SERVICE MANUAL

N-Series

Fork Positioner with Sideshift

Original Instructions

Number 8658419 EN

CE

cascade® corporation

CONTENTS

1.1 Introduction

This manual provides Periodic Maintenance, Troubleshooting, Service and Specifications for Cascade N-Series Fork Positioner with Integrated Sideshift.

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

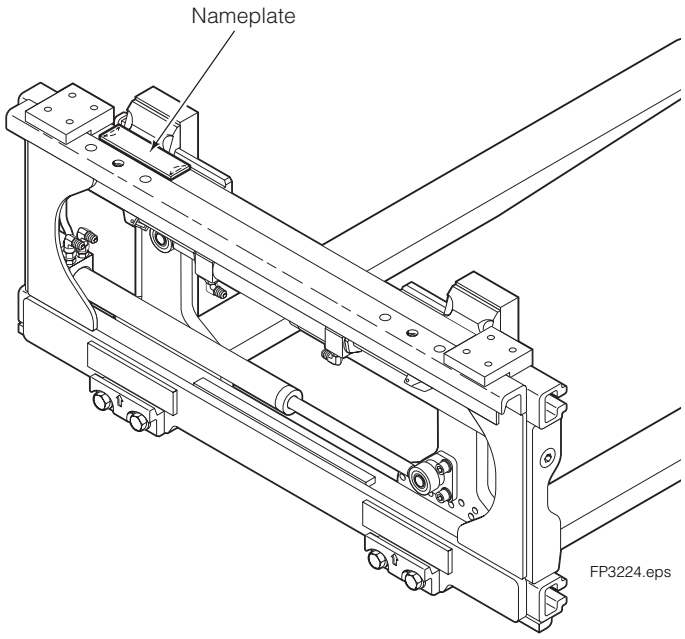
IMPORTANT: The N-Series Fork Positioner is metric. Supply fittings adapted as required for application.

NOTE: Specifications are shown in metric units. All fasteners have a torque value range of ±10% of stated value.

Weighted Emission Sound Pressure Level – Weighted emission sound pressure level (LρA) does not exceed 70 dB(A).

Measured Value of Whole Body Vibration – Measured value of whole body vibration (m/s^2) does not exceed 0,5 m/s^2.

Measured Value of Hand-Arm Vibration – Measured value of hand-arm vibration (m/s^2) does not exceed 2,5 m/s^2.



1.2 Disposal

At the end of life of the equipment, all the parts must be disassembled and cleaned of grease and hydraulic oils. Prepare containers for the collection of hydraulic fluids and greases. Dispose of the device according to the applicable regulations in your country.

IMPORTANT: Do not dispose equipment along with household waste.

1.3 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 Daily

Check items shown each day. Report problems to your supervisor. Refer to service manual for troubleshooting, maintenance and repair procedures.

- Check for the following:
  - Loose or missing hardware
  - Damaged or missing fork stops,
  - Worn or damaged hoses,
  - Hydraulic leaks
- Check decals and nameplate for legibility.

WARNING: After completing any service procedure, always test the fork positioner through five complete cycles to make sure the attachment operates correctly before returning it to the job.

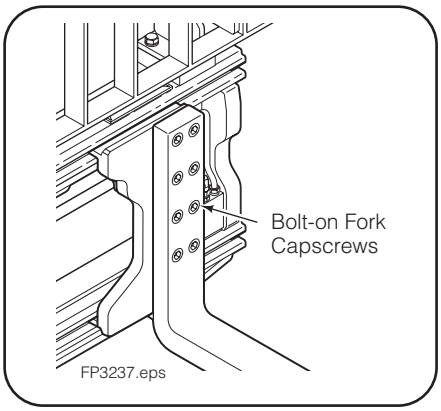
WARNING: Before starting any work on the unit, the operator must wear the appropriate personal protective equipment (PPE) such as gloves, eye protection and safety shoes.

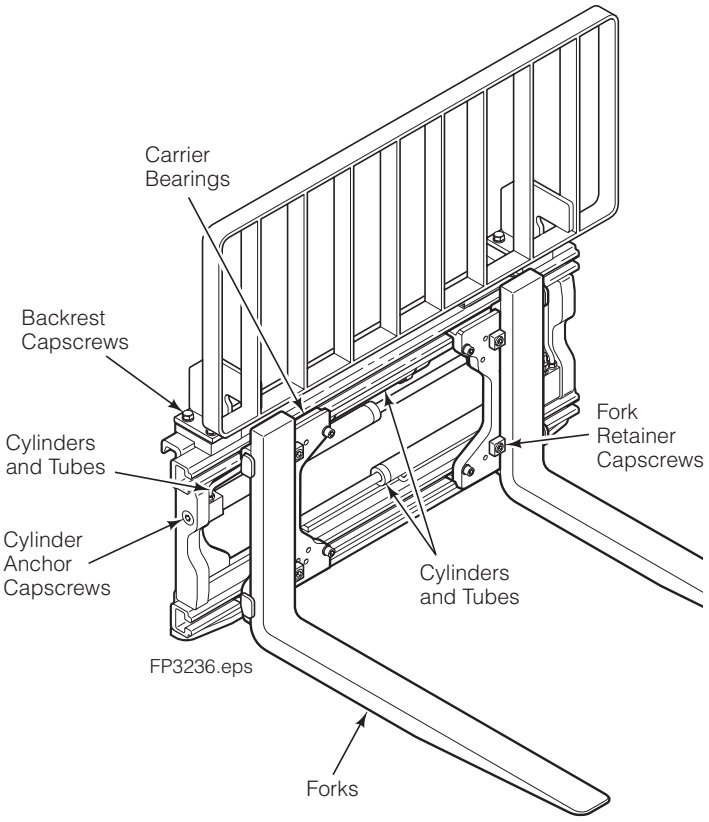
2.2 1000-Hour

Every time the lift truck is serviced or every 1000 hours of truck operation, whichever comes first, complete the following maintenance procedure:

- **Hang-on Forks –** Tighten fork retainer capscrews to 100 Nm.
- **Bolt-on Forks –** Tighten fork capscrews:

  25N, 35N – 270 Nm
  50N, 60N – 530 Nm





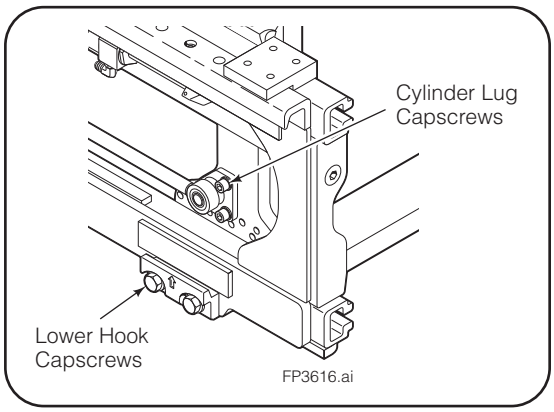
- Tighten backrest capscrews:

  25N – 90 Nm
  35N, 50N, 60N – 220 Nm
- Tighten lower hook capscrews to:

  CL II/III – 220 Nm
  CL IV – 320 Nm
- Tighten cylinder anchor capscrews to:

  25N, 35N, 50N – 160 Nm
  60N – 310 Nm
- Tighten cylinder lug capscrews to:

  25N, 35N, 50 – 80 Nm
  50N – 180 Nm



2.2 1000-Hour (Continued)

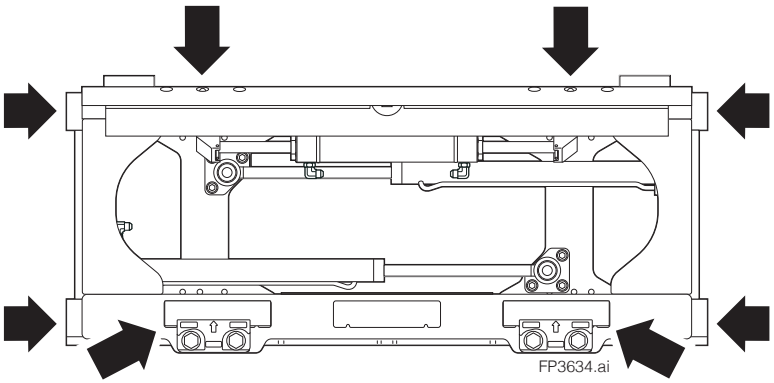
- Lubricate sideshifter upper and lower bearings.

  Standard Application – Apply general-purpose lithium-based chassis grease to the upper bearing fittings and lower bearings. Apply a single pump of grease for the fork carrier grease fittings.

  Dry Lube Application – Apply graphite dry-lube to fork carriage bars as required ('Slip Plate Aerosol', 'GraphKote' or equivalent).

- Inspect sideshifter upper and lower bearings for wear. If any bearing is worn to less than thickness 2.5 mm, replace the entire bearing set. Refer to Section 4.4-3 for service.
- Inspect carrier arm bars and bearings for wear or damage. If bearing thickness is less than 1.5 mm, replace both bearings.

Lubrication Points



Back (Driver's) View

2.3 2000-Hour

After 2000 hours of truck operation, in addition to the 1000-hour maintenance, forks in use shall be inspected at intervals of not more than 12 months (for single shift operations) or whenever any defect or permanent deformation is detected. Severe applications will require more frequent inspection.

Fork inspection shall be carried out by trained personnel to detect any damage that might impair safe use. Any fork that is defective shall be removed from service. Reference ISO 5057.

Inspect for the following defects:

- Surface cracks
- Straightness of blade and shank
- Fork angle
- Difference in height of fork tips
- Positioning lock
- Wear on fork blade and shank
- Wear on fork hooks
- Legibility of marking

NOTE: Fork Safety Kit 3014162 contains wear calipers, inspection sheets and safety poster. Also available is fork hook & carriage wear gauge 209560 (Class II), 209561 (Class III) and 6105257 (Class IV).

3.1 General Procedures

3.1-1 Truck System Requirements

- Truck hydraulic pressure should be within the range shown in Specifications, Section 6.1. **PRESSURE TO THE ATTACHMENT MUST NOT EXCEED 250 BAR.**
- Truck hydraulic flow should be within the range shown in Specifications, Section 5.1.
- Hydraulic fluid supplied to the attachment must meet the requirements shown in Specifications, Section 5.1.

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

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

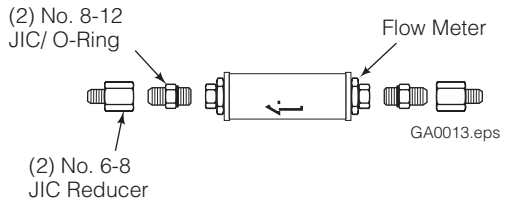
Stay clear of the load while testing. Do not raise the load more than 10 cm off the floor while testing.

3.1-2 Tools Required

- In addition to a normal selection of mechanic's hand tools, the following are required:
- In-line Flow Meter Kit:
  37 l/min – Cascade Part No. 671476.
- Pressure Gauge Kit:
  345 bar – Cascade Part No. 671212.
- Assorted fittings, hoses, and quick-disconnect couplers as required.

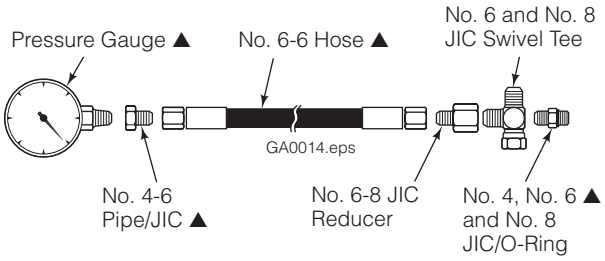
Flow Meter Kit

671476 – 37 l/min



Pressure Gauge

671212



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:

Fork Positioning Circuit

- Forks do not move.
- Forks move slowly or unevenly.

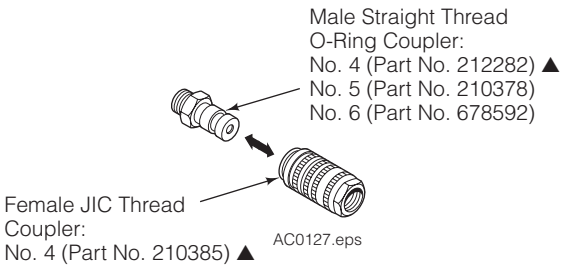
To correct one of these problems, see Section 3.4.

Sideshift Circuit

- Attachment will not sideshift.
- Attachment sideshifts slowly.

To correct one of these problems, see Section 3.5.

Quick-Disconnect Couplers



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

3.2 Plumbing – 25N, 35N, 50N

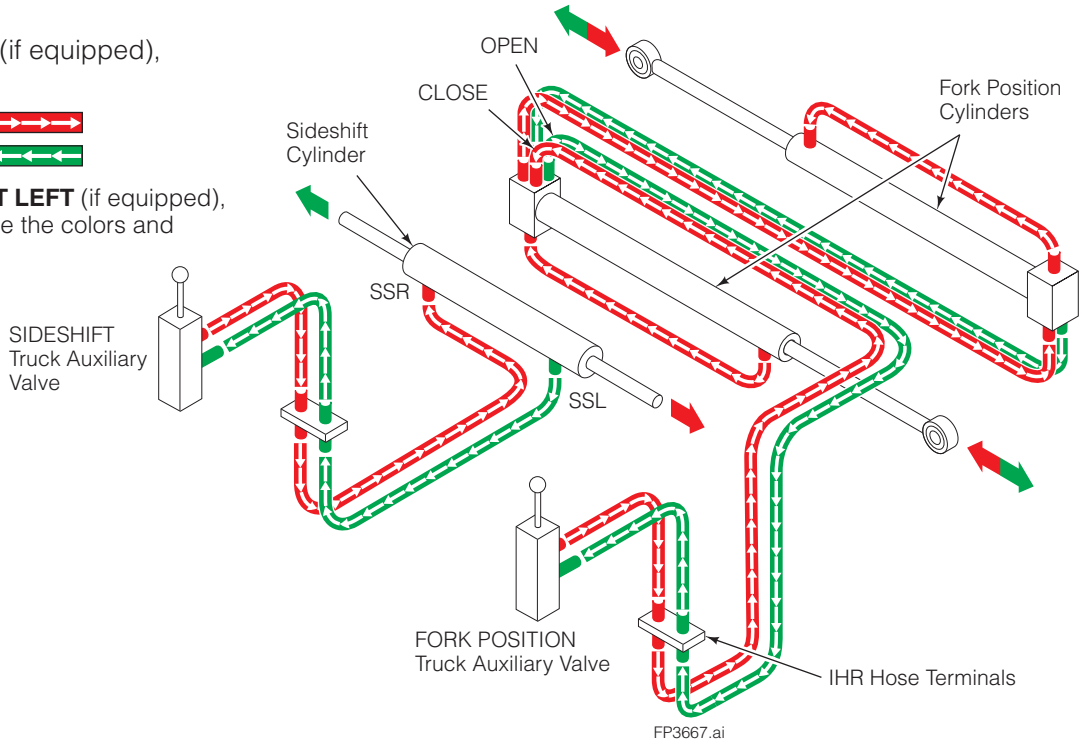
3.2-1 Hosing Diagram – Standard

SIDESHIFT RIGHT (if equipped), **CLOSE FORKS**

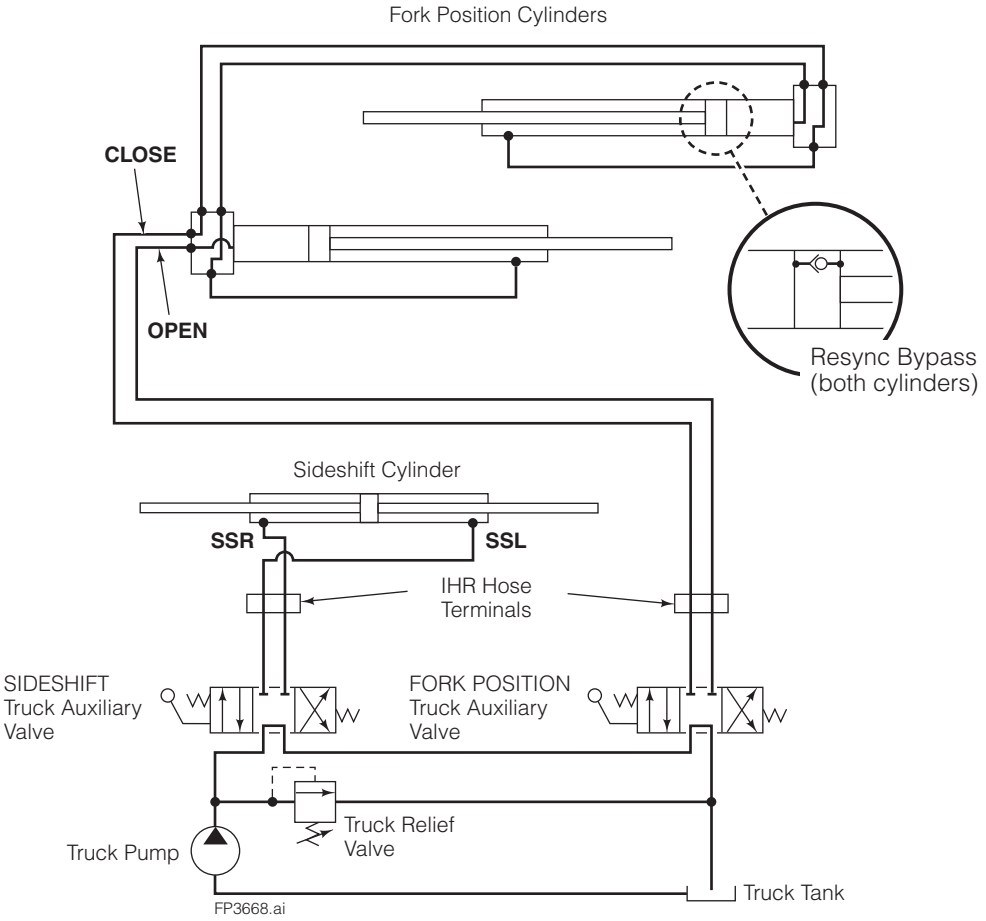
PRESSURE

RETURN

NOTE: For **SIDESHIFT LEFT** (if equipped), **OPEN FORKS**, reverse the colors and arrows shown.



