

SERVICE MANUAL

20G-77G

Non-Revolving Sliding Arm Clamps & Fork Positioners

Original Instructions

Number 6033703-R5 EN



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corporation**

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INTRODUCTION

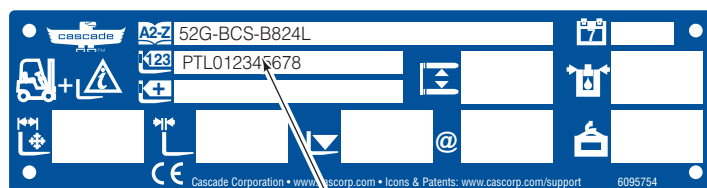
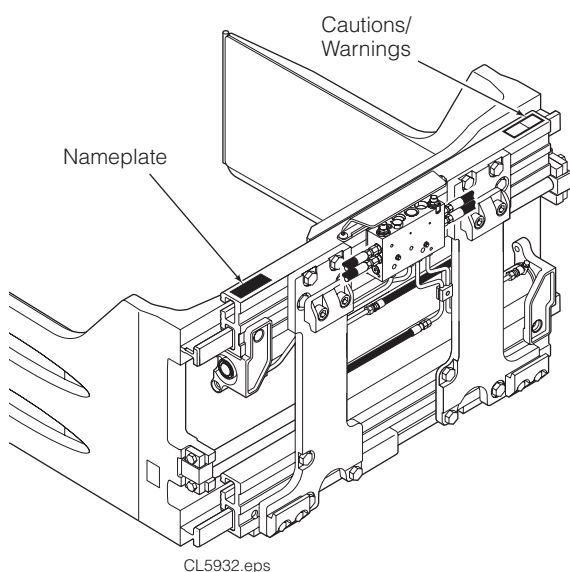
1.1 Introduction

This manual provides the Periodic Maintenance, Troubleshooting, Service and Specifications for Cascade G-Series Non-Revolution Sliding Arm Clamps and Fork Positioners.

These attachments are designed for three-shifts-a-day continuous duty operation with minimal maintenance. They provide exceptional visibility for the lift truck driver and provide optimized clamp force and load handling.

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 both Metric units. 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.

PERIODIC MAINTENANCE

2.1 General

2.1-1 Daily Inspection

Prior to each shift of truck operation, complete the following procedures:

- Check for loose or missing bolts, worn or damaged supply hoses and hydraulic leaks.
- Inspect cylinder rod ends and anchor bars (or anchor nuts) for damage.

NOTE: The rod end anchors operate with a loose clearance and require no lubrication.

- Check for equal arm movement.
- Check decals and nameplate for legibility.

2.1-2 1000-Hour Maintenance

After each 1000 hours of truck operation, in addition to the daily inspection, perform the following procedures:

- Inspect arm bearings for wear or damage. If bearings are worn in any area to less than 1.5 mm thickness, replace bearings.
- Check lower mounting hooks for engagement clearance:

Quick-Change Hooks – 5 mm Max.

Bolt-on Hooks – Tight against lower carriage bar

If adjustment is necessary, refer to Installation Step 6.

- Tighten lower bolt-on hook capscrews:
 - CL II** – 165 Nm
 - CL III** – 225 Nm
 - CL IV** – 435 Nm
- Tighten accessible mounting plate capscrews. Double-torque capscrews by tightening to final torque value, loosen 1/2 turn, then retighten.

20G – 108 Nm
28G, 36G, 44G – 270 Nm
52G, 64G*, 70G* – 520 Nm

* Applies to only mounting plates not welded.

IMPORTANT: If any capscrews are found loose, remove attachment from truck and check all mounting plate and sidsifter mount capscrews for proper torque values.

- Tighten cylinder rod end anchor bar capscrews.

20G – 63 Nm
28G, 36G – 110 Nm
44G, 52G, 64G, 70G, 77G – 275 Nm

- Tighten bolt-on fork arm capscrews.

20G, 28G – 275 Nm
36G, 44G, 52G – 535 Nm
64G, 70G, 77G – 585 Nm

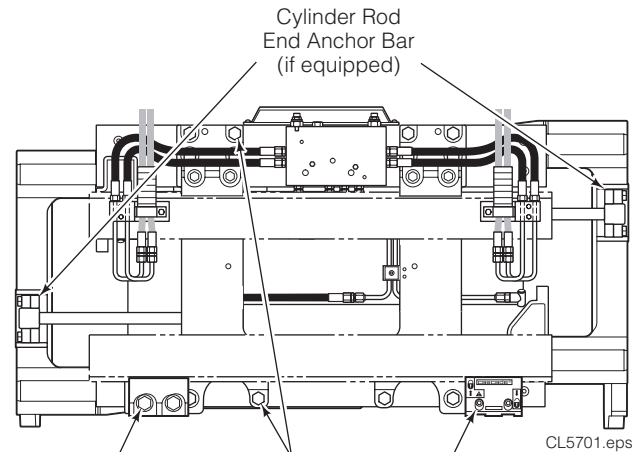
2.1-3 4000-Hour Maintenance

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

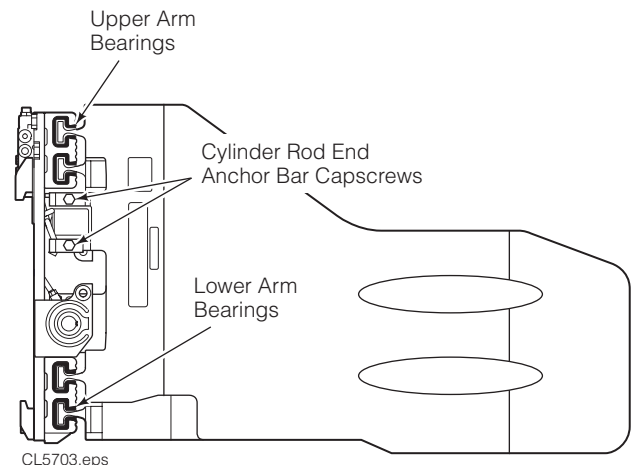
- Due to normal mechanical wear and component service life, cylinder seals should be replaced to maintain performance and safe operation.



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.



Non-Sideshifting Clamp and Internal Sideshifting Clamp Back (Driver's) View



RH Side
(Bale Clamp shown)

2.2 Attachments with External Sideshift

In addition to (or in place of, where necessary) the periodic maintenance found in the "General" periodic maintenance schedule, perform the following for attachments with external sideshift equipped:

2.2-1 1000-Hour Maintenance

- Inspect external sideshifter bearings for wear or damage. If upper bearings are worn to less than 1.5 mm thickness, replace bearings. If lower bearings are worn to less than 1.5 mm exposed thickness, replace bearings.
- Apply general-purpose chassis grease to external sideshifter upper bearing grease fittings and lower bearing areas.
- Check lower mounting hooks for engagement clearance of 1.5 to 5 mm.

- Tighten lower bolt-on hook capscrews:

CL II, CL III – 165 Nm

CL IV – 435 Nm

- Tighten external sideshift cylinder mounting capscrews:

Socket Capscrew (Upper):

20G–36G, 44G (CL II) – 285 Nm

44G (CL III), 52G – 520 Nm

64G, 70G – 445 Nm

Hex Capscrew (Lower):

20G–36G, 44G (CL II) – 235 Nm

44G (CL III), 52G – 520 Nm

64G, 70G – 445 Nm

IMPORTANT: If any capscrews are found loose, remove attachment from truck and check all sideshifter mount capscrews for proper torque values.

- Tighten the following accessible mounting plate and lower spacer capscrews. Double-torque capscrews by tightening to final torque value, loosen 1/2 turn, then retighten.

Mounting Plate and Type 1 Lower Spacer:

20G – 108 Nm

28G, 36G, 44G – 270 Nm

52G – 435 Nm

Mounting Plate and Type 2 Lower Spacer:

20G – 108 Nm (M12), 225 Nm (M16)

28G, 36G, 44G – 270 Nm

52G – 270 Nm (M16), 520 Nm (M20)

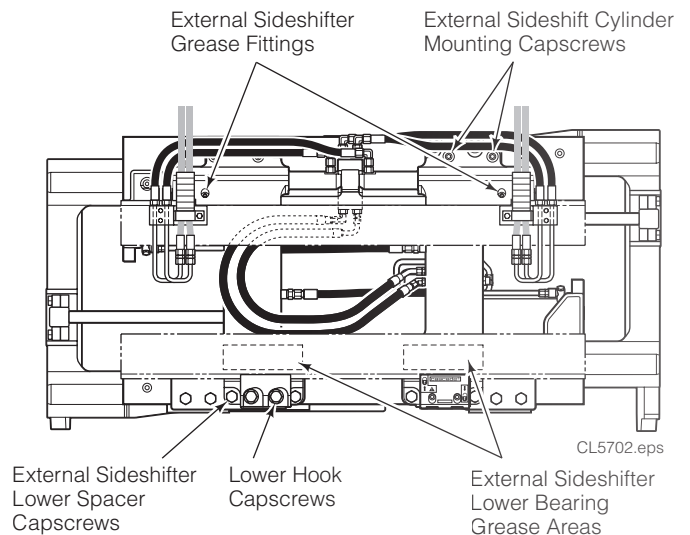
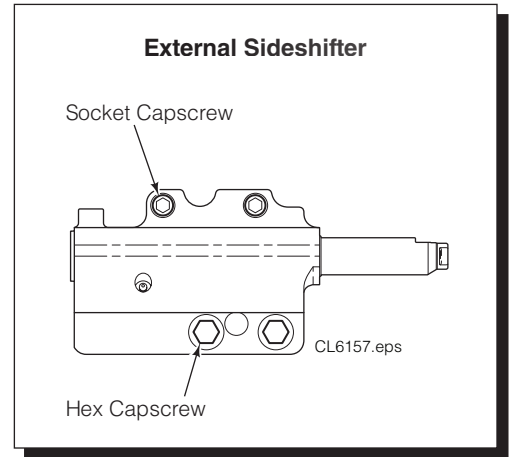
IMPORTANT: If any capscrews are found loose, remove attachment from truck and check all mounting plate and lower spacer capscrews for proper torque values.

- Tighten cylinder rod end anchor bar capscrews.

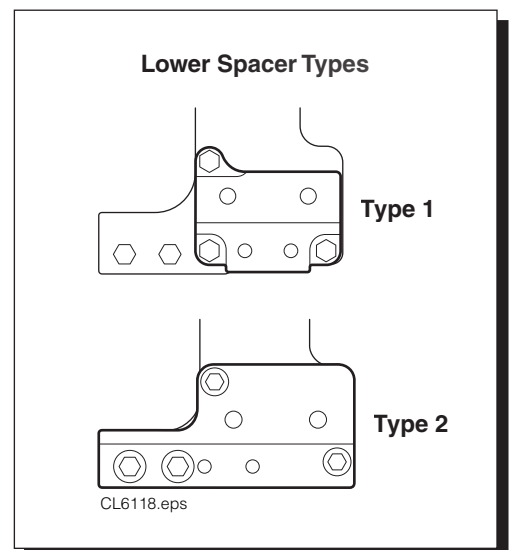
20G – 63 Nm

28G, 36G – 90 Nm

44G-70G – 225 Nm



External Sideshifting Clamp Back (Driver's View)



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:**
 - Low Pressure Valve** – 155 bar
 - High Pressure Valve** – 190 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:
 - 37 L/min – Cascade Part No. 671476
 - OR**
 - 75 L/min – Cascade Part No. 671477
- Pressure Gauge Kit:
 - 345 bar – Cascade Part No. 671212

OR

Wireless Pressure Monitor:

Pressure transducers monitor the hydraulic pressure, data is transmitted wirelessly to the receiver/display.

- Assorted fittings, hoses, and quick-disconnect couplers as required.



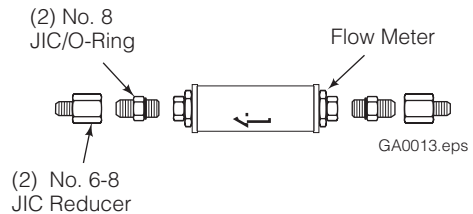
WARNING: Before servicing any hydraulic component, relieve pressure in the system. Turn the truck off and move the truck auxiliary control valves several times in both directions.

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 10 cm off the floor while testing.

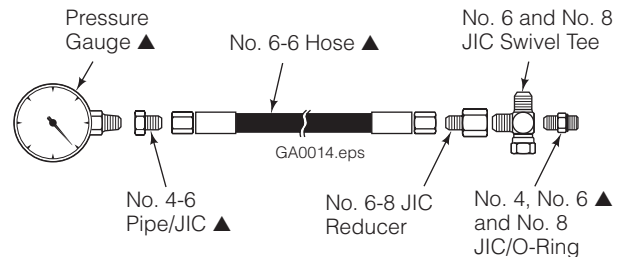
Flow Meter Kits:

- 671476 – 37 L/min
- 671477 – 75 L/min



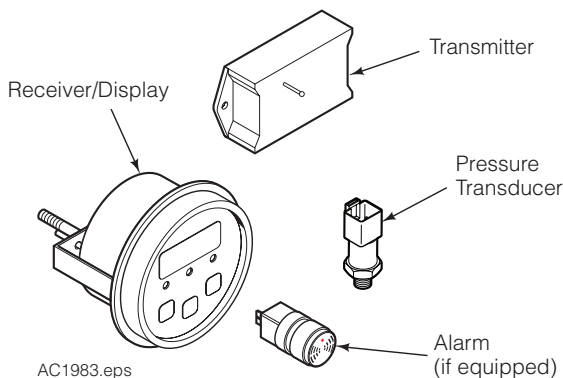
Pressure Gauge Kit:

671212



Wireless Pressure Monitor Kits

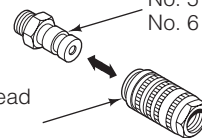
- 6803614 – 12V Kit
- 6815672 – 12V Kit, includes alarm
- 6803617 – 24V-48V Kit
- 6815675 – 24V-48V Kit, includes alarm



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) ▲
- No. 6 (Part No. 678591)

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

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. The following guidelines can then be used as a starting point to begin troubleshooting procedures:

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 3.3-1 and 3.3-2.

Fork Position Circuit

- Forks open and close unevenly.
- Forks will not open and close.

To correct these problems, see Section 3.3-1 and 3.3-2.

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 3.4-1, 3.4-2, 3.4-3.

TROUBLESHOOTING

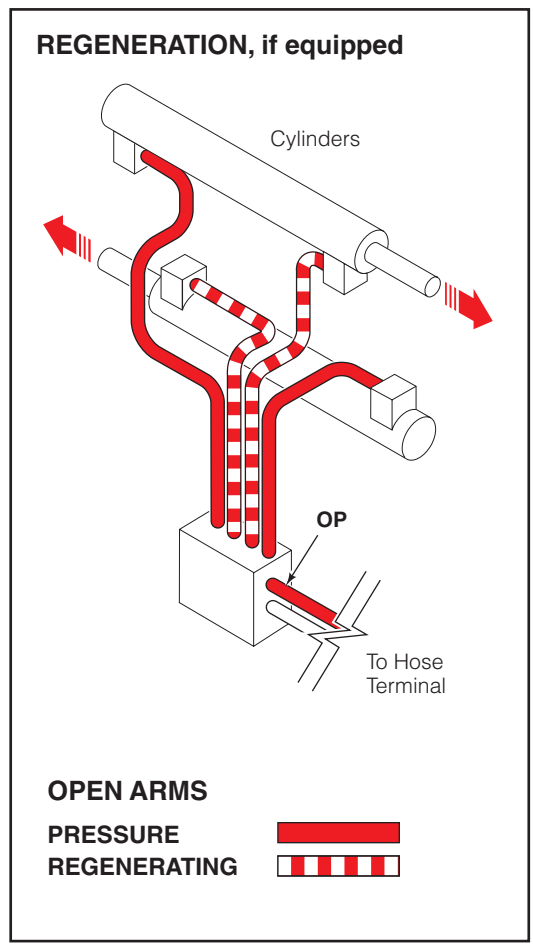
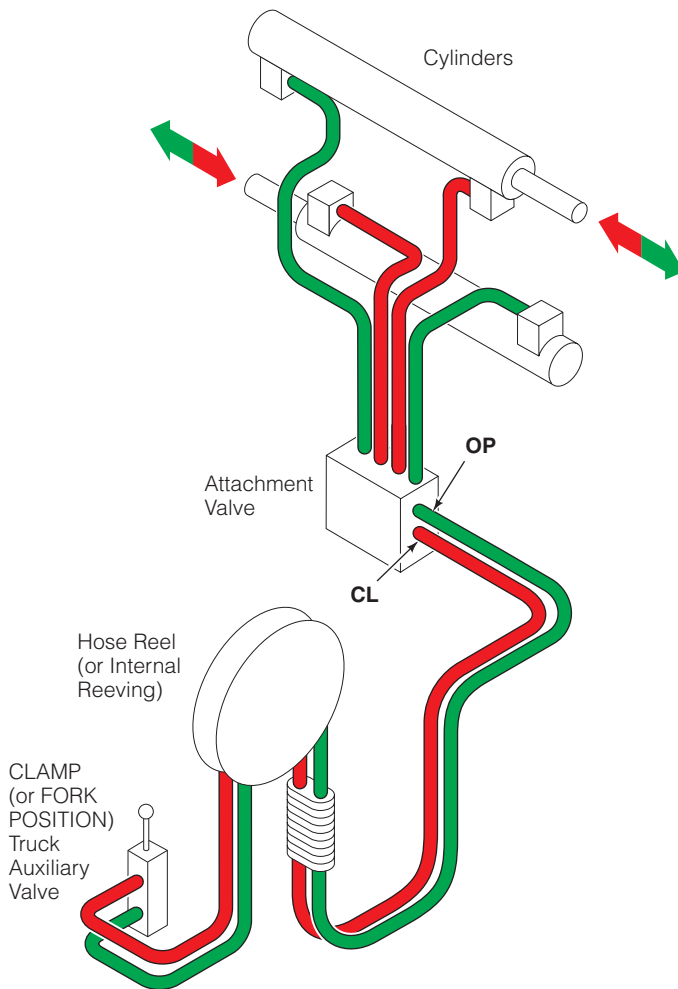
3.2 Plumbing

3.2-1 Non-Sideshifting Clamps – Hosing Diagram

CLAMP ARMS

PRESSURE 
RETURN 

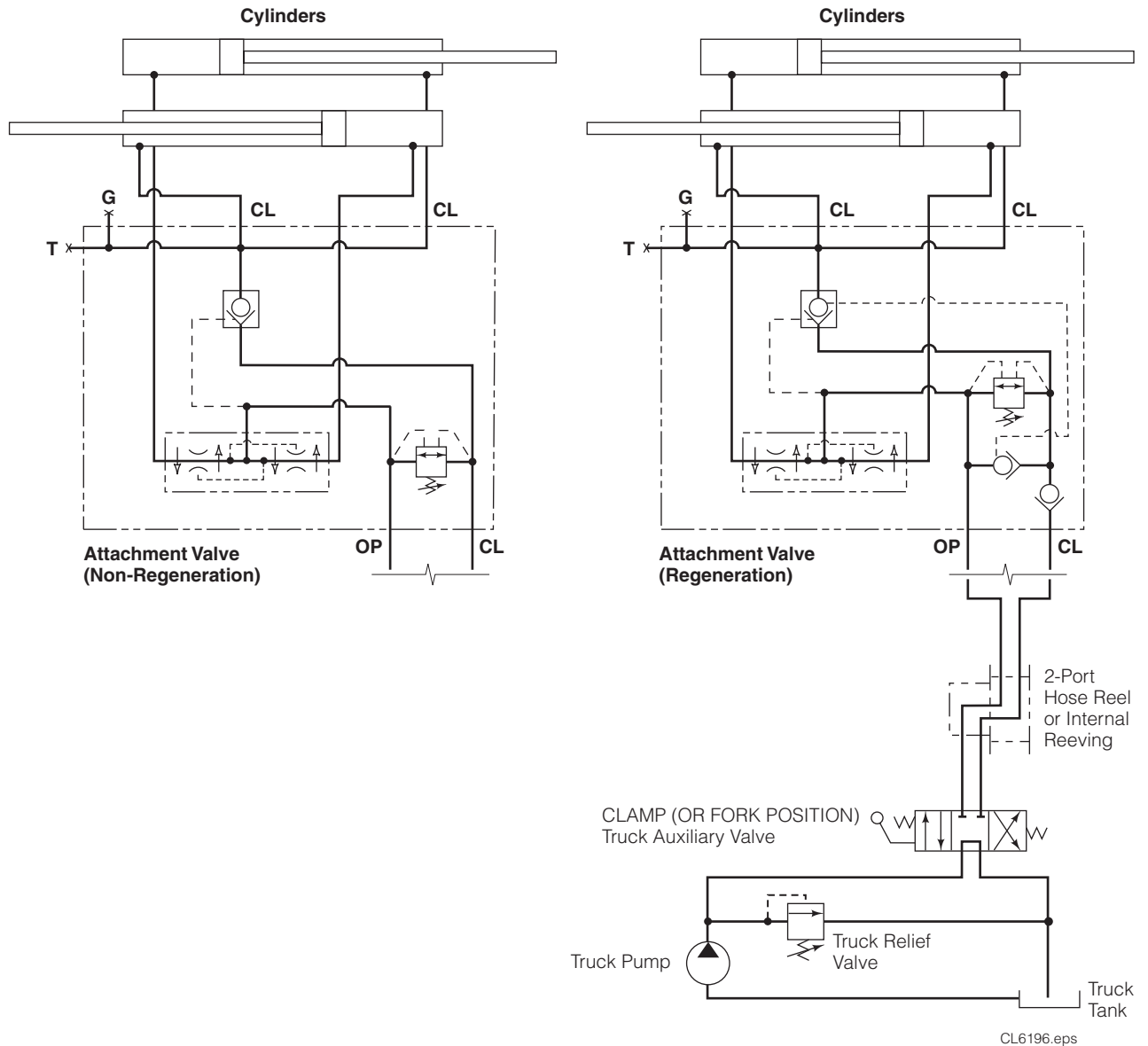
NOTE: For **OPEN ARMS**, reverse the colors shown.



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TROUBLESHOOTING

3.2-2 Non-Sideshifting Clamps – Hydraulic Circuit



TROUBLESHOOTING

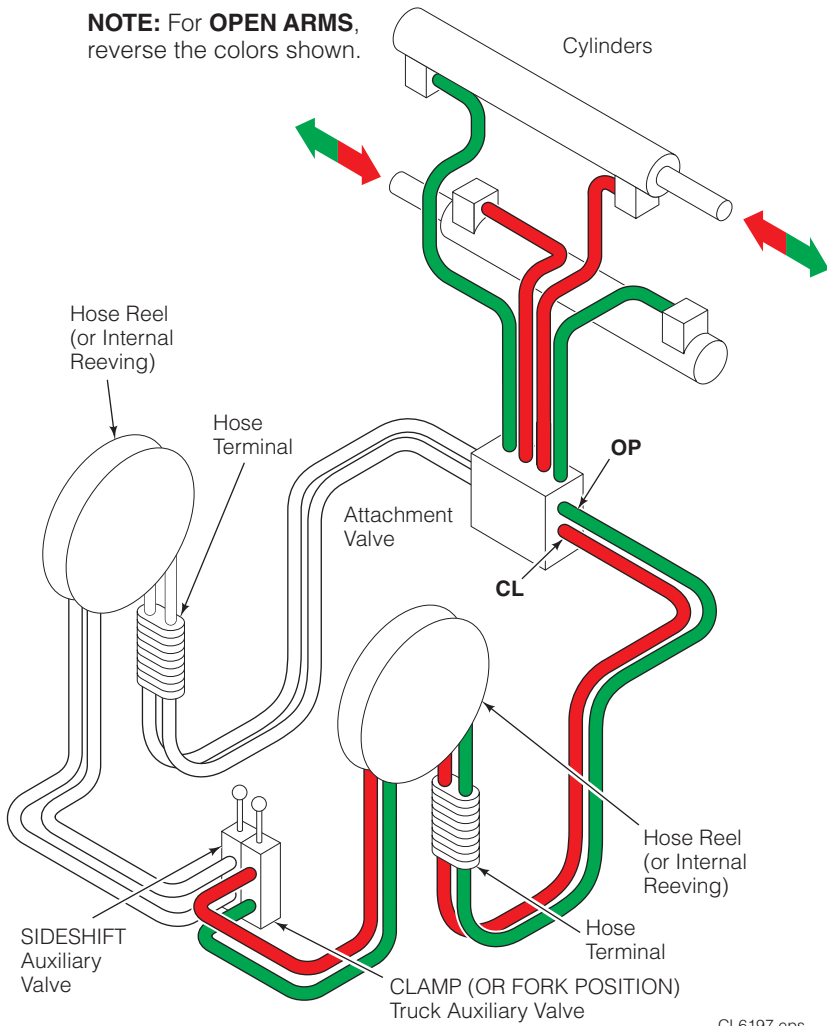
3.2-3 Sideshifting Clamps – Hosing Diagram

CLAMP CIRCUIT

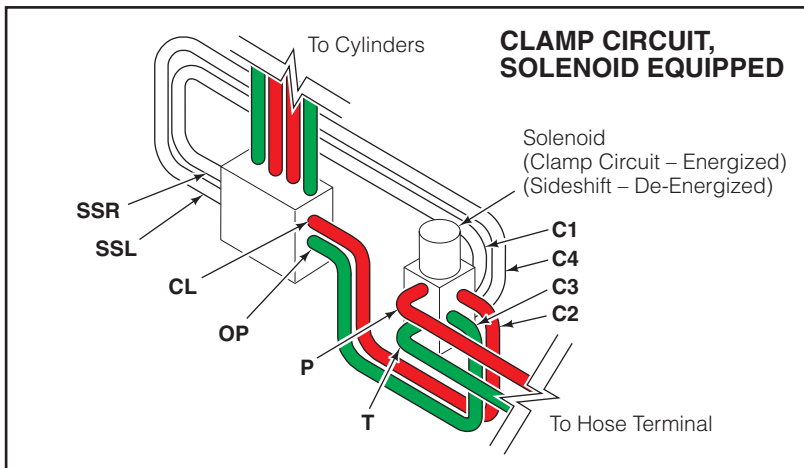
CLAMP ARMS

PRESSURE 
RETURN 

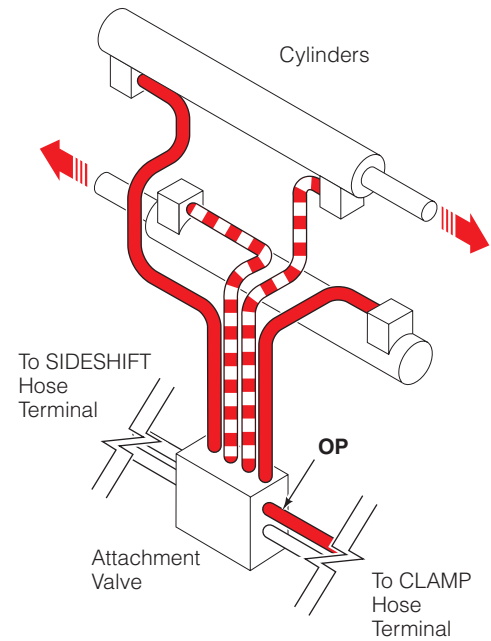
NOTE: For **OPEN ARMS**,
 reverse the colors shown.



