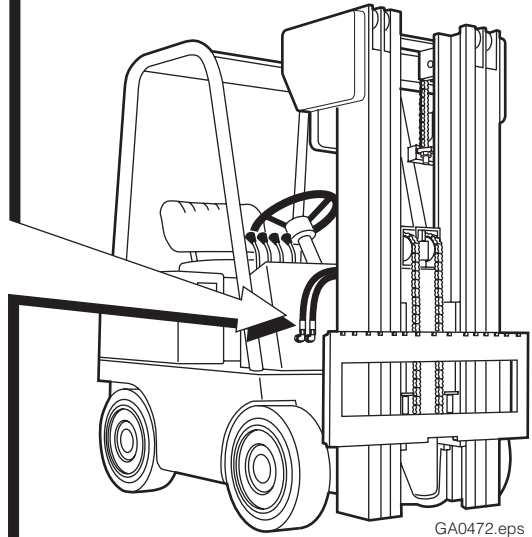
① Cascade 80G-170G Non-Revolution Clamps are compatible with SAE 10W petroleum base hydraulic fluid meeting Mil. Spec. MIL-0-5606 or MIL-0-2104B. Use of synthetic or aqueous base hydraulic fluid is not recommended. If fire resistant hydraulic fluid is required, special seals must be used. Contact Cascade.

② Flow less than recommended will result in reduced system performance.

③ Flow greater than maximum can result in excessive heating, reduced system performance and short hydraulic system life.

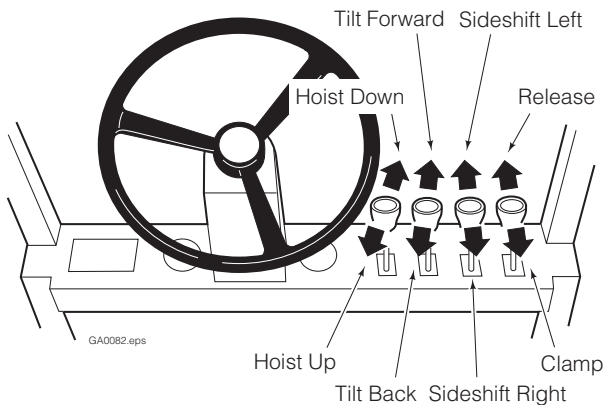
Hoses and Fittings

All supply hoses and fittings must be M8 (No. 6) minimum with an orifice size of 9/32 in. (7 mm) minimum.



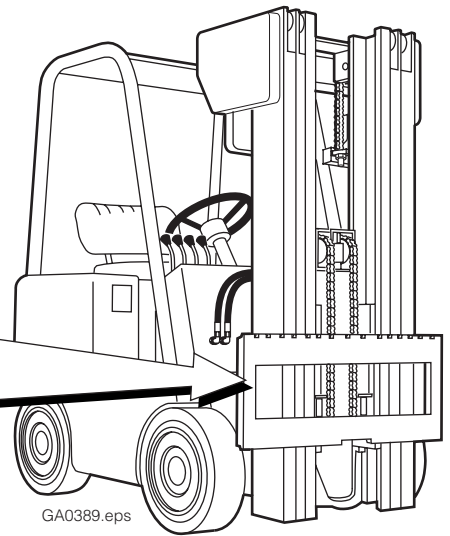
5.1-2 Auxiliary Valve Functions

Check for compliance with ANSI/ITSDF (ISO) standards:



5.1-3 Truck Carriage

A	Carriage Mount Dimension (A) ITA (ISO)	
	Minimum	Maximum
Class III	18.68 in. (474.5 mm)	18.74 in. (476.0 mm)
Class IV	23.44 in. (595.5 mm)	23.50 in. (597.0 mm)