3.2-2 Hydraulic Schematic – Standard



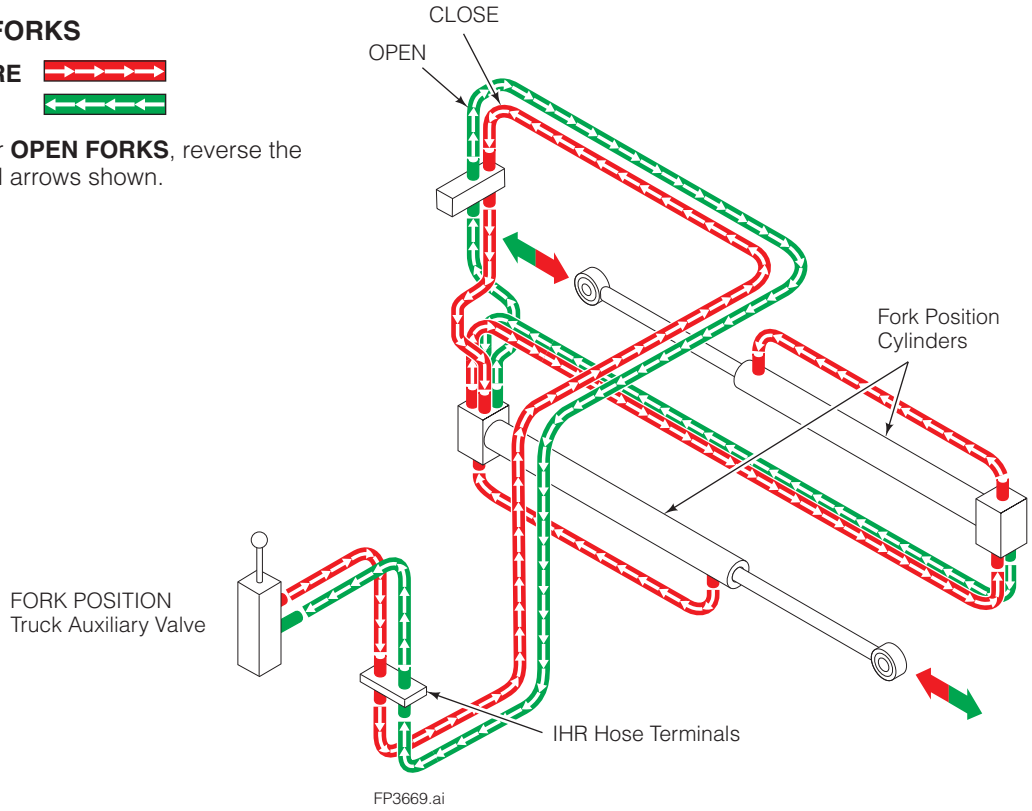
3.2-3 Hosing Diagram – High Termination

CLOSE FORKS

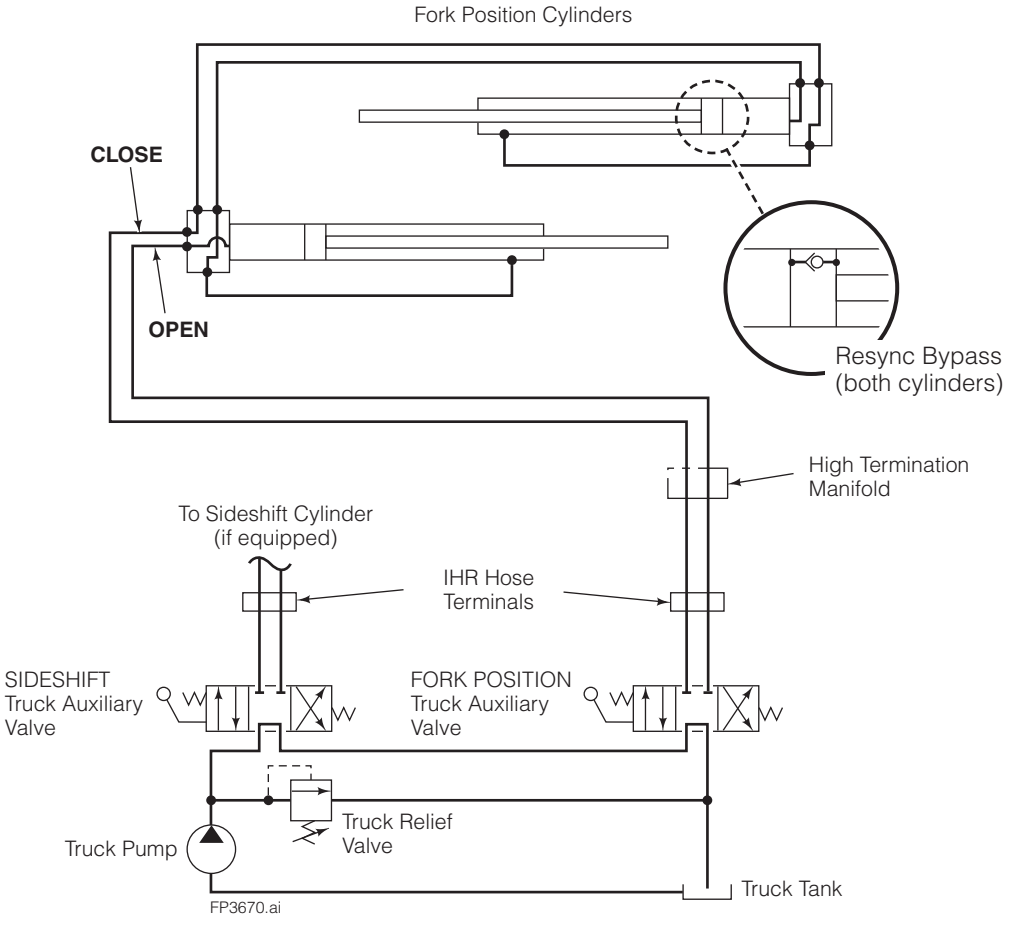
PRESSURE

RETURN

NOTE: For **OPEN FORKS**, reverse the colors and arrows shown.



3.2-4 Hydraulic Schematic – High Termination

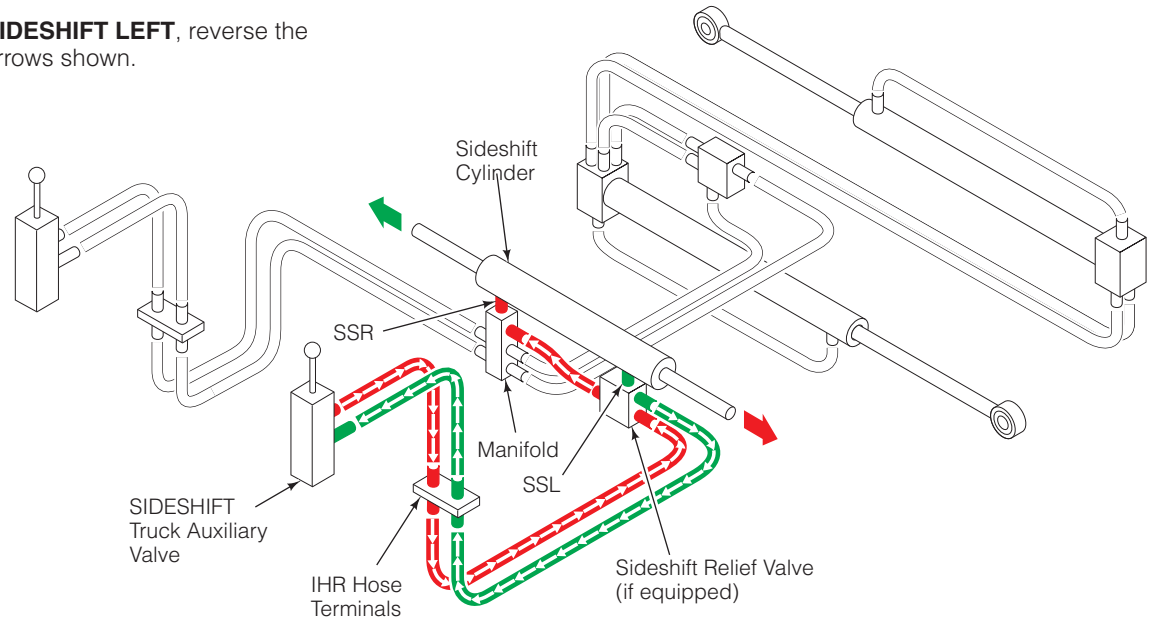


3.2-5 Hosing Diagram – Universal and Relief Valve (if equipped)

SIDESHIFT RIGHT

PRESSURE
RETURN

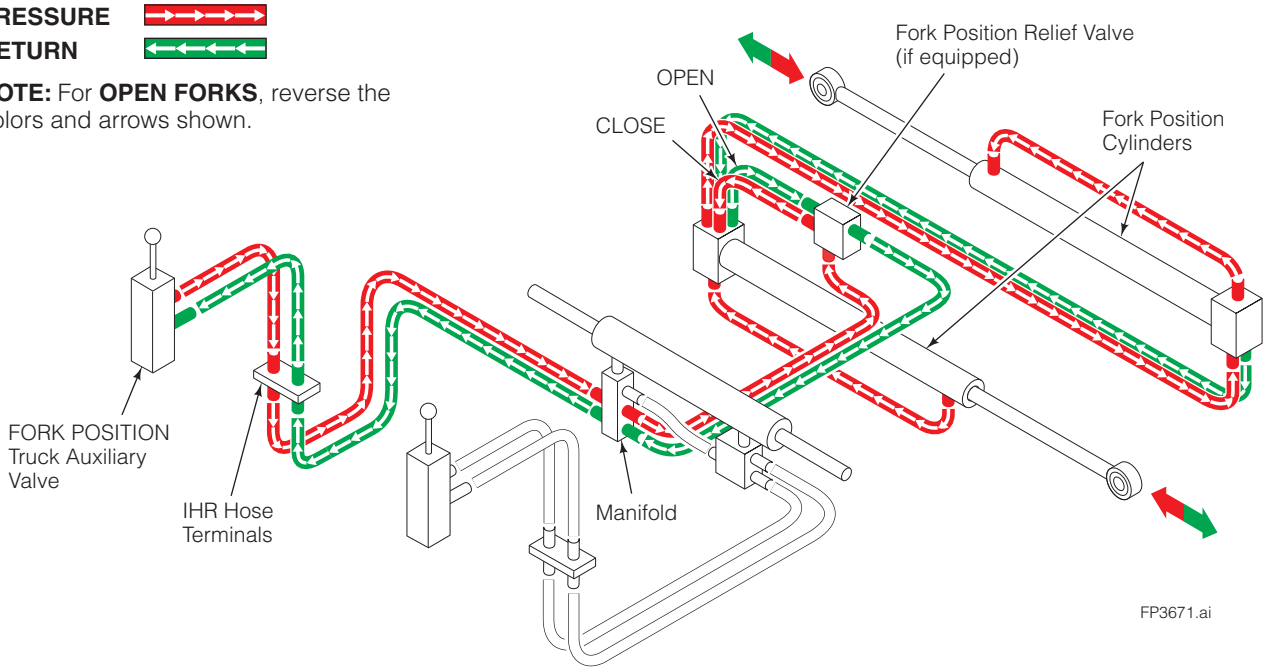
NOTE: For **SIDESHIFT LEFT**, reverse the colors and arrows shown.



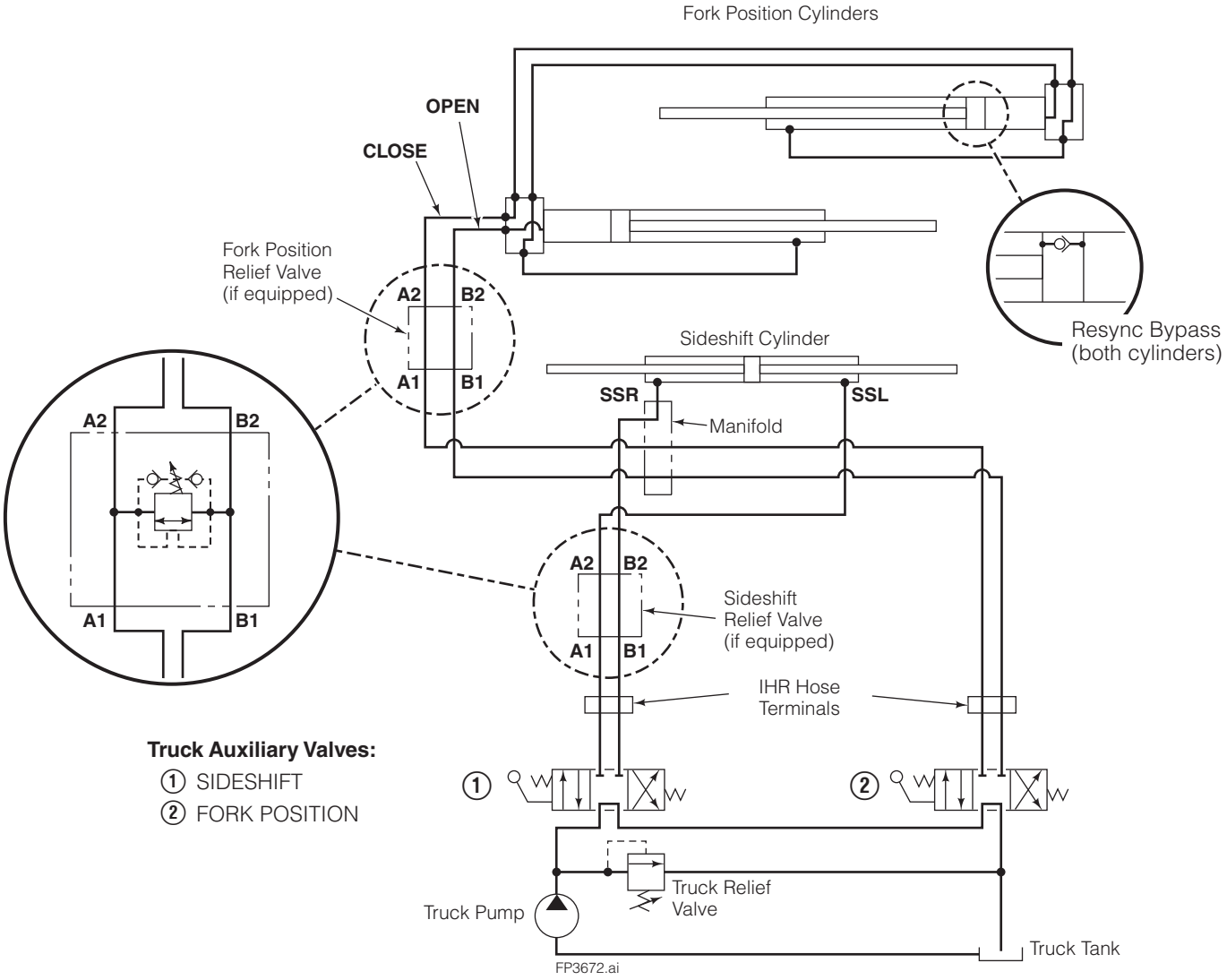
CLOSE FORKS

PRESSURE
RETURN

NOTE: For **OPEN FORKS**, reverse the colors and arrows shown.



