

SERVICE MANUAL

13H

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

Manual Number 6839447

**cascade[®]
corporation**

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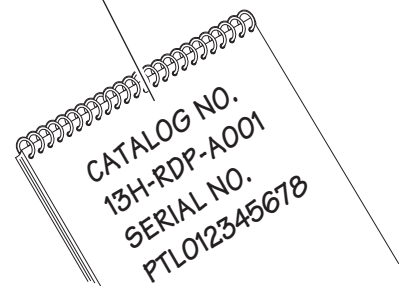
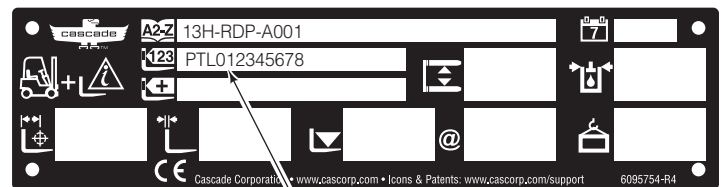
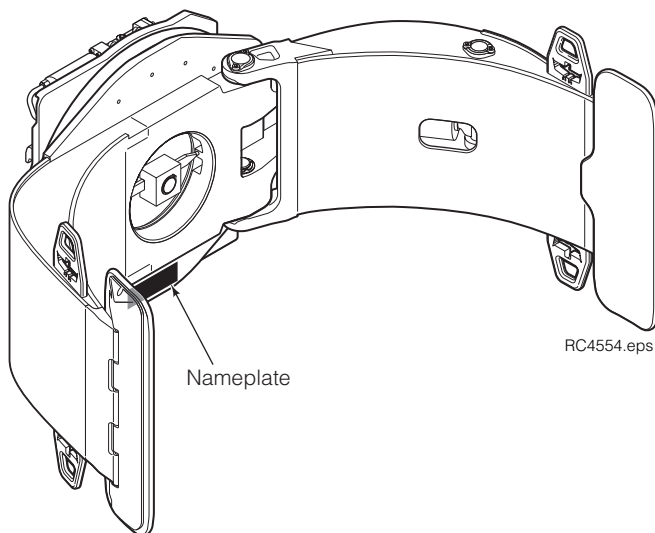
1.1 Introduction

This manual provides the Periodic Maintenance, Troubleshooting, Service and Specifications for Cascade 13H 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 front bottom of the faceplate.

IMPORTANT: Supply input fittings are SAE (JIC) No. 6 O-ring fittings with 9/32 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.

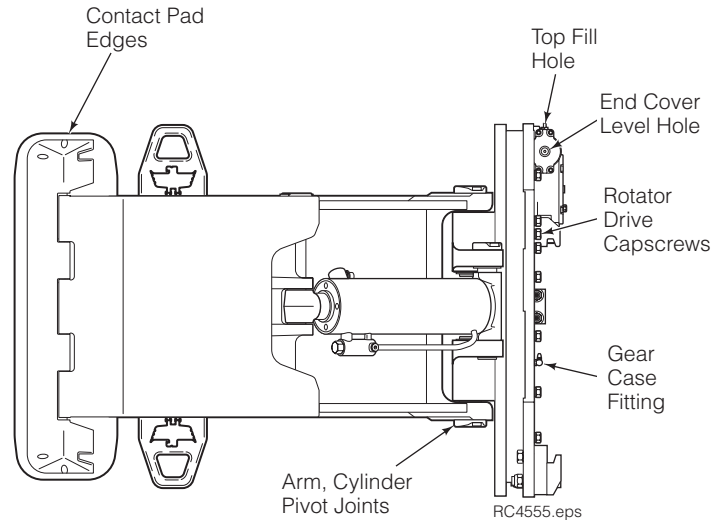
2.1 100-Hour Maintenance

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. Cascade Clamp Force Indicators 830141 and 832442 are available for this test.
- 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.

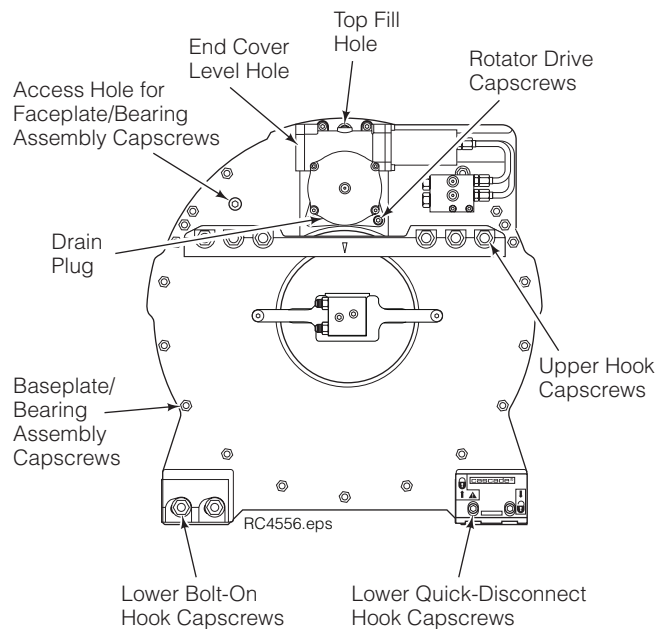


Left Side

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 and gear with EP-2 grease. (Whitmore 'OmniTask' or equivalent). Rotate attachment in 90 degree increments and grease in each position.
- **For Initial 500 Hours** – Check rotator drive gearcase oil level. Oil should be filled up to the end cover level hole. Add oil through the top fill 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.



Back (Driver's) View

2.3 1000-Hour Maintenance

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

- **For Initial 1000 Hours** – Check rotator drive gearcase oil level. Drain oil out the bottom case hole. Fill through top fill hole up to the end cover level hole. Use Cascade Rotator Drive Lubricant Part No. 656300, or SAE 90 wt. gear lube (AGMA 'mild' 6 EP Gear Oil). Replace 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 rotator drive gearcase oil level. Lubricant should be filled up to end cover level 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.

2.5 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 ★

★ Includes alarm

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

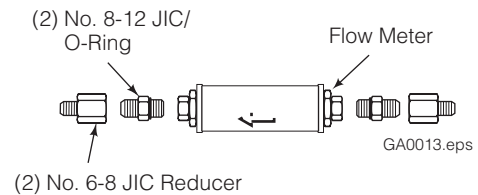


WARNING: Before servicing any hydraulic component, relieve pressure in the system. Turn the truck off and move the truck auxiliary control valves several times in both directions.

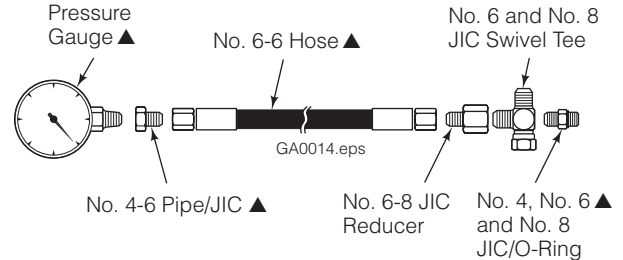
After completing any service procedure, test the attachment through several cycles. First test the attachment empty to bleed any air trapped in the system to the truck tank. Then test the attachment with a load to be sure it operates correctly before returning to the job.

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

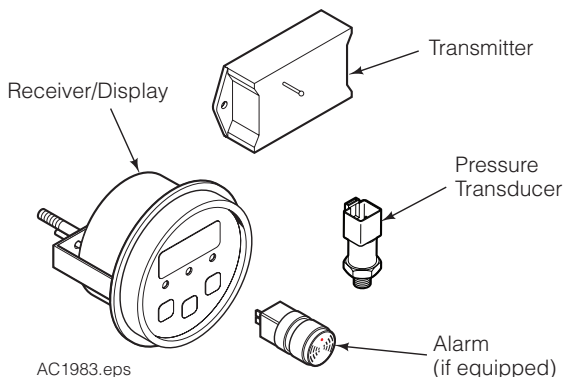
Flow Meter Kit 671477



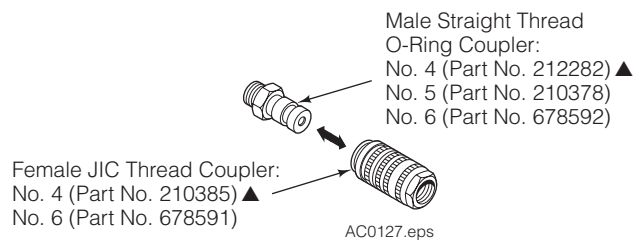
Pressure Gauge Kit 671212



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



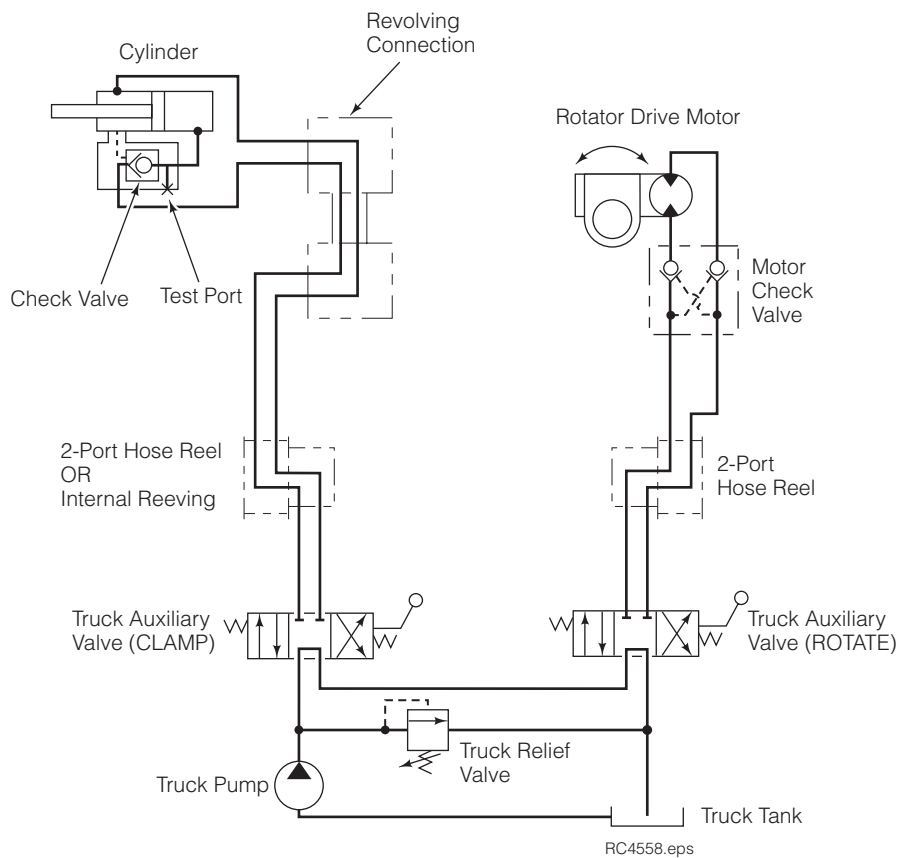
CLOSE ARMS, ROTATE CLOCKWISE

PRESSURE

RETURN

NOTE: For **OPEN ARMS** and **ROTATE COUNTERCLOCKWISE**, 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.

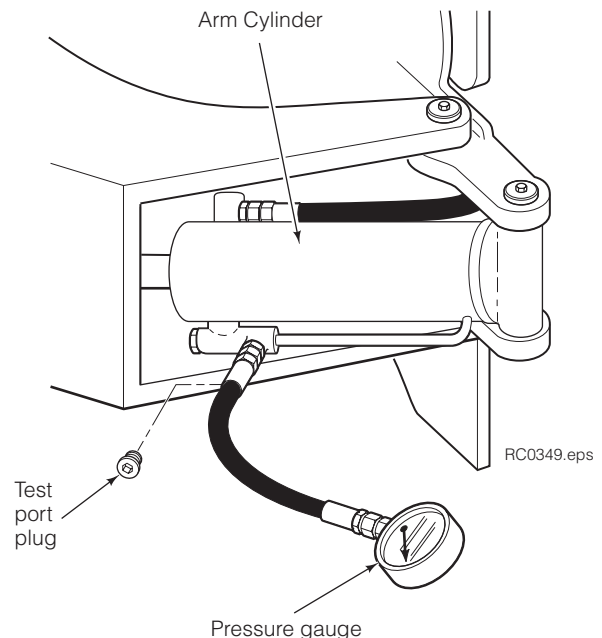
- 1 Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. **Pressure to the attachment must not exceed 2300 psi (160 bar)**, measured at the carriage hose terminal.
- 2 Check the flow volume at the carriage hose terminal. See Section 5.1-1 for recommended flow volumes. If the truck pressure and flow are correct, proceed with the Clamp 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 Install a pressure gauge to the cylinder test port. Close the arm and hold the handle in the CLAMP position a few seconds to develop full truck system pressure. Watch the gauge pressure readings.
 - 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.
 - 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.
 - 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 arm to midstroke to relieve cylinder pressure. Remove the cylinder check valve cartridge. Install a new check valve cartridge.
- 4 Close the 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.



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 Rotation 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 check valve assembly may need service. Refer to Section 4.5.
 - 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 degree fittings, or hose sizes less than No. 6.