5.1-4 80G–140G Torque Values

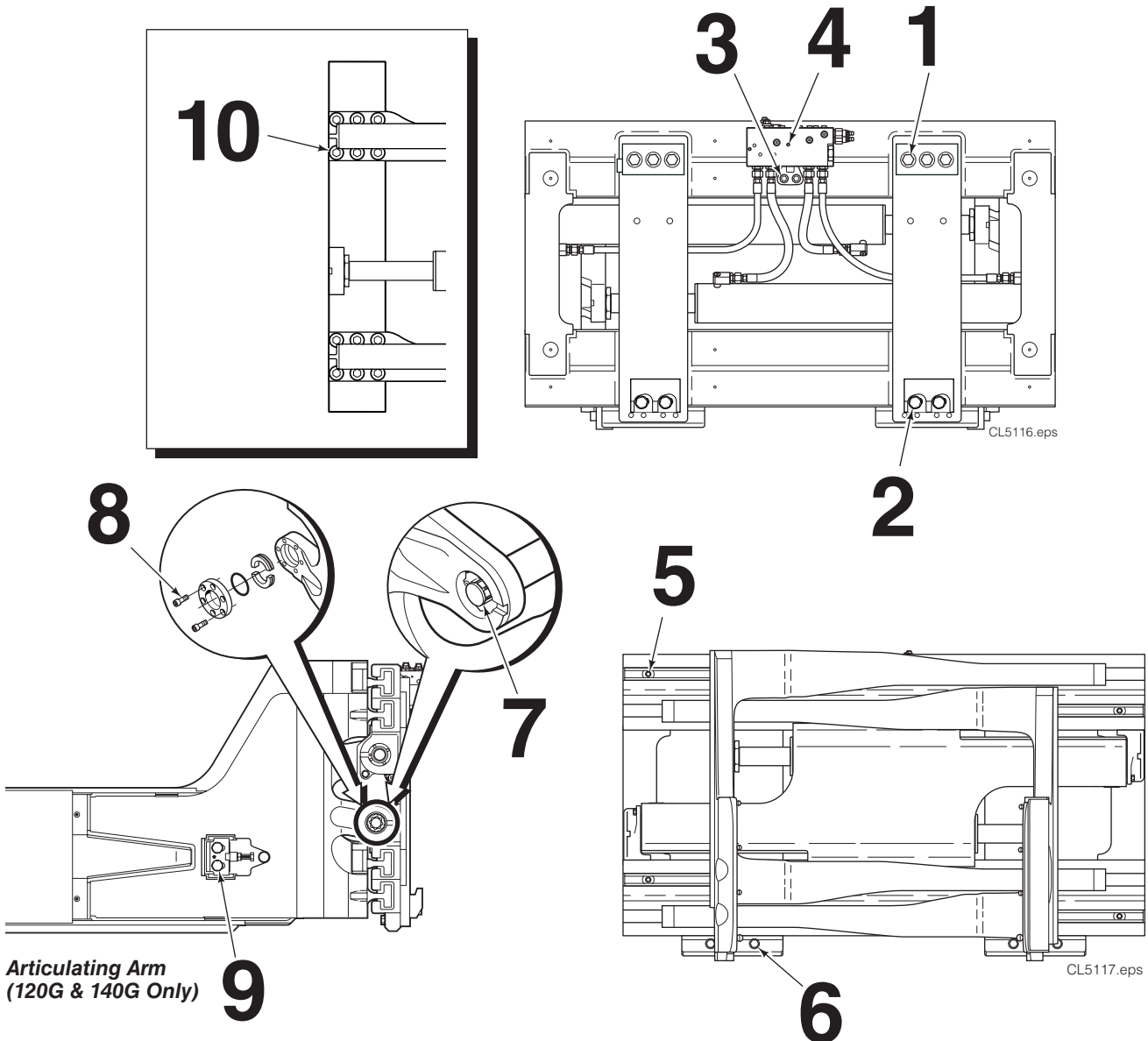
Fastener torque values for 80G, 100G, 120G and 140G Clamps are shown in the table below in US and metric. All torque values are also called out in each specific service procedure section through out the manual.

NOTE: All fasteners have a torque value range of $\pm 10\%$ of stated value.