3.2-6 Hydraulic Schematic – Universal and Relief Valve (if equipped)

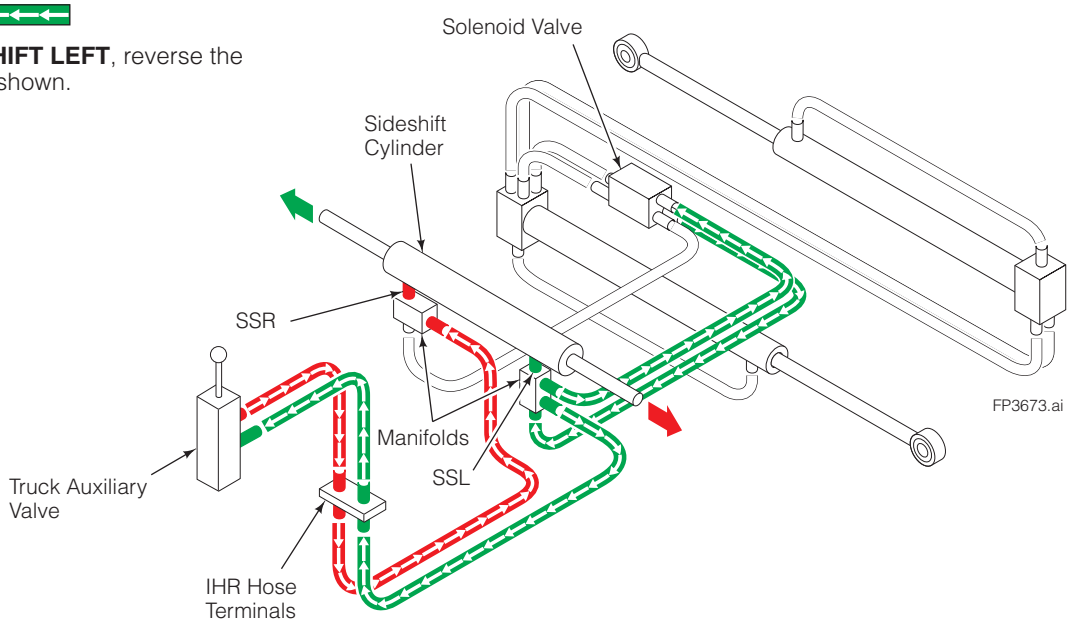


3.2-7 Hosing Diagram – Solenoid

SIDESHIFT RIGHT

PRESSURE
RETURN

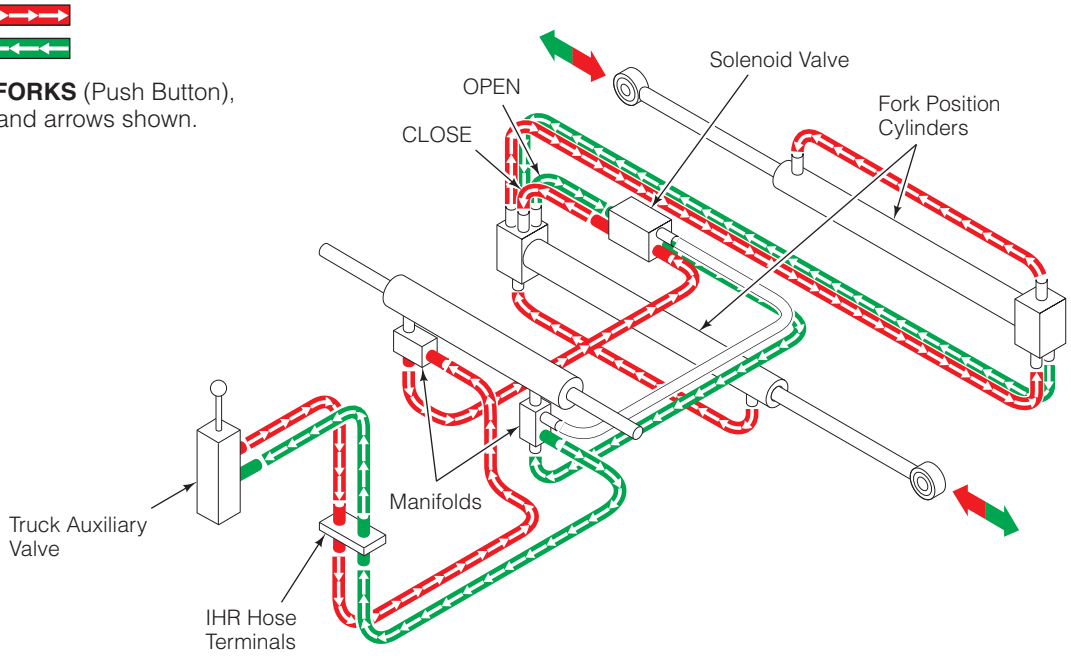
NOTE: For **SIDESHIFT LEFT**, reverse the colors and arrows shown.



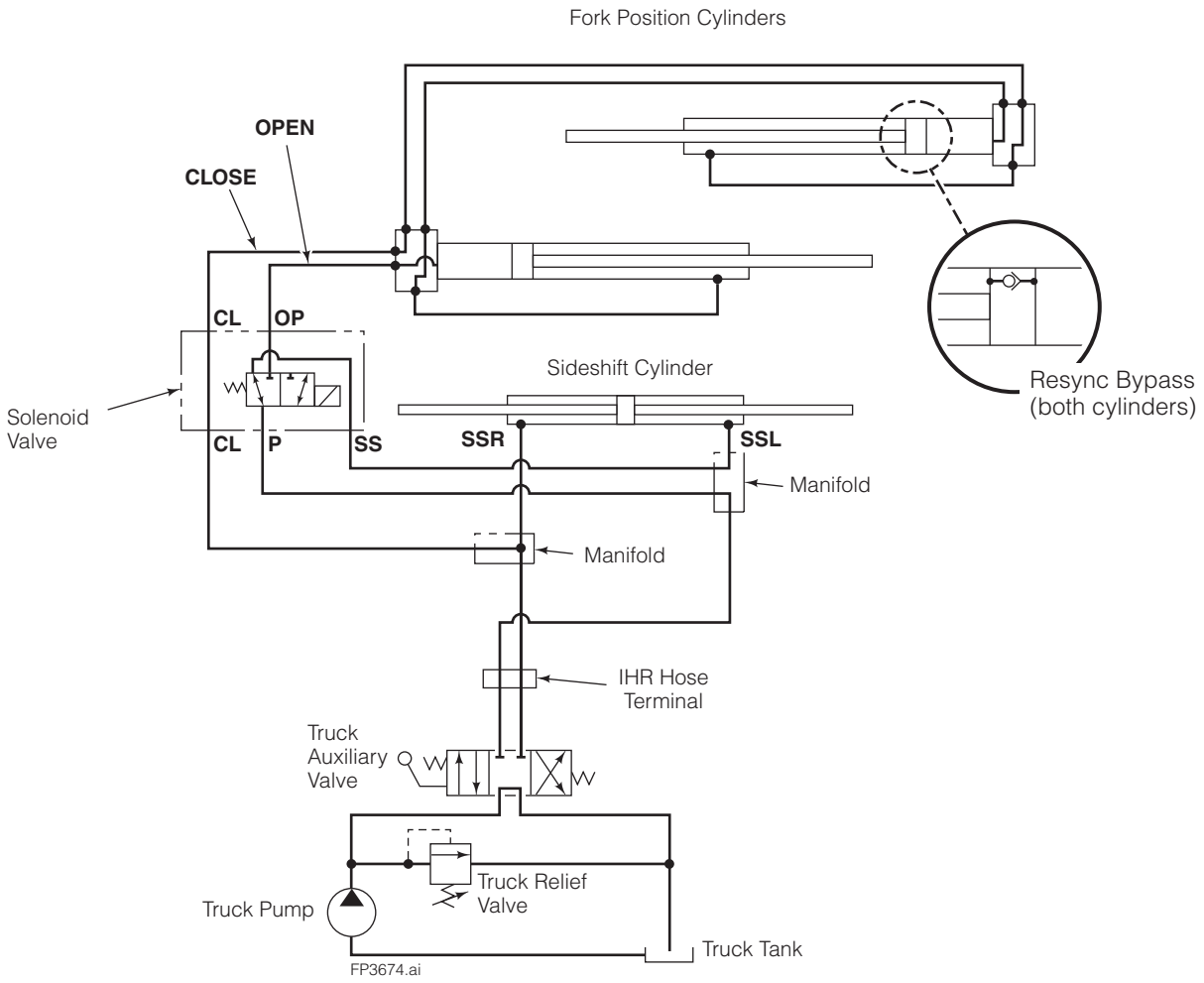
CLOSE FORKS (Push Button)

PRESSURE
RETURN

NOTE: For **OPEN FORKS** (Push Button), reverse the colors and arrows shown.



3.2-8 Hydraulic Schematic – Solenoid



3.2-9 Hosing Diagram – Sequence Valve

SIDESHIFT RIGHT

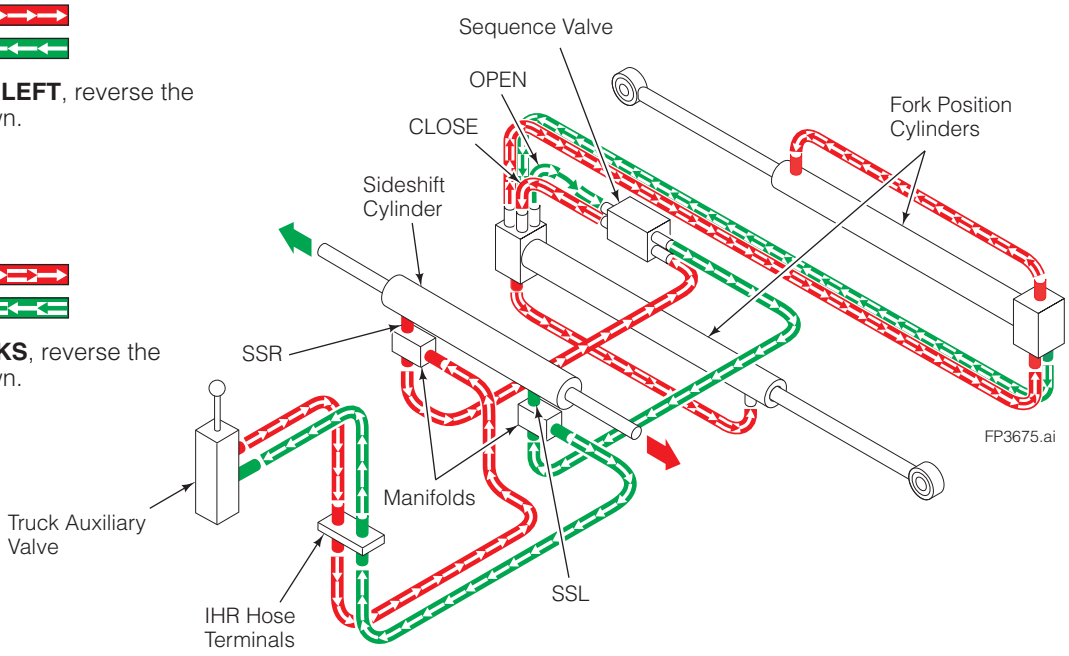
PRESSURE
RETURN

NOTE: For **SIDESHIFT LEFT**, reverse the colors and arrows shown.

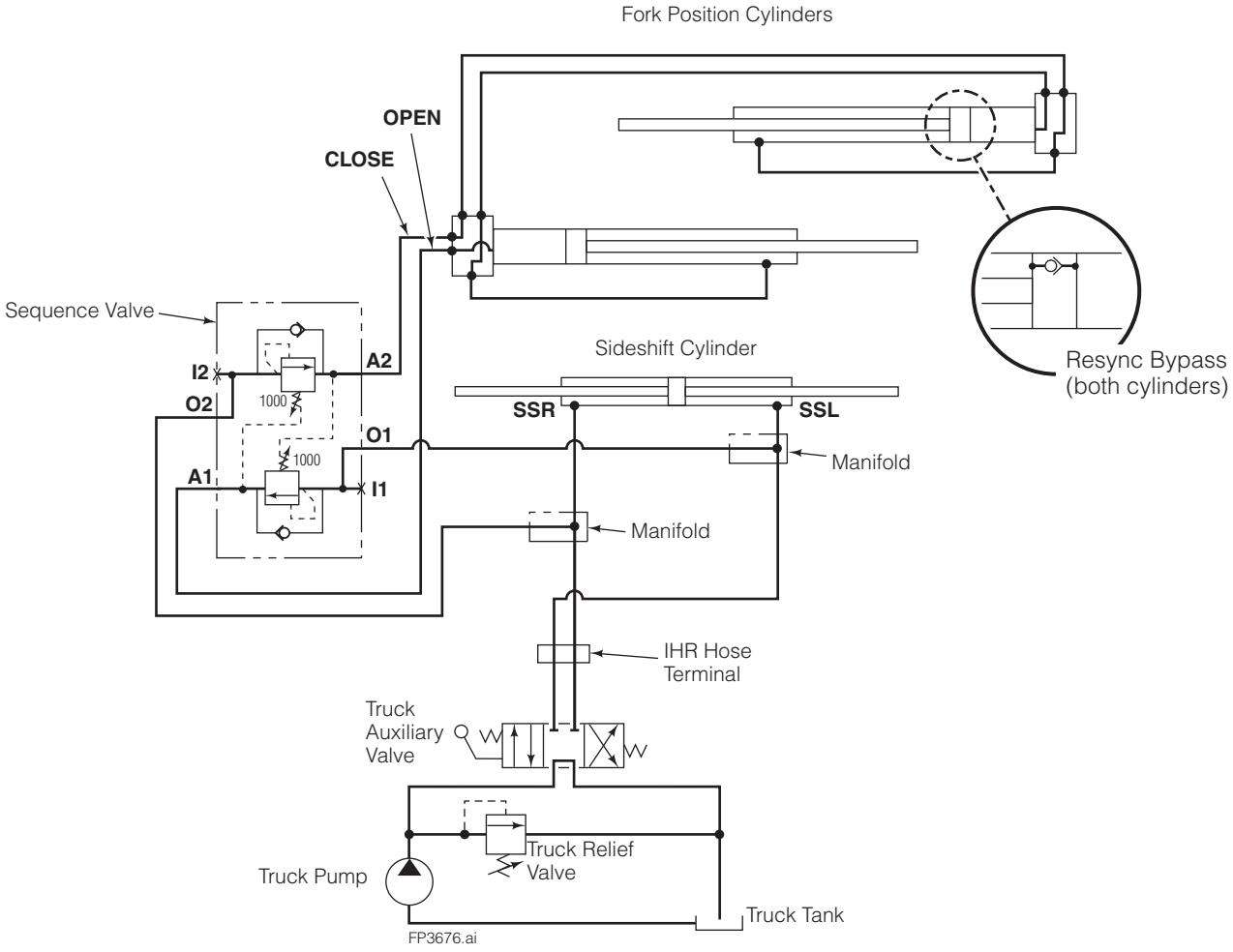
CLOSE FORKS

PRESSURE
RETURN

NOTE: For **OPEN FORKS**, reverse the colors and arrows shown.