3.4-3 Rotation with Load

- 1 Rotate a load requiring approximately 3/4 of the attachment's maximum torque capacity:

13H – 40,000 in.-lbs. @ 2300 psi
(4519 Nm @ 160 bar)

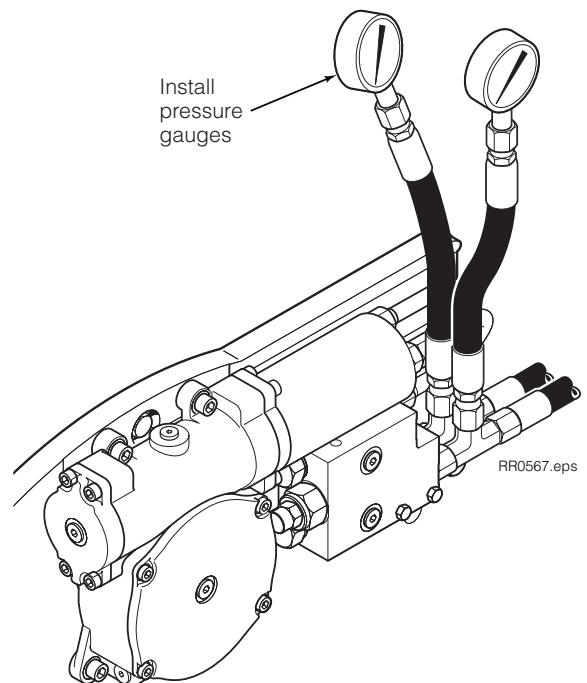
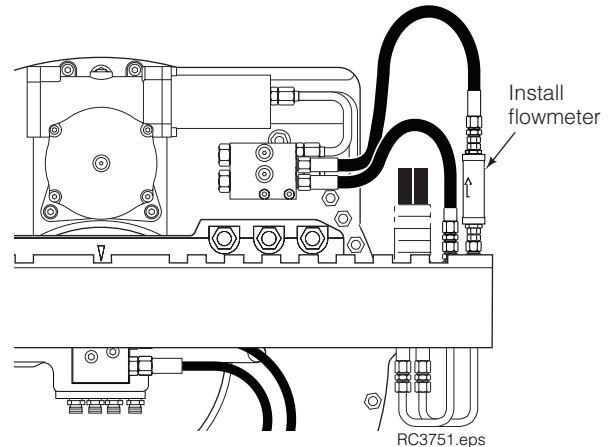
Note gauge readings during rotation.

- 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.



4.1 Attachment Removal

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



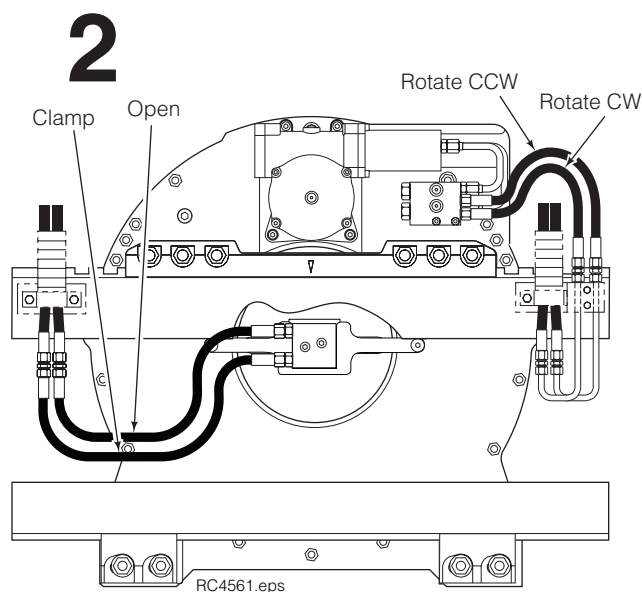
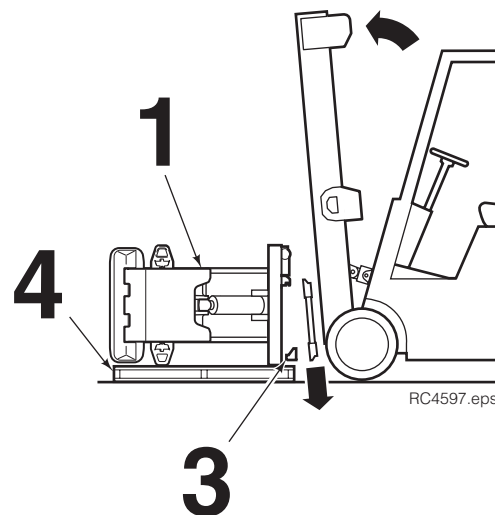
WARNING: Before removing hydraulic lines, relieve pressure in the hydraulic system. Turn the truck off and open the truck auxiliary control valves several times in both directions.

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

Bolt-On Hooks – Remove the lower mounting hooks. For reassembly, tighten the capscrews to 122 ft.-lbs. (165 Nm).

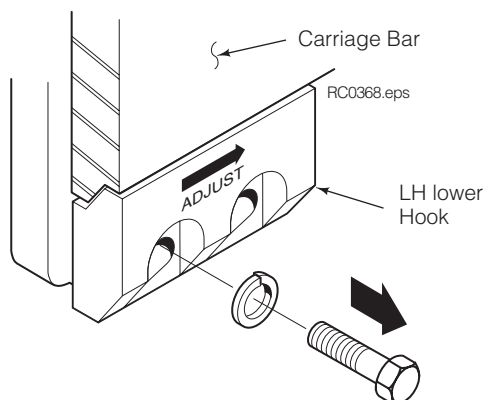
Quick-Change Hooks – Pull out the locking pins and drop the lower hooks to the unlocked position. Reinstall the pins in the lower holes. For reassembly, slide the hooks up to the locked position and install the locking pins in the top holes.

- 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.

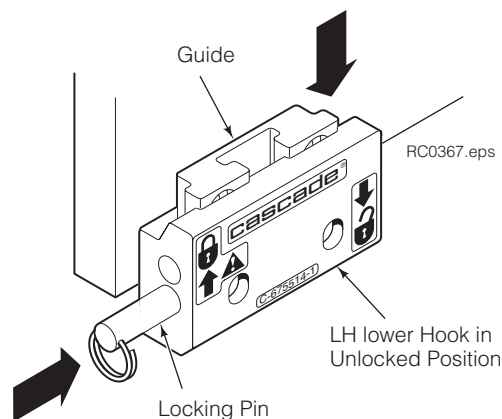


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BOLT-ON HOOKS



QUICK-CHANGE HOOKS



4.2 Arm

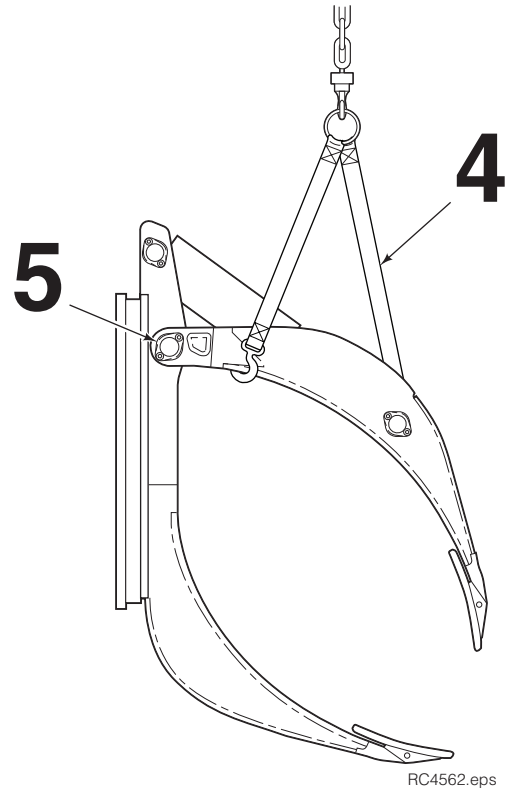
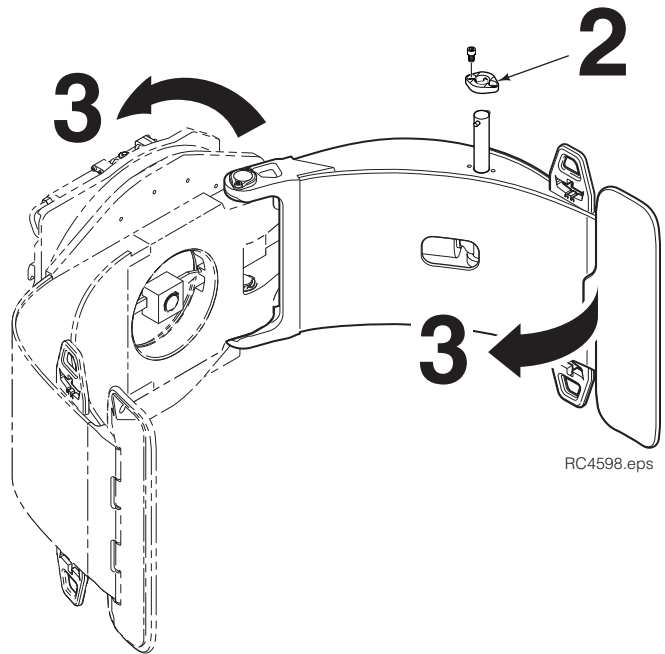
4.2-1 Arm Assembly – Removal and Installation

- 1 Rotate the attachment to the vertical roll handling position.
- 2 Remove the retainer and cylinder rod anchor pin. 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 long arm on top.



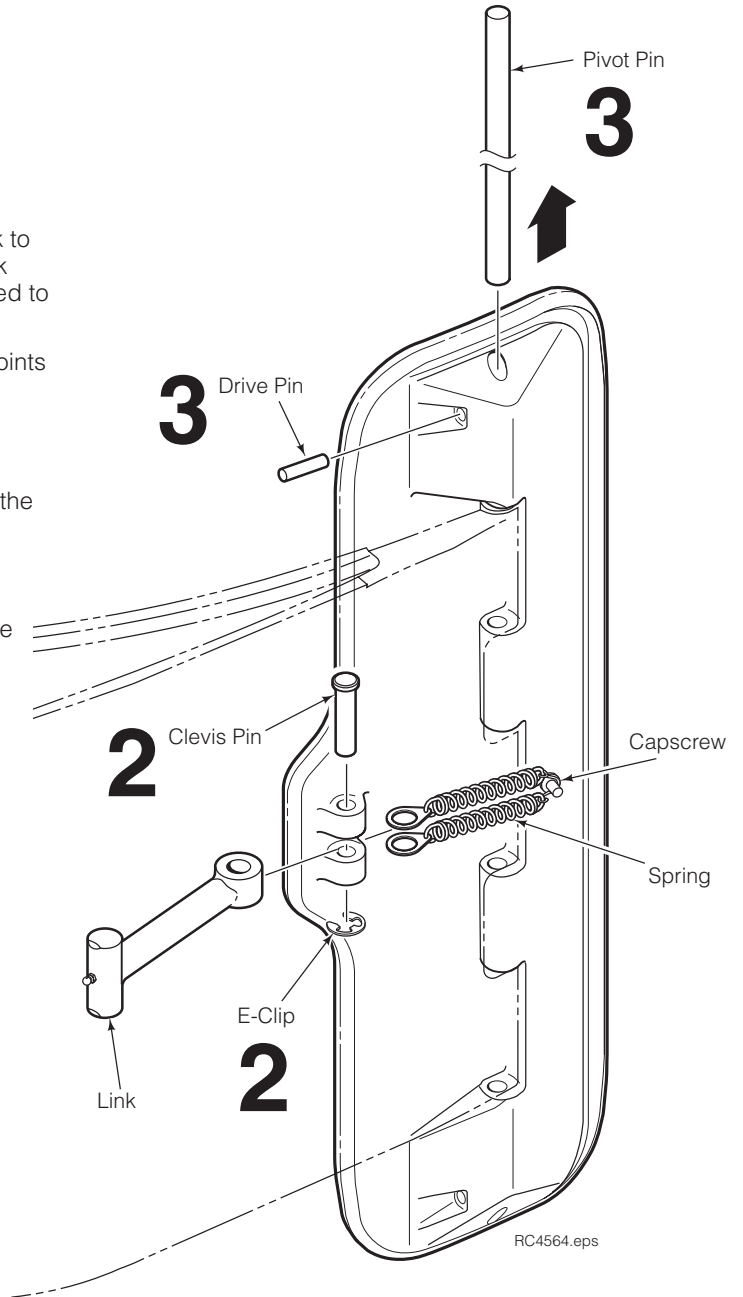
WARNING: Verify that the overhead hoist and chains or straps are rated for the weight of the attachment. Refer to nameplate for attachment weight.

- 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.



4.2-2 Contact Pad – Removal and Installation

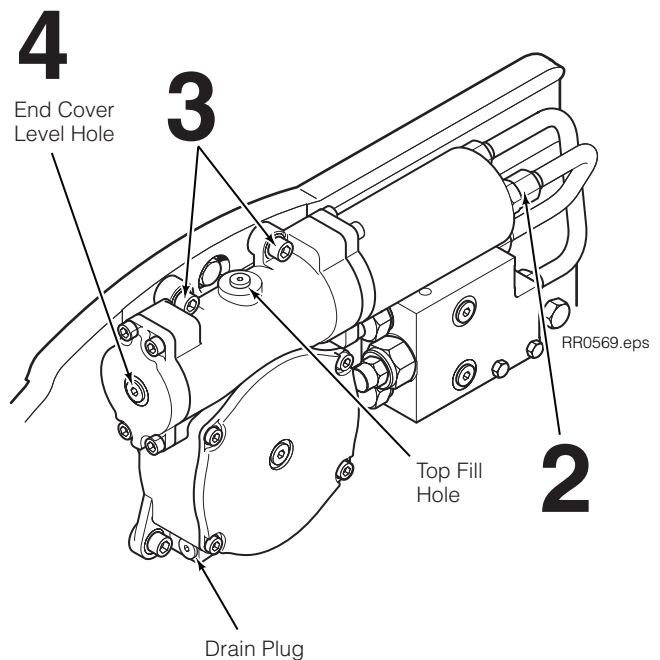
- 1** Rotate the attachment to the vertical roll handling position. Lower the unit until the contact pads are approximately 1 in. (25 mm) off the ground.
- 2** Remove e-clip from the clevis pin that fasten the link to the contact pad. Remove the clevis pin from the link while detaching the springs. Springs will remain fixed to the arm.
- 3** Remove the drive pins from the contact pad pivot points and remove the pivot pins.
- 4** Remove the contact pad. Pad link 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 or replace as necessary.
 - Install pivot pin and top drive pin. Make sure drive pin is an interference fit. Pin is 0.30 in. (8.0 mm) diameter x 1.15 in. (30.0 mm) long.
 - Check the condition of the springs. Replace as required.



