

SERVICE MANUAL

10H

***Fixed Frame
Pivot Arm
Paper Roll Clamps***

Manual Number 6862661-R1

**cascade[®]
corporation**

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	Page
INTRODUCTION, Section 1	
Introduction	1
Special Definitions	1
PERIODIC MAINTENANCE, Section 2	
100-Hour Maintenance	2
500-Hour Maintenance	2
1000-Hour Maintenance	3
2000-Hour Maintenance	3
4000-Hour Maintenance	3
TROUBLESHOOTING, Section 3	
General Procedures	4
Truck System Requirements	4
Tools Required	4
Troubleshooting Chart	5
Plumbing	6
Hosing Diagram	6
Hydraulic Schematic	7
Clamp Function	8
Supply Circuit Test	8
Clamp Circuit Test	8
Rotation Function	9
Supply Circuit Test	9
Rotation without Load	9
Rotation with Load	10
Electrical Circuit	11
SERVICE, Section 4	
Attachment Removal	12
Arms	13
Arm Assembly Removal and Installation	13
Contact Pad Removal and Installation	14
Wear Tile Replacement	14
Arm Tip Repair	15
Drive Group	17
Drive Group Removal and Installation	17
Drive Group Disassembly and Service	17
Drive Group Reassembly	19
Drive Motor	21
Drive Motor Removal and Installation	21
Drive Motor Disassembly	22
Drive Motor Inspection	23
Drive Motor Reassembly	23

	Page
SERVICE, Section 4, Continued	
Valve	25
Valve Removal	25
Valve Service	25
Revolving Connection	26
Revolving Connection Removal and Installation	26
Revolving Connection Service	27
Cylinders	29
Servicing Cylinders on the Attachment	29
Cylinder Removal	29
Cylinder Check Valve Service	30
Cylinder Bushing Service	31
Cylinder Service – 1.77 in. (45 mm) Bore Diameter	32
Cylinder Disassembly	32
Cylinder Inspection	32
Cylinder Reassembly	33
Cylinder Service – 2.95 in. (75 mm) Bore Diameter	34
Cylinder Disassembly	34
Cylinder Inspection	34
Cylinder Reassembly	35
Base Unit	36
Frame Bushing Service	36
Rotation Bearing Assembly – Removal and Installation	37
Solenoid Valve	39
Coil Service	39
Valve Service	39
SPECIFICATIONS, Section 5	
Specifications	40
Hydraulics	40
Auxiliary Valve Functions	40
Truck Carriage	41
Torque Values	42

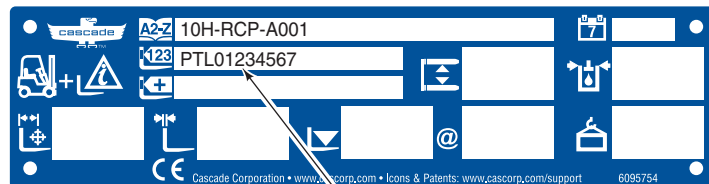
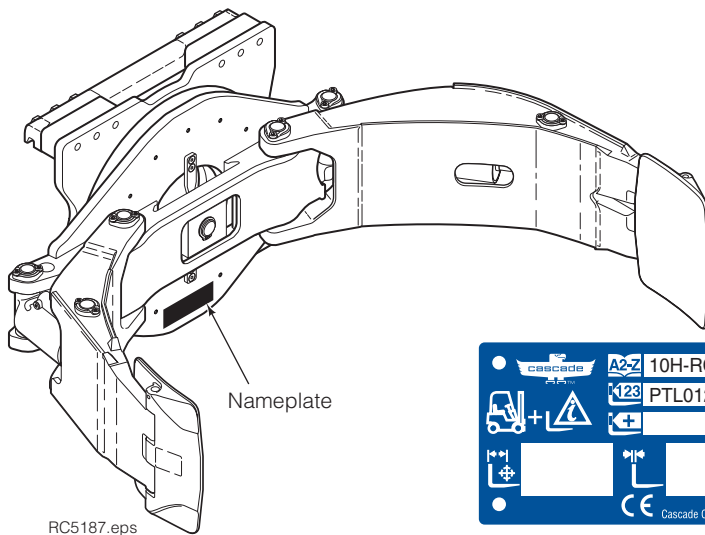
1.1 Introduction

This manual provides the Periodic Maintenance, Troubleshooting, Service and Specifications for Cascade 10H Fixed Frame Paper Roll Clamps.

In any communication about the attachment, refer to the product catalog and serial numbers stamped on the nameplate as shown. If the nameplate is missing, the numbers can be found stamped on the lower front of the faceplate.

IMPORTANT: Supply input fittings are SAE (JIC) No. 6 O-ring fittings with 9/16 in. (7 mm) minimum ID.

NOTE: Specifications are shown in both US and (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.



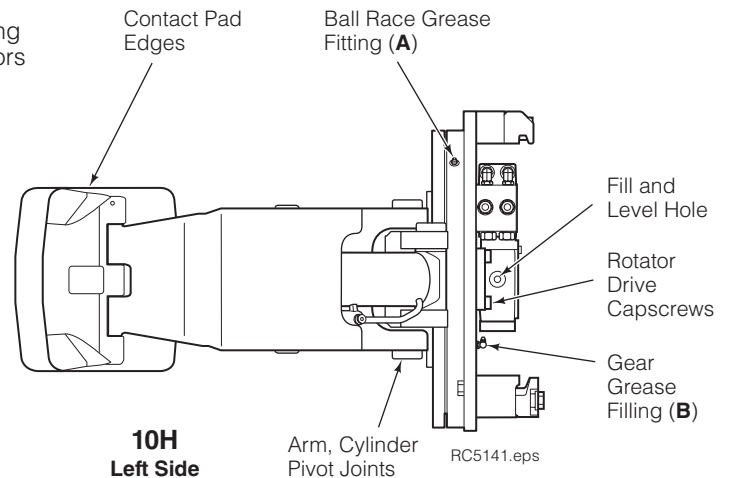
2.1 100-Hour Maintenance

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 hoses and hydraulic leaks.
- Check edges of contact pads for wear or sharp nicks that could damage or tear paper rolls. Grind edges smooth.
- Check that load-holding hydraulic system is functioning properly. For this test, Cascade Clamp Force Indicators 300G-DFI-812C and 300G-CFI-812C are available.
- Check decals and nameplate for legibility.



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



2.2 500-Hour Maintenance

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

- Tighten lower mounting hook capscrews to 122 ft.-lbs. (165 Nm).
- Tighten rotator drive capscrews to 24 ft.-lbs. (32 Nm).
- Lubricate rotator bearing assembly ball race (A) and gear (B) with EP-2 grease. (Whitmore 'Omnitask' or equivalent). Rotate attachment in 90° increments and grease in each position.
- **Initial 500 Hours** – Check rotator drive gearcase lubricant level (remove vent cap). Oil should be filled up to the bottom of the fill plug hole. Add oil through the fill plug hole. If necessary, fill with Cascade Rotator Drive Lubricant, Part No. 656300 or SAE 90 wt. gear lube (AGMA 'mild' 6 EP Gear Oil). Replace the plug.
- Inspect all arm, frame and cylinder pivot bushings for wear. Replace if necessary.
- Inspect all load-bearing structural welds on arms, arm pivots and cylinder pivot areas for visual cracks. Replace components as required.
- Inspect wear tile, arm tips and contact pads for wear and damage. Replace or repair, as needed. Refer to Section 4.2.



WARNING: A sampling of rotation capscrews must be checked for proper torque at 500 hours (see TB183). A complete inspection is required every 2000 hours. Failure to keep the capscrews tightened can result in attachment damage and serious injury.

2.3 1000-Hour Maintenance

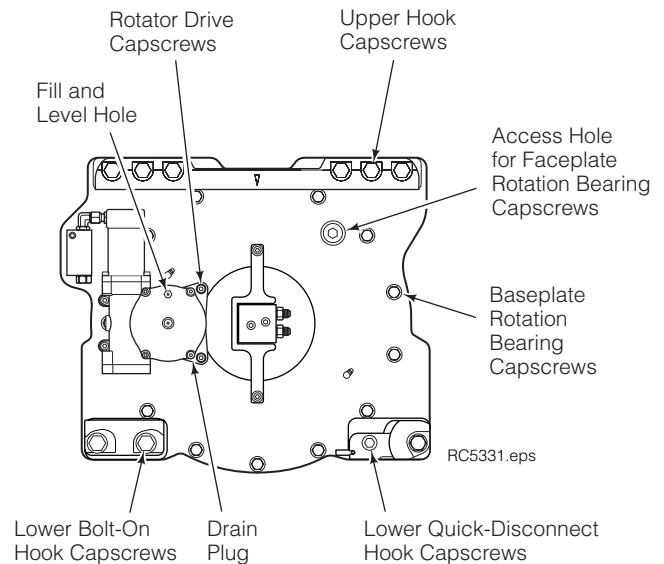
After the **initial** 1000 hours of truck operation, in addition to the 100 and 500-hour maintenance, perform the following procedure:

- **Initial 1000 Hours** – Check rotator drive gearcase lubricant level (remove vent cap). Oil should be filled up to the bottom of the fill plug hole. Add oil through the fill plug hole. If necessary, fill with Cascade Rotator Drive Lubricant, Part No. 656300 or SAE 90 wt. gear lube (AGMA 'mild' 6 EP Gear Oil). Replace the plug.

2.4 2000-Hour Maintenance

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

- Check **all** rotation bearing capscrews for proper torque value. Refer to Service section 4.9-2 for replacement procedures.
- Inspect all arm and cylinder pivot pins for wear and replace if necessary.
- Check the gearcase oil level (remove the cap). Oil must be up to the bottom of the fill plug hole. Add oil through top fill hole. If necessary, fill with Cascade Gear Lube Part No. 656300, or SAE 90 wt. gear lube (AGMA 'mild' 6 EP Dear Oil). Replace plug.



10H
Back (Driver's) Side

2.5 4000-Hour Maintenance

After each 4000 hours of truck operation, in addition to the 100, 500 and 2000-hour maintenance, perform the following procedures:

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

3.1 General Procedures

3.1-1 Truck System Requirements

- Truck hydraulic pressure should be within the range shown in Specifications, Section 5.1. **Pressure to the attachment must not exceed 2300 psi (160 bar).**
- Hydraulic flow should be within the volume range as shown in Specifications, Section 5.1.
- Hydraulic fluid supplied to the attachment must meet the requirements as shown in Specifications, Section 5.1.

3.1-2 Tools Required

In addition to a normal selection of hand tools, the following will be required:

- Inline Flow Meter Kit:
20 GPM (75 L/min.) - Cascade Part No. 671477.
- Pressure Gauge Kit:
5000 psi (345 bar) - Cascade Part No. 671212. Two kits are required.

OR

Wireless Pressure Monitor:

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

One Pressure Transducer	
Voltage	Kit Part No.
12V	6803614, 6815672 ★
24-48V	6803617, 6815675 ★
Two Pressure Transducers	
Voltage	Kit Part No.
12V	6803615, 6815673 ★
24-48V	6803618, 6815676 ★

★ Includes alarm

- Assorted fittings and hoses to adapt the gauges and flowmeter to the components being tested.

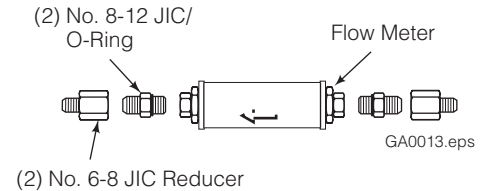


WARNING: Before servicing any hydraulic component, relieve pressure in the system. Turn the truck off and move the truck auxiliary control valves several times in both directions.

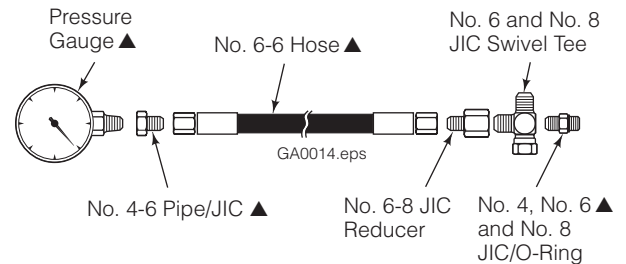
After completing any service procedure, test the attachment through several cycles. First test the attachment empty to bleed any air trapped in the system to the truck tank. Then test the attachment with a load to be sure it operates correctly before returning to the job.

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

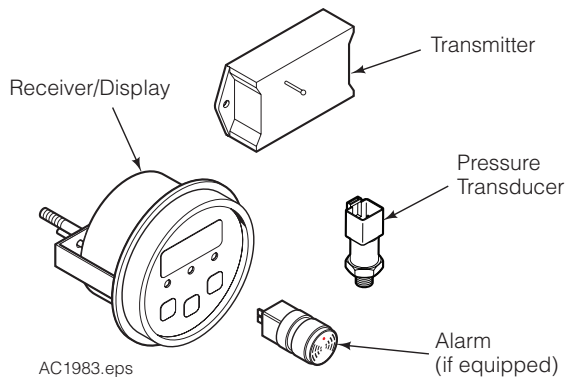
Flow Meter Kit 671477



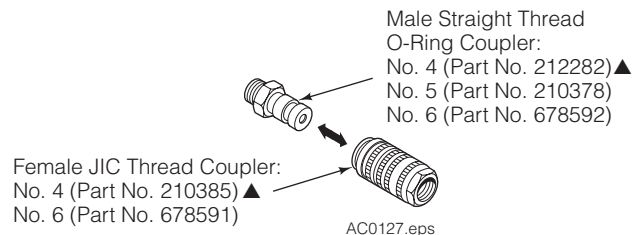
Pressure Gauge Kit 671212



Wireless Pressure Monitor Kits



Diagnostic Quick-Disconnects



▲ Included in Diagnostics Kit 394382.

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 roll after it has been picked up.
- Attachment will not carry rolls to its rated capacity.
- Attachment arms will not function properly.

To correct one of these problems, see Section 3.3.

Rotate Circuit

- Attachment will not rotate.
- Attachment will not rotate rolls up to its rated capacity.
- Attachment rotates in one direction only.

To correct one of these problems, see Section 3.4.