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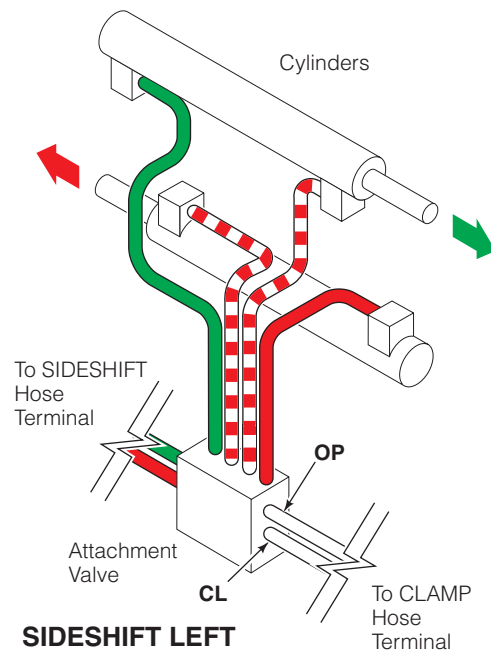
REGENERATION, if equipped



OPEN ARMS

PRESSURE 
REGENERATING 

SIDESHIFT CIRCUIT



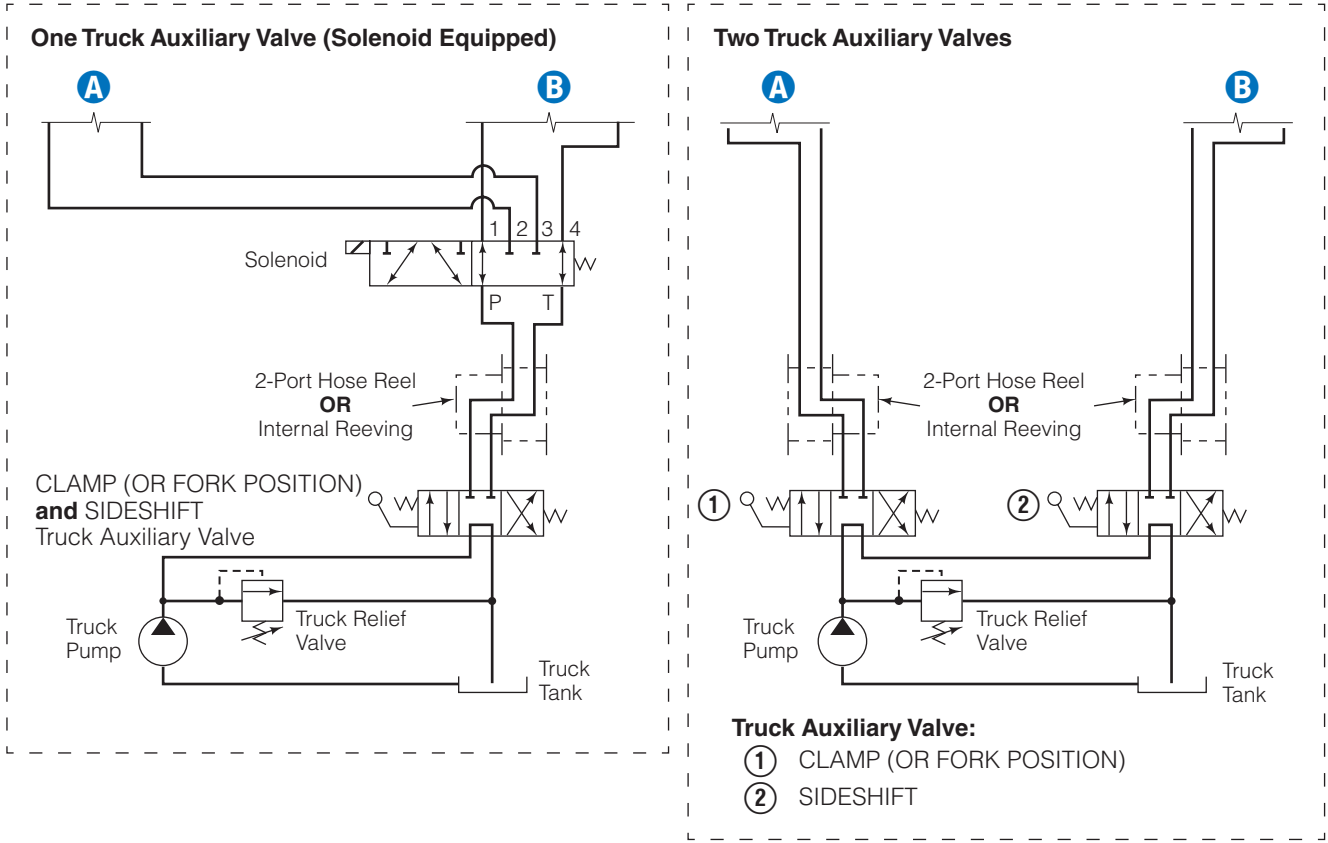
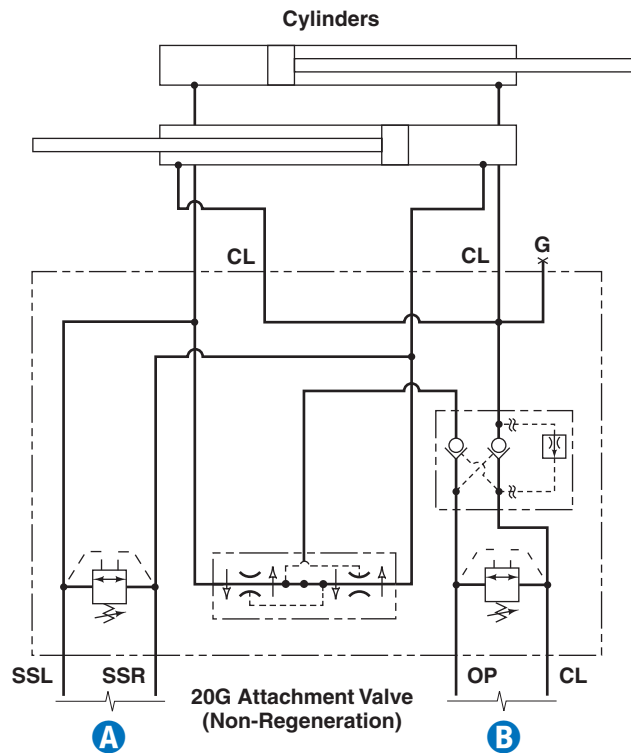
SIDESHIFT LEFT

PRESSURE 
RETURN 
SLAVE 

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

TROUBLESHOOTING

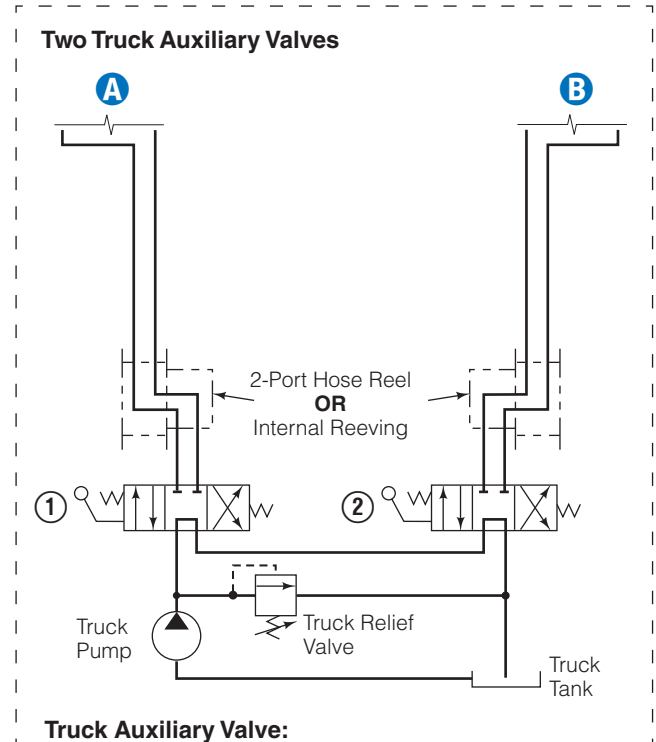
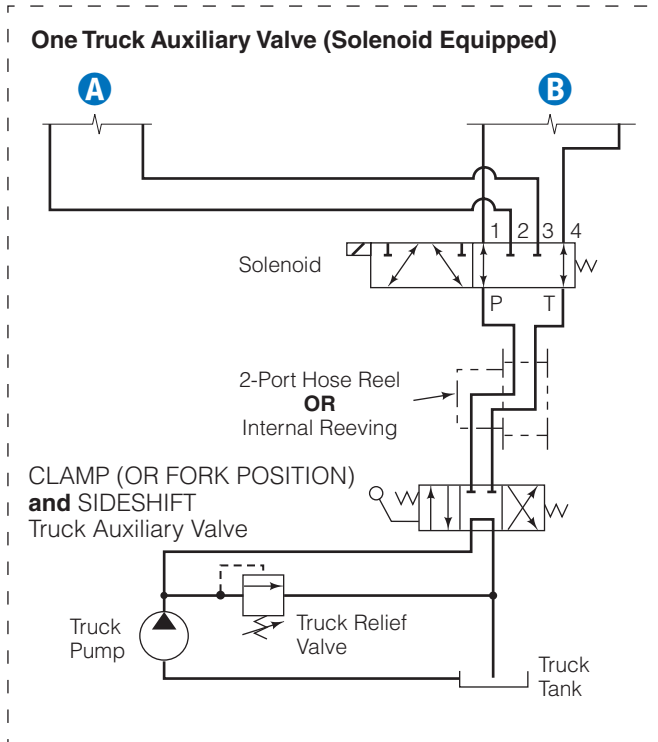
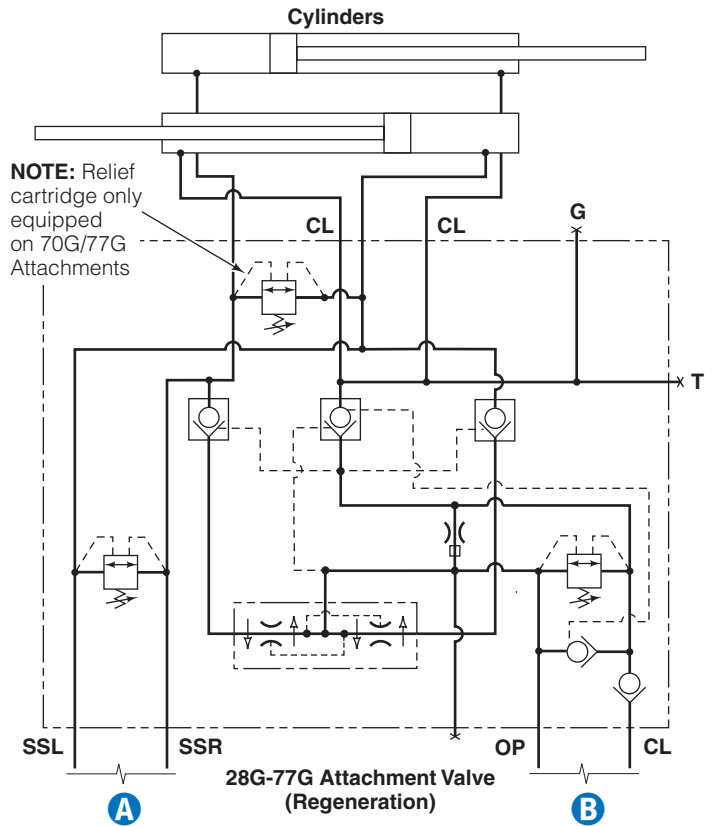
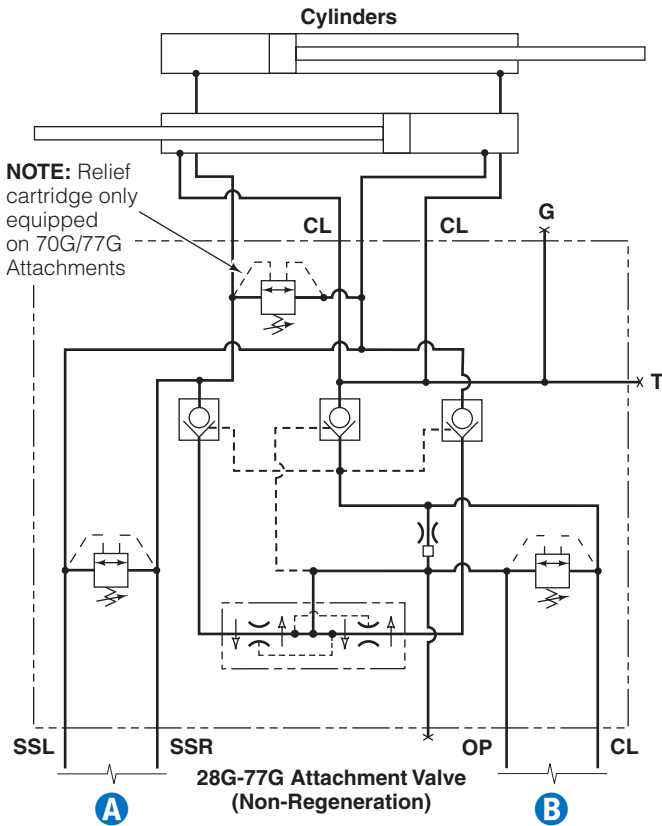
3.2-4 Sideshifting Clamps – Hydraulic Circuit, 20G



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TROUBLESHOOTING

3.2-5 Sideshifting Clamps – Hydraulic Circuit, 28G–77G



- Truck Auxiliary Valve:**
- ① CLAMP (OR FORK POSITION)
 - ② SIDESHIFT

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TROUBLESHOOTING

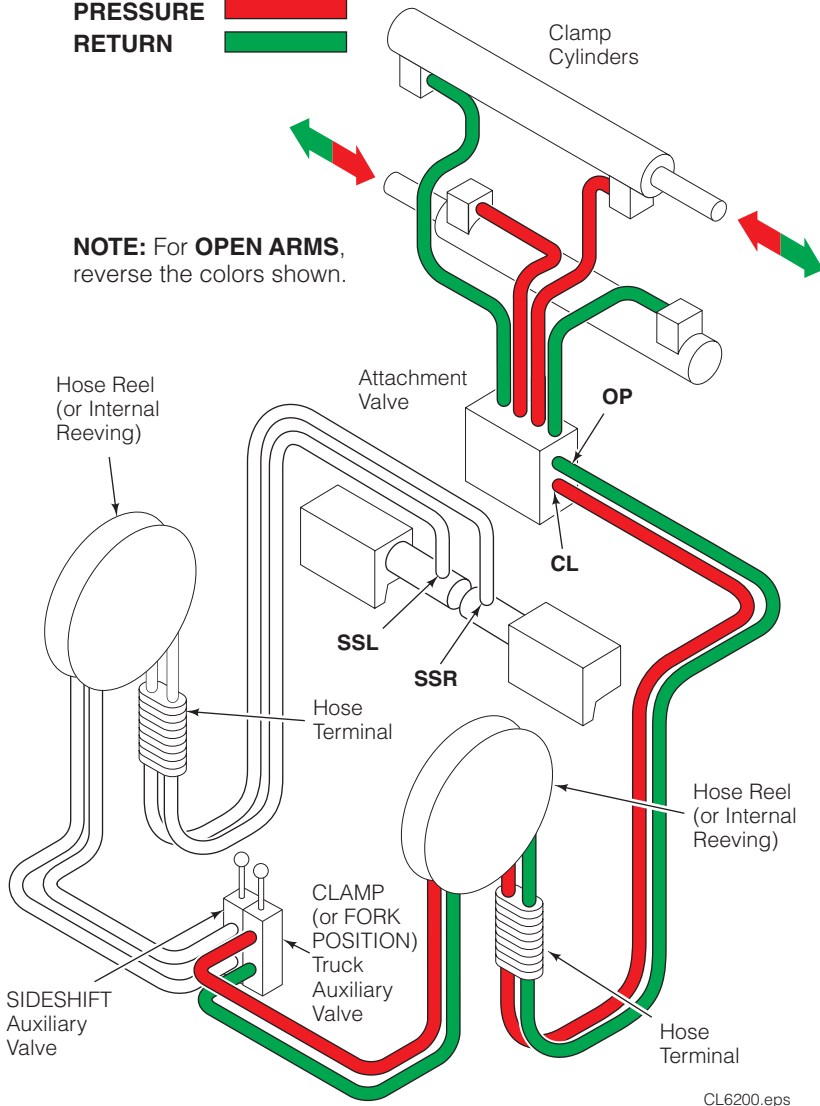
3.2-6 Sideshifting Clamps – Hosing Diagram, External Sideshift

CLAMP CIRCUIT

CLAMP ARMS

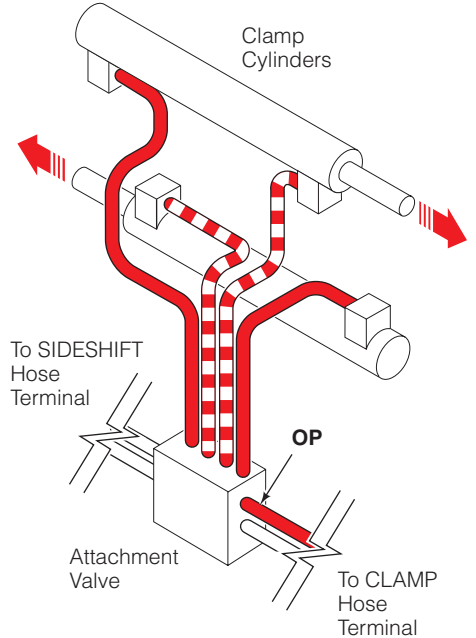
PRESSURE 
RETURN 

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



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REGENERATION, if equipped



OPEN ARMS

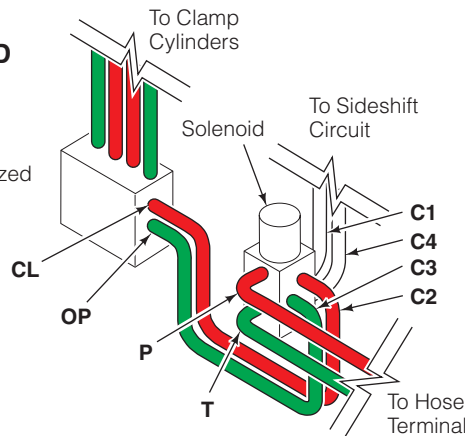
PRESSURE 
REGENERATING 

CLAMP CIRCUIT, SOLENOID EQUIPPED

Solenoid:

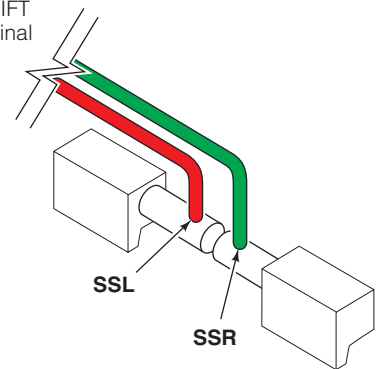
Clamp (or Fork Position) Circuit – Energized

Sideshift Circuit – De-Energized



SIDESHIFT CIRCUIT

To SIDESHIFT Hose Terminal
OR
 Solenoid Valve

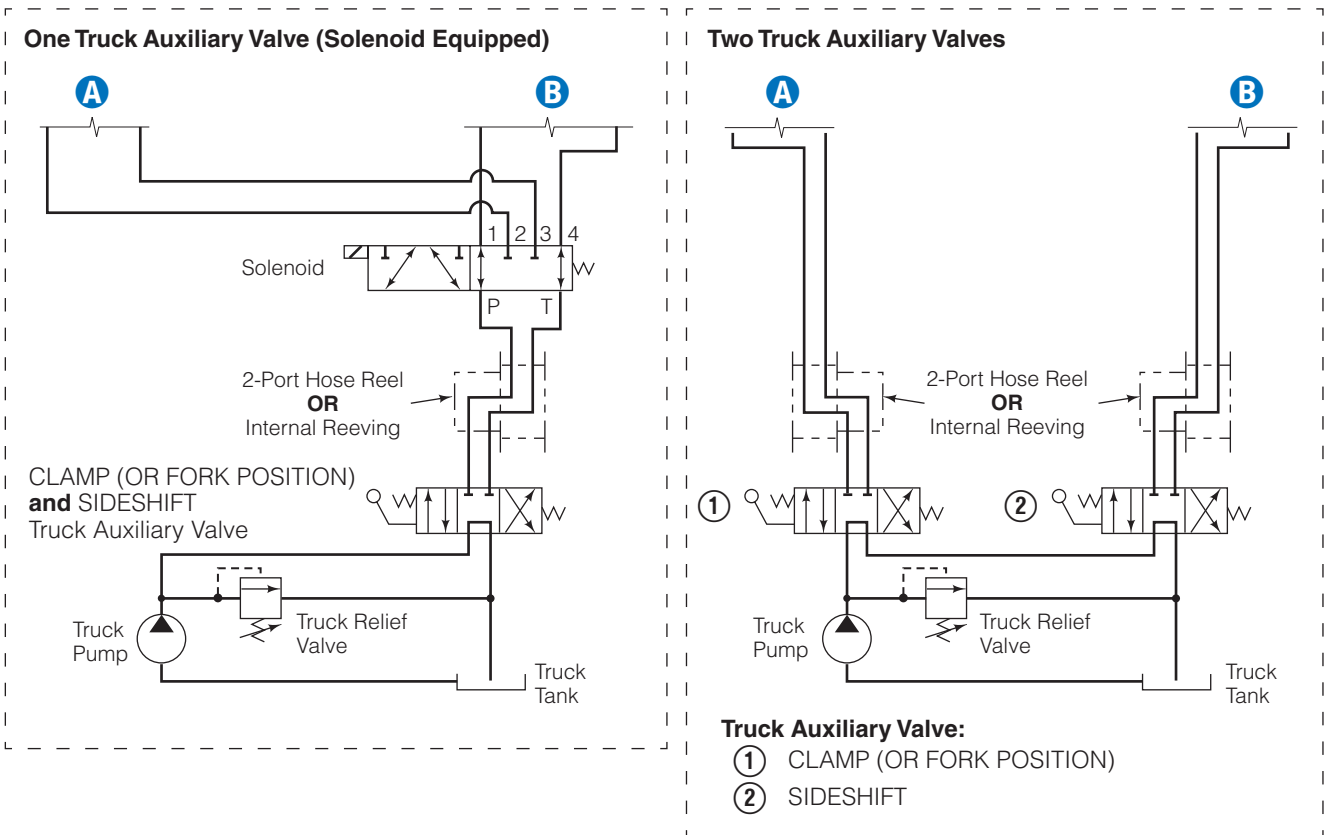
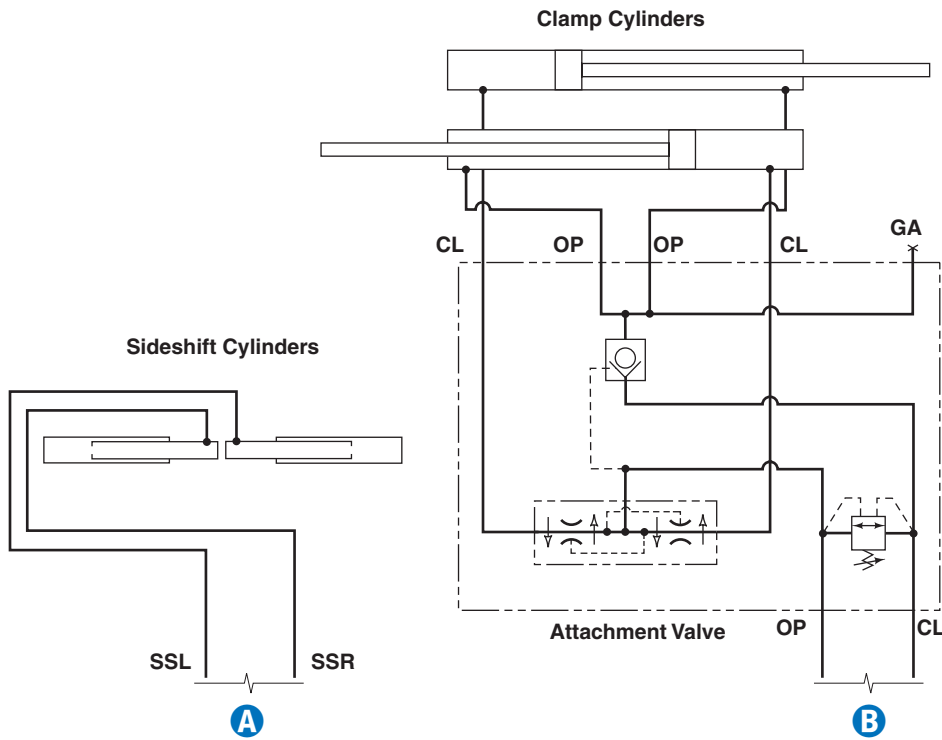


SIDESHIFT LEFT

PRESSURE 
RETURN 

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

3.2-7 Sideshifting Clamps – Hydraulic Circuit, External Sideshift



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3.3 Clamp & Fork Position Function

There are five potential problems that could affect the CLAMP and FORK POSITION 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.

