SERVICE MANUAL

G-Series

Carton Clamps
(includes White Goods Clamps)

Original Instructions

Number 6877047 EN

CE

cascade® corporation

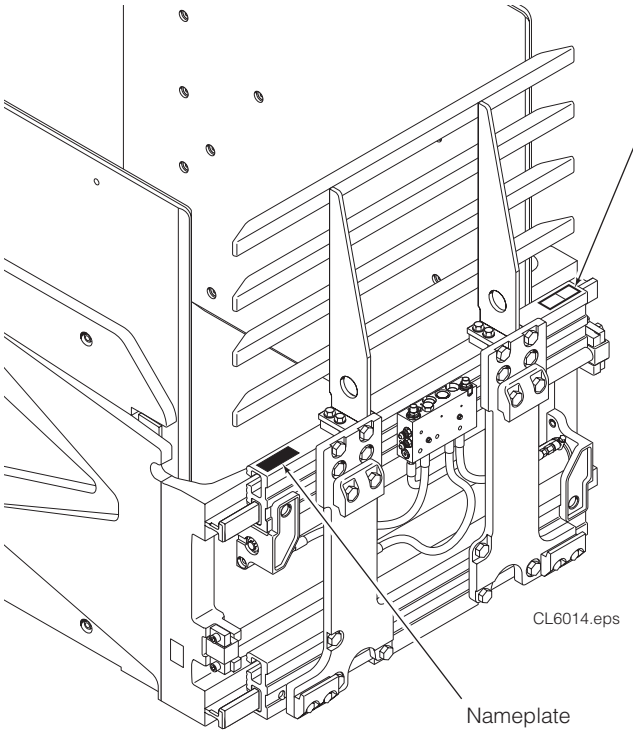
CONTENTS

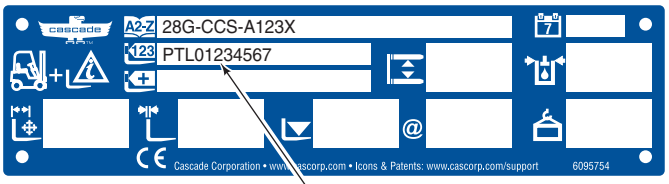
1.1 Introduction

This manual provides the Periodic Maintenance, Troubleshooting, Service and Specifications for Cascade G-Series Carton 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 units. All fasteners have a torque value range of ±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 the 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 rod ends and anchor bars for damage. The rod end anchors operate with a loose clearance and require no lubrication.
- Check for equal movement of arms.
- Check decals and nameplate for legibility.

2.2 500-Hour Maintenance

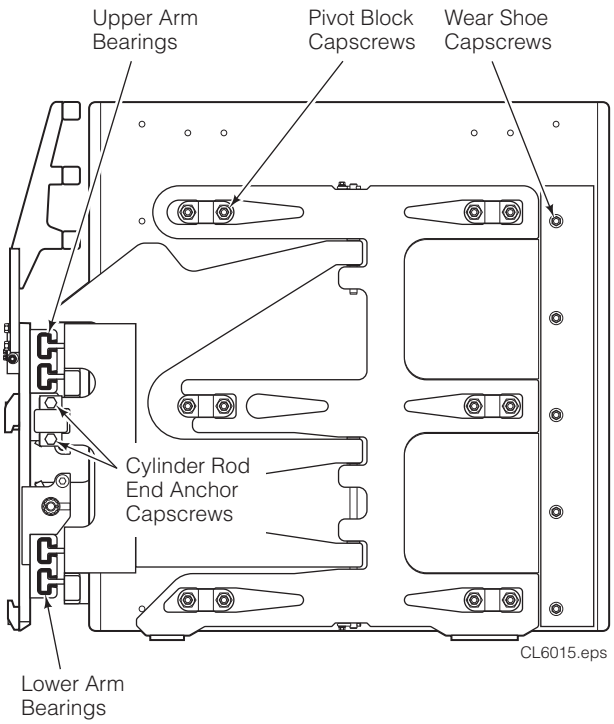
After each 500 hours of truck operation, in addition to the 100-hour maintenance, perform the following procedures:

- Inspect arm bearings for wear or 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 clearance:

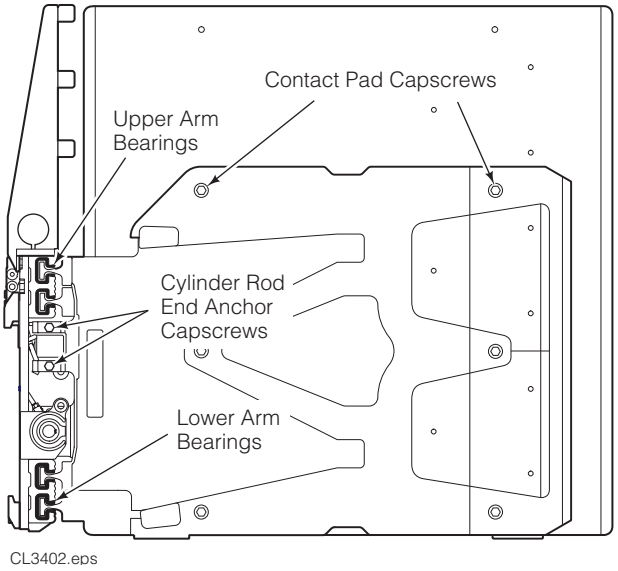
  Quick-Change Hooks – 5 mm maximum
  Bolt-on Hooks – Tight against lower carriage bar

  If adjustment is necessary, refer to Installation Step 6.
- Tighten lower hook capscrews:

  Bolt-on Hooks, CL II, CL III – 165 Nm
  Quick-Change Hooks, CL II, CL III – 225 Nm
- Inspect stabilizer wear tile for wear and damage. Replace or repair, as needed.



Flexible (ADJUSTA-BLOCK) Design
RH Side



Standard (Shimmed) Design
RH Side

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:

- Tighten accessible mounting capscrews. Double-torque capscrews by tightening to final torque value, loosen 1/2 turn, then retighten.

  12G–44G – 270 Nm
  52G – 520 Nm

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

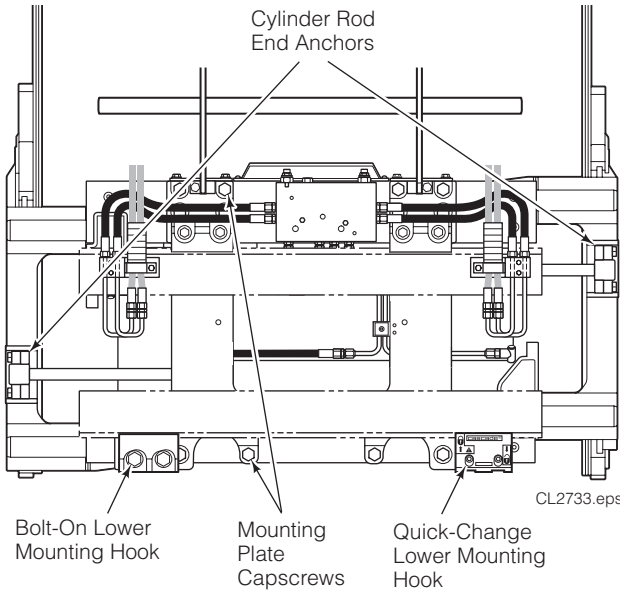
- Tighten cylinder rod end anchor capscrews:

  12G–18G – 275 Nm
  28G – 110 Nm
  36G – 90 Nm
  44G, 52G – 275 Nm

- Tighten contact pad capscrews to:

  Standard (Shimmed) Design – 65 Nm
  Flexible (ADJUSTA-BLOCK) Design – 90 Nm

- Inspect lower frame wear tile for wear or damage. Replace as necessary.



Standard Attachments
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.

2.5 Attachments with External Sideshift

In addition to (or in place of, where necessary) the periodic maintenance found in the periodic maintenance schedule in the previous Sections 2.1, 2.2, 2.3 and 2.4, perform the following for attachments with external sideshift equipped.

2.5-1 500-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.

2.5-2 1000-Hour Maintenance

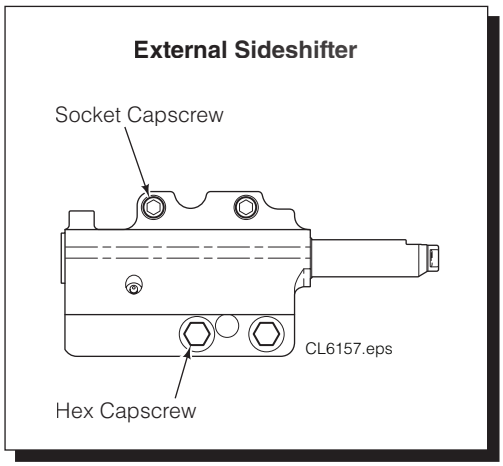
- Tighten external sideshift cylinder mounting capscrews:

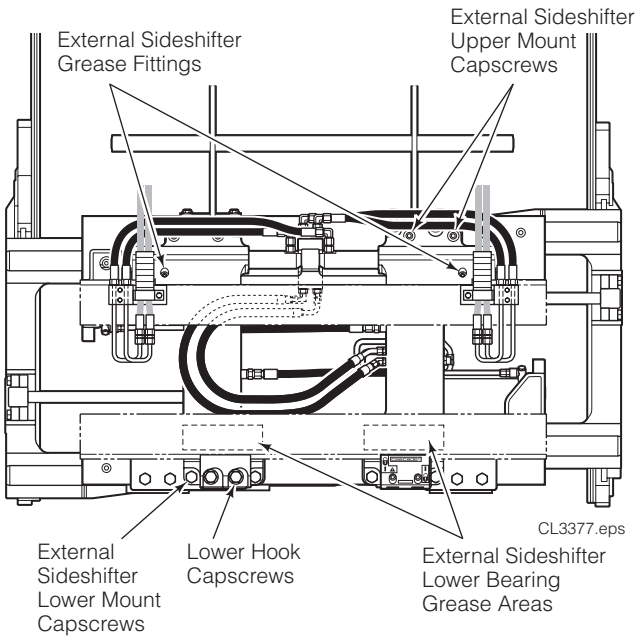
  Socket Capscrew (Upper), 28G, 36G – 285 Nm
  Hex Capscrew (Lower), 28G, 36G – 235 Nm

  IMPORTANT: If any capscrews are found loose, remove attachment from truck and check all sideshifter mount capscrews for proper torque values.
- Tighten lower spacer capscrews. Double-torque capscrews by tightening to final torque value, loosen 1/2 turn, then retighten.

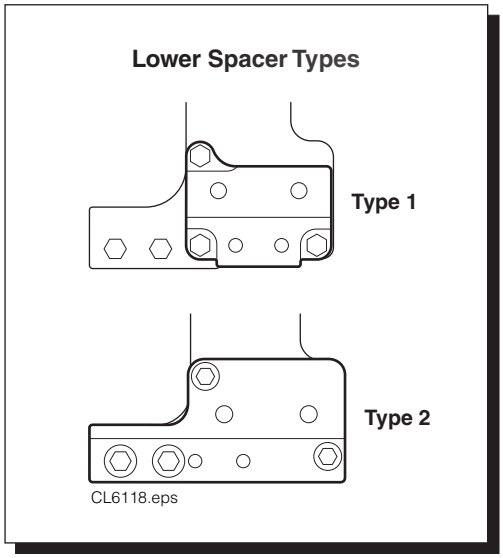
  28G, 36G – 270 Nm
- Tighten cylinder rod end anchor capscrews:

  12G–18G – 225 Nm
  28G, 36G – 90 Nm





Attachments with External Sideshift
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.

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.

3.1-2 Tools Required

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

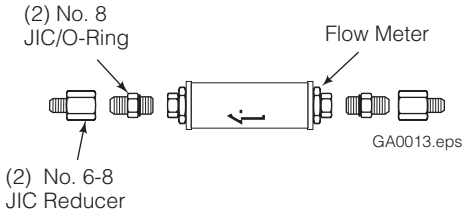
- In-line Flow Meter Kit:

  37 L/min – Cascade Part No. 671476.
  OR
  75 L/min – Cascade Part No. 671477.
- Pressure Gauge Kit:

  345 bar – Cascade Part No. 671212.
- Arm Bearing Retainer Tool – Cascade Part No. 6042633.
- Assorted fittings, hoses, and quick-disconnect couplers as required.

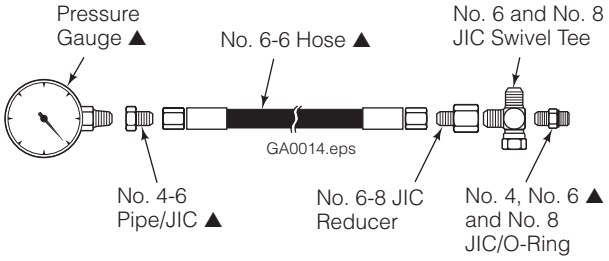
Flow Meter Kits:

671476 – 37 L/min
671477 – 75 L/min



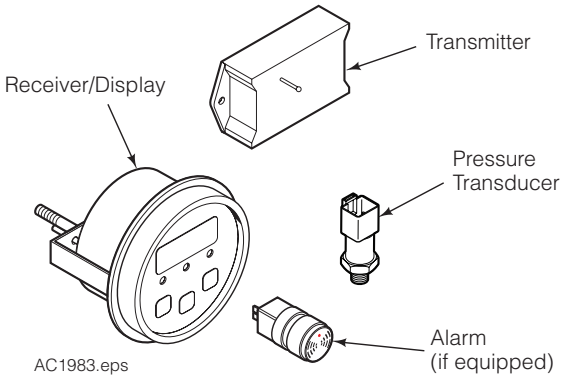
Pressure Gauge Kit:

671212

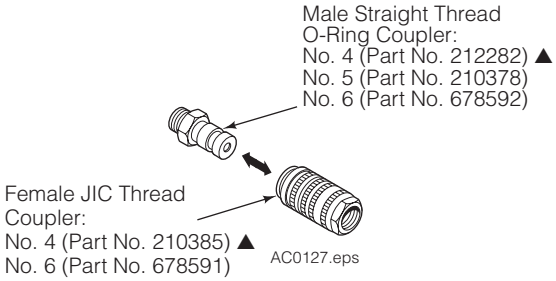


Wireless Pressure Monitor Kits

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

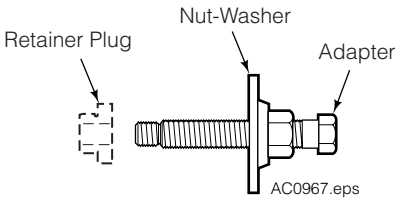


Quick-Disconnect Couplers



Arm Bearing Retainer Removal/Installation Tool:

6042633



▲ **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. 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.

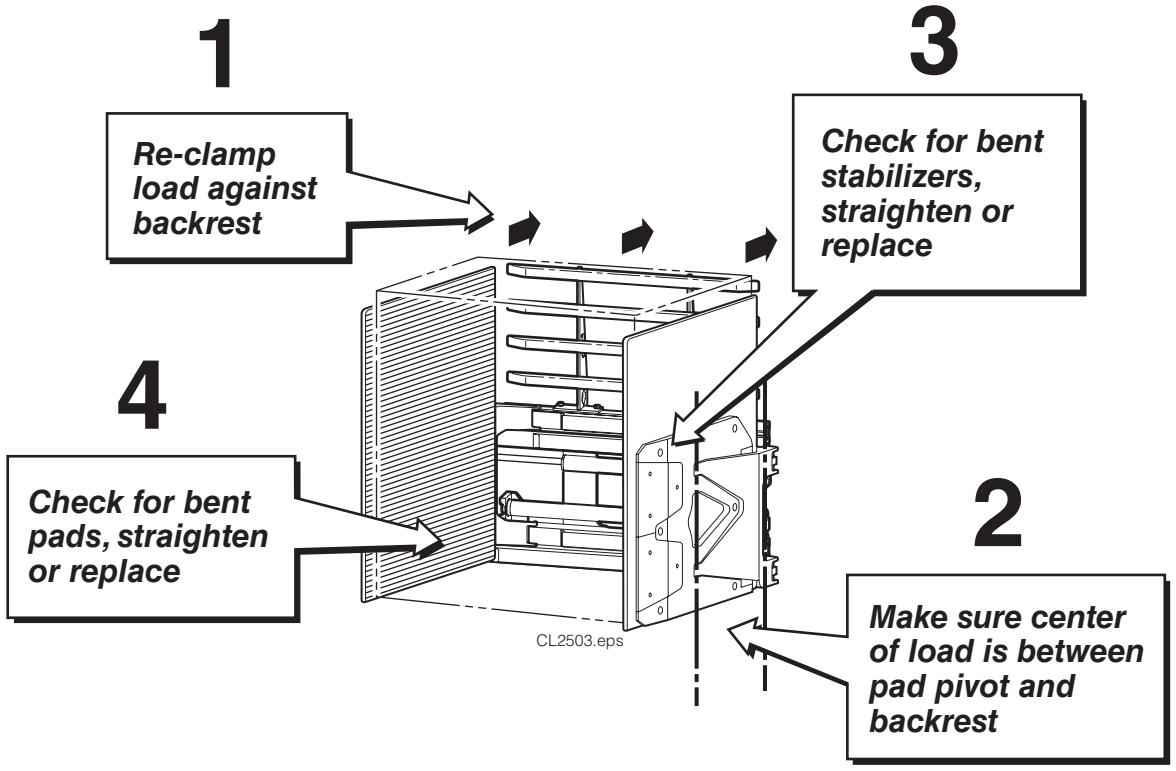
Carton Clamp Loads
- Front stack of load tilts out.
- Lower tier of load bridges down or slides out.
- Lower tier of load is creased.

To correct these problems, see Section 3.1-4.

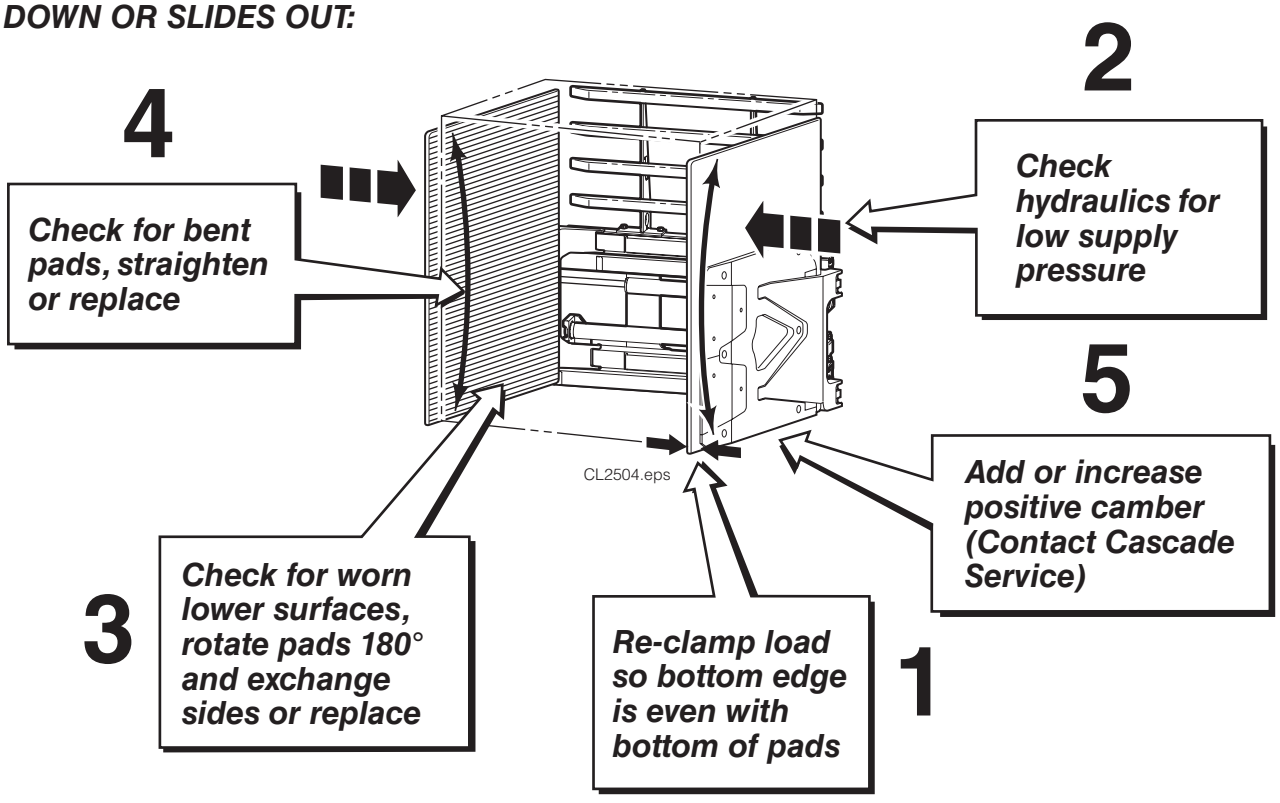
3.1-4 Carton Clamp Loads

IMPORTANT: Before adjusting contact pad camber to solve handling problems, make sure the attachment is being used correctly and is not damaged. Use the troubleshooting procedure shown and, if necessary, adjust the contact pad camber using a Cascade Shim Service Kit.

IF FRONT STACK OF LOAD TILTS OUT:

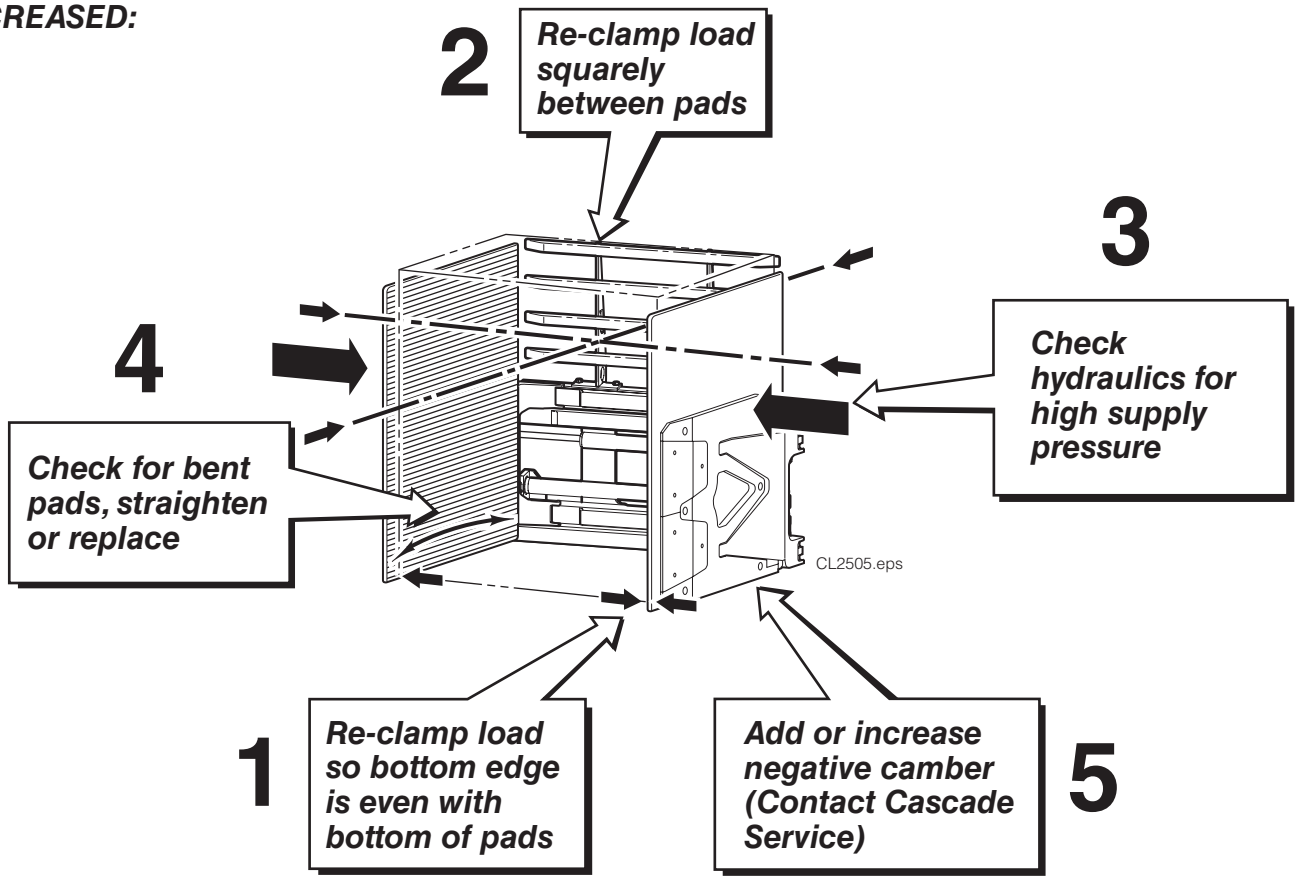


IF LOWER TIER OF LOAD BRIDGES DOWN OR SLIDES OUT:

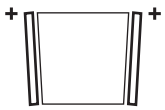
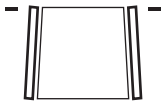
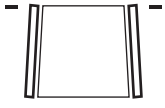


3.1-4 Carton Clamp Loads (continued)

IF LOWER TIER OF LOAD IS CREASED:



TYPICAL PAD CAMBER FOR HANDLING CARTON CASE LOADS

CANNED / BOTTLED / DENSE CASE GOODS	**Neutral-to-positive**	
SOFT CASE GOODS	**Neutral-to-Negative**	
APPLIANCE / LARGE CASE GOODS	**Neutral-to-Negative**	
UNKNOWN LOADS	**Start with neutral, look for creases and adjust camber as required**	