4.3 Drive Group

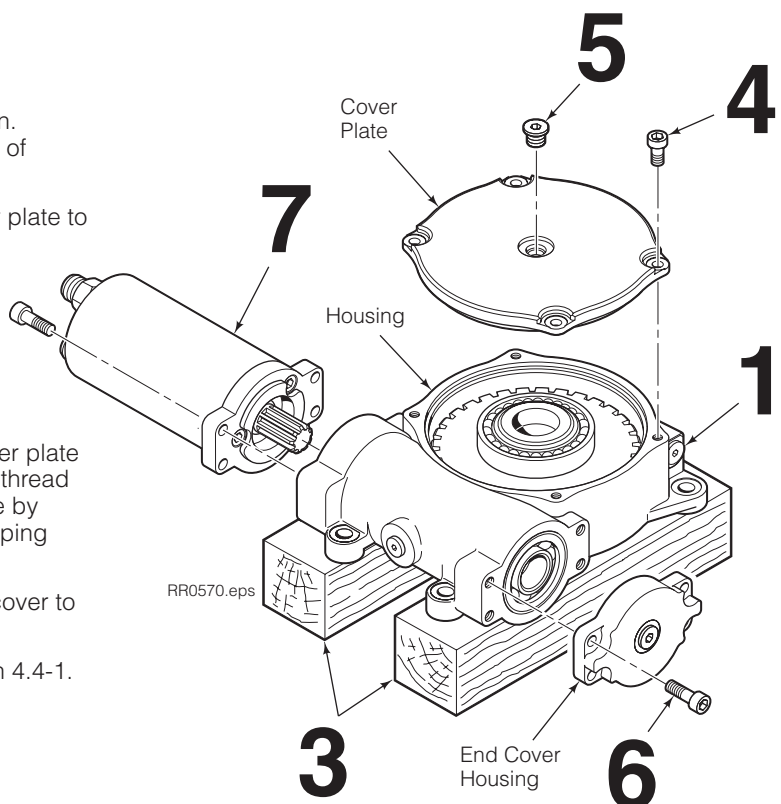
4.3-1 Drive Group Removal and Installation

- 1 Remove the attachment from the truck as described in Section 4.1.
- 2 Remove tubes connecting the motor to the valve.
- 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 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 Gear Lube).



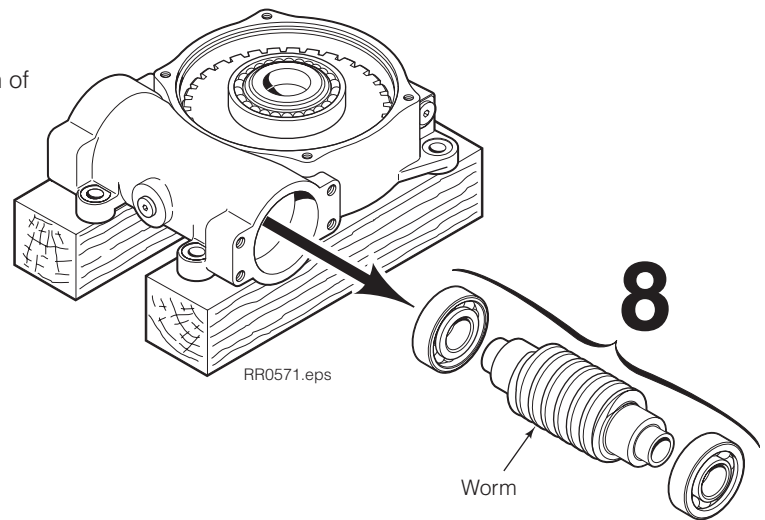
4.3-2 Drive Group Disassembly and Service

- 1 Drain oil out from the bottom housing 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.

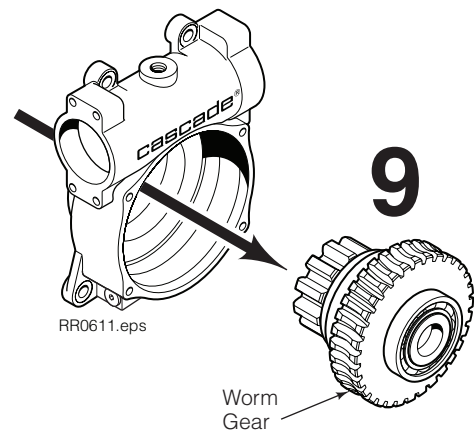


4.3-2 Drive Group Disassembly and Service (Continued)

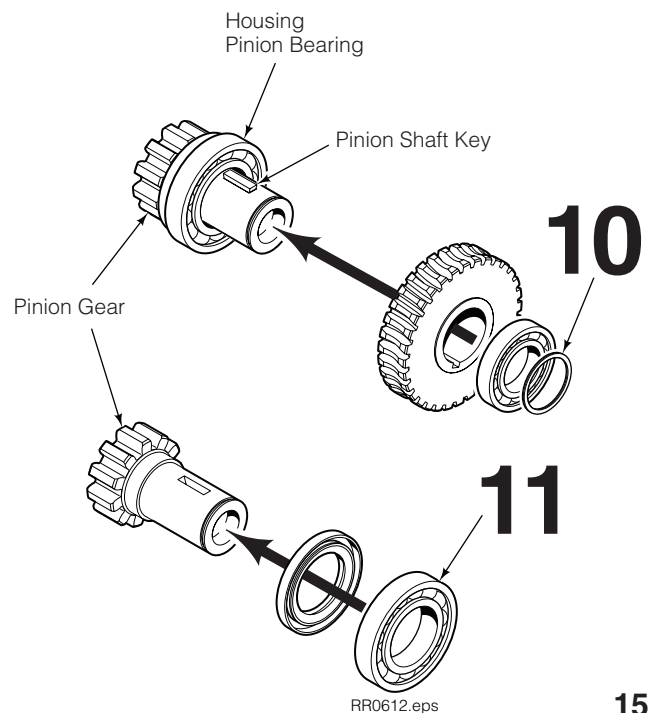
- 8** Tap the worm and bearing assembly out through the end-cover side of the housing. Note direction of bearings. Bearings are directional.



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

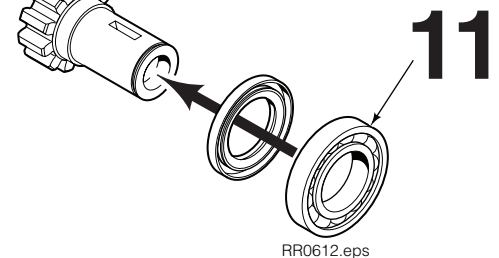


- 10** Remove the retaining ring from the pinion gear shaft. Press the pinion gear from the worm ring gear and cover plate pinion bearing. Remove the pinion shaft key.



- 11** Press the pinion gear out of the housing pinion bearing.

- 12** 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 Install pinion seal onto seal seating area.
- 2 Apply Loctite 271 (red) to the bearing seating area as shown. Press housing bearing onto the pinion shaft. Remove excess Loctite.
- 3 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.
- 4 Apply Loctite 271 (red) to housing seating area and shoulder for the housing pinion bearing. Install the complete pinion assembly into the housing. Remove excess Loctite.

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

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

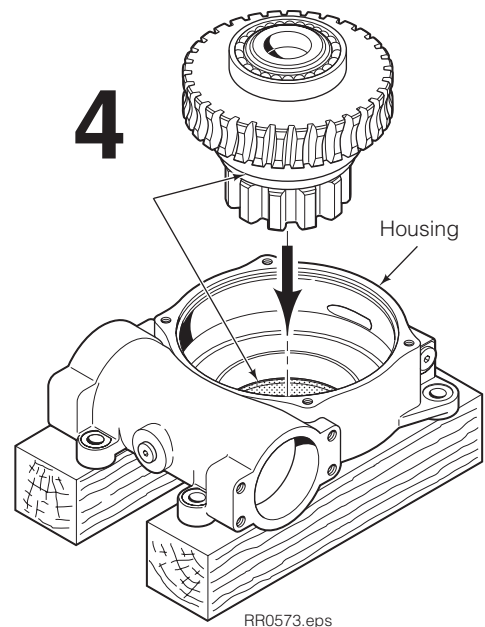
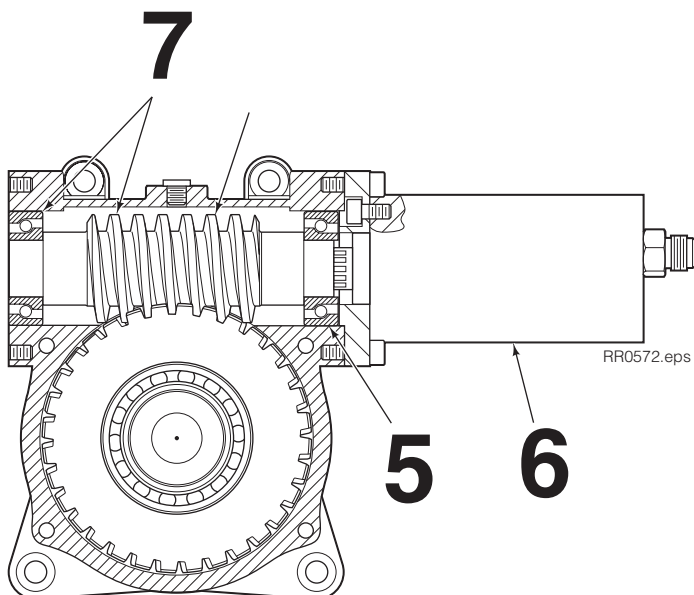
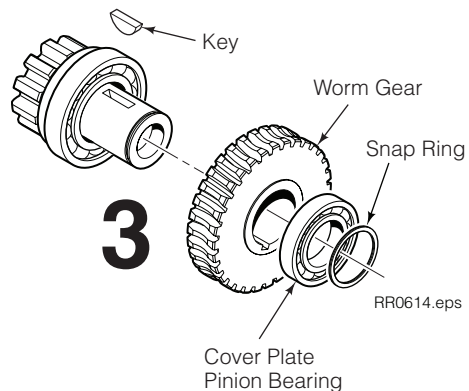
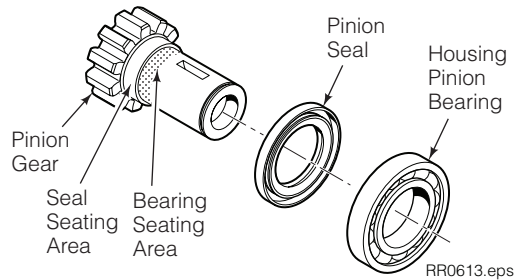
CAUTION: Bearing is directional. Install bearing with the part number side facing the motor.

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

- 7 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



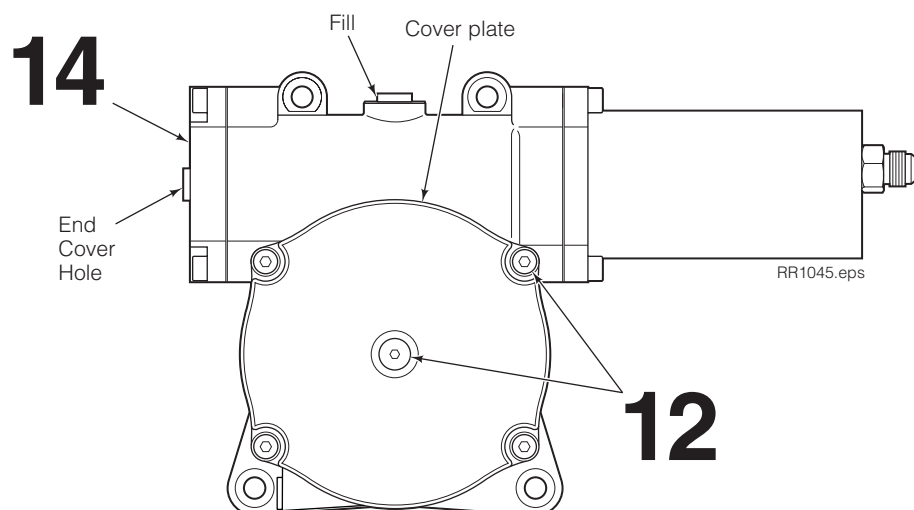
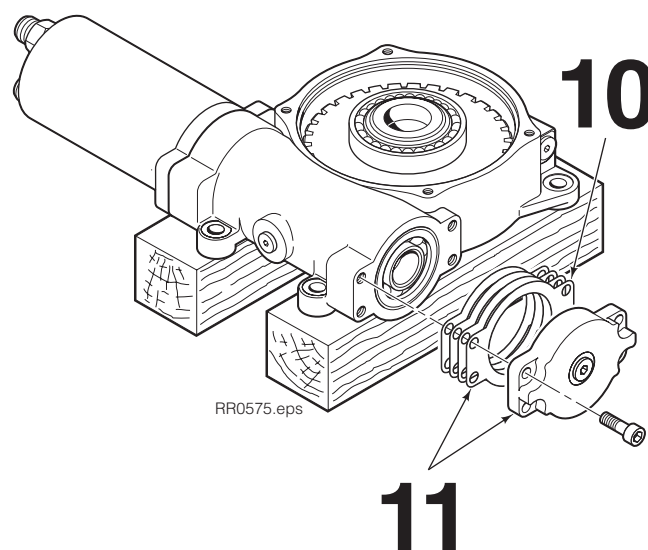
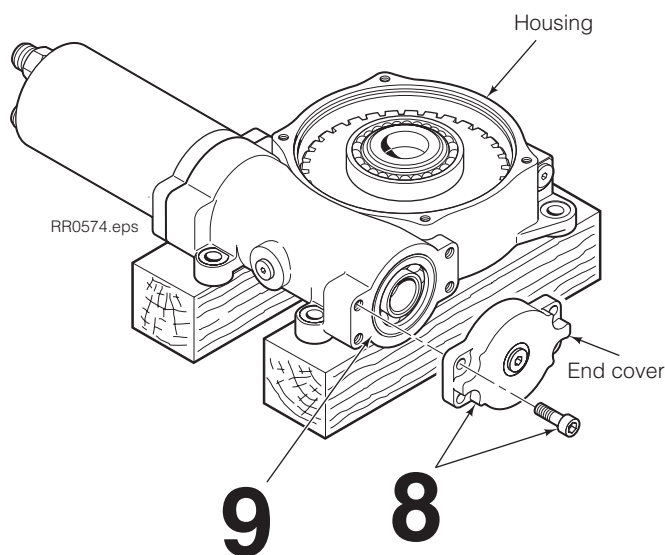
4.3-3 Drive Group Reassembly (Continued)

- 8 Temporarily install the end cover without shims. Tighten the capscrews sequentially to 115 in.-lbs. (13 Nm).
- 9 Measure the gap between the end cover and housing in three places with a feeler gauge or 'Plastigage' thread and determine the minimum gap.
- 10 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–.356 mm) measured gap, use 0.015 in. (0.381 mm) total shim thickness.
 For 0.009 in. (.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.