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:**

Low Pressure Valve – 155 bar

High Pressure Valve – 190 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 (or CLOSE) position for a few seconds. Release the lever and check for external leaks at fittings, hoses and valve.

3.3-2 Clamp & Fork Position Circuit Test

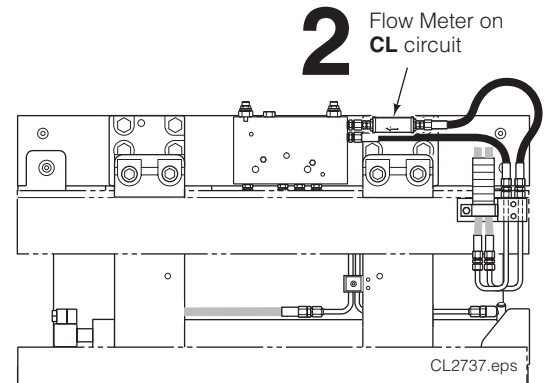
- 1 If equipped, press the solenoid button. Listen for a 'click' at the solenoid valve. If no sound is heard, first check the fuse, wiring and coil. Make sure that the valve is not jammed. Refer to Section 4.7.

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

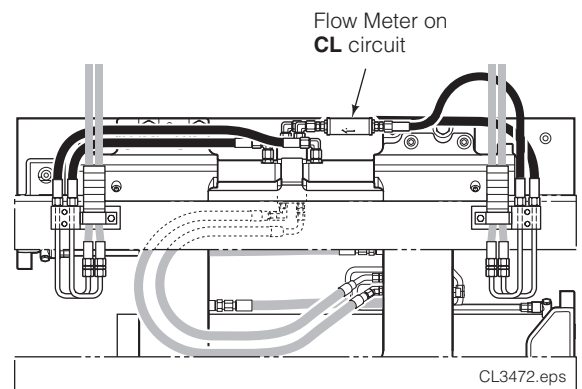
- 2 Fully open and close the arms (or forks). If the arms move slowly or not at all, the CLAMP relief cartridge may be faulty or need adjustment. Refer to the next page illustrations. Replace or adjust the cartridge. If the arms move unequally, the FLOW DIVIDER cartridge may be faulty. Replace the cartridge. Refer to Section 4.3.
- 3 Position the arms to mid-stroke. Turn the truck off and connect a 345 bar pressure gauge to the **G** port on the valve.
- 4 Start the truck and clamp on a rigid load (or clamp force indicator) or fully close forks. Hold the lever in the CLAMP (or CLOSE) position for a few seconds.



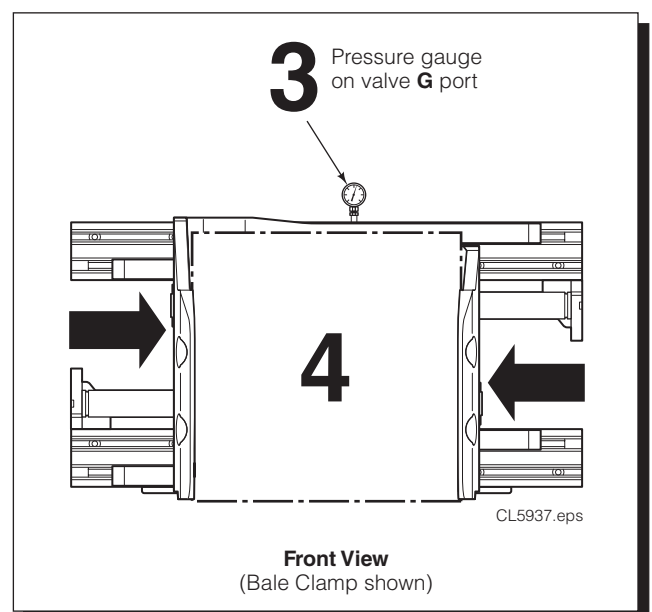
WARNING: Before removing hydraulic lines or components, relieve pressure in the hydraulic system. Turn truck off and open the truck auxiliary control valve(s) several times in both directions.



Back (Driver's) View, Rear Mounted Valve



Back (Driver's) View, Front Mounted Valve



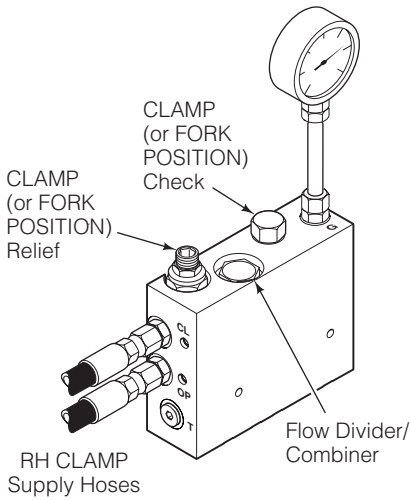
Front View
(Bale Clamp shown)

TROUBLESHOOTING

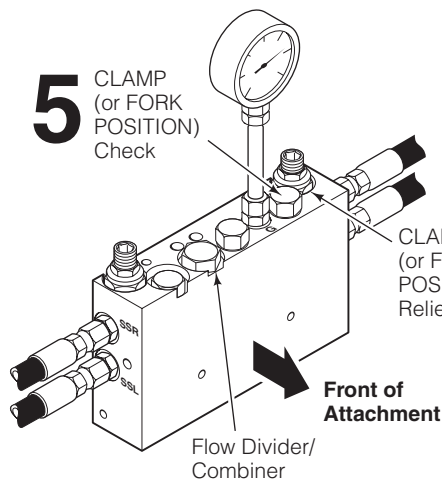
3.3-2 Clamp & Fork Position Circuit Test (Continued)

- 5 Release the lever and watch the pressure gauge:
- If the pressure drop **is less** than 10 bar initially, and additional drop does not exceed 2 bar per minute, the problem is not hydraulic. Refer to Section 3.1-3.
 - If the pressure drop **is more** than 10 bar initially, and additional drop exceeds 2 bar per minute, the CLAMP check valve cartridge may be faulty. Replace the cartridge. Refer to Section 4.3.
- 6 Fully close the arms. Hold the lever in the CLAMP (or CLOSE) position for a few seconds. If the pressure still drops as before, one of the cylinders is faulty and must be serviced. Refer to Section 4.4.

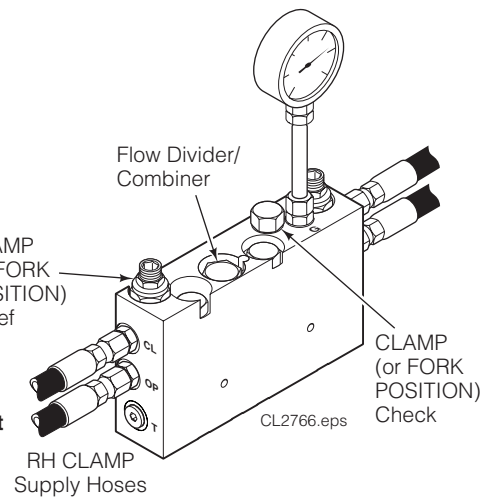
**NON-SIDESHIFT VALVE
RH CLAMP Ports**



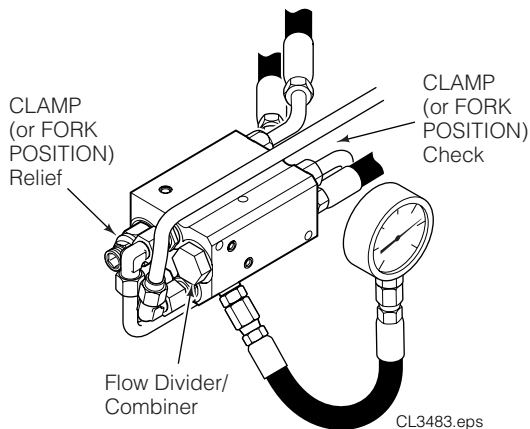
**SIDESHIFTING VALVE
LH CLAMP Ports**



**SIDESHIFTING VALVE
RH CLAMP Ports**



EXTERNAL SIDESHIFTING VALVE



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.

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. **PRESSURE TO THE ATTACHMENT MUST NOT EXCEED:**

Low Pressure Valve – 155 bar

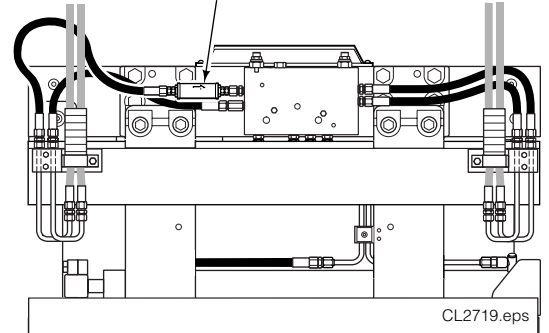
High Pressure Valve – 190 bar

- 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.

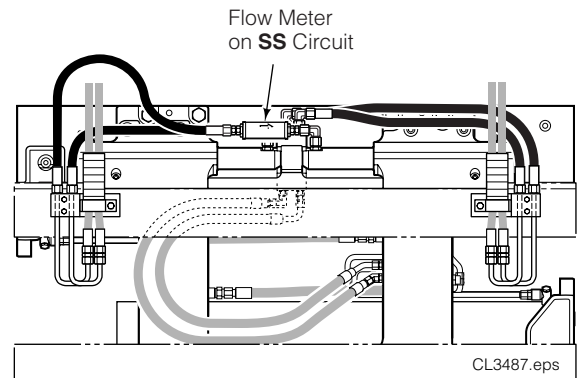


WARNING: Before removing hydraulic lines or components, relieve pressure in the hydraulic system. Turn truck off and open the truck auxiliary control valve(s) several times in both directions.

2 Flow Meter on **SS** Circuit



Back (Driver's) View, Rear Mounted Valve



Back (Driver's) View, Front Mounted Valve

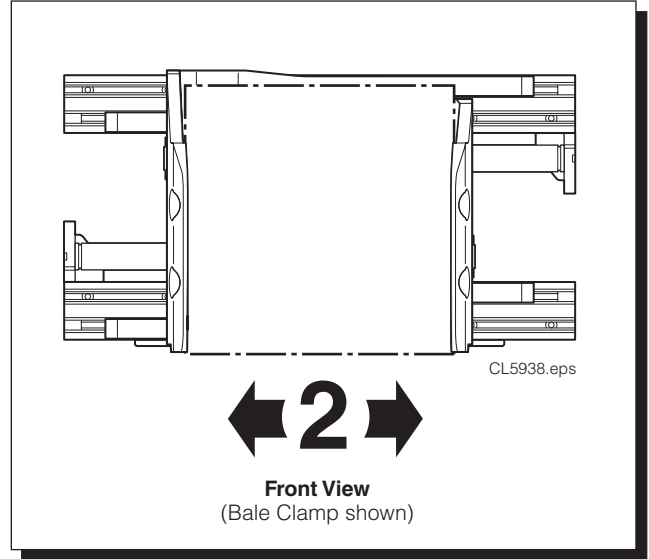
3.4-2 Internal Sideshift Circuit Test

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

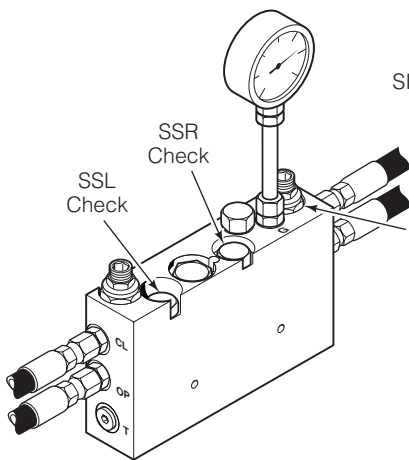
- 1 If equipped, press the solenoid button. Listen for a 'click' at the solenoid valve. If no sound is heard, check fuse, wiring and coil. Make sure that the valve is not jammed. Refer to Section 4.7.

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

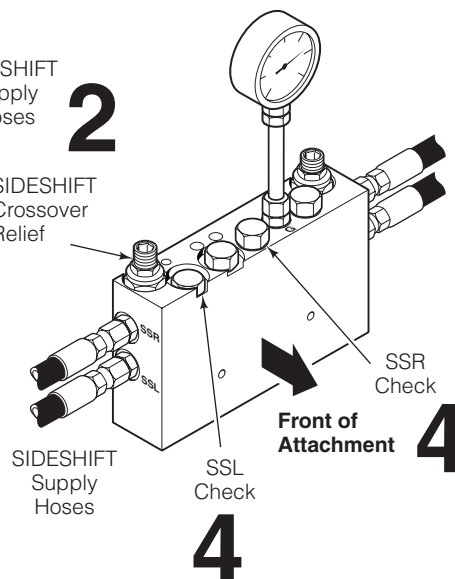
- 2 Clamp a maximum load. Sideshift LEFT and RIGHT observing sideshifting movement:
 - If there is little or no movement, adjust SS relief clockwise (CW) until attachment sideshifts. Then adjust counterclockwise (CCW) 1/4 turn increments until sideshift speed slows (relief opening). Finish by adjusting cartridge clockwise (CW) 1/4 turn.
 - If the attachment will not sideshift after attempted relief adjustment, go to Step 3.
- 3 **Early Valves** – Remove the setscrew plug 4 mm Allen socket from the equalization orifice located in the port stamped 'OR' on top of the valve. Re-adjust SS relief per Step 2.
 - If valve does not have an 'OR' port, install a new valve with equalization circuit or install an external equalization connection between CLAMP/ OPEN lines. Refer to Service Kit 212863 (includes Installation Sheet 212862) or TB167.
- 4 If the attachment sideshifts at the proper speed in one direction but not the other, the SS 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.



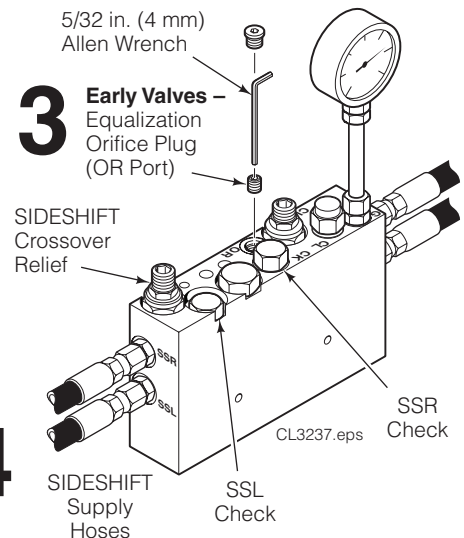
**SIDESHIFTING VALVE
LH Sideshift Ports**



**SIDESHIFTING VALVE
RH Sideshift Ports**



**SIDESHIFTING VALVE with REGENERATION
RH Sideshift Ports**

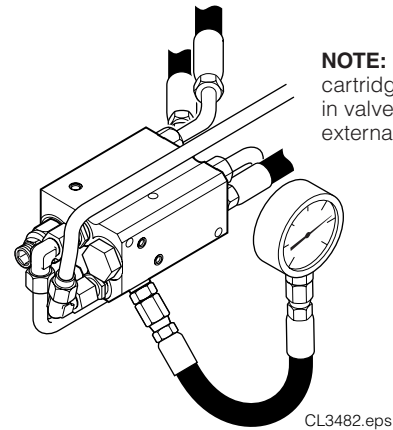


3.4-3 External Sideshift Circuit Test

NOTE: No cartridge valves used in external sideshift circuit.

1 Sideshift fully to the LEFT or RIGHT. Hold the lever for 5 seconds:

- If there is **little or no movement**, the flow restrictor(s) may be plugged in the cylinder(s). Remove end plug from the head end. Inspect cylinders and flow restrictors for debris. Service cylinders if required. Refer to Section 4.5-2.
- If there is **any hydraulic leakage** at the cylinder rod seals, the sideshift cylinder assemblies require service. Refer to Section 4.5-2.
- If there is **no hydraulic leakage** at the cylinder rod seals, the problem is not hydraulic. Refer to Section 3.4.

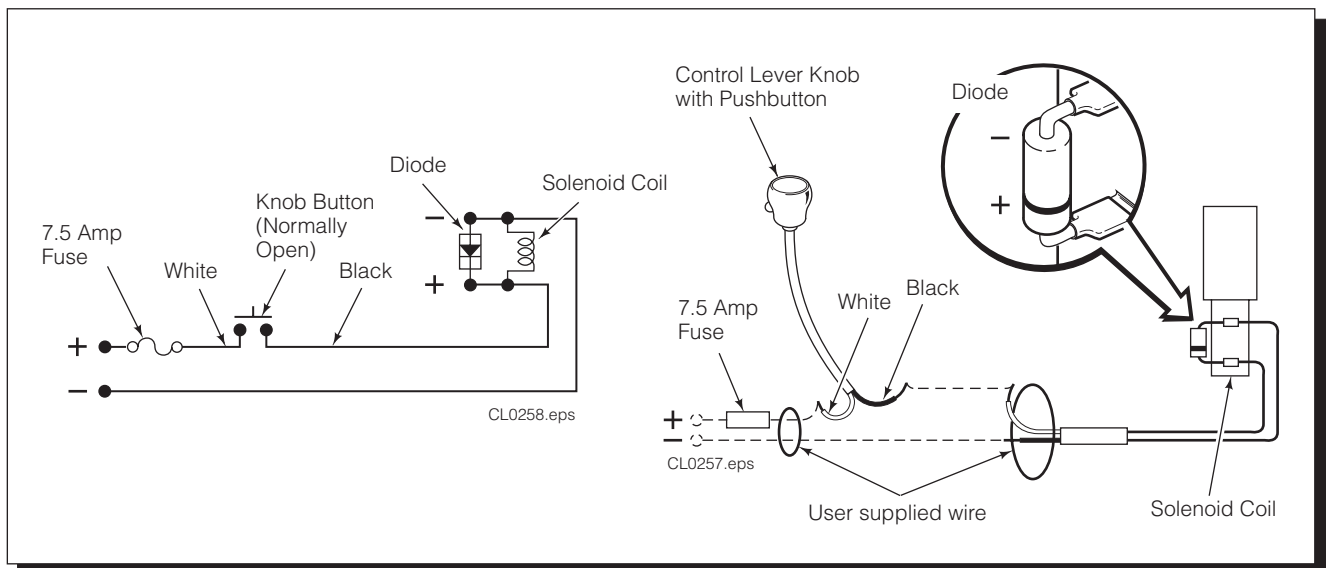


NOTE: No sideshift cartridges contained in valve used with external sideshifter.

3.5 Electrical Circuit (Solenoid-equipped Attachments)

Use the electrical schematic and diagram 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 4.7.
 - If there is no ohmmeter reading, the coil is defective and should be replaced. Refer to Section 4.7.



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 Disconnect the lower hooks:

Quick-Change Hooks – Remove the locking pins and drop the hooks into the unlocked position. Replace the pins in the lower holes. For reassembly, remove the pins and slide the hooks up to the locked position. Replace the pins in the top holes.

Bolt-On Hooks – Remove the capscrews and mounting hooks. For reassembly, tap the hooks tight against the carriage bar and tighten the capscrews to:

Standard Attachments:

CL II – 165 Nm

CL III – 225 Nm

CL IV – 435 Nm

Attachments with External Sideshift:

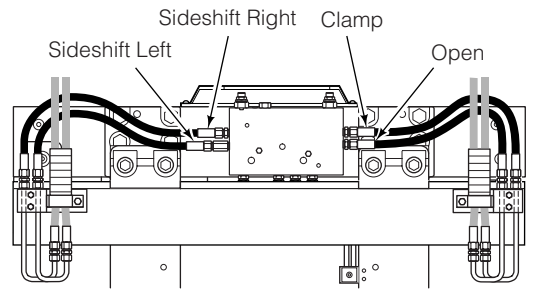
CL II, CL III – 165 Nm

CL IV – 435 Nm

4 Lower the attachment onto a pallet. Tilt the mast forward and lower the carriage to disengage the upper hooks.

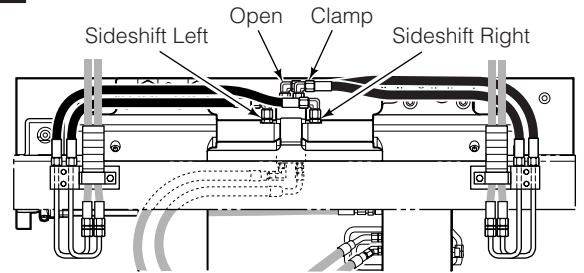
5 For attachment installation, reverse the above procedures with the following exceptions:

- For complete installation procedure, refer to Installation Instructions 6033701.
- **Attachments with External Sideshift** – Make sure upper bearings and anchor plate are properly installed and secured before mounting attachment on truck. Refer to Sections 4.5-2 and 4.6-2.



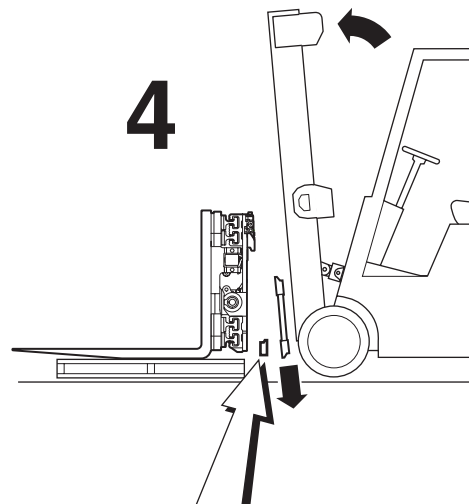
CL3478.eps

2 INTERNAL SIDESHIFTING ATTACHMENTS



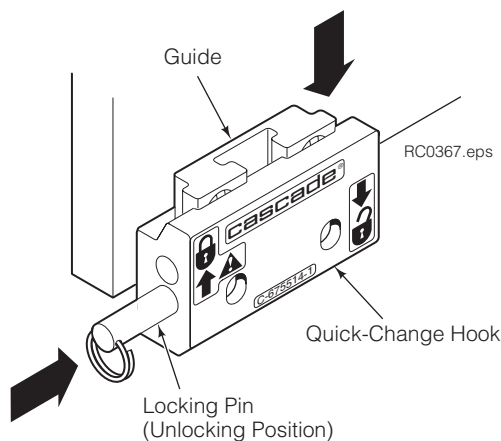
CL3477.eps

EXTERNAL SIDESHIFTING ATTACHMENTS



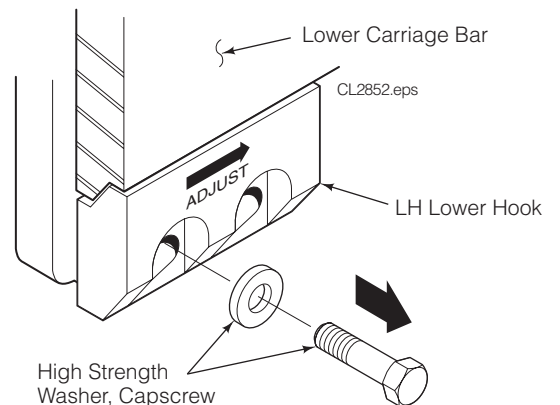
3

QUICK-CHANGE LOWER HOOKS



RC0367.eps

BOLT-ON LOWER HOOKS



CL2852.eps

CL2705.eps

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 contact pads 13 mm above the floor.
- 2 Remove the cylinder rod anchor bars on the arm to be removed. Slowly power the cylinder rod open to expose the rod end. For reassembly, tighten the anchor bar capscrews to the following torque value:

Standard Attachments:

- 20G – 63 Nm
- 28G, 36G – 110 Nm
- 44G-77G – 275 Nm

Attachments with External Sideshift:

- 20G – 63 Nm
- 28G, 36G – 90 Nm
- 44G-77G – 225 Nm

- 3 Slide the rod end toward the cylinder to remove the split-ring keepers. Slide the rod end off the cylinder rod. Inspect rod end and keepers for wear.
- 4 Fully retract the cylinder rods.