3.2-10 Hydraulic Schematic – Sequence Valve



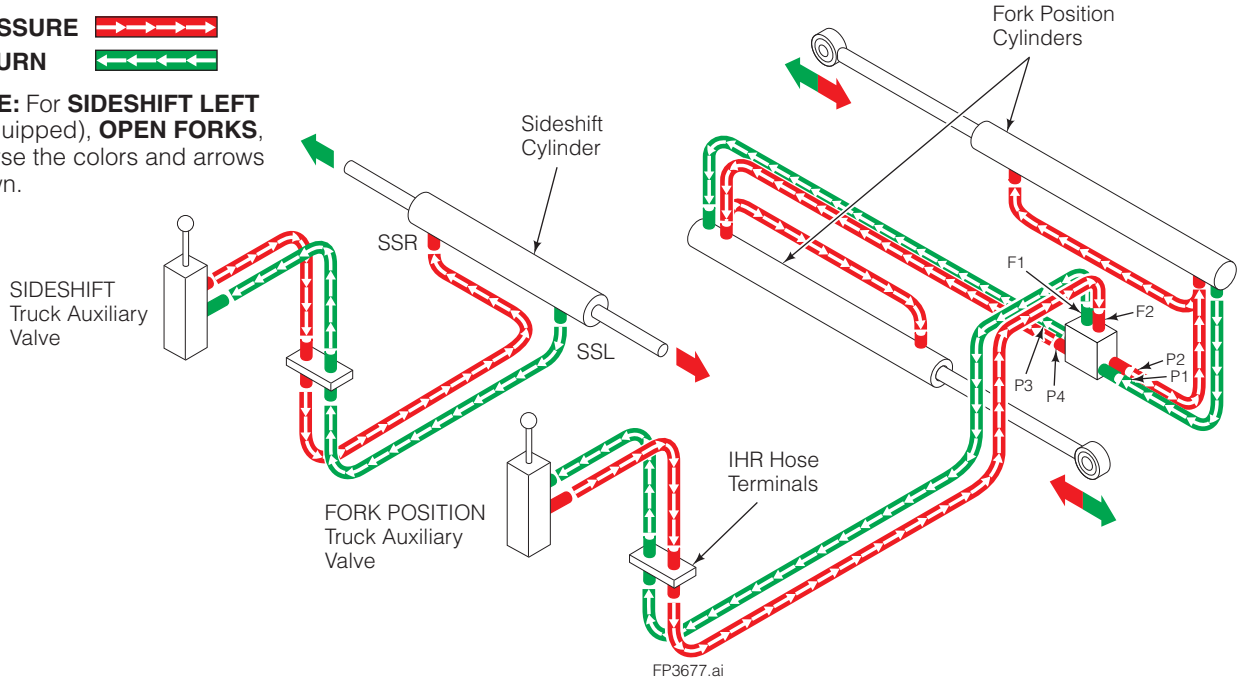
3.3 Plumbing – 60N

3.3-1 Hosing Diagram – Standard

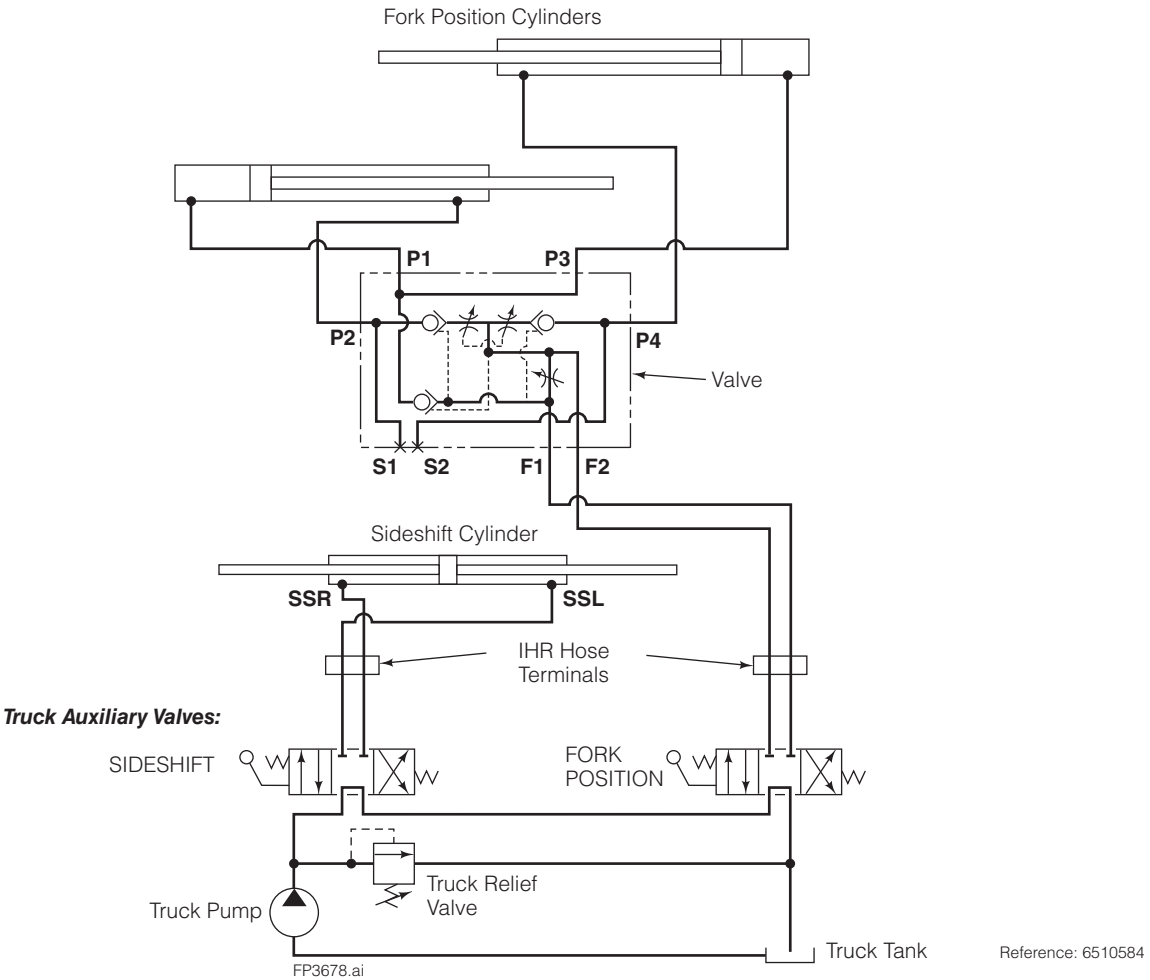
SIDESHIFT RIGHT (if equipped),
CLOSE FORKS

PRESSURE
RETURN

NOTE: For **SIDESHIFT LEFT** (if equipped), **OPEN FORKS**, reverse the colors and arrows shown.



3.3-2 Hydraulic Schematic – Standard



Reference: 6510584

3.4 Fork Position Function

There are five potential problems that could affect the FORK POSITION function:

- Binding due to bending damage, wear, lack of lubrication.
- Incorrect hydraulic pressure or flow from truck.
- External leaks.
- **Solenoid equipped –** Electrical circuit faults, defective solenoid coil or valve.
- Worn or defective cylinder seals.

3.4-1 Supply Circuit Test

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

1. Check the pressure supplied by the truck at the carriage hose terminal. Pressure must be within the range shown in Specification, Section 5.1. **PRESSURE TO THE ATTACHMENT MUST NOT EXCEED 250 BAR.**
2. Check the flow volume at the carriage hose terminal. Flow must be within the range shown in Specifications, Section 5.1.
3. Close the arms fully, holding the lever in the CLOSE position for a few seconds. Release the lever and check for external leaks at fittings, tubing and hoses.

3.4-2 Fork Position Circuit

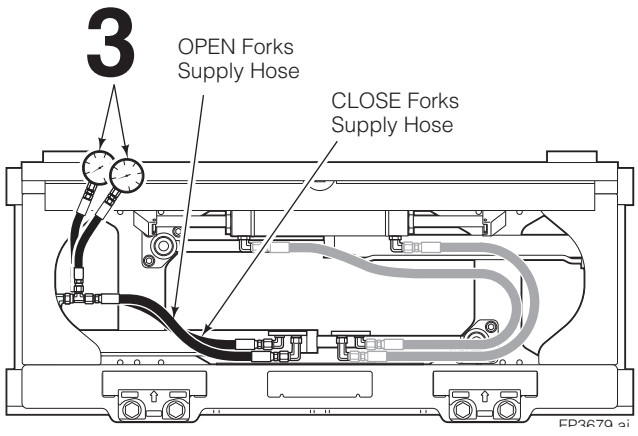
1. If equipped, press the solenoid button. Listen for a 'click' as the solenoid valve. If no sound is heard, check the fuse, wiring and coil. Make sure that the valve is not jammed. Refer to Section 3.5.

   IMPORTANT: Solenoid-operated valve must be plumbed so that the solenoid is energized during the CLOSE/OPEN function.

2. Fully open and close the forks and observe fork movement. If the forks move unequally, continue to Step 3.

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

3. Turn the truck off and relieve the attachment's system pressure. Connect a 345 bar pressure gauge in each location as follows:
   - **25N, 35N, 50N –** CLOSE port and supply hose, OPEN port and supply hose
   - **60N (valve equipped) –** Valve "F2" port fitting and supply hose, Valve "F1" port filling and supply hose



Back (Driver's) View

3.4 Fork Position Function (continued)

3.4-2 Fork Position Circuit (continued)

4 Start the truck and slowly actuate the CLOSE forks lever until forks are fully closed. Hold lever for 5 seconds. Observe the pressure gauge.

- If the pressure builds to the system pressure measured at the hose terminal, continue to Step 5 .
- If the pressure does not build to the system pressure:

  25N, 35N, 50N – Service the fork positioner cylinders. Refer to Section 4.3.

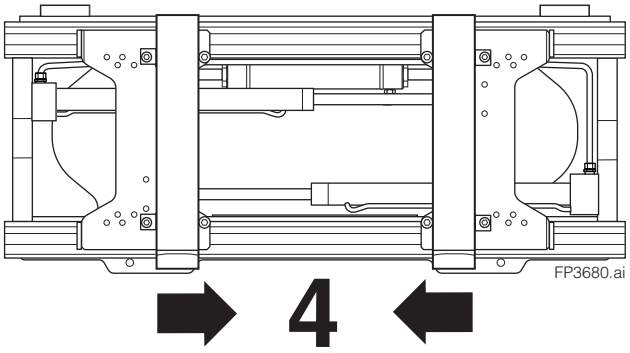
  60N (valve equipped) – Service the valve, then repeat this step. Refer to Section 4.5. If the pressure still does not build to system pressure, then service the cylinders. Refer to Section 4.3

5 Slowly actuate the OPEN forks lever until forks are fully closed. Hold lever for 5 seconds. Observe the pressure gauge.

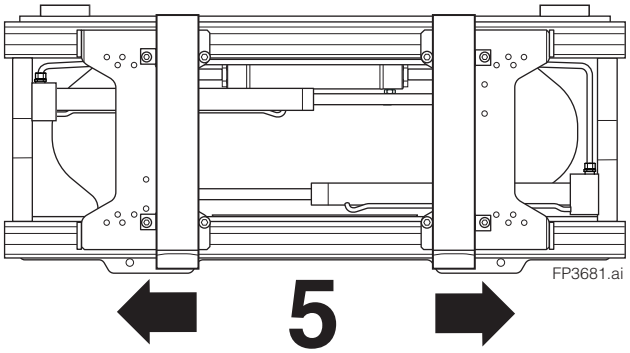
- If the pressure builds to the system pressure measured at the hose terminal, the problem is not hydraulic. Refer to the list at the beginning of this section.
- If the pressure does not build to the system pressure:

  25N, 35N, 50N – Service the fork positioner cylinders. Refer to Section 4.3.

  60N (valve equipped) – Service the valve, then repeat this step. Refer to Section 4.5. If the pressure still does not build to system pressure, then service the cylinders. Refer to Section 4.3.



Front View



Front View

3.5 Sideshift Function

There are seven potential problems that could affect the SIDESHIFT function:

- Binding due to bending damage, wear, lack of lubrication.
- Incorrect hydraulic pressure or flow from truck.
- Flow restrictor orifices plugged, incorrect type, or improperly installed.
- External leaks.
- Lower mounting hooks installed with incorrect clearance.
- **Solenoid equipped –** Electrical circuit faults, defective solenoid coil or valve.
- Worn or defective cylinder seals.

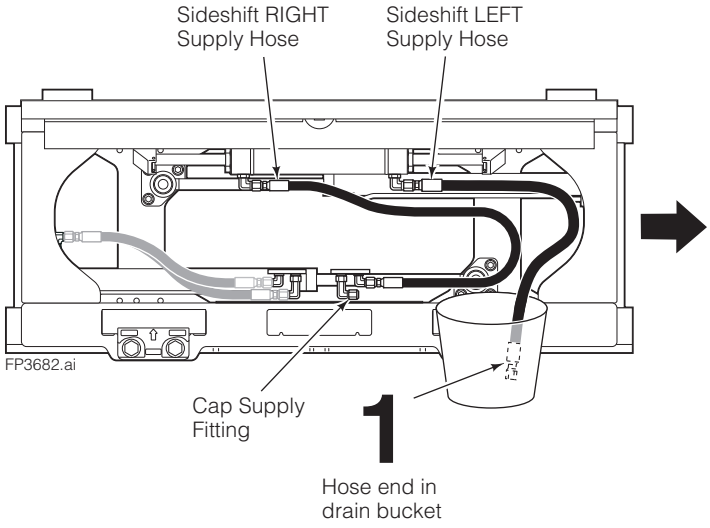
WARNING: Before disconnecting hoses, relieve pressure in the attachment hydraulic system. Turn the truck off and move the truck auxiliary control handle several times in both directions.

3.5-1 Supply Circuit Test

1. Check the pressure supplied by the truck at the carriage hose terminals. Pressure must be within the range shown in Specifications, Section 6.1. **PRESSURE TO THE SIDESHIFTER MUST NOT EXCEED 250 BAR.**
2. Check the flow volume at the carriage hose terminal. Flow must be within the range shown in Specifications, Section 6.1.
3. Sideshift fully to the left and hold the lever in the SIDESHIFT LEFT position for a few seconds. Release the lever and check for external leaks at fittings, hoses and cylinder rod ends.

3.5-2 Sideshift Circuit Test

1. Sideshift fully right. Turn the truck off and relieve attachment system pressure. Disconnect the SIDESHIFT LEFT supply hose from the truck hose terminal and route to a drain bucket. Cap the supply fitting.
2. Start the truck and actuate the SIDESHIFT RIGHT lever for 5 seconds:
   - If there is substantial hydraulic flow out of the drain hose, the sideshift cylinder is faulty and requires replacement. Refer to Section 4.4-4.
   - If there is little or no hydraulic flow out of the hose, first check for plugged or incorrectly installed flow restrictor washers and fittings. Refer to Section 4.4-4. If there is still no hydraulic flow, the problem is not hydraulic. Refer to Section 3.4, above.



Back (Driver's) View

3.6 Electrical Circuit (Solenoid-Equipped Attachments)

Use the electrical schematic and diagram below.

1 Check the control knob circuit fuse Replace if necessary.

2 Check for loose electrical connections at the truck ignition switch, control knob button, solenoid coil terminals and diode.

3 Remove the diode from the solenoid coil terminal. Test with an ohmmeter for high resistance in one direction and no resistance in the other direction. If there is no resistance in both directions, replace the diode.