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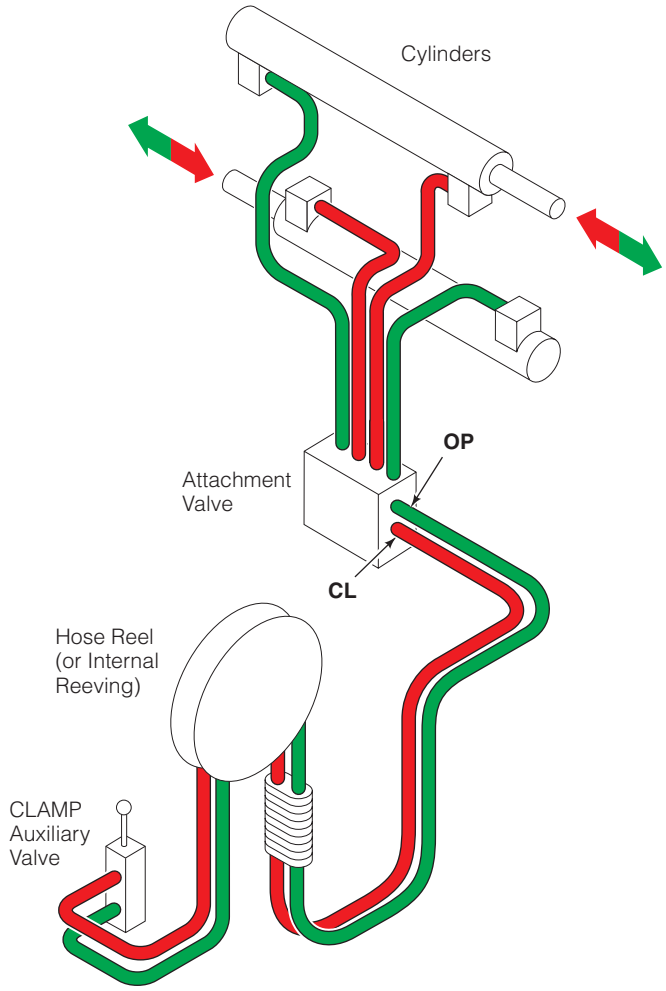
3.2 Plumbing

3.2-1 Non-Sideshifting – Hosing Diagram

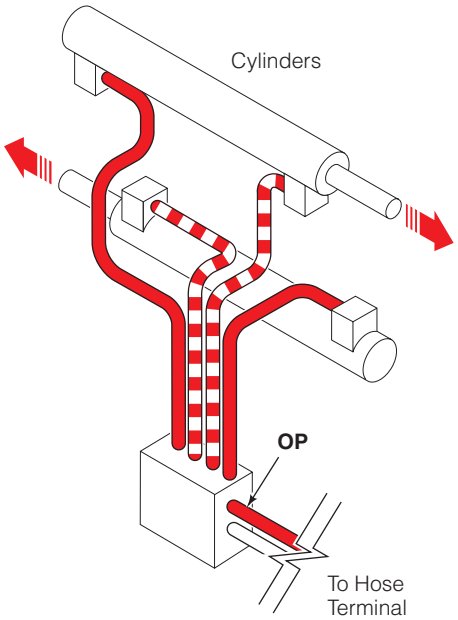
CLAMP ARMS

PRESSURE
RETURN

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



REGENERATION, if equipped



OPEN ARMS

PRESSURE
REGENERATING

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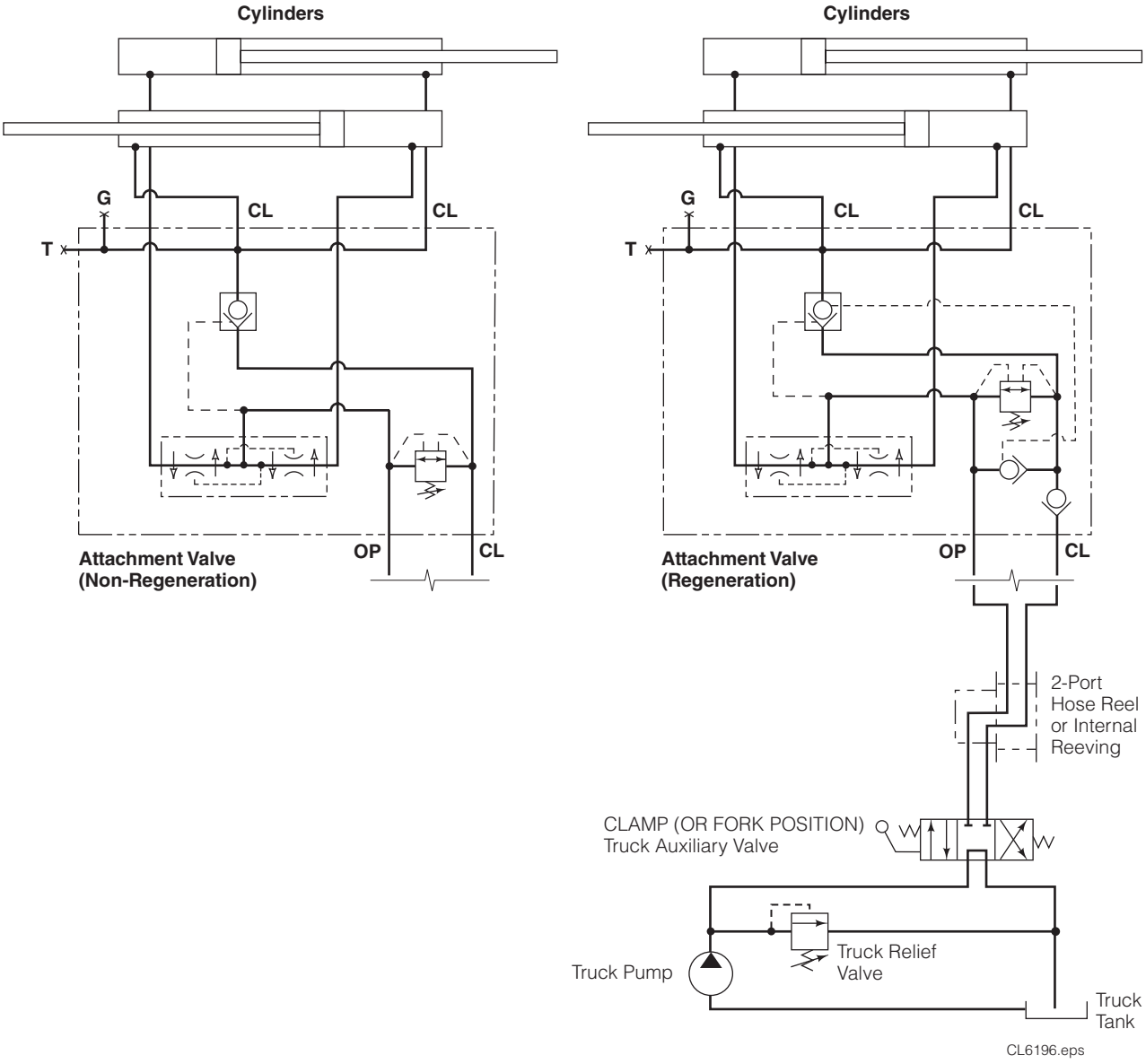
3.2-2 Non-Sideshifting – Hydraulic Circuit



3.2-3 Sideshifting – Hosing Diagram

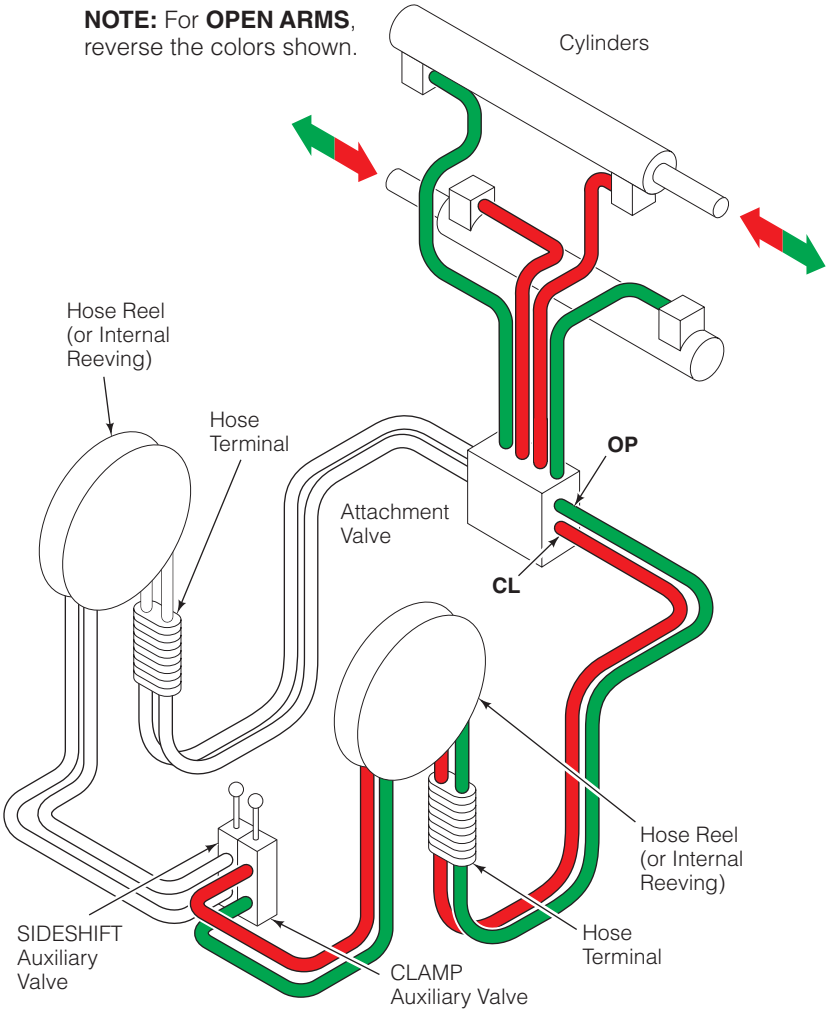
CLAMP CIRCUIT

CLAMP ARMS

PRESSURE

RETURN

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



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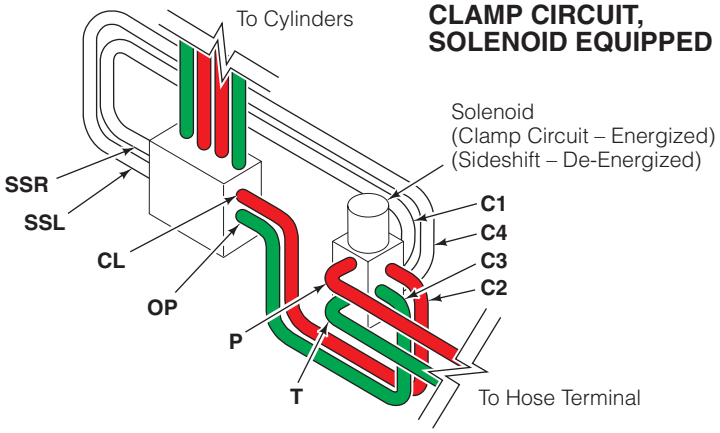
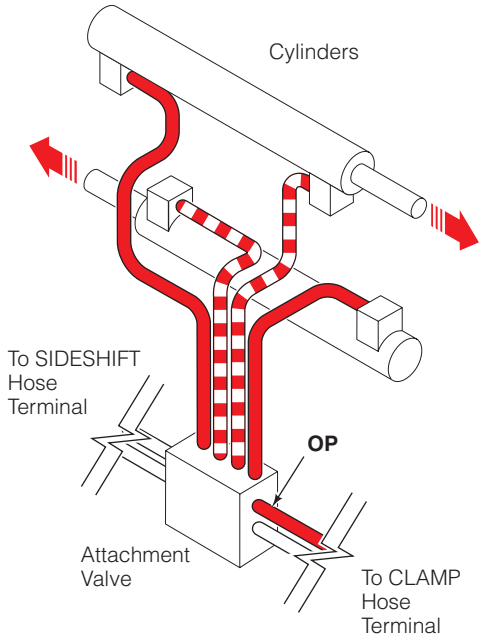


CLAMP CIRCUIT, SOLENOID EQUIPPED

REGENERATION, if equipped

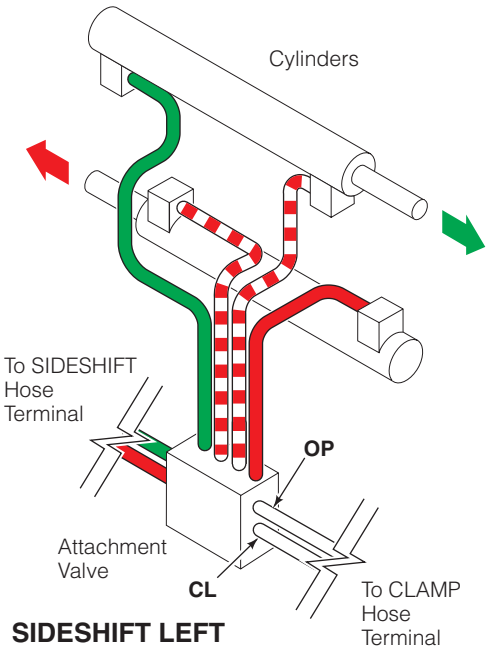


OPEN ARMS

PRESSURE

REGENERATING

SIDESHIFT CIRCUIT



SIDESHIFT LEFT

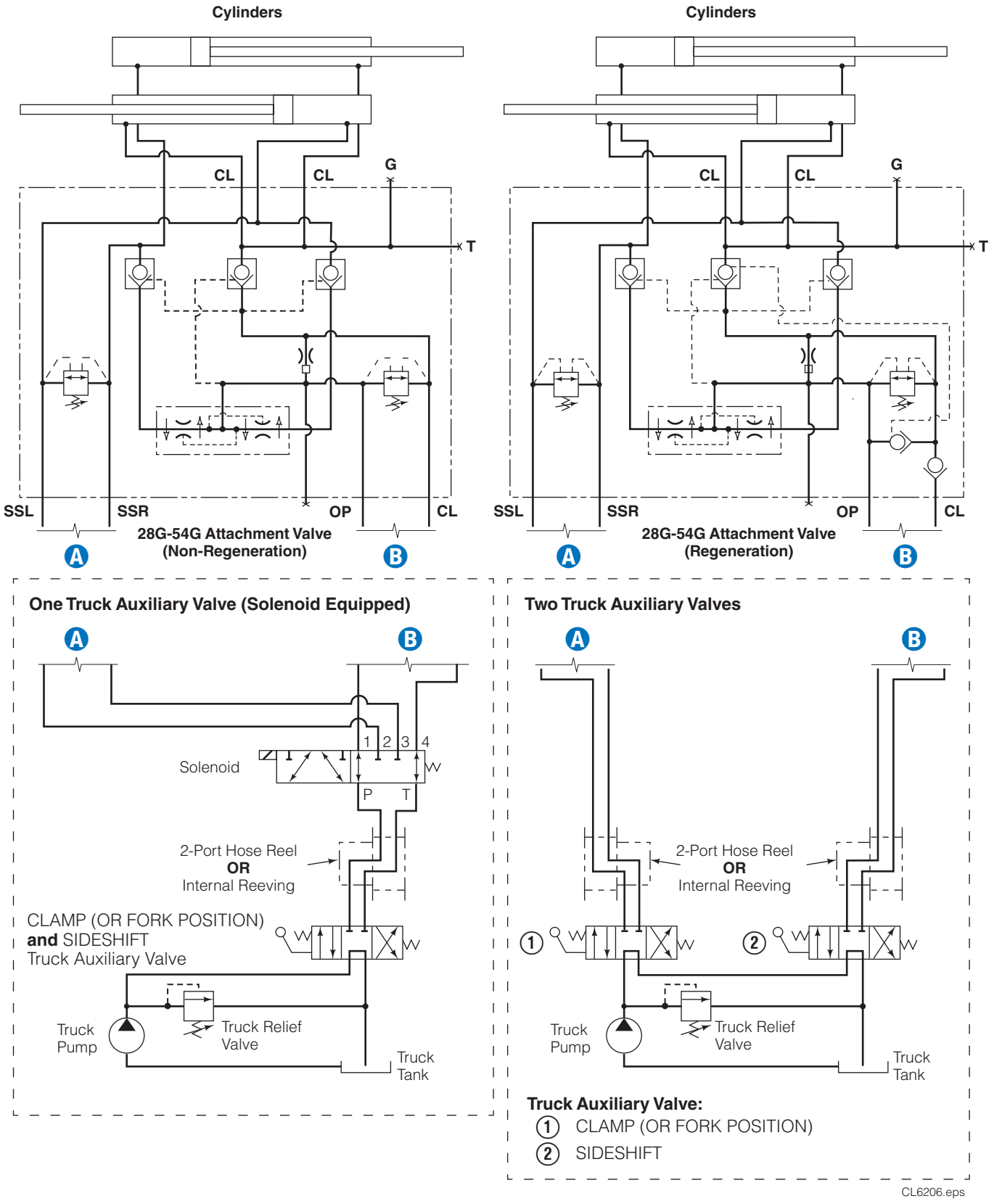
PRESSURE

RETURN

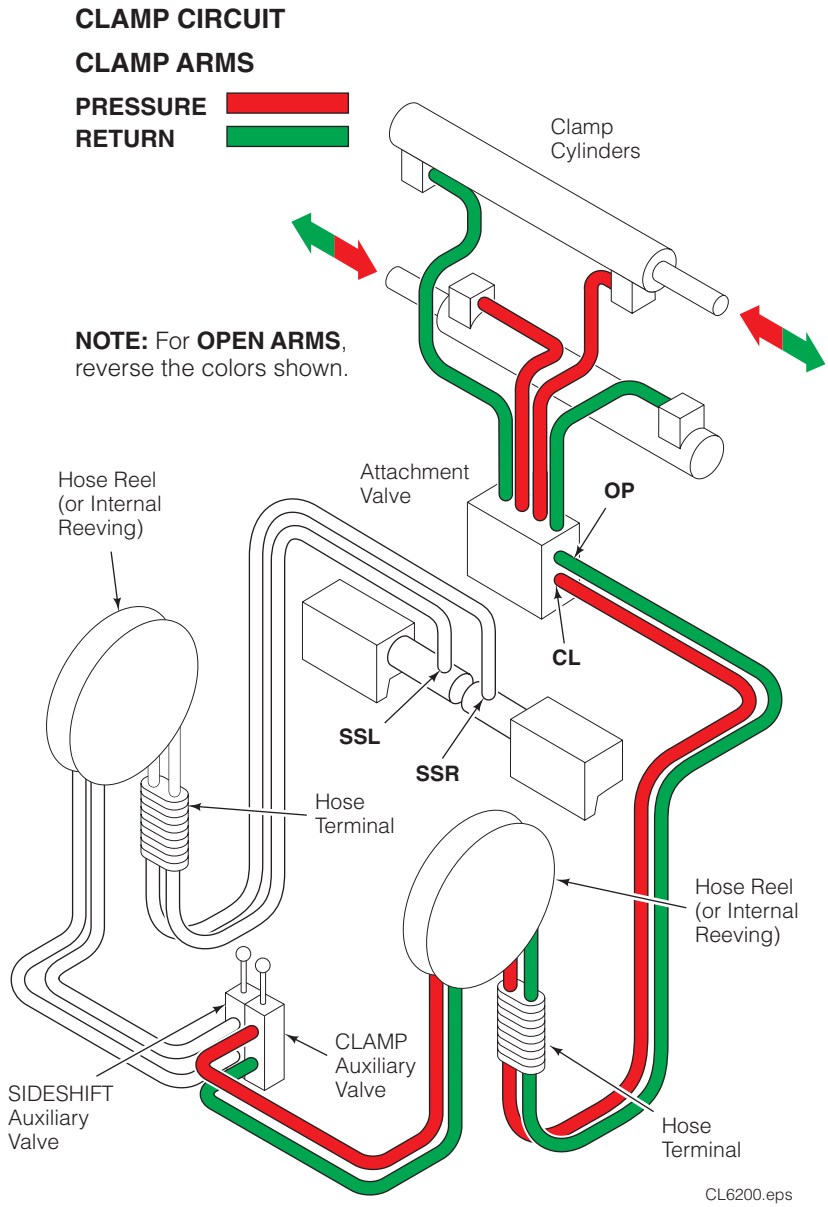
SLAVE

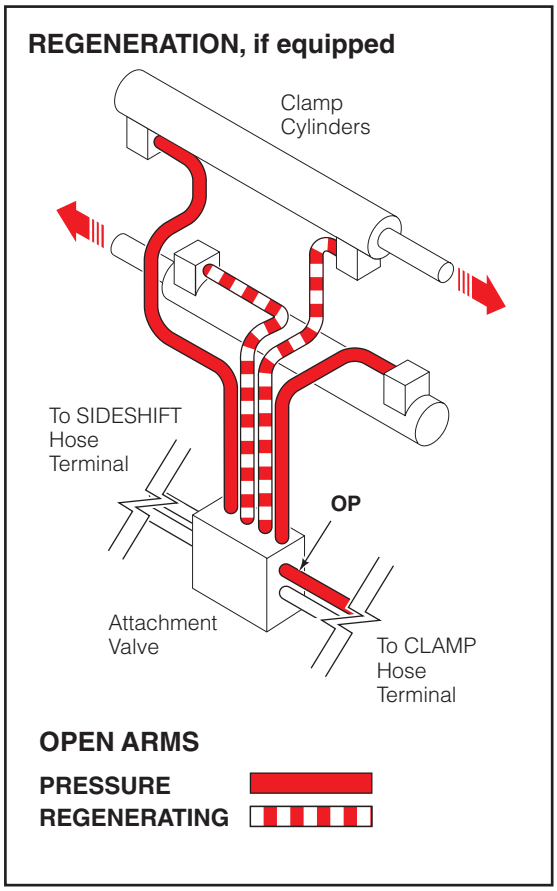
NOTE: For **SIDESHIFT RIGHT**, reverse the colors shown.

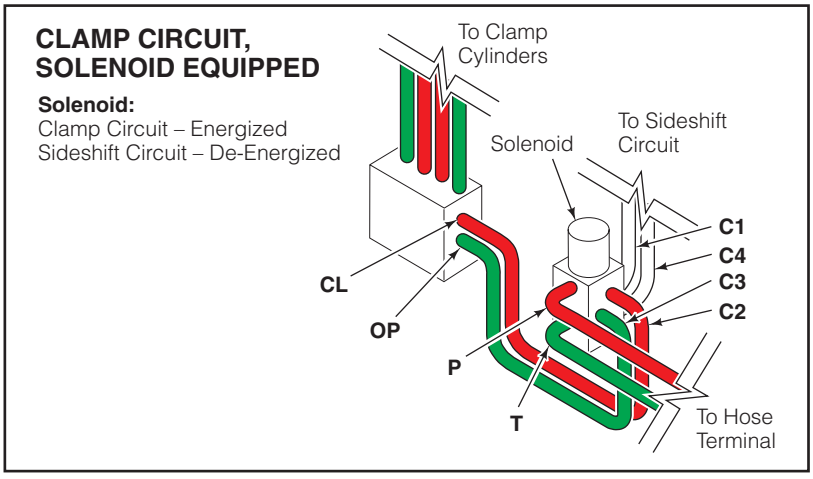
3.2-5 Sideshifting – Hydraulic Circuit

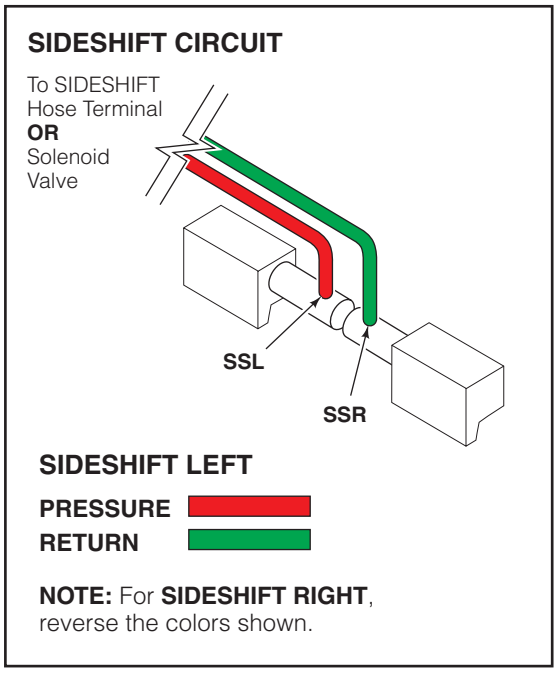


3.2-6 Sideshifting with External Sideshift – Hosing Diagram

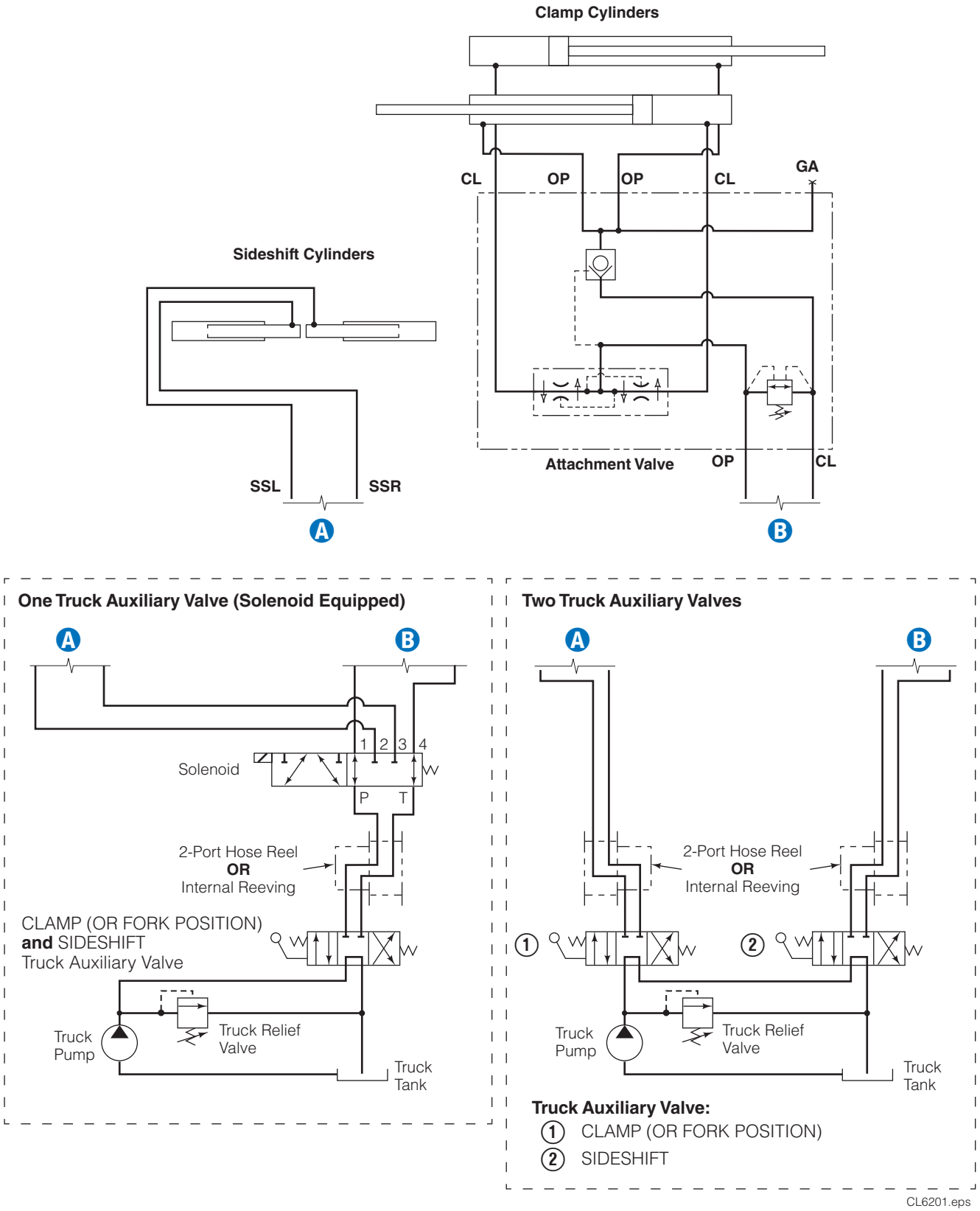








3.2-7 Sideshifting with External Sideshift – Hydraulic Circuit



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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.