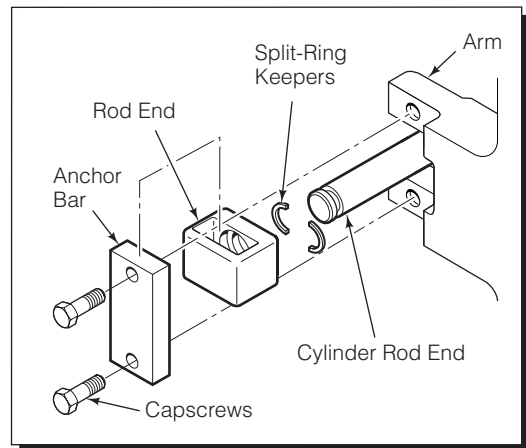
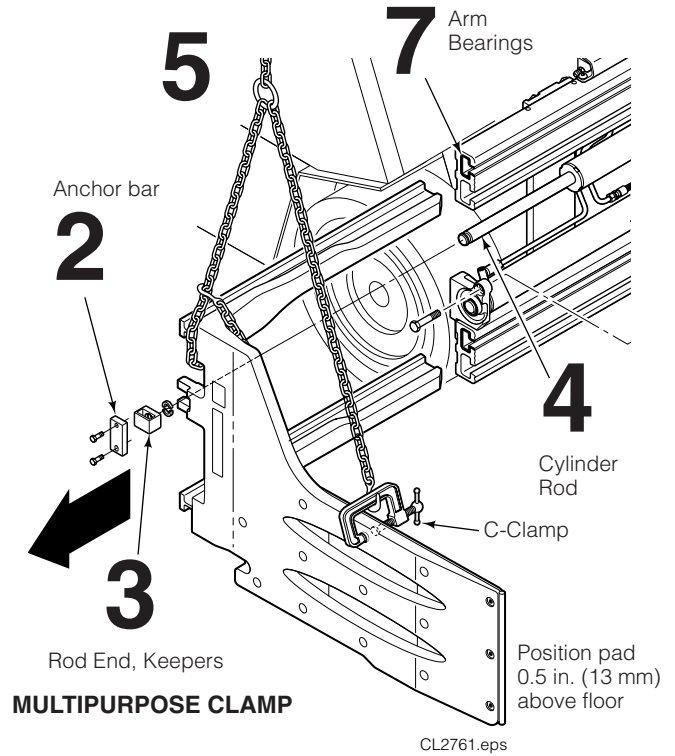


WARNING: Verify that the overhead hoist and chains or straps are rated for the weight of the attachment. Refer to nameplate for attachment weight.

- 5 Attach an overhead hoist to the arm assembly. Position the chain clear of the arm bearing surfaces.

CAUTION: Use a second chain and eyebolt or C-clamp on the contact pads to stabilize the arms.

- 6 Slide the arm assembly out of the frame. Do not damage the bearings when removing the arm.
- 7 For reassembly, reverse the above procedures with the following exceptions:
 - Inspect the upper and lower bearings for wear. Bearing thickness should not be less than 1.5 mm on any part of the bearing. Install new bearings as a complete set as required.
 - Inspect the arm bar bearing area and chamfered areas for nicks or damage. Break any sharp edges and polish with 400-grit emery paper as necessary.



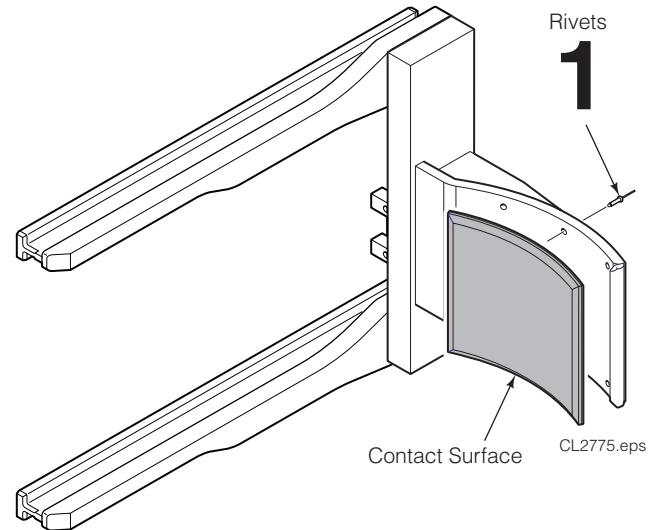
4.2-2 Drum Arm, Multipurpose Arm – Surface Replacement

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

NOTE: To remove the arm base from the arm bars, refer to Section 4.2-3 for specific procedures.

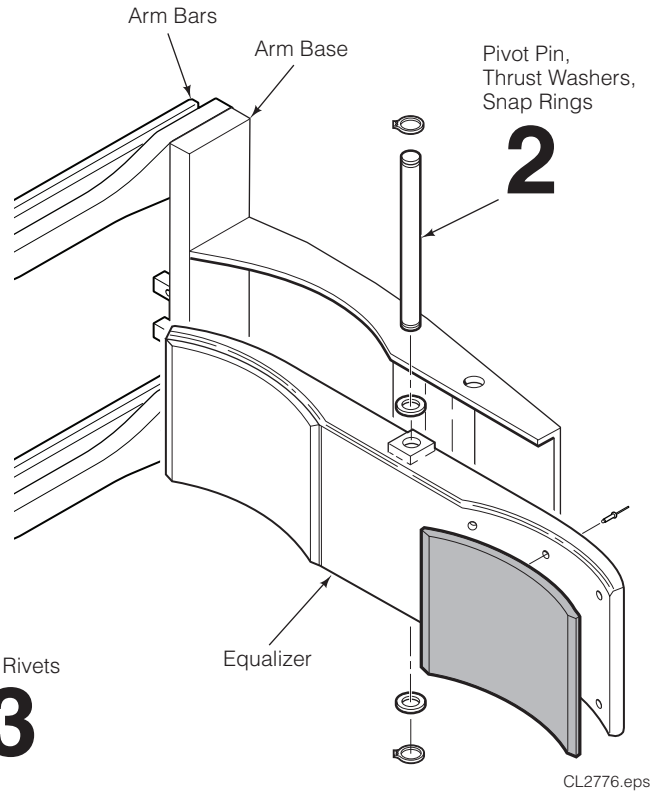
Single Drum Arms

- 1 Drill out the rivets using a 5 mm drill bit. Drill from the back side (outside) of the arm. Align the new contact pad surface to the arm. Drill new holes in the contact pad by drilling through the arm holes. Rivet the contact surface to the arm.



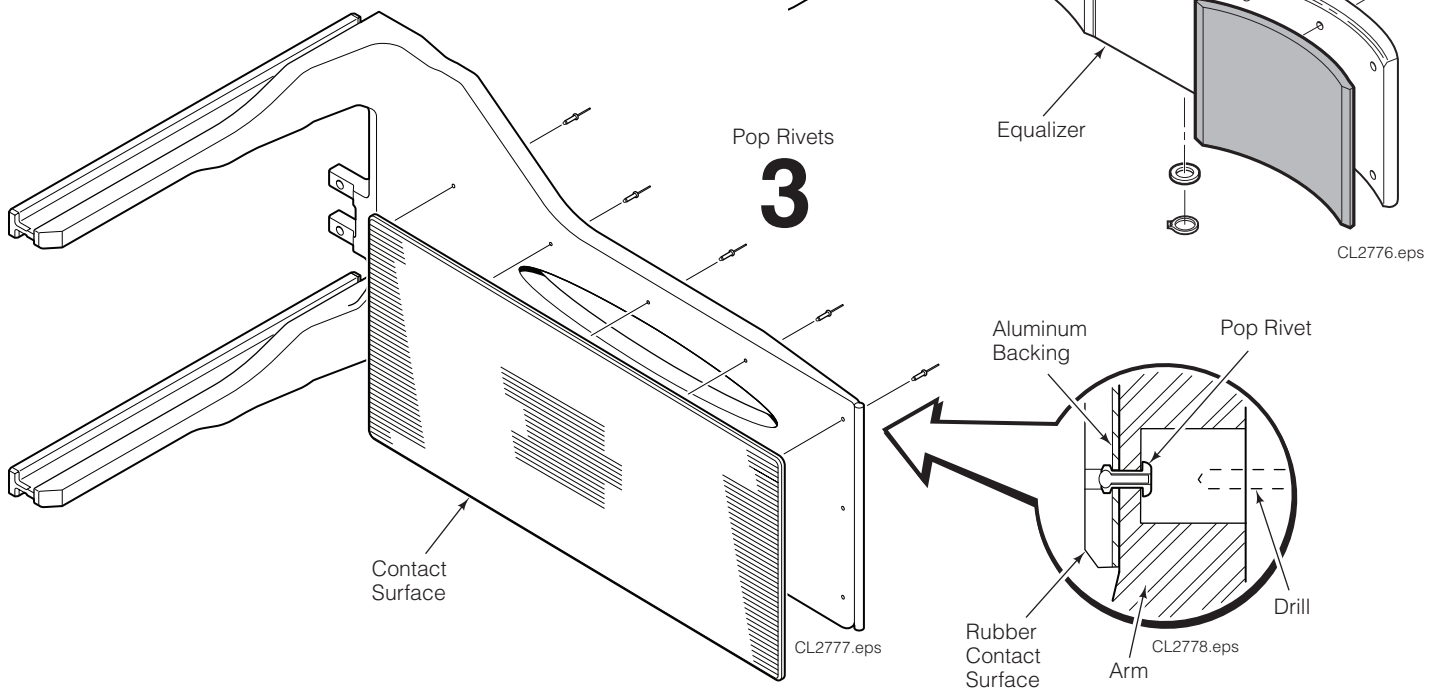
Multiple Drum Arms

- 2 Remove the snap ring, pivot pin, thrust washers and equalizer to provide access to the rivets. Replace the contact surfaces as in Step 1. Reinstall the equalizer.



Multipurpose Arms

- 3 Drill out the rivets using a 5 mm drill bit. Drill from the back side (outside) of the arm. Align the new contact pad surface to the arm. Drill new holes in the contact pad by drilling through the arm holes. Rivet the contact surface to the arm.



4.2-3 Custom Arm Bases

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 – 420 mPa min.
- YIELD STRENGTH – 300 mPa min.
- CARBON CONTENT – 23% max.

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

1 Fasten the arm bases to the arm bars. Tighten the capscrews to the torque values indicated below with a drive extension tool*, required to clear the arm bar:

20G, 28G – 275 Nm
36G, 44G, 52G – 534 Nm
64G, 70G, 77G – 584 Nm

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.

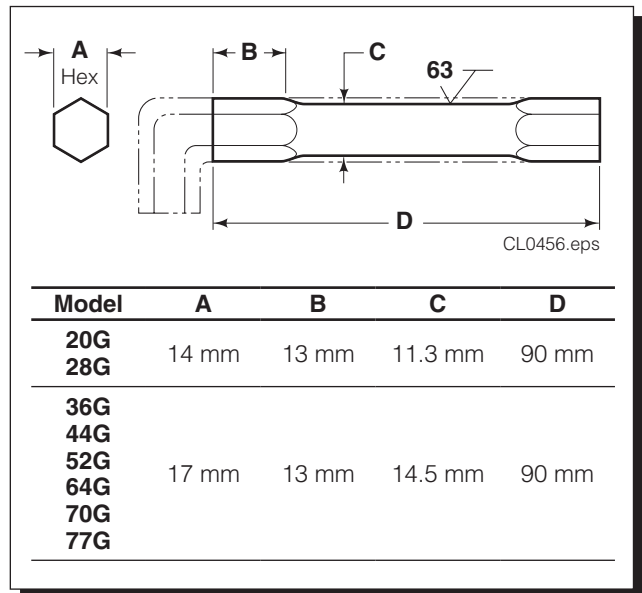
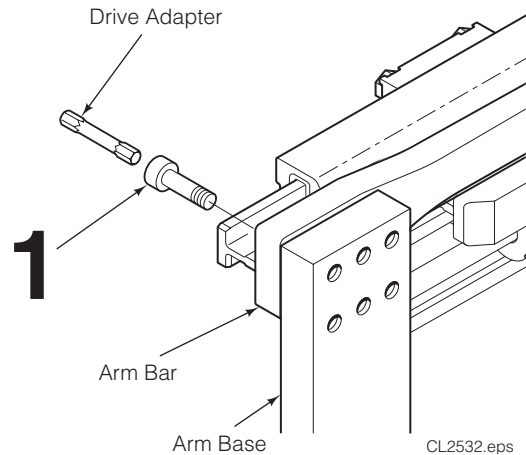
2 Place the rod ends on the cylinder rods. Install the split ring keepers.

3 Install the anchor bar through the cylinder rod end and fasten to the arm anchor. Tighten the anchor bar capscrews as follows:

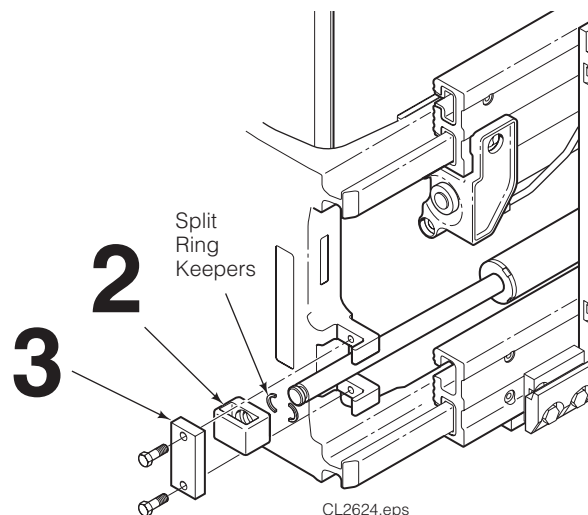
Standard Attachments:
20G – 63 Nm
28G, 36G – 110 Nm
44G-77G – 275 Nm

Attachments with External Sideshift:
20G – 63 Nm
28G, 36G – 90 Nm
44G-77G – 225 Nm

4 Lubricate the bearing surface of the arm bars with a thin film of dry lube graphite, teflon or silicone.



* Cascade Drive Extension Tool Part Numbers:
 6040284 (14 mm hex), 6040285 (17 mm hex).

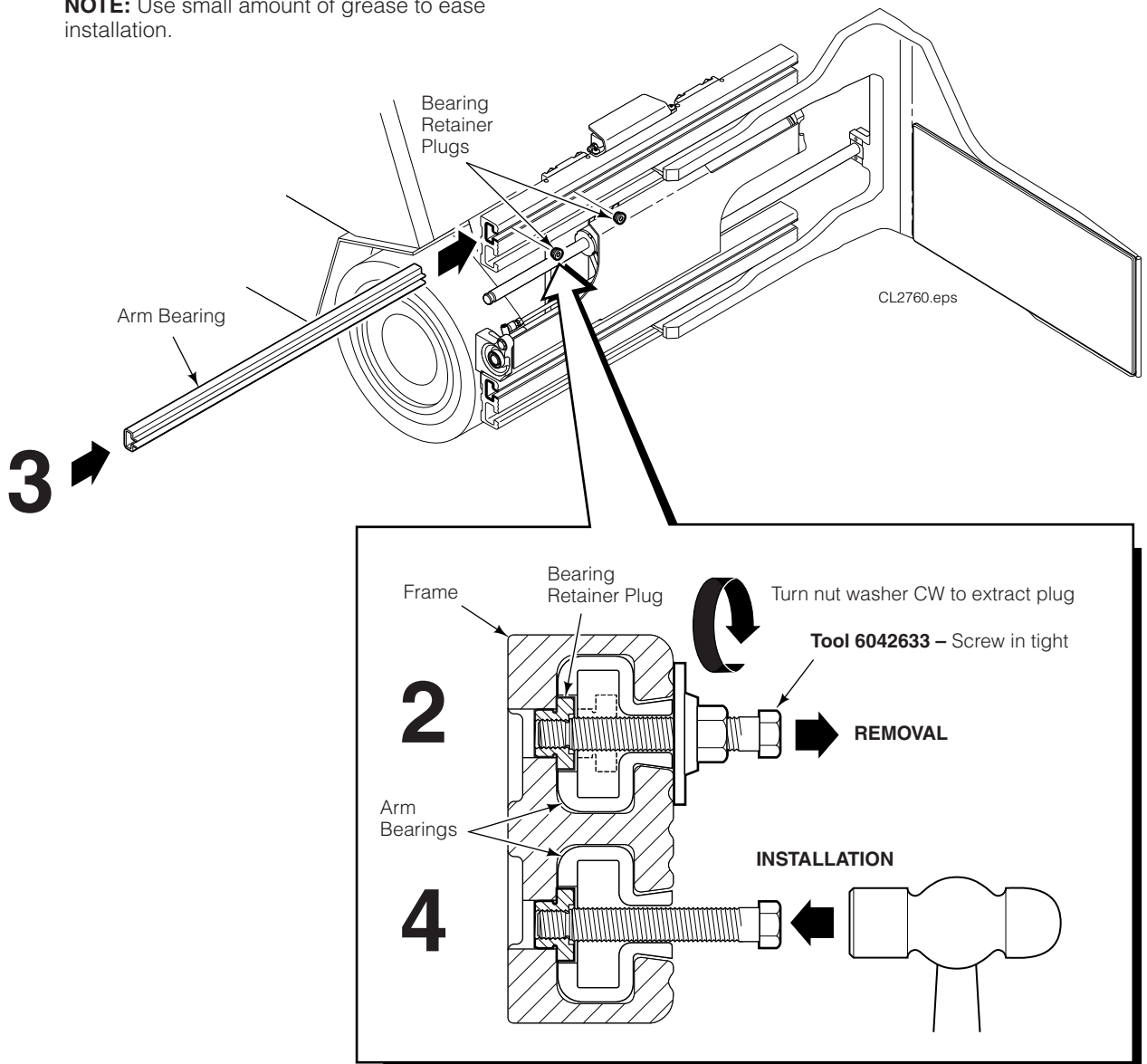


4.2-4 Arm Bearings – Removal and Installation

NOTE: Replace all arm bearings if wear exceeds 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 Remove the bearing retainer plugs using Cascade Tool 6042633, as shown.
NOTE: M10 x1.25 x 80L capscrew and 40 mm OD large washer may also be used.
- 3 Drive a new bearing into the frame, displacing the old bearing.
- 4 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.

NOTE: Use small amount of grease to ease installation.



4.3 Valve

4.3-1 Valve Removal and Installation

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

- 1 Rear Mounted** – Raise the attachment 60 cm so the valve is accessible from behind. Do not reach or work through the mast.
- Front Mounted** – Position the arms fully open so that the valve is accessible from the front.
- 2** Remove valve guards or bumpers (if equipped).



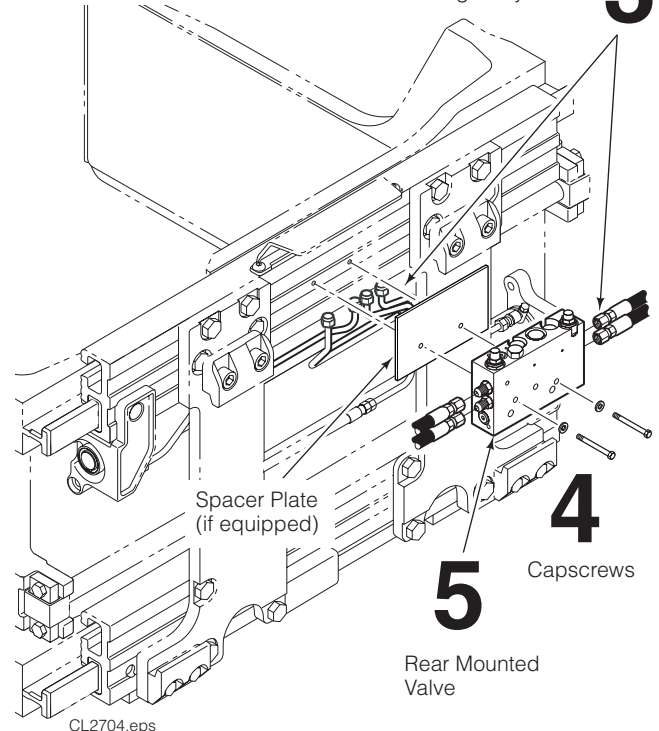
WARNING: Before removing hydraulic components, relieve pressure in the hydraulic system. Turn the truck off and move the auxiliary control valves several times in both directions.

- 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 and spacer plate (if equipped). For reassembly, tighten the capscrews to the following:
 - Rear Mounted Valve** – 8 Nm
 - Front Mounted Valve** – 38 Nm
- 5** For reassembly, reverse the above procedures with the following exceptions:
 - Service the valve as described in Section 4.3-3.
 - Make sure all flareless hydraulic connections are assembled using new seals.
 - If required, adjust relief cartridges as described in Section 4.3-4.

REAR MOUNTED VALVE

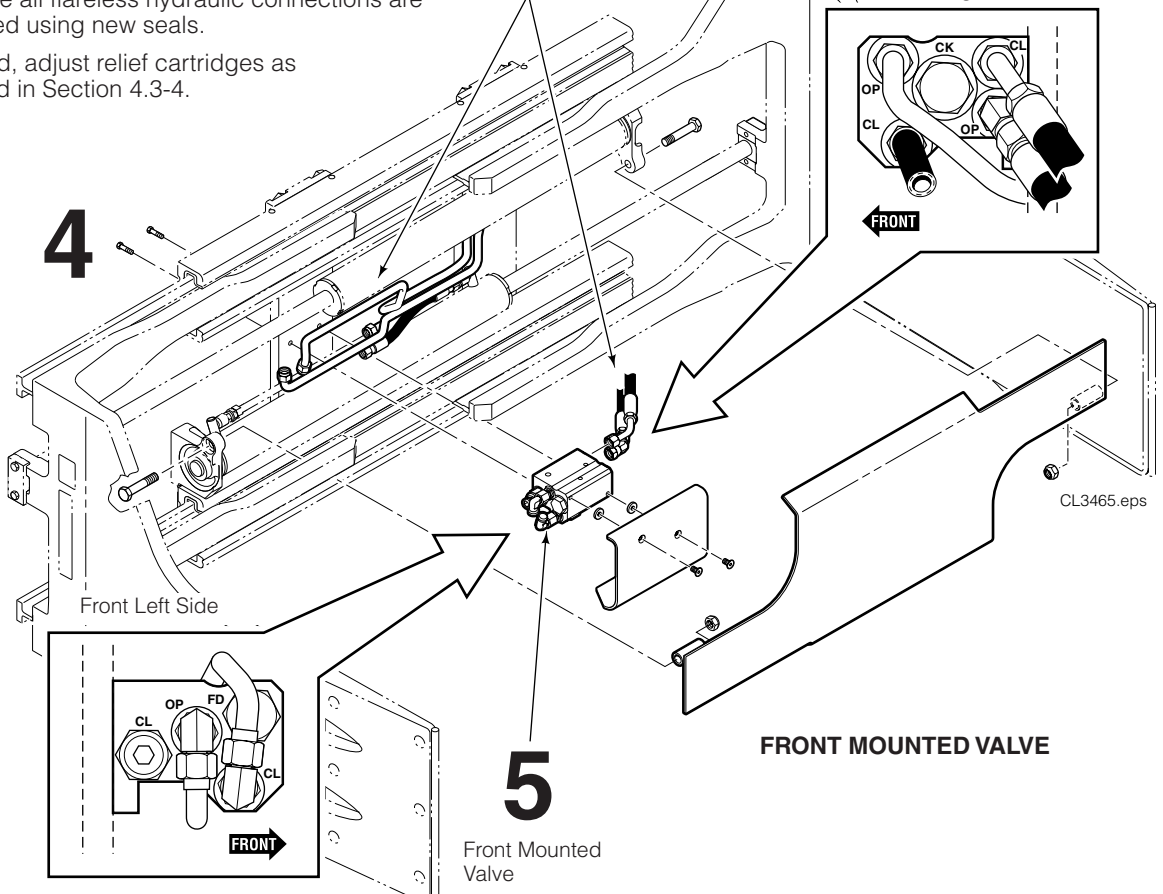
Supply Hoses,
Tubing to Cylinders

3



3 Supply Hoses,
Tubing to Cylinders

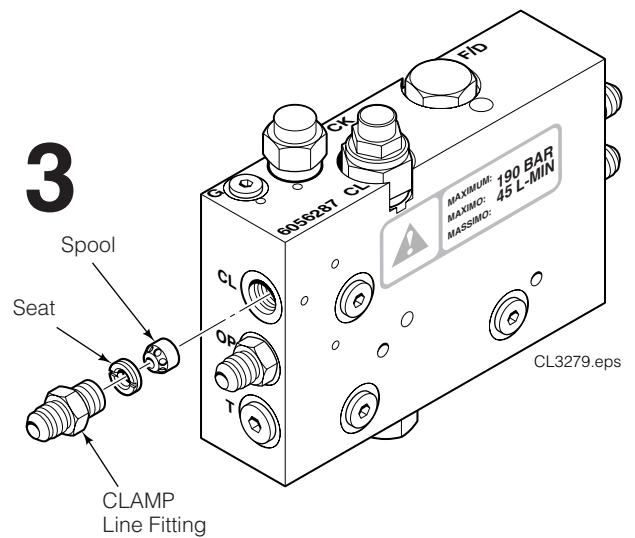
Front Right Side



4.3-2 Eliminating Regenerative Circuit (Fast Arm Opening)

The regenerative circuit can be deactivated to reduce the arm opening speed. This procedure can be performed with the attachment mounted on the truck.

- 1** Raise the attachment 60 cm so that the rear mounted valve is accessible from behind. Do not reach or work through the mast.
- 2** Disconnect the hydraulic hose from the CLAMP (CL) supply port and remove the fitting.
- 3** Remove the check valve seat and spool from the port. Use a large blade screwdriver to unscrew the seat, and a magnetic tool to extract the spool.
- 4** Reinstall the CLAMP (CL) fitting. The Valve will now function without regeneration in the hydraulic circuit and the arms will open and close at the same speed.



4.3-3 Valve Service

G-Series Clamps use various valves depending on high or low flow, regeneration, LH or RH supply porting, and external sideshifting. Refer to the attachment nameplate and pressure/flow decal on the valve or top of the attachment.

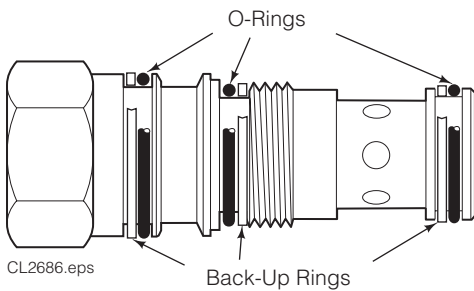
IMPORTANT: Service the valve in a clean work area. Service procedures are the same for all valves:

- 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.
- 4 Remove the O-rings and back-up rings from the cartridges.
- 5 Clean all parts with cleaning solvent.