Ref.	Fastener Location	Size	Ft.-Lbs.	Nm	
1	Upper Hook Capscrews	M20	320	435	
2	Lower Hook Capscrews	CL III	M16	165	225
		CL IV	M20	320	435
3	Centering Tab Capscrew	M16	120	165	
4	Valve Capscrews	80G, 100G	M8	14	19
		120G, 140G	M6	6	8
5	Bearing Retainer Plug Capscrew ■	M8	24	32	

Ref.	Fastener Location	Size	Ft.-Lbs.	Nm	
6	Wear Tile Capscrew	M16	165	225	
7	Rod End Nut	80G, 100G	–	310	420
		120G, 140G	–	250	340
8	Spherical End Cap Capscrews	M12	80	110	
9	Pivot Arm Capscrew	M20	320	435	
10	Bolt-On Arm Capscrews	M24	680	924	

■ Use Loctite 242 (Blue)



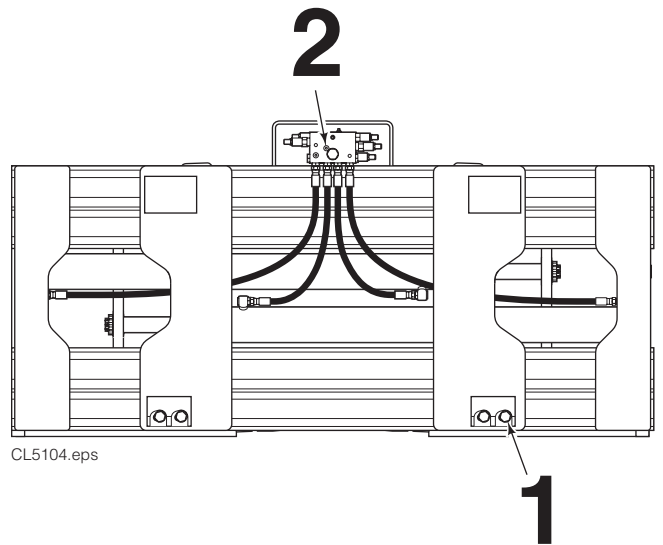
5.1-5 170G Torque Values

Fastener torque values for 170G Clamps are shown in the table below in Metric. All torque values are also called out in each specific service procedure section through out the manual.

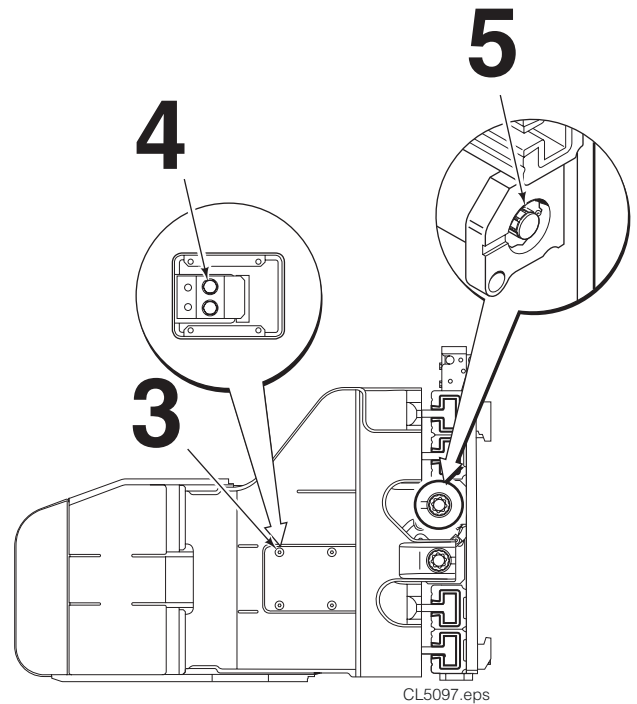
NOTE: All fasteners have a torque value range of $\pm 10\%$ of stated value.

Ref.	Fastener Location	Size	Ft.-Lbs.	Nm
1	Lower Hook Capscrews	M20	320	435
2	Valve Capscrews	M10	30	40
3	Pivot Arm Cover Capscrew ■	M12	48	66
4	Pivot Arm Capscrew ■	M20	235	320
5	Rod End Nut	-	235	340

■ Use Loctite 243



CL5104.eps



CL5097.eps

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