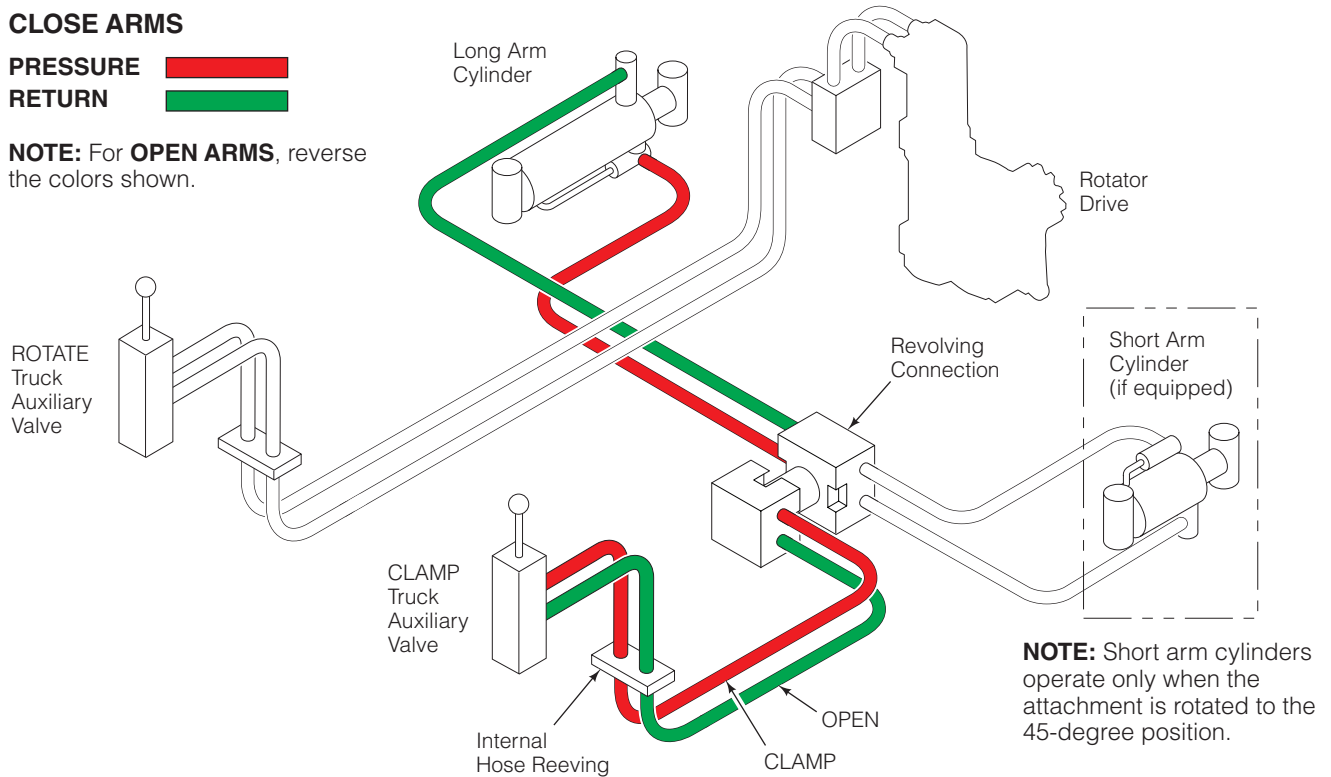
3.2 Plumbing

3.2-1 Hosing Diagram

CLOSE ARMS

PRESSURE █
RETURN █

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

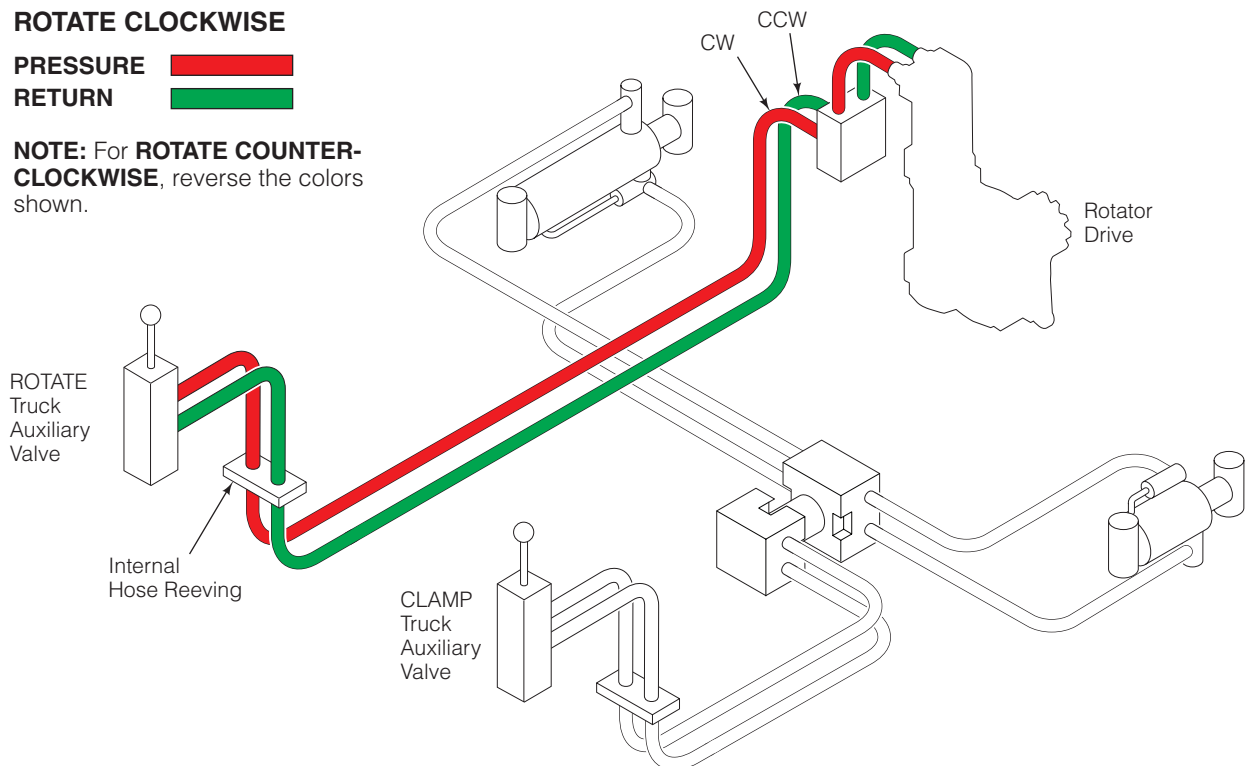


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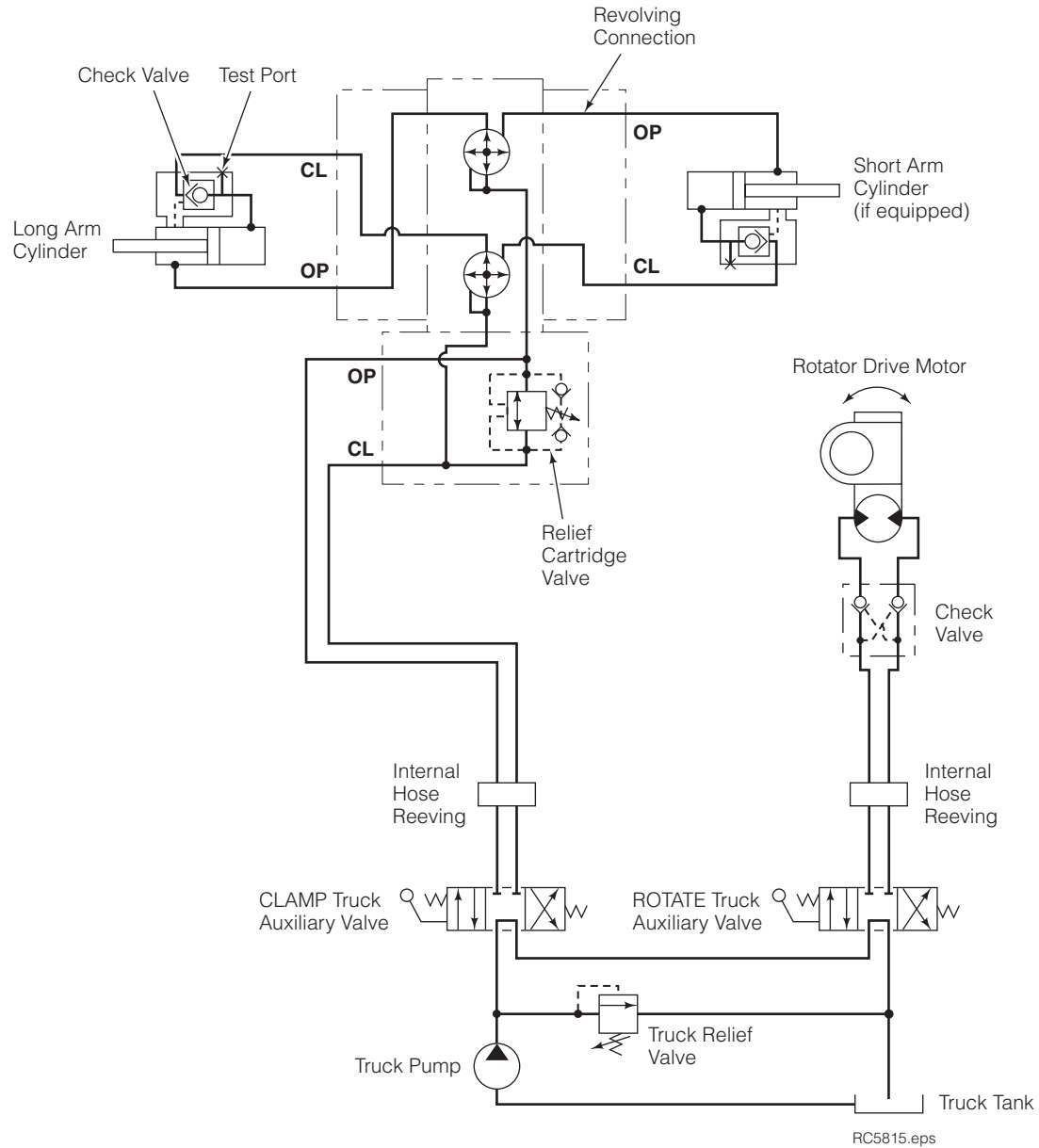
ROTATE CLOCKWISE

PRESSURE █
RETURN █

NOTE: For **ROTATE COUNTER-CLOCKWISE**, reverse the colors shown.



3.2-2 Hydraulic Schematic



3.3 Clamp Function

There are four potential problem areas that can affect the clamp function:

- Operator may be handling roll incorrectly. Loads may be too heavy, exceeding capacity of the attachment. Refer to the attachment's Operator's Guide (Cascade part no. 210135) for suggested procedures.
- Low hydraulic pressure or flow from lift truck.
- External leaks.
- Worn/defective revolving connection shaft seals, cartridge valves, cylinder seals or check valves.

3.3-1 Supply Circuit Test



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.

- 1 Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. **Pressure to the attachment must not exceed 2300 psi (160 bar)**, measured at the carriage hose terminal.
- 2 Check the flow volume at the carriage hose terminal. See Section 5.1-1 for recommended flow volumes. If the truck pressure and flow are correct, proceed with the CLAMP/OPEN circuit pressure test.

3.3-2 Clamp Circuit Test

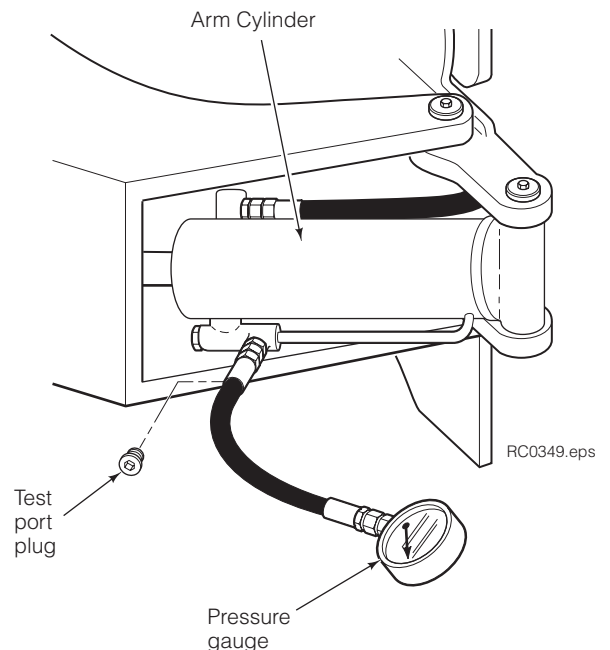


WARNING: Before removing hydraulic lines, position both arms at midstroke to relieve cylinder pressure. Turn the truck off and open the truck auxiliary control valves several times in both directions.

- 1 Check for external leaks at the cylinders and revolving connection.
- 2 **Long Arm Cylinder** – Install a pressure gauge to the long arm cylinder's test port. Close the long arm and hold the handle in the CLAMP position a few seconds to develop full truck system pressure. Watch the gauge pressure reading.
Short Arm Cylinder – Install a pressure gauge to the short arm cylinder's test port. Rotate the attachment to the 45° position. Close the short arm fully and hold the handle in the CLAMP position a few seconds to develop full truck system pressure. Watch the gauge pressure reading.
 - If the initial gauge pressure is **not** within 100 psi (7 bar) of system pressure measured at the hose terminal, the revolving connection may be faulty and require service. Refer to Section 4.6.

Clamp Circuit Test Continued, Step 2 Continued

- If the gauge pressure drops **more** than 150 psi (10 bar) initially and an additional drop **exceeds** 25 psi (2 bar) per minute, the cylinder check valve cartridge or piston seals may be faulty. Continue troubleshooting, Step 3.
 - If the gauge pressure **does not drop** more than 150 psi (10 bar) initially, and additional drop **does not exceed** 25 psi (2 bar) per minute, the problem is not hydraulic. Refer to Section 3.3.
- 3 Position both arms to midstroke to relieve cylinder pressure. Remove, swap or reinstall the cylinder check valve cartridge.
 - 4 **Long Arm Cylinder** – Close the long arm fully and hold the handle in the CLAMP position a few seconds to develop full truck system pressure. Watch the gauge pressure readings.
Short Arm Cylinder – Rotate the attachment to the 45° position. Close the short arm fully and hold the handle in the CLAMP position a few seconds to develop full truck system pressure. Watch the gauge pressure readings.
 - If the gauge pressure on the cylinder **continues** to drop more than 150 psi (10 bar) initially, and additional drop **exceeds** 25 psi (2 bar) per minute, the cylinder piston seals are faulty. Refer to Section 4.7 for cylinder service.
 - If the gauge pressure on the cylinder **does not** drop more than 150 psi (10 bar) initially, and additional drop **does not exceed** 25 psi (2 bar) per minute, the check valve (now in the other cylinder) is faulty and requires replacement. Refer to Section 4.7-3 for check valve service.



3.4 Rotation Function

There are four potential problem areas that can affect the rotation function:

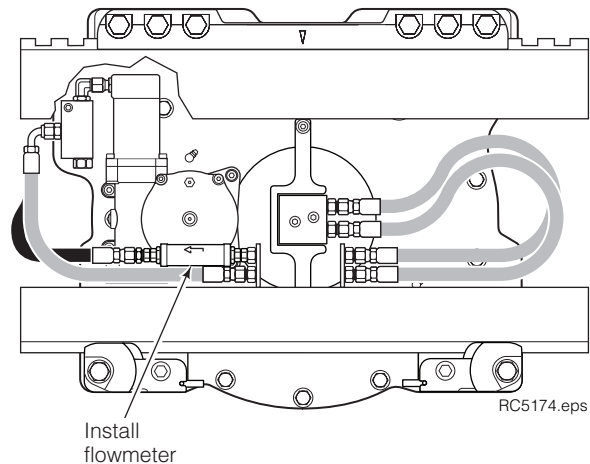
- Operator may be handling roll incorrectly. Loads may be too heavy or rotated off-center, exceeding capacity of attachment. Refer to the attachment's Operator's Guide (Cascade part no. 210135) for suggested procedures.
- Low hydraulic pressure or flow from lift truck.
- Worn or defective hydraulic rotator motor.
- Worn or defective drive assembly or rotator frame bearing assembly.

3.4-1 Supply Circuit Test



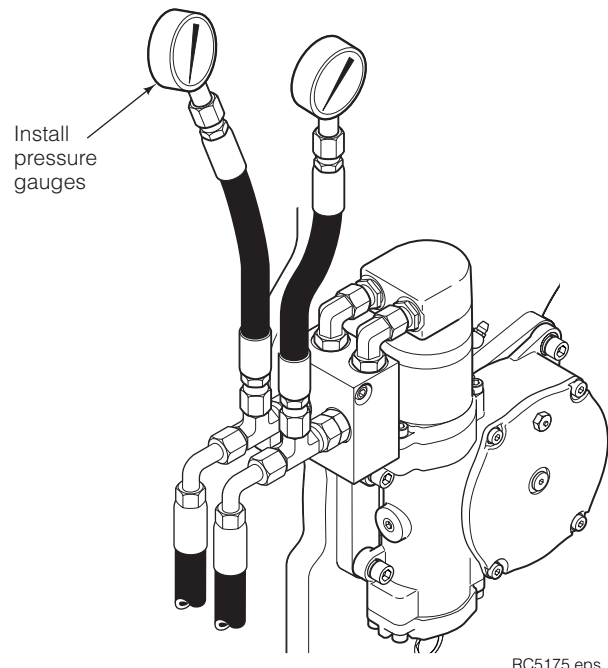
WARNING: Before removing hydraulic lines, relieve pressure in the hydraulic system. Turn the truck off and open the truck auxiliary control valves several times in both directions.

- 1 Check for external leaks.
- 2 Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. **Pressure to the attachment must not exceed 2300 psi (160 bar),** measured at the carriage hose terminal.
- 3 Check the flow volume at the carriage hose terminal. See Section 5.1-1 for recommended flow volumes. If the truck pressure and flow are correct, proceed with the ROTATE circuit pressure test.



3.4-2 Rotation without Load

- 1 Install pressure gauges on the rotator motor fittings.
- 2 Rotate the attachment without a load and note pressure readings of both gauges.
 - If the attachment rotates in one direction faster than the other, or rotates in one direction only, the drive box may need service. Refer to Section 4.3.
 - If the lower gauge reading **exceeds** 500 psi (35 bar), there is excessive back pressure in the supply circuit. Check for restrictions such as numerous fittings, 90° fittings, or hose sizes less than No. 6.



3.4 Rotation Function (continued)

3.4-3 Rotation with Load

- 1 Select a load that is approximately 3/4 of the attachment's maximum torque capacity:

10H – 20,860 in.-lbs. @ 2300 psi
(2355 Nm @ 160 bar)

10H (low flow) – 13,689 in.-lbs. @ 2300 psi
(1545 Nm @ 160 bar)

Use the chart as a guideline to determine the approximate roll diameter and roll weight to achieve the 3/4 torque capacity.

- 2 Rotate the load. Note gauge readings during rotation.
 - If the higher gauge reading is substantially **less** than the truck pressure as measured at the carriage hose terminal, the drive motor geroler set may need repair. Refer to Section 4.4.
 - If the higher gauge reading is **close** to truck pressure as measured at the carriage hose terminal and no rotation occurs, the drive motor output shaft or drive box may need repair. Continue troubleshooting.
- 2 Remove the motor from the drive box assembly as described in Section 4.4-1.
- 3 Reinstall the hoses to the drive motor fittings. Actuate the rotate circuit.
 - If the drive motor shows rotational output, the drive box may require service. Refer to Section 4.3.
 - If the drive motor shows little or no rotational output, the drive motor requires service. Refer to Section 4.4.

10H – 3/4 of maximum torque capacity:
15645 in.-lbs. @ 2300 psi (1326 Nm @ 160 bar)

US		Metric	
Roll Diameter	Roll weight	Roll Diameter	Roll weight
20 in.	782 lbs.	510 mm	3463 N
30 in.	522 lbs.	762 mm	2318 N
40 in.	391 lbs.	1016 mm	1738 N
50 in.	313 lbs.	1270 mm	1391 N
60 in.	261 lbs.	1525 mm	1158 N

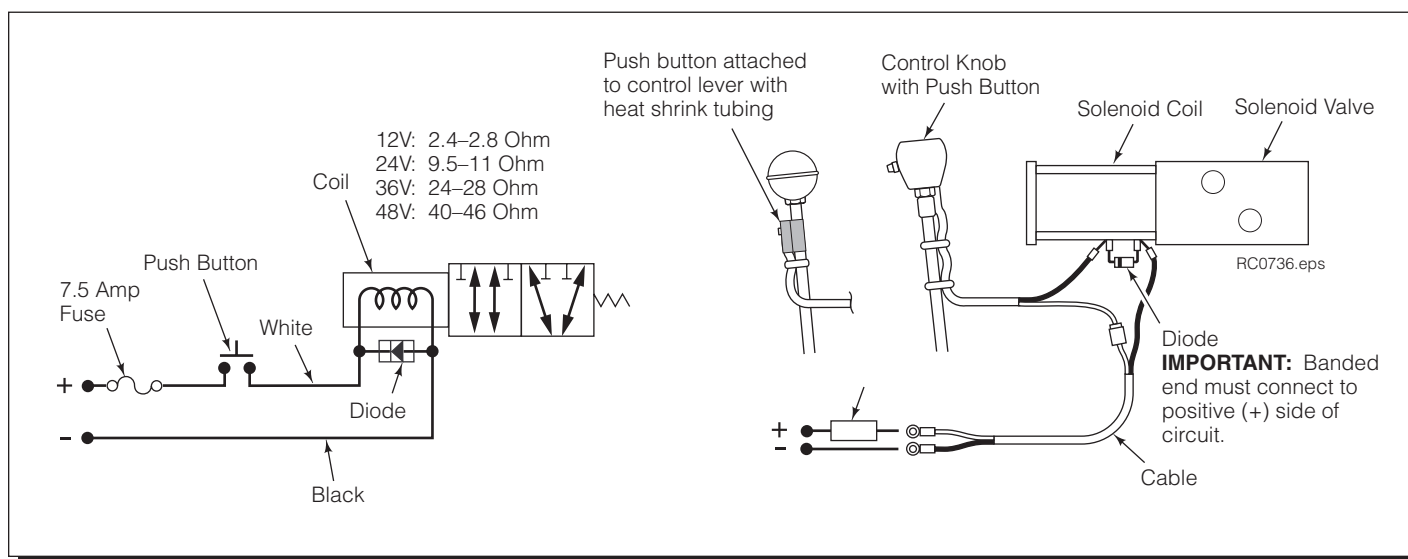
10H (low flow) – 3/4 of maximum torque capacity:
10267 in.-lbs. @ 2300 psi (1159 Nm @ 160 bar)

US		Metric	
Roll Diameter	Roll Weight	Roll Diameter	Roll Weight
20 in.	513 lbs.	510 mm	2272 N
30 in.	342 lbs.	762 mm	1521 N
40 in.	257 lbs.	1016 mm	1141 N
50 in.	205 lbs.	1270 mm	912 N
60 in.	171 lbs.	1525 mm	760 N

3.5 Electrical Circuit (Solenoid-equipped attachments)

Use the schematic shown and follow the steps below.

- 1 Check the control knob circuit fuse. Replace if necessary.
- 2 Check for loose electrical connections at the truck ignition switch, control knob button, solenoid coil terminals and diode.
- 3 Remove the diode from the solenoid coil terminal. Test with an ohmmeter for high resistance in one direction and no resistance in the other direction. If there is no resistance in both directions, replace the diode.
NOTE: When replacing the diode, the banded (+) end must connect to the positive (+) side of 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 at 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.
 - If there is no ohmmeter reading, the coil is defective. Replace coil.



4.1

Attachment Removal

- 1 Rotate the attachment to the vertical roll handling position. Extend the arm outside the frame width.

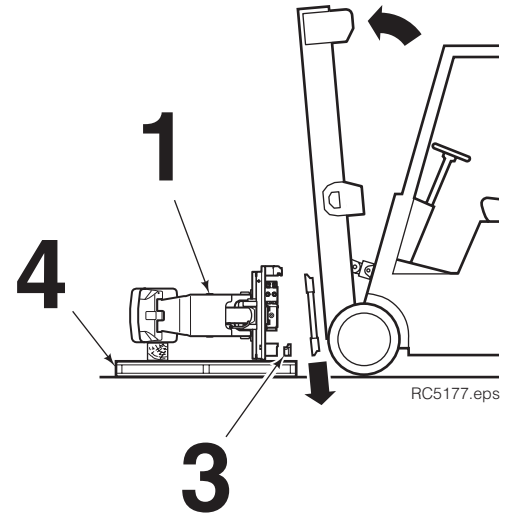


WARNING: Before removing hydraulic lines, relieve pressure in the hydraulic system. Turn the truck off and open the truck auxiliary control valves several times in both directions.

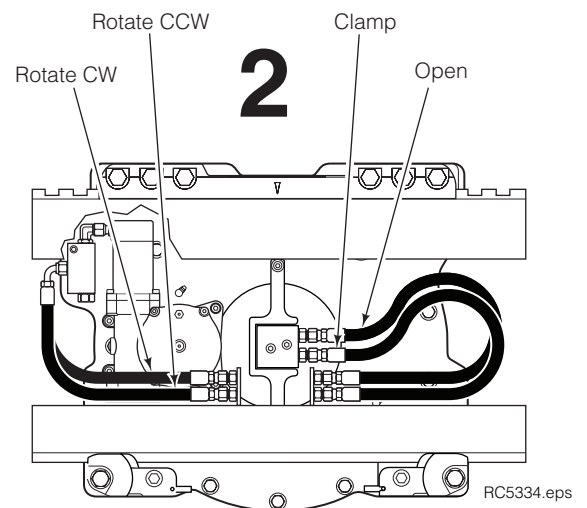
- 2 Disconnect and plug the hydraulic supply hoses to the attachment. Tag hoses for reassembly.
- 3 Disconnect/remove the lower hooks:

Bolt-On Hooks – Remove the lower mounting hooks. For reassembly, apply Loctite 242 (blue) on the capscrew threads. Tighten the capscrews to 122 ft.-lbs. (165 Nm).

Quick-Change Hooks – Pull out pin and rotate hook down. Release pin. For reassembly, pull pin and rotate hook up. Release pin.
- 4 Set the attachment on a pallet. Tilt the mast forward and lower the carriage to remove the attachment from the truck.
- 5 For installation, reverse the above procedures with the following exceptions:
 - Refer to Installation Instructions manual 6077316 for complete installation procedures.