Qty	Part No.	Color	Thickness
2	6060031	Blue	0.005 in. (0.125 mm)
2	6060032	Brown	0.010 in. (0.254 mm)
2	6060033	Pink	0.015 in. (0.381 mm)
2	6060034	Yellow	0.020 in. (0.508 mm)

- 11 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.
- 12 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.
- 13 Reinstall the drive group on the rotator baseplate as described in Section 4.3-1.
- 14 Fill gearcase until oil begins to run from end cover hole. Use Cascade Gear Lube Part No. 656300, or SAE 90 wt. gear lube (AGMA 'mild' 6EP Gear Lube).



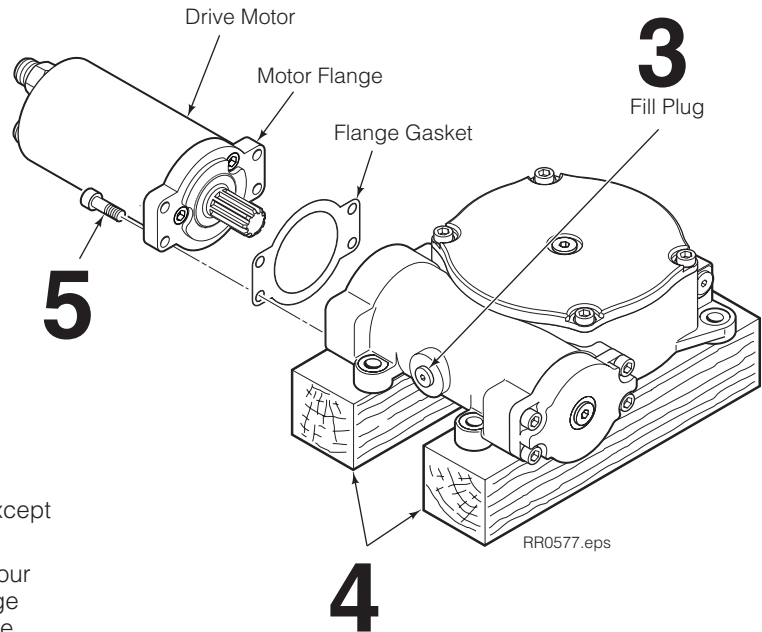
4.4 Drive Motor

4.4-1 Drive Motor Removal and Installation



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 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 fill 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 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).
 - Fill gearcase until oil begins to run from end cover hole. Use Cascade Gear Lube Part No. 656300, or SAE 90 wt. gear lube (AGMA 'mild' 6 EP Gear Lube).

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 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.

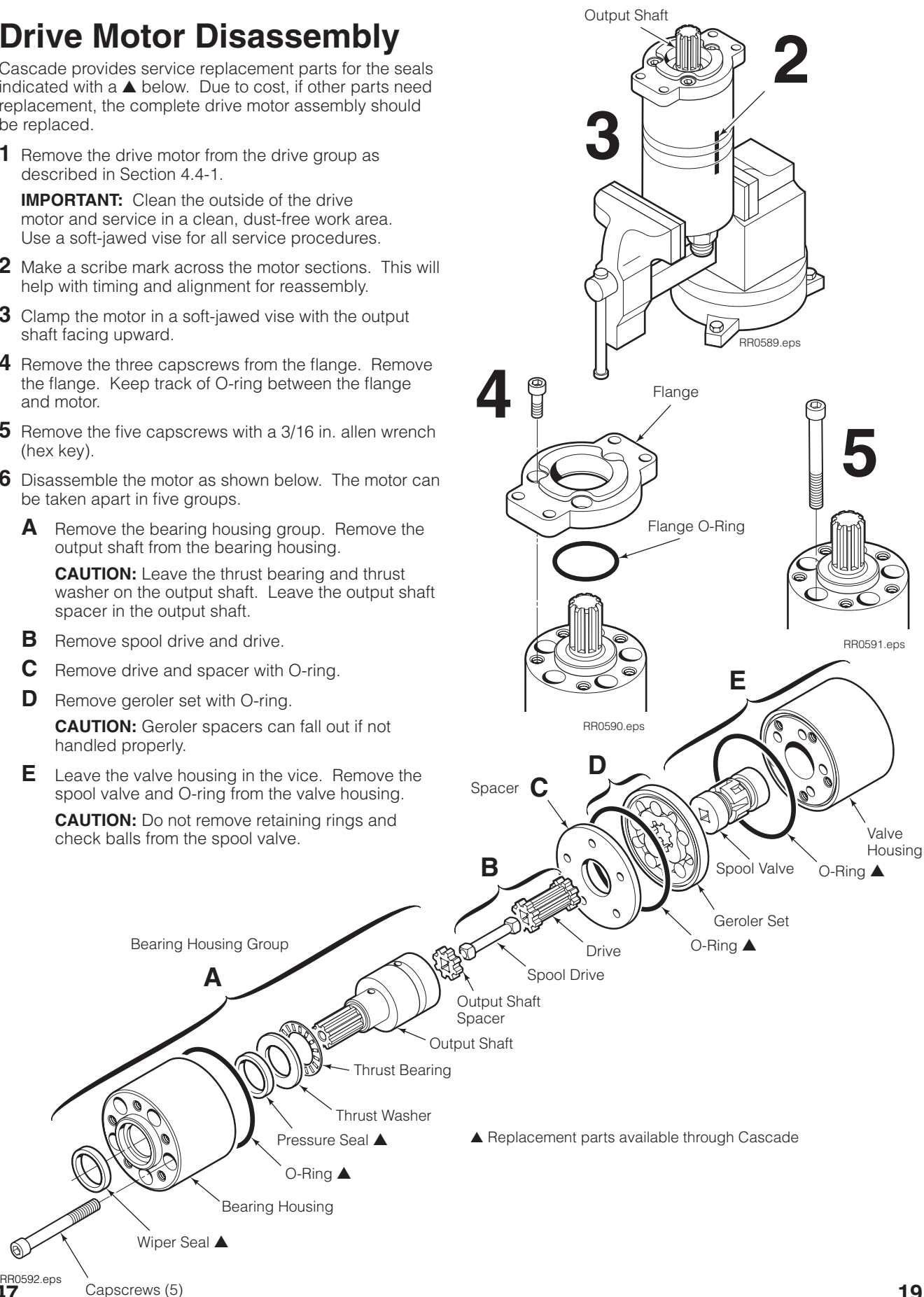
- C** Remove drive and spacer with O-ring.

- 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.

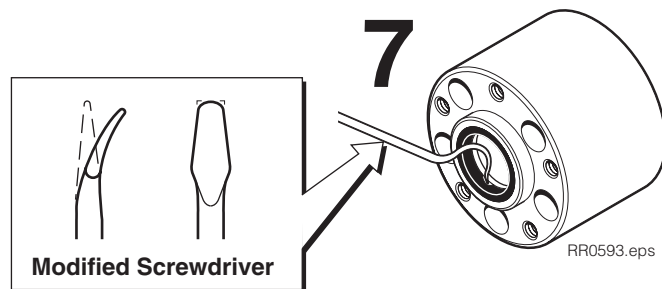
CAUTION: Do not remove retaining rings and check balls from the spool valve.



- 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

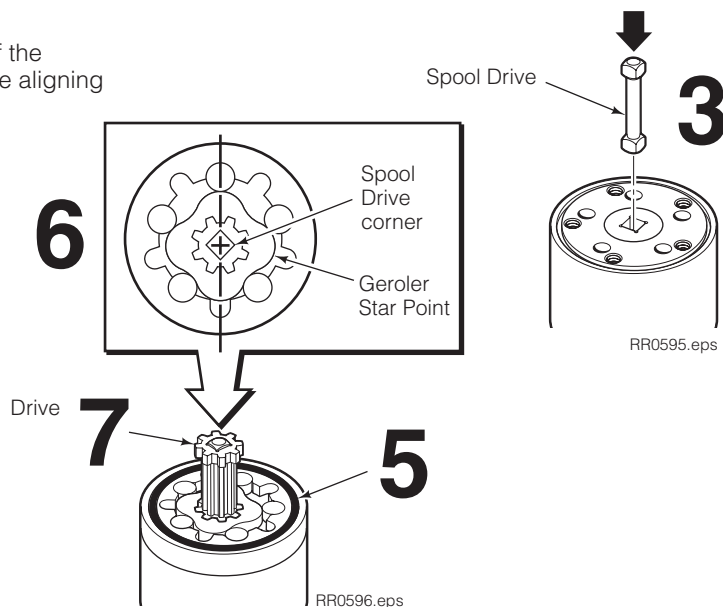
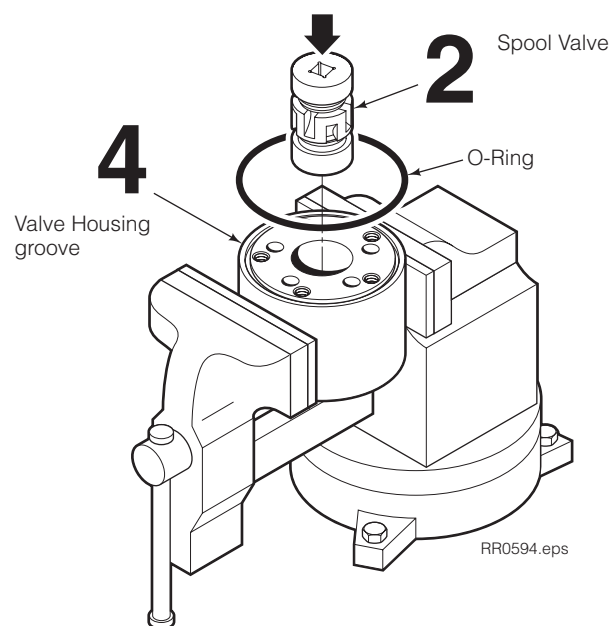
- Clean all parts with solvent and blow dry. **Do not use paper or cloth towels.**
- Inspect all parts for small nicks or burrs. Remove any small nicks or burrs with emery cloth.
- Inspect the bearing housing seal seats for scratches. Check for cracks that could cause leakage.