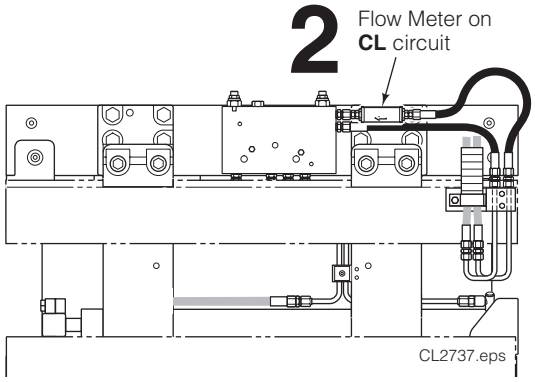
3.3-1 Supply Circuit Test

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:**

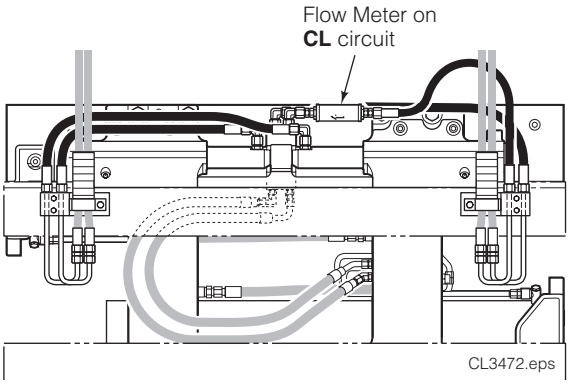
Low Pressure Valve – 155 bar
High Pressure Valve – 190 bar

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 position for a few seconds. Release the lever and check for external leaks at fittings, hoses and valve.



Rear Mounted Valve
Back (Driver's) View



Front Mounted Valve
Back (Driver's) View

3.3-2 Clamp Circuit Test

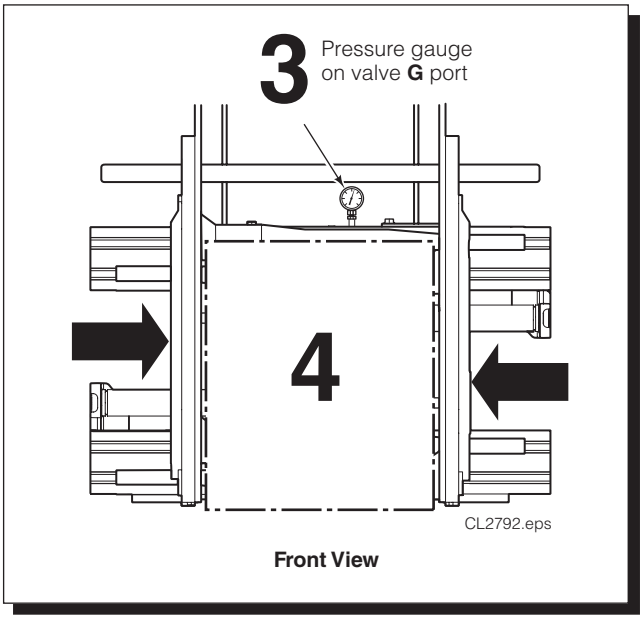
1 **Solenoid equipped –** Press the solenoid button. Listen for a 'click' at the solenoid valve. If no sound is heard, first check the fuse, wiring and coil. Make sure that the valve is not jammed. Refer to Section 4.7.

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. If the arms move slowly or not at all, the CLAMP relief cartridge may be faulty or need adjustment. Refer to the next page for cartridge location. 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.

3 Position the arms to mid-stroke. Turn the truck off and connect a pressure gauge to the **G** 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.



Front View

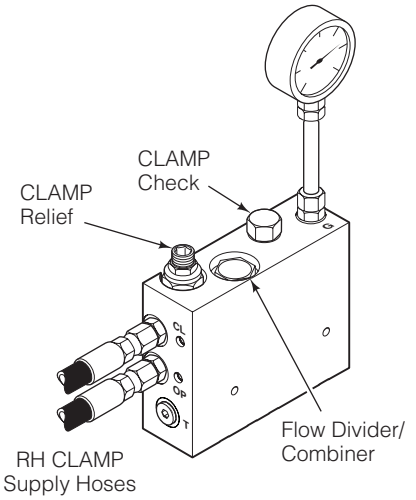
3.3-2 Clamp Circuit Test (Continued)

5 Release the lever and watch the pressure gauge:

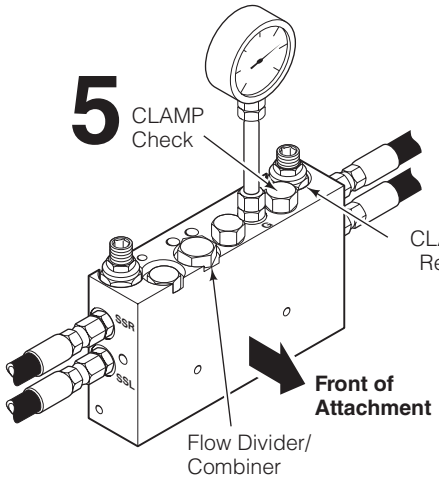
- If the pressure drop is **less** than 10 bar initially, and additional drop does not exceed 2 bar per minute, the problem is not hydraulic. Refer to the list of potential problems, Section 3.3.
- If the pressure drop **is more** than 10 bar initially, and additional drop exceeds 2 bar per minute, the CLAMP check valve cartridge may be faulty. Replace the cartridge. Refer to Section 4.3-3.

6 Fully close the arms. Hold the lever in the CLAMP 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 for cylinder service.

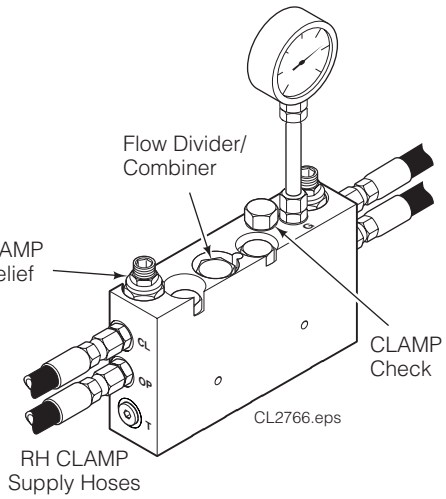
NON-SIDESHIFT VALVE
RH CLAMP Ports



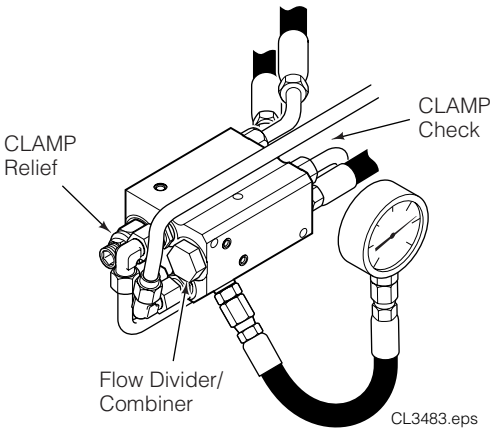
SIDESHIFTING VALVE
LH CLAMP Ports



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

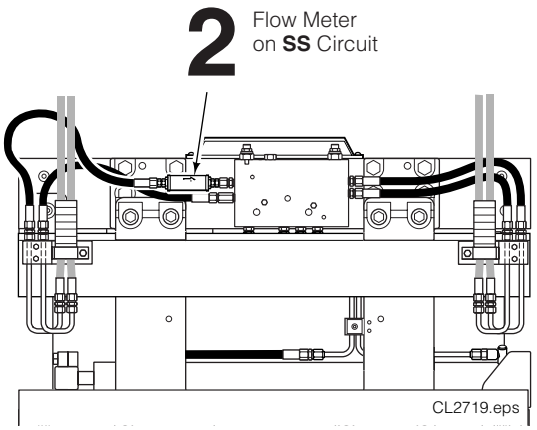
1 Check the pressure supplied by the truck at the carriage hose terminal. Pressure must be within the range shown in Specifications, Section 5.1. **PRESSURE TO THE ATTACHMENT MUST NOT EXCEED:**

Low Pressure Valve – 155 bar
High Pressure Valve – 190 bar

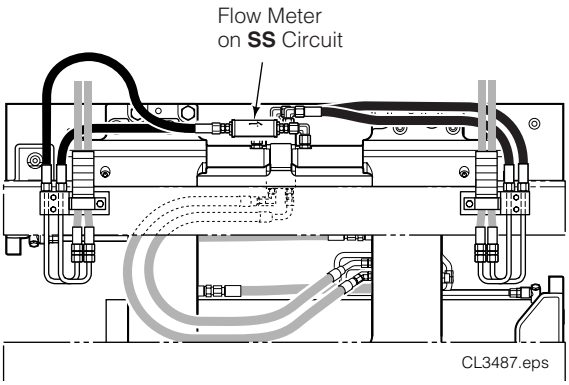
2 Check the flow volume at the carriage hose terminal. Flow must be within the range shown in Specifications, Section 5.1.

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.



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 **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 4.7.

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:

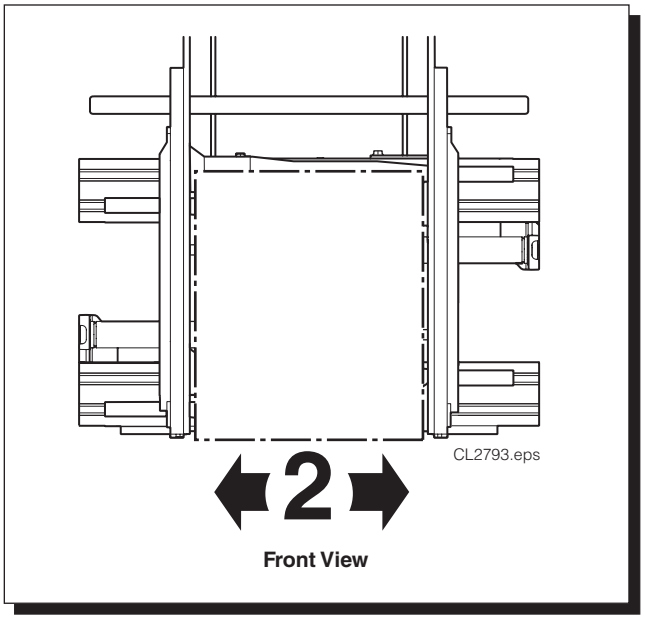
- If there is little or no movement, adjust SS relief clockwise (CW) until attachment sideshifts. Then adjust counterclockwise (CCW) 1/4 turn increments until sideshift speed slows (relief opening). Finish by adjusting cartridge clockwise (CW)1/4 turn.
- If the attachment will not sideshift after attempted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

3 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.

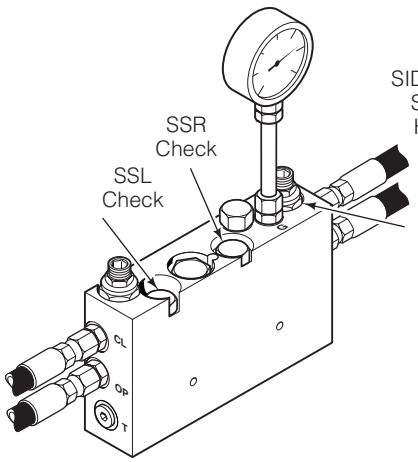
- If valve does not have an 'OR' port, install a new valve with equalization circuit or install an external equalization connection between CLAMP/ OPEN lines. Refer to Service Kit 212863 (includes Installation Sheet 212862) or TB167.

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).

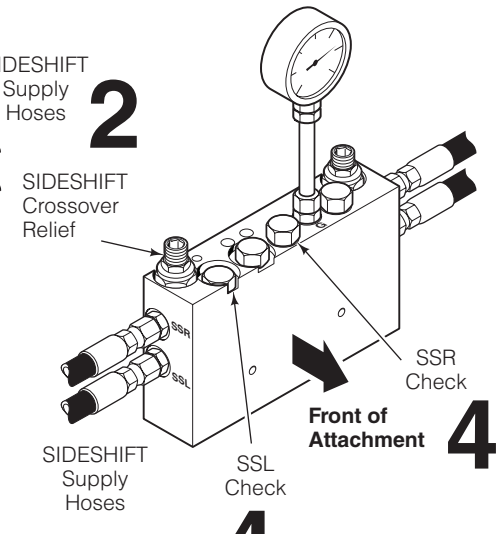
- If the attachment still sideshifts improperly in one or both directions, problem is not hydraulic. Refer to the list of potential problems, Section 3.4.



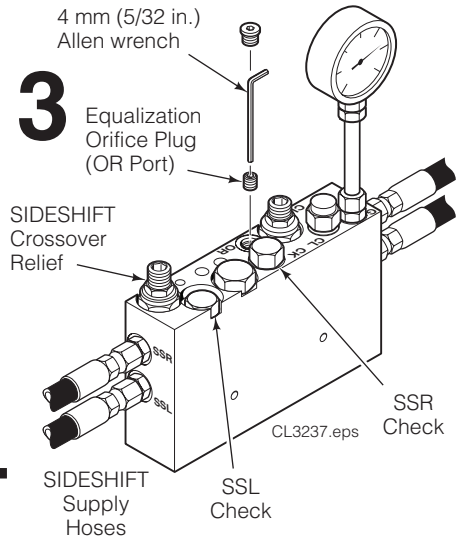
SIDESHIFTING VALVE LH Sideshift Ports



SIDESHIFTING VALVE RH Sideshift Ports



SIDESHIFTING VALVE with REGENERATION RH Sideshift Ports



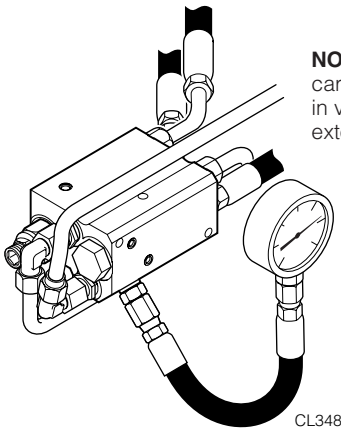
4

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.
- If there is **any hydraulic leakage** at the cylinder rod seals, the sideshift cylinder assemblies require service. Refer to Section 4.5.
- If there is **no hydraulic leakage** at the cylinder rod seals, the problem is not hydraulic. Refer to the list of potential problems, Section 3.4.



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

3.5 Electrical Circuit
(Solenoid-equipped Clamps)

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.

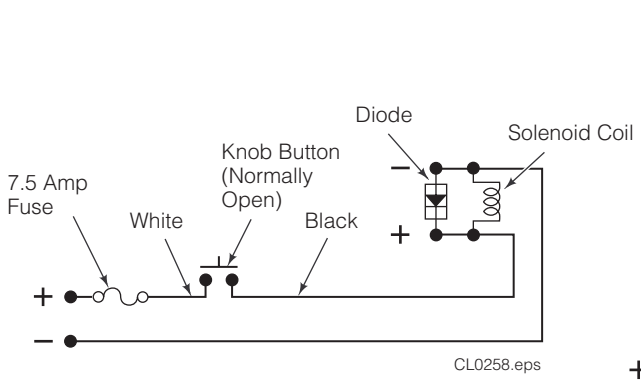
NOTE: When replacing the diode, the banded (+) end must be connected to the coil and wiring as shown.

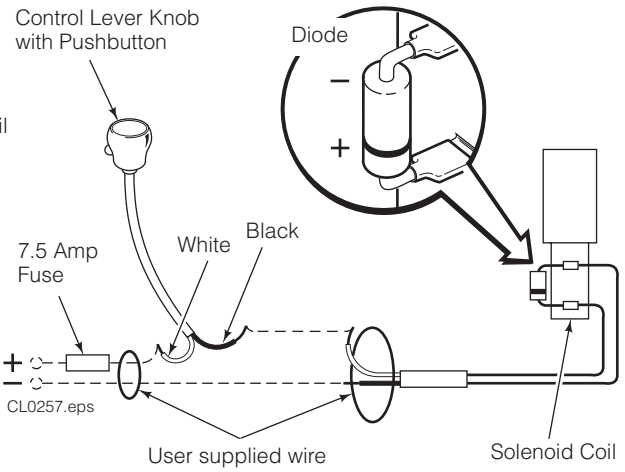
4 Use a voltmeter to determine if correct voltage is present at the electrical leads when the button is pressed.

- 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:

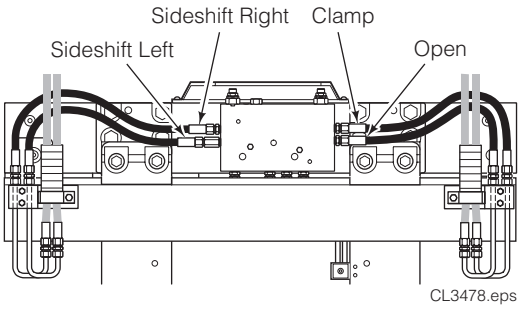
Quick-Change Hooks – Remove the locking pins and drop the hooks into the unlocked position. Replace the pins in the lower holes. For reassembly, remove the pins and slide the hooks up to the locked position. Replace the pins in the top holes.

Bolt-On Hooks – Remove the capscrews and mounting hooks. For reassembly, tap the hooks tight against the carriage bar and tighten the capscrews to 165 Nm.

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

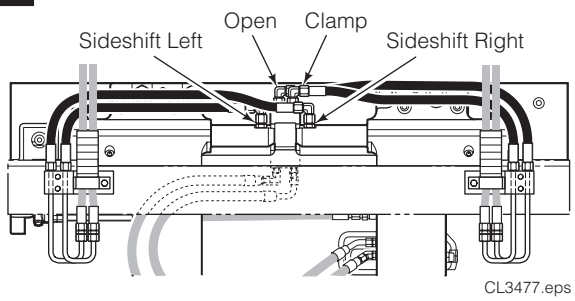
5 For attachment installation, reverse the above procedures with the following exceptions:

- For complete installation procedure, refer to Installation Instructions 6033701.
- **External Sideshifting Attachments –** 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.



Internal Sideshifting Attachments
Back (Driver's) View

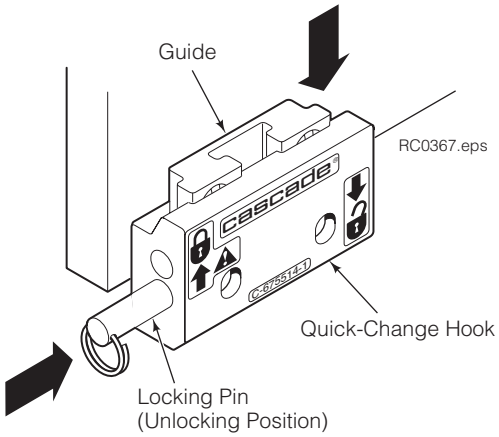
2



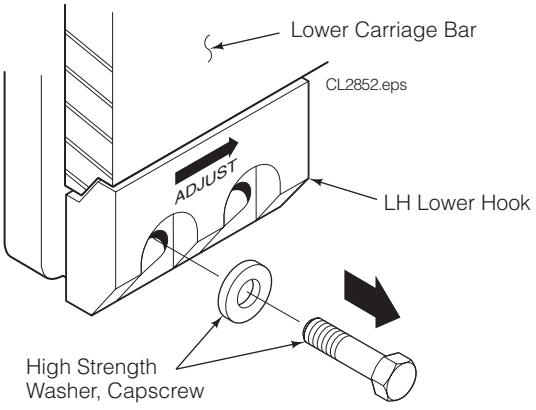
External Sideshifting Attachments
Back (Driver's) View

3

Quick-Change Lower Hook



Bolt-On Lower Hooks



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
12G-18G – 275 Nm
28G – 110 Nm
36G (M12) – 110 Nm
36G (M16) – 275 Nm
44G, 52G – 275 Nm

Attachments with External Sideshift
28G, 36G – 90 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.

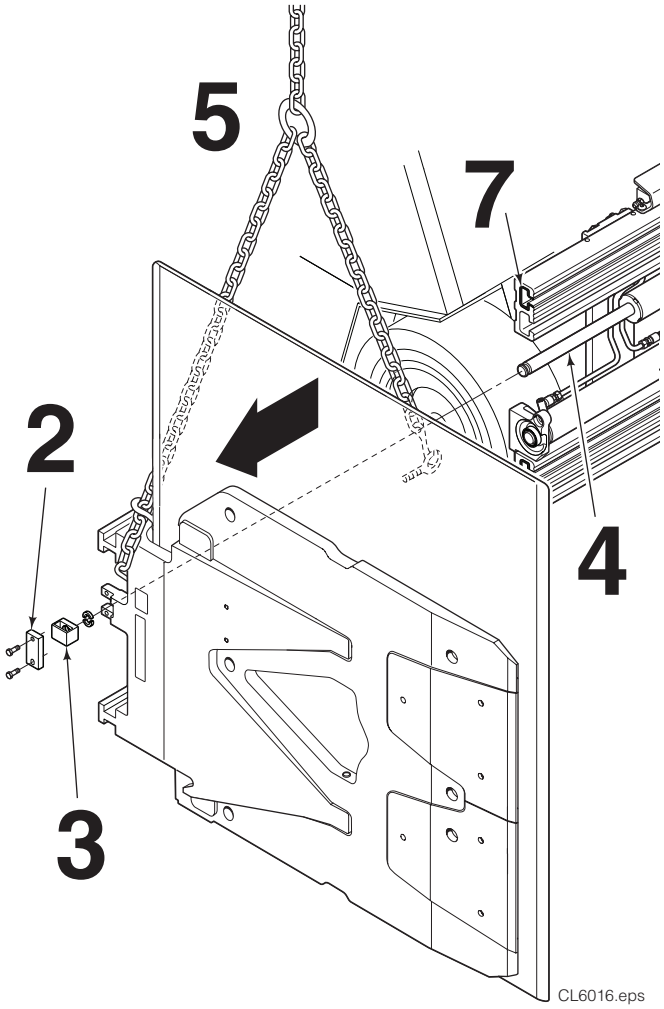
5 Attach an overhead hoist to the arm assembly. Position the chain clear of the arm bearing surfaces.

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.



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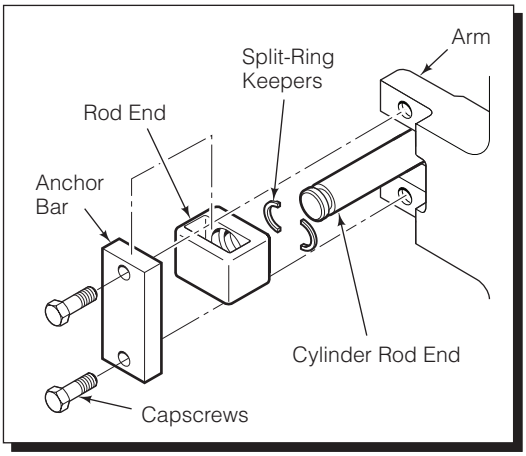

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4.2-2 Carton Clamp Arm Contact Pad – Replacement or Rotation

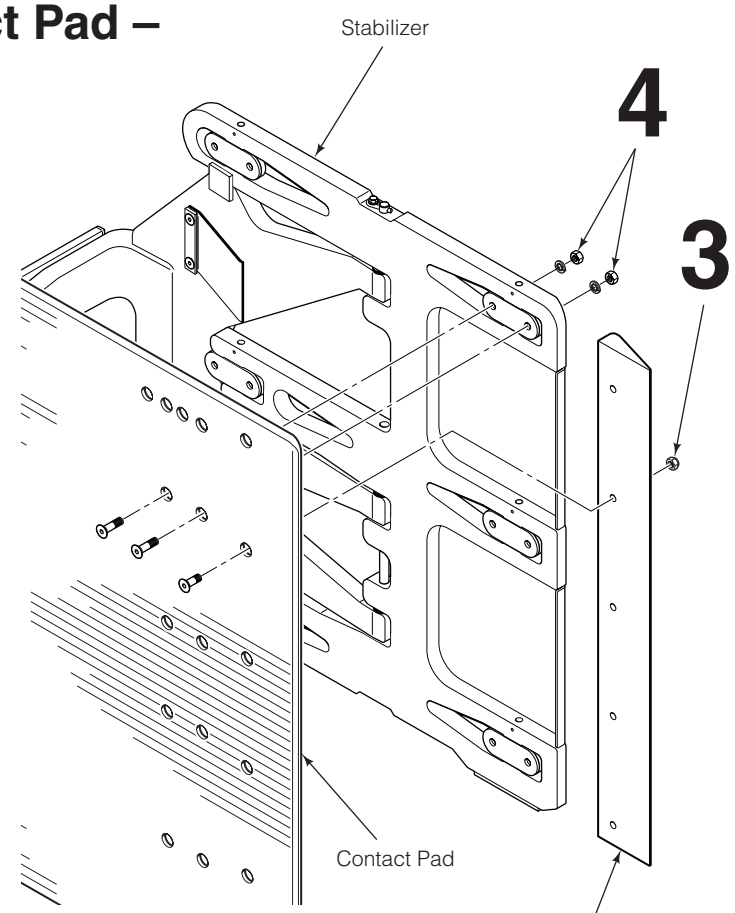
The following procedures can be performed with the attachment mounted on the truck.