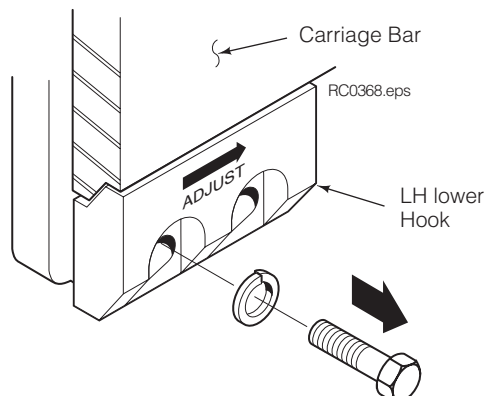
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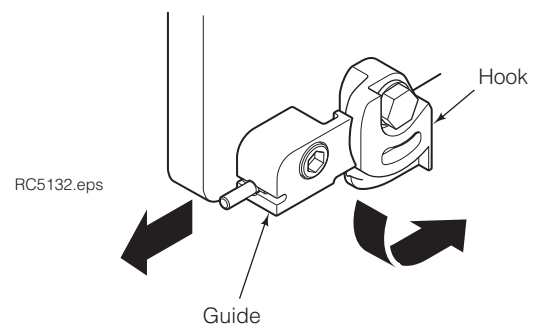
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3

BOLT-ON HOOKS



QUICK-CHANGE HOOKS



4.2 Arm

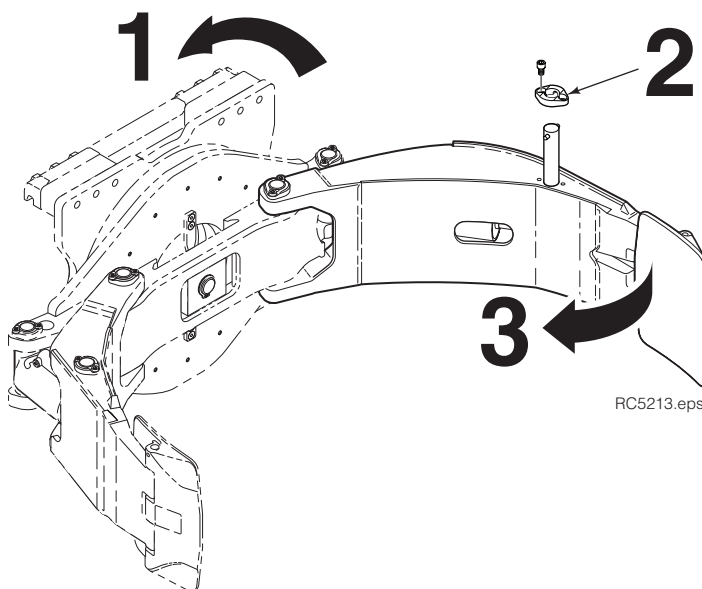
4.2-1 Arm Assembly – Removal and Installation

- 1 Rotate the attachment to the vertical roll handling position.
- 2 Remove the retainer and cylinder rod anchor pin from the arm being removed. Retract the cylinder rod. For reassembly, tighten the retainer capscrews to 28 ft.-lbs. (38 Nm).
- 3 Swing the arm inward to contact the other arm. Rotate the attachment 90° to position the arm being removed on top.

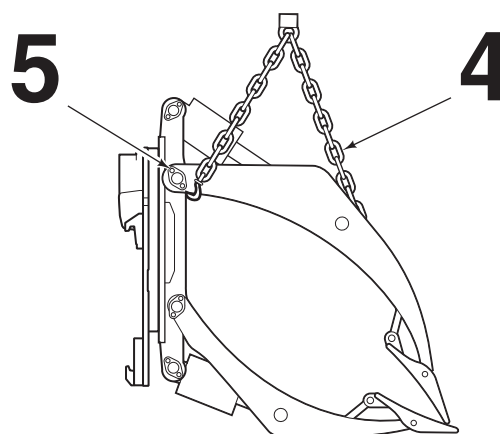


WARNING: Verify that the overhead hoist and chains or straps are rated for the weight of the attachment. Refer to nameplate for attachment weight.

- 4 Attach an overhead hoist to the arm and take up slack in the chain or strap.
- 5 Remove arm/faceplate retainers and arm pivot pins. Note location of shims. Lift away arm assembly. For reassembly, tighten the pivot pin retainer capscrews to 28 ft.-lbs. (38 Nm).
- 6 For reassembly, reverse the above procedures.



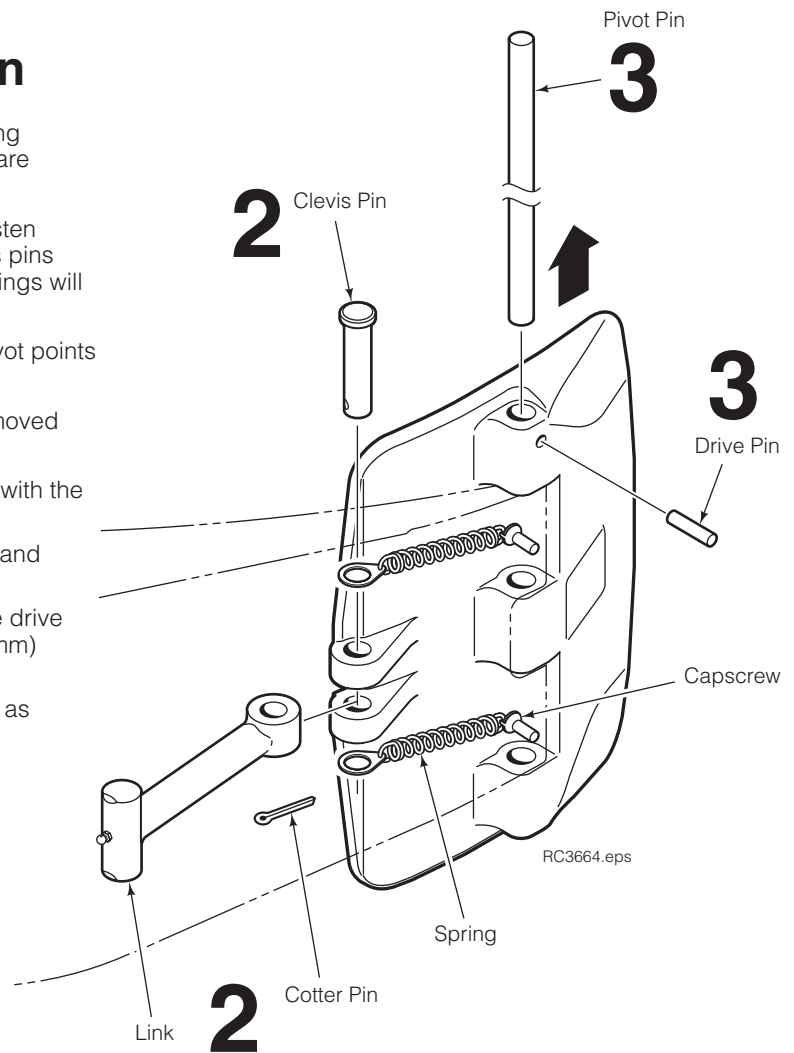
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4.2-2 Contact Pad – Removal and Installation

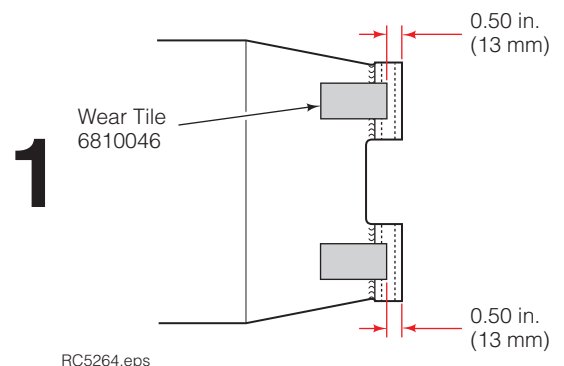
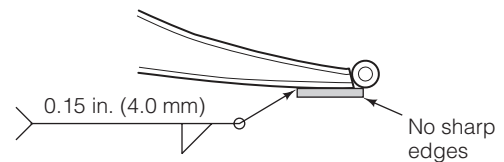
- 1 Rotate the attachment to the vertical roll handling position. Lower the unit until the contact pads are approximately 1 in. (25 mm) off the ground.
- 2 Remove cotter pins from the clevis pins that fasten the links to the contact pad. Remove the clevis pins from the links while detaching the springs. Springs will remain fixed to the arms.
- 3 Remove the drive pins from the contact pad pivot points and remove the pivot pins.
- 4 Remove the contact pad. Pad links can be removed from the arm by rotating 90° and pulling out.
- 5 For reassembly, reverse the above procedures with the following exceptions:
 - Inspect the arm tips and pivot pins for wear and repair/replace as necessary.
 - Install pivot pin and top drive pin. Make sure drive pin is an interference fit. Pin is 0.33 in. (8.4 mm) diameter x 1.50 in. (38.1 mm) long.
 - Check the condition of the springs. Replace as required.



4.2-3 Wear Tile Replacement

- 1 Position the wear tiles on the back of the short arm using the dimensions shown. Tack, then weld the wear tiles using the weld procedures described on Section 4.2-4, Step 8.
- 2 Remove slag after each weld and inspect for defects.

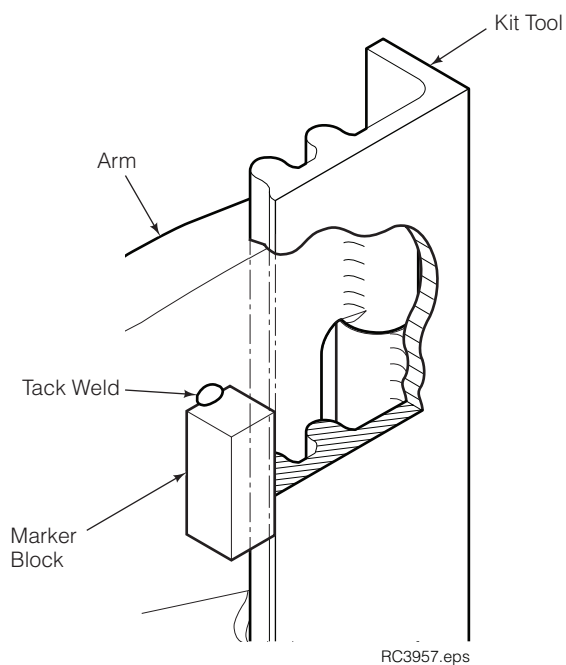
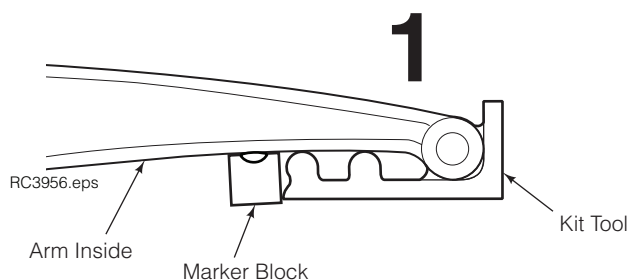
NOTE: Arc craters, undercut, overlap and porosity are not permitted. Repair any defect as required.
- 3 Grind all welds to smooth transitions between parts.
- 4 Install contact pads by reversing Steps 1 through 4 of Removing Contact Pads.



4.2-4 Arm Tip Repair

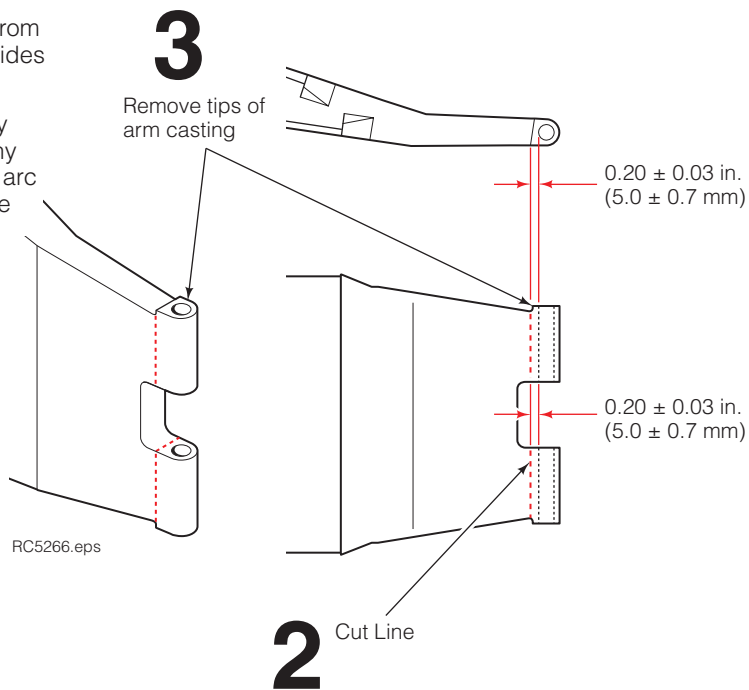
- 1 Place the tool against the tip with raised ribs on the inner arm surface and the spacers in between each tip. Tack weld two blocks (user equipped) to the inside of the arm as a marker at the edge of the tool. Remove the tool.

IMPORTANT: Avoid damage to machined features and threaded holes.

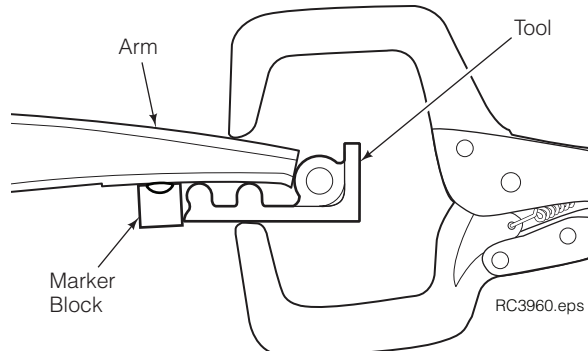


- 2 Scribe a cut line 0.20 ± 0.03 in. (5 ± 0.7 mm) back from the inner surface of the existing tip holes on both sides of the arm tips.

- 3 Remove defective tip area entirely at the cut line by grinding, sawing, torch or arc gouging. Remove any paint contamination from around the repair area. If arc gouging is used, make sure all carbon particles are completely removed.

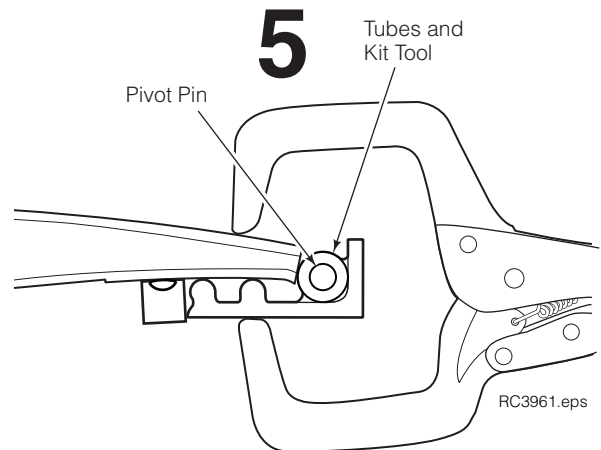


- 4 Clamp the kit tool against the marker blocks.

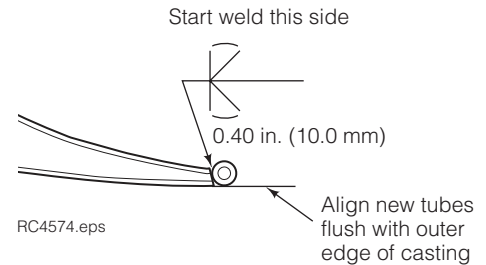


4.2-4 Arm Tip Repair (Continued)

- 5 Position the new tubes on the arm tips using the kit tool. Place existing pivot pin through all tubes and kit tool for alignment. All repairs should be done in the flat position.



- 6 Preheat arm tip base metal to 70°F (21°C) minimum. Tack weld new tubes to the tips. Use the recommended weld procedures listed in step 8. Remove kit tool.
- 7 Install the contact pad and pivot pin on the arm. Check the tube alignment, realign as required. Remove the contact pad and pin.

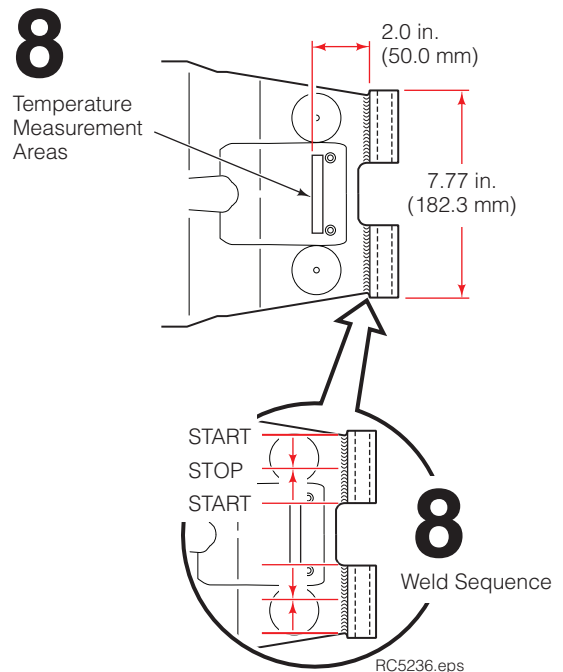


- 8 Finish-weld the tubes to the arm tips and wear tiles using the following weld procedures:

- Protect inside of tubes from weld spatter.
- Preheat arm tip base metal to 150°F (66°C). Monitor and maintain arm tip heat at locations shown using suitable temperature-indicating devices.
- Weld Sequence – Start weld on side indicated. Terminate each weld at center of tube.
- **WELD METHOD A – FCAW (Flux-Cored Arc Weld).** Attach ground wire to arm. Weld using AWS E70T-1 1/16 in. (1.6 mm) or 5/64 in. (2 mm) diameter wire with 100% CO₂ shielding gas at 35-50 CFH. Set welding amp per manufacturers recommendations. Apply weld holding a close arc. Do not oscillate or use a wash bead pattern.

WELD METHOD B – SMAW (Stick Welding). Attach ground wire to arm. Weld using E-7015 low hydrogen 1/8 in. (3.2 mm) or 5/32 in. (4.0 mm) diameter electrodes. Set welding amps per manufacturer's recommendations. Do not use electrode exposed to moisture without first re-drying them at 200°F (75°C) for 2 hours. Apply weld holding a close arc. Do not oscillate or use a wash bead pattern.

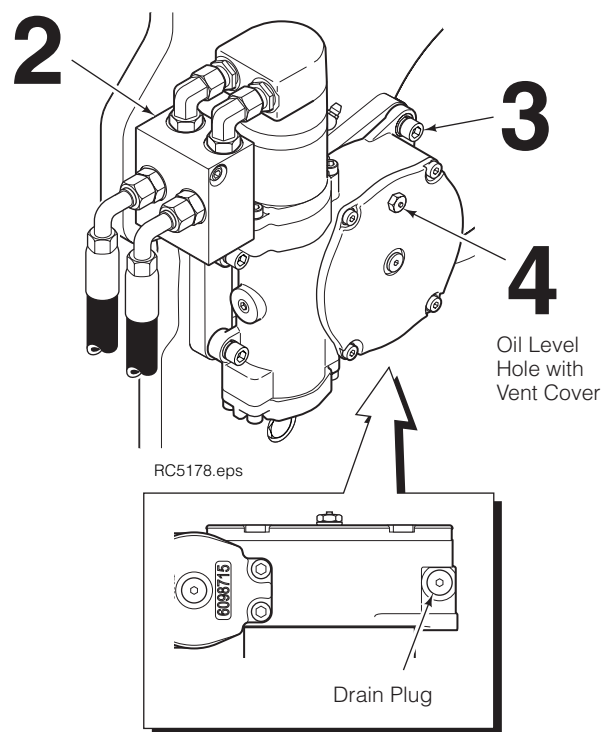
- Cool arm tip base metal at normal air cool.
- Remove marker blocks. Smooth out tack weld spots.



4.3 Drive Group

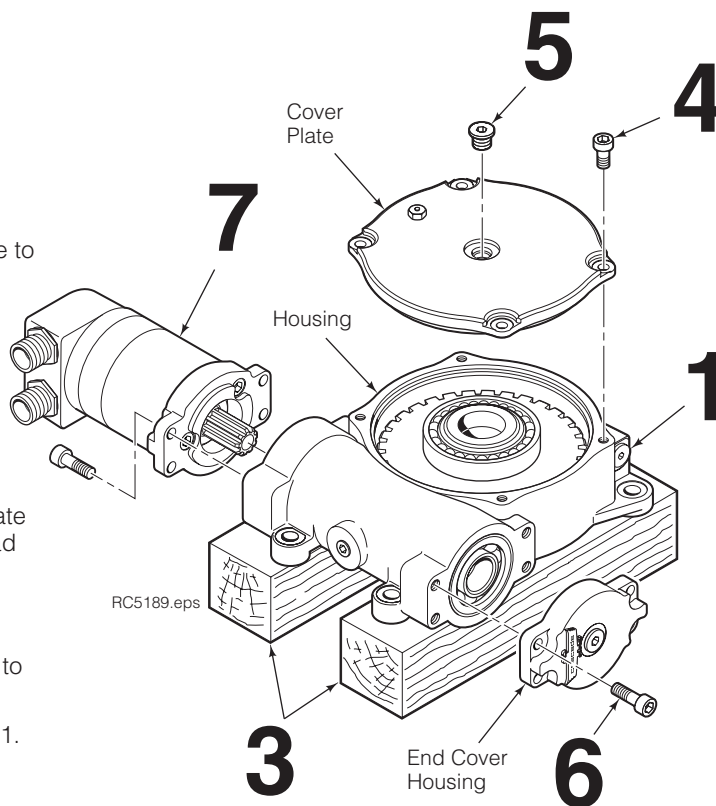
4.3-1 Drive Group Removal and Installation

- 1 Remove the attachment from the truck as described in Section 4.1.
- 2 Remove the valve from the motor and baseplate as described in Section 4.5.
- 3 Remove the four capscrews fastening the drive group to the baseplate. For reassembly, clean and dry capscrews. Apply Loctite 242 (blue) to threads and tighten the capscrews to 25 ft.-lbs. (32 Nm).
- 4 For reassembly, reverse the above procedures with the following exceptions:
 - After the drive group has been reinstalled, check the gearcase oil level. Oil must be up to the bottom of the oil level hole. Add oil through the cover vent hole. If necessary, fill with Cascade Gear Lube Part No. 656300, or SAE 90 wt. gear lube (AGMA 'mild' 6 EP Gear Lube).