4.4-4 Drive Motor Reassembly

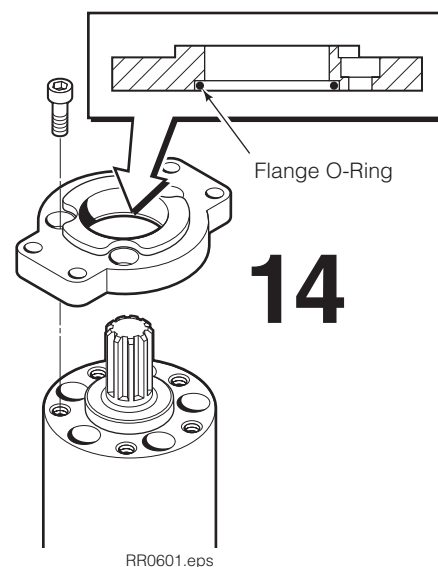
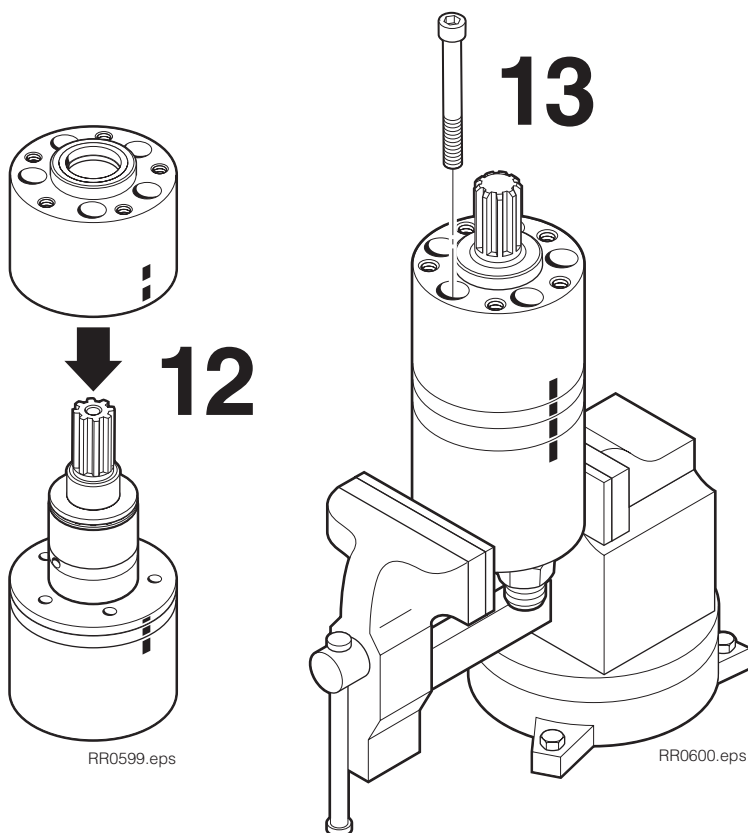
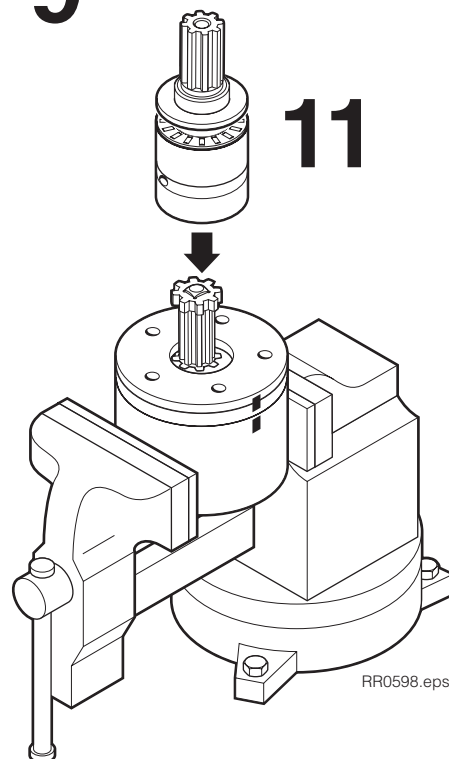
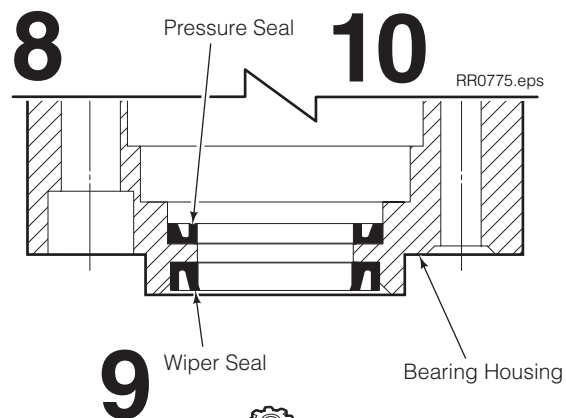
IMPORTANT: Use new seals for reassembly. Lubricate new seals with petroleum jelly to help hold seals in place when installed.

- 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.



- 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 the five capscrews by pre-torquing them in an alternating cross pattern to 90 in.-lbs. (10 Nm). Final torque in an alternating cross pattern to 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).



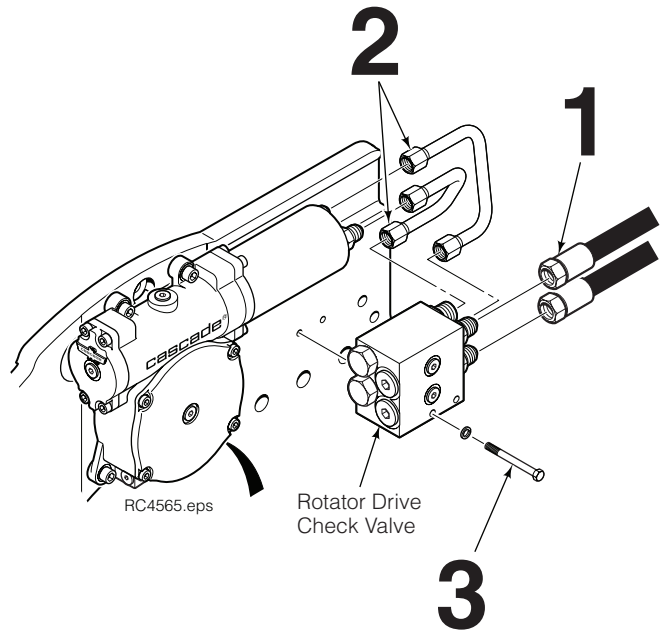
4.5 Valve

4.5-1 Valve Removal



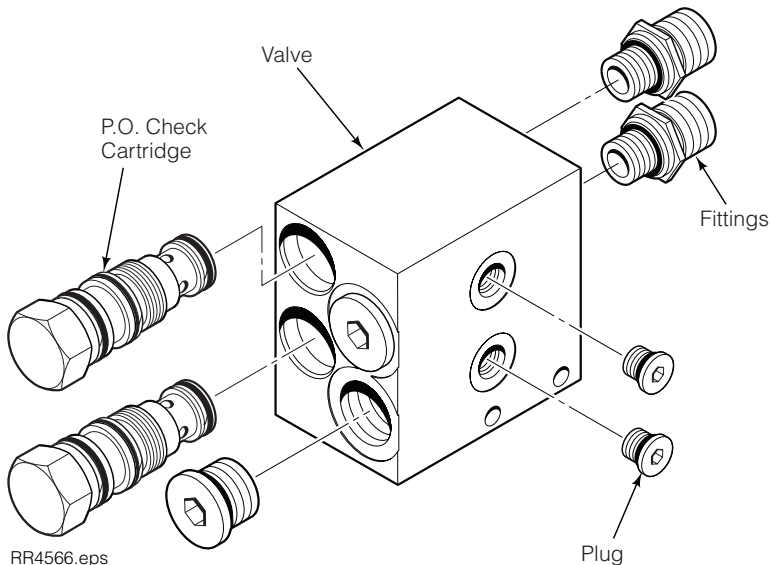
WARNING: Before removing hydraulic lines, relieve pressure in the attachment hydraulic system. Turn the truck off and move the auxiliary control valves several times in both directions.

- 1 Disconnect the hydraulic hoses to the drive group valve. Tag hoses for reassembly.
- 2 Disconnect the tubes to the drive box and valve. Tag for reassembly.
- 3 Remove the two capscrews fastening the valve to the Rotator baseplate. For reassembly, clean and dry capscrews. Apply Loctite 242 (blue) to threads and tighten the capscrews to tighten the capscrews to 6 ft.-lbs. (8 Nm).

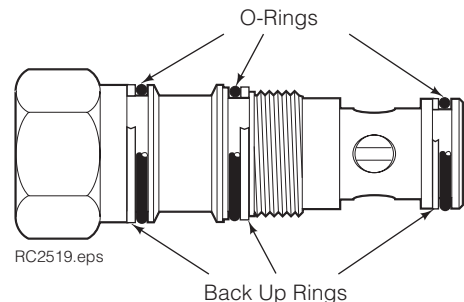


4.5-2 Valve Service

- 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.



P.O. Check Cartridge



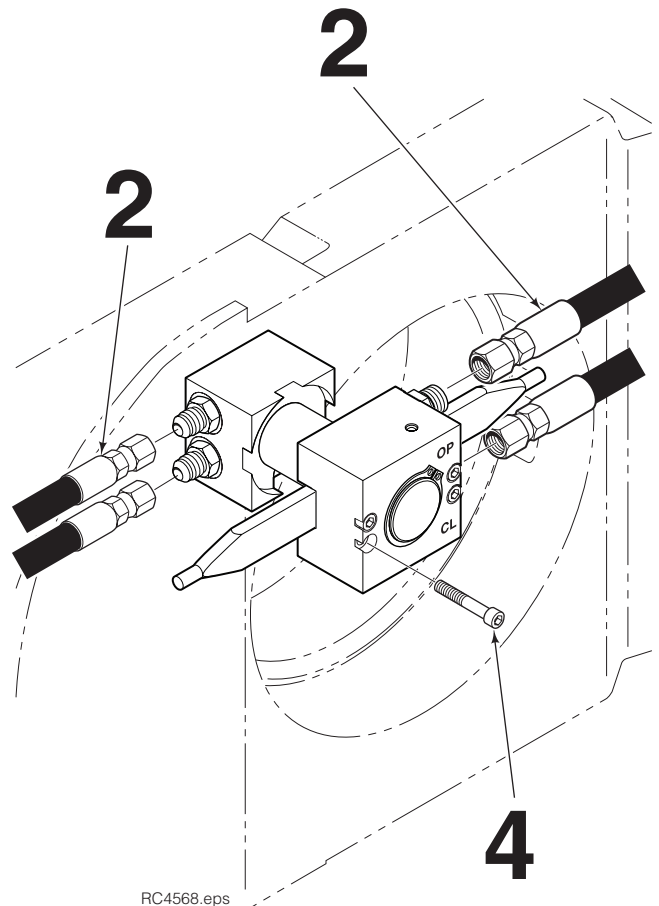
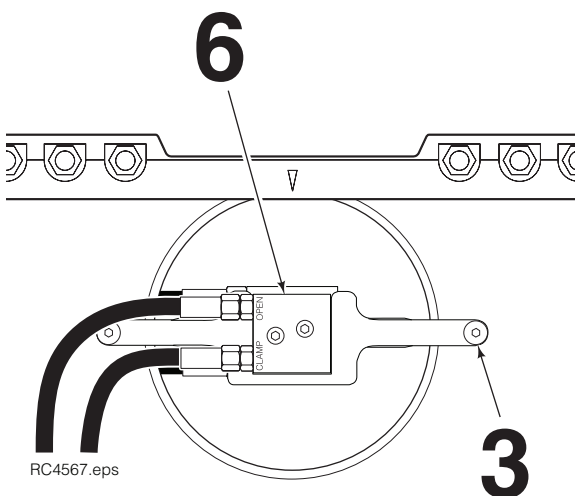
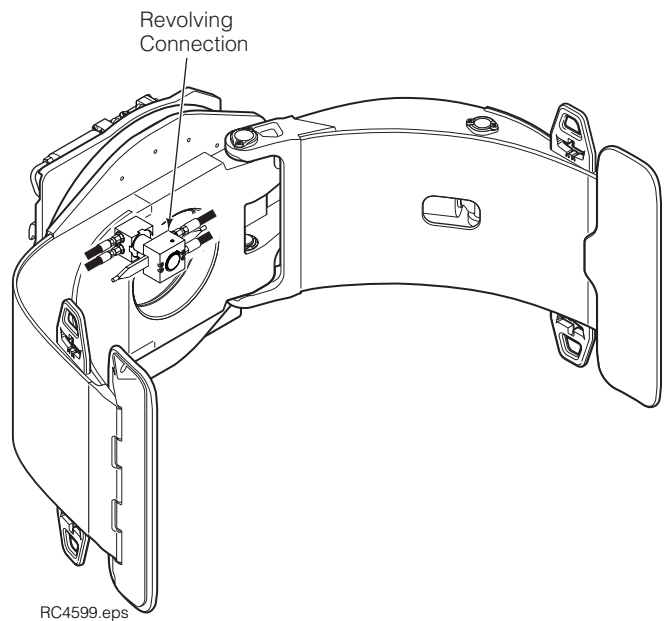
4.6 Revolving Connection

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 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.
 - Service the revolving connection in a clean work area.



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.

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

- 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).