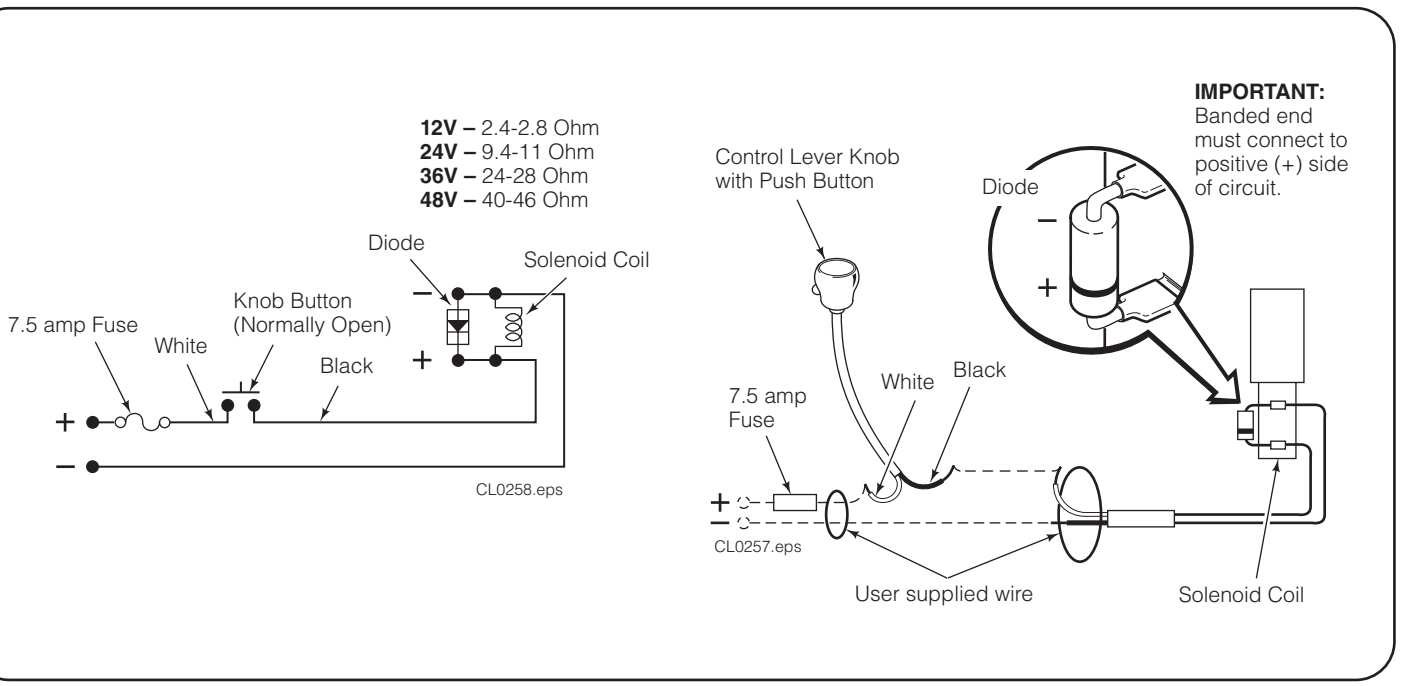
NOTE: When replacing the diode, the banded (+) end must be connected to the coil and wiring as shown.

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

- If there is no voltage 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. Refer to Section 4.5.



4.1 Attachment Removal

NOTE: For removing and servicing the frame assembly (frame, bearings and sideshifter), follow the procedure in Section 5.4.

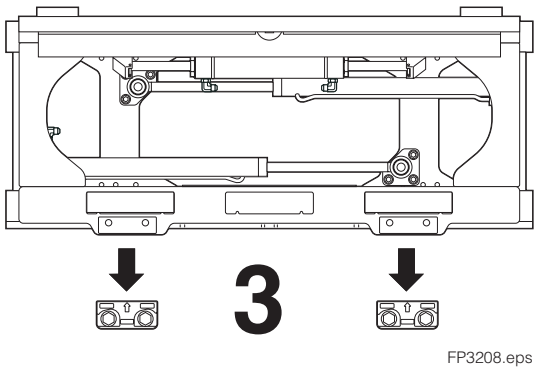
1 Position the forks to the width of the frame.

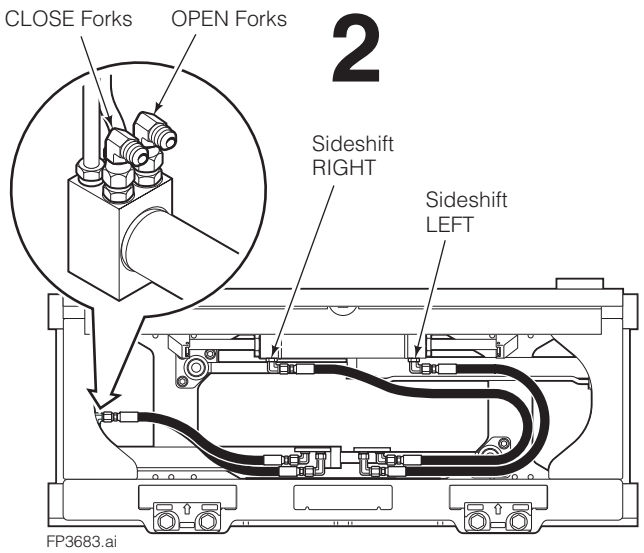
> **WARNING:** Before removing any hoses, relieve pressure in the hydraulic system. With the truck off, open the truck auxiliary control valve (valves) several times in both directions.

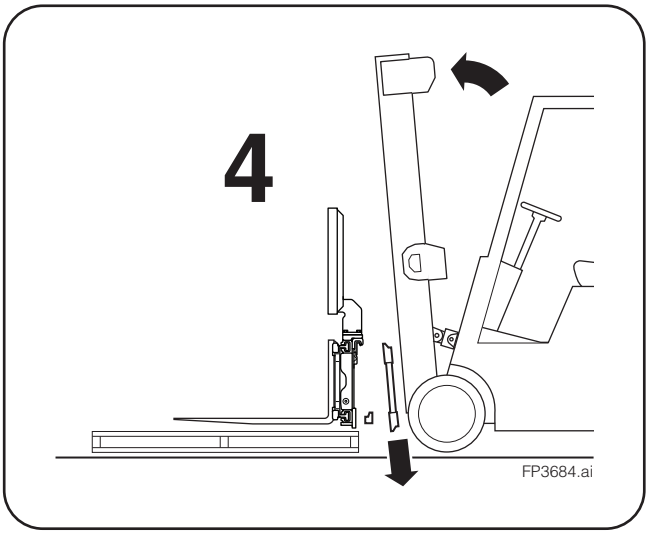
2 Disconnect and plug the hydraulic supply hoses to the attachment's cylinders. Cap hoses and tag for reassembly.

3 Remove the capscrews and mounting hooks. For reassembly, tighten the capscrews to a torque of:

CL II/III – 220 Nm
CL IV – 320 Nm







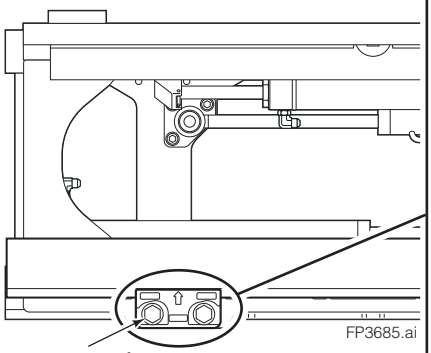
4 Lower the attachment onto the pallet. Tilt the mast forward and lower the carriage to disengage upper frame hook and sideshift cylinder.

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

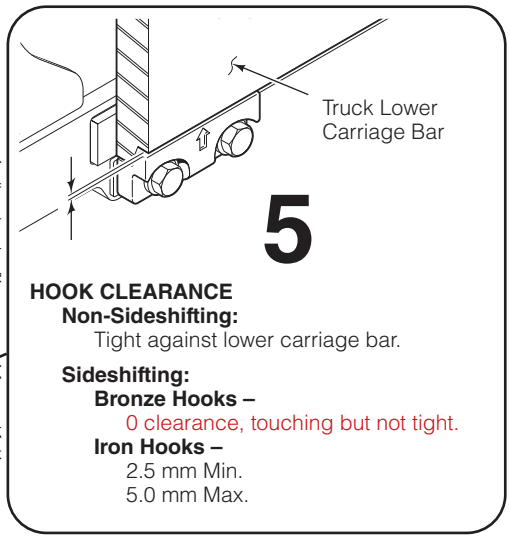
- Check the clearance between lower mounting hooks and truck carriage bar:

  Non-Sideshfting – Tight against lower carriage bar.
  Sideshifting, Iron Hooks – 5.0 mm Max.
  Sideshifting, Bronze Hooks – Touching carriage bar but not tight.

- Lubricate both upper and lower frame sideshift bearings with general-purpose chassis grease.
- Refer to User Manual 6580684 for complete installation procedures.



Tighten capscrews to a toque of:
CLII/III – 220 Nm
CL IV – 320 Nm



HOOK CLEARANCE
Non-Sideshifting:
Tight against lower carriage bar.

Sideshifting:
Bronze Hooks –
0 clearance, touching but not tight.
Iron Hooks –
2.5 mm Min.
5.0 mm Max.

4.2 Fork Positioner Components

4.2-1 Hang-on Fork Removal

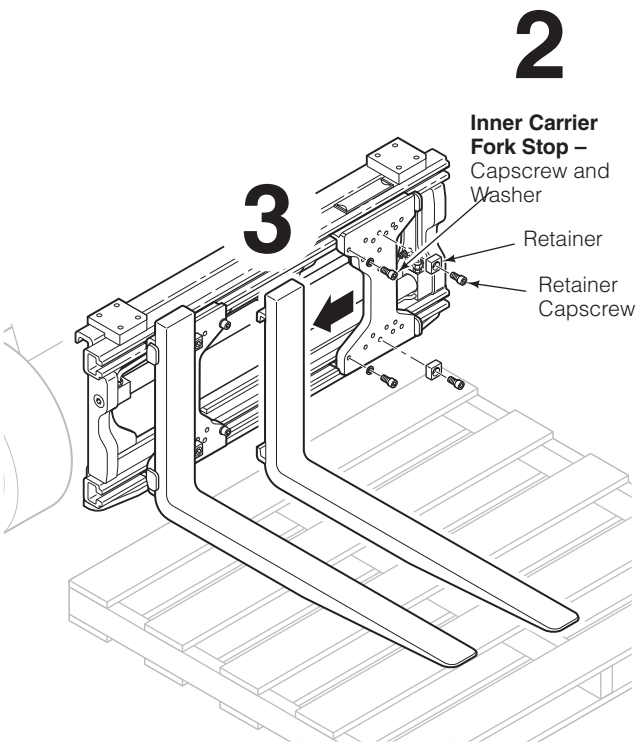
NOTE: The following procedures can be performed with the attachment mounted on the truck.

1 Close the forks midrange.

2 Remove retainer with capscrew and inner carrier fork stop capscrews with washers. Note location of hardware on fork carriers. For reassembly, tighten capscrews to 100 Nm.

3 Remove forks using a pallet or blocks. Keep feet clear of forks.

4 Re-install fork stops and retainers.



4.2-2 Bolt-On Fork Removal

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

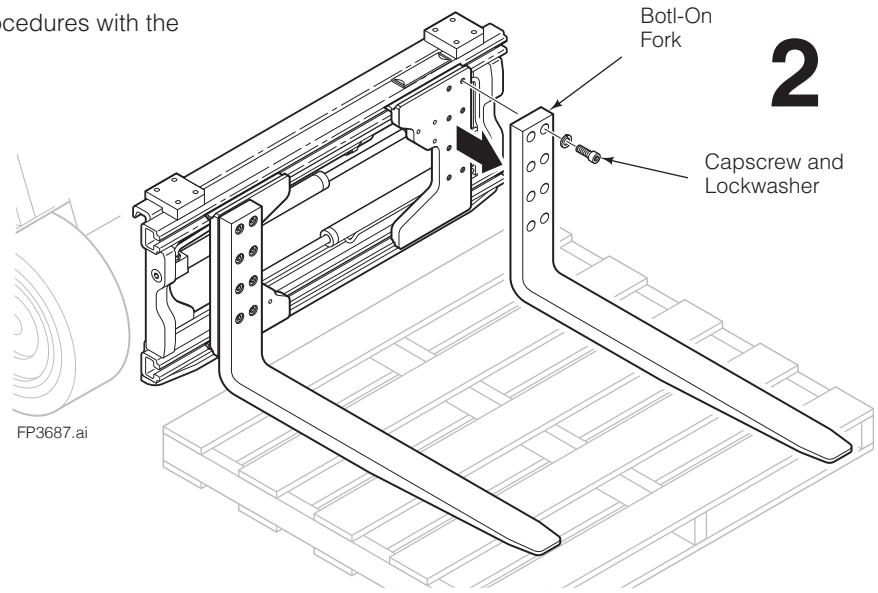
1 Close the forks midrange. Lower forks to rest lightly on a pallet or wood blocks.

2 Remove capscrews from the forks. For reassembly, tighten capscrews to:

25N, 35N – 270 Nm
50N, 60N – 530 Nm

3 For installation, reverse the above procedures with the following exceptions:

- Replace all capscrews.



4.2-3 Fork Carrier Removal

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

1 Remove forks, refer to Section 4.2-1 or 4.2-2.

2 Disconnect one or both fork positioner cylinder rods by removing the capscrews from the anchor from the carrier. For reassembly, apply Loctite 242 (blue) to capscrews. Tighten capscrews to the following torque valve:

25N, 35N, 50N – 80 Nm
60N – 180 Nm

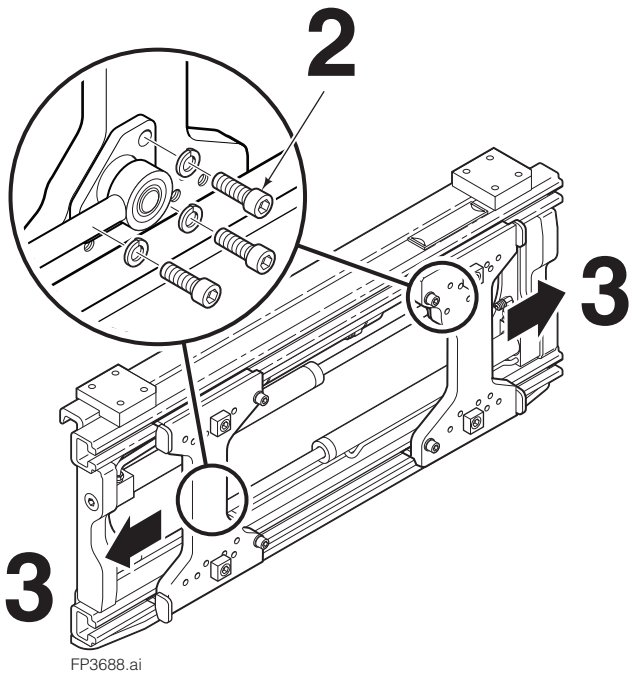
3 Slide the carriers out the side.

4 For installation reverse the above procedures with the following exceptions:

- Inspect the fork carrier bearings for wear. If bearings are worn in an area to less than 2.0 mm, they should be replaced. For bearing service, refer to section 4.2-4.
- Clean the fork carrier bars of any built-up grease.
- Clean all fork carrier parts prior to reassembly.
- Lubricate fork carriers as follows:

  Standard Application – Apply a single pump of grease for the fork carrier grease fittings.

  Dry Lube Application – Apply graphite dry-lube to fork carriage bars as required ('Slip Plate Aerosol', 'GraphKote' or equivalent).



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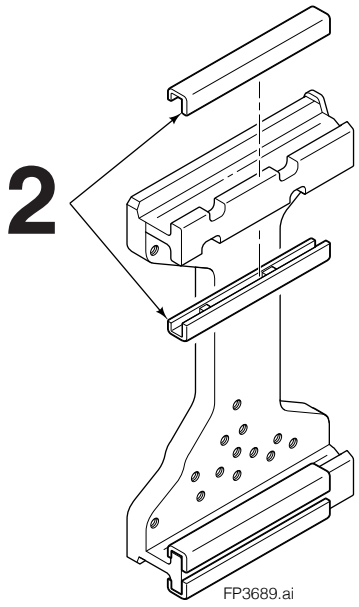
4.2-4 Fork Carrier Service

1 Remove fork carriers by performing Steps 1-3, Section 4.2-3.

2 Remove the old bearings from carrier.

3 Inspect fork carrier arms for wear and clean off any built-up grease and dirt.

4 Install new bearings.



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4.3 Fork Positioner Cylinders

4.3-1 Cylinder Removal and Installation

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

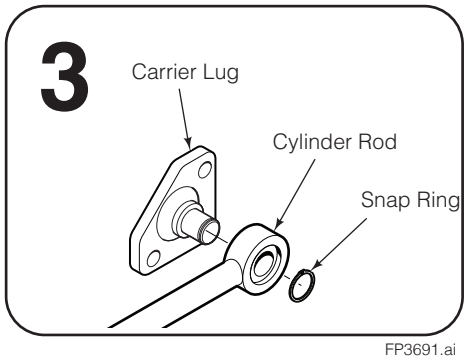
1 Close the forks midrange.