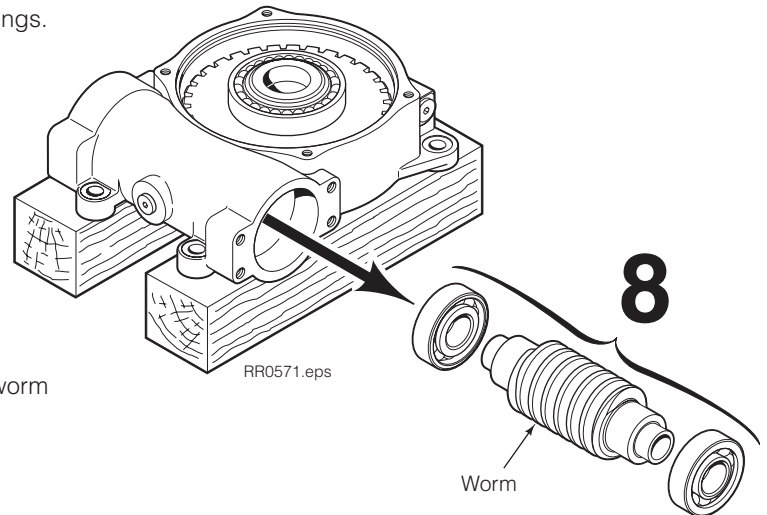
4.3-2 Drive Group Disassembly and Service

- 1 Drain oil from the housing drain hole.
- 2 Remove the drive group from the baseplate as described in Section 4.3-1.
- 3 Lay the drive group, pinion down, on two 4 x 4 in. (10 x 10 cm) wood blocks placed on both sides of the pinion.
- 4 Remove the four capscrews fastening the cover plate to the housing.
- 5 Remove the center capscrew plug from the cover plate and install an 3/8 NF capscrew with a minimum thread length of 2 in. (50 mm). Remove the cover plate by turning the capscrew clockwise while lightly tapping around the sides of the cover plate.
- 6 Remove the four capscrews fastening the end cover to the housing.
- 7 Remove the drive motor as described in Section 4.4-1.

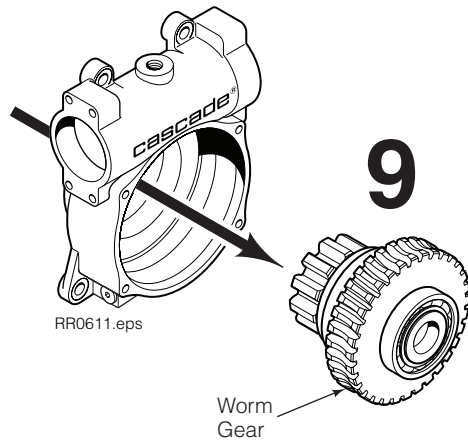


4.3-2 Drive Group Disassembly and Service (Continued)

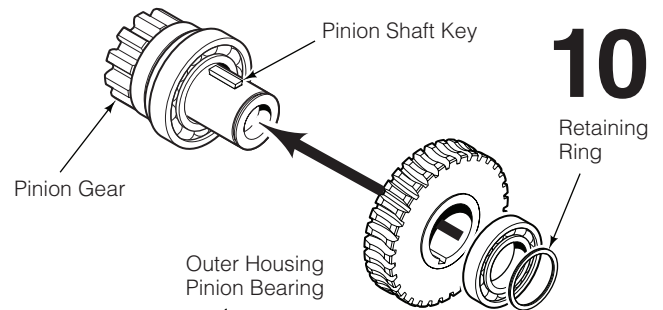
- 8** Tap the worm and bearings out through the end cover side of the housing. Note direction of bearings. Bearings are directional.



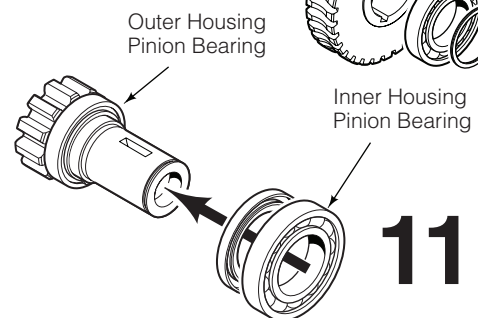
- 9** Press the pinion gear, seal, pinion bearings and worm gear out of the housing as an assembly.



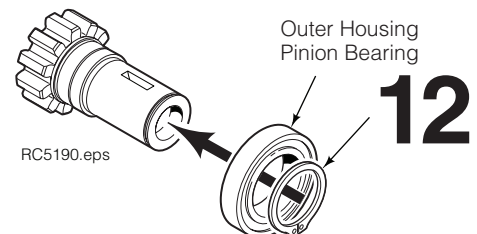
- 10** Remove the retaining ring from the pinion gear shaft. Press the pinion gear from the worm ring gear and cover plate pinion bearing. Remove the pinion shaft key.



- 11** Press the pinion gear from the inner housing pinion bearing and pinion seal.



- 12** Remove the second retaining ring from the pinion gear shaft. Press the pinion gear from the outer housing pinion bearing.



- 13** Clean and inspect all components. Remove all dried sealant residue. Replace all worn items. Remove any burrs or sharp edges with emery cloth.

4.3-3 Drive Group Reassembly

Build up the pinion/worm gear assembly vertically with the pinion gear down.

- 1 Position outer bearing and snap ring on the pinion shaft outer bearing seating area.

- 2 Install pinion seal onto seal seating area.

- 3 Apply Loctite 271 (red) to the inner bearing seating area, as shown. Press housing bearing onto the pinion shaft. Remove excess Loctite.

CAUTION: Make sure Loctite does not squeeze into the seal or bearings.

- 4 Install the key onto pinion shaft. Apply Loctite 271 (red) to the pinion shaft. Install the worm gear, cover plate pinion bearing and snap ring of the pinion.

CAUTION: Make sure Loctite does not squeeze into the seal or bearings.

- 5 Apply Loctite 271 (red) to housing seating area. Install the complete pinion assembly into the housing. Remove excess Loctite.

CAUTION: Make sure Loctite does not squeeze into the seal or bearings.

- 6 Install the worm's bearing in the drive motor side of the housing.

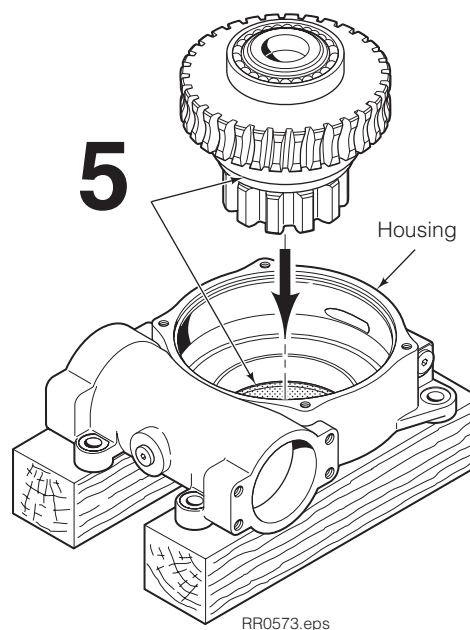
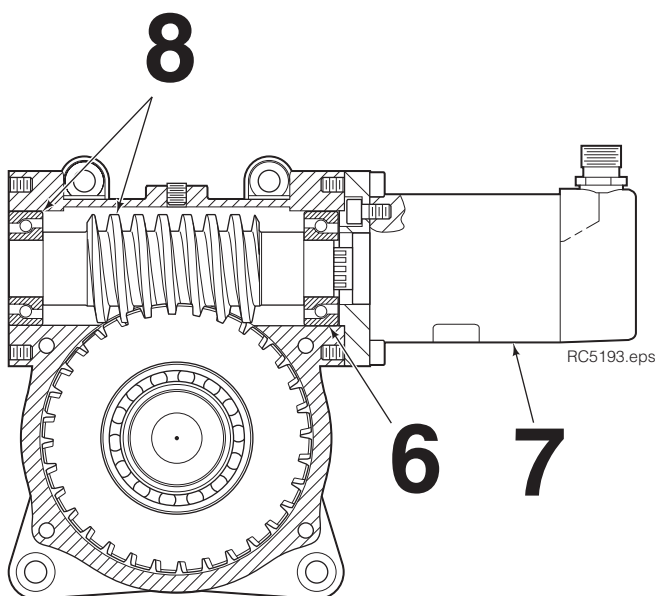
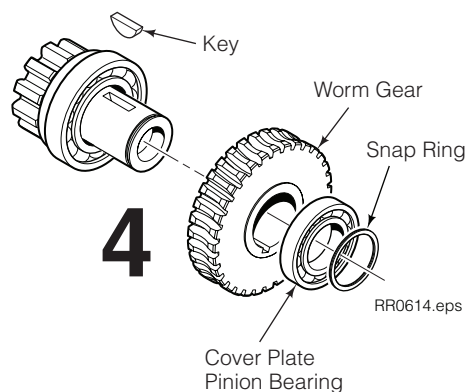
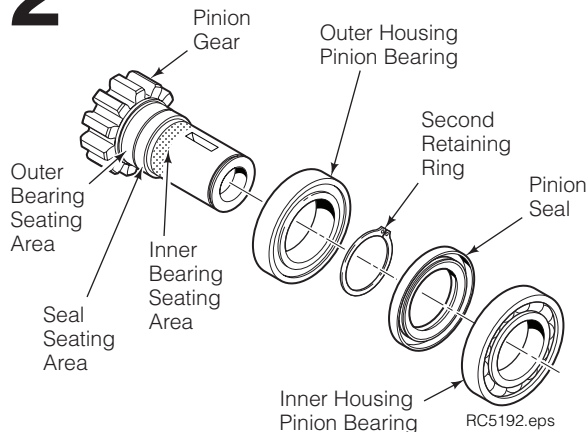
CAUTION: Bearing is directional. Install bearing with the part number side facing the motor.

- 7 Install the drive motor as described in Section 4.4-1.

- 8 Install the worm and second bearing in the housing. Fully engage the worm with the drive motor shaft.

CAUTION: Bearing is directional. Install bearing with the part number side facing end cover.

2 PINION AND BEARING WITH EXTERNAL SEAL



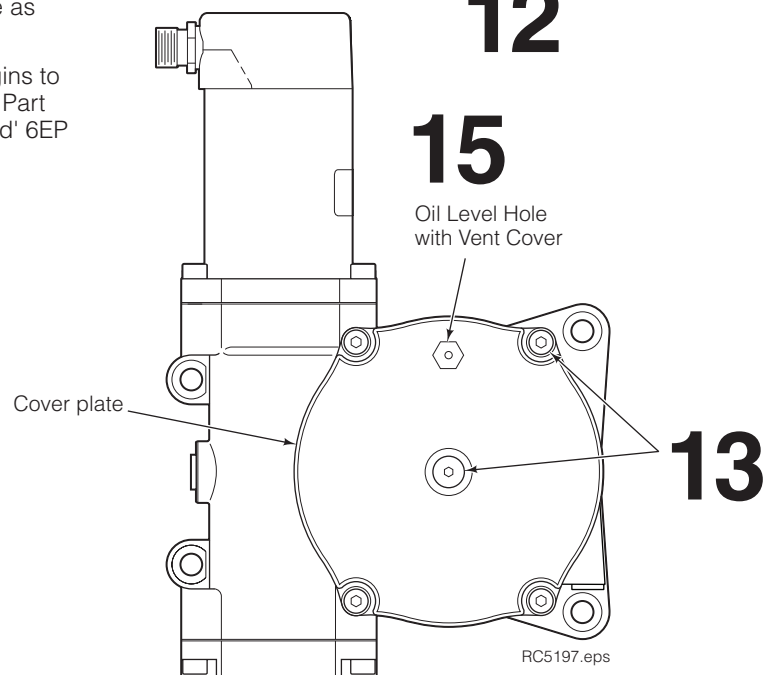
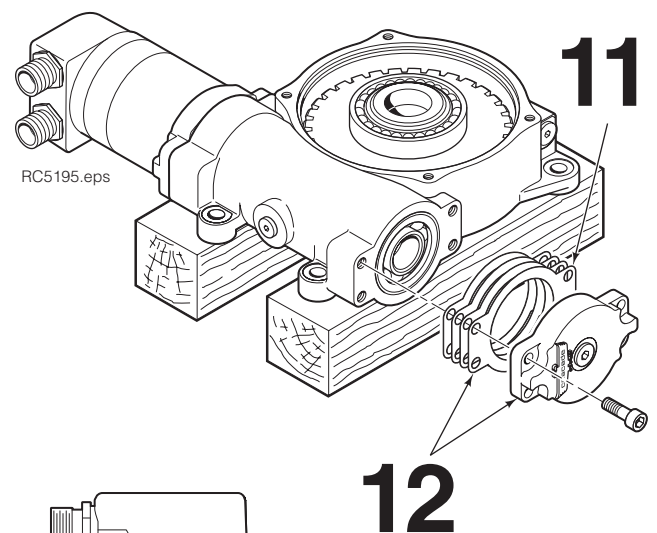
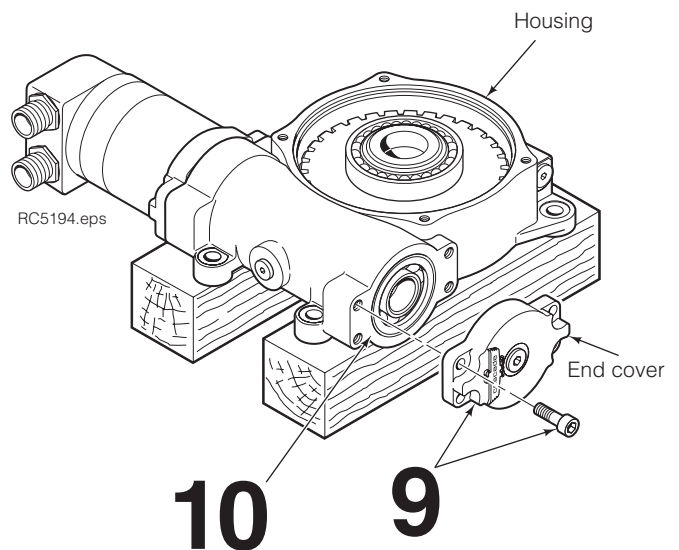
4.3-3 Drive Group Reassembly (Continued)

- 9 Temporarily install the end cover without shims. Tighten the capscrews sequentially to 115 in.-lbs. (13 Nm).
- 10 Measure the gap between the end cover and housing in three places with a feeler gauge or 'Plastigage' thread and determine the minimum gap.
- 11 Choose a combination of end cover shims equal to the minimum gap measured plus the next higher 0.005 in. (0.12 mm) increment. See examples below:
 - For 0.025–0.029 in. (0.635–0.736 mm) measured gap, use 0.030 in. (0.762 mm) total shim thickness.
 - For 0.010–0.014 in. (0.254–0.356 mm) measured gap, use 0.015 in. (0.381 mm) total shim thickness.
 - For 0.009 in. (0.228 mm) or less, use one 0.010 in. (0.254 mm) shim. A minimum of one 0.010 in. (0.254 mm) shim is required for proper seal.

NOTE: Shim Service kit 6089414 contains the shims listed. A minimum of one 0.010 shim is required to seal against leakage:

Qty	Part No.	Color	Thickness
2	6803094	Blue	0.005 in. (0.125 mm)
2	6803095	Brown	0.010 in. (0.254 mm)
2	6803096	Pink	0.015 in. (0.381 mm)
2	6803097	Yellow	0.020 in. (0.508 mm)

- 12 Remove the end cover. Apply Loctite 515 sealant (Cascade Part No. 668184) to both surfaces of the shims and end cover. Install the shim pack and end cover. Tighten the capscrews to a torque of 115 in.-lbs. (13 Nm). Remove excess sealant.
- 13 Install the cover plate and gasket. If the gasket shows porosity, apply Loctite 515 sealant to cover face. Install the four cover plate capscrews and tighten to 6 ft.-lbs. (8 Nm). Install the center hole plug.
- 14 Reinstall the drive group on the rotator baseplate as described in Section 4.3-1.
- 15 Remove cover vent and fill gearcase until oil begins to run from oil level hole. Use Cascade Gear Lube Part No. 656300, or SAE 90 wt. gear lube (AGMA 'mild' 6EP Gear Lube).



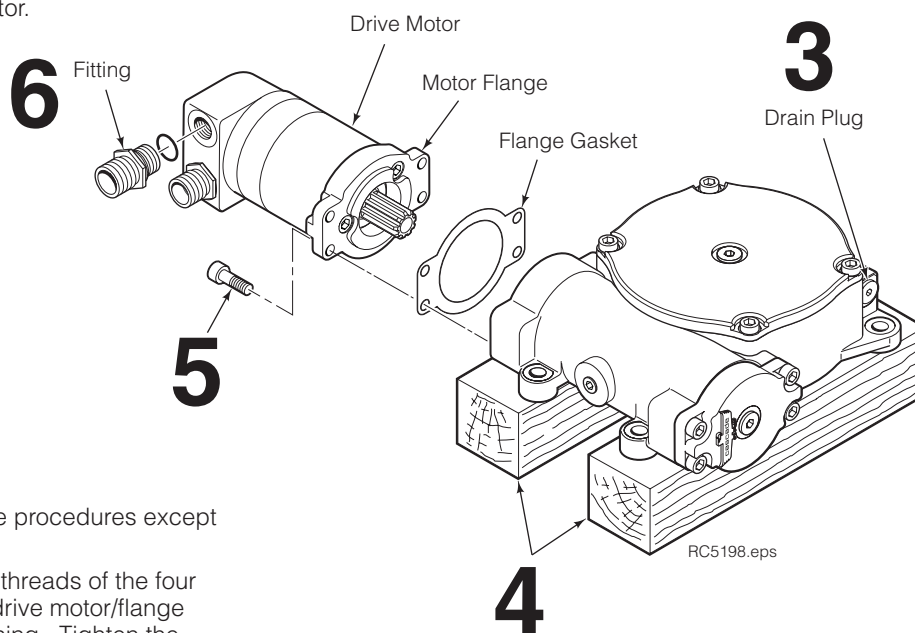
4.4 Drive Motor

4.4-1 Drive Motor Removal and Installation

- 1 Remove the attachment from the lift truck as described in Section 4.1.
- 2 Remove the drive group from the attachment as described in Section 4.3-1.
- 3 Remove the drain plug and drain the lubricant from the drive group.
- 4 Lay the drive group, pinion down, on two 4 x 4 in. (10 x 10 cm) wood blocks placed on both sides of the pinion gear.
- 5 Remove the four capscrews fastening the motor flange to the gearcase housing. Tap on the drive motor with a rubber mallet to separate the drive motor assembly from the housing.
- 6 Remove fittings from the drive motor.



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.



- 6 For reassembly, reverse the above procedures except as follows:
 - Apply Loctite 242 (blue) to the threads of the four flange capscrews. Install the drive motor/flange assembly to the gearcase housing. Tighten the capscrews to 115 in.-lbs. (13 Nm).
 - Install drive group and fill with lubricant as described in Section 4.3-1

4.4-2 Drive Motor Disassembly

Cascade provides service replacement parts for the seals indicated with a ▲ below. Due to cost, if other parts need replacement, the complete drive motor assembly should be replaced.

- 1 Remove the drive motor from the drive group as described in Section 4.4-1.
- IMPORTANT:** Clean the outside of the drive motor and service in a clean, dust-free work area. Use a soft-jawed vise for all service procedures.
- 2 Make a scribe mark across the motor sections. This will help with timing and alignment for reassembly.
- 3 Clamp the motor in a soft-jawed vise with the output shaft facing upward.
- 4 Remove the three capscrews from the flange. Remove the flange. Keep track of the O-ring between the flange and motor.
- 5 Remove the five capscrews with a 3/16 in. allen wrench (hex key).
- 6 Disassemble the motor as shown below. The motor can be taken apart in five groups.

A Remove the bearing housing group. Remove the output shaft from the bearing housing.

CAUTION: Leave the thrust bearing and thrust washer on the output shaft. Leave the output shaft spacer in the output shaft.

B Remove spool drive and drive.