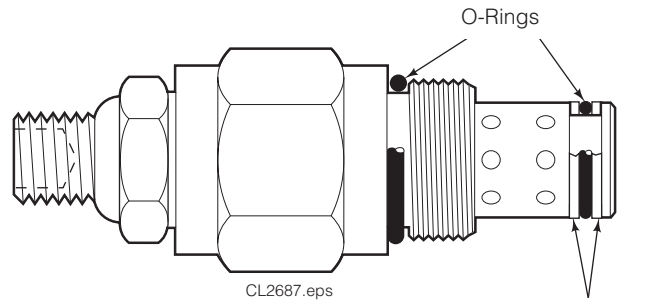
6 For reassembly, reverse the above procedures with the following exceptions:

- 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.
- Tighten cartridges to the following torque values:
PO or PC Check Valve – 50 Nm
Flow Divider/Combiner – 34 Nm
Adjustable Relief – 40 Nm

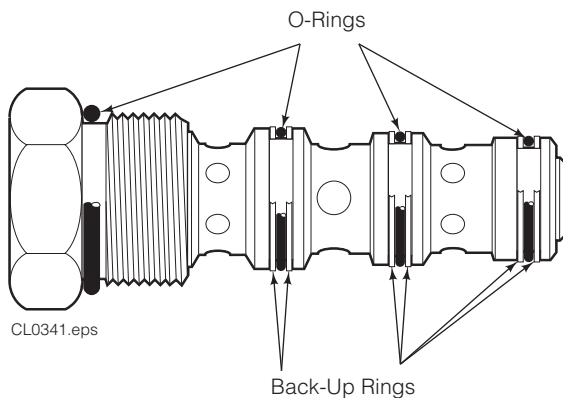
CAUTION: Make sure cartridges are installed in correct port location in valve body. Refer to the illustrations on following pages and stampings on valve body.



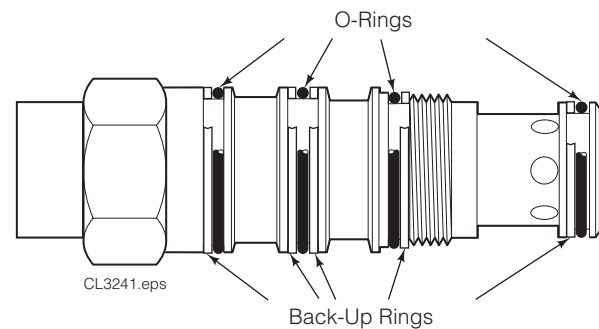
A PC Check Valve Cartridge



B, D Adjustable Relief Cartridge, CLAMP, SIDESHIFT, FORK POSITION



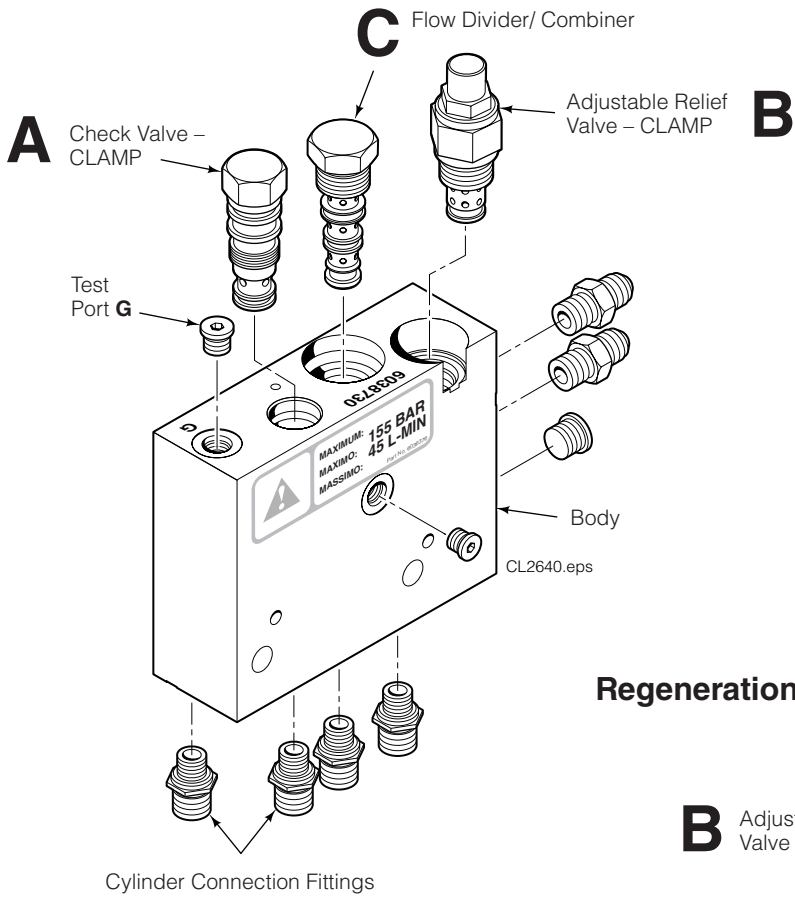
C Flow Divider / Combiner Cartridge
(Dual PO Check Valve Cartridge similar)



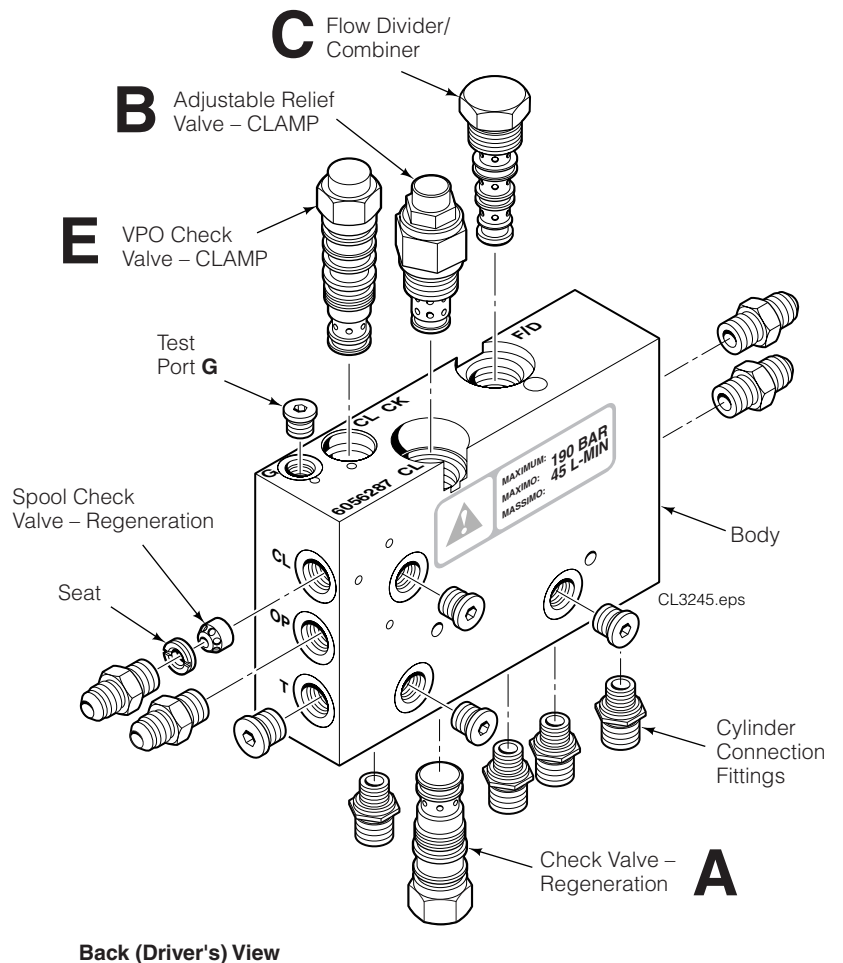
C VPO Check Cartridge, CLAMP Regeneration Circuit

4.3-3 Valve Service (Continued)

Non-Sideshift Valve – RH CLAMP Ports

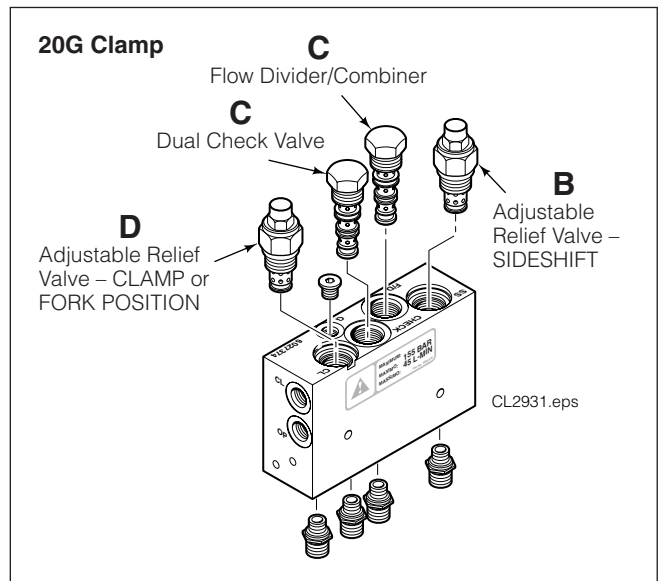
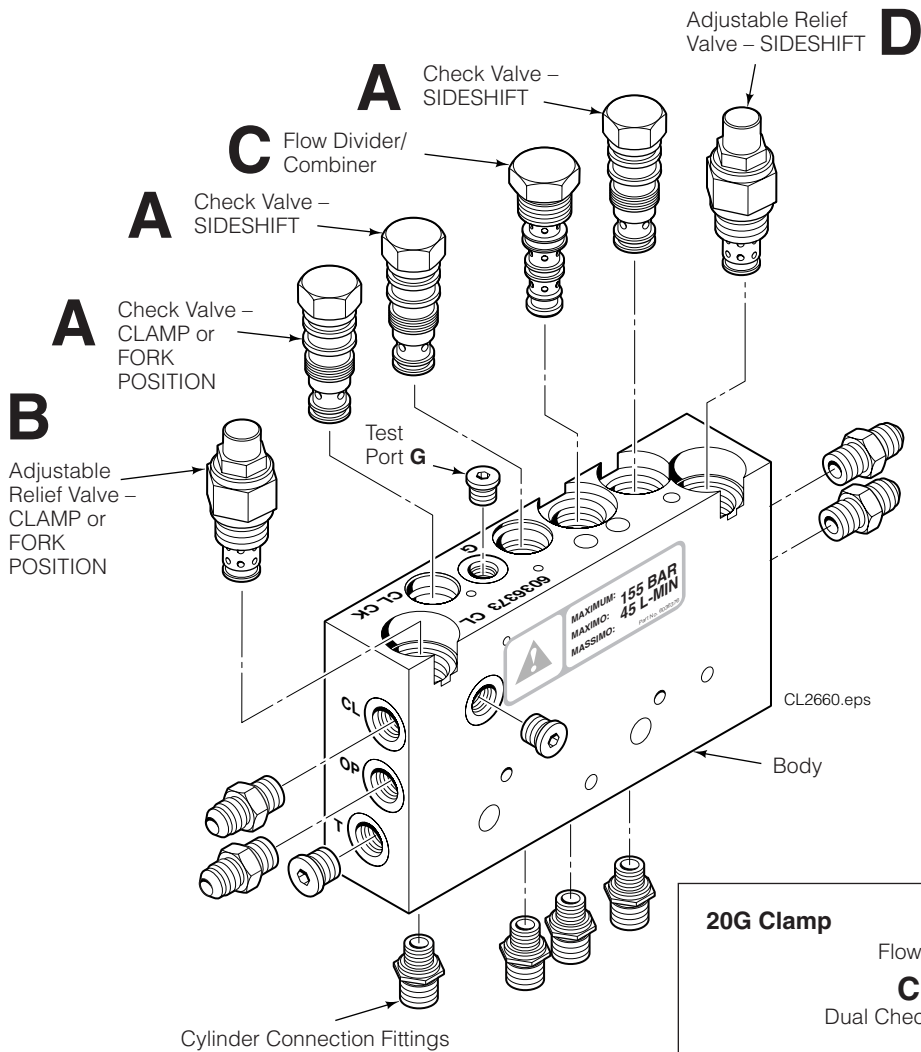


Regeneration Non-Sideshift Valve – LH CLAMP Ports



4.3-3 Valve Service (Continued)

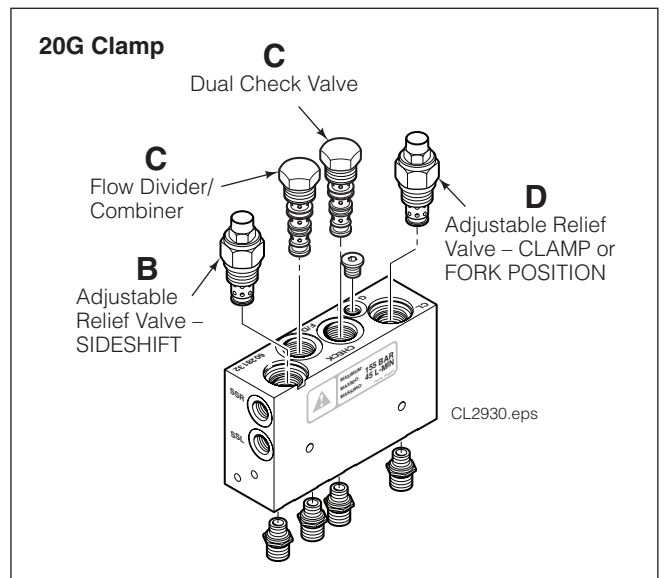
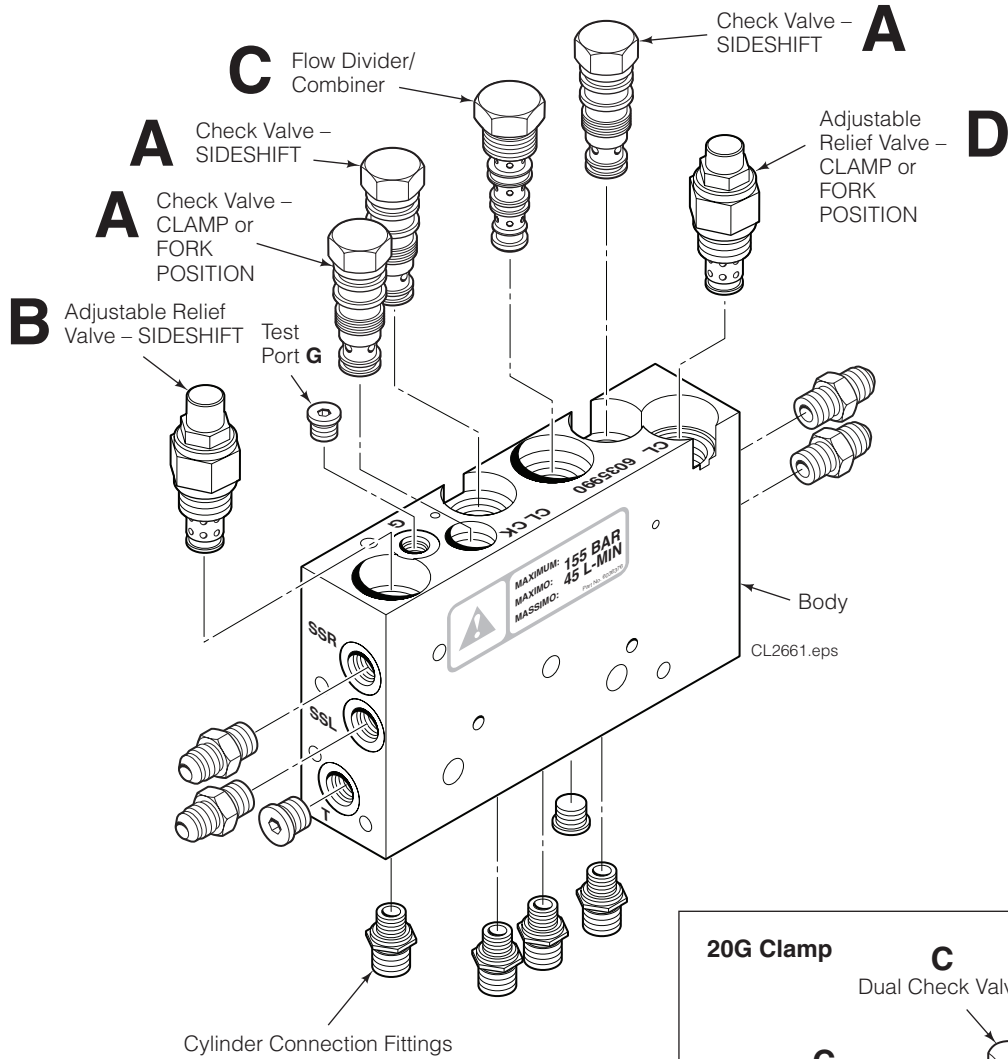
Sideshift Valves – LH CLAMP Ports 28G-64G Attachments



Back (Driver's) View

4.3-3 Valve Service (Continued)

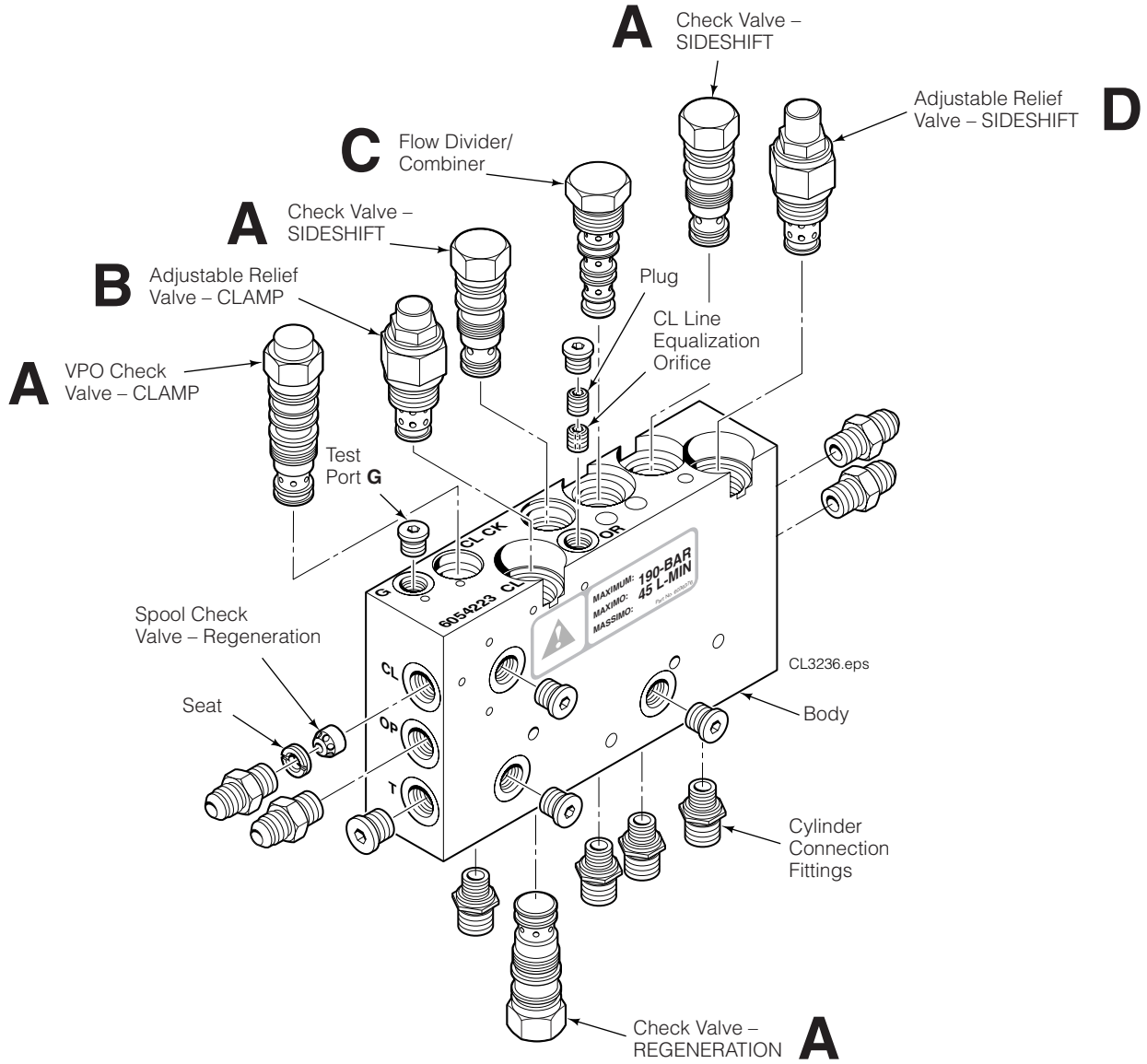
Sideshift Valves – RH CLAMP Ports 28G-64G Attachments



Back (Driver's) View

4.3-3 Valve Service (Continued)

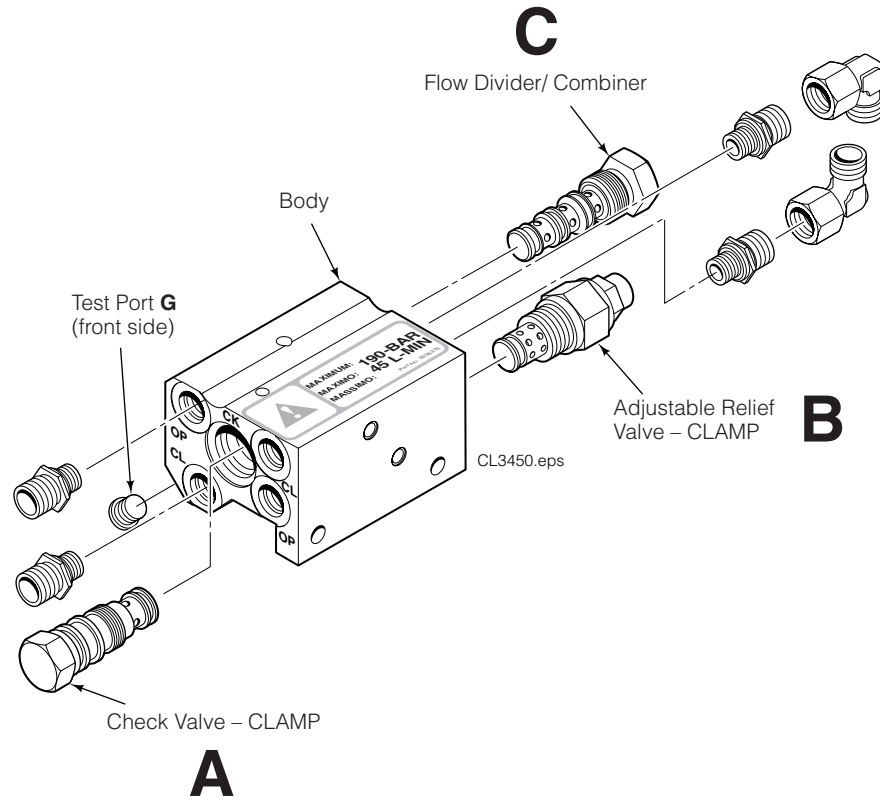
Regeneration Sideshift Valves – LH CLAMP Ports 28G-52G Attachments



Back (Driver's) View

4.3-3 Valve Service (Continued)

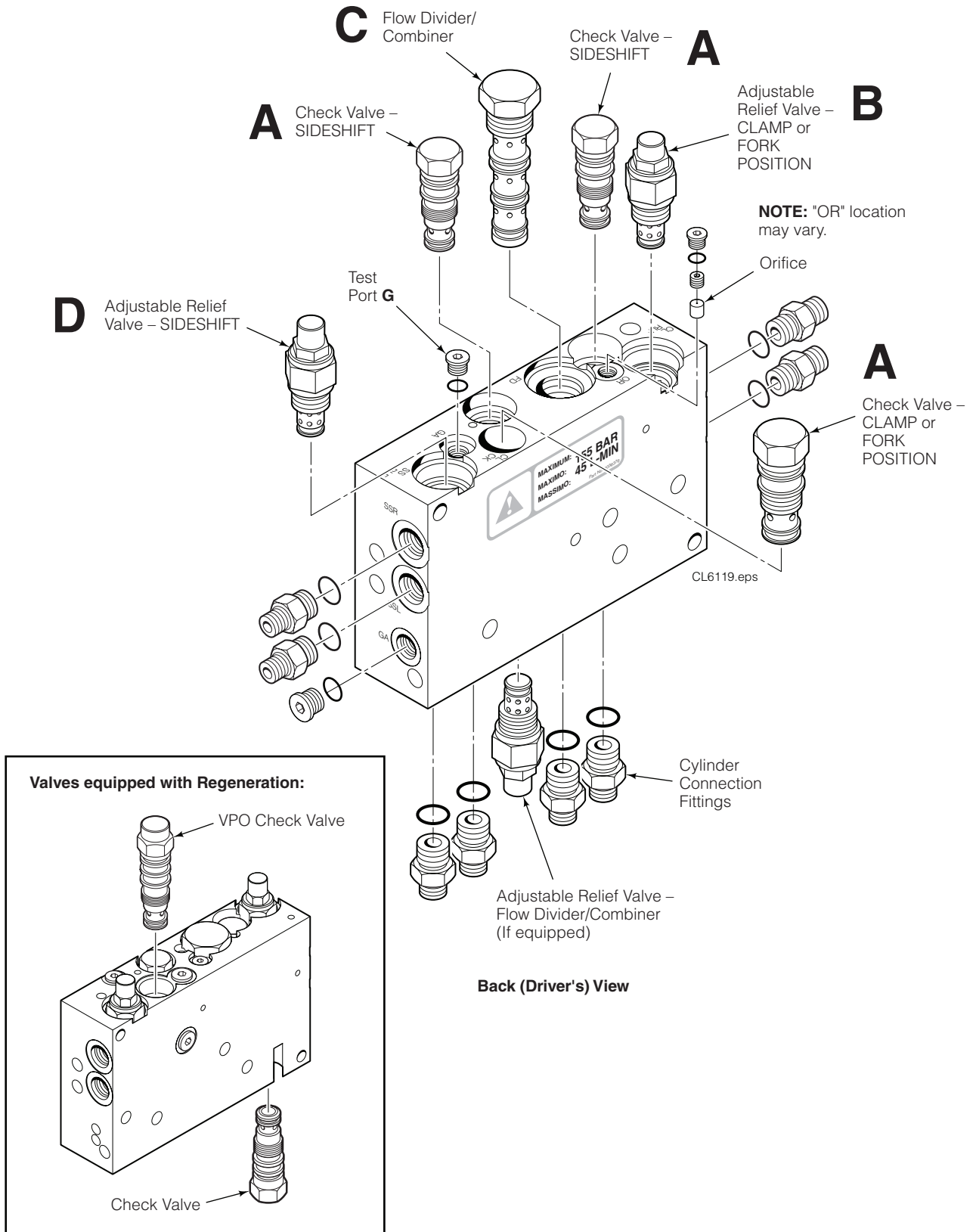
External Sideshifting Clamp Valve 36G-52G Class III Attachments



Back (Driver's) View

4.3-3 Valve Service (Continued)

Sideshift Valve – RH CLAMP Ports 70G Attachments



4.3-4 Relief Adjustments

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

NOTE 1: Attachment used for fork positioning requires no CLAMP relief adjustment. Contact Cascade before making any adjustments.