> **WARNING:** Before removing hydraulic lines or components, relieve pressure in the hydraulic system. With the truck off and move the truck auxiliary control valve (or valves) several times in both directions.

2 Disconnect tubes and hoses to the fork positioner cylinders. Plug the lines and cap the cylinder ports. Tag lines for reassembly.

3 Disconnect the cylinder and Remove the capscrews from the anchor from the carrier. To disconnect the anchor from the cylinder rod, remove the snap ring. For reassembly, apply Loctite 242 (blue) to capscrews. Tighten capscrews to the following torque valve:

25N, 35N, 50N – 80 Nm
60N – 180 Nm

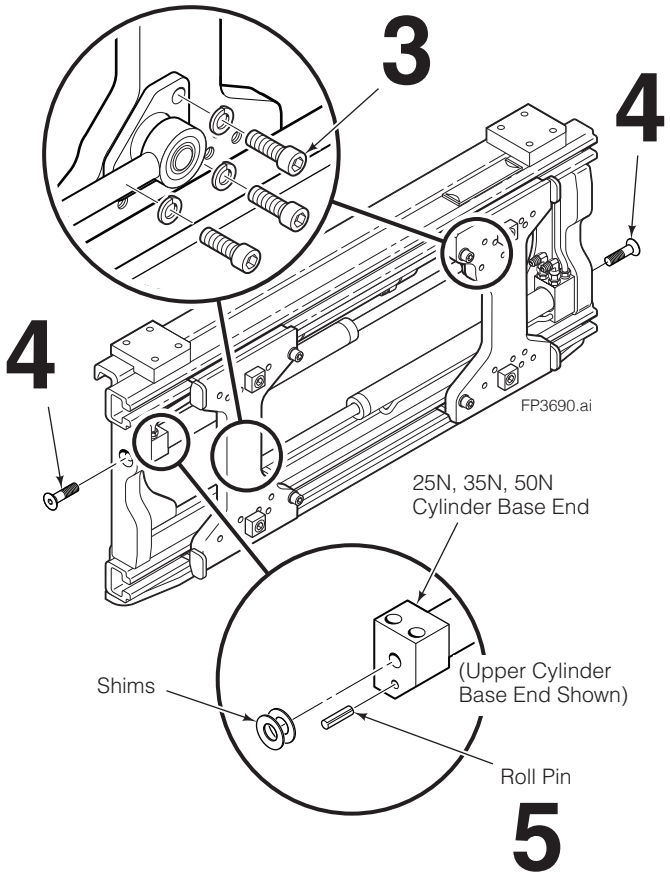


4 **25N, 35N, 50N –** Remove the capscrew connecting the cylinder to the frame. Disengage the cylinder base end from the frame and lift away. Note the shim count. For reassembly, apply Loctite 242 (Blue) to capscrew threads and tighten to a torque of 100 Nm.

60N – Remove cotter pin and nut retaining the cylinder base end to the frame. For reassembly, apply Loctite 242 (Blue) to nut threads and tighten to a torque of 310 Nm.

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

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



4.3-2 Disassembly

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

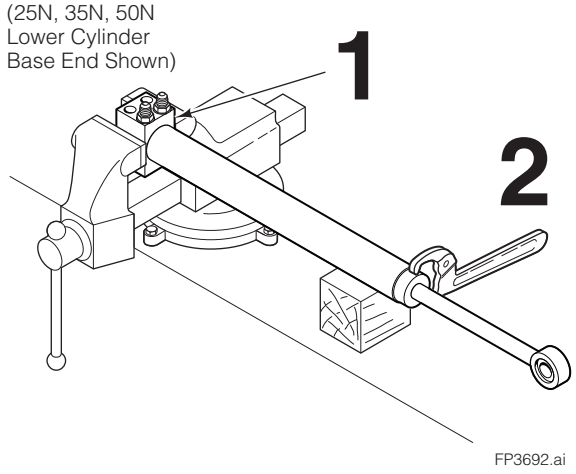
2 Unscrew and remove the retainer using a claw-type spanner wrench (Cascade Part No. 678598) as shown.

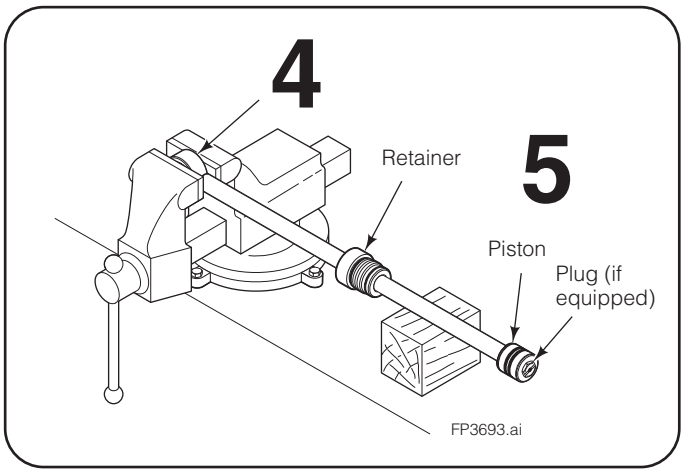
3 Remove the piston/rod assembly from the cylinder.

4 Remove the plug from the piston/rod assembly. Use a pin-type spanner wrench (Part No. 679917) to remove the piston from the cylinder rod.

5 Clamp the piston or retainer in a soft-jawed vise. Remove the seals. Pry the seals or O-rings up with a brass seal removal tool (Cascade Part No. 674424) and cut the seals to remove them.

CAUTION: Do not scratch the seal grooves.





4.3-3 Inspection

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

4.3-4 Reassembly

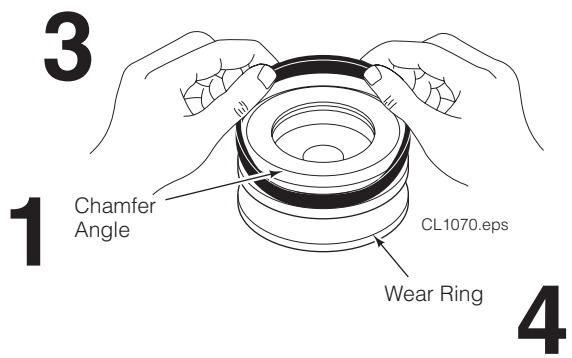
NOTE: Refer to cylinder cut views on the following page.

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.



NOTE: Use internal seal installation tool (Cascade Part No. 599512) to ease installation. If installing by hand, form seal into 'kidney' shape and position into internal groove. Use finger pressure to smooth into groove.

4.3-4 **Reassembly** (continued)

5 Install the retainer and then the piston on the cylinder rod. Perform one of the following:

25N, 35N, 50N – Tighten the piston to a torque of 90 Nm. Install shuttle and plug. Tighten plug to 28 Nm.

60N – Tighten the piston to a torque of 90 Nm.

6 Place the piston loader furnished with the seal kit into the cylinder shell. Make sure 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.

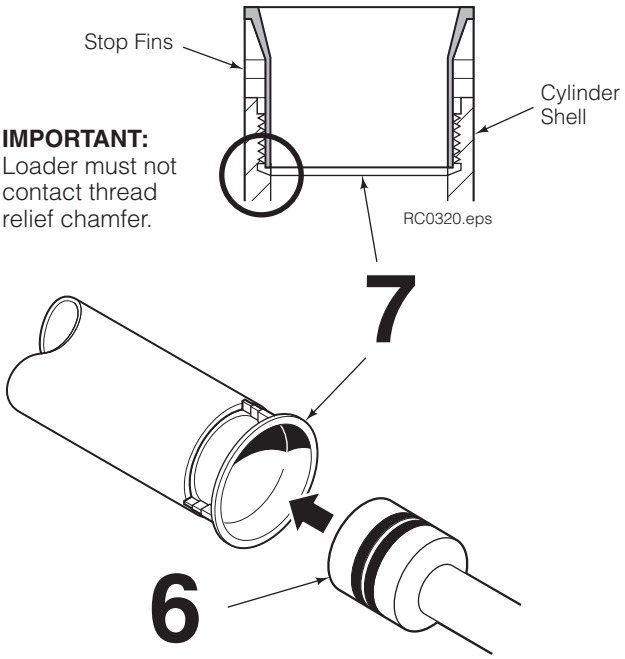
7 Apply a thick film of petroleum jelly to the inside of the cylinder shell, piston loader and piston seals.

8 Using a rubber mallet, tap the piston/rod assembly through the loader into the cylinder shell.

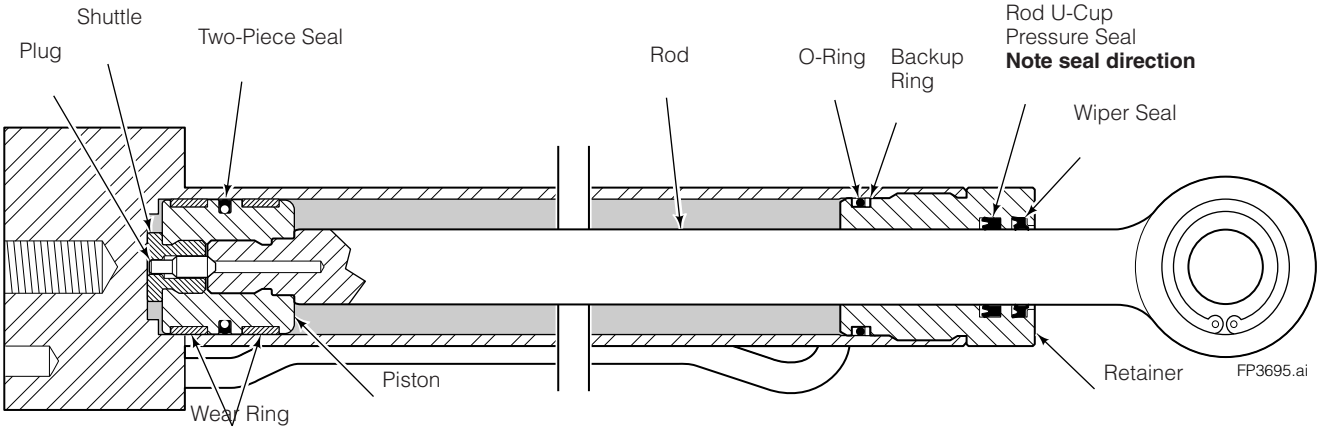
9 Remove the loader by cutting down one side and pulling it out of the cylinder bore.

10 Apply a thick film of petroleum jelly to the inside of the cylinder shell, and to the retainer and seal.

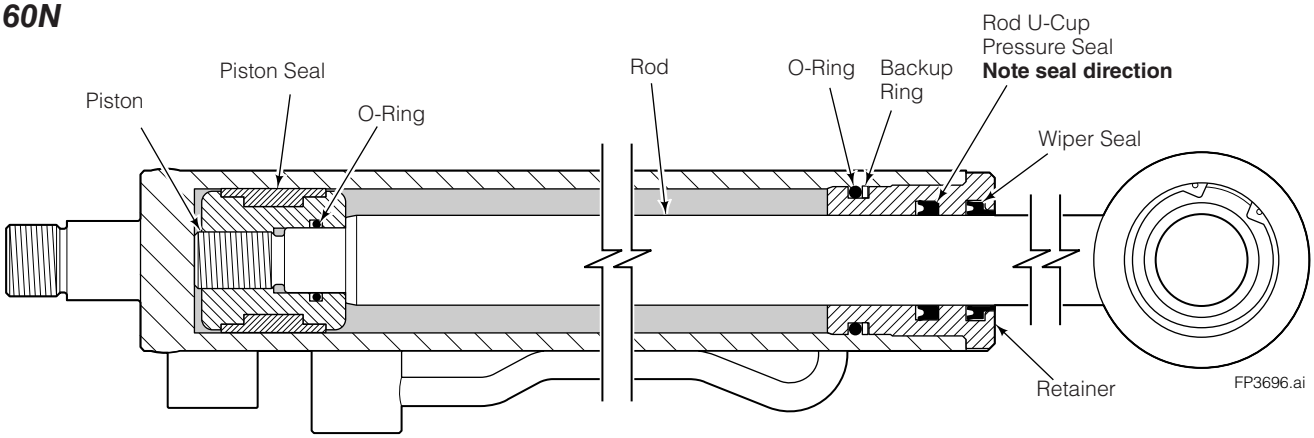
11 Screw the retainer into the cylinder shell. Tighten the retainer to a torque of 180 Nm.



25N, 35N, 50N



60N



4.4 Frame Assembly

5.4-1 Frame Removal and Service

1 Remove forks and fork carriers as described in Sections 4.2-1, 4.2-2 and 4.2-3.

CAUTION: If fork positioner cylinders remain mounted on the frame, secure the cylinder shell, rod end.

2 Remove backrest, if equipped. For reassembly, tighten the capscrews to a torque of:

25N – 90 Nm
35N, 50N, 60N – 220 Nm

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

3 Disconnect and plug the hydraulic supply hoses to the attachment's cylinders. Cap hoses and tag for reassembly.

4 If cylinder rod seals are to be serviced, loosen seal carriers before removing the attachment. For reassembly, tighten seal carriers to 230 Nm.

5 Remove the lower mounting hooks and inspect for wear. Replace if hooks can not be adjusted to clearance as shown in Section 4.1, Step 5. For reassembly, tighten the capscrews to a torque of:

CL II/III – 220 Nm
CL IV – 320 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.

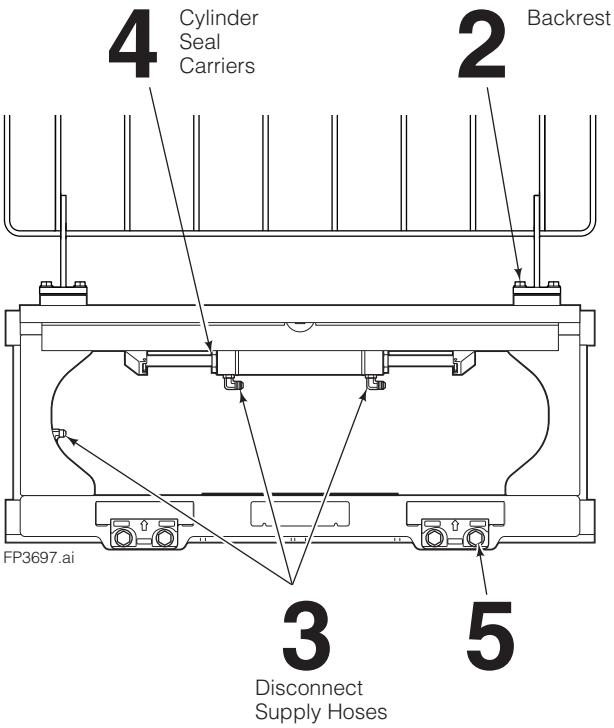
6 Attach an overhead hoist to the frame and lift away from the truck carriage. Lay frame flat on a pallet or workbench.

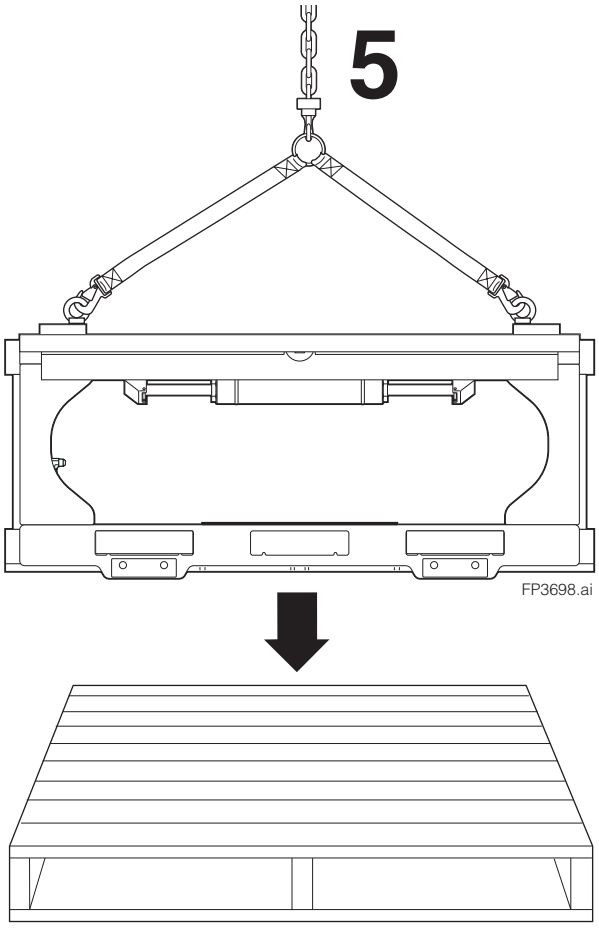
7 To service the frame, perform the following:

- Clean and inspect carriage bars for damage and smoothness. Make sure that bars are parallel and ends are flush. Repair any protruding welds or damaged notches by grinding, filing or welding.
- Clean all bearing areas of built-up dirt and grease.
- Inspect frame sideshift bearings for wear and replace as necessary. Refer to Section 4.4-3.