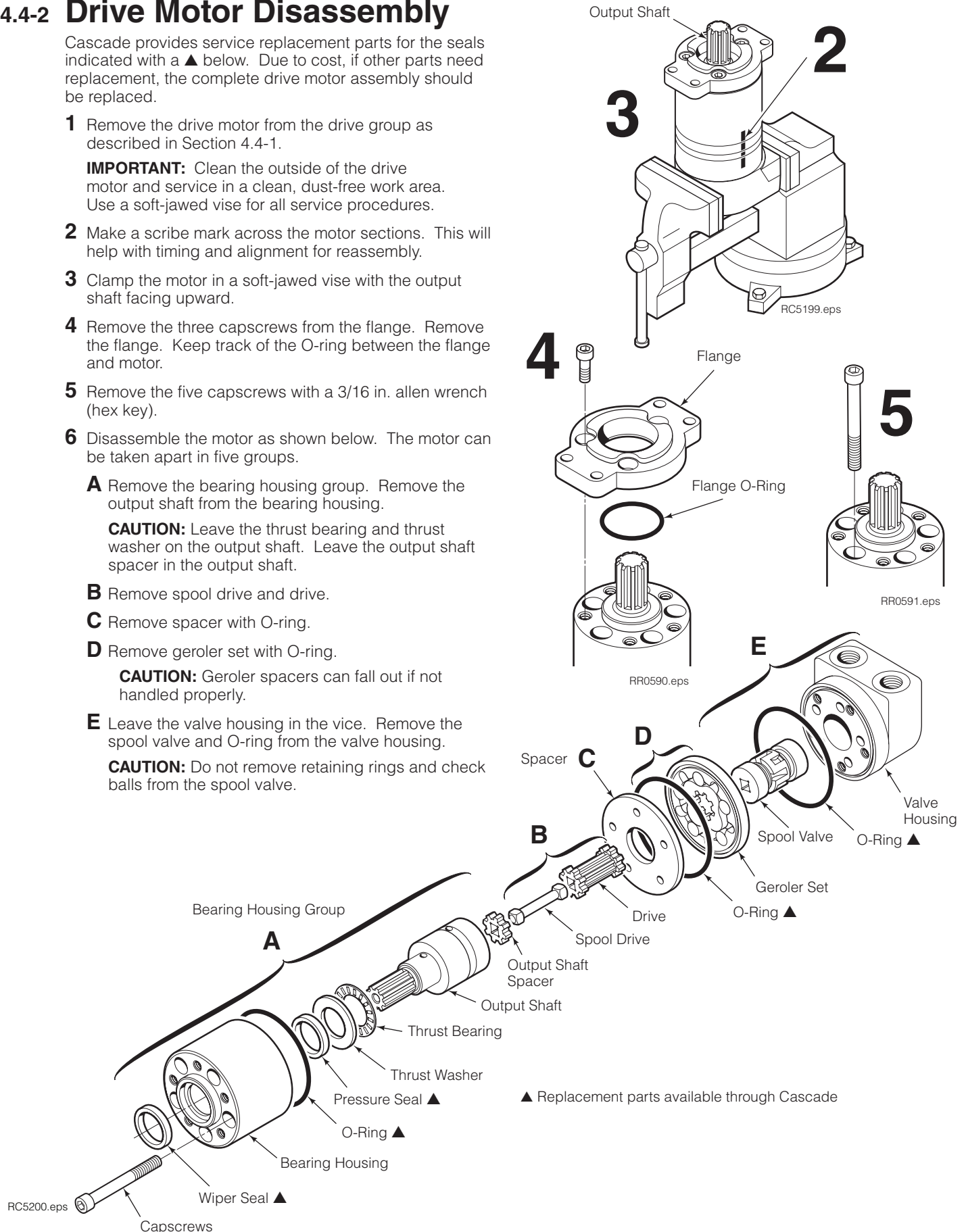
C Remove spacer with O-ring.

D Remove geroler set with O-ring.

CAUTION: Geroler spacers can fall out if not handled properly.

E Leave the valve housing in the vice. Remove the spool valve and O-ring from the valve housing.

CAUTION: Do not remove retaining rings and check balls from the spool valve.



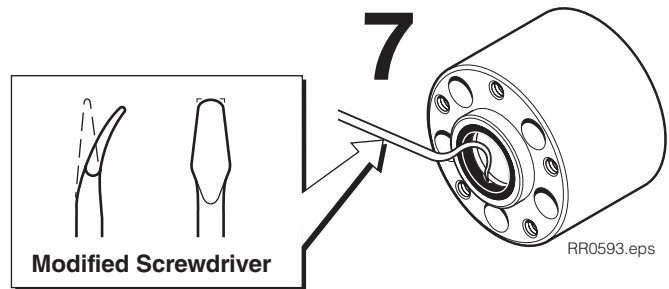
▲ Replacement parts available through Cascade

4.4-2 Drive Motor Disassembly (Continued)

- 7 Remove wiper seal and pressure seal from the bearing housing using a seal removal tool or modified screwdriver as shown.

IMPORTANT: Note the direction of the seals and thickness.

CAUTION: Do not scratch either of the seal cavities.



4.4-3 Drive Motor Inspection

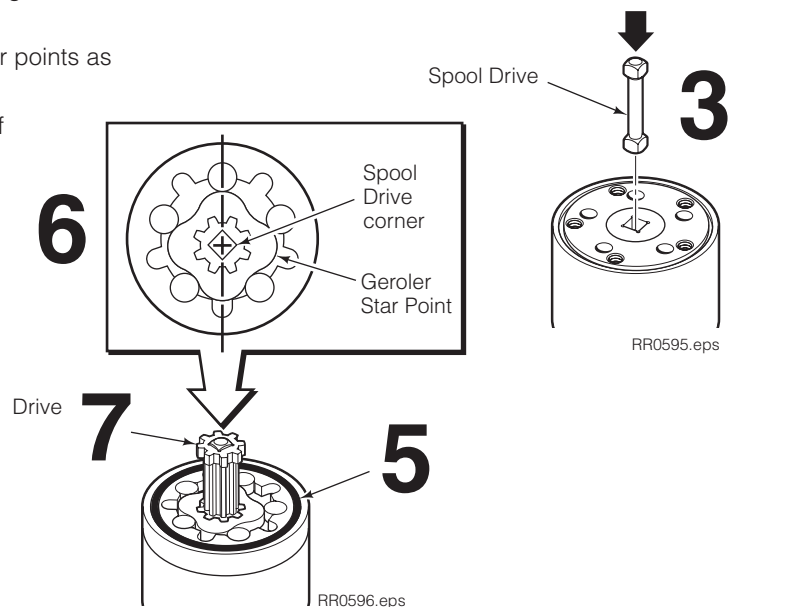
- Clean all parts with solvent and blow dry. **Do not use paper or cloth towels.**
- Inspect all parts for small nicks or burrs. Remove any small nicks or burrs with emery cloth.
- Inspect the bearing housing seal seats for scratches. Check for cracks that could cause leakage.

4.4-4 Drive Motor Reassembly

IMPORTANT: Use new seals for reassembly. Lubricate new seals with petroleum jelly to help hold seals in place when installed.

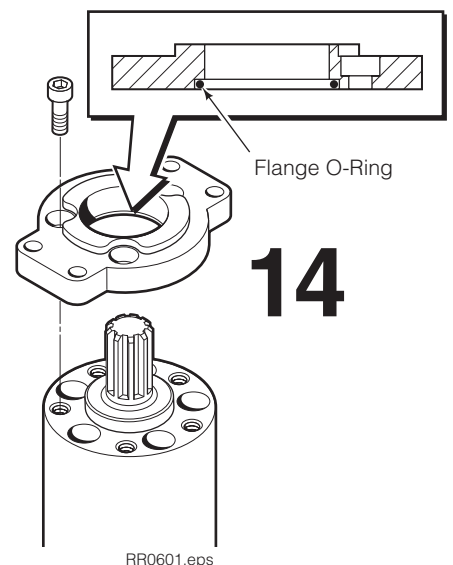
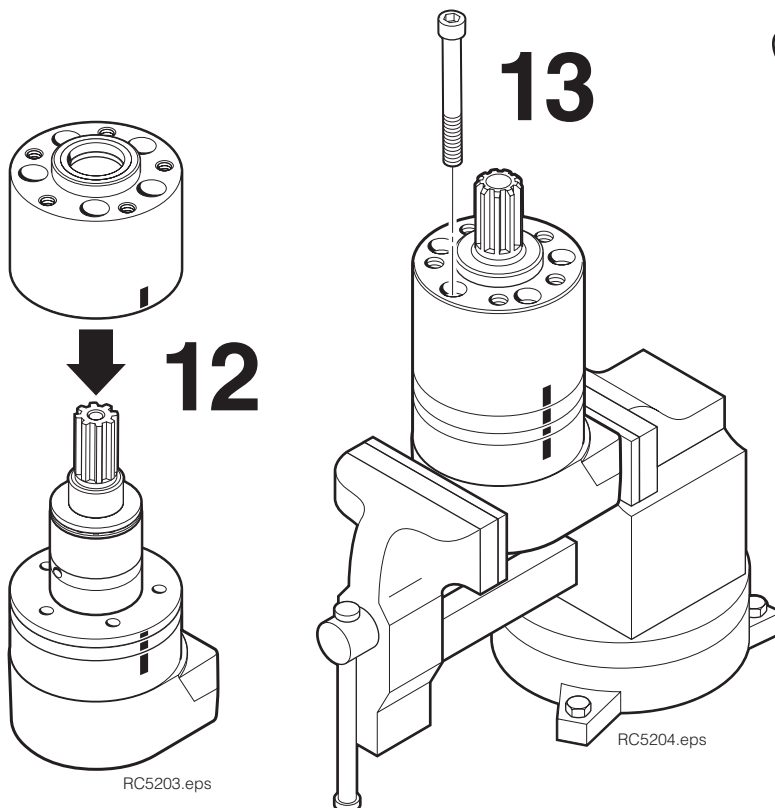
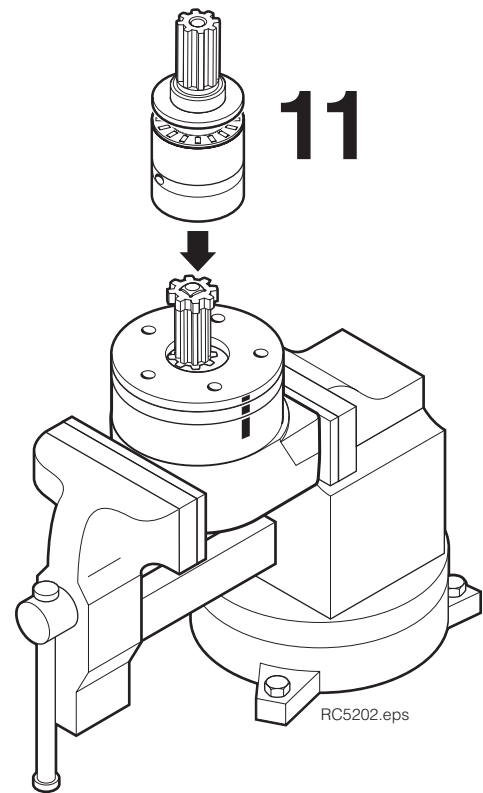
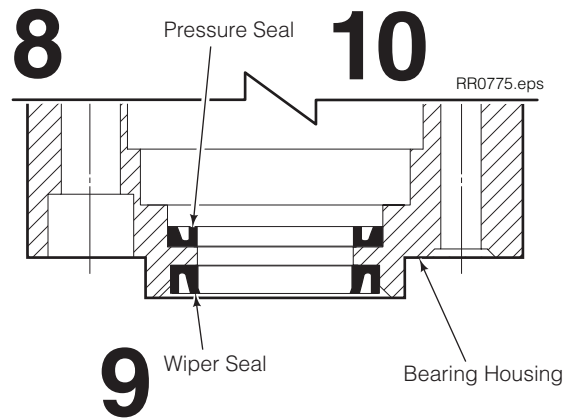
- 1 Clamp valve housing with fittings facing down.
- 2 Slide spool valve into the valve housing.
- 3 Place spool drive into the seating area of the spool valve.
- 4 Lubricate O-ring and install into the groove of the valve housing.
- 5 Lubricate O-ring and install into the groove of the geroler set. Place geroler set on valve housing while aligning the scribe mark and screw holes.
- 6 Align the corners of the spool drive to the star points as shown. Install the drive.
- 7 Lubricate O-ring and install into the groove of the spacer. Place the spacer on the geroler while aligning to the scribe marks and screw holes.

CAUTION: Be sure to not move the geroler.



4.4-4 Drive Motor Reassembly (Continued)

- 8 Apply a coating of a lithium based bearing grease, such as Mobilith SCH220, to inner edges of wiper seal, pressure seal, thrust bearing and washer.
- 9 Install wiper seal with the u-shape facing outward from its seat. Press the wiper seal firmly into its seat.
CAUTION: Do not damage seal. If seal is damaged during installation, it must be replaced.
- 10 Install pressure seal with the u-shape facing outward from its seat. Press the pressure seal firmly into its seat. If needed, use a 1 in. (25 mm) diameter dowel to press the seal.
CAUTION: Do not damage seal. If seal is damaged during installation, it must be replaced.
- 11 Place the output shaft onto the spool drive. Rock the shaft around until the spool drive engages into the output shaft spacer.
- 12 Install the bearing housing onto the output shaft while aligning the scribe marks and screw holes.
CAUTION: Do not damage seal. If seal is damaged during installation, it must be replaced.
- 13 Install and tighten the five capscrews. First, pre-torque the capscrews in an alternating cross pattern to 90 in.-lbs. (10 Nm). Then tighten, in an alternating cross pattern, to a final torque of 130 in.-lbs. (15 Nm).
- 14 Lubricate the flange O-ring with petroleum jelly and press into flange. Place flange on the shaft and flush against the housing. Install capscrews and tighten to a torque of 115 in.-lbs. (13 Nm).



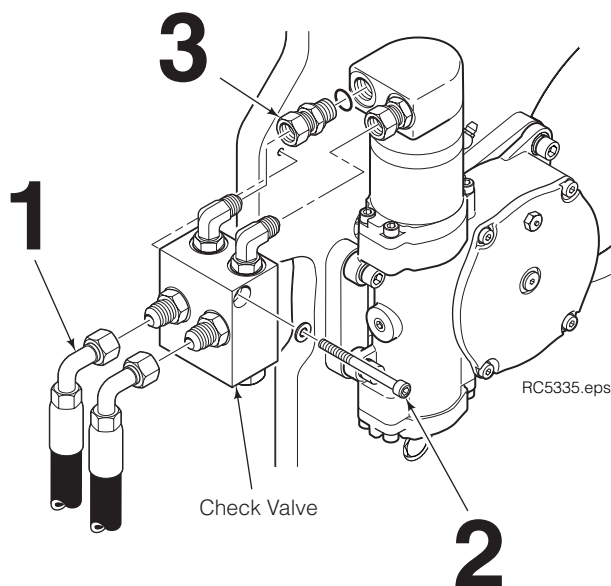
4.5 Valve

4.5-1 Valve Removal



WARNING: Before removing any hoses, relieve pressure in the hydraulic system. With the truck off, open the truck auxiliary control valve(s) several times in both directions.

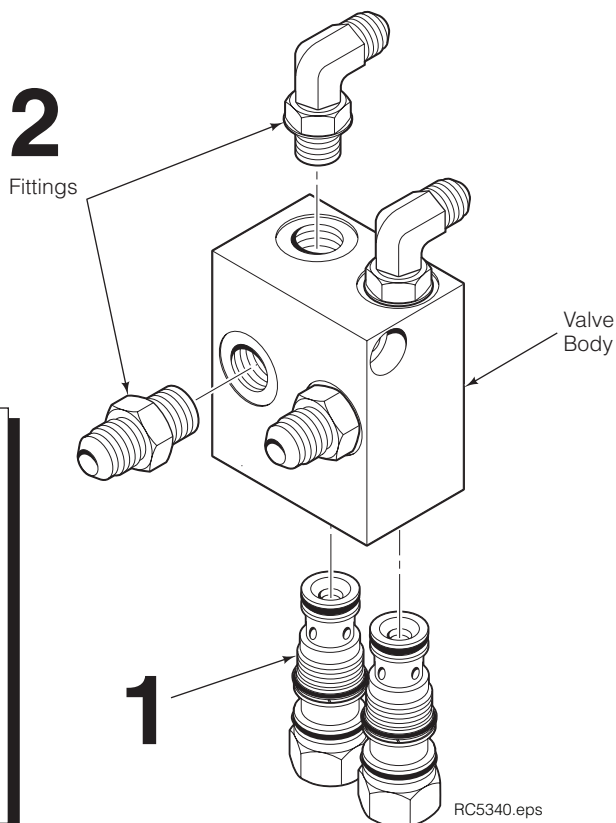
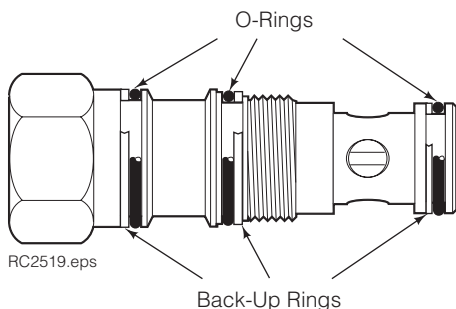
- 1 Disconnect the hydraulic hoses to the drive group valve. Tag hoses for reassembly.
- 2 Remove the capscrew fastening the valve to the baseplate. For reassembly, tighten the capscrew to 33 ft.-lbs. (45 Nm).
- 3 Disconnect the valve from the drive box fittings.



4.5-2 Valve Service

- 1 Remove cartridges from valve.
- 2 Remove the remaining fittings
- 3 Remove the O-rings and back-up rings from the cartridges.
- 4 Clean all parts with cleaning solvent.
- 5 For reassembly, reverse the above procedures except for the following special instructions:
 - The cartridge O-rings and back-up rings must be installed as shown for proper hydraulic operation.
 - Lubricate the cartridges and seals with petroleum jelly prior to reassembly.

PO Check Valve



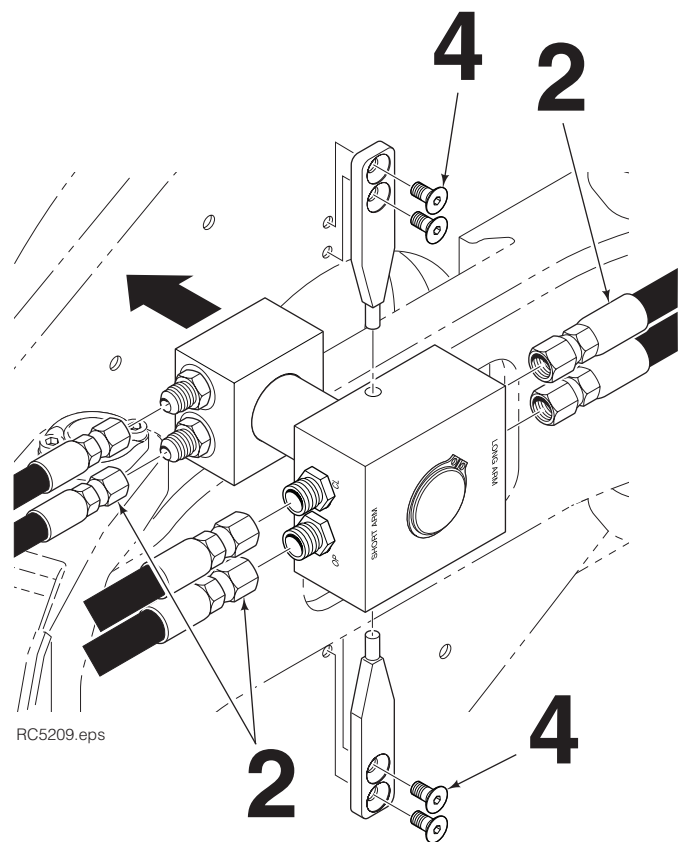
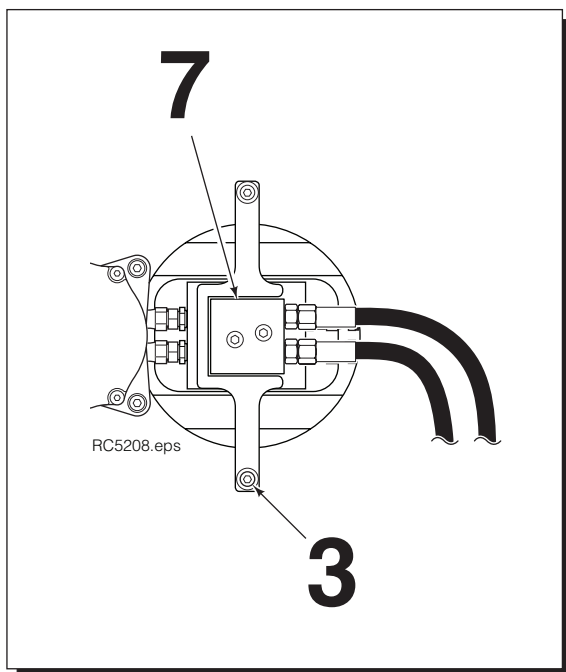
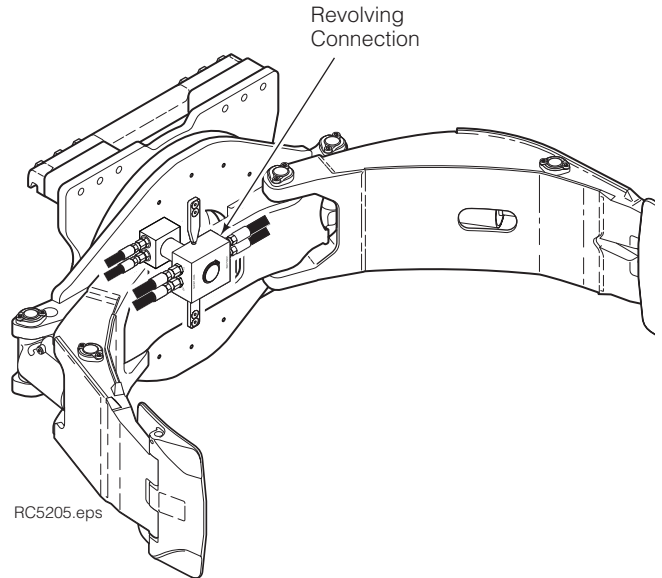
4.6 Revolving Connection