NOTE 2: External SS function has no relief adjustment.

Clamp Relief Adjustment

A Confirm that TRUCK pressure delivered to the attachment valve is within the range shown on the attachment nameplate.

Low Pressure	High Pressure	Rec. Max.
155 bar	190 bar	
189 bar	250 bar	

B Install a 5000 psi (345 bar) pressure gauge (with a No. 4 O-ring fitting) to the valve TEST port (location varies).

C From fully open, close arms at normal speed to clamp a rigid load or clamp force indicator. Release truck handle and read pressure gauge.

D Adjust the valve CLAMP relief cartridge to show a maximum setting (see valve decal) of:

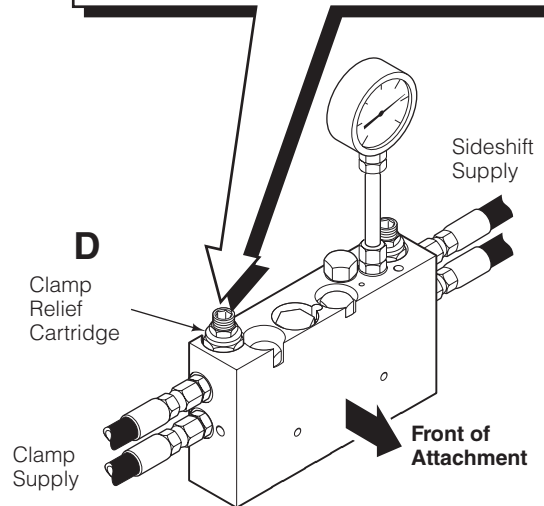
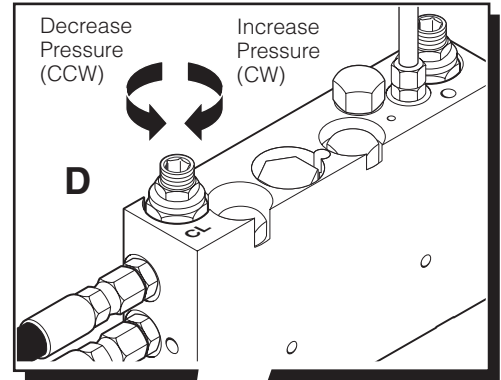
Low Pressure	High Pressure	Max.
155 bar	190 bar	

Turn clockwise (CW) to increase pressure, counterclockwise (CCW) to decrease pressure. Tighten the jam nut.

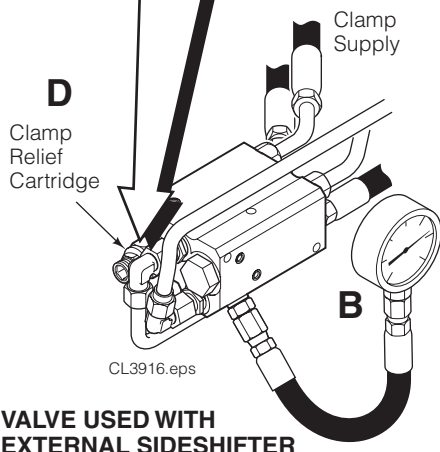
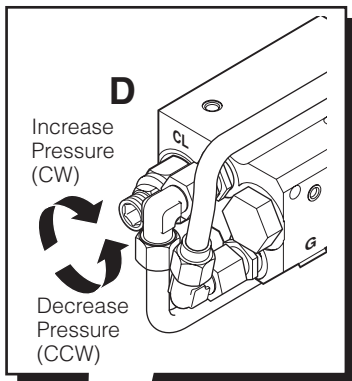
E Repeat steps C and D to confirm setting.



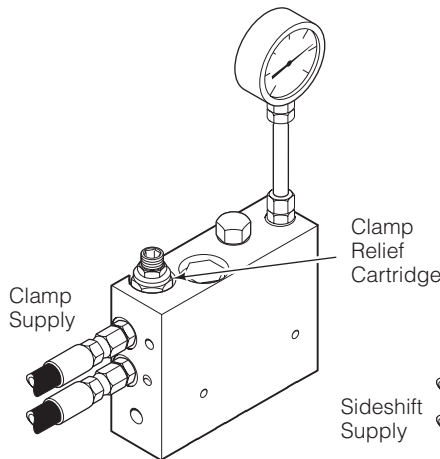
WARNING: Before removing hydraulic lines or components, relieve pressure in the hydraulic system. Turn the truck off and open the truck auxiliary control valves several times in both directions.



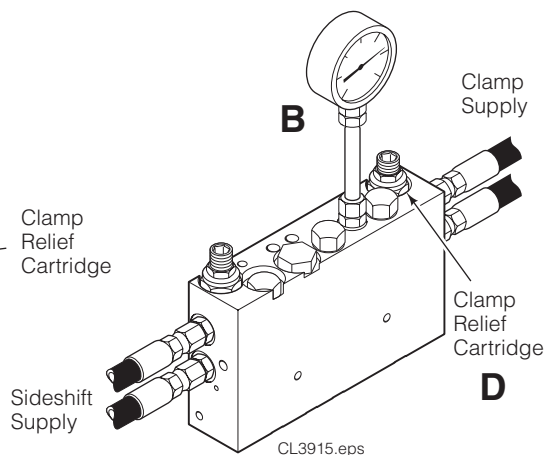
**SIDESHIFTING VALVE
RH CLAMP Ports**



**VALVE USED WITH
EXTERNAL SIDESHIFTER**



**NON-SIDESHIFT VALVE
RH CLAMP Ports**



**SIDESHIFTING VALVE
LH CLAMP Ports**

4.3-4 Relief Adjustments (Continued)

Sideshift Relief Adjustment (internal SS only)

A Clamp a maximum load and sideshift LEFT and RIGHT observing sideshifting movement:

- If attachment will not sideshift or sideshifts slowly, adjust SIDESHIFT relief clockwise (CW) until the attachment sideshifts, then go to Step D.
- If attachment will not sideshift after attempted relief adjustment, proceed to following Step B.

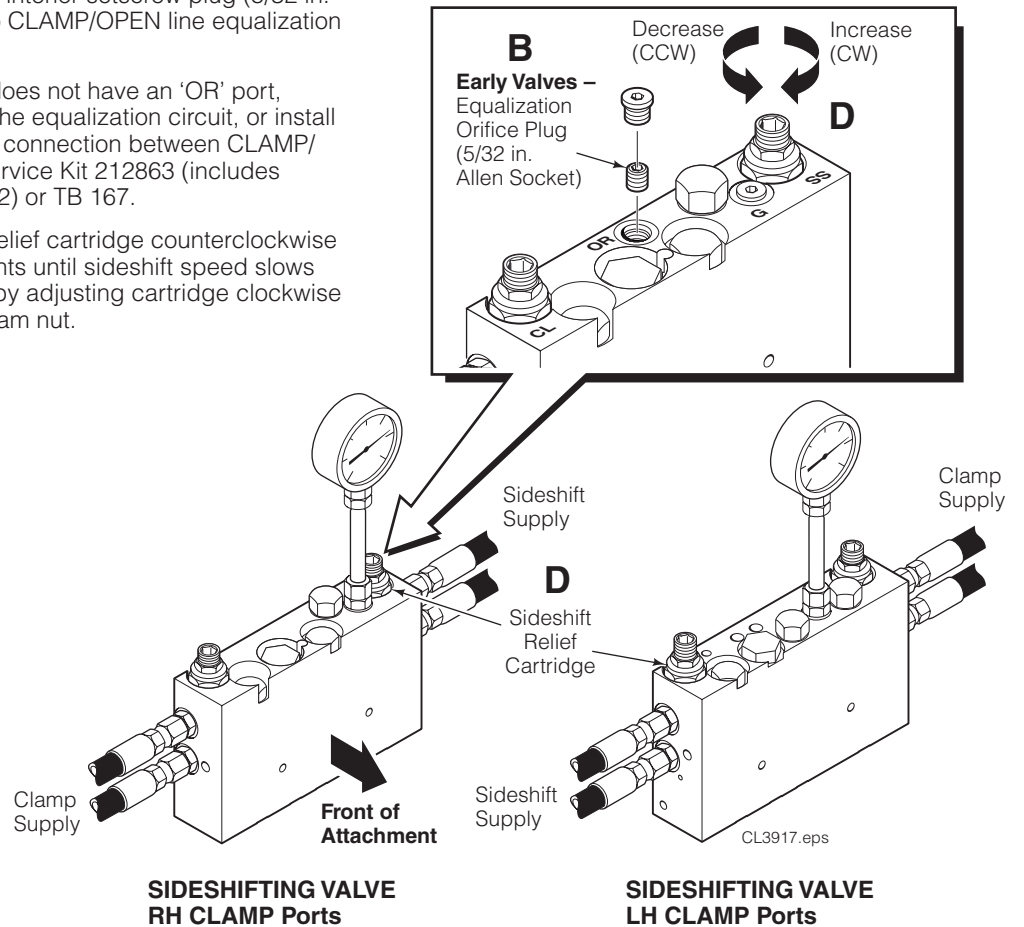
B Early Valves – Locate the cap plug stamped 'OR' on top of valve and remove interior setscrew plug (5/32 in. or 4 mm Allen socket) to CLAMP/OPEN line equalization orifice.

C Early Valves – If valve does not have an 'OR' port, install a new valve with the equalization circuit, or install an external equalization connection between CLAMP/OPEN lines. Refer to Service Kit 212863 (includes Installation Sheet 212862) or TB 167.

D Adjust the **SIDESHIFT** 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.

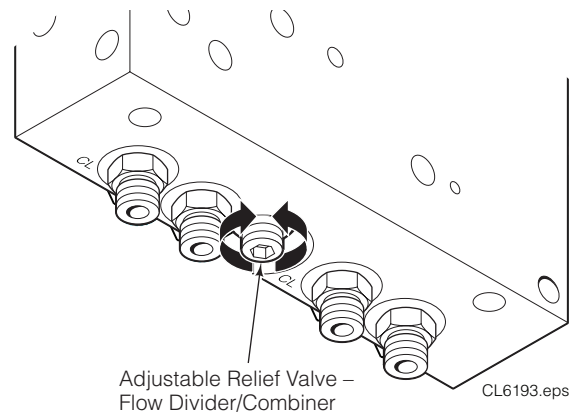


WARNING: Before removing hydraulic lines or components, relieve pressure in the hydraulic system. Turn the truck off and open the truck auxiliary control valves several times in both directions.



Equal Arm Movement, if equipped (70G attachments)

- To improve arm synchronization, turn adjustment relief valve counterclockwise (CCW).
- To improve arm speed during re-synchronization, turn adjustment relief valve clockwise (CW).



4.4 Clamp Cylinder

4.4-1 Cylinder 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.
- 3 Disconnect the cylinder rod end anchor bars.
- 4 Move the cylinder rod outward to expose the split ring keepers. Remove the keepers and slide the rod end off the cylinder rod.



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.

- 5 Loosen the brackets and disconnect the hydraulic lines from the cylinder ports. Keep tubing bends to a minimum. Plug the lines and cap the cylinder ports. Tag lines for reassembly.

- 6 Disconnect the cylinder base end.

Spherical End Collar – Remove the snap ring, slide the collar outward and remove the split ring keepers.

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

20G-52G – 235 Nm
64G-77G – 340 Nm

Disengage the cylinder from its mounting boss and lift away from the frame.

- 7 For reassembly, reverse the above procedures with the following exceptions:

- Install new keepers when reinstalling cylinders.
- Tighten anchor bar capscrews as follows:

Standard Attachments:

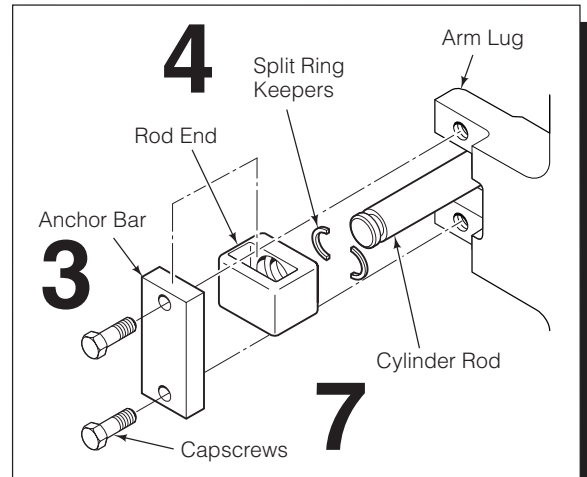
20G – 63 Nm
28G, 36G – 110 Nm
44G-77G – 275 Nm

Attachments with External Sideshift:

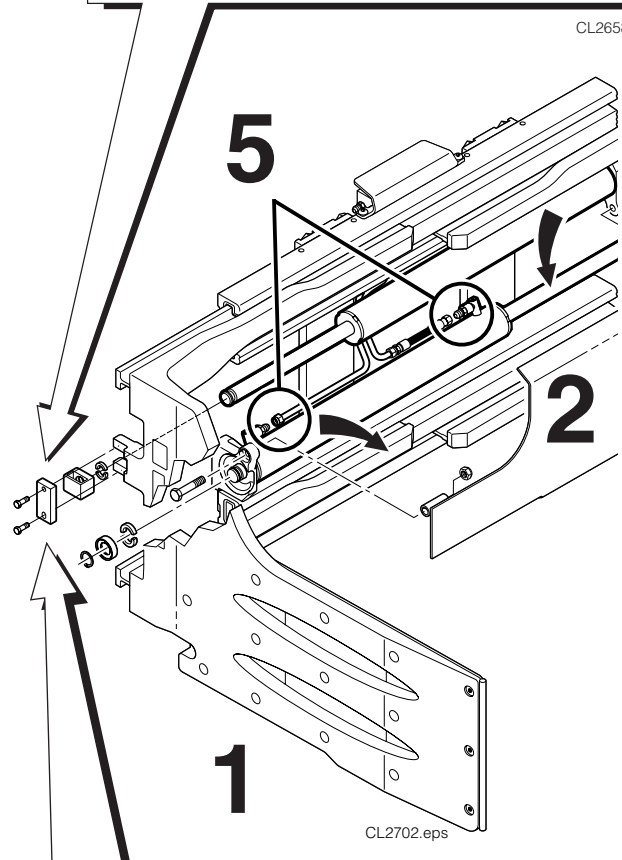
20G – 63 Nm
28G, 36G – 90 Nm
44G-70G – 225 Nm

- Make sure anti-roll pin is installed in cylinder head end.
- Cycle attachment through five complete cycles to remove entrapped air from cylinders.

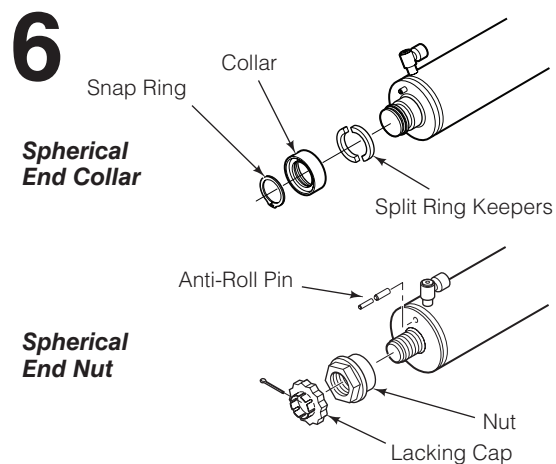
NOTE: The cylinder rod and base end connections are loose by design. This allows for cylinder alignment during clamping.



CL2658.eps



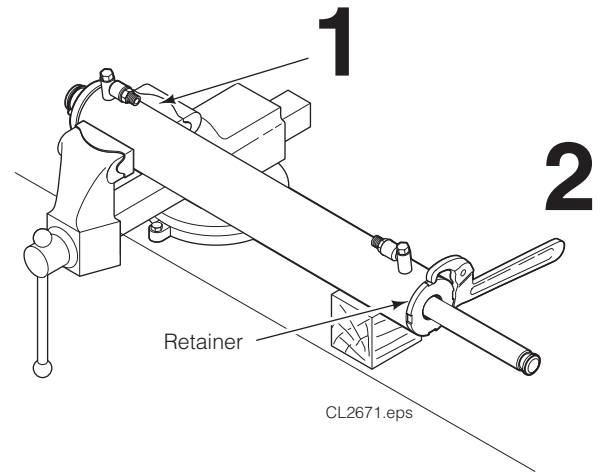
CL2702.eps



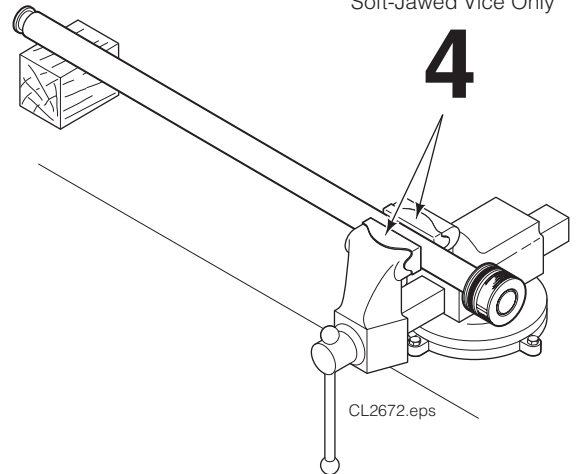
4.4-2 Cylinder Disassembly

- 1 Clamp the cylinder in a soft-jawed vise at the extreme head end only. Do not clamp on the shell.
- 2 Unscrew and remove the retainer using a claw-type spanner wrench as shown. (Cascade Part No. 678598)
- 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.

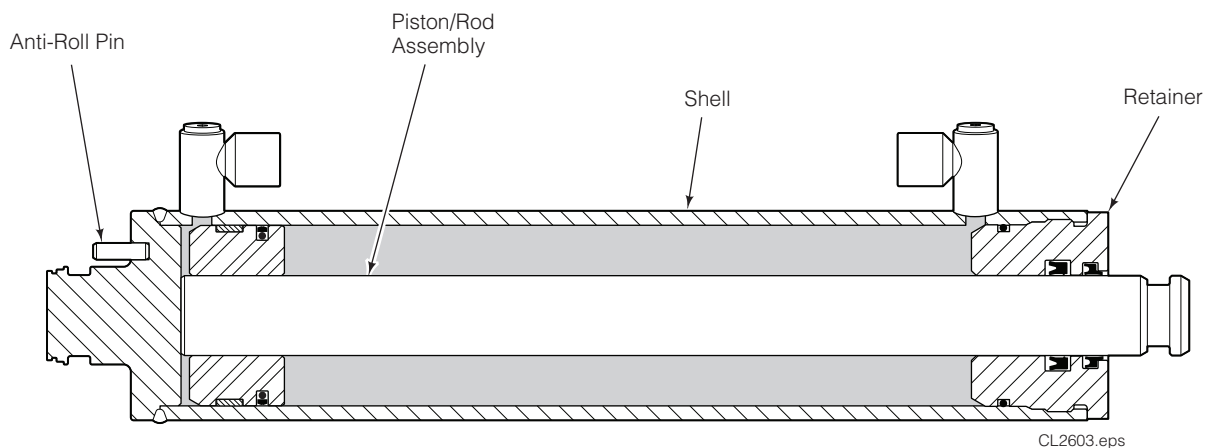


IMPORTANT: Clamp in Soft-Jawed Vice Only



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

NOTE: Seal kits are available. Refer to the attachment's part manual.

- 1 Using 400-grit emery cloth, polish the piston and retainer chamfer angles, and the ID threads within the cylinder shell. Clean all parts thoroughly.
- 2 Lubricate all new seals and O-rings with O-ring lube or petroleum jelly.
- 3 Install a new two-piece seal on the piston. Make sure that the inner O-ring (round or square-section) is installed in the bottom of the groove, and the composite outer ring is installed on top. Install seals from the rod end side of the piston by hooking one side into the groove and carefully working the seal over the piston as shown.
- 4 Install the composite wear ring on the piston.
- 5 Install a new rod seal and wiper seal in the retainer ID, and a new O-ring on the retainer OD as shown.

NOTE: 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.

- 6 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.

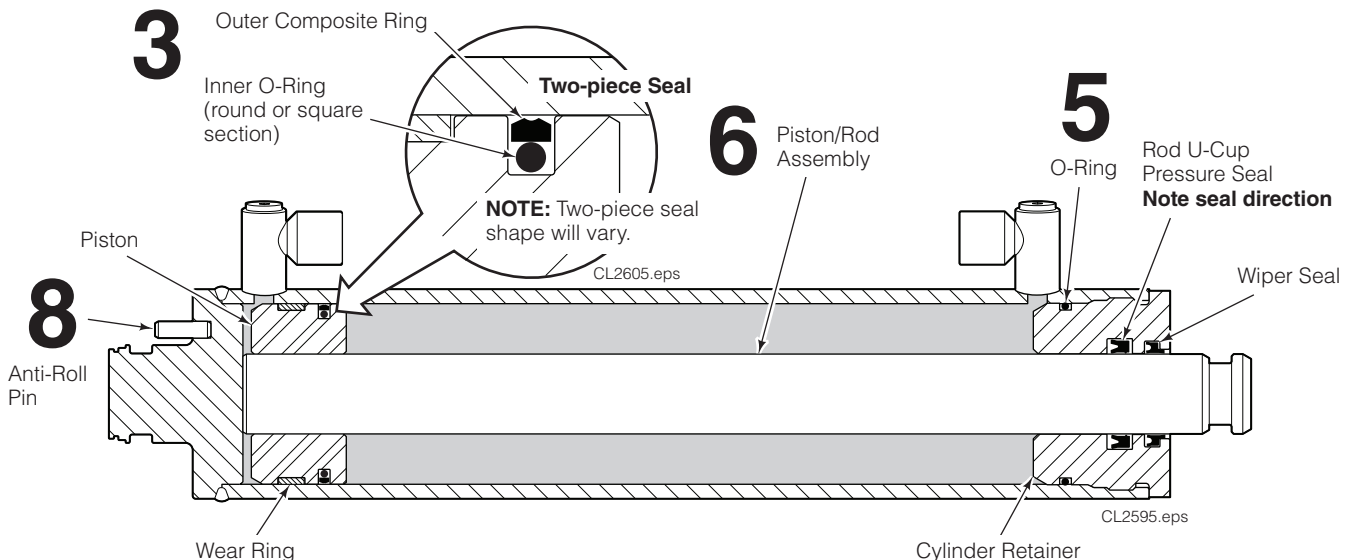
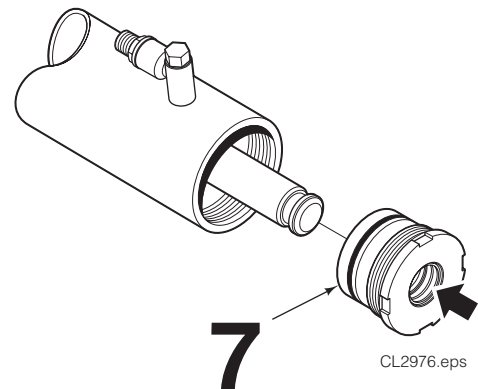
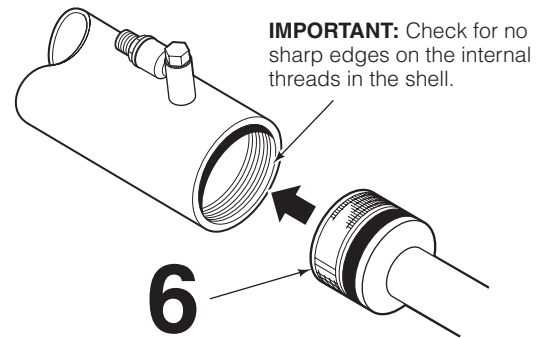
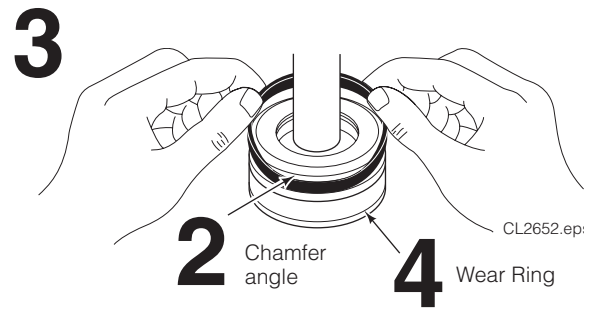
IMPORTANT: Prior to loading the piston into the shell, make sure that no sharp edges exist on the internal threads within the shell.