NOTE: Contact pad surfaces that are worn or damaged over the entire pad area will require pad replacement. If only the lower surface is worn, the pads can be rotated 180° and swapped side-for-side.

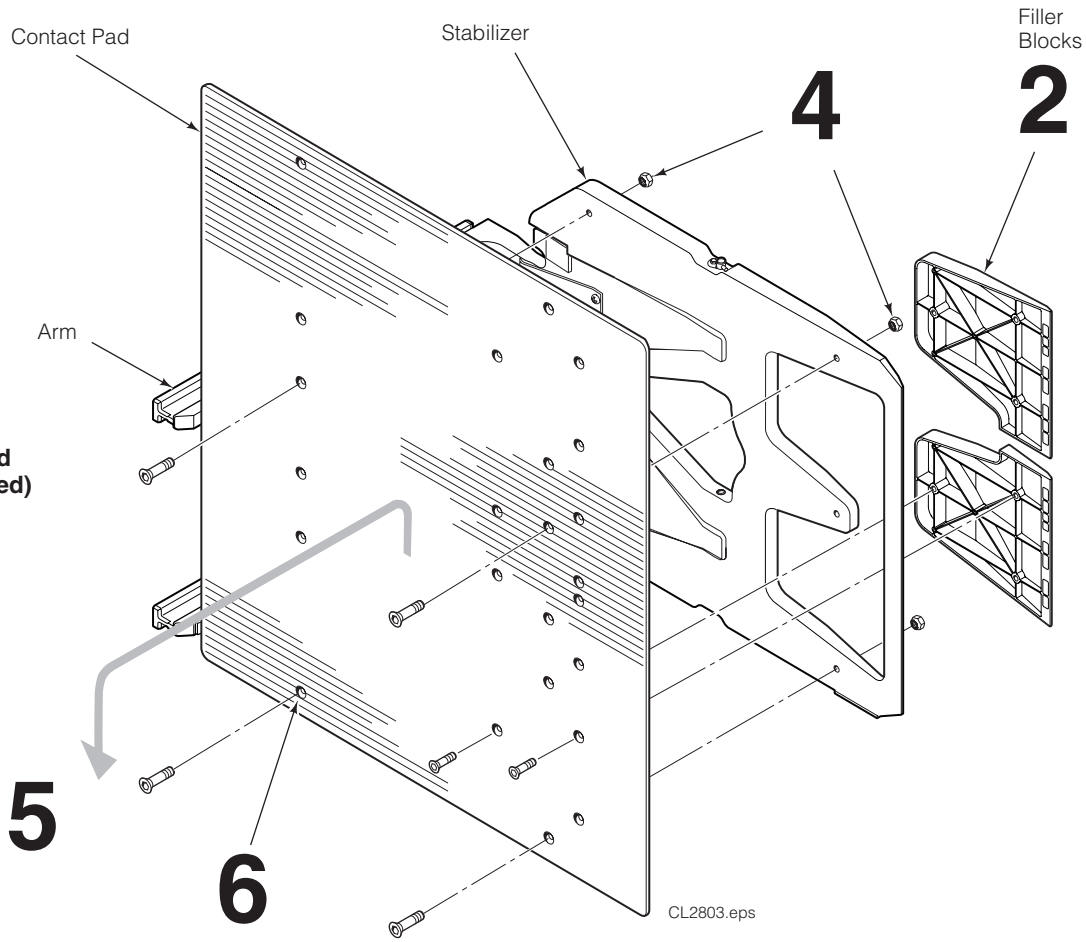
1. Extend the arms to frame width. Lower the attachment so that the contact pads just touch the floor.
2. **Standard (Shimmed) Design –** Remove the stabilizer filler blocks. For reassembly, tighten the capscrews to 25 Nm.

   CAUTION: Do not overtighten capscrews.
3. **Flexible (ADJUSTA-BLOCK) Design –** Remove the wear shoe. For reassembly, tighten the capscrews to 90 Nm.
4. Remove the capscrews and nuts fastening the contact pad to the stabilizer. Remove the contact pads. For reassembly, tighten the capscrews to:

   Standard (Shimmed) Design – 65 Nm
   Flexible (ADJUSTA-BLOCK) Design – 90 Nm
5. Install new pads, or rotate the pads 180° and swap side-for-side and reinstall.
6. For reassembly, reverse the above procedures with the following exceptions:
   - Inspect contact pad mounting holes for wear or elongation. Repair using Hole Service Kit 676841.



Flexible (ADJUSTA-BLOCK) Design



Standard (Shimmed) Design

4.2-3 Carton Clamp Contact Pad and Stabilizer Repair

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

1. Extend the arms to frame width. Lower the contact pads so that they just touch the floor.
2. Remove the contact pad from the attachment as described in Section 4.2-2.
3. Inspect the contact pad for flatness. Replace or straighten as required. Inspect the contact pad mounting holes for wear or elongation. Repair using Hole Service Kit 676841.
4. Remove the stabilizer from the arm by removing the two pin retainers and pivot pins. For reassembly:

   Standard (Shimmed) Design – Tighten each retainer capscrew to 20 Nm.

   Flexible (ADJUSTA-BLOCK) Design – Apply Loctite 242 (blue) to each capscrew thread and tighten to 20 Nm.
5. Inspect the stabilizer pivot pin, bushings and shims for wear and replace as necessary.

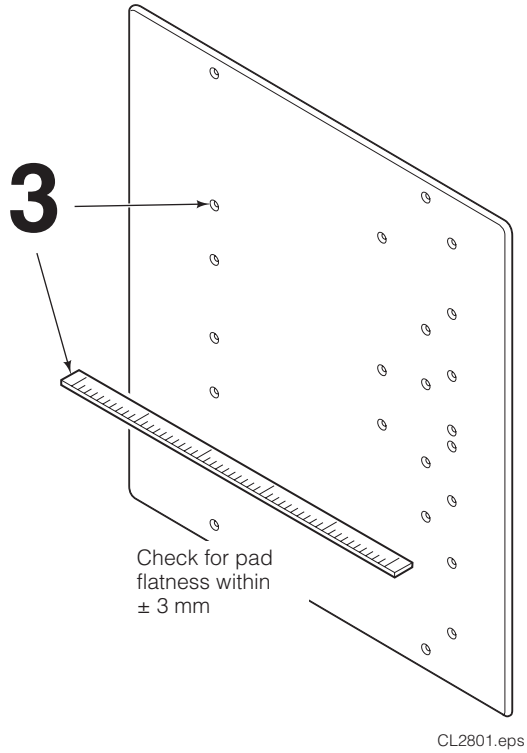
   CAUTION: Use a bushing driver to replace the bushings in the arm. Do not damage the bushing ID.
6. Inspect the wear tile(s) of each stabilizer for wear. Replace as necessary. Location(s) are as follows:

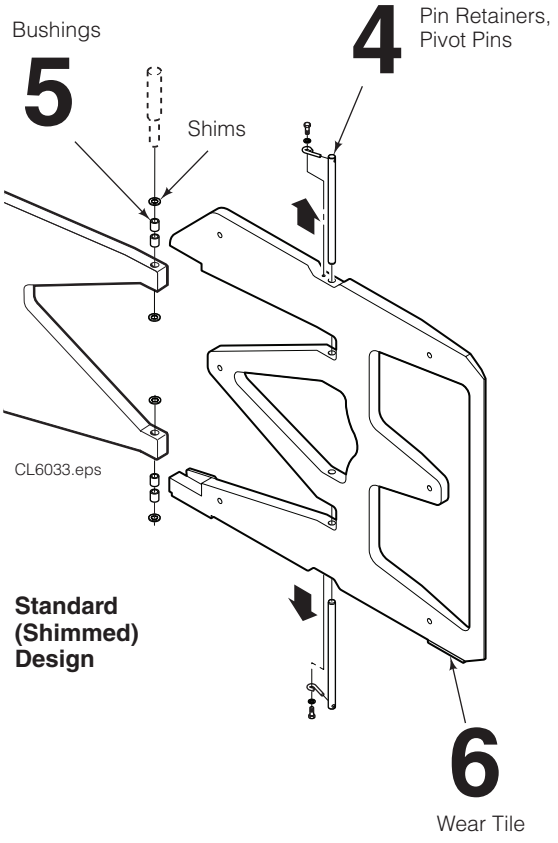
   Standard (Shimmed) Design – Bottom front surface

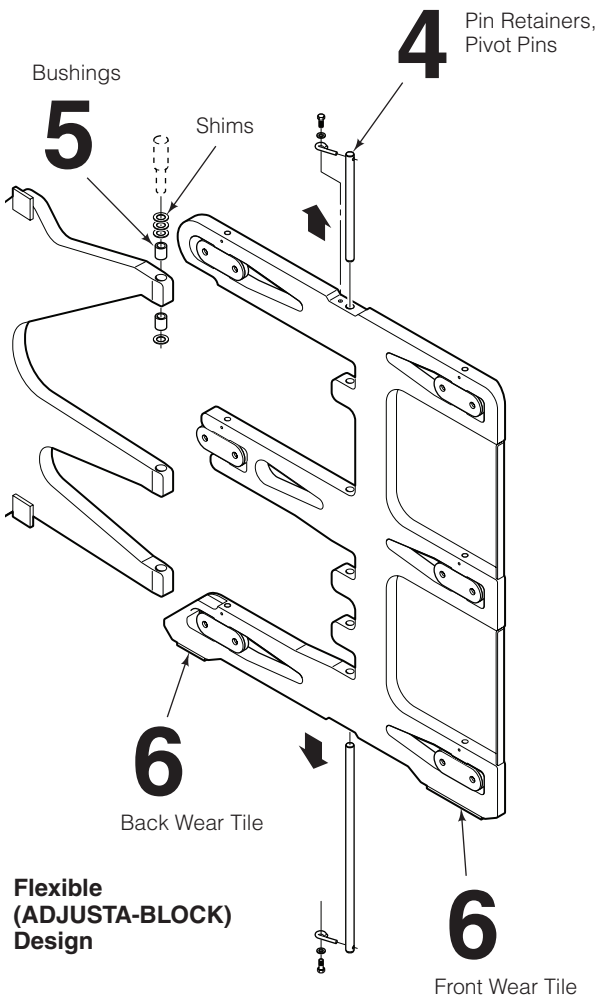
   Flexible (ADJUSTA-BLOCK) Design – Bottom front and back surfaces

   IMPORTANT: If wear extends into the stabilizer bottom surface, build up with weld and grind flat to within 1.5 mm along the full length of the stabilizer.

Procedure continued on the following page







4.2-3 Carton Clamp Contact Pad and Stabilizer Repair (continued)

7 Weld the new wear tile(s) onto the stabilizers, as follows:

- **Standard (Shimmed) Design –** Preheat weld area (through stabilizer thickness and minimum of 75 mm) to 10 °C minimum to 48 °C maximum before welding. Maximum interpass temperature should not exceed 103 °C.

  Weld new wear tile to the **bottom front surface of each stabilizer** using GMAW (Gas Metal Arc Welding). Weld using ER70S-3, ER70S-4, ER70S-6 and gas 92% Ar/ 8% CO_2. Weld with a 6 mm fillet weld only the areas as shown. Cool wear tile at normal air cool.

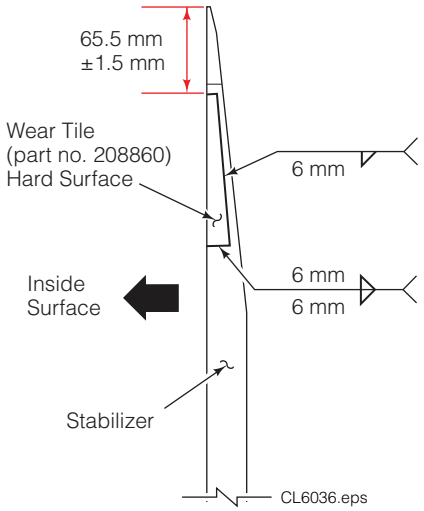
  NOTE: Weld only to the steel backing of the wear tile. Weld will not stick to the wear tile hard surfacing.

- **Flexible (ADJUSTA-BLOCK) Design –** Preheat weld area (through stabilizer thickness and minimum of 75 mm) to 121 °C minimum to 159 °C maximum before welding. Maximum interpass temperature should not exceed 214 °C.

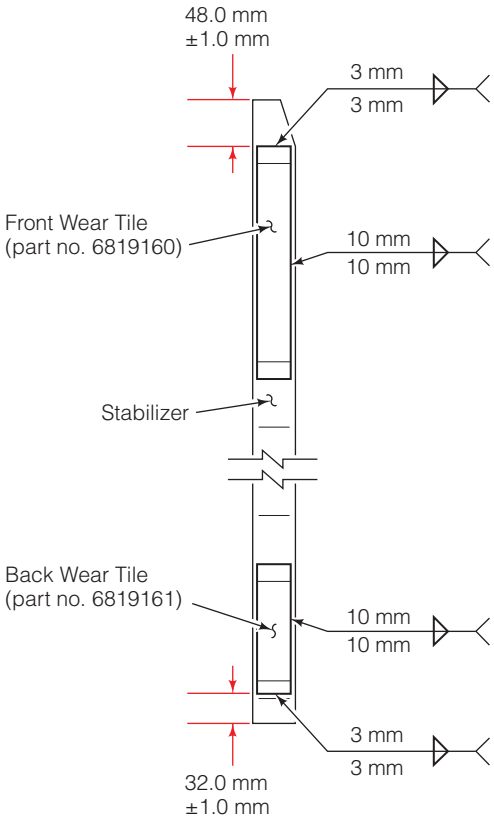
  Weld new wear tile to the **bottom front and back surface of each stabilizer** using FCAW (Flux-Cored Arc Welding). Attach ground wire to stabilizer. Weld using E70T-1 and shield gas per manufacturer's recommendation. Set welding amps per manufacturer's recommendation with polarity DCRP. Completely remove slag between passes. Fillet weld, with size indicated, only the areas as shown. Cool wear tiles slowly by covering with blankets.

8 If required, grind the weld along the inside edge of the stabilizer flush with the inside surface. The contact pads must bolt up flat against the stabilizer without interference from the welds.

9 For reassembly, reverse Steps 1–5.



Standard (Shimmed) Design



Flexible (ADJUSTA-BLOCK) Design

4.2-4 Standard (Shimmed) Design – Contact Pad Camber Adjustment

The following procedure is performed on attachments with standard (shimmed) design for contact pad and stabilizer. This procedure can be performed with the arms in place and the attachment mounted on the truck. A Cascade 4-Point Force Distribution Tester can also be used to verify the clamp force over the contact pad surface.

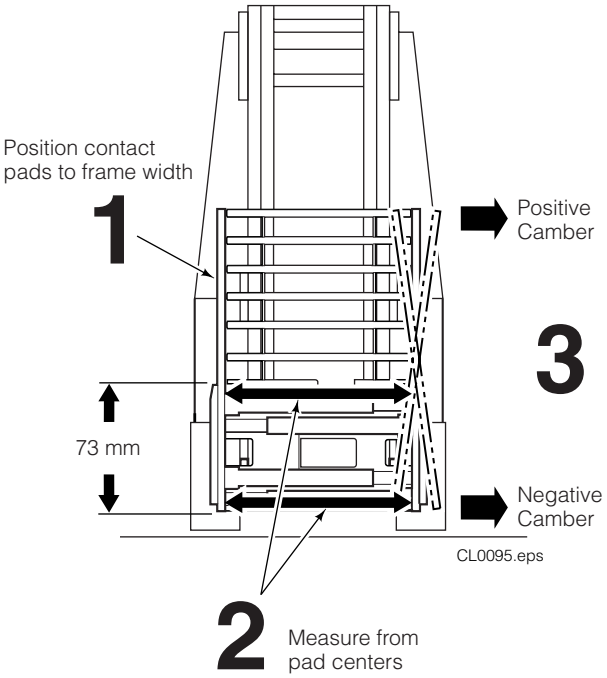
1 Extend the arms to frame width. Lower the contact pads so that they just touch the floor.

2 **Without Tester –** Measure the distance between the pads in two places: at the bottom center (in-line with the pivot pins) and 29 in. (73 cm) above the pad bottom centers, as shown. The difference between the two measurements is the pad camber.

With Tester – Perform Steps 1–5 in the following section, Section 4.2-5. Then continue to Step 4 in this procedure.

3 Determine the camber required for the product being handled. Refer to the Pad Camber Chart found in Section 3.1-4.

Procedure continued on the following page



4.2-4 Standard (Shimmed) Design – Contact Pad Camber Adjustment (Continued)

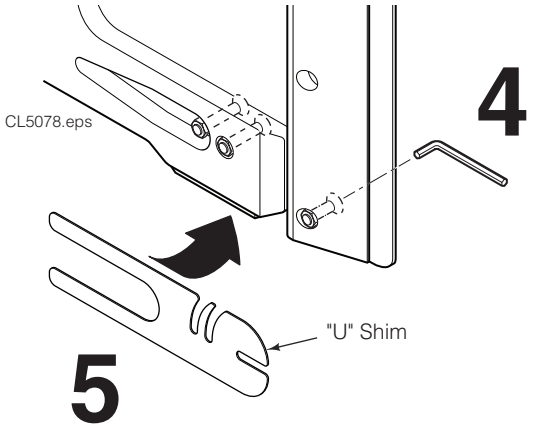
4 Loosen the contact pad capscrews and nuts.

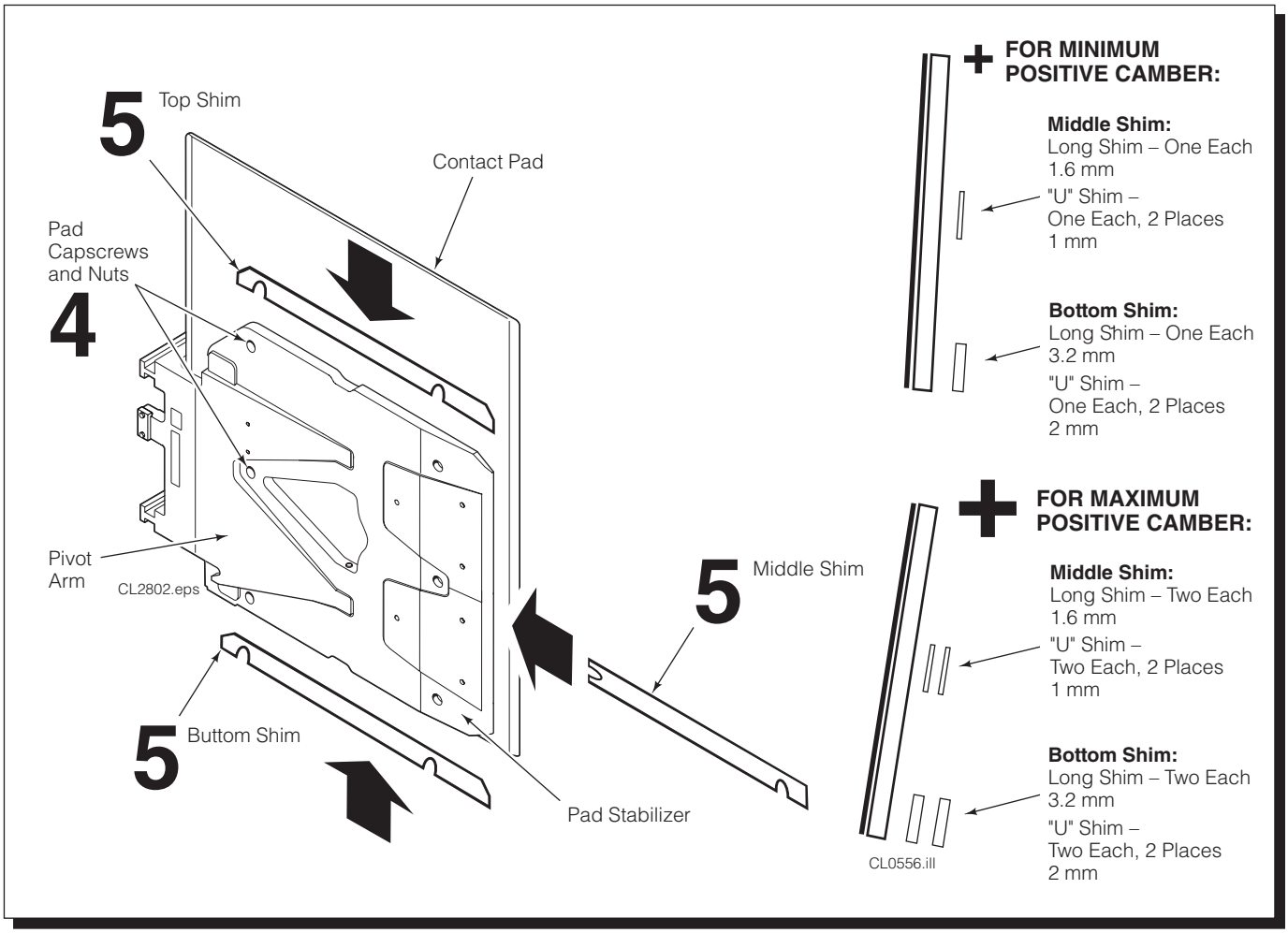
NOTE: It is not necessary to remove the capscrews and nuts to insert the shims.

5 Install shims as required.

- Install shims at the bottom and middle of the pad to provide positive camber (increase clamp force).
- Install shims at the top and middle of the pad to provide negative camber (decrease clamp force).

CAUTION: Use an equal number of shims on each contact pad. Pad camber must be the same on both sides of the attachment for proper load handling.





4.2-5 Flexible (ADJUSTA-BLOCK) Design – Contact Pad Camber Adjustment

The following procedure is performed on attachments with flexible (ADJUSTA-BLOCK) design for contact pad and stabilizer. This procedure can be performed with the arms in place and the attachment mounted on the truck. A Cascade 4-Point Force Distribution Tester is required for this procedure.

IMPORTANT: Clamp circuit pressure should be adjusted, if required, prior to adjusting the pad camber. Refer to Section 4.3-4.

1 Extend the arms to the most common load width. Lower the contact pads to just above the floor.

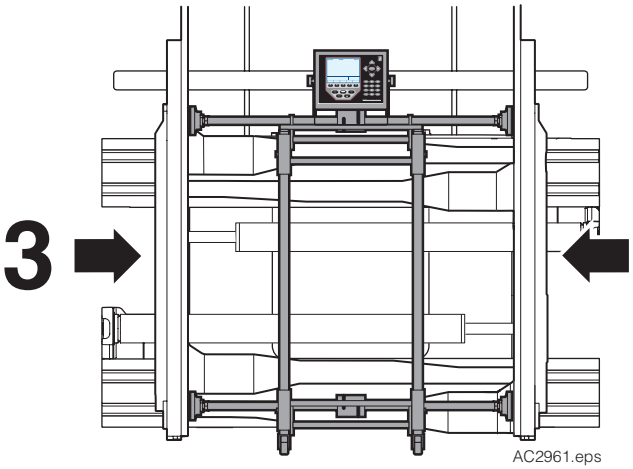
2 Position the tester between the contact pads. Adjust the tester spindle locations to be perpendicular to the contact pad surfaces and to the desired position based on the type of product being handled.

3 Clamp on the tester and hold activated for 5 seconds.

4 The tester will display **clamp force** and **percentage of clamp force** for each spindle location and **total clamp force** (sum of force of the four spindles).

5 Clamp force distribution should be within the desired percentages and tolerances.

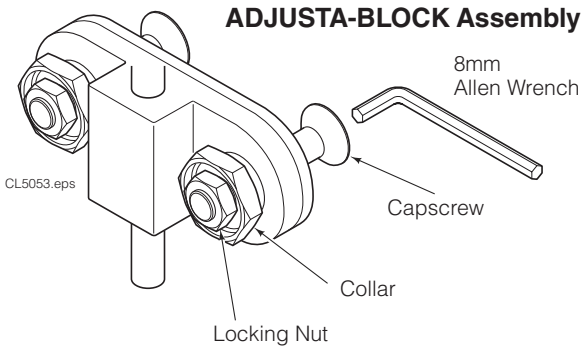
If the tolerance difference is greater than allowable tolerance difference, the contact pads require pivot block adjustment. Continue to Step 6 for adjustment.



6 Clamp force distribution can be changed at the ADJUSTA-BLOCK locations on the right hand contact pad. Tune as follows:

- Loosen the locking nuts 3 turns. Use an 0.31 in. (8 mm) allen wrench to hold the capscrews.
- Adjust the collar using a 1.25 in. (32 mm) socket. Turn the collar **CW** to **increase** clamp force, **CCW** to **decrease** clamp force. One full turn of the collar is approximately 0.08 in. (2 mm) linear travel or 10% of force.

Follow adjustment sequence, Step 7.