4.6-1 Revolving Connection Removal and Installation



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

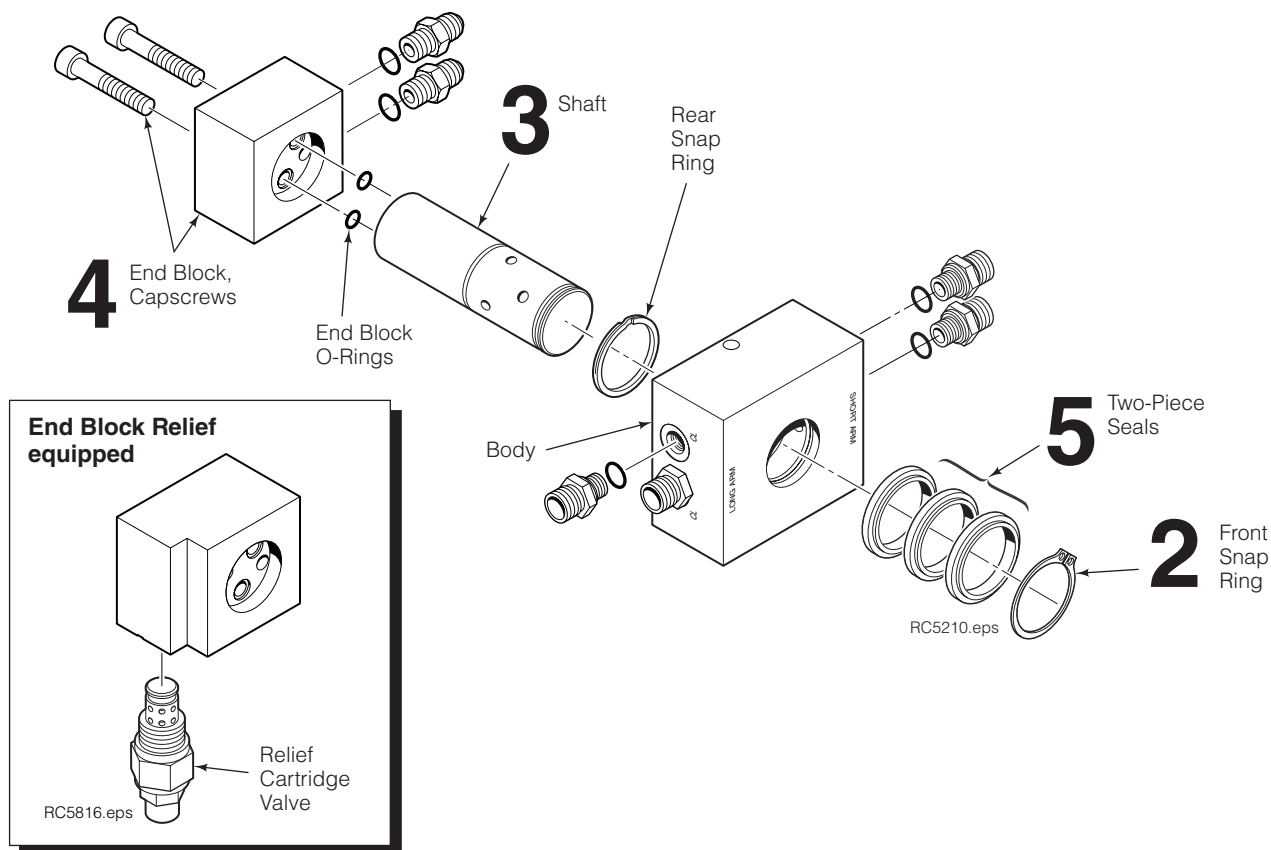
- 1 Remove the attachment from the lift truck as described in Section 4.1.
- 2 Disconnect the hoses from the front and rear of the revolving connection. Tag for reassembly.
- 3 Remove the capscrews fastening the end block plate to the baseplate. For reassembly, tighten the capscrew to 30 ft.-lbs. (40 Nm).
- 4 Remove the capscrews fastening the revolving connection to the faceplate. For reassembly, tighten the capscrews to 10 ft.-lbs. (14 Nm).
- 5 Remove the revolving connection from the faceplate.
- 6 Service the revolving connection in a clean work area.
- 7 For reassembly, reverse the above procedures except as follows:
 - Position the revolving connection on the faceplate where the stamps 'CL' and 'OP' face the long arm.
 - Position the end block/shaft assembly so that the stamping 'OPEN' is on top.



4.6-2 Revolving Connection Service

- 1 Remove the revolving connection from the attachment as described in Section 4.6-1.
- 2 Remove the front snap ring from the revolving connection shaft.
CAUTION: Remove all burrs and paint from the exposed shaft surface prior to removal from the body. **Burrs or paint chips pulled through the bore may permanently damage the body.**
- 3 Remove the shaft from the body.
- 4 Remove the end block from the shaft. For reassembly, tighten capscrews to 30 ft.-lbs. (40 Nm).
- 5 Remove the two-piece seals from the revolving connection body using brass hook-type tools (Cascade Part No. 674424).
NOTE: Do not scratch or damage the grooved surfaces.
- 6 Clean all parts with clean solvent and inspect the following areas:
 - Check the sealing surface of the shaft for minor surface imperfections. Remove with 320-grit emery paper. Sand the shaft radially (around), not along the length. Break the edges on the outer end of the shaft and the snap ring grooves with 320-grit emery paper. If severely worn, replace the shaft.
 - Check the seal grooves in the body for sharp nicks or projections. Remove minor imperfections with 320-grit emery paper. If severely worn, replace the body.

Procedure continued on next page

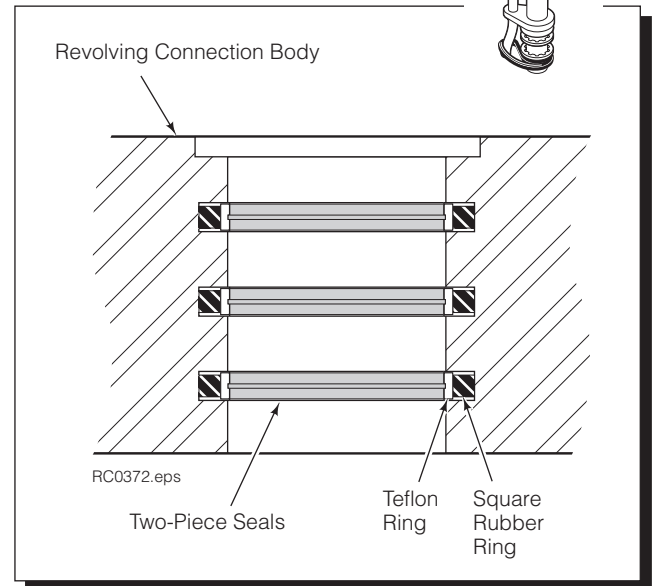
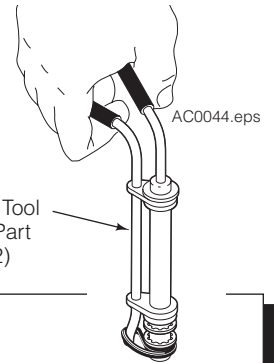
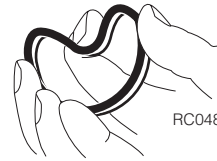


4.6-2 Revolving Connection Service (Continued)

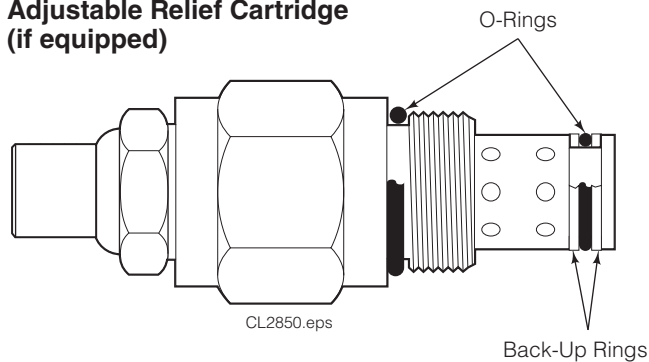
7 For reassembly, reverse the previous procedures with the following exceptions:

- Install new O-rings and back-up rings on relief cartridge valve, as shown.
 - Clean all traces of oil and moisture from the 2-piece seal grooves inside the revolving connection body using a non-petroleum based cleaner. Example: electronic contact cleaner.
 - Clean hands thoroughly to remove all traces of oil and moisture prior to 2-piece seal installation.
 - **A)** Install the square rubber rings into the revolving connection body grooves.
 - **B)** Install the Teflon rings on top of the rubber rings.
- IMPORTANT:** Use seal installation tool (Cascade part no. 599512) when installing seals. If seals are installed by hand, form the seals into a 'kidney' shape as shown to install to avoid sharp bends. Press the seals into the grooves using finger pressure.
- Lubricate the shaft and body with hydraulic oil prior to reassembly.
 - Use shaft loader (Cascade part no. 222224) and apply gentle pressure to install shaft in body. Rotate body to ease installation.

Form Teflon ring into 'kidney' shape to install



Adjustable Relief Cartridge (if equipped)



4.7 Cylinders

4.7-1 Servicing Cylinders on the Attachment

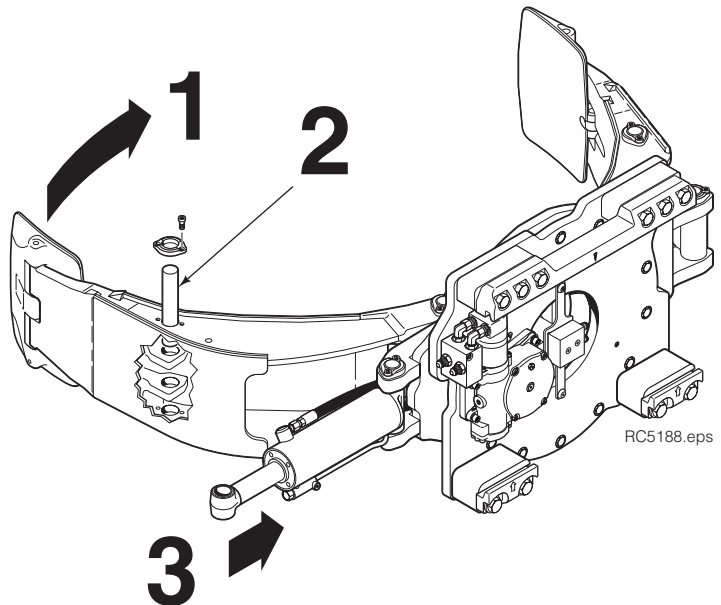
- 1 Rotate the attachment to the vertical roll handling position. Fully close arm.
- 2 Remove the cylinder rod anchor pin. For reassembly, tighten retainer capscrews to 28 ft.-lbs. (38 Nm).
- 3 Retract the cylinder rod. Swing the cylinder outward to expose the cylinder rod and retainer.



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

- 4 Place a drip pan under the cylinder and disconnect the hoses from the cylinders ports. Plug the hose ends and tag for reassembly.
- 5 Service the cylinder as described in:

Bore Diameter	Section
1.77 in. (45 mm)	4.8
2.95 in. (75 mm)	4.9



4.7-2 Cylinder Removal

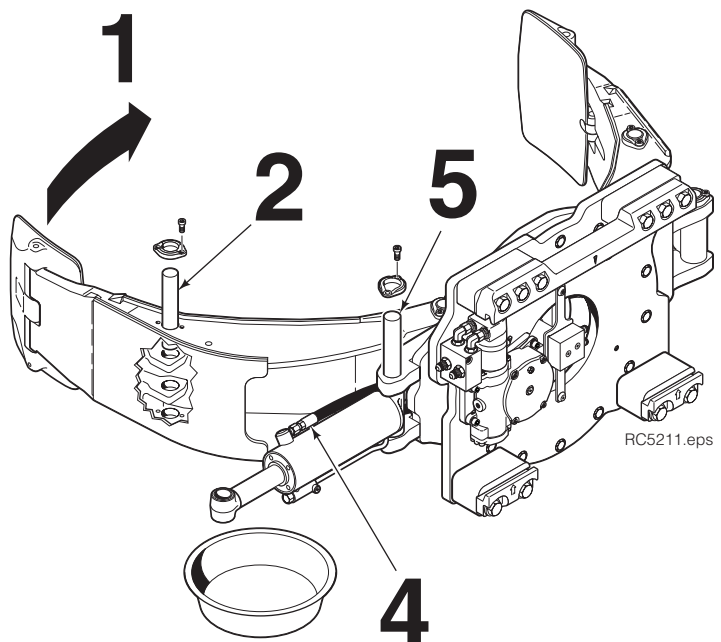
- 1 Position the arm attached to the cylinder being removed to mid-range. Rotate the attachment to the vertical roll handling position.
- 2 Remove the cylinder rod anchor pin from the cylinder to be removed.
- 3 Swing the arm inward.



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

- 4 Place a drip pan under the cylinder. Disconnect the hoses from the cylinder ports. Plug the hose ends and tag for reassembly.
- 5 Remove the cylinder base anchor pin. Note location of shims. For reassembly, tighten the anchor pin retainer capscrews to 28 ft.-lbs. (38 Nm).
- 6 Service the cylinder as described in:

Bore Diameter	Section
1.77 in. (45 mm)	4.8
2.95 in. (75 mm)	4.9



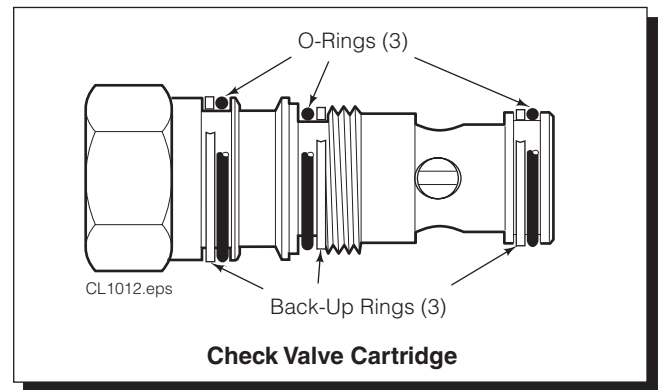
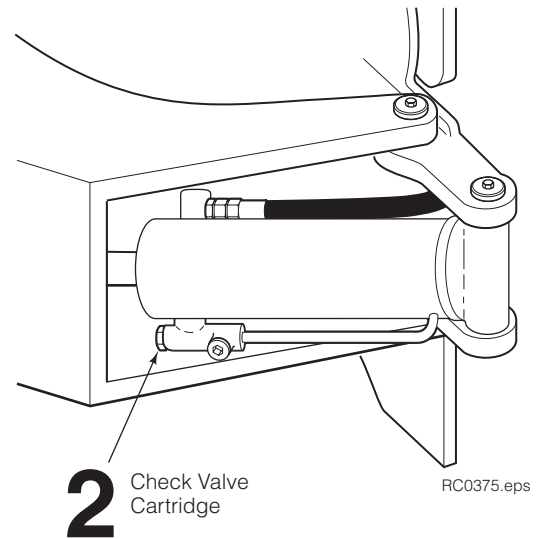
4.7-3 Cylinder Check Valve Service

- 1 Rotate the attachment to the vertical roll handling position. Close the arm attached to the cylinder being serviced to gain access to the cylinder check valve.



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 Remove the check valve cartridge from the cylinder port.
- 3 Remove the O-rings and back-up rings. Clean the check valve cartridge with solvent.
- 4 Install new O-rings and back-up rings as shown.
- 5 Lubricate the check valve cartridge with petroleum jelly prior to reassembly. Tighten the check valve cartridge to 35 ft.-lbs. (50 Nm).

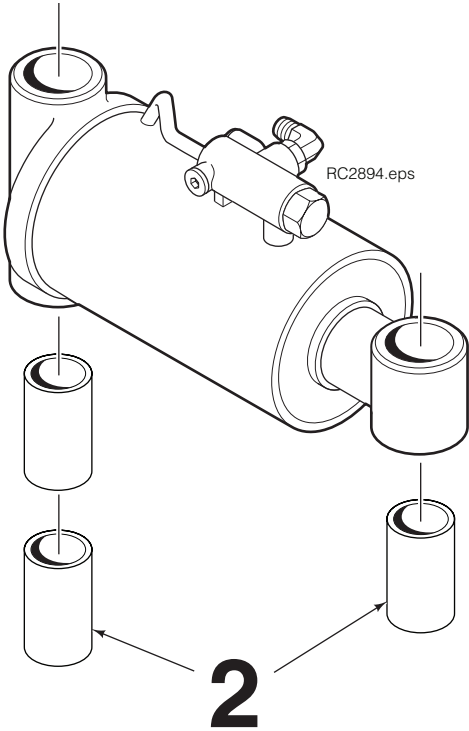
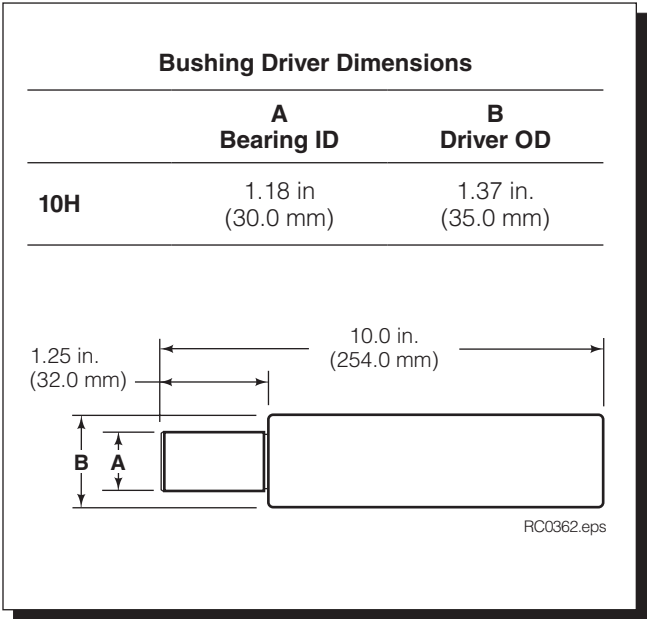


4.7-4 Cylinder Bushing Service

NOTE: Bushings require replacement if bushing-to-pin clearance exceeds 1/16 in. (1.6 mm).

- 1 Remove the cylinder from the attachment as described in section 4.7-2.
 - 2 Remove the bushings from the cylinder using a bushing driver.
- NOTE:** Bushing drivers can be machined using the dimensions shown below.
- 3 Install new bushings in the cylinder. Replace with the same number of bushings removed.

CAUTION: Bushings may be damaged if installed without a proper bushing driver.



4.8 Cylinder Service – 1.77 in. (45 mm) Bore Diameter

4.8-1 Cylinder Disassembly

- 1 Clamp the cylinder so that the vise jaws contact only the extreme end of the cylinder base.

NOTE: Use a soft-jawed vise for all cylinder disassembly and assembly procedures.

- 2 Unscrew the retainer from the cylinder with a claw-type spanner wrench, as shown (Cascade Part No. 678598).