- 7 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 the following torque value:

- 20G-44G – 270 Nm
- 52G, 65 mm ① – 300 Nm
- 52G-77G, 70 & 75 mm ① – 375 Nm
- 70G-77G, 80 mm ① – 405 Nm

① Cylinder bore diameter

- 8 Make sure anti-roll pin fits tightly in place at cylinder head end. Replace if necessary (pin size: M6 x 20).

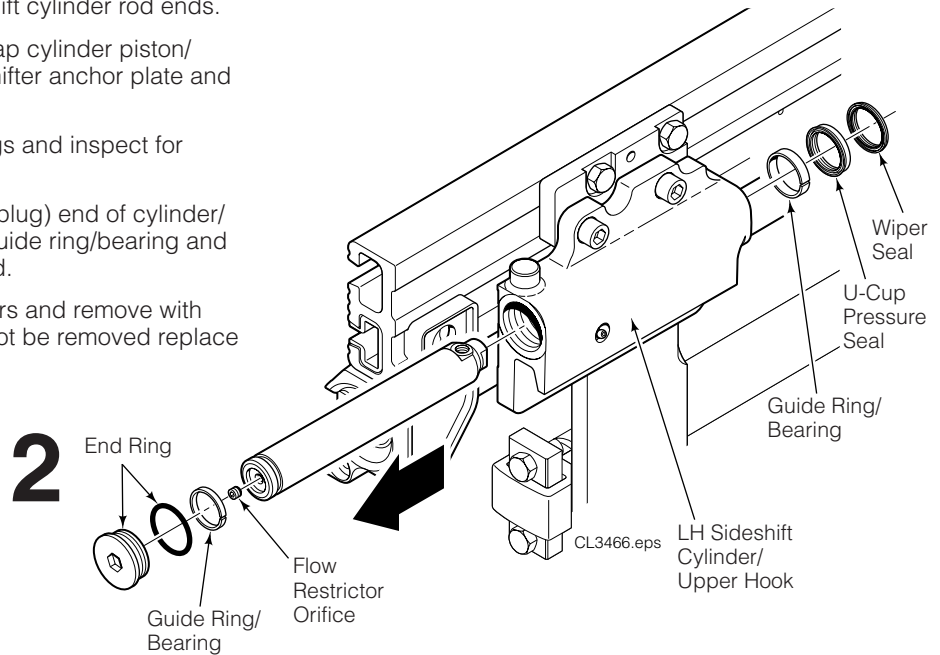


4.5 External Sideshift Cylinder – Servicing on the Attachment

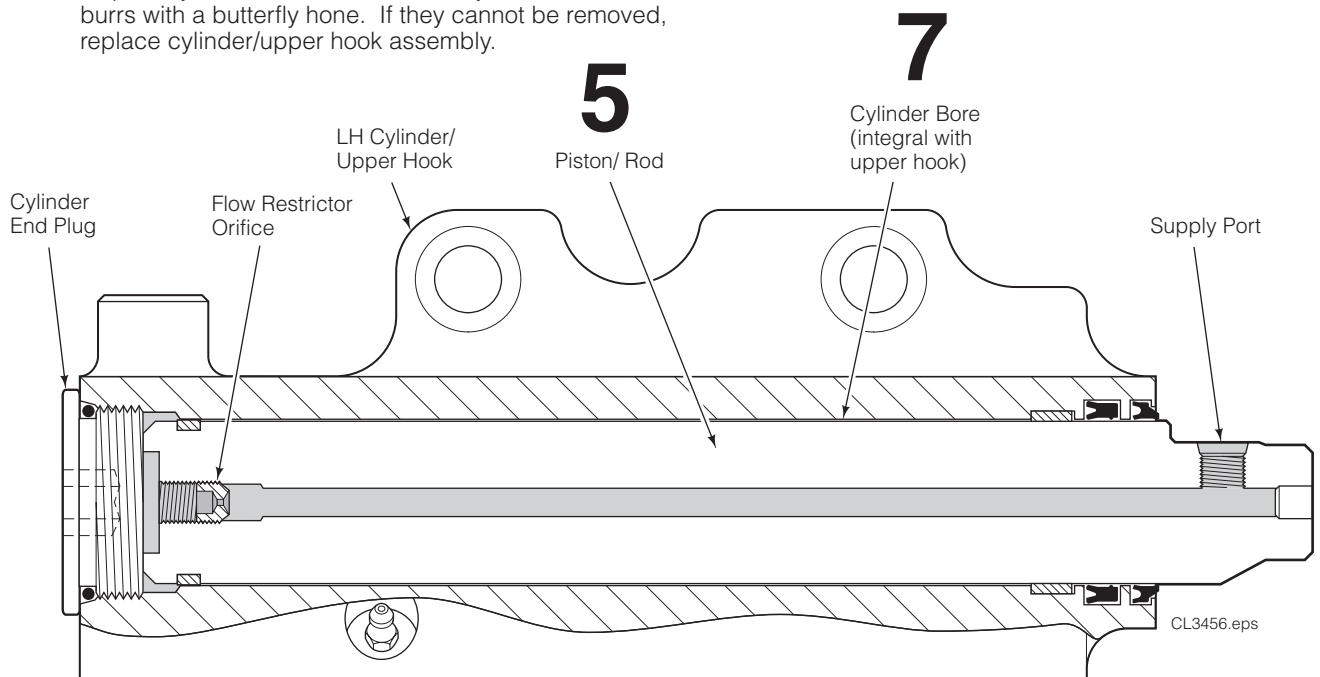
NOTE: Remove attachment from truck to service external sideshift cylinder/upper hook assemblies.

4.5-1 Cylinder Disassembly and Inspection

- 1 Remove attachment as described in Section 4.1.
NOTE: Sideshifter anchor plate and upper bearings are retained in upper hooks by sideshift cylinder rod ends.
- 2 Remove cylinder end plugs and tap cylinder piston/rods outward to disengage sideshifter anchor plate and bearings.
- 3 Remove anchor plate and bearings and inspect for wear as shown on next page.
- 4 Drive piston/rod through outside (plug) end of cylinder/upper hook assembly. Remove guide ring/bearing and orifice from head end of piston/rod.
- 5 Inspect piston/rod for nicks or burrs and remove with 400 grit emery cloth. If they cannot be removed replace part.

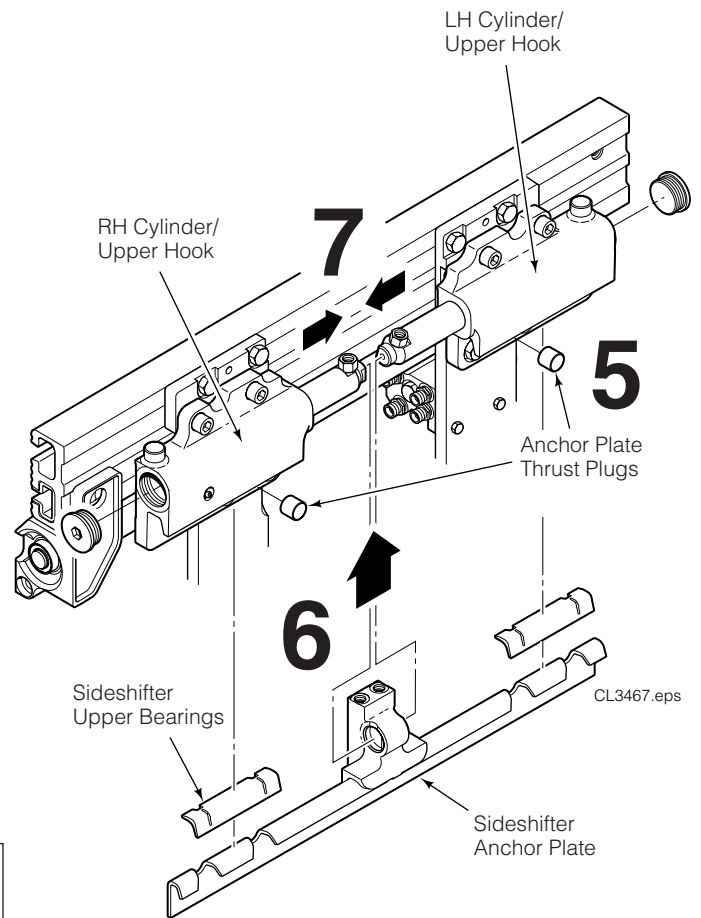


- 6 Use brass seal extraction tools (Cascade Part No. 674424) and remove wiper seal, pressure seal, guide ring/bearing from cylinder bore in upper hook.
- 7 Inspect cylinder bore and remove any minor nicks or burrs with a butterfly hone. If they cannot be removed, replace cylinder/upper hook assembly.

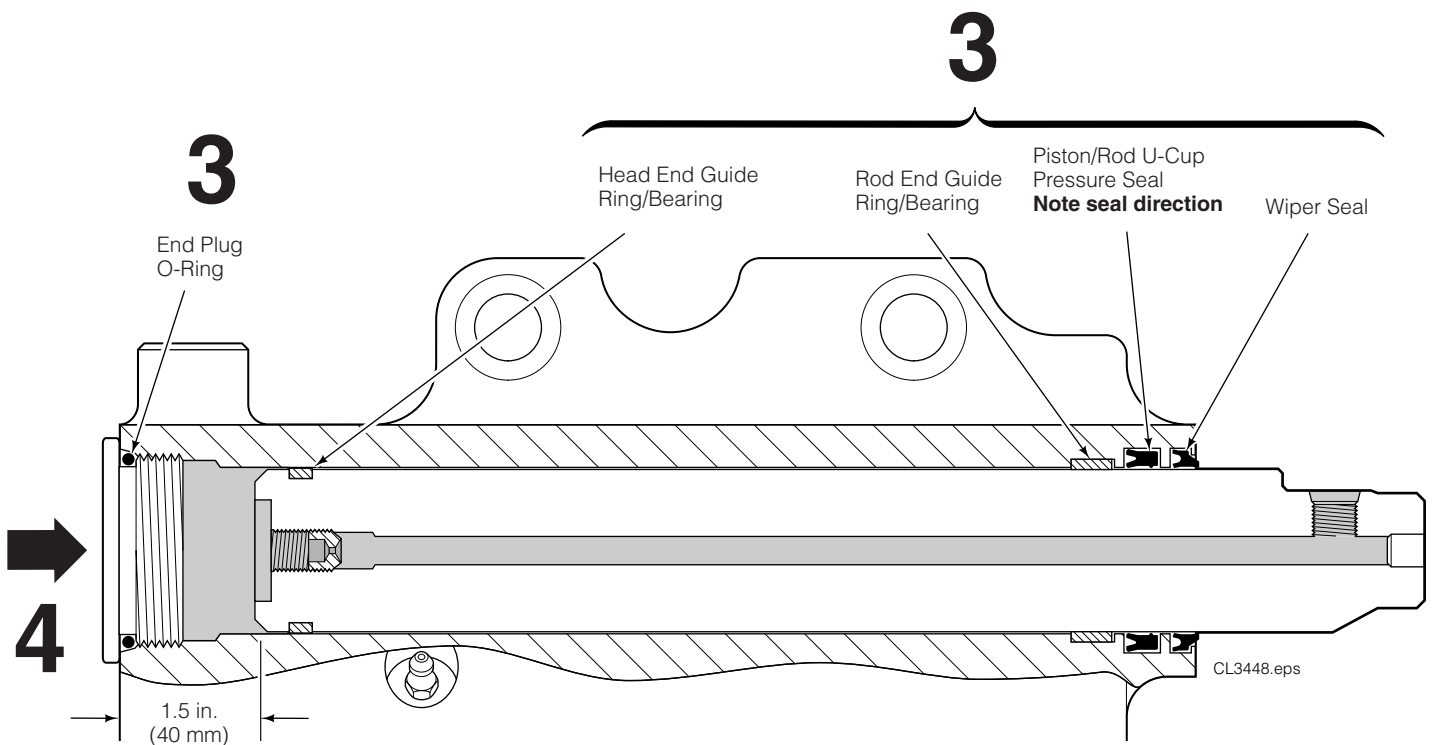


4.5-2 Cylinder Reassembly

- 1 Polish piston/rod chamfer angles if necessary using 400 grit emery cloth. Clean all parts thoroughly with solvent.
- 2 Lubricate new guide rings/bearings, seals and O-rings with O-ring lube or petroleum jelly.
- 3 Install new guide rings/bearings, seals, O-rings as shown below. Use brass seal installation tools (Cascade Part No. 674424) to avoid scratches in cylinder bore grooves.
- 4 Lubricate piston/rod assembly with a thick film of petroleum jelly and drive into cylinder bore from outside (plug) end.
IMPORTANT: Install piston/rod at least 40 mm into cylinder bore to fully engage seals.
- 5 Install anchor plate thrust plugs in upper hooks.
- 6 Position sideshifter anchor plate and upper bearings into upper hooks.
CAUTION: Make sure sideshifter bearings are installed properly. Do not install bearings backwards. Refer to Section 4.6-2.
- 7 Drive piston/rods into anchor plate center to hold anchor plate and bearings in place.
- 8 Install new O-rings and install end plugs on cylinders. Tighten end plug to 250 Nm.



WARNING: Do not pressurize sideshift cylinders unless installed on mounting frames with anchor plate in place. Sideshifter piston/rod is not retained in cylinder bore.



4.6 Base Unit

4.6-1 Frames and Mounting Plates – Disassembly and Reassembly

NOTE: Some base units have welded mounting plates.

- 1 Remove the arms as described in Section 4.2-1.
- 2 Remove the cylinders as described in Section 4.4-1.
- 3 Disconnect the supply hoses and remove the valve and tubing as described in Section 4.3-1.
- 4 Disconnect the lower hooks:

Quick-Change Hooks – Remove the locking pins and drop the hooks into the unlocked position. Replace the pins in the lower holes. For reassembly, remove the pins and slide the hooks up to the locked position. Replace pins in the top holes.

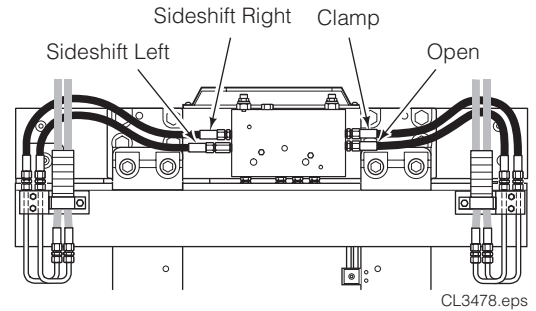
Bolt-On Hooks – Remove the capscrews and mounting hooks. For reassembly, tap the hooks tight against the carriage bar and tighten capscrews to:

Standard Attachments:

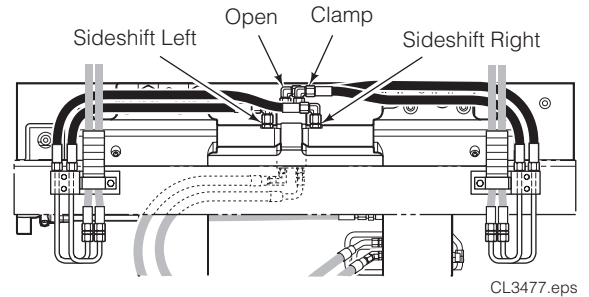
- CL II – 165 Nm
- CL III – 225 Nm
- CL IV – 435 Nm

Attachments with External Sideshift:

- CL II, CL III – 165 Nm
- CL IV – 435 Nm



3 INTERNAL SIDESHIFTING ATTACHMENT



EXTERNAL SIDESHIFTING ATTACHMENT

4 QUICK-CHANGE LOWER HOOKS

BOLT-ON LOWER HOOKS

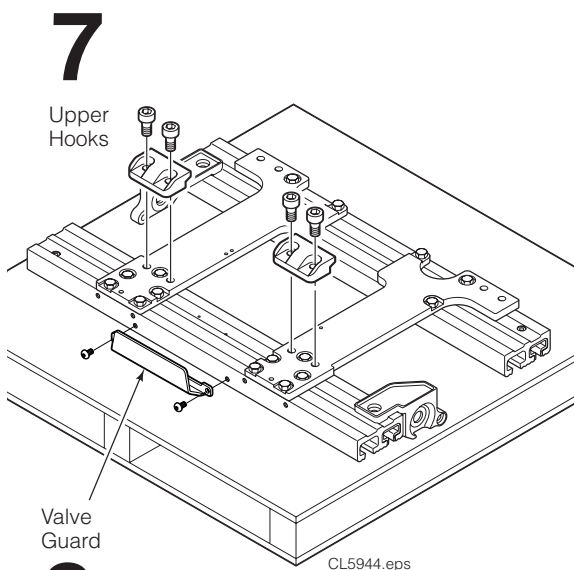
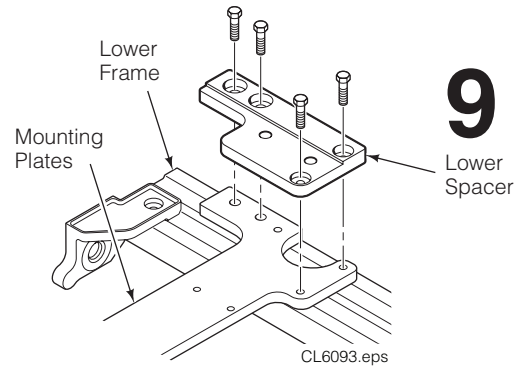
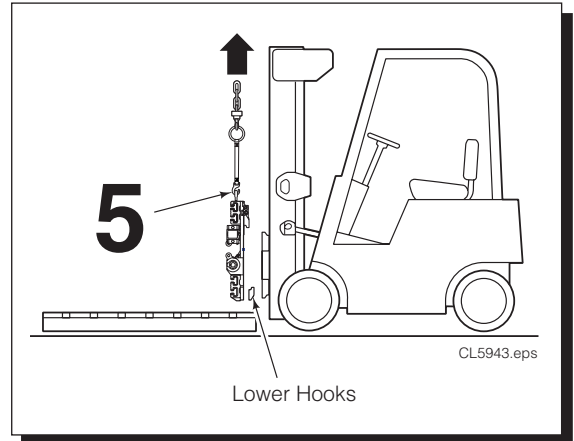
4.6-1 Frames and Mounting Plates – Disassembly and Reassembly (Continued)



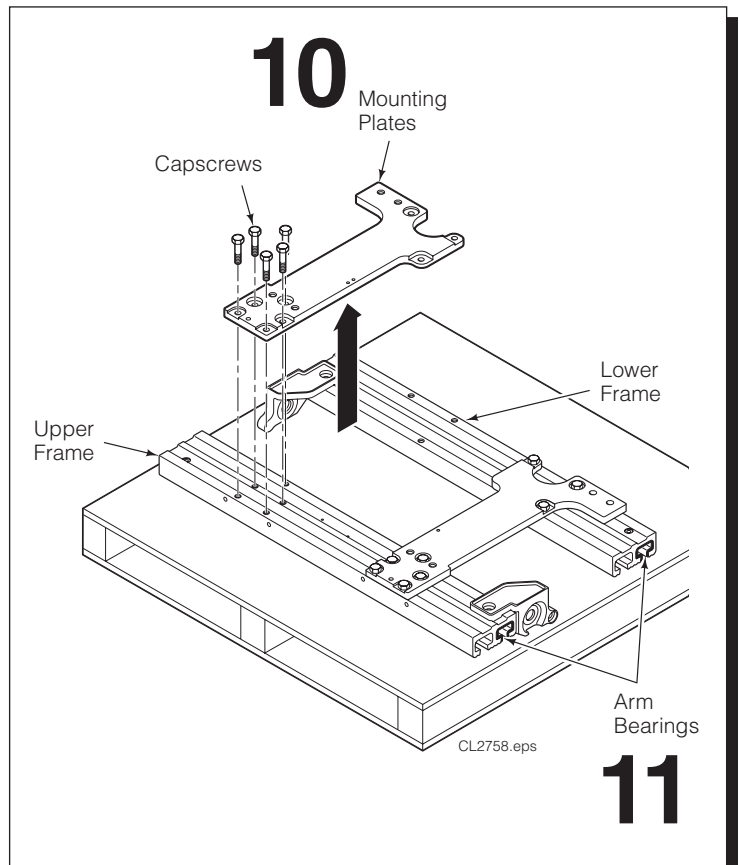
WARNING: Verify that the overhead hoist and chains or straps are rated for the weight of the attachment. Refer to nameplate for attachment weight.

- 5 Install two eyebolts in the frame. Attach a suitable overhead hoist and lift the attachment away from the truck.
- 6 Set the attachment frame on a smooth-top pallet or workbench with the mounting plates up.
- 7 Remove the upper mounting hooks, or external sideshifter group. Refer to Section 4.6-2. For reassembly, tighten capscrews, based on attachment model, to the torque values shown in Section 5.1-4.
- 8 If equipped, remove the valve guard. For reassembly, tighten capscrews to a torque of 90 Nm.
- 9 If equipped, remove the lower spacer from the mounting plates.
- 10 **Bolt-On Type Frames** – Remove the capscrews fastening the mounting plates to the frames and remove the mounting plates.

IMPORTANT: Keep track of shorter capscrews (used to avoid fouling arm bearings).
- 11 Inspect arm bar bearings for wear. Replace if any bearing cross-section is worn to less than 1 mm thickness. Refer to Section 4.2-4.



8



4.6-1 Frames and Mounting Plates – Disassembly and Reassembly (Continued)

12 Bolt-On Type Frames – For reassembly, reverse the previous procedures, with the following exception for tightening capscrews:

- Tighten mounting plate capscrews as follows:

A Tighten upper mounting plate capscrews in the sequence shown to one-half of final torque value. Check that the upper frame is perpendicular to mounting plates within 0.8 mm.

B Double-torque upper mounting plate capscrews by tightening to the final torque value, backing off capscrew one-half turn, and retightening to final value.

C Tighten lower mounting plate (and lower spacer, if equipped) capscrews in the sequence shown to one-half of final torque value. Check that lower frame is parallel to edge of mounting plates within 0.8 mm.

D Trial-fit arms into frames and make sure that arms move free manually and have unrestricted travel. Adjust lower frame if required.

E Double-torque lower mounting plate (and lower spacer, if equipped) capscrews by tightening to the final torque value (shown below), backing off capscrew one-half turn, and retightening to final value of:

Standard Attachments:

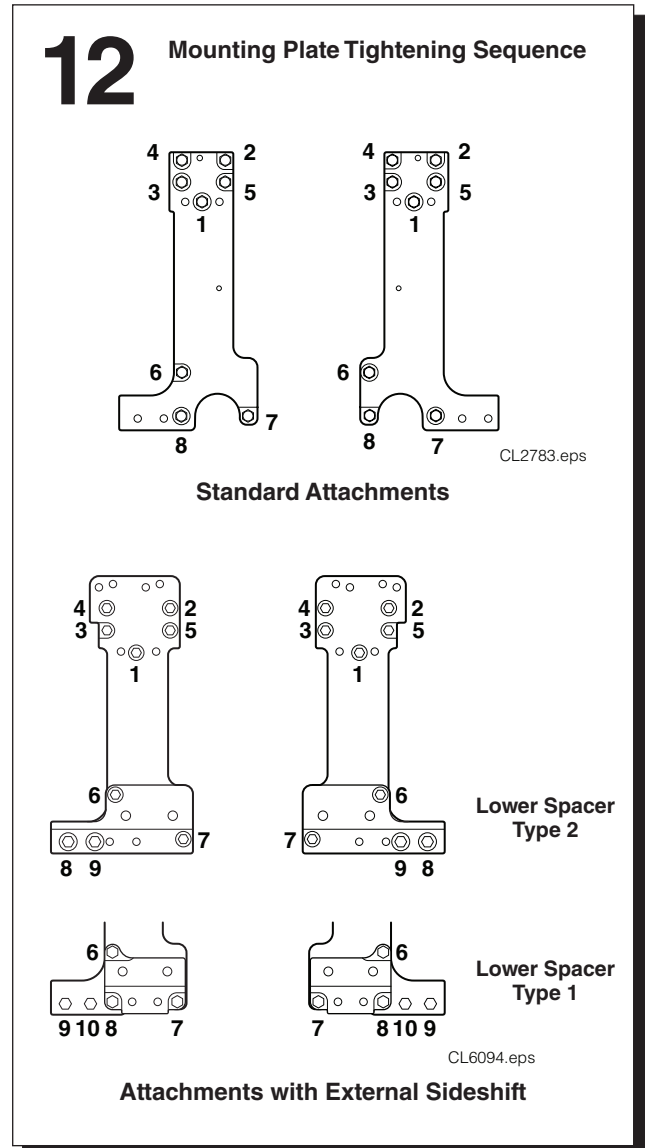
- 20G – 108 Nm
- 28G, 36G, 44G – 270 Nm
- 52G, 64G – 520 Nm

Attachments with External Sideshift, Mounting Plate and Type 1 Lower Spacer:

- 20G – 108 Nm
- 28G, 36G, 44G – 270 Nm
- 52G – 435 Nm

Attachments with External Sideshift, Mounting Plate and Type 2 Lower Spacer:

- 20G – 108 Nm (M12), 225 Nm (M16)
- 28G, 36G, 44G – 270 Nm
- 52G – 270 Nm (M16), 520 Nm (M20)



NOTE: If Type 1 External Sideshifter Lower Spacers require replacement, order the following direct replacement Type 2 External Sideshifter Lower Spacers:

Model	Type 1 Sideshift Lower Mount	Direct Replacement Type 2 Sideshift Lower Mount
20G	6047675	6061528 (RH), 6061529 (LH)
28G	6052437	6061569 (RH), 6061570 (LH)
36G, 44G	6049974	6061084 (RH), 6061086 (LH)
52G	6050381	6061583 (RH), 6061584 (LH)

4.6-2 External Sideshifter Group – Removal and Replacement

- 1 Remove attachment from truck as described in Section 4.1.
- 2 Disconnect CLAMP hoses at bottom of manifold on anchor plate. Cap hoses and tag for reassembly.
- 3 Remove cylinder end plugs and drive cylinder rods outward to release sideshifter anchor plate and bearings. For reassembly, drive rods inward to engage anchor plate, as shown in Section 4.5-2.
- 4 Inspect sideshifter upper bearings for wear. Replace all if any bearing is worn to less than 2.5 mm thickness on the back surface.
- 5 Inspect lower sideshifter bearings for wear. Replace if any bearing is worn to less than 2.5 mm thickness. Pry old bearings from lower bearing adapter plates and install new bearings.