Procedure continued on the following page

4.2-5 Flexible (ADJUSTA-BLOCK) Design – Contact Pad Camber Adjustment (Continued)

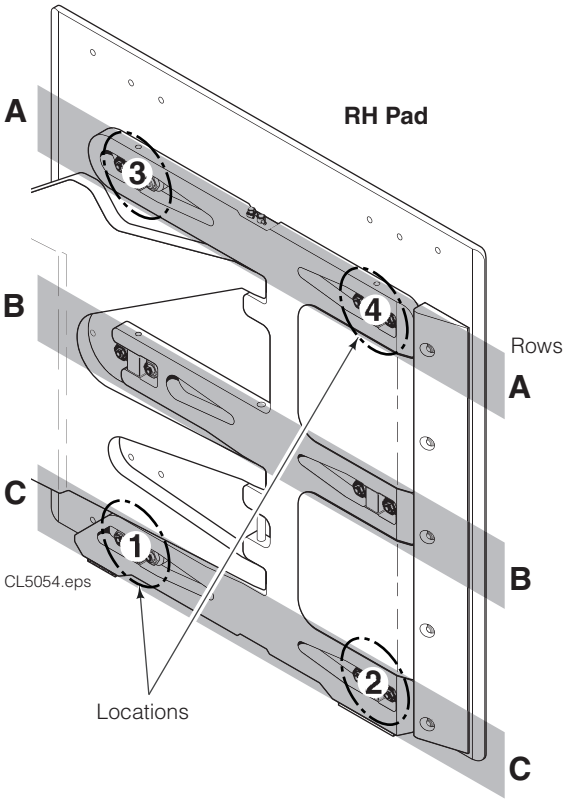
7 Adjustment Sequence –

- Adjust force at location **2** to the desired specification. Validate clamp force with tester and adjust as required.
- Adjust force at location **4** to the desired specification. Validate clamp force with tester and adjust as required.
- Adjust force at location **1** to the desired specification. Validate clamp force with tester and adjust as required.
- Adjust force at location **3** to the desired specification. Validate clamp force with tester and adjust as required.

IMPORTANT: When adjustments are made in Rows **A** or **C**, Row **B** must be adjusted by 1/2.

Example 1: If location **2** in row **C** is increased by 2 mm, the location above **2** in row **B** must be increased by 1 mm.

Example 2: If location **3** in row A is decreased by 2 mm, the location below **3** in row **B** must be decreased by 1 mm.



4.2-6 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.

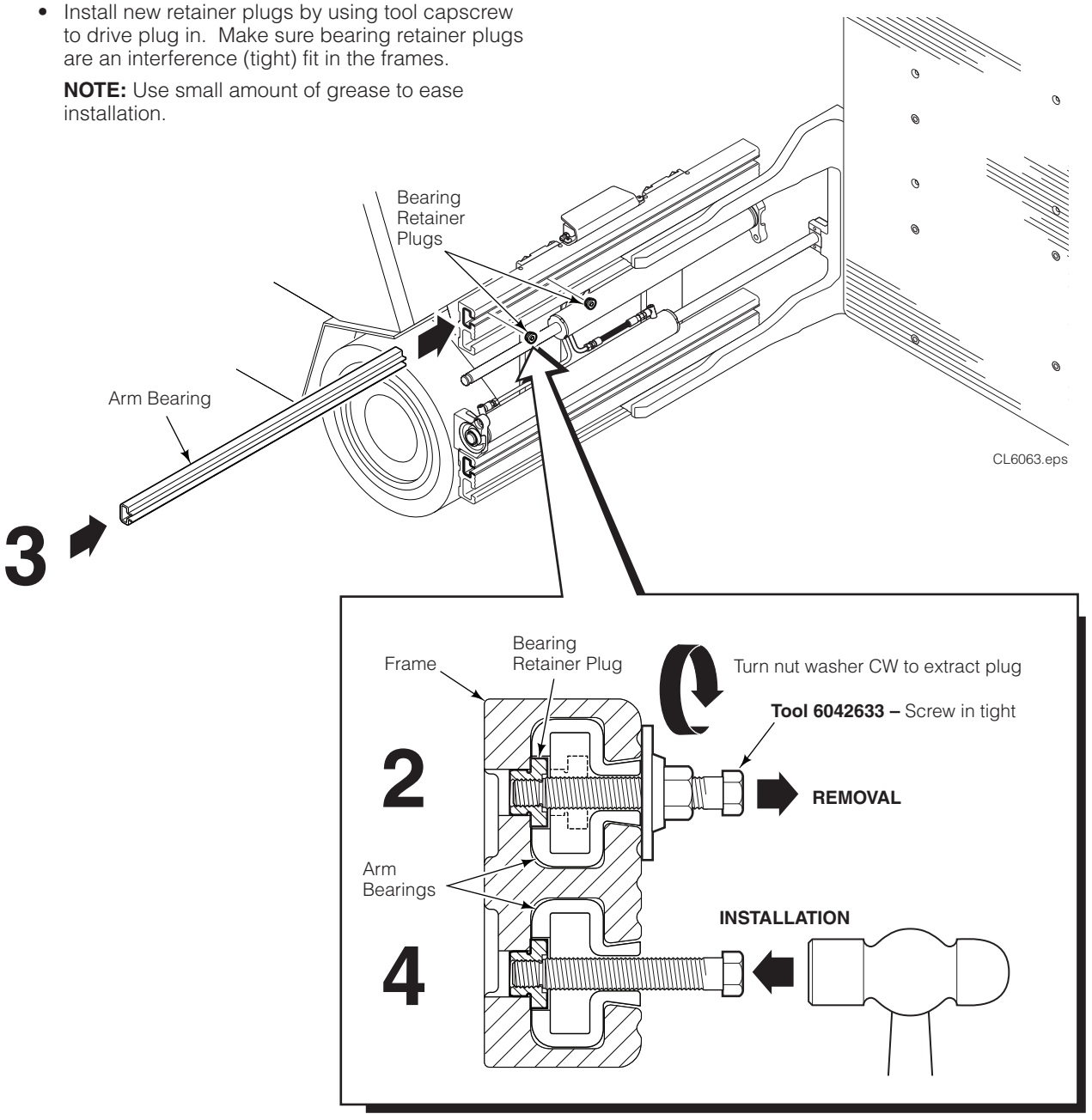
NOTE: M10 x1.25 x 80L capscrew and 40 mm OD large washer may also be used.

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.

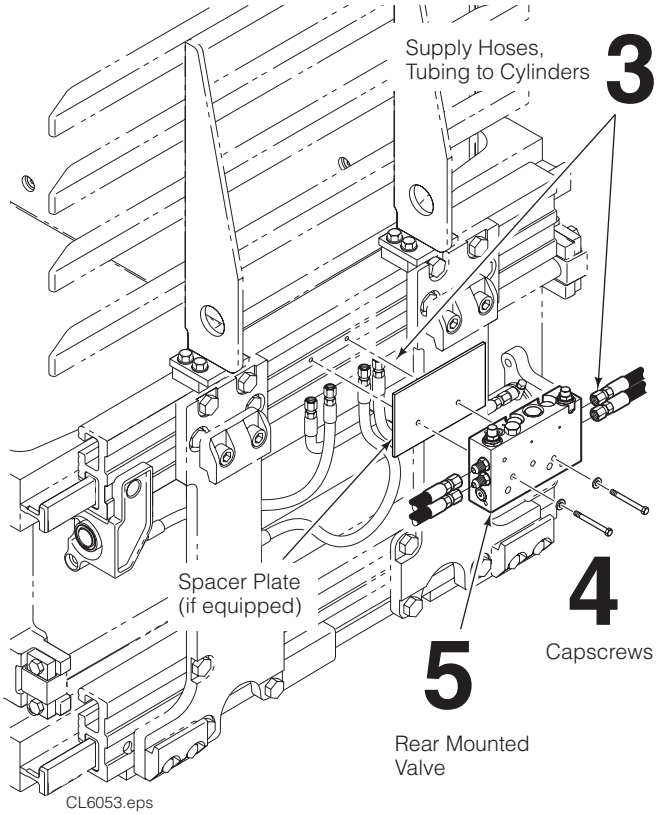
4 Remove the capscrews fastening the valve to the attachment and remove the valve and spacer plate (if equipped). For reassembly, tighten the capscrews to the following:

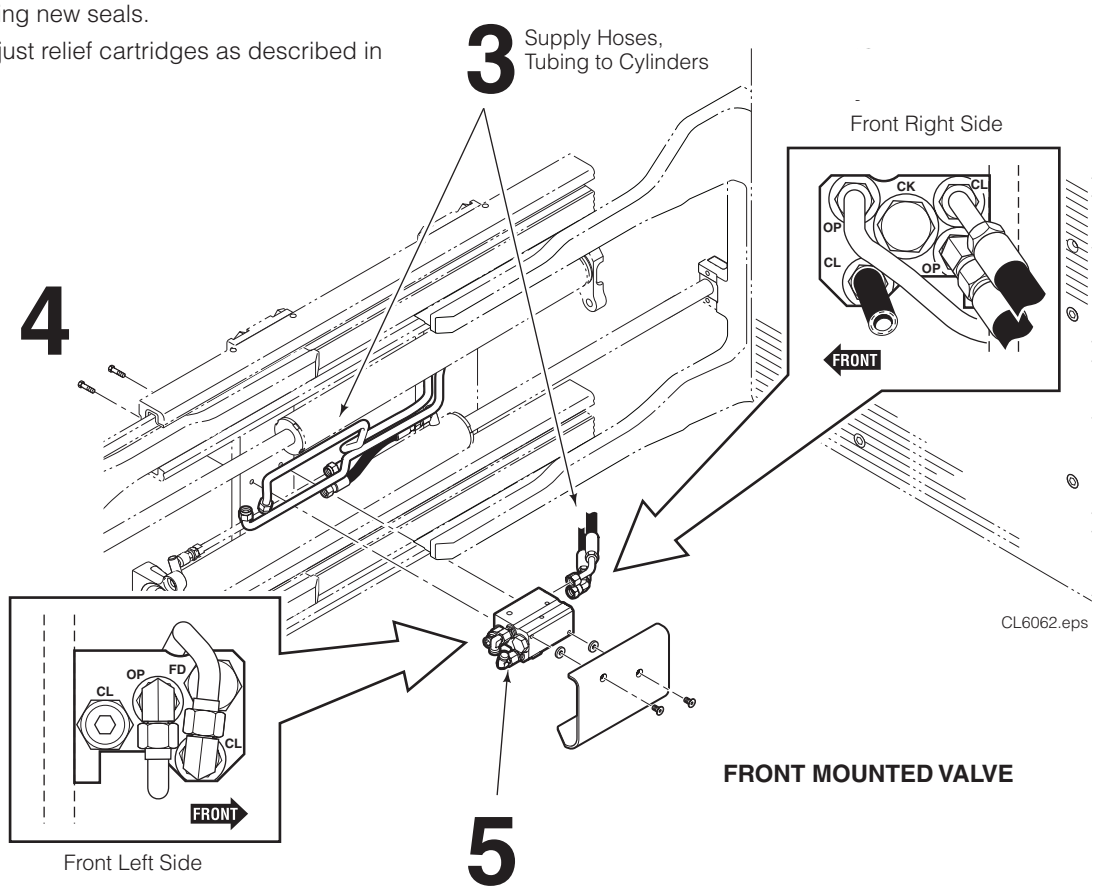
Rear Mounted Valve – 8 Nm
Front Mounted Valve – 38 Nm

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



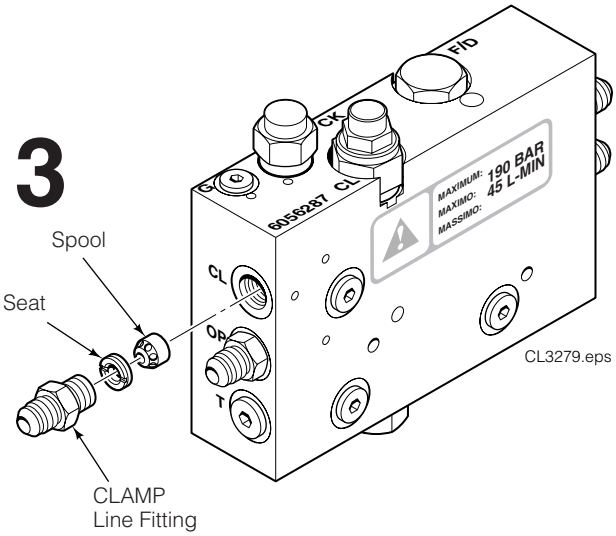


FRONT MOUNTED VALVE

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

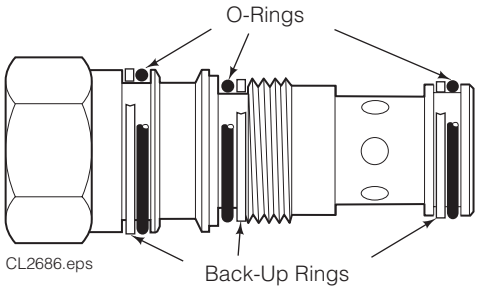
G-Series Clamps use various valves depending on high or low flow, regeneration, LH or RH supply porting, and external sideshifting. Refer to the attachment nameplate and pressure/flow decal on the valve or top of the attachment.

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

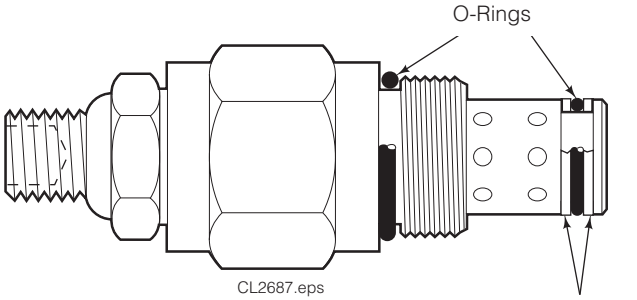
1. Remove the valve from the attachment as described in Section 4.3-1.
2. Remove the cartridges from the valve.
3. Remove the remaining threaded plugs and fittings. Valve body must be completely stripped for proper cleaning.
4. Remove the O-rings and back-up rings from the cartridges.
5. Clean all parts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

     VPO or PC Check Valve – 50 Nm
     Flow Divider/ Combiner – 34 Nm
     Adjustable Relief – 40 Nm

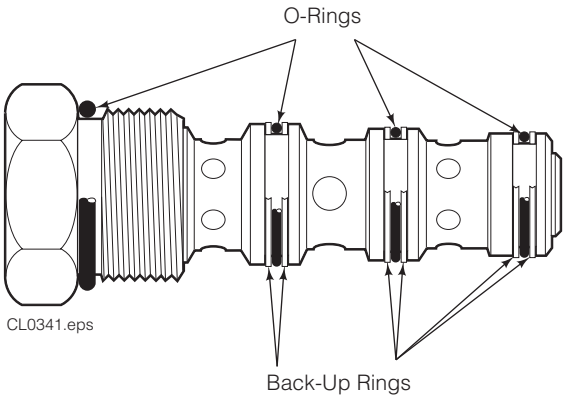
     CAUTION: Make sure cartridges are installed in correct port location in valve body. Refer to the illustrations on following pages and stampings on valve body.



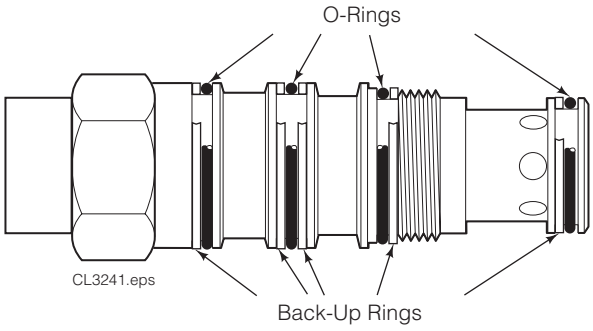
A **PC Check Valve Cartridge**



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



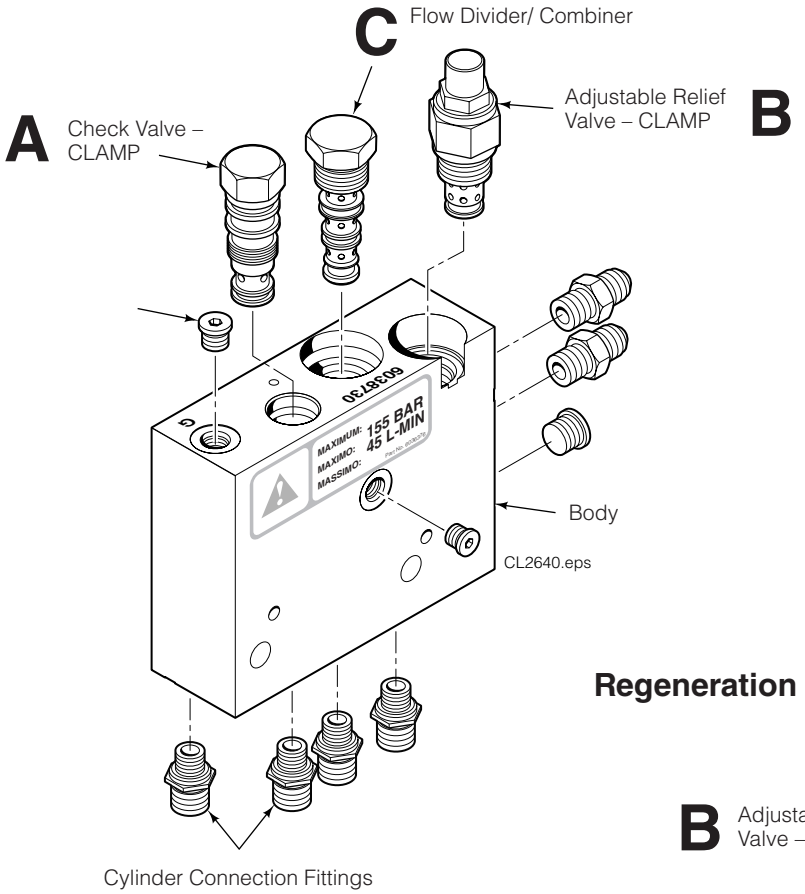
C **Flow Divider / Combiner Cartridge**
(Dual PO Check Valve Cartridge similar)



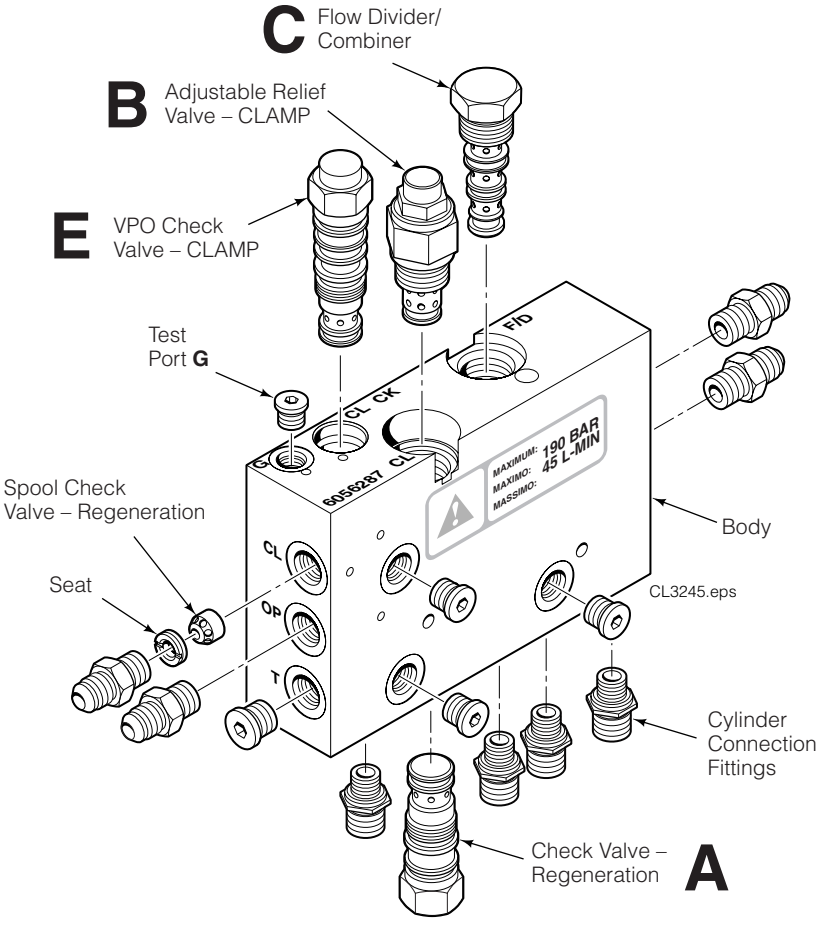
C **VPO Check Cartridge, CLAMP Regeneration Circuit**

4.3-3 Valve Service (Continued)

Non-Sideshift Valve – RH CLAMP Ports



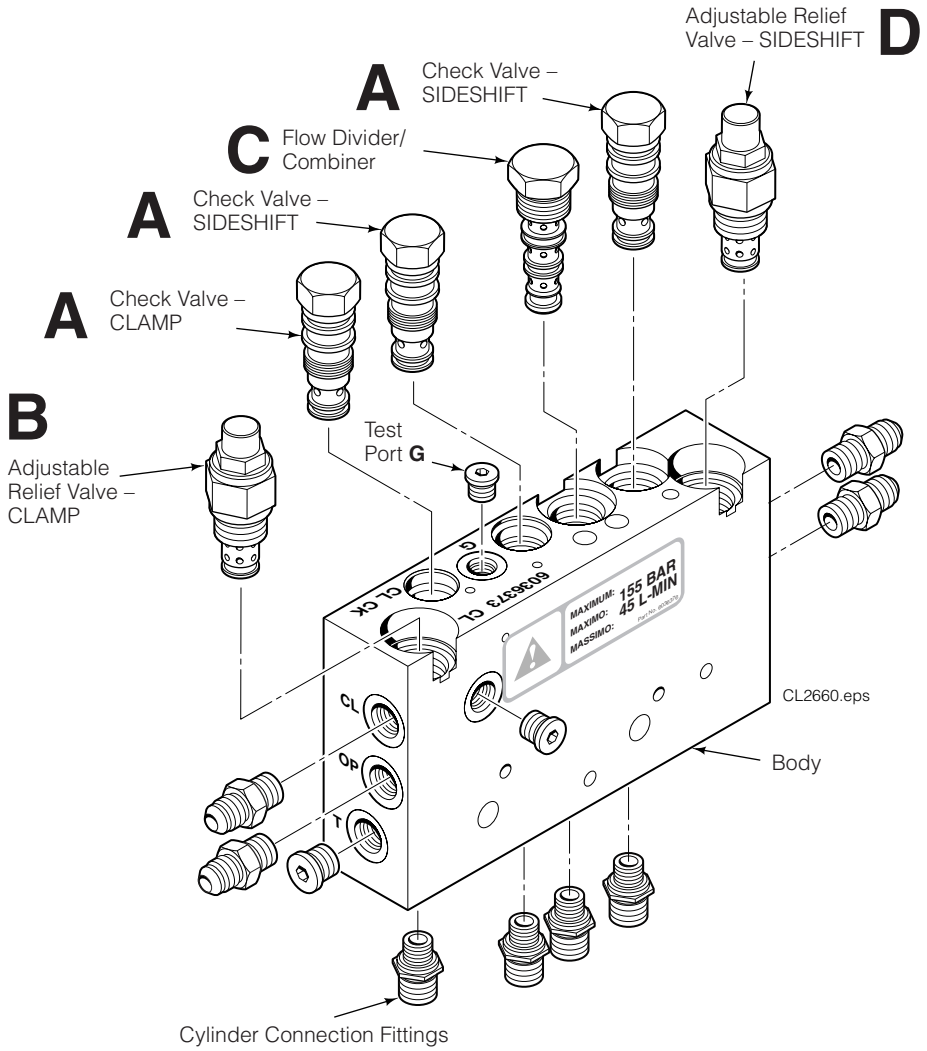
Regeneration Non-Sideshift Valve – LH CLAMP Ports



Back (Driver's) View

4.3-3 **Valve Service** (Continued)