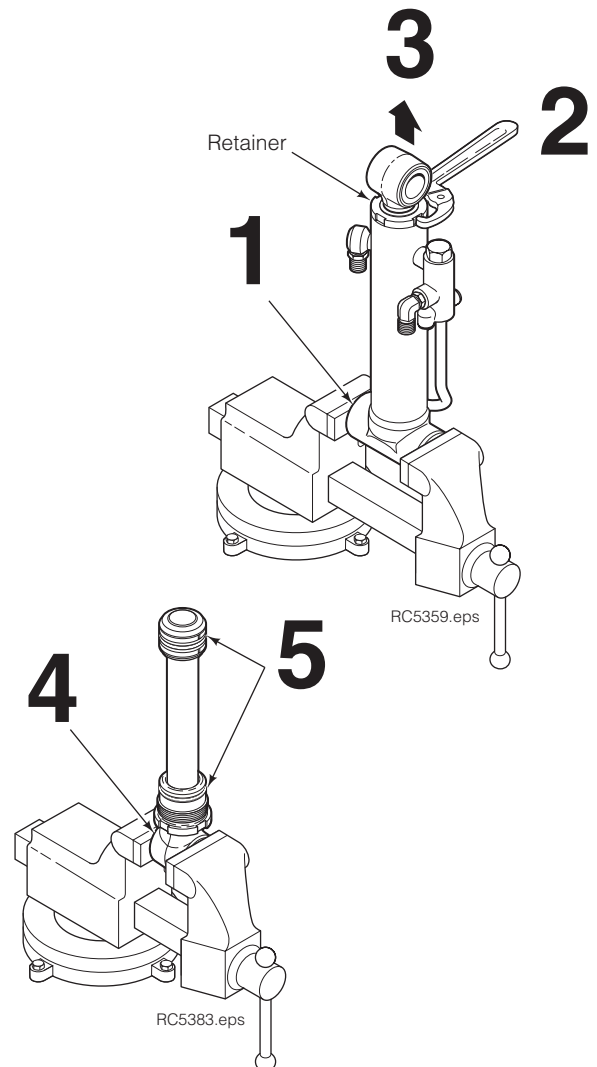
- 3 Remove the piston/rod/retainer assembly from the cylinder shell.

- 4 Clamp the piston/rod/retainer assembly across the rod end. **Never clamp directly on the rod sealing surface.**

- 5 On the retainer and piston, pry the seals up with a brass seal removal tool (Cascade Part No. 674424) and cut the seals to remove them.

CAUTION: Do not scratch and seal grooves.

IMPORTANT: Piston and rod end are not removable. Only the outer seals are removable. Replace the piston/rod/retainer assembly if the inner seals are damaged.



4.8-2 Cylinder Inspection

- Inspect the piston/rod/retainer assembly for nicks or burrs. Minor nicks or burrs may be removed with emery cloth. If they cannot be removed, replace the assembly.
- Inspect the cylinder shell bore and remove any minor nicks or burrs with a butterfly hone. If the nicks or burrs cannot be removed, replace the part.
- Inspect the outside of the shell for any deformities or cracks that could impair performance or cause leaks under pressure. If necessary, replace the part.

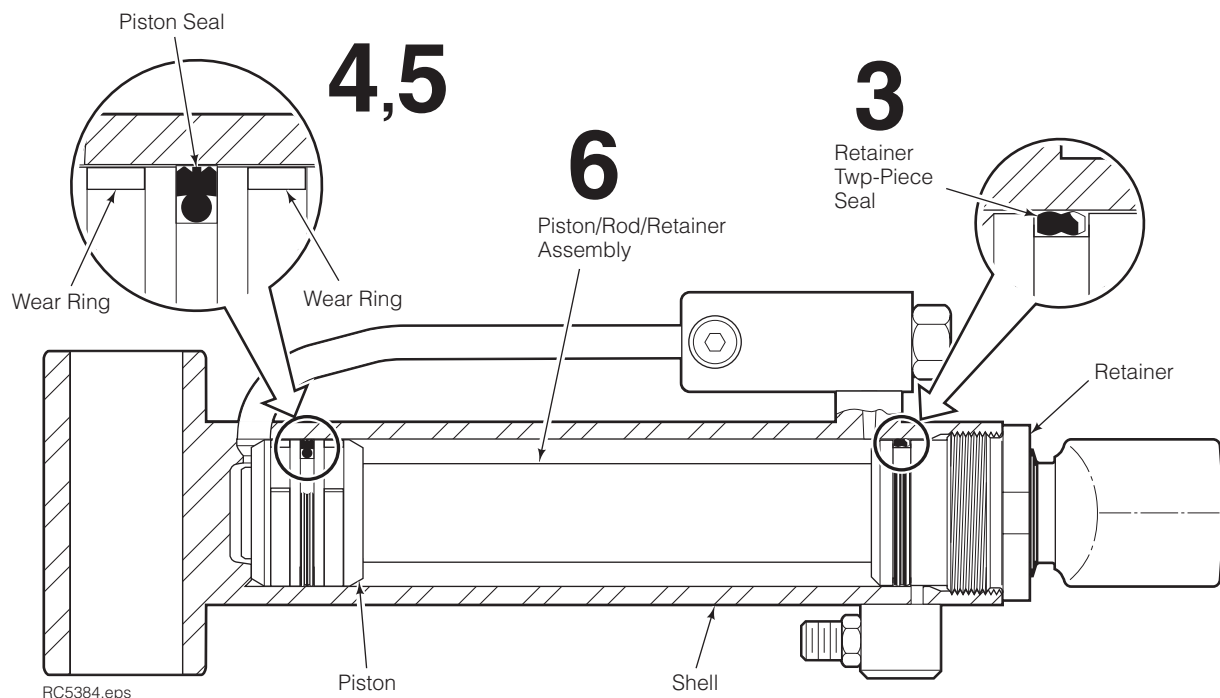
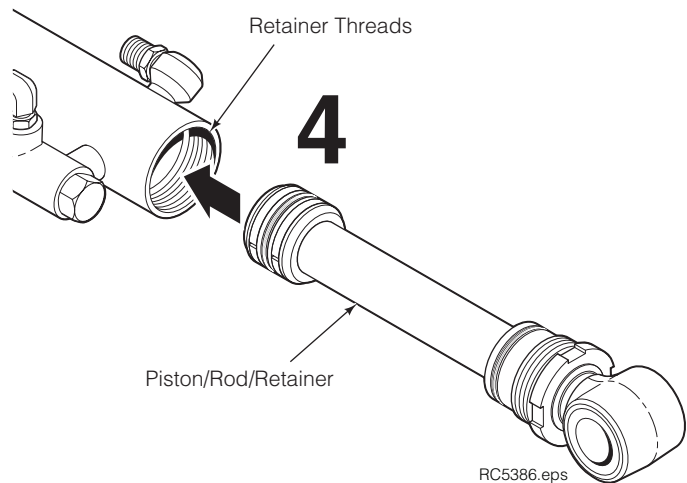
4.8 Cylinder Service – 1.77 in. (45 mm) Bore Diameter (Continued)

4.8-3 Cylinder Reassembly

- 1 Lubricate all new seals and with petroleum jelly.
- 2 Polish the piston and retainer chamfer angle with emery cloth to facilitate seal installation.
- 3 Install new seal on the retainer. Hook one side of the seal in the groove and carefully work it over the retainer. See seal details below.
- 4 Install new seal on the piston. Hook one side of the seal in the groove and carefully work it over the piston. See seal details below.
- 5 Install the composite wear rings on the piston.
- 6 Apply petroleum jelly to the piston and shell threads. Carefully insert the piston/rod/retainer assembly into the cylinder shell and using a rubber mallet to drive the assembly into the shell.

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

- 7 Screw the retainer into the shell. Use a claw-type spanner wrench, tighten the retainer to 65 ft.-lbs. (88 Nm).



4.9 Cylinder Service – 2.95 in. (75 mm) Bore Diameter

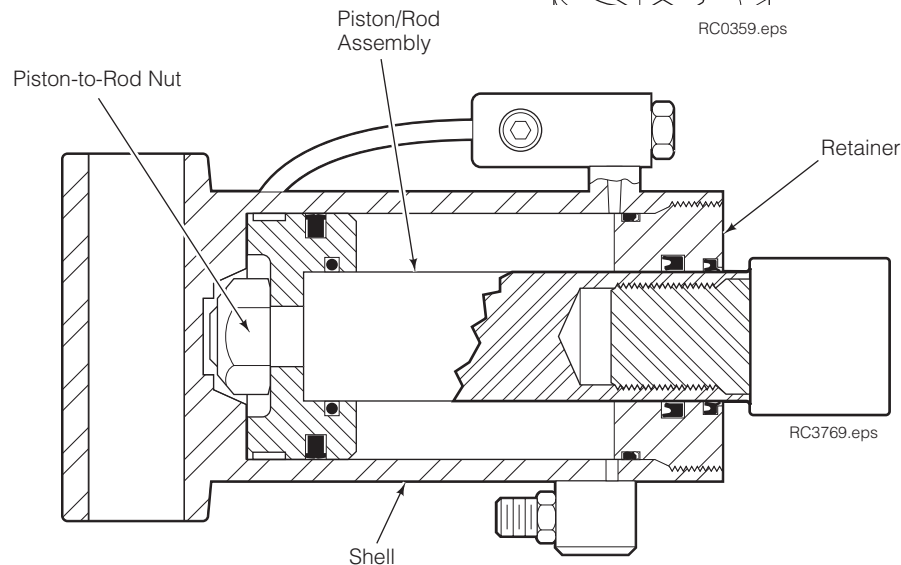
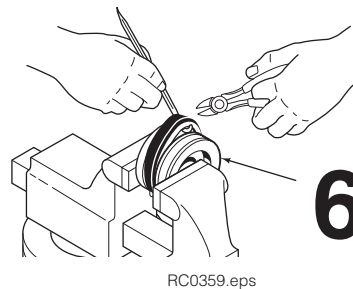
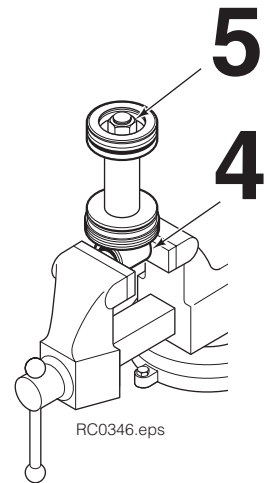
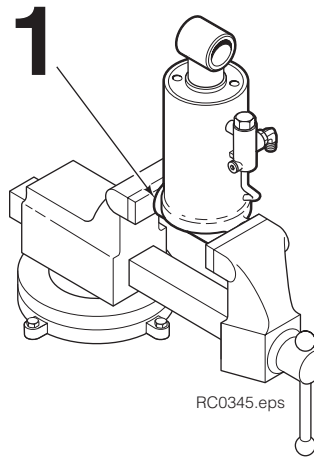
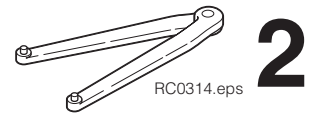
4.9-1 Cylinder Disassembly

- 1 Clamp the cylinder so that the vise jaws contact only the extreme end of the cylinder base.

NOTE: Use a soft-jawed vise for all cylinder disassembly and assembly procedures.

- 2 Remove the cylinder retainer by unscrewing it with a pin-type spanner wrench.
- 3 Remove the piston/rod/retainer as an assembly from the cylinder shell.
- 4 Clamp the piston/rod/retainer assembly across the rod end. **Never clamp directly on the rod sealing surface.**
- 5 Remove the piston nut from the rod.
- 6 Clamp the piston on the top and bottom in a soft-jawed vise. Pry seals up with a dental tool and cut to remove.

CAUTION: Do not scratch the seal grooves.



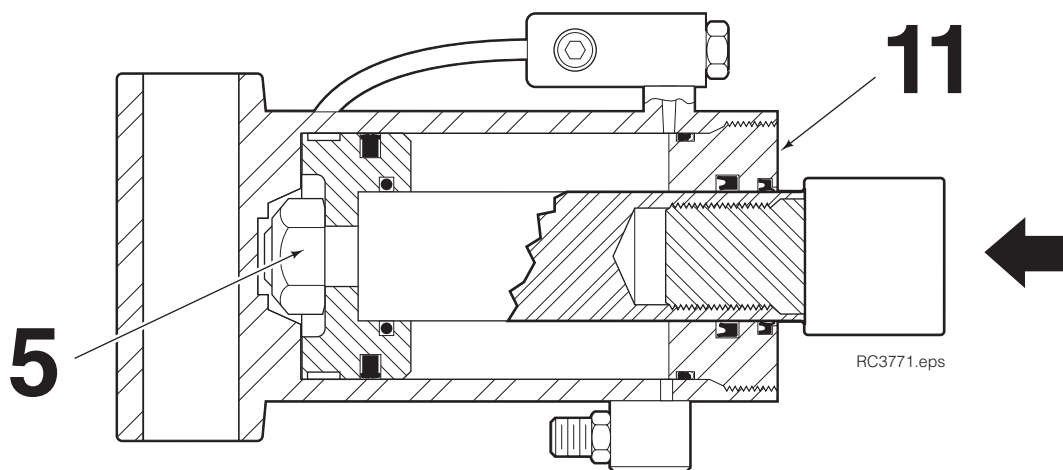
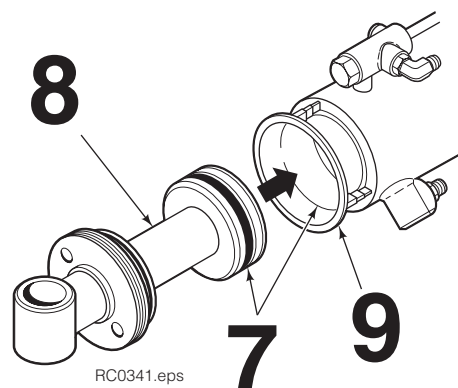
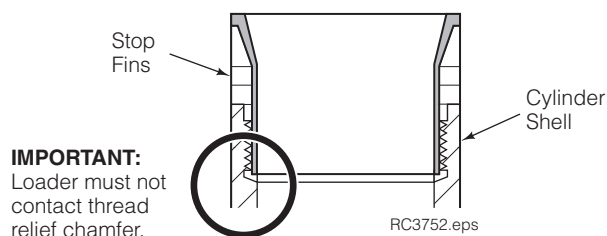
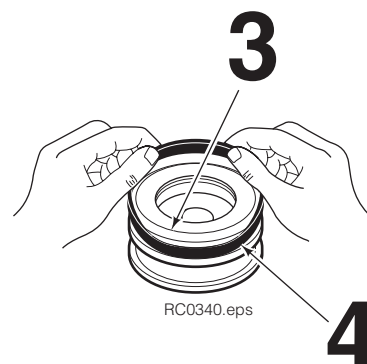
4.9-2 Cylinder Inspection

- Inspect the rod, piston and retainer for nicks or burrs. Minor nicks or burrs may be removed with emery cloth. If they cannot be removed, replace the part.
- Inspect the cylinder shell bore and remove any minor nicks or burrs with a butterfly. If the nicks or burrs cannot be removed, replaced the part.
- Inspect the outside of the shell for any deformities or cracks that could impair performance or cause leaks under pressure. If necessary, replace the part.

4.9 Cylinder Service – 2.95 in. (75 mm) Bore Diameter (Continued)

4.9-3 Cylinder Reassembly

- 1 Lubricate all new seals and O-rings with petroleum jelly.
- 2 Note the direction of the U-cup seals. Pressure seals must always be installed with the lip toward the high pressure side of the cylinder.
- 3 Polish the piston and retainer chamfer angle with emery cloth to facilitate seal installation.
- 4 Install new seals on the piston and retainer. Hook one side of the seal in the groove and carefully work it over the piston or retainer, as shown.
- 5 Install the retainer and then the piston on the cylinder rod. Tighten the piston retaining nut to a torque of 258 ft.-lbs. (350 Nm).
- 6 Place the piston loader furnished with the seal kit into the cylinder shell. Check that the loader covers all the cylinder shell threads but does not contact the thread relief chamfer. Trim the loader stop fins if more engagement is needed.
- CAUTION:** The piston will not enter the cylinder shell properly if the loader contacts the thread relief chamfer.
- 7 Apply a thick film of petroleum jelly to the inside of the cylinder shell, piston loader and piston seals.
- 8 Using a rubber mallet, tap the piston/rod assembly through the loader into the cylinder shell.
- 9 Remove the loader by cutting down one side and pulling it out of the cylinder bore.
- 10 Apply a thick film of petroleum jelly to the inside of the cylinder shell, and to the retainer and seal.
- 11 Screw the retainer into the cylinder shell. Tighten the retainer to a torque of 258 ft.-lbs. (350 Nm).



4.10 Base Unit

4.10-1 Frame Bushing Service

- 1 Remove the arm from the attachment as described in Section 4.2-1.
- 2 Remove the arm pivot bushings from the frame using a bushing driver.

NOTE: Bushing drivers can be machined using the dimensions shown in the chart below.

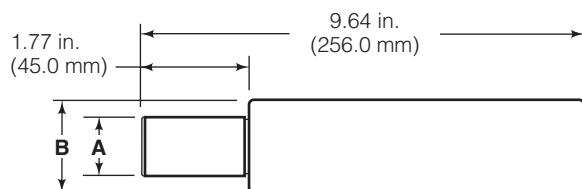
- 3 For reassembly, reverse the above procedures with the following exceptions:

- Install new arm pivot bushings and spacer.

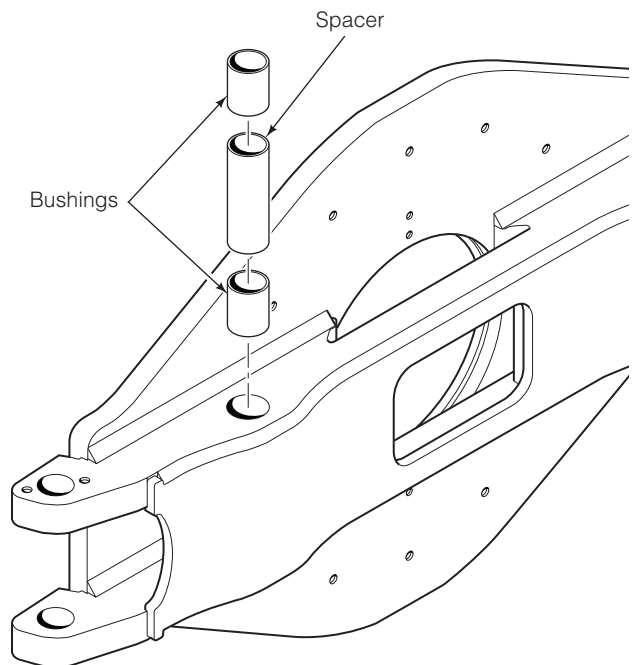
CAUTION: Bushings may be damaged if installed without a proper bushing driver.

Bushing Driver Dimensions

	A Bearing ID	B Driver OD
10H	1.18 in. (30.0 mm)	1.38 in. (35.0 mm)



RC0362.eps



RC5212.eps

4.10-2 Rotation Bearing Assembly – Removal and Installation

- 1 Remove the attachment from the lift truck as described in Section 4.1.
- 2 Remove the valve as described in Section 4.5-1.
- 3 Remove the drive group as described in Section 4.3-1.
- 4 Remove lower spacers. For reassembly, apply Loctite 242 (Blue) to capscrew threads and tighten capscrews to 165 ft.-lbs. (225 Nm).
- 5 Remove the upper hook and upper spacers. For reassembly, apply Loctite 242 (Blue) to capscrew threads and tighten capscrews to 122 ft.-lbs. (165 Nm).
- 6 Remove the capscrews fastening the end block plate to the baseplate. For reassembly, tighten the capscrew to 30 ft.-lbs. (40 Nm).



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

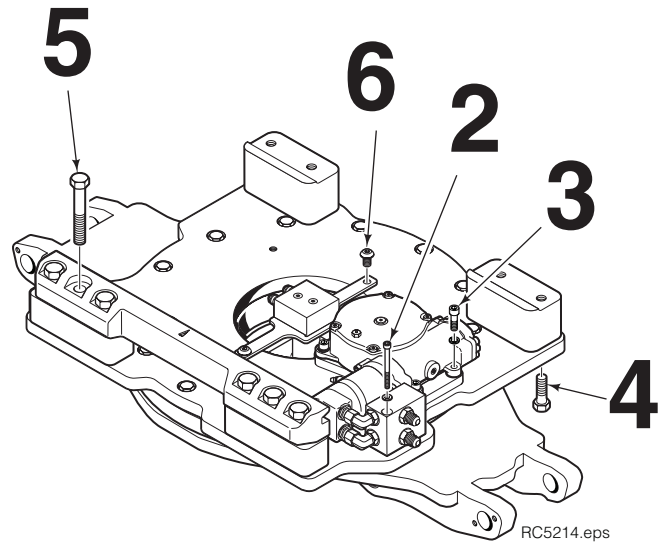
- 7 Attach two eyebolts to the baseplate. Attach an overhead hoist to the baseplate.
- 8 Remove the capscrews fastening the baseplate to the bearing assembly.

Baseplate Capscrew Reassembly –

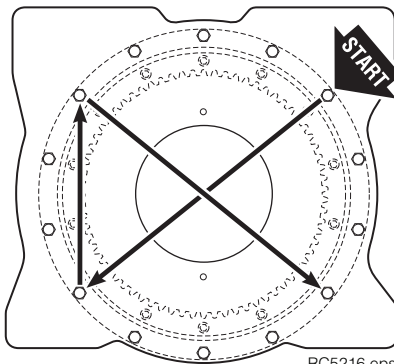
- A** Apply Loctite 242 (Blue) to capscrew threads and threaded holes in the bearing assembly. Threads must be clean and dry for new Loctite to cure properly.
- B** Tighten using the alternating cross pattern shown to one-half the final torque value shown below.
- C** Tighten using the alternating cross pattern to the final torque value, then double torque by backing off 1/2 turn and immediately retightening to a final torque of 38 ft.-lbs. (52 Nm).