NOTE: Bearing adapter plates need not be removed unless attachment mounting plates or frames are to be replaced. Refer to Section 4.6-1.

- 6 Remove cylinder/upper hook assemblies from attachment. Service cylinders as described in Section 4.5. For reassembly, tighten capscrews to the following torque values:

Socket Capscrew (Upper):

20G–36G, 44G (CL II) – 285 Nm

44G (CL III), 52G – 520 Nm

64G, 70G – 445 Nm

Hex Capscrew (Lower):

20G–36G, 44G (CLII) – 235 Nm

44G (CL III), 52G – 520 Nm

64G, 70G – 445 Nm

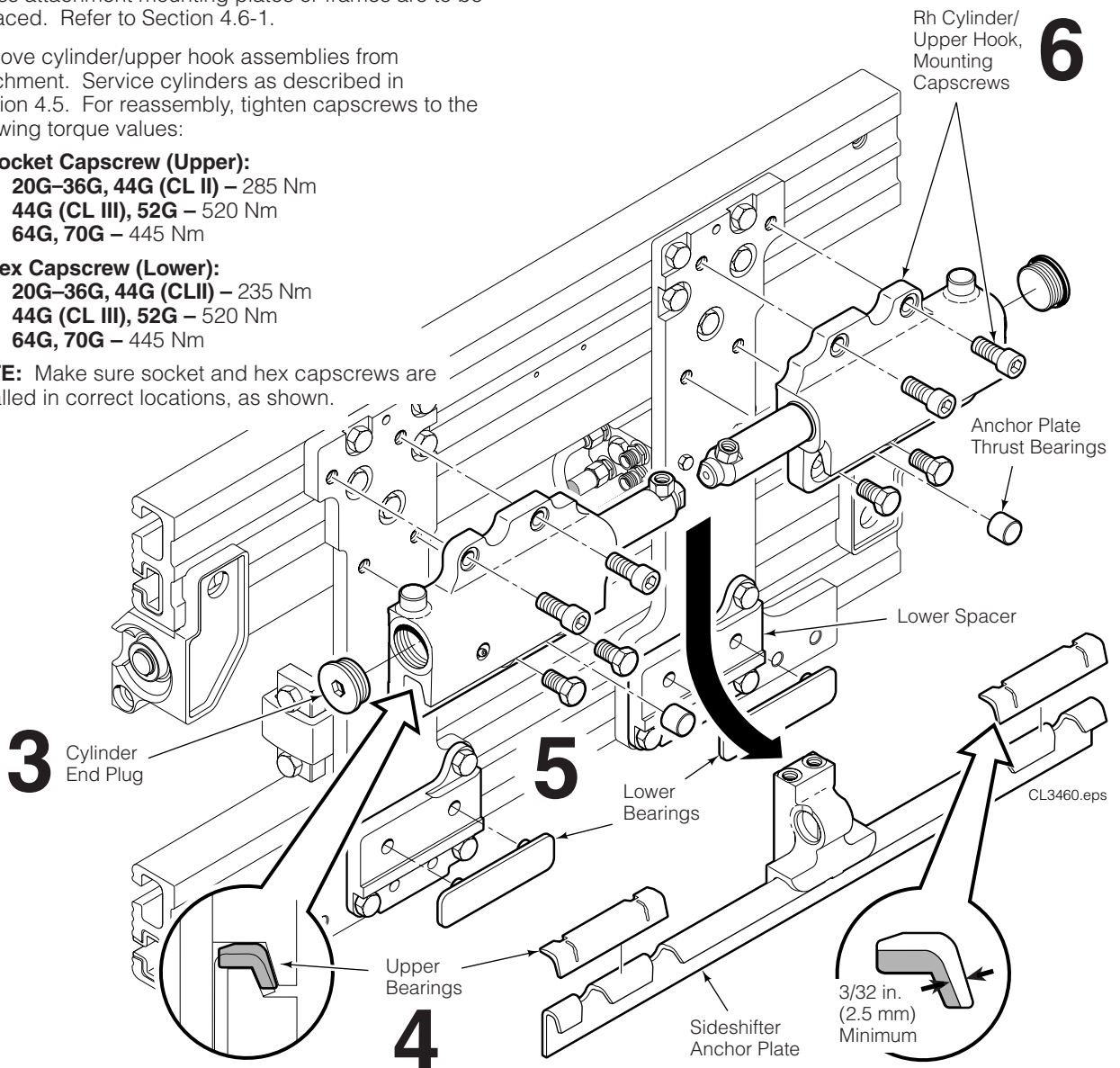
NOTE: Make sure socket and hex capscrews are installed in correct locations, as shown.

- 7 For reassembly, reverse the above procedures with the following exceptions:

- Clean upper and lower sideshifter bearing contact surfaces and bearings (if reused).
- Locate upper bearings in anchor plate cutouts as shown in the detail below).

CAUTION: Make sure bearings are not installed backwards. Bearings must be installed properly in anchor plate for correct lower hook clearance adjustment.

- Apply general-purpose chassis grease to upper bearing grease fittings and lower bearing contact surfaces.



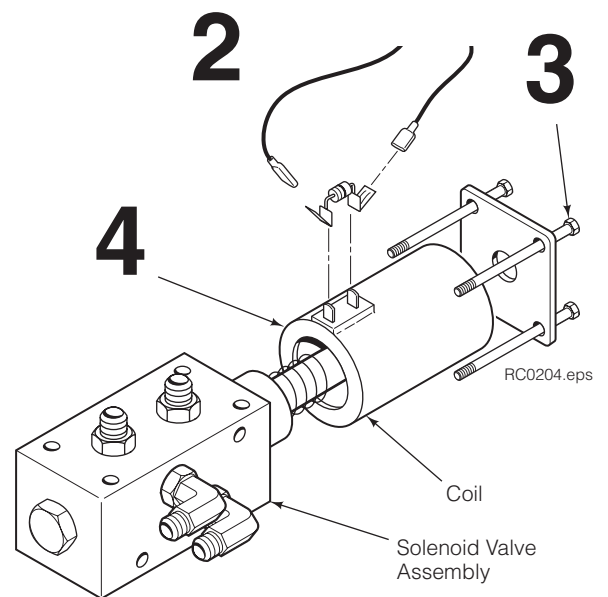
4.7 Solenoid Valve

4.7-1 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.

4.7-2 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.



SPECIFICATIONS

5.1 Specifications

5.1-1 Hydraulics

Truck Relief Setting (see attachment nameplate)

Low Pressure	High Pressure	
155 bar	190 bar	- Recommended
189 bar	250 bar	- Maximum

NOTE: The attachment valve has separate pressure relief control, refer to Section 4.3-4 for adjustment.

Truck Flow Volume ^①

	Min. ^②	Recommended	Max. ^③
20G, 28G, 36G, 44G, 52G, 64G	19 L/min.	28 L/min.	56 L/min.
70G, 77G	26 L/min.	45 L/min.	75 L/min.

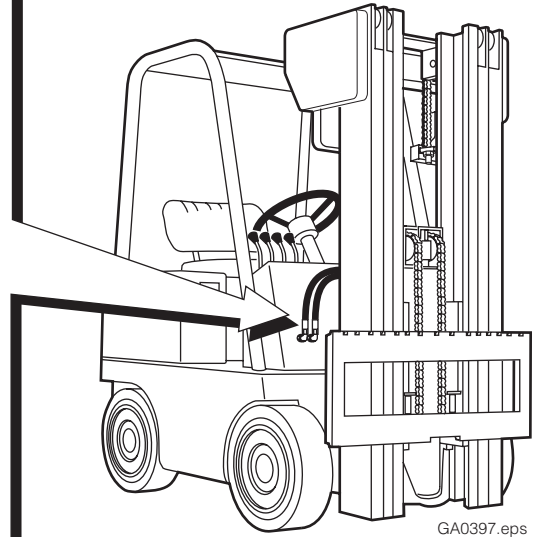
① Cascade 20G–77G Non-Revolution Sliding Arm Clamps and Fork Positioners are compatible with SAE 10W petroleum base hydraulic fluid meeting Mil. Spec. MIL-O-5606 or MIL-O-2104B. Use of synthetic or aqueous base hydraulic fluid is not recommended. If fire resistant hydraulic fluid is required, special 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.

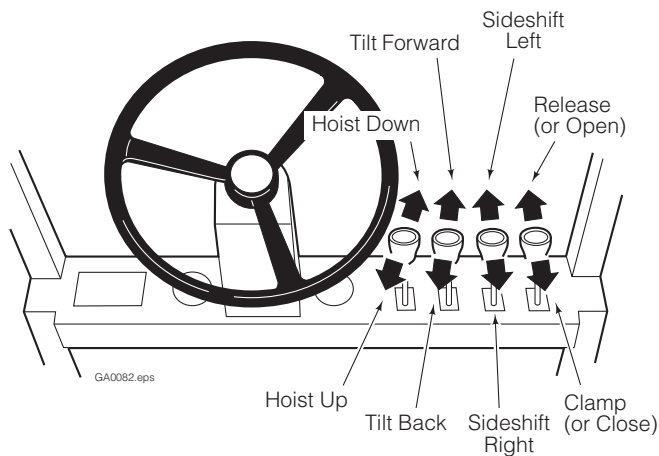
Hoses and Fittings

All supply hoses and fittings must be No. 6 minimum with an orifice size of 7 mm minimum.



5.1-2 Auxiliary Valve Functions

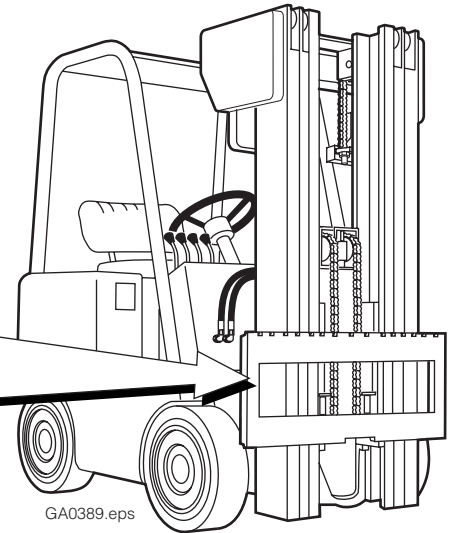
Check for compliance with ANSI/ITSDF (ISO) standards:



SPECIFICATIONS

5.1-3 Truck Carriage

Carriage Mount Dimension (A) ISO (ITA)		
	Minimum	Maximum
Class II	380.0 mm	381.0 mm
Class III	474.5 mm	476.0 mm
Class IV	595.5 mm	597.0 mm



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SPECIFICATIONS

5.1-4 Torque Values

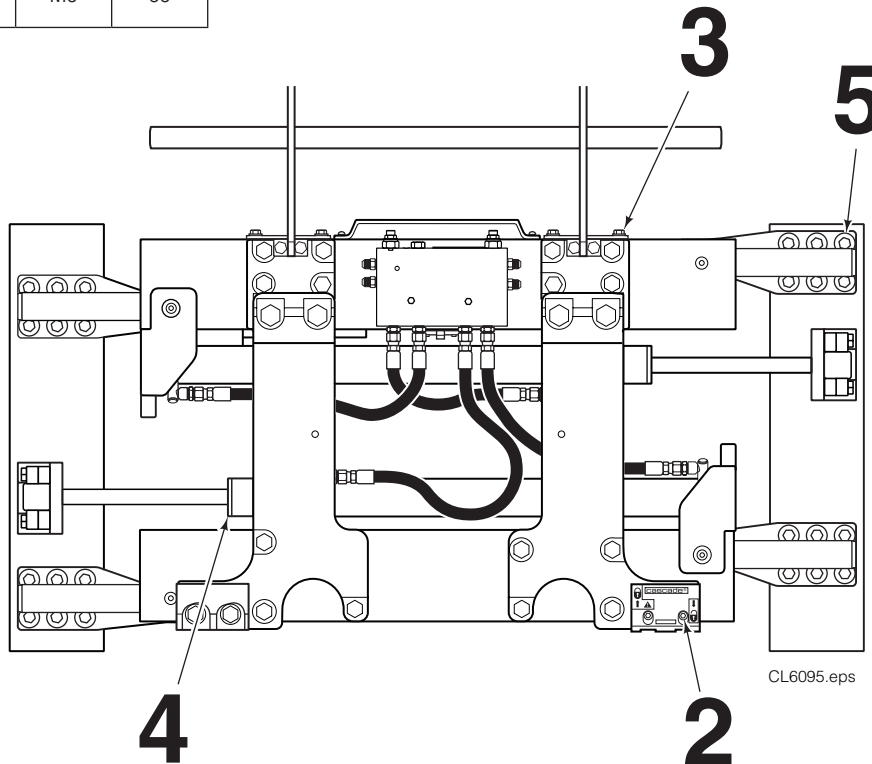
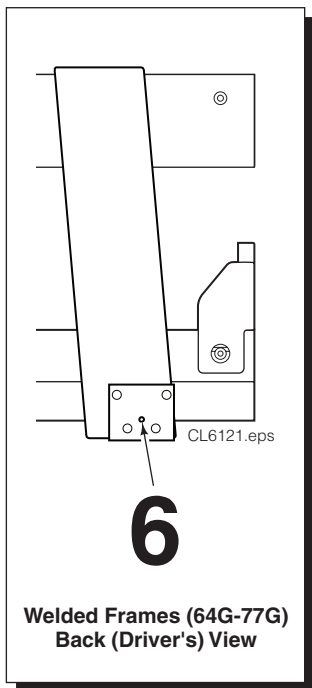
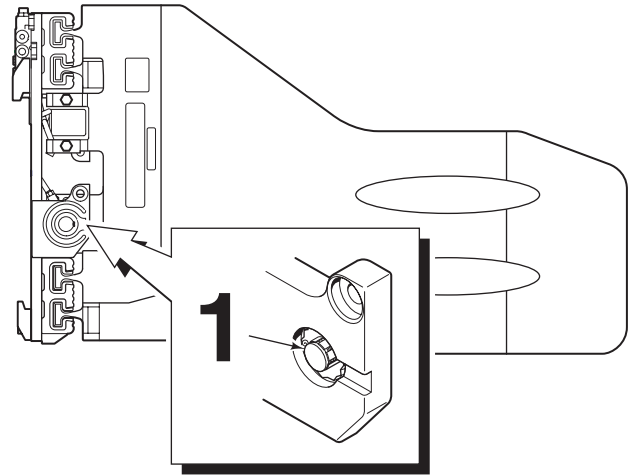
Fastener torque values for 20G-77G Non-Revolution Sliding Arm Clamps and Fork Positioners are shown in the table below in both US and metric units. All torque values are also called out in each specific service procedure section through out the manual.

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

All Attachments

Ref.	Fastener Location	Size	Size	Nm
1	Base End Nut	20G-52G	–	235
		64G-77G	–	340
2	QD Guide Capscrews	CL II & III	M16	165
		CL IV	M20	435
3	Backrest Capscrews		M12	125
4	Cylinder Retainer	20G-44G	–	270
		52G ①	–	300
		52G-77G ②	–	375
		70G-77G ③	–	405
5	Arm Bar Capscrews	20G-28G	M16	275
		36G-52G	M20	535
		64G-77G	M20	585
6	Spacer Plate Capscrew (Welded Type Frames)		M8	38

- ① 65 mm cylinder bore diameter
- ② 70 & 75 mm cylinder bore diameter
- ③ 80 mm cylinder bore diameter



SPECIFICATIONS

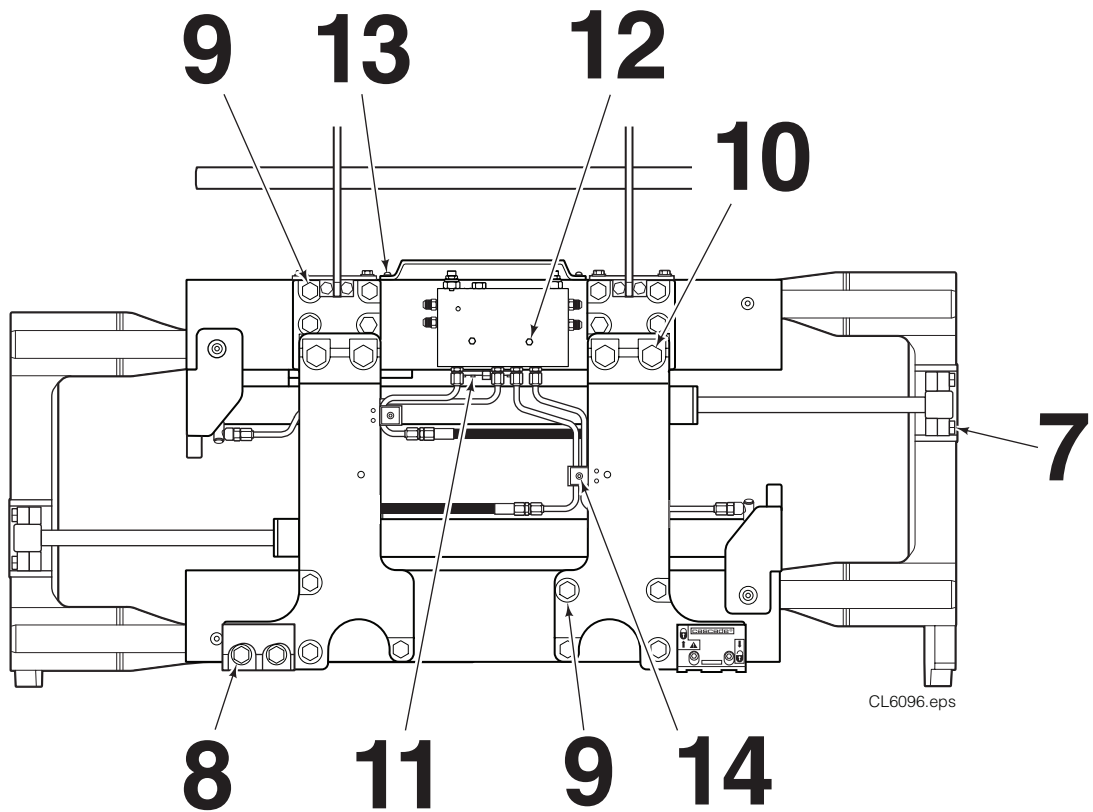
5.1-4 Torque Values (continued)

Standard Attachments

Ref.	Fastener Location	Size	Nm
7	Cylinder Rod Anchor Capscrews	20G	M10 63
		28G, 36G	M12 110
		44G-77G	M16 275
8	Lower Hook Capscrews	CL II	M16 165
		CL III	M16 or M20 225
		CL IV	M20 435
9	Mounting Plate Capscrews ▲	20G	M12 108
		28G, 36G, 44G	M16 270
		52G, 64G, 70G, 77G	M20 520

Ref.	Fastener Location	Size	Nm
10	Upper Hook Capscrews	28G-36G	M20 435
		44G, 52G	M20 535
		64G	M20 435
		70G, 77G	M20 520
11	Centering Tab Cap-screw	Class II	M10 50
		Class III	M12 90
12	Valve Capscrews	M6	8
13	Guard Capscrews	M12	90
14	Tube Clamp Capscrew	M8	20

▲ Double-Torque (tighten, loosen 1/2 turn, retighten)



Standard Attachments
Back (Driver's) View

SPECIFICATIONS

5.1-4 Torque Values (continued)

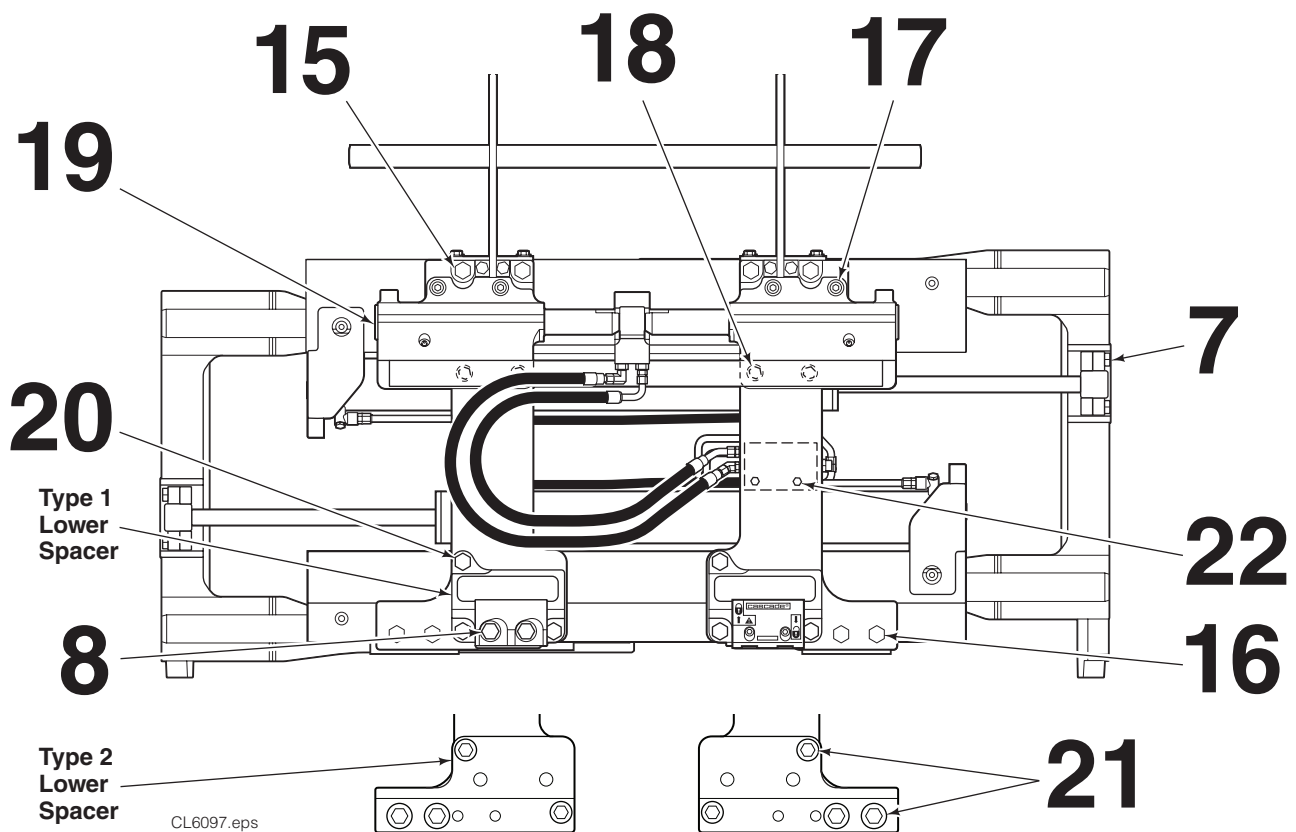
Attachments with External Sideshift

Ref.	Fastener Location	Size	Nm
7	Cylinder Rod Anchor Capscrews	20G	M10 63
		28G	M12 90
		36G-70G	M16 225
8	Lower Hook Capscrews	CL II & III	M16 165
		CL IV	M20 435
15	Mounting Plate (Upper Capscrews) ▲	20G	M12 108
		28G, 36G, 44G	M16 270
		52G ■	M20 435
		52G ●	M20 520
16	Mounting Plate (Lower Capscrews) ▲	20G	M12 225
		28G-44G	M16 270
		52G	M20 435
17	Sideshifter Socket Capscrews ▲	28G-36G, 44G – CL II	M16 285
		44G – CL III, 52G	M20 520
		64G-70G	M20 445

Ref.	Fastener Location	Size	Nm
18	Sideshifter Hex Capscrews ▲	28G-36G, 44G – CL II	M16 235
		44G – CL III, 52G	M20 520
		64G-70G	M20 445
19	Sideshift Cylinder End Plug	–	250
20	Type 1 Lower Spacer Capscrews ▲	20G	M12 108
		28G, 36G, 44G	M16 270
		52G	M20 435
21	Type 2 Lower Spacer Capscrews ▲	20G	M12 108
			M16 225
		28G, 36G, 44G	M16 270
		52G	M16 270
		M20 520	
22	Valve Capscrews	M8	38

▲ Double-Torque (tighten, loosen 1/2 turn, retighten)

- Attachments equipped with Type 1 Lower Spacer
- Attachments equipped with Type 2 Lower Spacer



Attachments with External Sideshift
Back (Driver's) View

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Do you have questions you need answered right now? Call your nearest Cascade Service Department. Visit us online at www.cascorp.com

Zijn er vragen waarop u direct een antwoord nodig hebt? Neem dan contact op met uw dichtstbijzijnde serviceafdeling van Cascade. Of ga naar www.cascorp.com

Haben Sie Fragen, für die Sie sofort eine Antwort benötigen? Wenden Sie sich an Ihren nächsten Cascade-Kundendienst. Besuchen Sie uns online: www.cascorp.com

En cas de questions urgentes, contactez le service d'entretien Cascade le plus proche. Visitez le site Web www.cascorp.com.

Per domande urgenti contattare l'Ufficio Assistenza Cascade più vicino. Visitate il nostro sito all'indirizzo www.cascorp.com

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