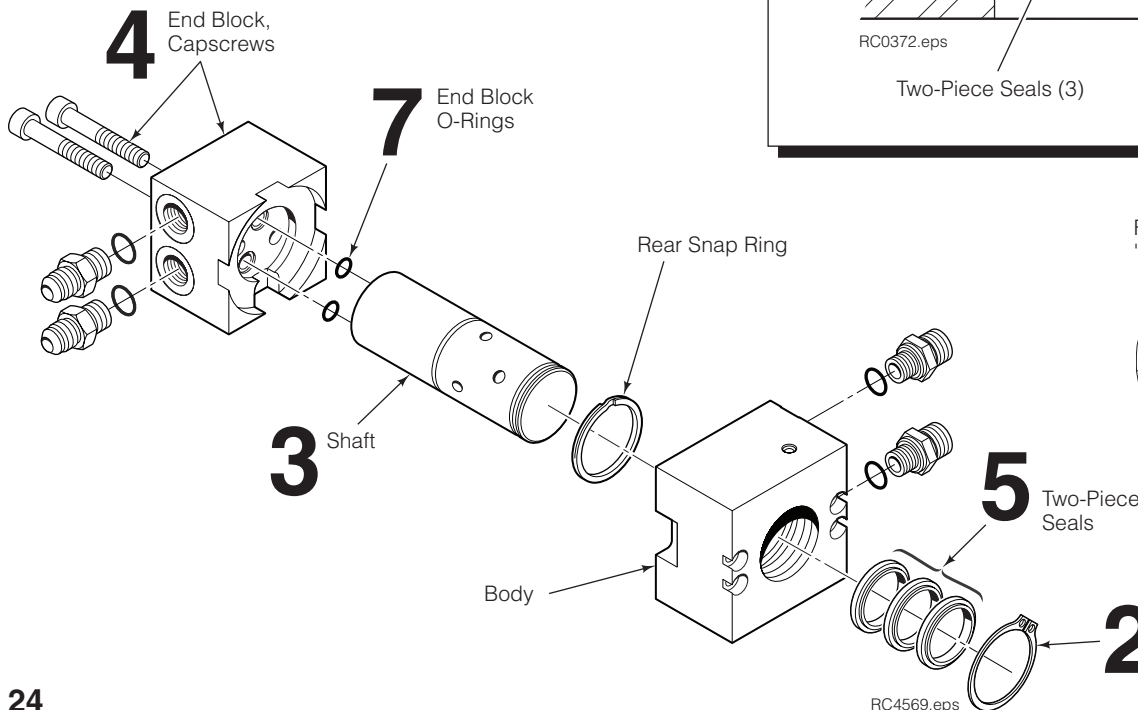
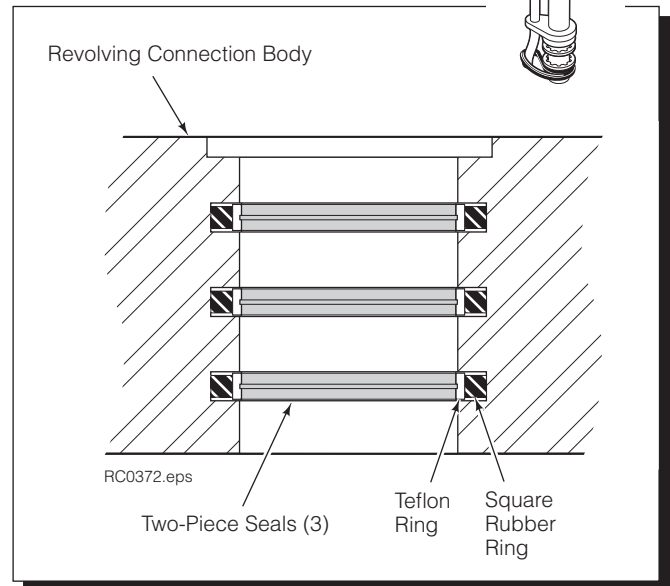
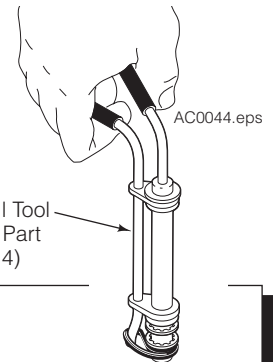
- Clean hands thoroughly to remove all traces of oil and moisture prior to 2-piece seal installation.
- A) Install the square rubber rings into the revolving connection body grooves.

B) Install the Teflon rings on top of the rubber rings.

IMPORTANT: Form the seals into a 'kidney' shape as shown to install. Avoid sharp bends. Press the seals into the grooves using finger pressure.

- Lubricate the shaft and body with hydraulic fluid prior to reassembly.

- Use seal/shaft loader and apply gentle pressure to install shaft in body. Rotate body to ease installation.



Form Teflon ring into 'kidney' shape to install



4.7 Cylinders

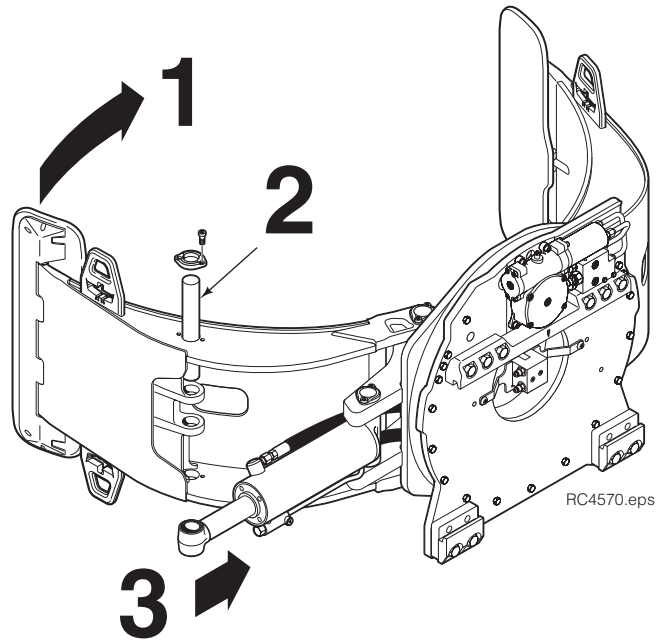
4.7-1 Servicing Cylinders on the Attachment

- 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 Section 4.8.



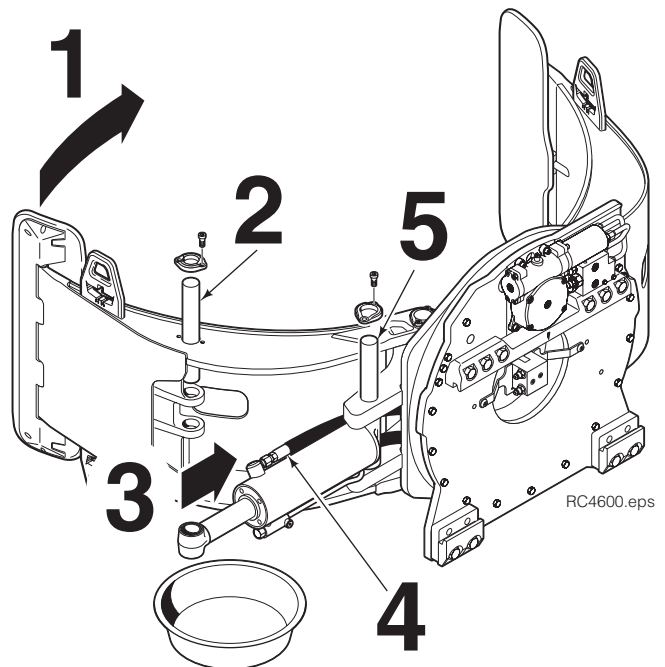
4.7-2 Cylinder Removal

- 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 Section 4.8.



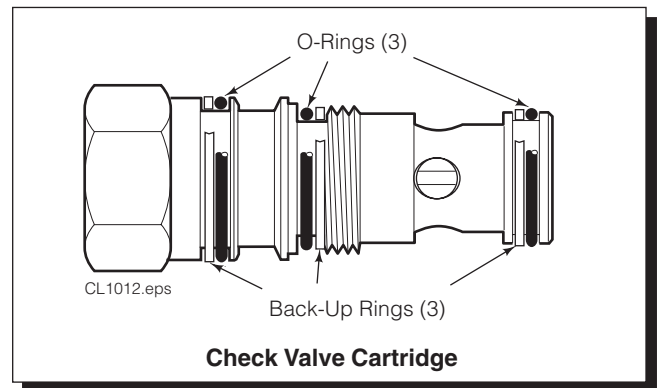
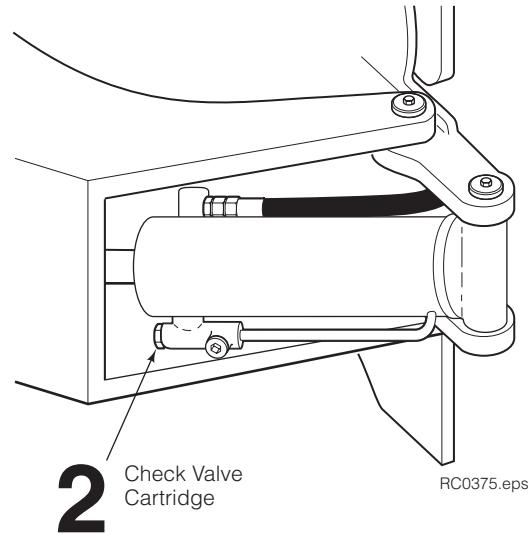
4.7-3 Cylinder Check Valve Service

- 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

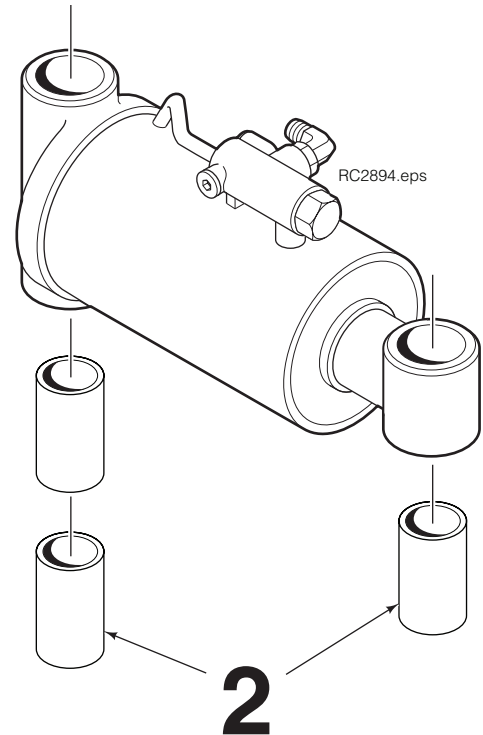
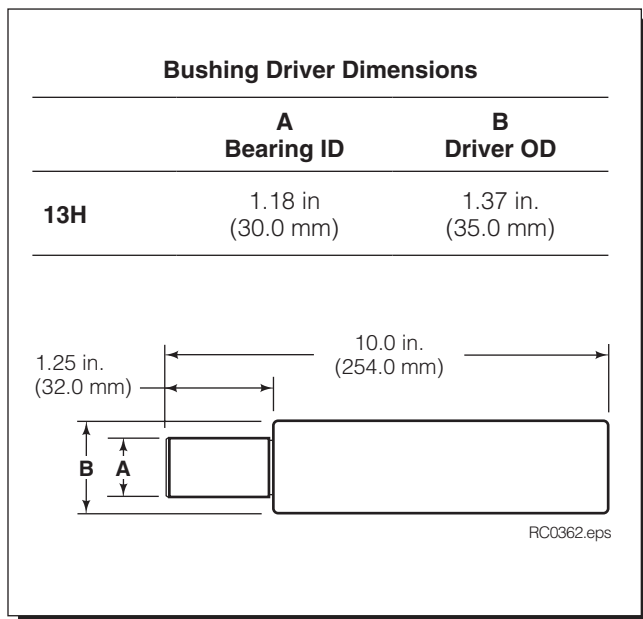
NOTE: Bushings require replacement if bushing-to-pin clearance exceeds 1/16 in. (1.6 mm).

- 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

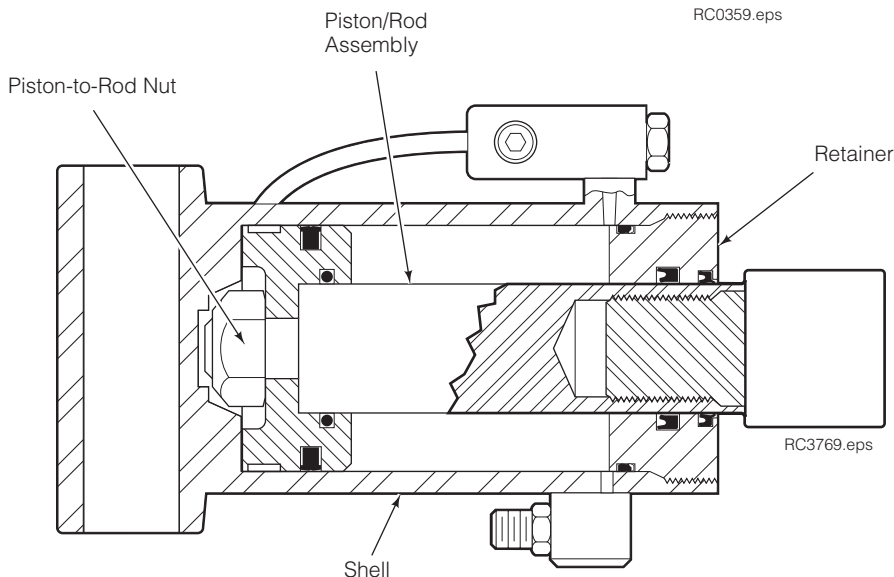
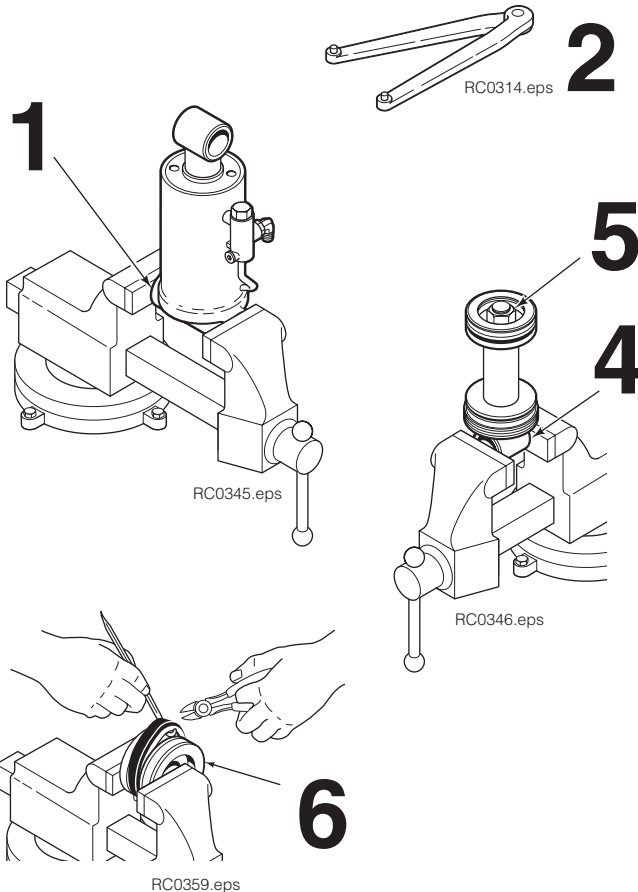
4.8-1 Cylinder Disassembly

- 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 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.