CAUTION: Do not reuse old capscrews or washers. Use new hardware kit when installing a new bearing assembly.

- 9 Lift away the baseplate.

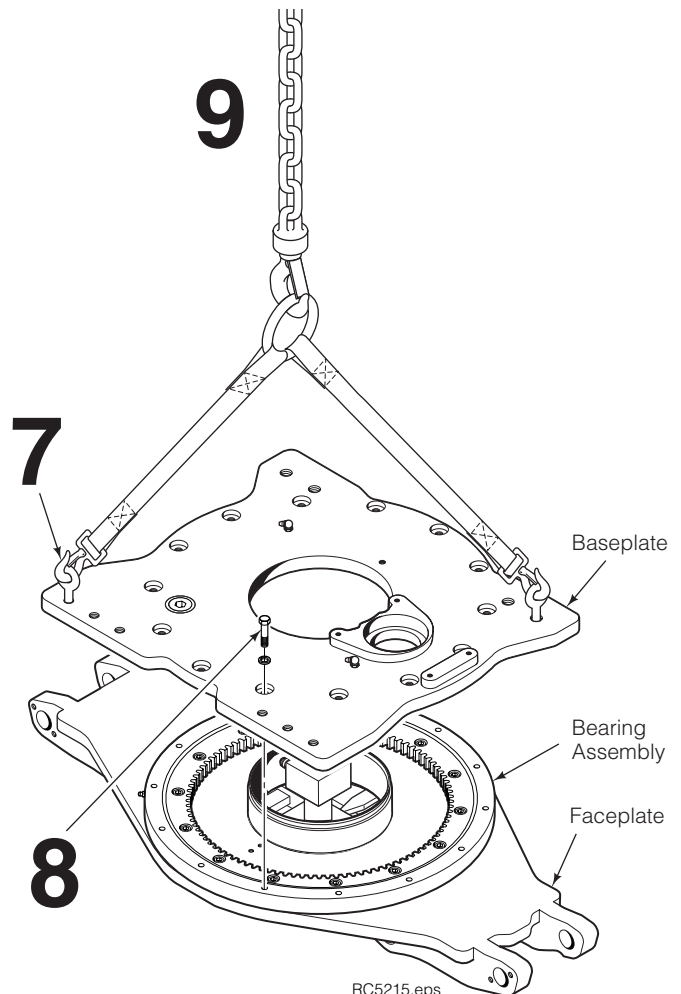


RC5214.eps



RC5216.eps

Alternating cross pattern tightening sequence.



RC5215.eps

4.10-2 Rotation Bearing Assembly – Removal and Installation (Continued)

10 Attach two eyebolts to the bearing assembly. Attach an overhead hoist.

11 Remove the capscrews fastening the bearing to the faceplate. For reassembly, tighten the capscrews using the following technique:

Bearing-to-faceplate capscrews –

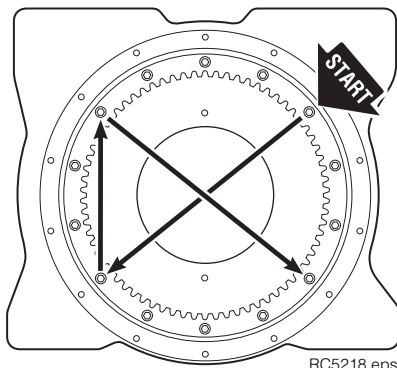
A Apply Loctite 242 (Blue) to capscrew threads and threaded holes in the faceplate. Threads must be clean and dry for new Loctite to cure properly.

B Tighten using the alternating cross pattern shown to one-half the final torque value below.

C Tighten using the alternating cross pattern to the final torque value, then double torque by backing off 1/2 turn and immediately retightening to a final torque of 47 ft.-lbs. (63 Nm).

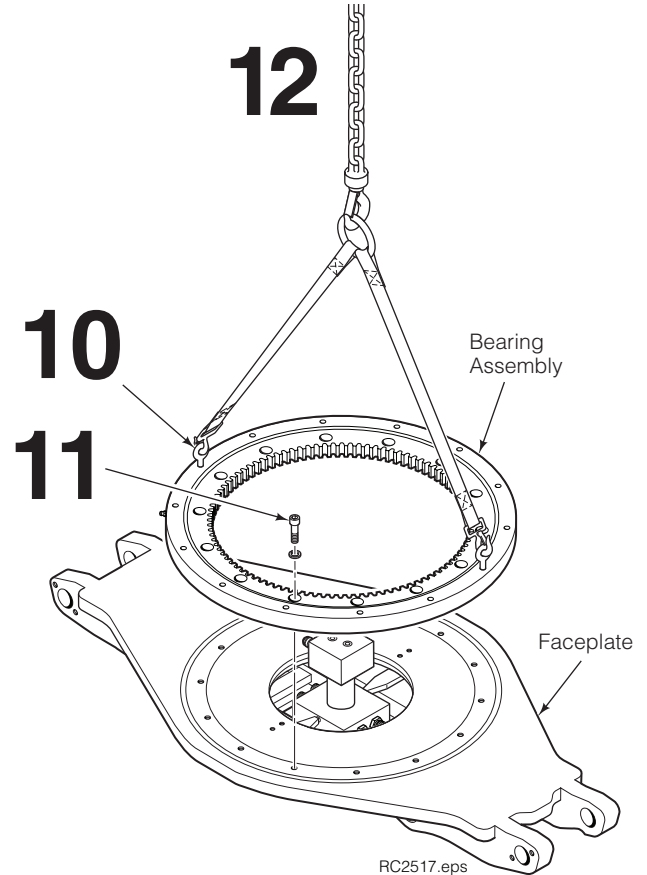
CAUTION: Do not reuse old capscrews or washers. Use new hardware kit when installing a new bearing assembly.

12 Lift away bearing assembly.



Alternating cross pattern tightening sequence.

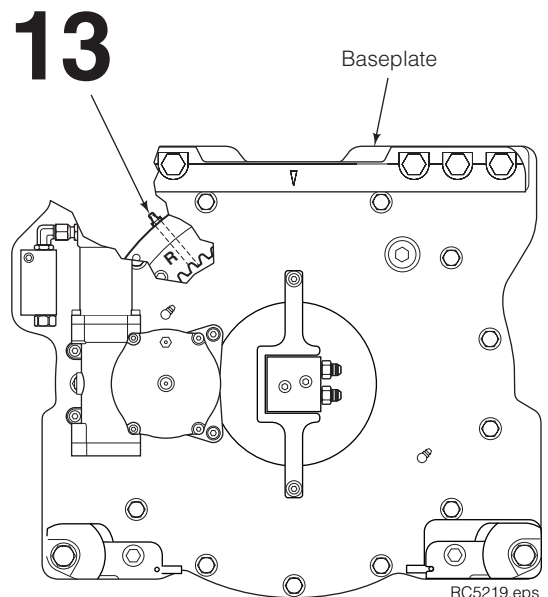
RC5218.eps



RC2517.eps

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

- When installing the rotation bearing assembly on the faceplate, align and position the heat-treated overlap zone 'R' on the ring gear with the outer race grease fitting 40° above horizontal as shown.
- Check the condition of the faceplate center hole seal. Replace if necessary. Attach seal to faceplate with 3M Scotch Grip 1300.
- Apply NLGI No. 0 grease to the teeth of the bearing assembly ring gear.
- After remounting the attachment, apply chassis grease to the bearing assembly grease fitting. Rotate the attachment slowly during the procedure.

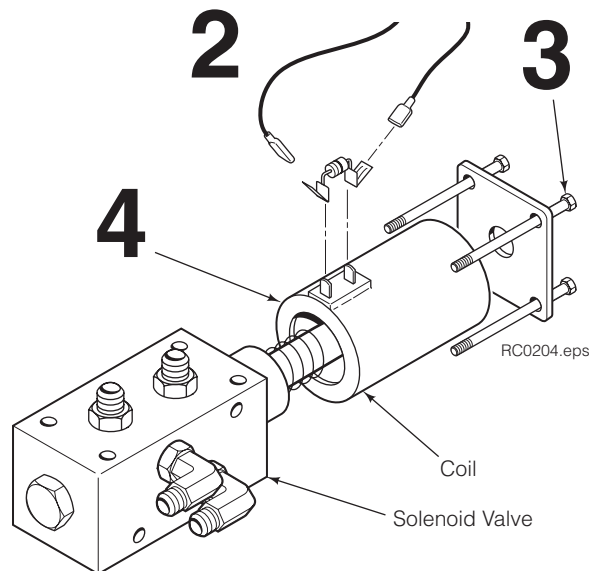


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4.11 Solenoid Valve

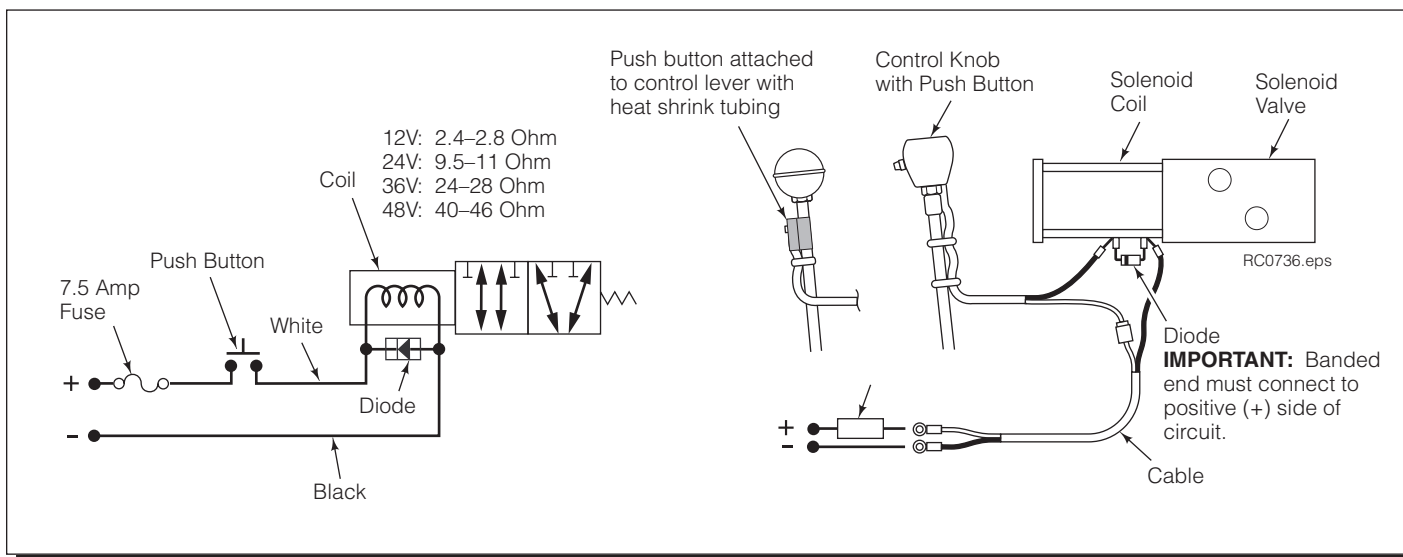
4.11-1 Coil Service

- 1 Disconnect the wires and diode from the coil terminals.
- 2 Remove the end cover capscrews and remove the end cover and coil. Note the position of the coil terminals.
- 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 electrical schematic below for correct wire and diode installation.



4.11-2 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 solenoid valve as a complete assembly.



5.1 Specifications

5.1-1 Hydraulics

Truck Relief Setting

2300 psi (160 bar) Maximum

Truck Flow Volume^①

	Min. ^②	Recommended	Max. ^③
10H (Low Flow)	1 GPM (4 L/min.)	3 GPM (11 L/min.)	5 GPM (18 L/min.)
10H	3 GPM (11 L/min.)	5 GPM (18 L/min.)	8 GPM (30 L/min.)

① Cascade 10H Roll Clamps 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.

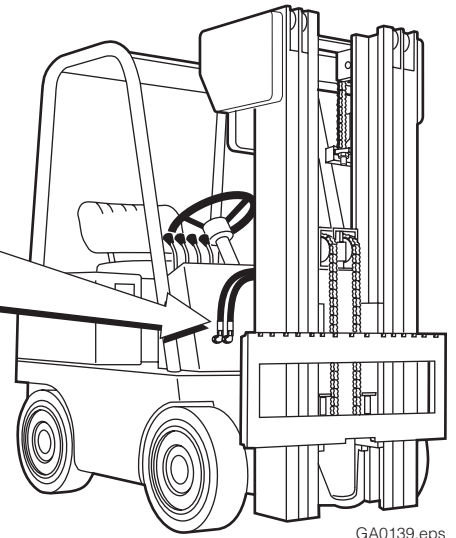
② Flow less than recommended will result in a rotate speed less than 3 RPM.

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

Hoses and Fittings

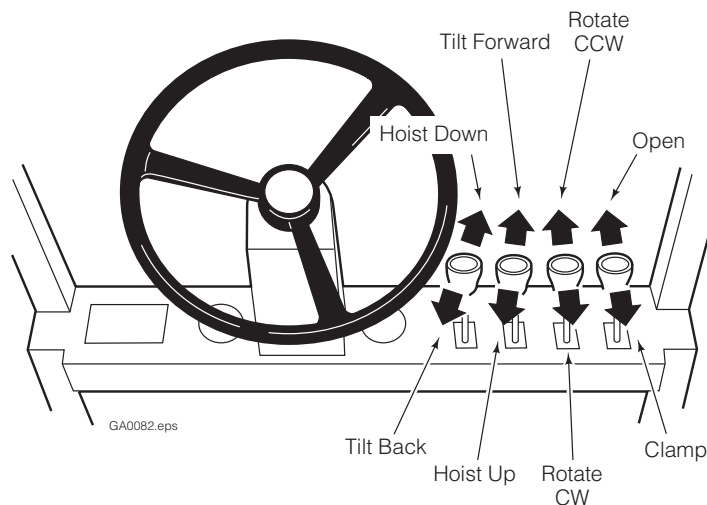
All supply hoses should be No. 6.

All fittings should have a minimum orifice size of 9/16 in. (7 mm).



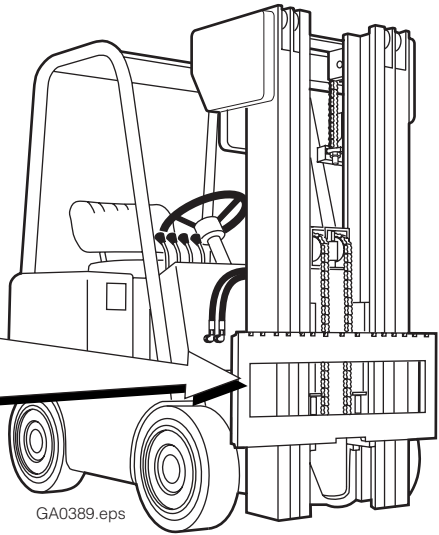
5.1-2 Auxiliary Valve Functions

Check for compliance with ANSI (ISO) standards:



5.1-3 Truck Carriage

<div><div>A</div></div>	Carriage Mount Dimension (A) ITA (ISO)	
	Minimum	Maximum
	Class II	14.94 in. (380.0 mm) 15.00 in. (381.0 mm)



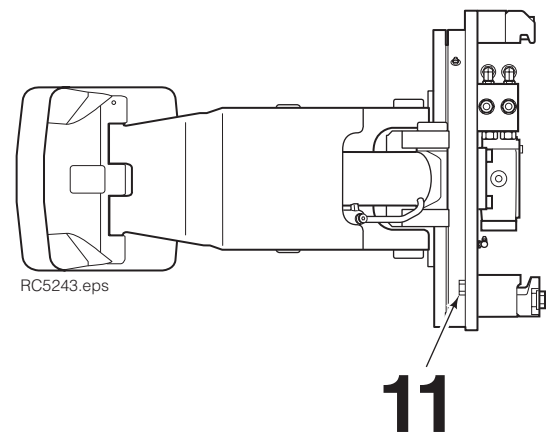
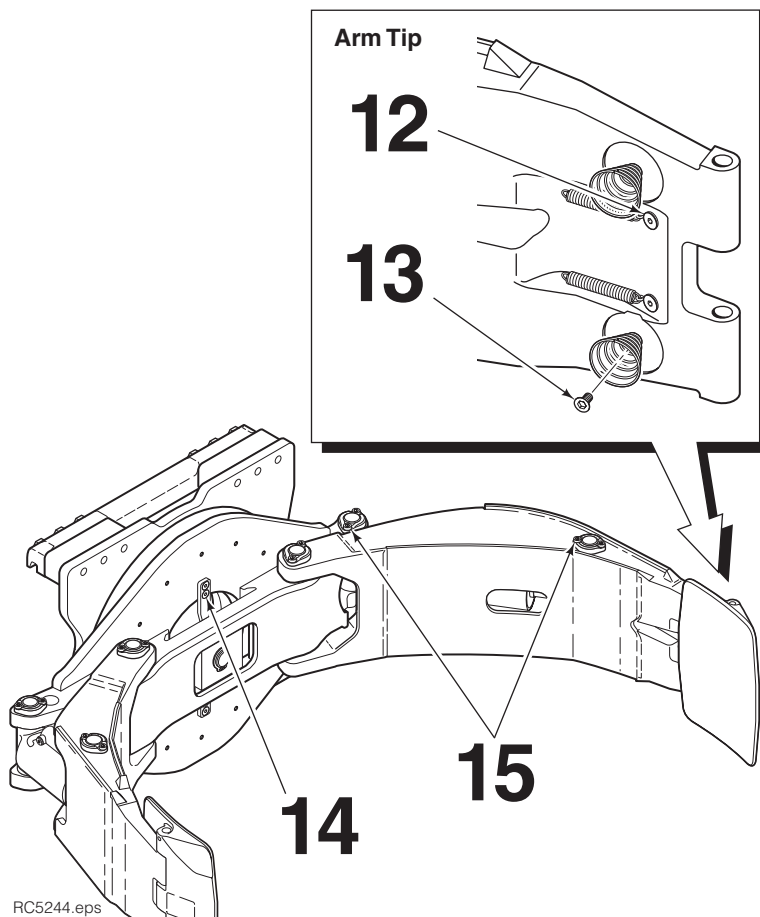
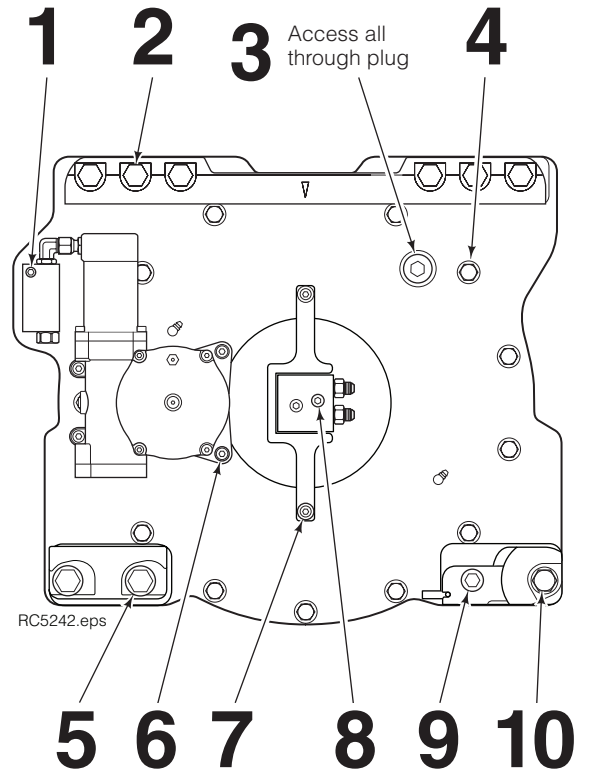
5.1-4 Torque Values

Fastener torque values for the 10H Roll Clamps are shown in the table below in both US and Metric units. All torque values are also called out in each specific service procedure throughout this manual

Ref.	Fastener Location	Size	ft.-lbs.	Nm
1	Valve Capscrews	M6	33	45
2	Upper Hook Capscrews ●	M16	165	225
3	Bearing Assembly/Faceplate Capscrews ●	M10	47	64
4	Baseplate/Bearing Assembly Capscrews ●	M10	38	52
5	Lower Hook Capscrews ●	M16	122	165
6	Drive Group Capscrews ●	M8	24	32
7	End Block Bracket Capscrews	M10	38	52
8	End Block Capscrews	M8	30	40
9	Quick-Disconnect Guide Capscrew ●	M16	122	165
10	Quick-Disconnect Lower Hook Capscrew ●	M16	165	225
11	Spacer Block Capscrews ●	M16	165	225
12	Spring Capscrew	M6	5	7
13	Pad Spring Capscrew	M6	5	7
14	Rev. Conn. Support Bracket Capscrews ●	M8	20	26
15	Retainer Capscrews	M10	28	38

● Use Loctite 242 (Blue)

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



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

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