8 For attachment installation reverse the above procedures with the following exceptions:

- Lubricate both upper and lower frame sideshift bearings with general-purpose chassis grease.



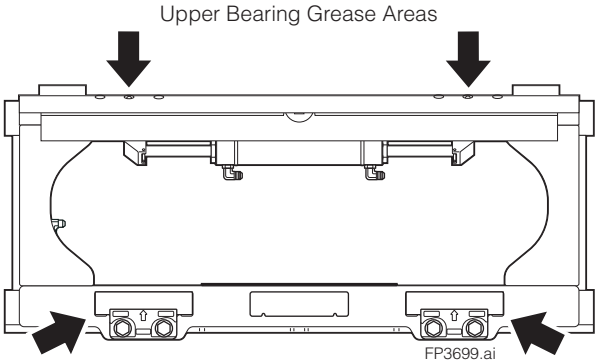


4.4-2 Bearing Lubrication

Lubricate both the upper and lower frame sideshift bearings with every 1000 hours or 12 weeks of operation (whichever comes first). In contaminated environments, lubricate every week or as required.

Standard Application – Apply a single pump of grease for the fork carrier grease fittings.

Dry Lube Application – Apply graphite dry-lube to fork carriage bars as required ('Slip Plate Aerosol', 'GraphKote' or equivalent).



4.4-3 Bearing Service

1 Remove the frame from the truck as described in Section 5.4-1 and lay flat on a pallet or workbench.

2 Remove retainer pins and sideshift cylinder assembly from the frame.

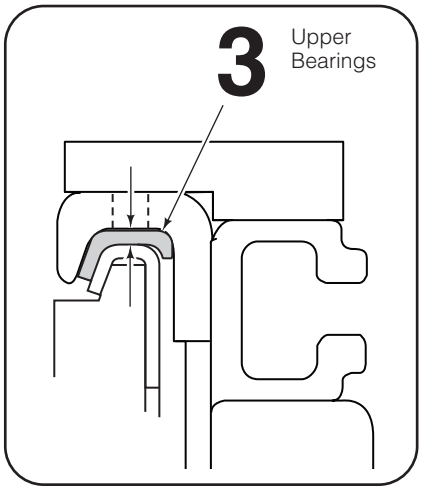
3 Remove the upper bearings by driving out of the frame. If any bearing is worn to less than 2.5 mm thickness, replace all the upper bearings.

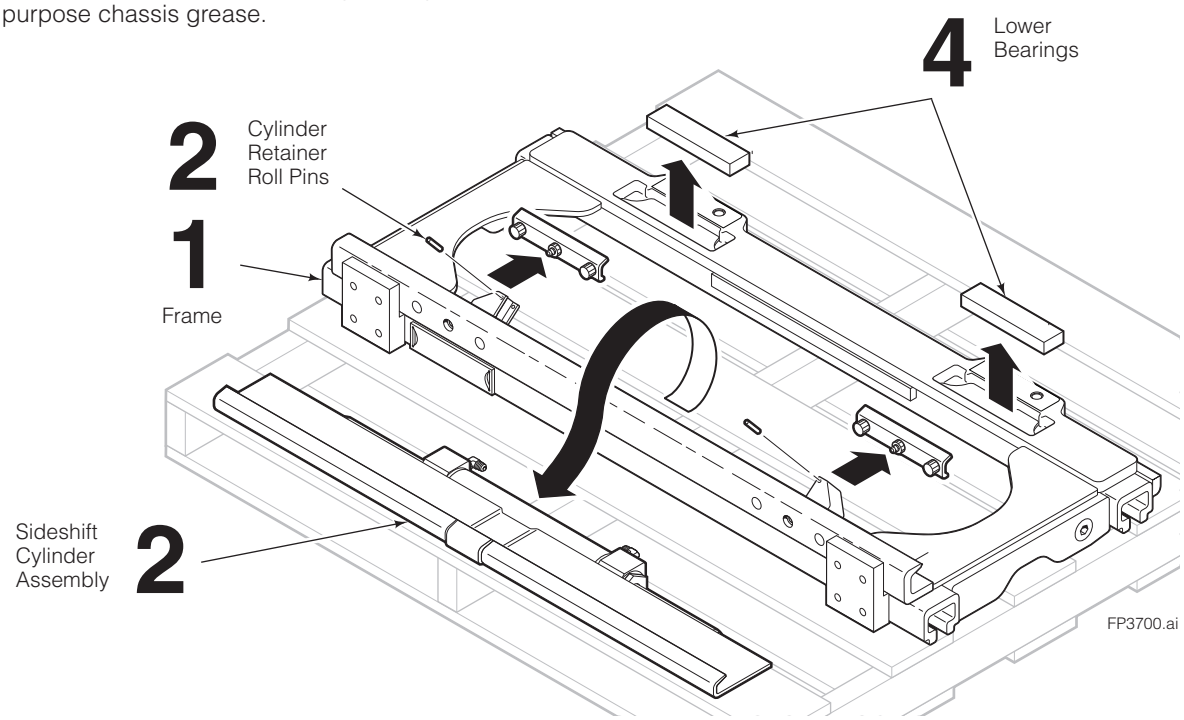
IMPORTANT: Use a wood block or plastic hammer to fully seat new bearings into upper frame, as shown. Proper lower hook clearance requires that upper bearings be fully seated into upper frame.

4 Inspect the lower bearing exposed thickness. If the exposed thickness is less than 1.5 mm, replace all lower bearings.

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

- Grease upper and lower bearings with general purpose chassis grease.





4.4-4 Cylinder Assembly Service

NOTE: The cylinder rod and shell are not serviceable. If the rod or shell are damaged, replace entire cylinder assembly.

1 Remove the frame from the truck as described in Section 4.4-1 and lay flat on a pallet or workbench.

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

2 Remove the retainer pins and remove the cylinder assembly from the frame as shown in Section 4.4-3, Step 2.

3 Inspect the outside of the cylinder shell for damage that could impair performance or cause leaks under pressure. If damage is found, replace the complete cylinder assembly.

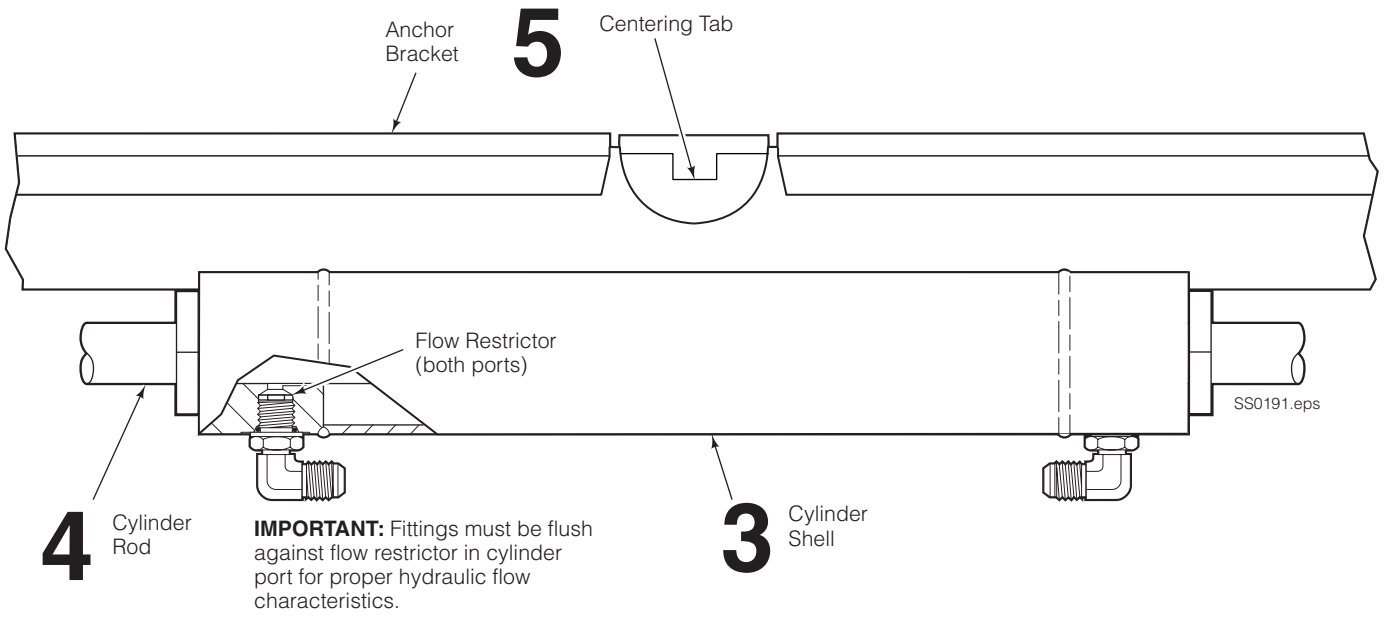
IMPORTANT: Make sure cylinder fittings and flow restrictors are installed correctly, as shown.

4 Inspect the cylinder rods for damage. If bent or scored, replace the complete cylinder assembly.

5 Inspect the anchor bracket and centering tab for damage. If damage is found, replace the complete cylinder assembly.

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

- Use new cylinder retainer roll pins.



4.4-5 Cylinder Rod Seal Replacement

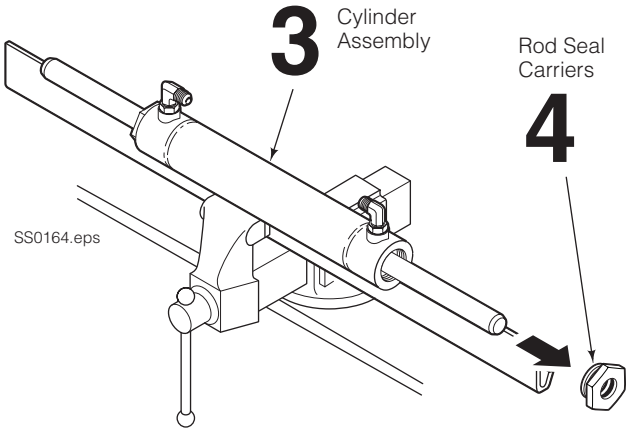
NOTE: The frame must be removed from the truck to replace the cylinder rod seals.

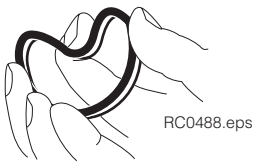
1. Loosen the seal carriers, then remove the frame from the truck as described in Section 4.4-1.
2. Remove the cylinder assembly from the frame as described in Section 4.4-3, Step 2.
3. In a soft jawed vise, clamp the cylinder assembly on the bracket.

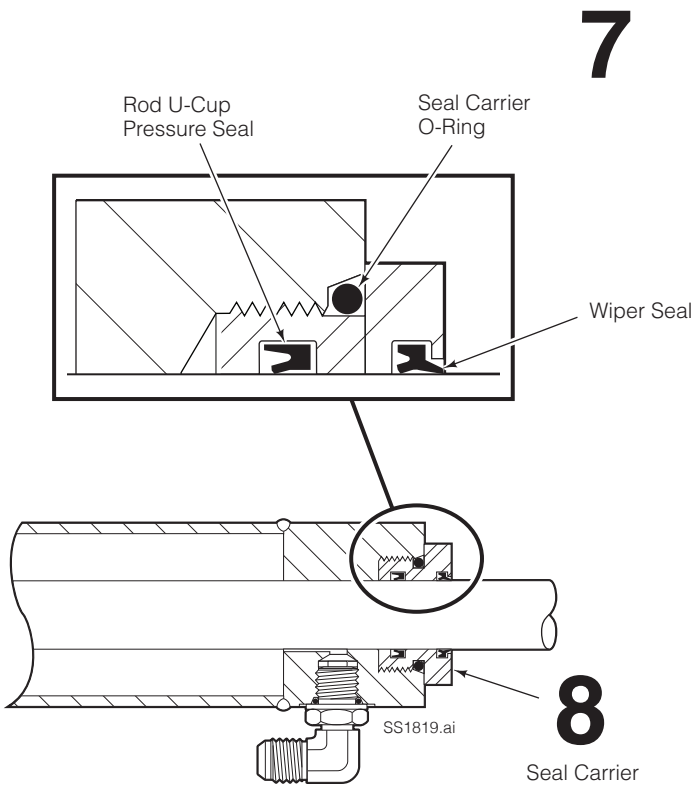
   CAUTION: Do not clamp on the cylinder shell.
4. With the cylinder rod centered, unscrew the seal carriers from each end of the cylinder shell. Slide the seal carriers off the cylinder rod.

   NOTE: If installing new loaded (seals installed) seal carriers, proceed to Step 8 below.
5. Use a brass O-ring tool to remove seals and O-rings, as shown.

   CAUTION: Do not scratch the seal grooves.
6. Clean the seal carrier and cylinder rod with cleaning solvent. Break any sharp edges on the cylinder rod end. Lubricate the new seals and O-rings with petroleum jelly.
7. Install the seals into the seal carrier grooves. Form the seals into a 'kidney' shape to ease placement into the bore. Note the direction of the U-cup seals: **Pressure seals are installed with the lip toward the pressure side of the cylinder, as shown.**
8. Apply a thick film of petroleum jelly to the inside of the seal carrier and slide onto the cylinder rod. Screw the seal carriers into the cylinder shell.
9. For reassembly, reverse the above procedures with the following exceptions:
   - After cylinder and frame are mounted on the truck, tighten seal carriers to 230 Nm.







4.5 Valve

4.5-1 Valve Removal

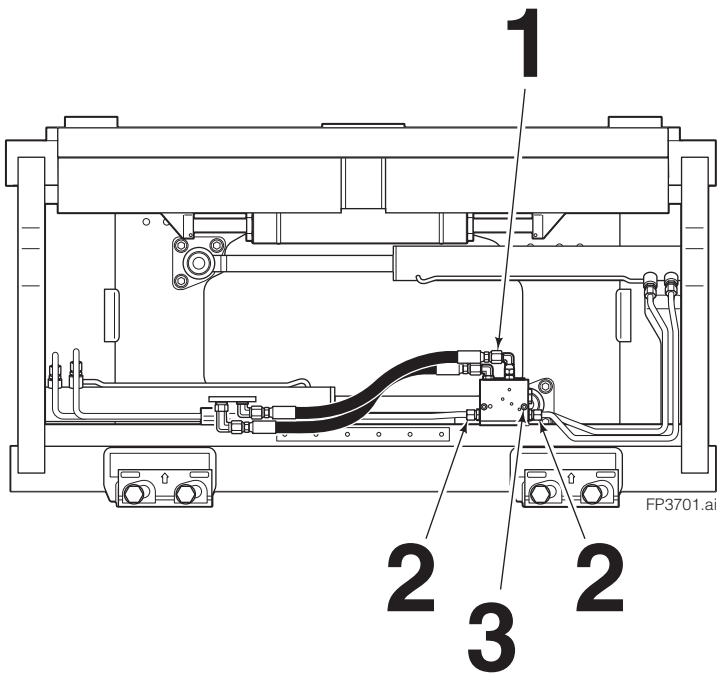
1 Disconnect hoses from the valve. Tag hoses for reassembly.