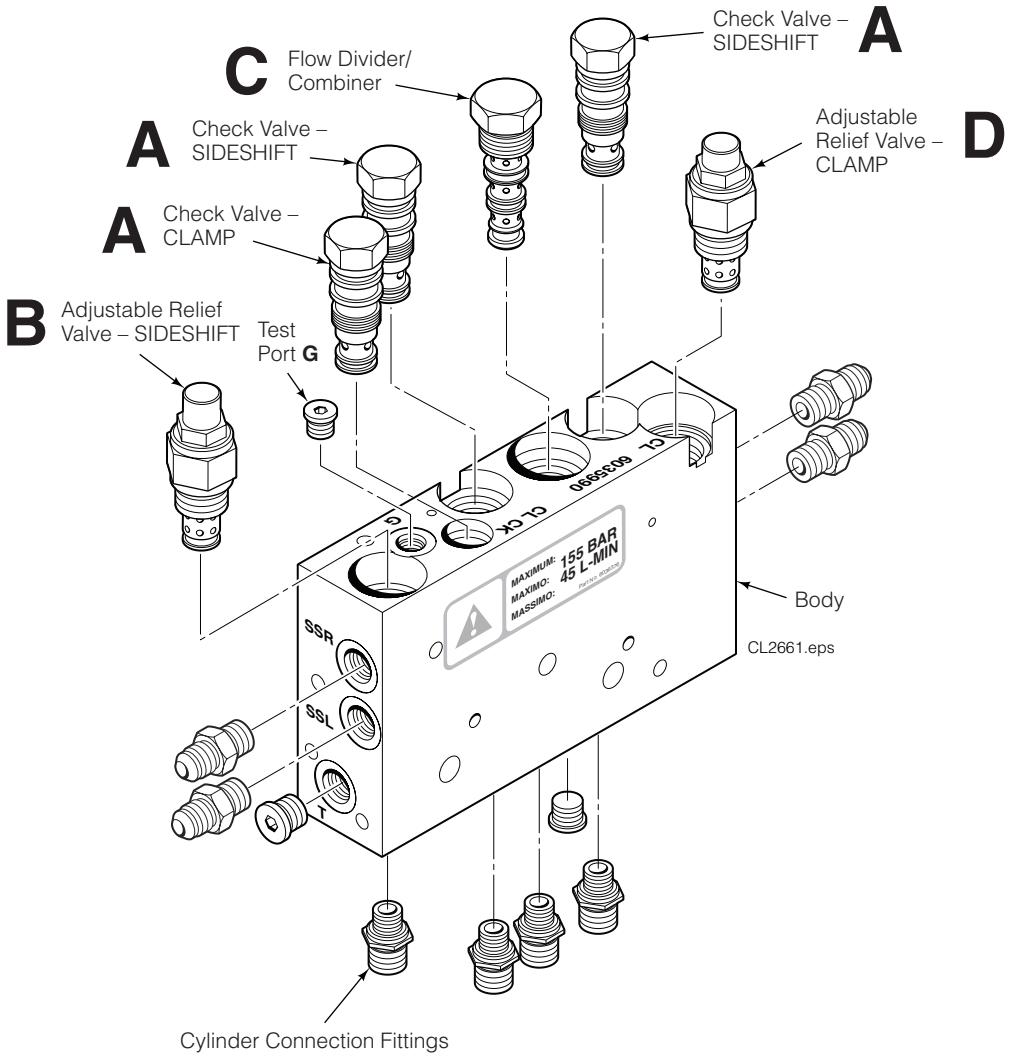
Sideshift Valves – LH CLAMP Ports



Back (Driver's) View

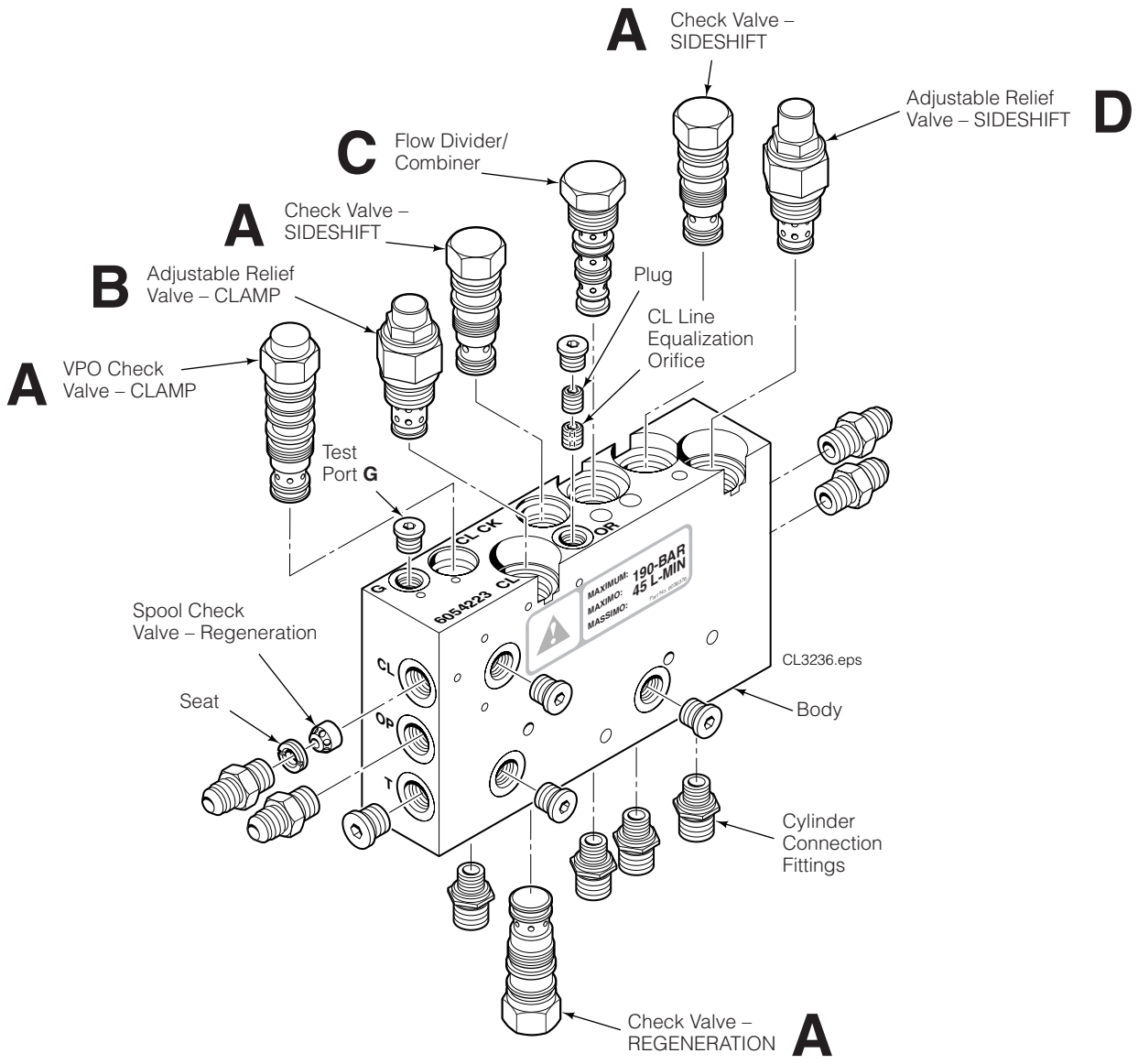
4.3-3 Valve Service (Continued)

Sideshift Valves – RH CLAMP Ports



4.3-3 **Valve Service** (Continued)

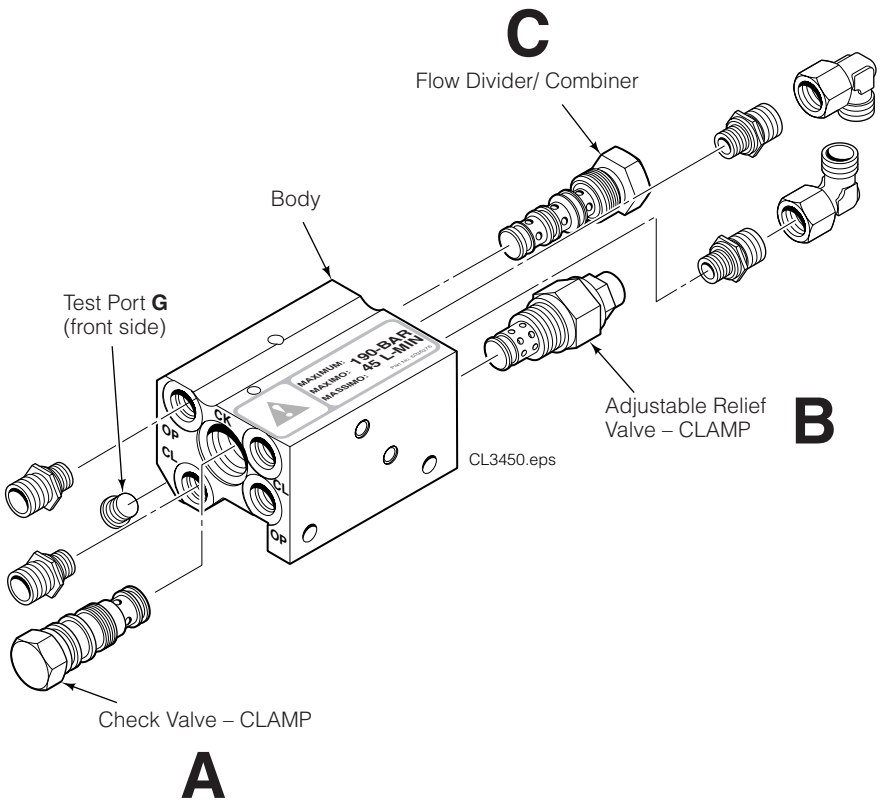
Regeneration Sideshift Valves – LH CLAMP Ports



Back (Driver's) View

4.3-3 Valve Service (Continued)

External Sideshifting Clamp Valve



Back (Driver's) View

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.

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.

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	
155 bar	190 bar	**Rec.**
189 bar	250 bar	**Max.**

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

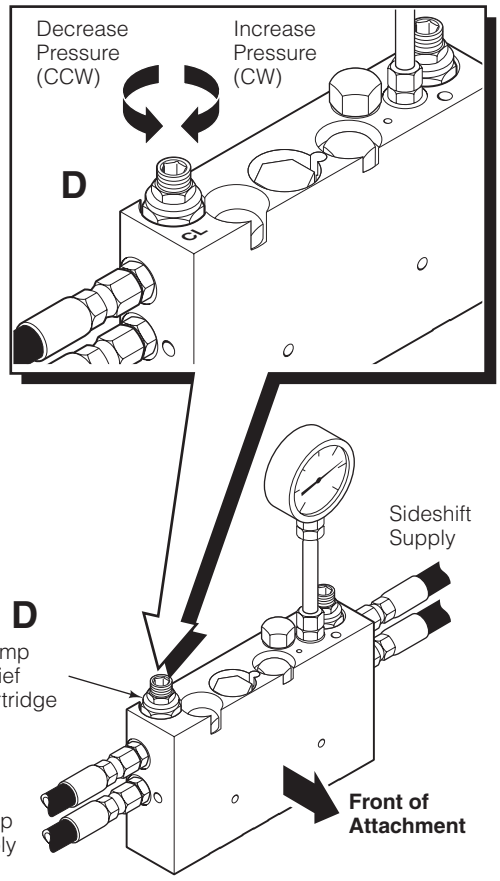
C From fully open, close arms at normal speed to clamp a rigid load or clamp force indicator. Release truck handle and read pressure gauge.

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

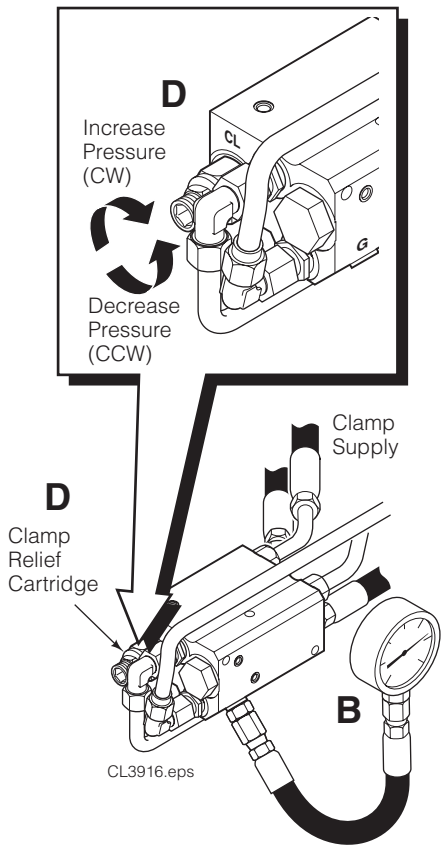
Low Pressure	High Pressure	
189 bar	250 bar	**Max.**

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

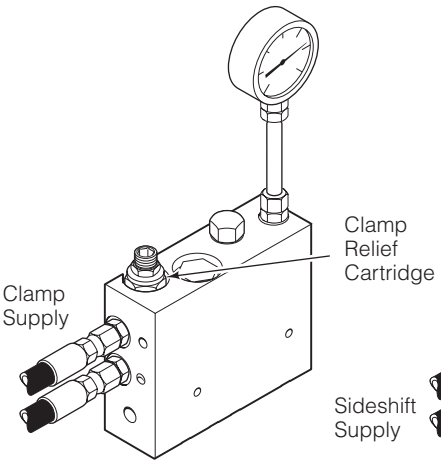
E Repeat steps **C** and **D** to confirm setting.



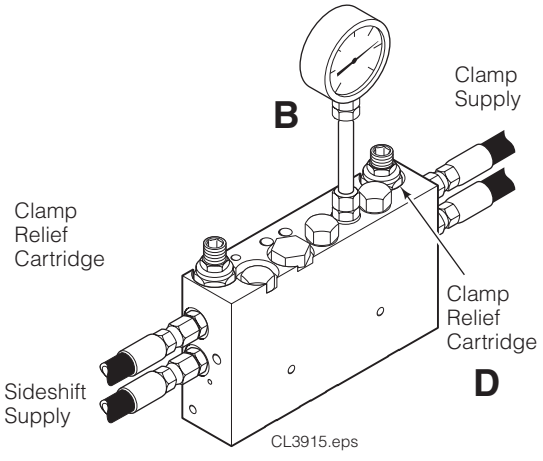
Sideshifting Valve RH CLAMP Ports



External Sideshift Valve



Non-Sideshift Valve RH CLAMP Ports



Sideshifting Valve LH CLAMP Ports

4.3-4 Relief Adjustments (Continued)

Clamp Relief Adjustment – Clamp Force Method
A Cascade 4-Point Force Distribution Tester is required for this procedure.

1 Extend the arms to the most common load width. Lower the contact pads to just above the floor.

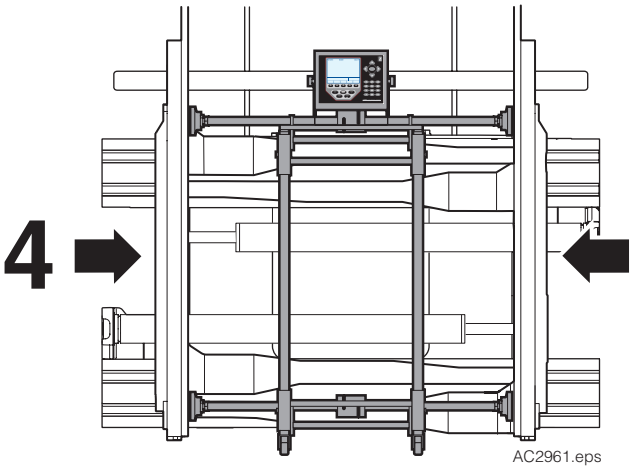
2 Position the tester between the contact pads. Adjust the tester's spindle locations to be perpendicular to the contact pad surfaces and to the desired position based on the type of product being handled.

3 Set the truck clamp circuit to the approximate pressure for the required clamp force on the load.

4 Clamp on the tester and hold activated for 5 seconds.

5 The tester will display **clamp force** and **percentage of clamp force** for each spindle location and **total clamp force** (sum of force of the four spindles).

6 Adjust the truck clamp circuit pressure to the required total clamp force for the load.



Sideshift Relief Adjustment (internal SS only)

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

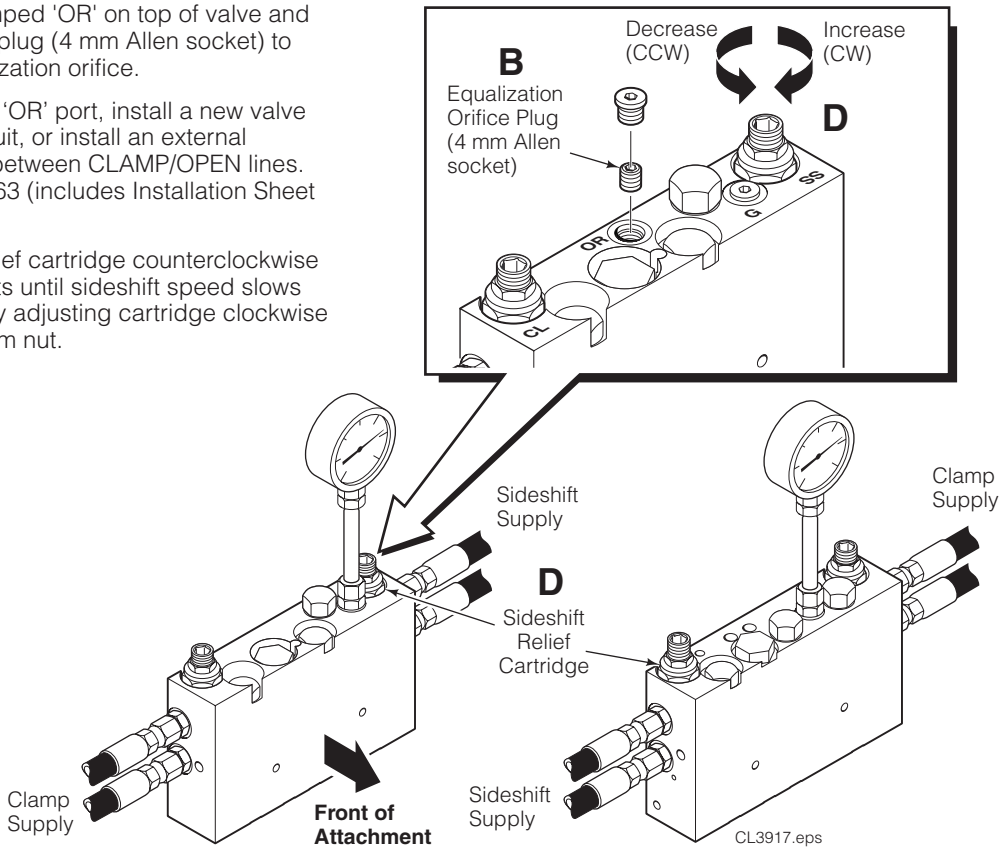
- If attachment will not sideshift or sideshifts slowly, adjust SIDESHIFT relief clockwise (CW) until the attachment sideshifts, then go to Step **D**.
- If attachment will not sideshift after attempted relief adjustment, proceed to following Step **B**.

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

C 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.



Sideshifting Valve RH CLAMP Ports

Sideshifting Valve LH CLAMP Ports

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 340 Nm.

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

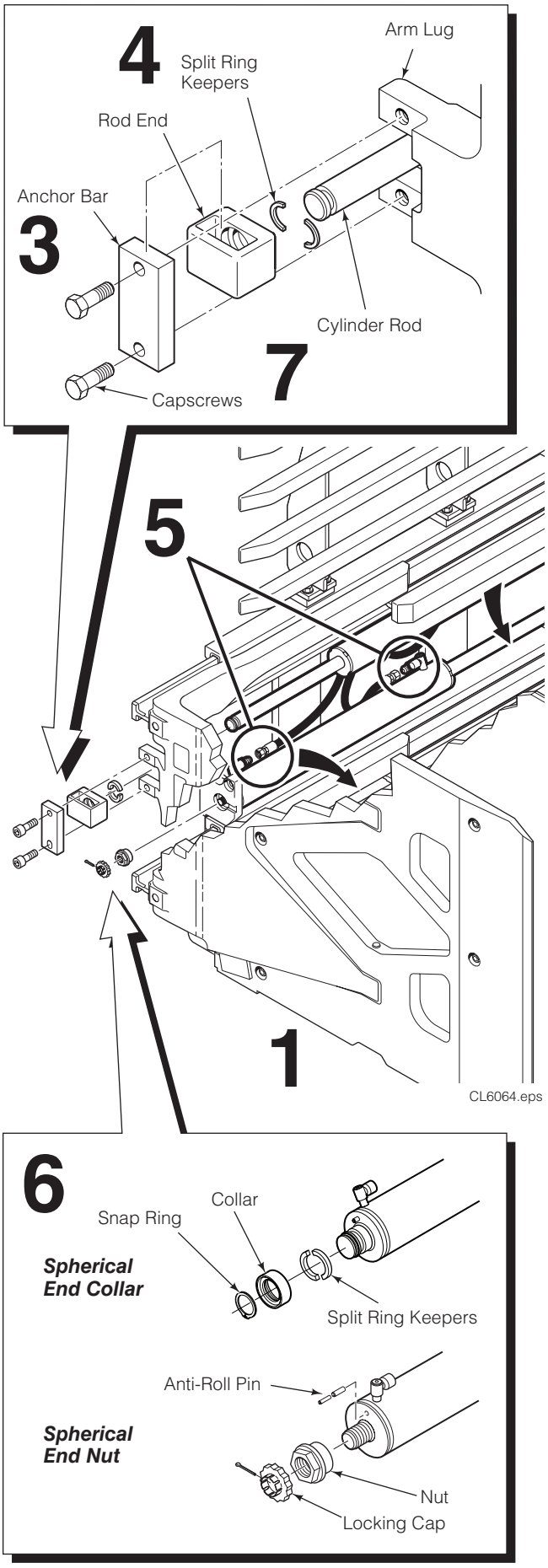
7 For reassembly, reverse the above procedures with the following exceptions:

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

  Standard Attachments
  12G-18G – 275 Nm
  28G – 110 Nm
  36G (M12) – 110 Nm
  36G (M16) – 275 Nm
  44G, 52G – 275 Nm

  Attachments with External Sideshift
  28G, 36G – 90 Nm

- Make sure anti-roll pin is installed in cylinder head end.
- Cycle attachment through 5 complete cycles to remove trapped air from cylinders.



4.4-2 Cylinder Disassembly

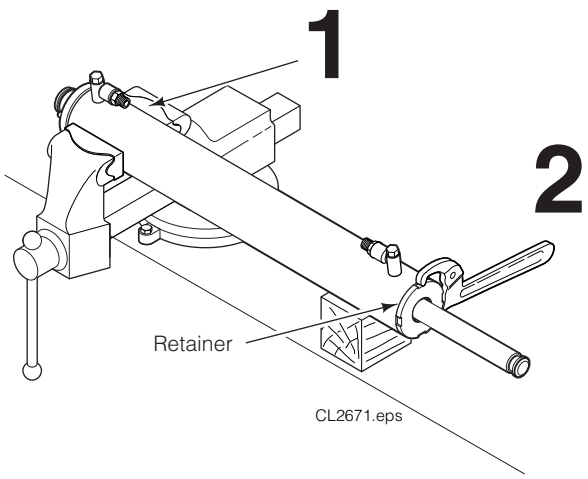
1 Clamp the cylinder in a soft-jawed vise at the extreme head end only. Do not clamp on the shell.

2 Unscrew and remove the retainer using a claw-type spanner wrench as shown. (Cascade Part No. 678598)

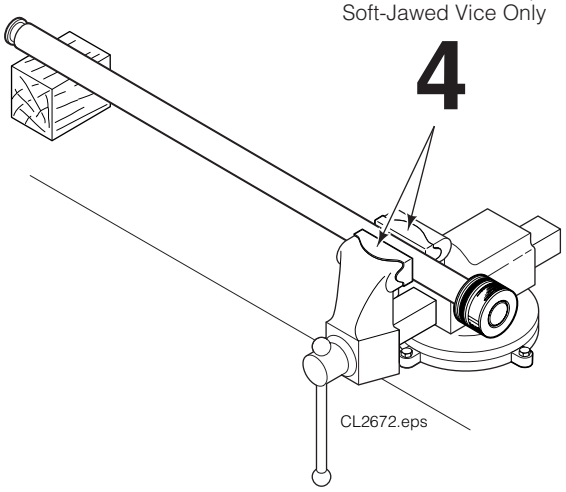
3 Remove the piston/rod assembly from the cylinder.

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.

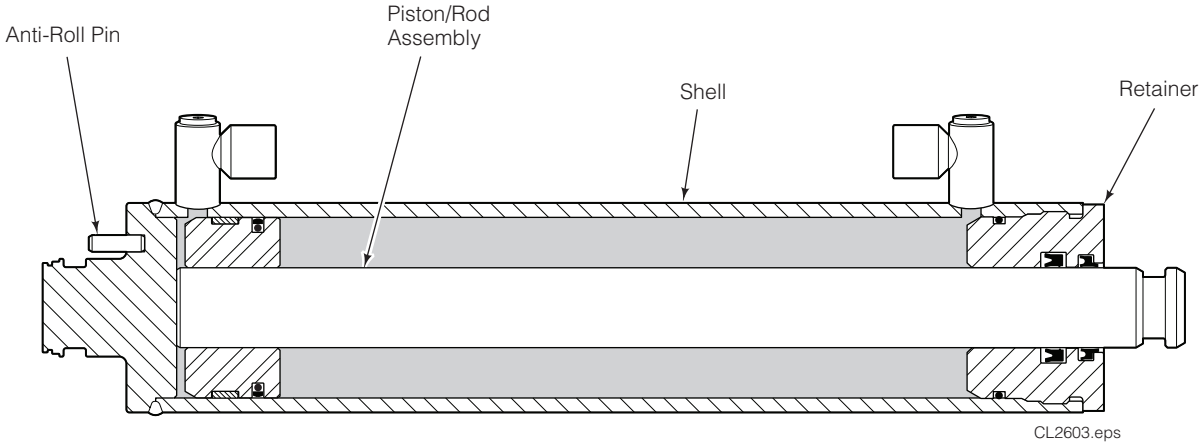


IMPORTANT: Clamp in Soft-Jawed Vice Only



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

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.

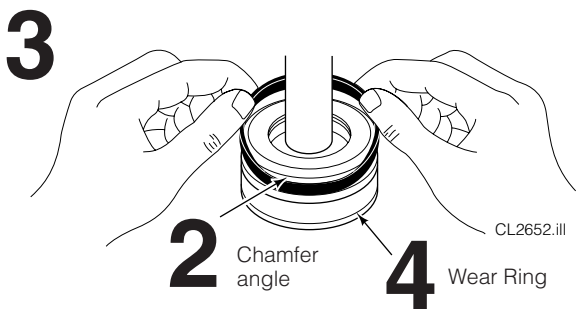
6 Apply O-ring lube or petroleum jelly to the piston and shell. Carefully center the piston into the cylinder shell and using a soft-faced hammer drive the piston/rod assembly into the shell.

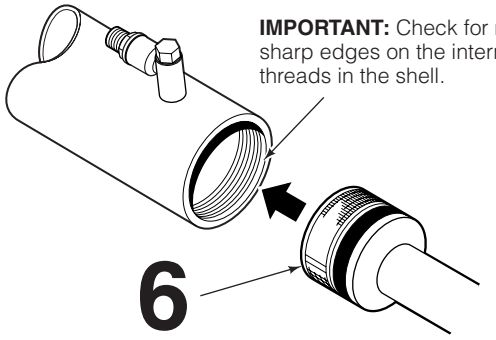
IMPORTANT: Prior to loading the piston into the shell, make sure that no sharp edges exist on the internal threads within the shell.