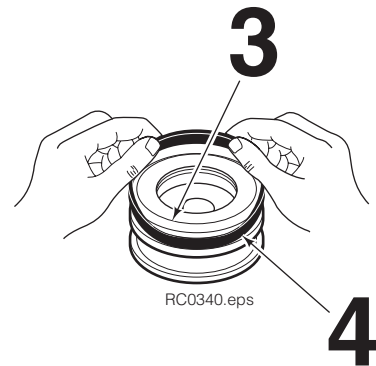


4.8-2 Cylinder Inspection

- 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 cuts that could impair performance or cause leaks under pressure. If necessary, replace the part.

4.8-3 Cylinder Reassembly

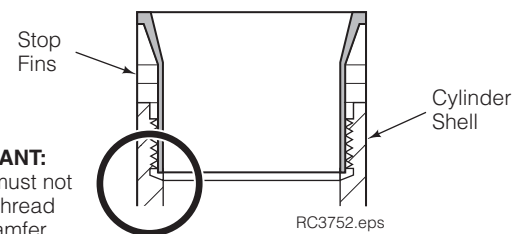
- 1 Lubricate all new seals and O-rings with petroleum jelly.
- 2 Note the direction of the U-cup seals. Pressure seals must always be installed with the lip toward the high pressure side of the cylinder.
- 3 Polish the piston and retainer chamfer angle with emery cloth to facilitate seal installation.
- 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 400 ft.-lbs. (540 Nm).



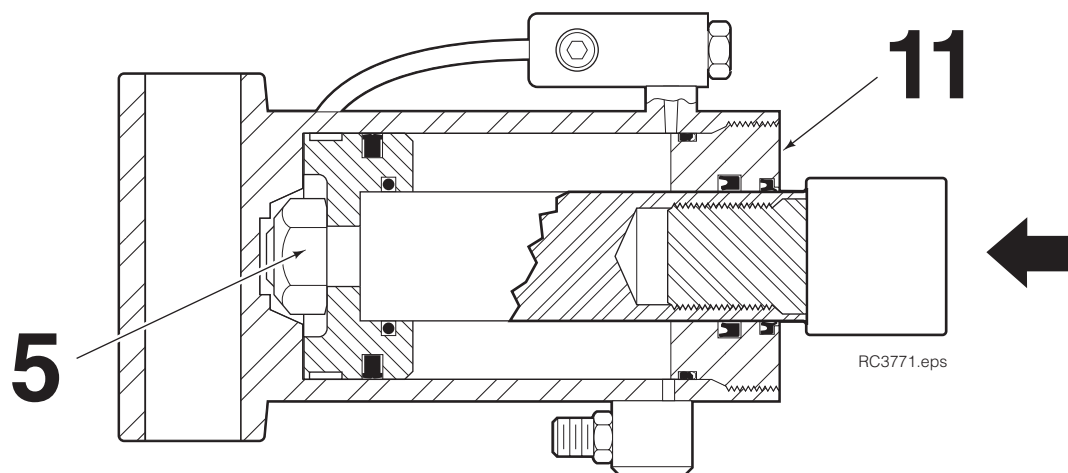
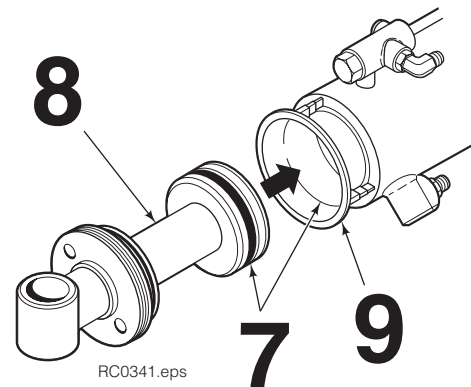
- 6 Place the piston loader furnished with the seal kit into the cylinder shell. Check that the loader covers all the cylinder shell threads but does not contact the thread relief chamfer. Trim the loader stop fins if more engagement is needed.

CAUTION: The piston will not enter the cylinder shell properly if the loader contacts the thread relief chamfer.

IMPORTANT: Loader must not contact 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 400 ft.-lbs. (540 Nm).



4.9 Base Unit

4.9-1 Frame Bushing Service

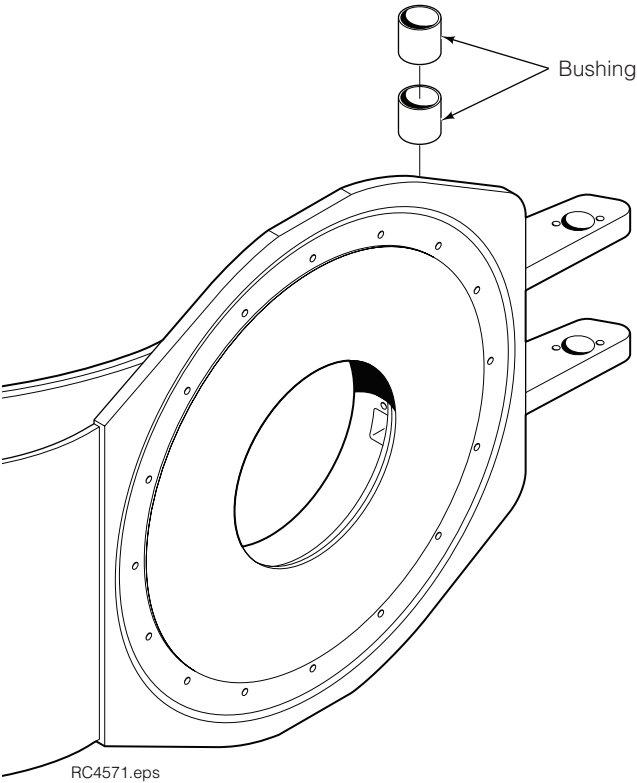
- 1 Remove the arm from the attachment as described in Section 4.2-1.
- 2 Remove the arm pivot bushings from the frame using a bushing driver.

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.

Bushings Driver Dimensions		
	A Bearing ID	B Driver OD
13H	1.57 in (39.8 mm)	1.75 in. (44.5 mm)

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4.9-2 Rotation Bearing Assembly – Removal and Installation

- 1 Remove the attachment from the lift truck as described in Section 4.1.
- 2 Remove the drive group as described in Section 4.3-1.
- 3 Remove the valve assembly capscrews. For reassembly, tighten capscrews to 6 ft.-lbs. (8 Nm).
- 4 Remove the upper hook. For reassembly, tighten capscrews to 122 ft.-lbs. (165 Nm).
- 5 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.

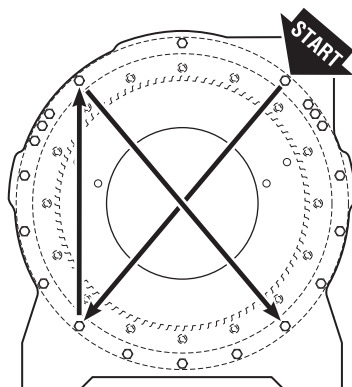
- 6 Attach two eyebolts to the baseplate. Attach an overhead hoist to the baseplate.
- 7 Remove the capscrews fastening the baseplate to the bearing assembly. For reassembly, tighten capscrews to a torque of 38 ft.-lbs. (52 Nm).

Baseplate Capscrew Reassembly –

- A) Clean and dry capscrews. 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 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).

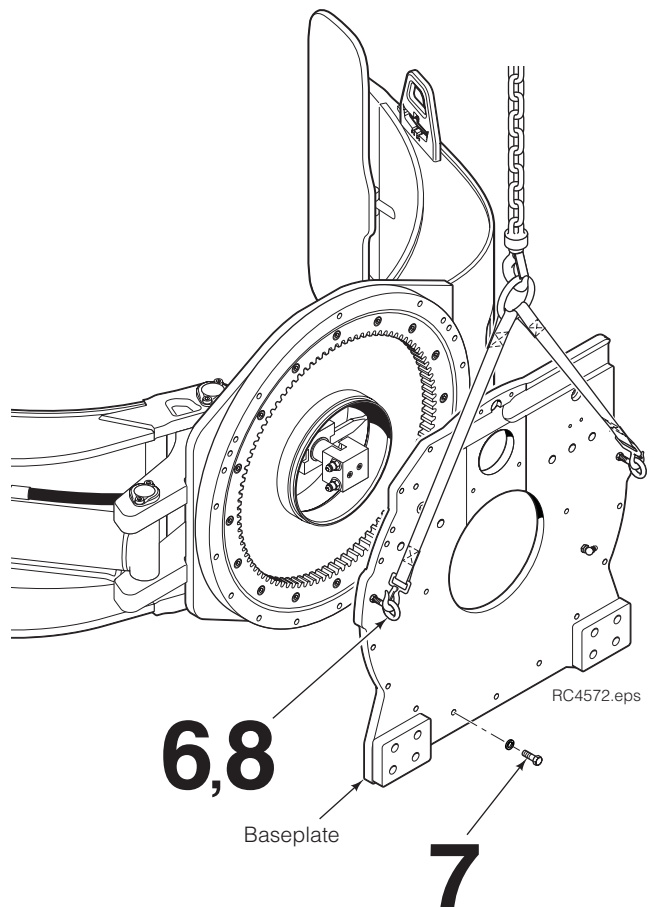
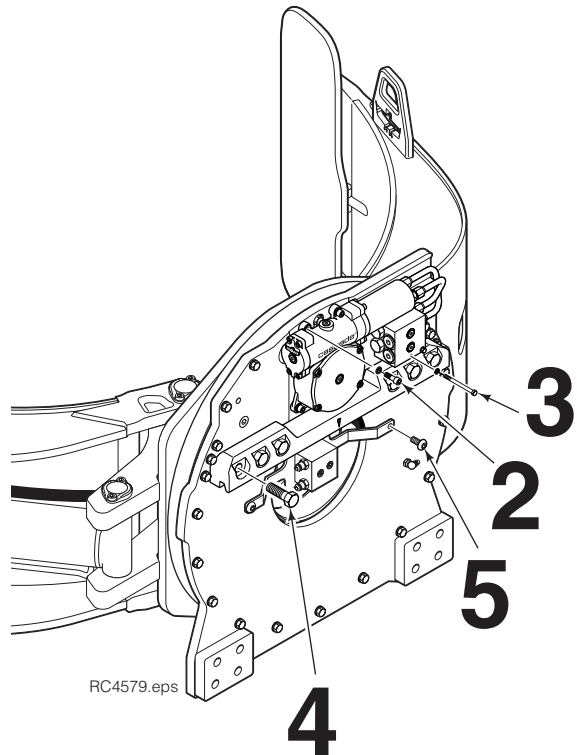
CAUTION: Do not reuse old capscrews or washers. Use new hardware kit when installing a new bearing assembly.

- 8 Lift away the baseplate.



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Alternating cross pattern tightening sequence.



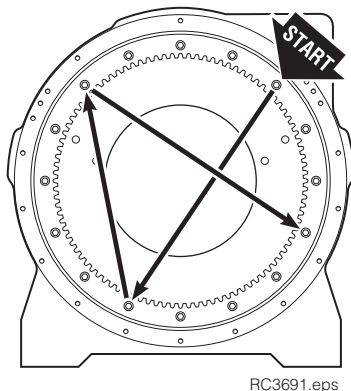
- 9 Attach two eyebolts to the bearing assembly. Attach an overhead hoist.
- 10 Remove the capscrews fastening the bearing to the faceplate. For reassembly, tighten the capscrews using the following technique:

Bearing-to-faceplate capscrews –

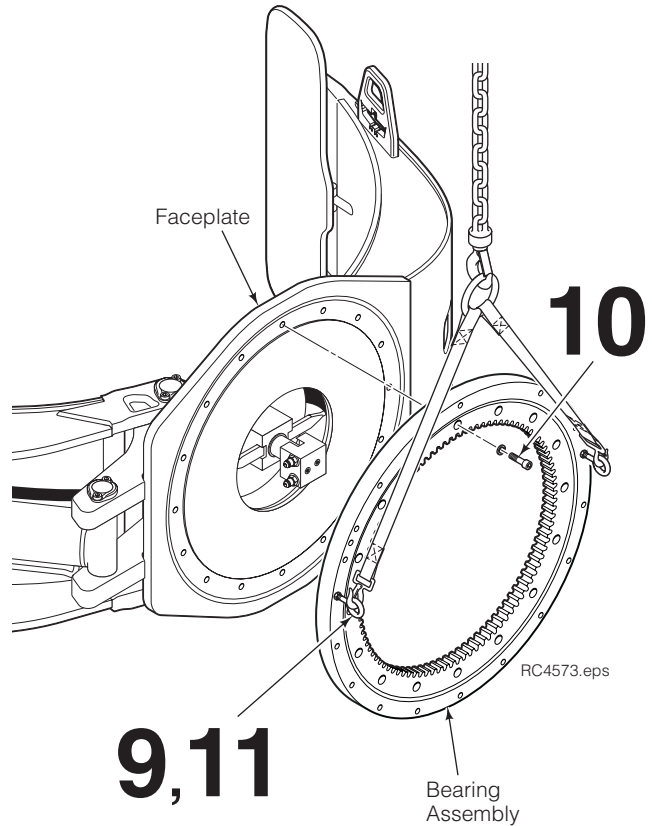
- A) Clean and dry capscrews. Apply Loctite 242 (Blue) to capscrew threads and threaded holes in the faceplate. Threads must be clean and dry for new Loctite to cure properly.
- B) Tighten using the alternating cross pattern shown to one-half the final torque value below.
- C) Tighten using the alternating 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.