2 Disconnect the tubing from the valve. Plug the tubing ends.

3 Remove capscrews fastening the valve to the frame valve bracket. For reassembly, apply Loctite 242 (blue) to capscrews. Tighten the capscrews to 12 Nm.

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

- Service the valve as described in Section 4.5-2.



4.5-2 Valve Service

IMPORTANT: Service the valve in a clean work area.

1 Remove the valve from the Fork Positioner as described in Section 4.5-1.

2 Remove the check valve, flow divider and restrictor cartridges. Remove the O-rings and back-up rings from the cartridges.

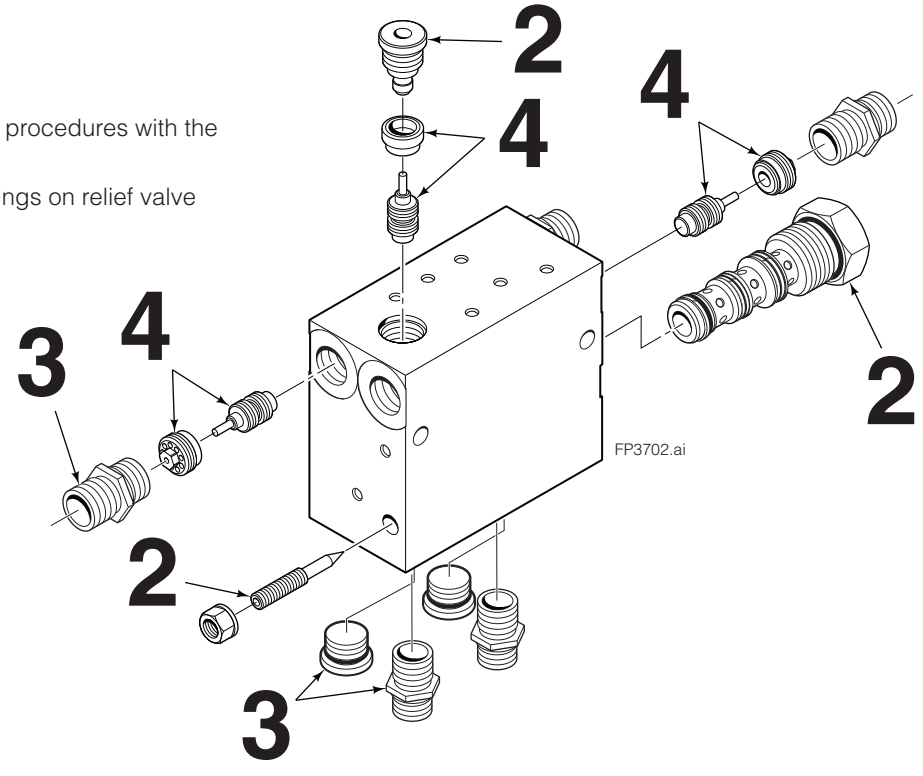
3 Remove the fittings from the valve.

4 Remove internal components.

5 Clean all parts with solvent.

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

- Replace O-rings and back-up rings on relief valve cartridges.



4.6 Solenoid Valve

4.6-1 Coil Service

1 Remove the cover from the valve assembly.

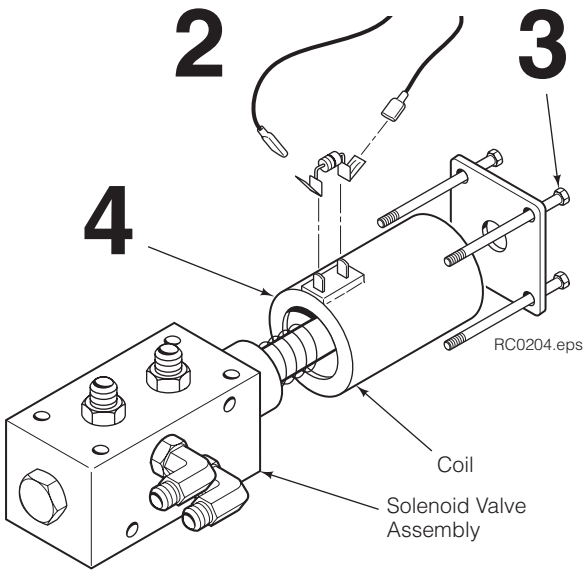
2 Disconnect the wires and diode from the coil terminals.

3 Loosen the end cover capscrews. Remove the end cover and coil. Note the position of coil terminals.

4 Install the new coil and end cover. Make sure that the terminals are positioned correctly.

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

- Refer to the electrical schematic in Section 3.5 for correct wire and diode installation.



4.6-2 Valve Service

- Check the plunger within the valve body for freedom of movement. If jammed or damaged, replace the solenoid valve as a complete assembly.

5.1 Hydraulics

Truck Relief Setting

152 bar Recommended
250 bar Maximum

Truck Flow Volume ①

	Min. ②	Recommended	Max. ③
25N, 35N, 50N	4 L/min.	16 L/min.	20 L/min.
60N	12 L/min.	20 L/min.	30 L/min.

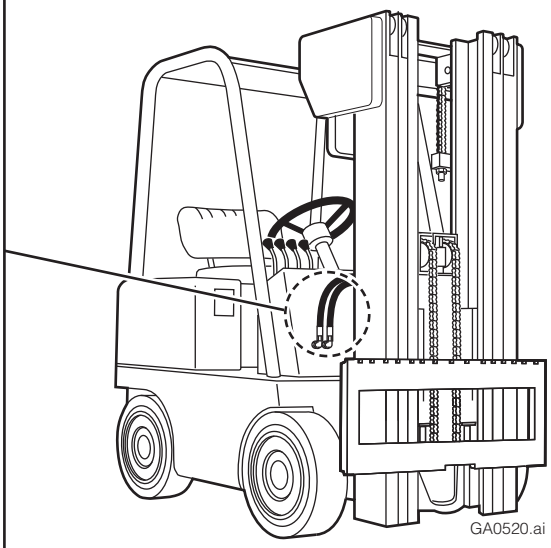
① Cascade Fork Positioners are compatible with SAE 10W petroleum base hydraulic fluid meeting Mil. Spec. MIL-0-5606 or MIL-0-2104B. Use of synthetic or aqueous base hydraulic fluid is not recommended. If fire resistant hydraulic fluid is required, special seals must be used. Contact Cascade.

② Flow less than recommended will result in slow fork positioning and sideshift speed.

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

Hoses and Fittings

All supply hoses and fittings must be No. 6 hose minimum with an orifice size of 5 mm minimum.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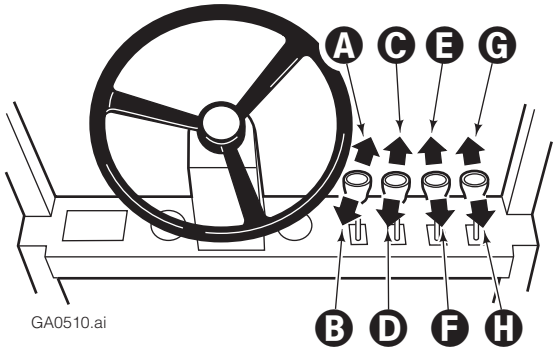
5.2 Auxiliary Valve Functions

Check for compliance with ISO standards:



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Main Functions

A	Hoist Down	C	Tilt Forward
B	Hoist Up	D	Tilt Back

Auxiliary Functions

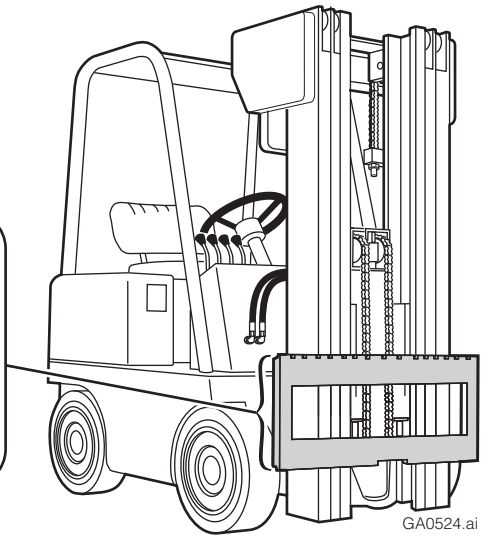
E	Sideshift Left	G	Open Forks
F	Sideshift Right	H	Close Forks

5.3 Truck Carriage

GA0028.eps

Carriage Mount Dimension (A) ISO

	Minimum	Maximum
Class II	380,0 mm	381,0 mm
Class III	476,0 mm	476,0 mm
Class IV	595,5 mm	597,0 mm


GA0524.ai

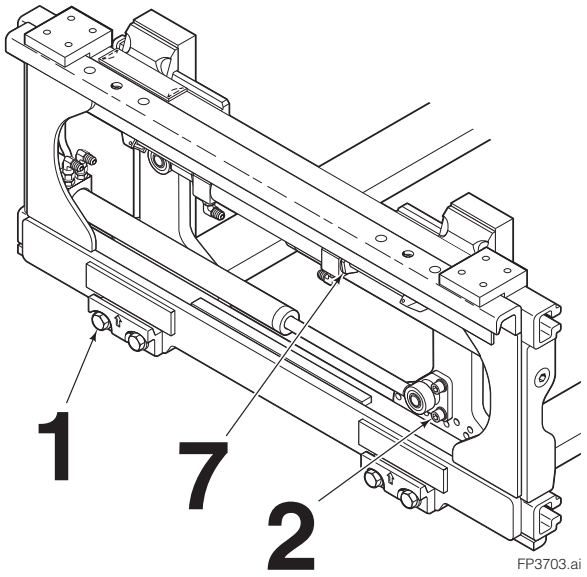
5.4 Torque Values

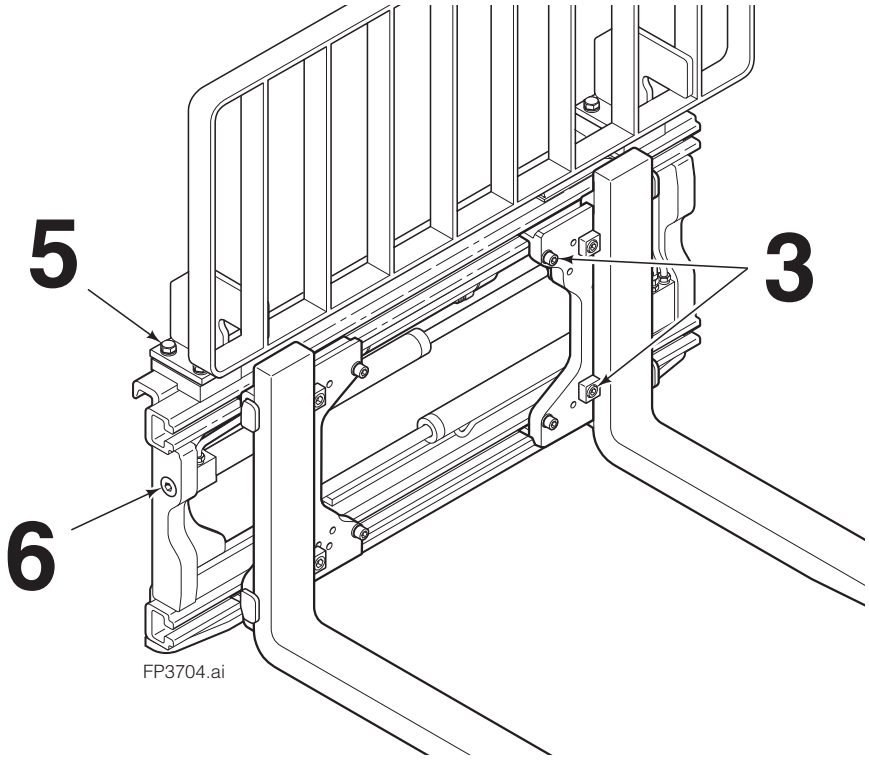
Fastener torque values for N-Series Fork Positioners are shown in the table below in metric units. All torque values are also called out in each specific service procedure section through out the manual.

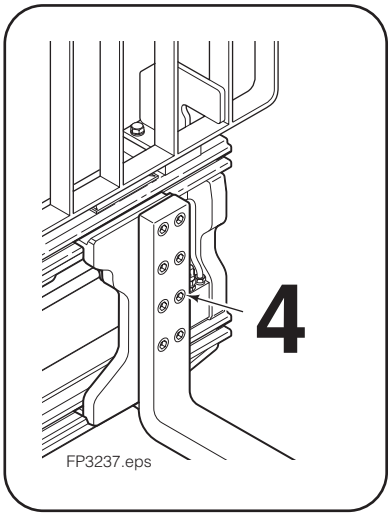
NOTE: All fasteners have a torque value range of ±10% of stated value.

Ref.	Fastener Location		Size	Nm
1	Lower Hook Capscrews	**CL II/III**	M16	220
		CL IV	M20	320
2	Carrier Anchor Capscrews ①	**25N, 35N, 50N**	M12	80
		60N	M16	180
3	Retainer and Inner Carrier Fork Stop Capscrews	**25N, 35N, 50N**	M12	60
		60N	M16	120
4	Fork Mounting Capscrews	**25N, 35N**	M16	270
		50N, 60N	M20	530
5	Backrest Capscrews	**25N**	M12	90
		35N, 50N, 60N	M16	220
6	Cylinder Frame Mounting Capscrew ①	**25N, 35N, 50N**	M16	100
		60N	–	310
7	Sideshift Cylinder Rod Seal Carrier		–	230

① Apply Loctite 242 (blue) to threads.







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Zavolajte najbližšie servisné stredisko spoločnosti Cascade. Pozrite si naše internetové stránky www.cascorp.com

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AMERICAS

Cascade Corporation
U.S. Headquarters
2201 NE 201st
Fairview, OR 97024-9718
Tel: 800-CASCADE (227-2233)
Fax: 800-693-3768

Cascade Canada Inc.
5570 Timberlea Blvd.
Mississauga, Ontario
Canada L4W-4M6
Tel: 905-629-7777
Fax: 905-629-7785

Cascade México
Almacén Dicex PDN
Libramiento Noroeste
4001 Km 27.5
Parque Industrial Puerta del Norte
Escobedo N.L 66050
México
Tel: 800-CASCADE (227-2233)

Cascade Brasil
Av. Casa Grande, 850
Casa Grande, Diadema SP,
09961-350
Tel: +55 11 4930-9800

Anval – Cascade Distributor
Av. El Ventisquero 1225,
Bodega 99,
Renca – Santiago, Chile
8661516
Tel: +56 2 29516907

EUROPE-AFRICA

Cascade Italia S.R.L.
European Headquarters
Via Dell'Artigianato 1
37030 Vago di Lavagno (VR)
Italy
Tel: 39-045-8989111
Fax: 39-045-8989160

Cascade (Africa) Pty. Ltd.
PO Box 625, Isando 1600
60A Steel Road
Sparton, Kempton Park
South Africa
Tel: 27-11-975-9240
Fax: 27-11-394-1147

ASIA-PACIFIC

Cascade Japan Ltd.
2-23, 2-Chome,
Kukuchi Nishimachi
Amagasaki, Hyogo
Japan, 661-0978
Tel: 81-6-6420-9771
Fax: 81-6-6420-9777

Cascade Korea
121B 9L Namdong Ind.
Complex, 691-8 Gojan-Dong
Namdong-Ku
Inchon, Korea
Tel: +82-32-821-2051
Fax: +82-32-821-2055

Cascade-Xiamen
No. 668 Yangguang Rd.
Xinyang Industrial Zone
Haicang, Xiamen City
Fujian Province
P.R. China 361026
Tel: 86-592-651-2500
Fax: 86-592-651-2571

Cascade India Material Handling Pvt Ltd
Gat. No. 319/1 & 319/2, Village Kuruli,
Taluka Khed, Pune 410 501
Maharashtra, India
Tel: +91 77200 25745

Cascade Australia Pty. Ltd.
36 Kiln Street
Darra QLD 4076
Australia
Tel: 1-800-227-223
Fax: +61 7 3373-7333

Cascade New Zealand
9 Blackburn Rd
East Tamaki, Auckland
New Zealand
Tel: +64-9-273-9136

Sunstream Industries Pte. Ltd. – Cascade Distributor
18 Tuas South Street 5
Singapore 637796
Tel: +65-6795-7555
Fax: +65-6863-1368

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