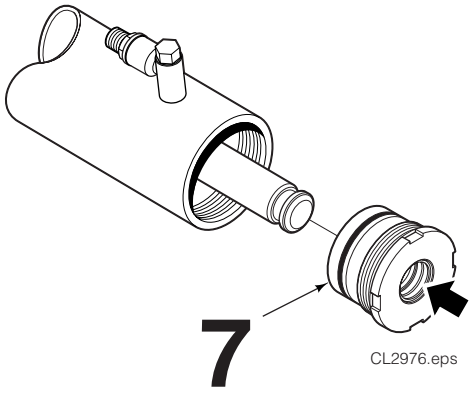
7 Apply petroleum jelly to the retainer ID and carefully slide onto the rod. Screw the retainer into the shell. Use a claw-type spanner wrench, tighten the retainer to:

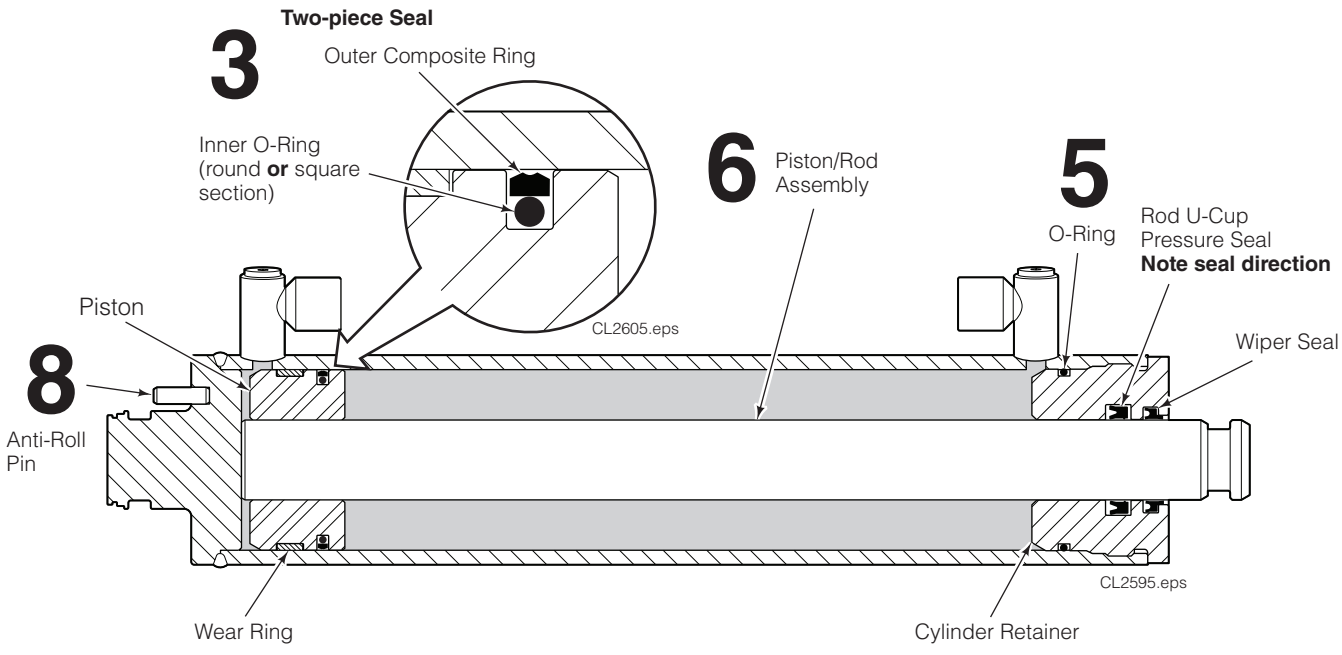
12G – 270 Nm
15G-18G – 300 Nm
28G – 270 Nm
36G-44G – 300 Nm
58G – 375 Nm

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.

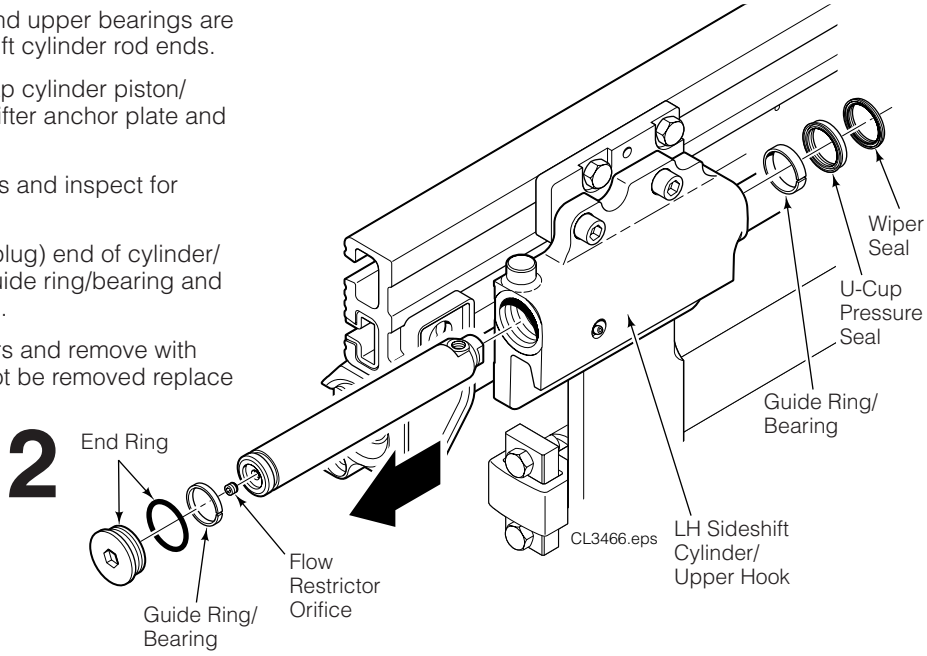
NOTE: Sideshifter anchor plate and upper bearings are retained in upper hooks by sideshift cylinder rod ends.

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.

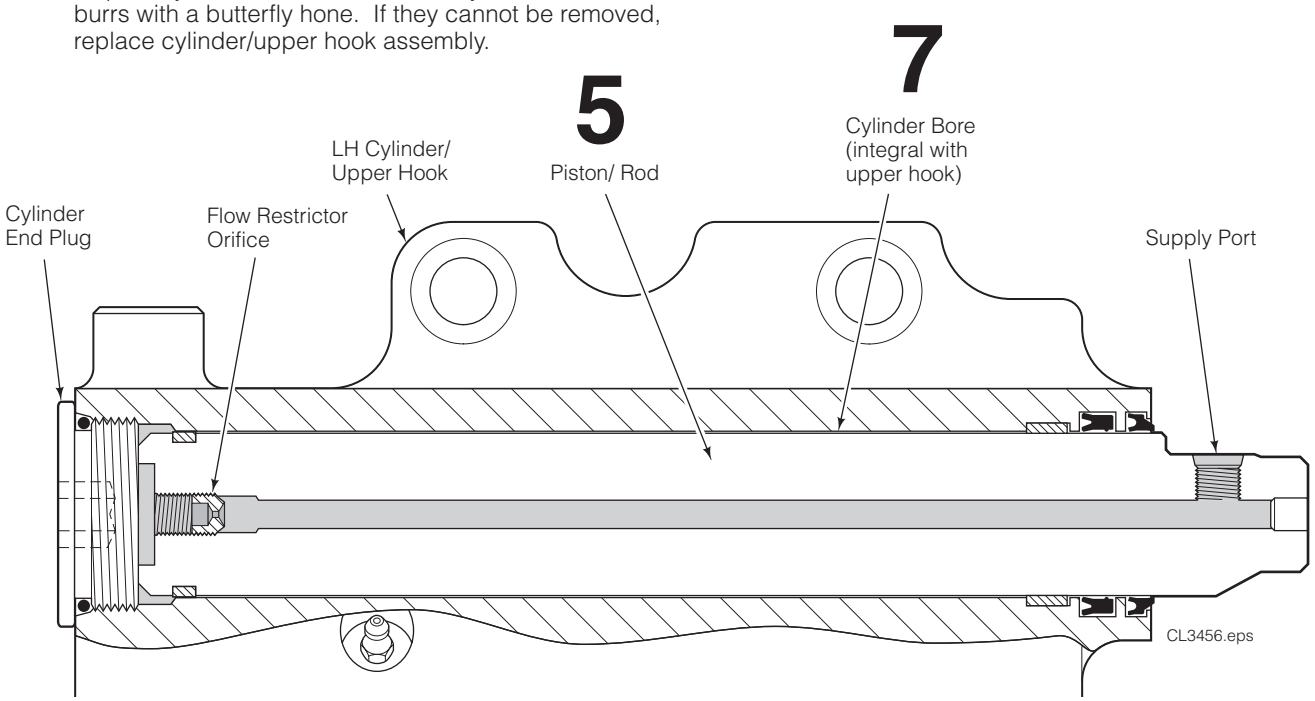
4 Drive piston/rod through outside (plug) end of cylinder/ upper hook assembly. Remove guide ring/bearing and orifice from head end of piston/rod.

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.

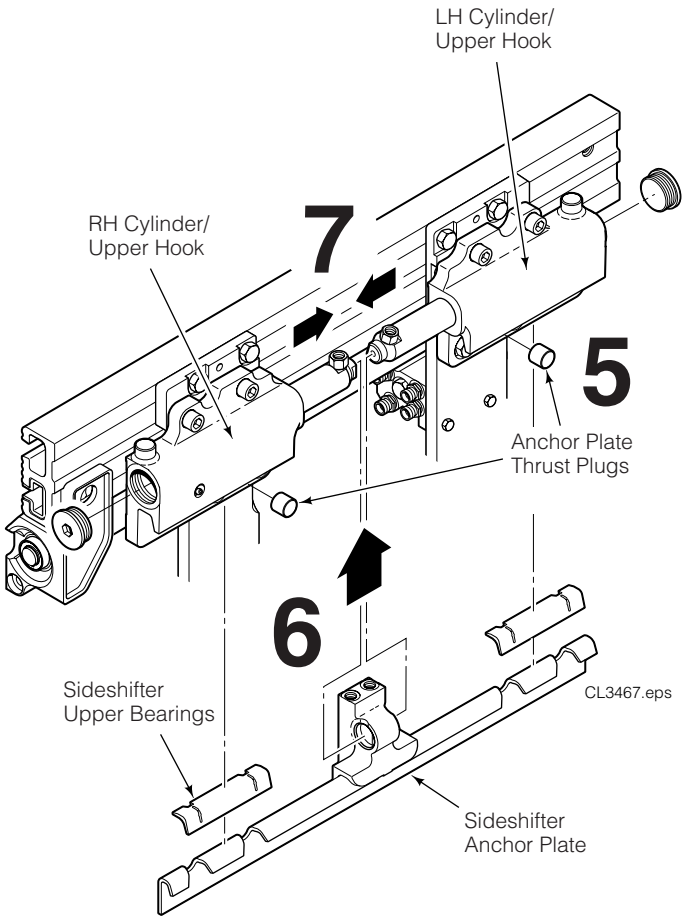
6 Position sideshifter anchor plate and upper bearings into upper hooks.

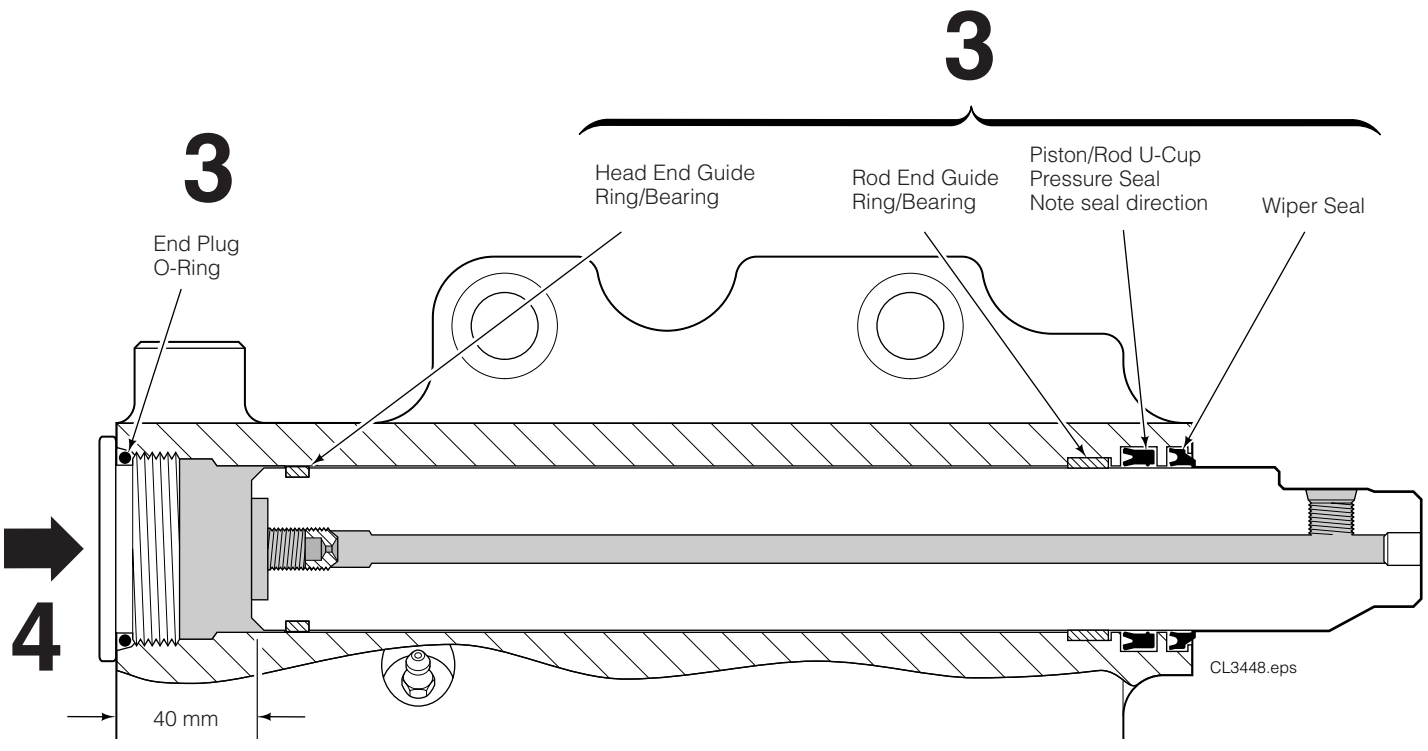
CAUTION: Make sure sideshifter bearings are installed properly. Do not install bearings backwards. Refer to Section 4.6-2.

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.

NOTE: Carton Clamp contact pad and stabilizer may be removed as an assembly by removing the pivot pins as shown.

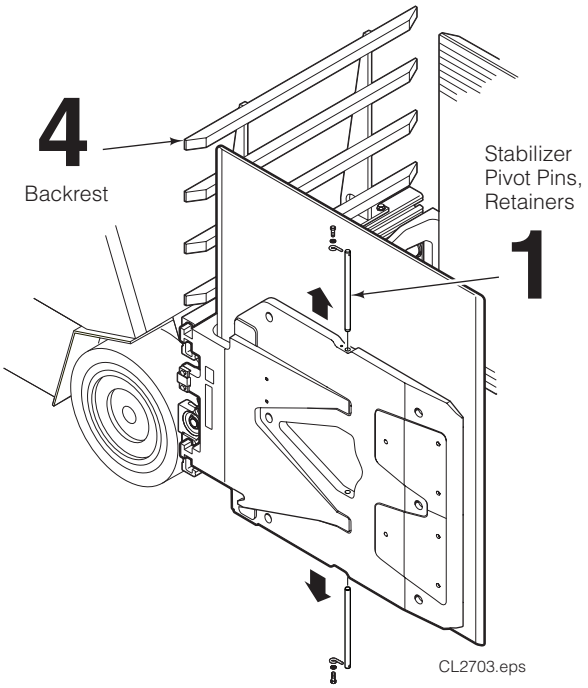
2 Remove the cylinders as described in Section 4.4-1.

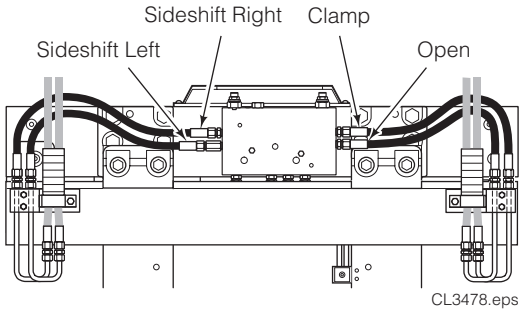
3 Disconnect the supply hoses and remove the valve and tubing as described in Section 4.3-1.

4 Disconnect the lower hooks:

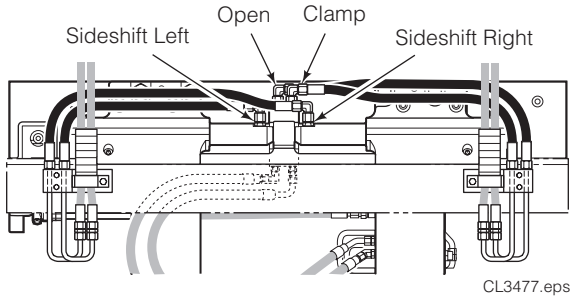
Quick-Change Hooks – Remove the locking pins and drop the hooks into the unlocked position. Replace the pins in the lower holes. For reassembly, remove the pins and slide the hooks up to the locked position. Replace pins in the top holes.

Bolt-On Hooks – Remove the capscrews and mounting hooks. For reassembly, tap the hooks tight against the carriage bar and tighten capscrews to 165 Nm.



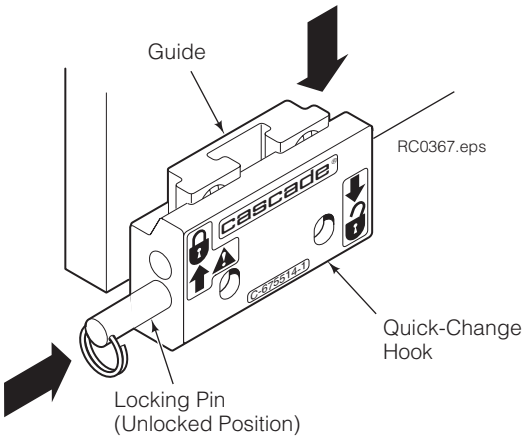


3 **Internal Sideshifting Attachments**
Back (Driver's) View

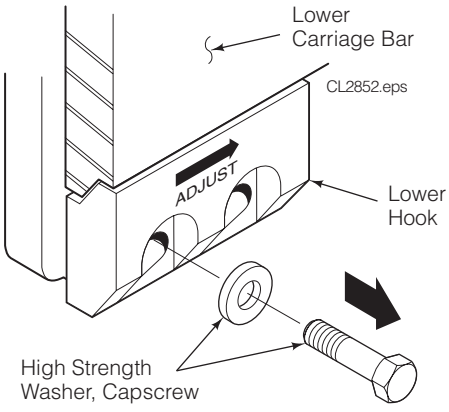


External Sideshifting Attachments
Back (Driver's) View

5 **Quick-Change Lower Hook**



Bolt-On Lower Hooks



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

5 Attach an overhead hoist to the backrest cutout holes as shown and remove the attachment from the truck.

6 Set the attachment frame on a smooth-top pallet or workbench with the mounting plates up.

7 If equipped, remove the valve guard. For reassembly, tighten capscrews to a torque of 90 Nm.

8 If equipped, remove the backrest. For reassembly, tighten the backrest capscrews to:

12G-18G – 52 Nm
28G-52G – 90 Nm

9 If equipped, remove the lower spacer from the mounting plates. For reassembly, tighten the mounting plate capscrews to 270 Nm (28G-36G attachments only).

10 Remove the upper mounting hooks, or external sideshifter group. Refer to Section 4.6-2 for external sideshift removal. For reassembly, tighten capscrews to the following torque value:

Class II Hook – 435 Nm
Class III Hook – 535 Nm
External Sideshift Hook (Socket) – 285 Nm
External Sideshift Hook (Hex) – 235 Nm

11 Remove the tubing and hoses from the mounting plates and tag for reassembly.

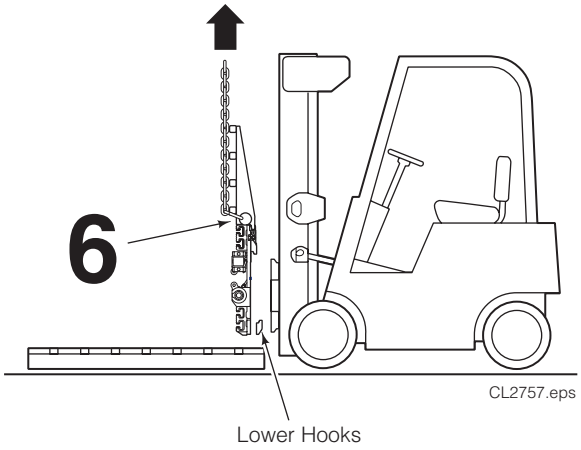
12 Remove the capscrews fastening the mounting plates to the frames and remove the mounting plates.

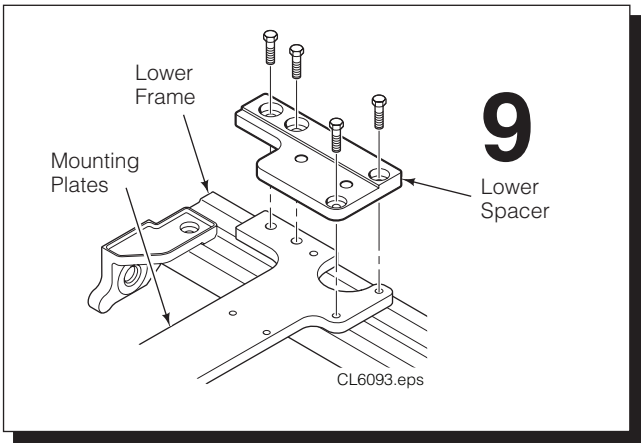
IMPORTANT: Keep track of shorter capscrews (used to avoid damaging arm bearings).

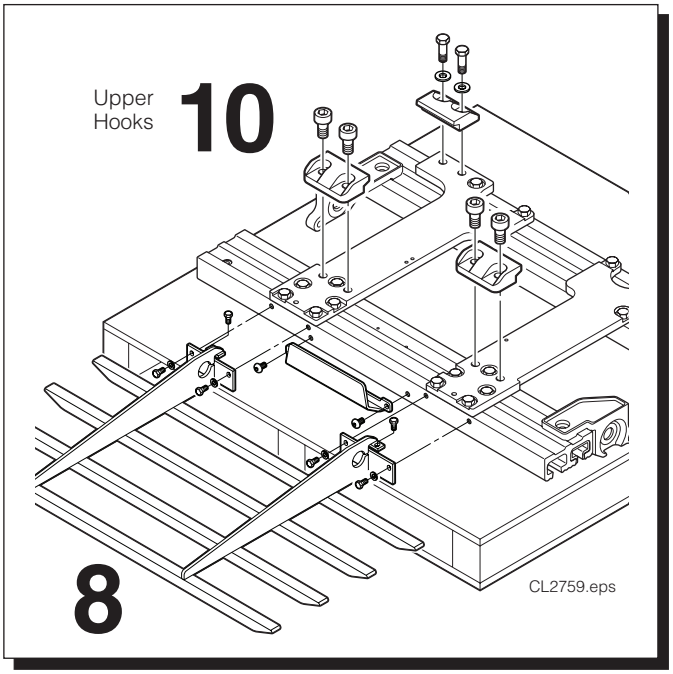
For reassembly tighten capscrews to the following, including the instructions in Step 14:

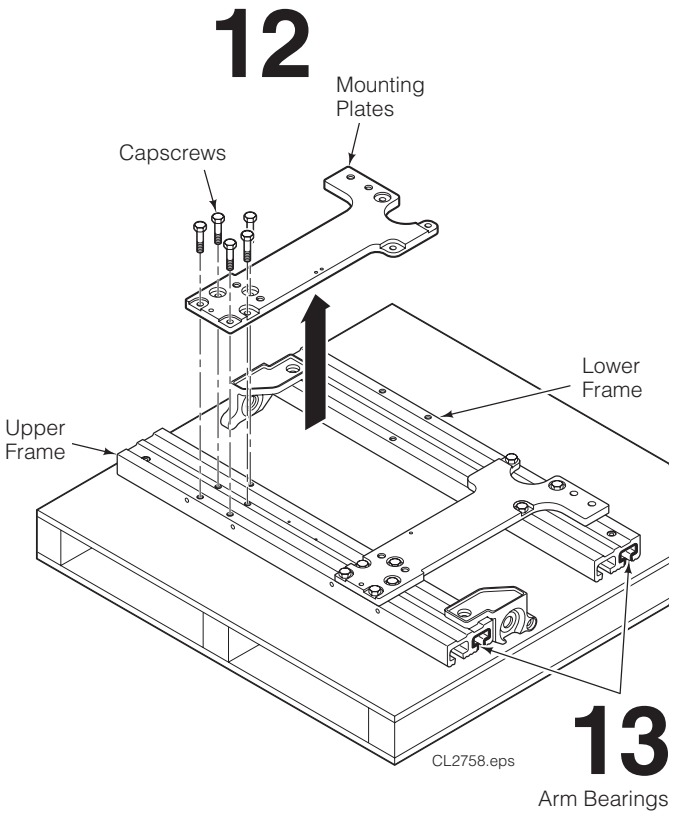
12G-44G – 270 Nm
52G – 520 Nm

13 Inspect arm bar bearings for wear. Replace if any bearing cross-section is worn to less than 1 mm thickness. Refer to Section 4.2-6.









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

14 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 50 percent of final torque value. Make sure 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 capscrews in the sequence shown to 50 percent of final torque value. Make sure 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.