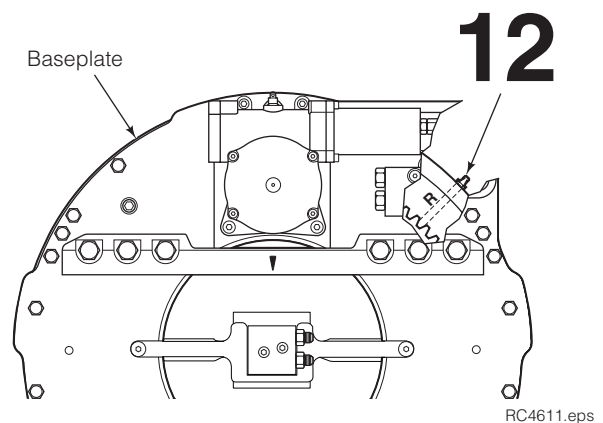
- 11 Lift away bearing assembly.



Alternating cross pattern tightening sequence.



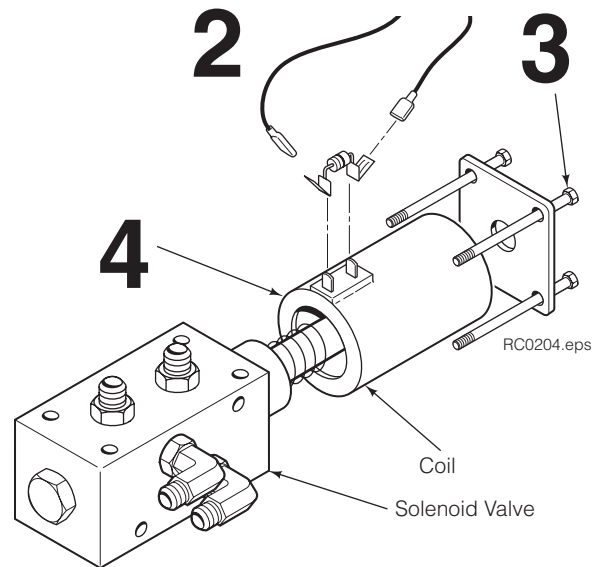
- 12 For reassembly, reverse the above procedures except as follows:
 - When installing the rotation bearing assembly on the faceplate, align and position the heat-treated overlap zone 'R' on the ring gear with the outer race grease fitting 45° above horizontal as shown.
 - Check the condition of the 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.



4.10 Solenoid Valve

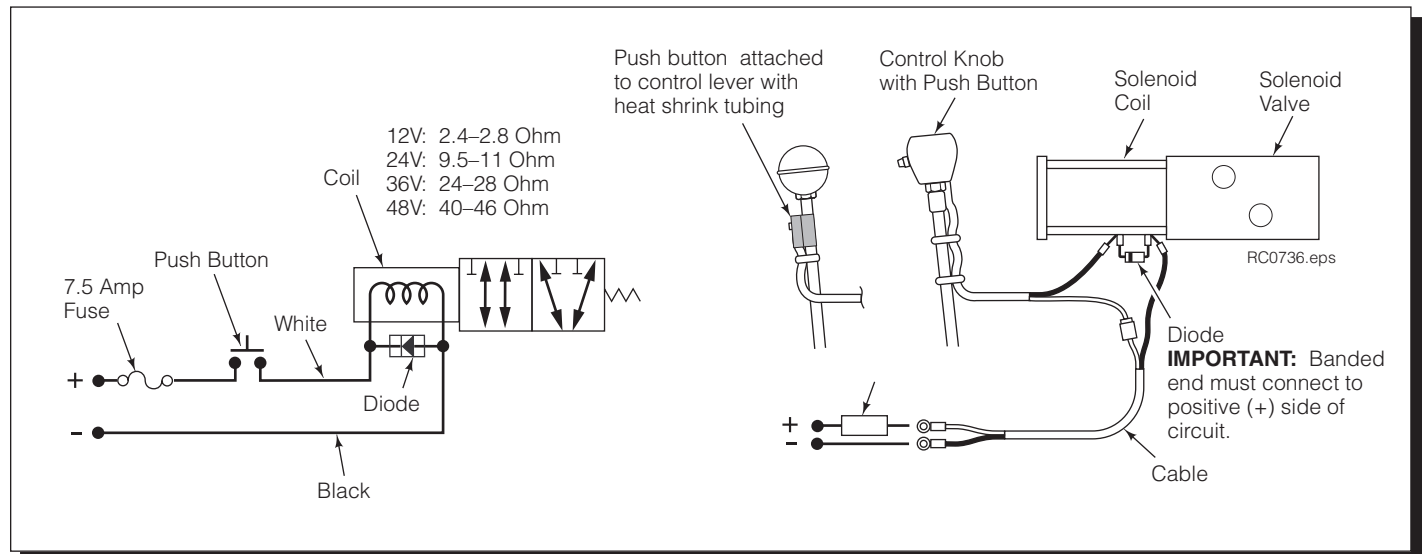
4.10-1 Coil Service

- 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.



4.10-2 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
13H	5 GPM (18 L/min.)	10 GPM (37 L/min.)	15 GPM (56 L/min.)

① Cascade 13H 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.

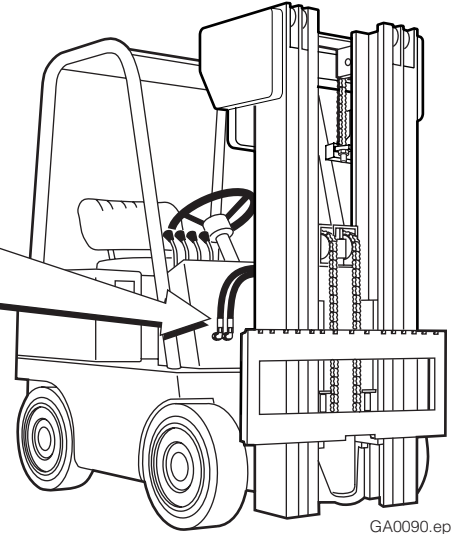
② Flow less than recommended will result in a rotate speed less than 3 RPM.

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

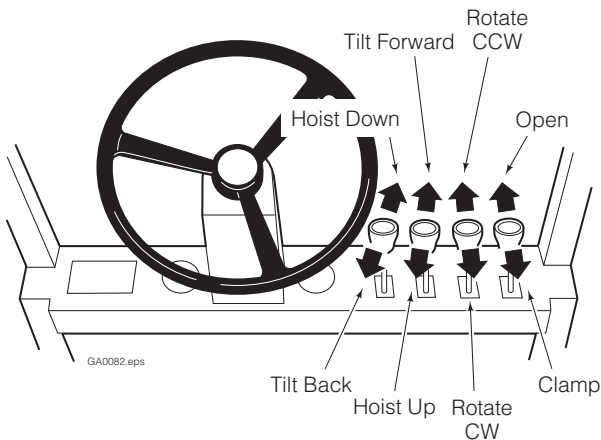
All fittings should have a minimum orifice size of 9/32 in. (7 mm)



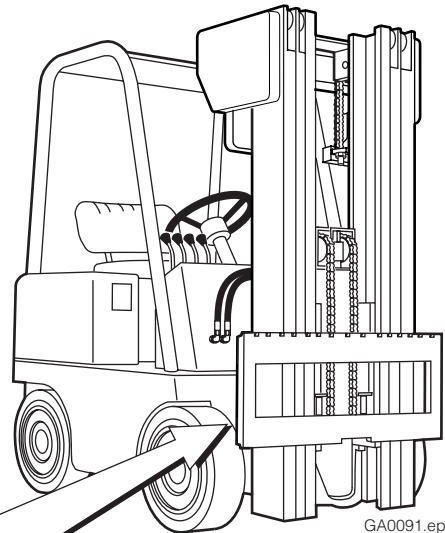
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5.1-2 Auxiliary Valve Functions

Check for compliance with ANSI (ISO) standards:



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5.1-3 Truck Carriage

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

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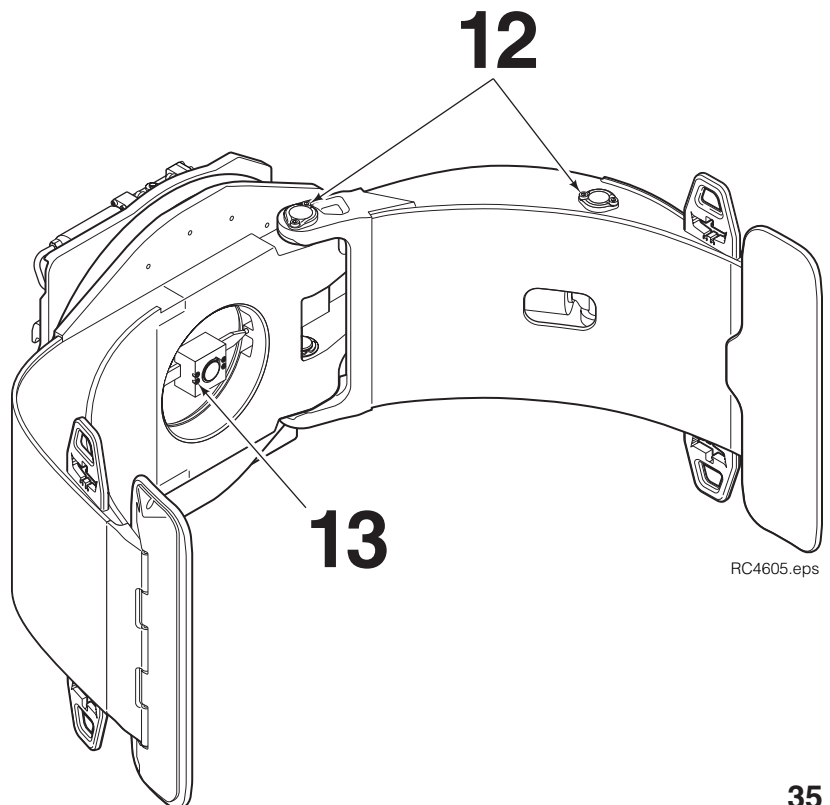
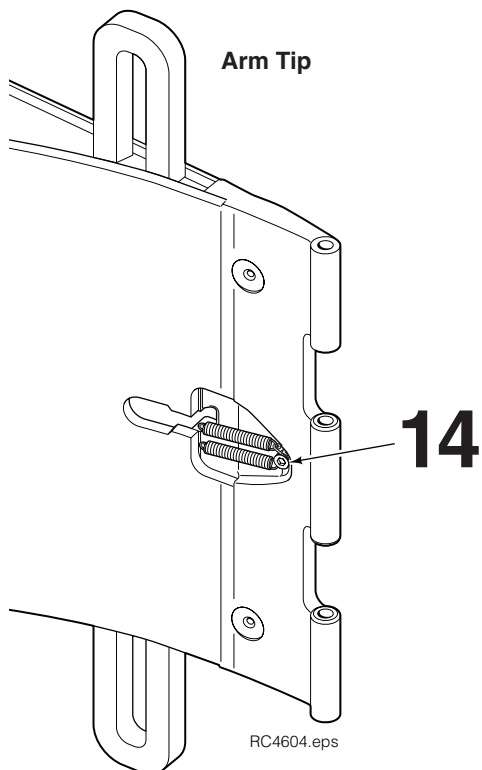
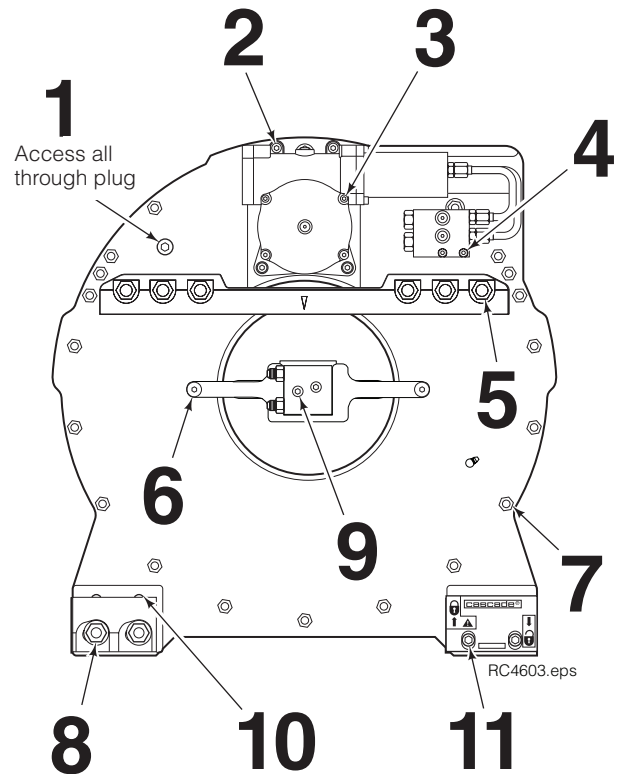
5.1-4 Torque Values

Fastener torque values for the 13H 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

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

Ref.	Fastener Location	Size	ft.-lbs.	Nm
1	Bearing Faceplate Capscrew ● ▲	M10	47	63
2	Drive Group Capscrew ●	M8	25	32
3	Housing Cover Plate Capscrew ●	M6	6	8
4	Valve Capscrew ●	M6	6	8
5	Upper Hook Capscrew ●	M16	165	225
6	End Block Bracket Capscrew	M10	30	40
7	Bearing Baseplate Capscrew ● ▲	M10	38	52
8	Lower Hook Capscrew	M16	122	165
9	End Block Capscrew	M8	30	40
10	Spacer Block Capscrew ●	M16	122	165
11	Quick-Disconnect Hook Capscrew	M16	122	165
12	Arm Retainer Capscrew	M10	28	38
13	Rev. Conn. Support Bracket Capscrew	M10	10	14
14	Spring Button Head Capscrew ●	M6	5	7

- Use Loctite 242 (Blue)
- ▲ Double torque



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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