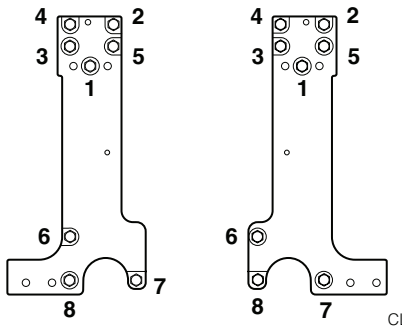
E Double-torque lower mounting plate (and lower spacer, if equipped) capscrews by tightening to the final torque value (shown below), backing off capscrew one-half turn, and retightening to final value of:

12G-44G – 270 Nm
52G (M20) – 520 Nm

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
28G	6052437	6061569 (RH), 6061570 (LH)
36G	6049974	6061084 (RH), 6061086 (LH)

14 **Mounting Plate Tightening Sequence**



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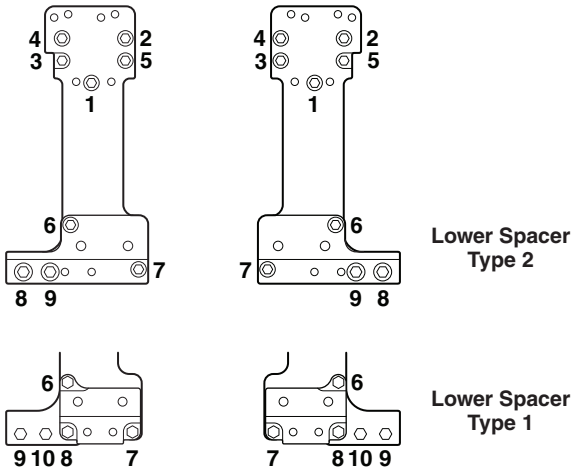
Standard Attachments



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Attachments with External Sideshift

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)
28G, 36G – 285 Nm

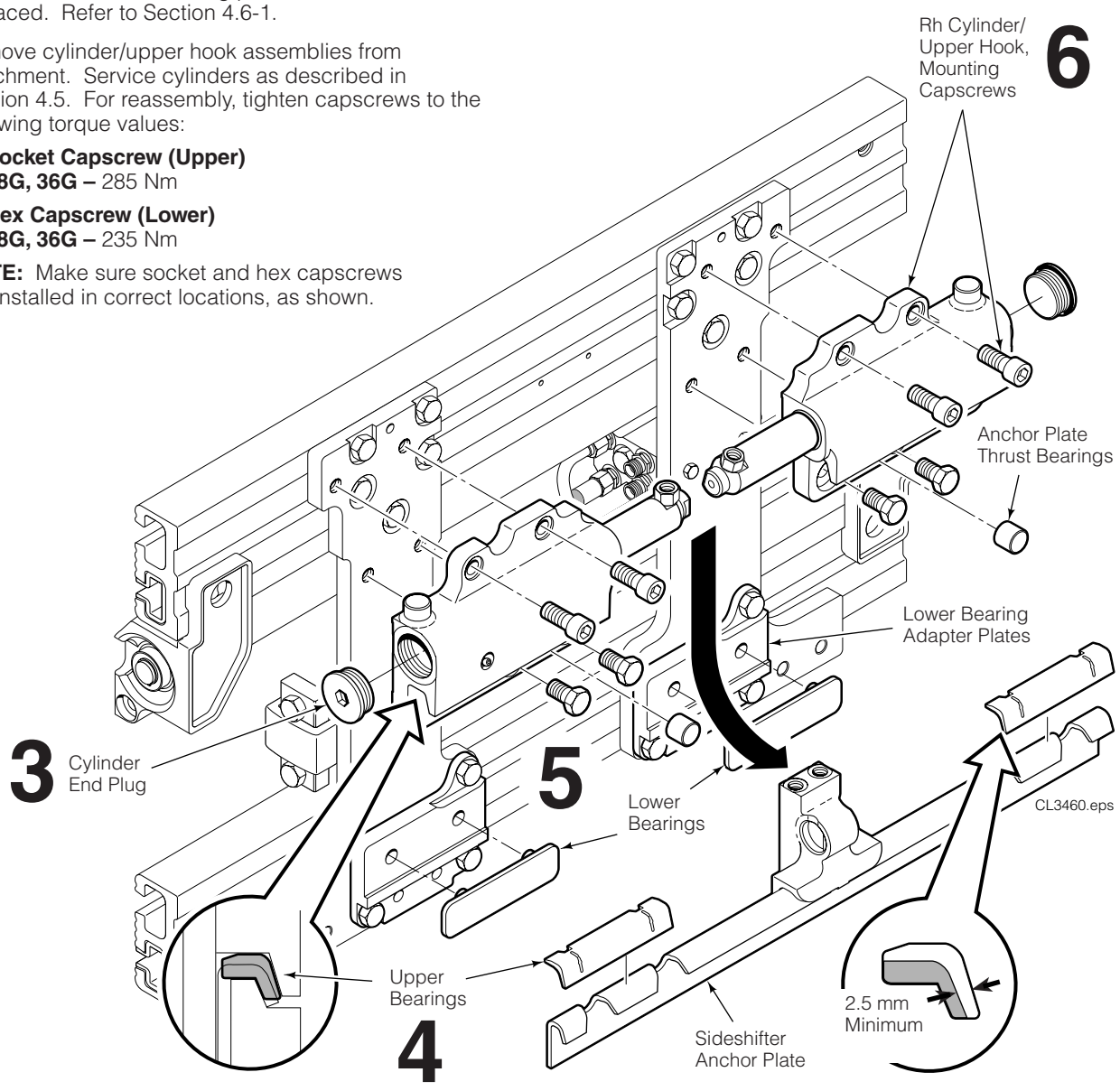
Hex Capscrew (Lower)
28G, 36G – 235 Nm

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

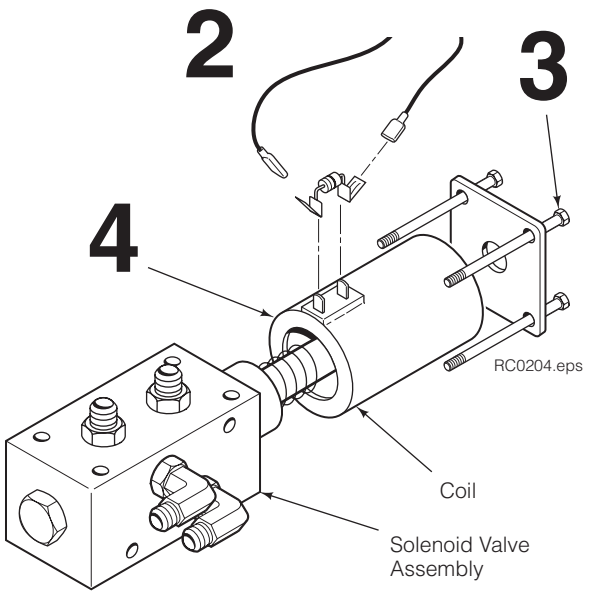
1 Disconnect the wires and diode from the coil terminals.

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.

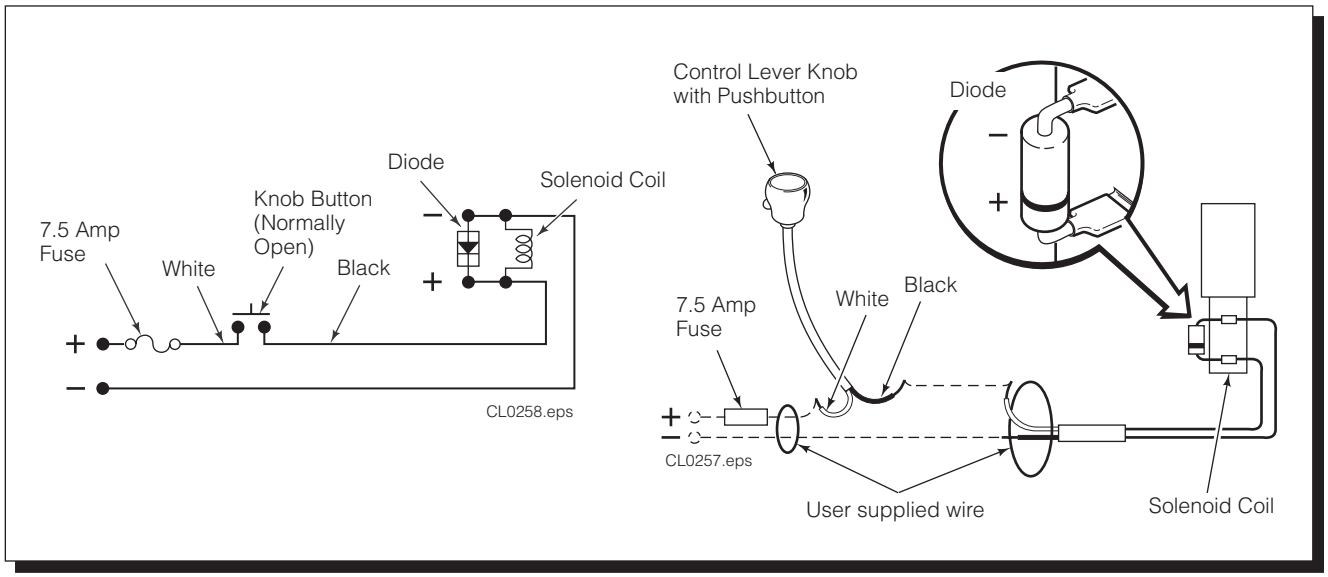
4 For reassembly, reverse the above procedures except as follows:

- Refer to the electrical schematic below 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.



5.1 Specifications

5.1-1 Hydraulics

Truck Relief Setting (see attachment nameplate)

12G-15G

250 bar Maximum

18G-52G

Low Pressure	High Pressure	
155 bar	189 bar	Recommended
190 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
12G – 52G	19 L/min.	26 L/min.	38 L/min.

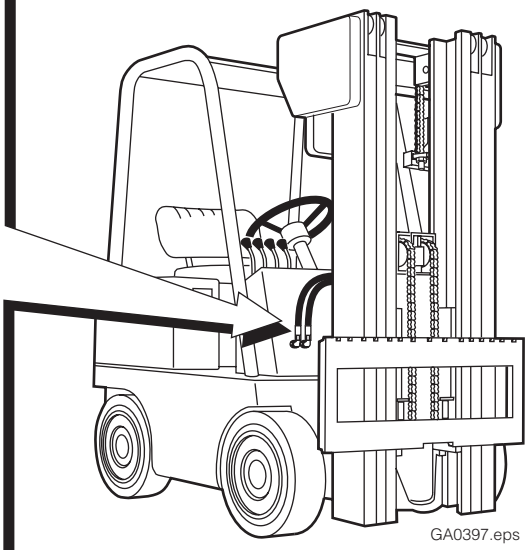
① Cascade Clamps are compatible with SAE 10W petroleum base hydraulic fluid meeting Mil. Spec. MIL-0-5606 or MIL-0-2104B. Use of synthetic or aqueous base hydraulic fluid is not recommended. If fire resistant hydraulic fluid is required, special seals must be used. Contact Cascade.

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 No. 6 minimum with an orifice size of 7 mm minimum.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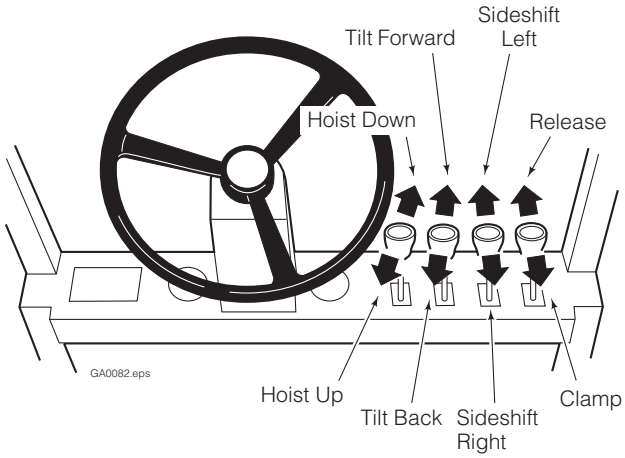
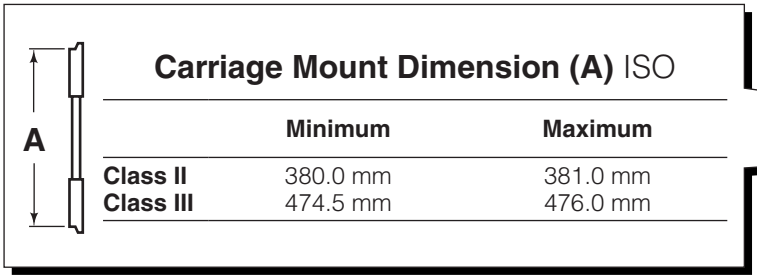
5.1-2 Auxiliary Valve Functions

Check for compliance with ISO standards:

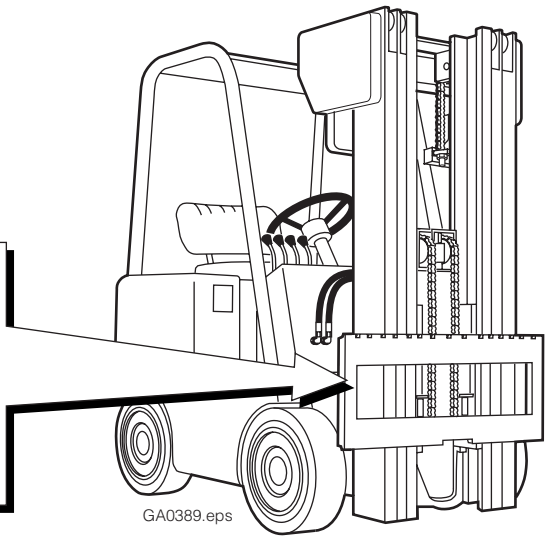


5.1-3 Truck Carriage



Carriage Mount Dimension (A) ISO

	Minimum	Maximum
Class II	380.0 mm	381.0 mm
Class III	474.5 mm	476.0 mm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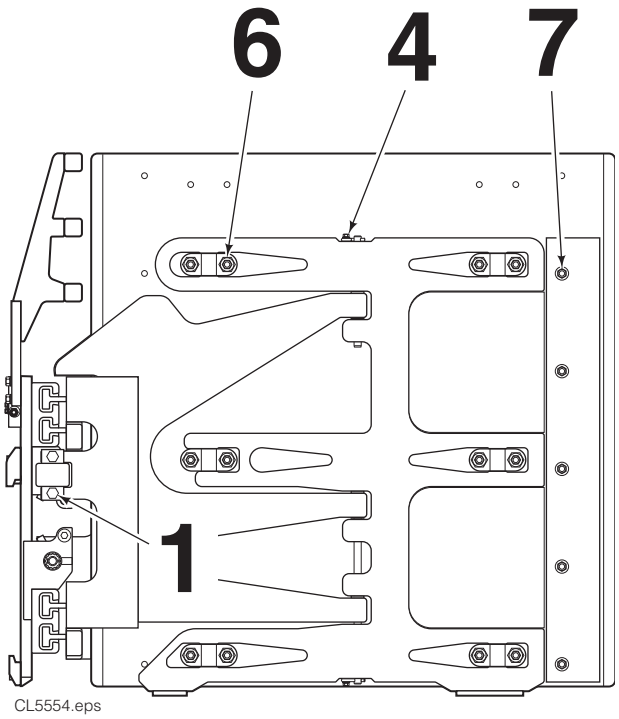
5.1-4 Torque Values

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

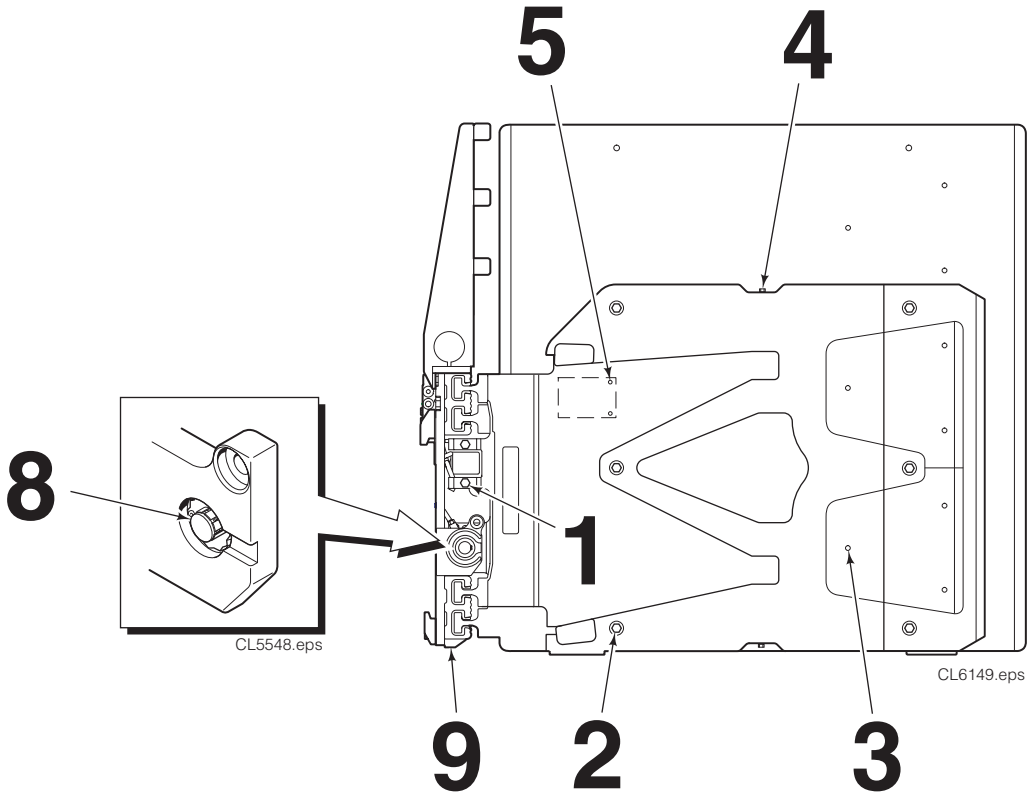
NOTE: All fasteners have a torque value range of ±10% of stated value.

Ref.	Fastener Location		Size	Nm
1	**Standard Attachments:**			
	Cylinder Rod Anchor Capscrews	**12G-18G**	M16	275
		28G	M12	110
		36G	M12	90
			M16	275
		44G-52G	M16	275
	Attachments Equipped with External Sideshift:			
	Cylinder Rod Anchor Capscrews	**28G, 36G**	M12	90
2	Contact Pad Capscrews		M12	65
3	Filler Block Capscrews		M10	25
4	Pivot Pin Capscrews ■		M8	20
5	Spring Plate Capscrews ■		M10	40
6	ADJUSTA-BLOCK Nut		M12	90
7	Shoe Capscrews		M12	90
8	Base End Nut		–	235
9	Wear Tile Capscrews	**28G-52G**	M10	52

■ Use Loctite 242 (Blue)



Flexible (ADJUSTA-BLOCK) Attachments (Side View)

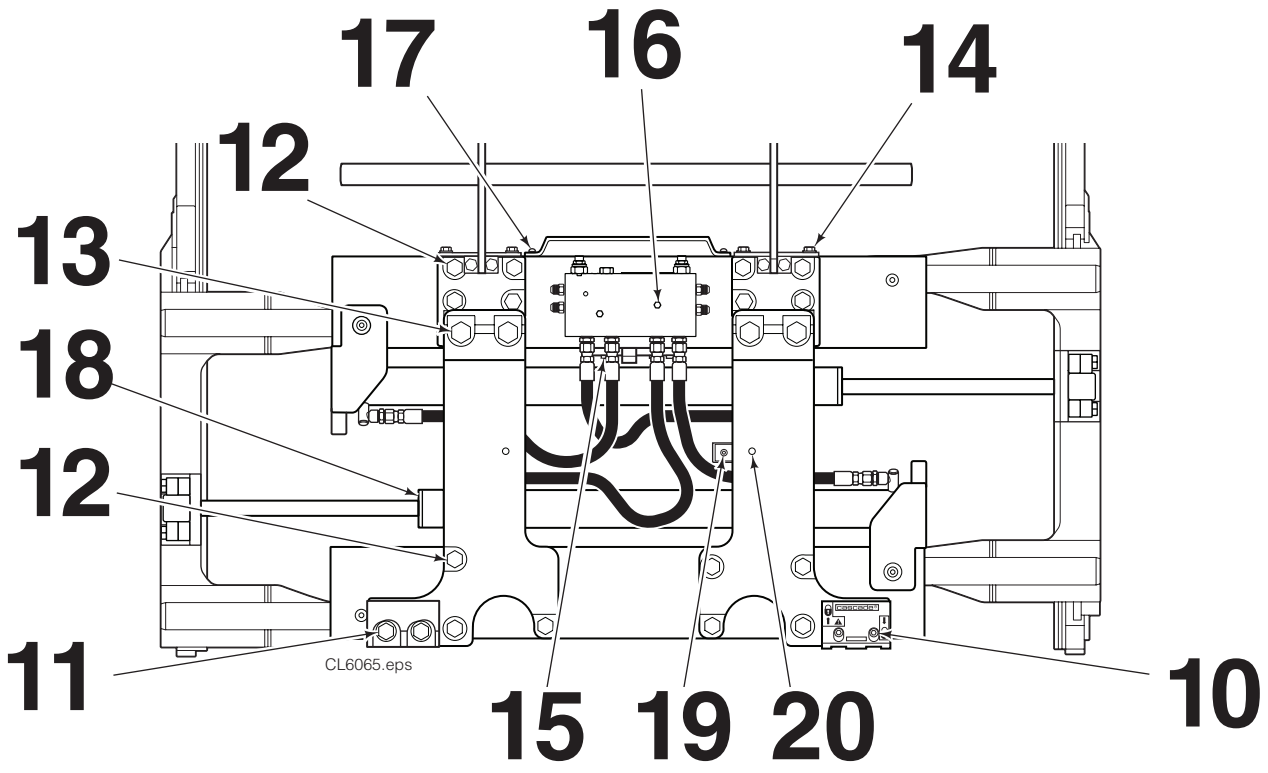


Standard Pad Attachments (Side View)

5.1-4 Torque Values (continued)

Ref.	Fastener Location		Size	Nm
10	QD Guide Capscrews	**Class II & III**	M16	165
		Class IV	M20	435
11	Lower Hook Capscrews	**Class II & III**	M16	165
12	Mounting Plate ▲	**12G-44G**	M16	270
		52G	M20	520
13	Upper Hook Capscrews	**Class II**	M20	435
		Class III	M20	535
14	Backrest Capscrews		M12	125
15	Centering Tab Capscrew	**Class II**	M10	63
		Class III	M12	90
16	Valve Capscrews		M6	8
17	Guard Capscrews		M12	90
18	Cylinder Retainer		–	135
19	Tube Clamp Capscrew		M6	8
20	Tube Bracket Capscrew		M8	26

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

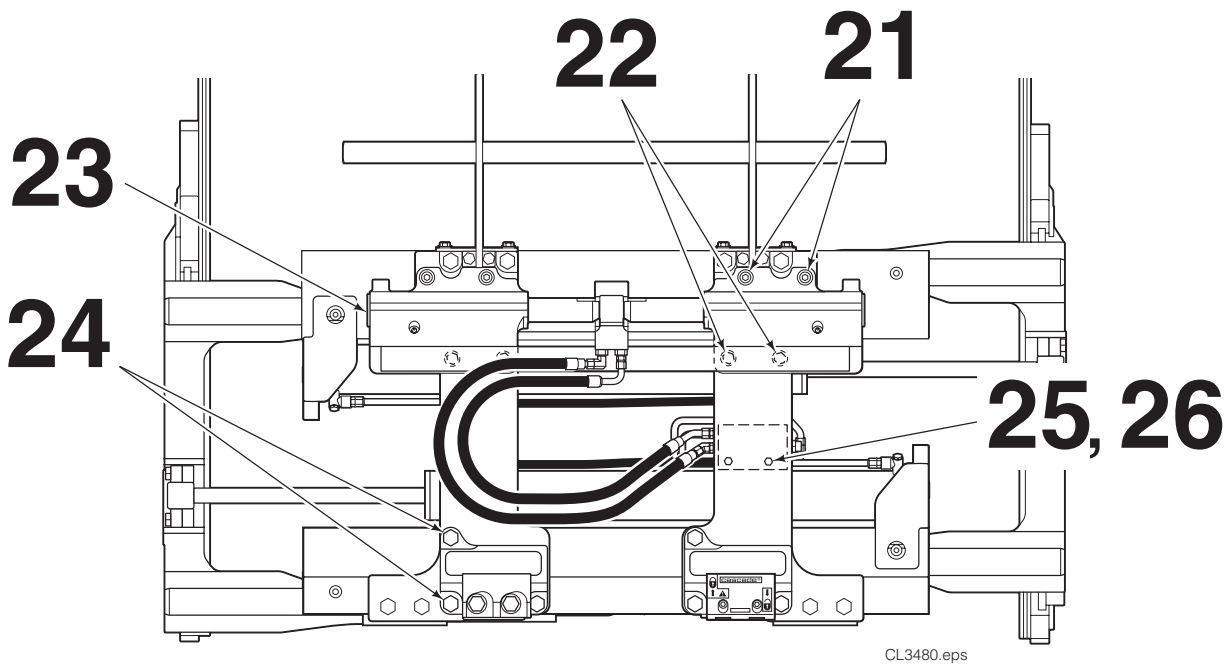


Standard Attachments
Back (Driver's) View

5.1-4 Torque Values (continued)

Ref.	Fastener Location		Size	Nm
21	Sideshifter Upper Hook Socket Capscrews ▲	**28G, 36G**	M16	285
22	Sideshifter Upper Hook Hex. Capscrews ▲	**28G, 36G**	M16	235
23	Sideshift Cylinder End Plug		–	250
24	Sideshift Lower Bearing Plate ▲	**28G, 36G**	M16	270
25	Valve Mounting Capscrews ■		M10	38
26	Valve Bracket Capscrews		M8	26

■ Use Loctite 242 (Blue)
▲ Double-Torque (tighten, loosen 1/2 turn, retighten)



Attachments with External Sideshift (Back View)

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

En cas de questions urgentes,
contacter leservice d'entretien Cascade le plus proche.
Visiter le site Web www.cascorp.com.

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

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

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

¿Tiene alguna consulta que deba ser respondida de inmediato? Llame por teléfonoal servicio técnico de Cascade más cercano. Visítenos en www.cascorp.com

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