

SERVICE MANUAL

E-Series

***Dedicated Push/Pull &
Load Push
QFM™ Quick Fork Mount
Push/Pull & Load Push***

Manual Number 686455-R3

**cascade®
corporation**

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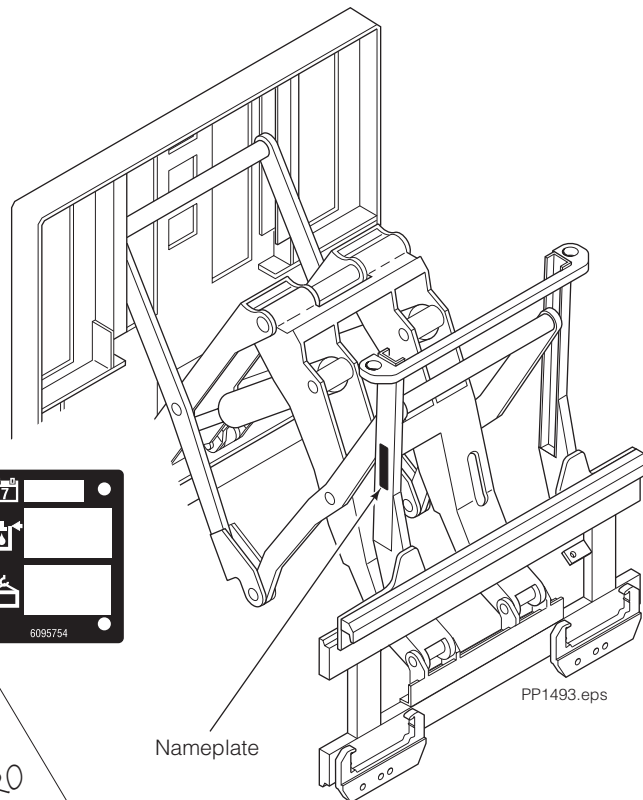
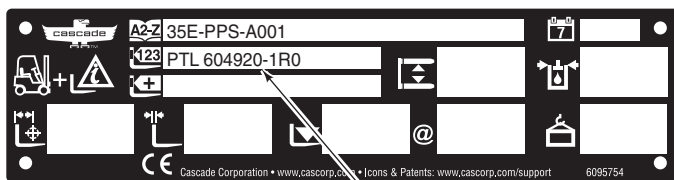
1.1 Introduction

This manual provides the Periodic Maintenance, Troubleshooting, Service and Specifications for Cascade E-Series QFM™ and Dedicated Push/Pulls.

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 right front web of the baseplate.

IMPORTANT: All hoses, tubes and fittings on these attachments are JIC.

NOTE: Specifications are shown in both US and (metric) units. All fasteners have a torque value range of $\pm 10\%$ of stated value.



Nameplate

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1.2 Special Definitions

The statements shown appear throughout this Manual where special emphasis is required. Read all **WARNINGS** and **CAUTIONS** before proceeding with any work. Statements labeled **IMPORTANT** and **NOTE** are provided as additional information of special significance or to make the job easier.



WARNING - A statement preceded by WARNING is information that should be acted upon to prevent **bodily injury**. A **WARNING** is always inside a ruled box.

CAUTION - A statement preceded by CAUTION is information that should be acted upon to prevent machine damage.

IMPORTANT - A statement preceded by IMPORTANT is information that possesses special significance.

NOTE - A statement preceded by NOTE is information that is handy to know and may make the job easier.

2.1 Dedicated Push/Pulls

CAUTION: For push/pulls used in extreme conditions, refer to TB 297 in place of this periodic maintenance. Failure to follow this schedule may result in push/pull failure and void warranty.



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

2.1-1 100-Hour Maintenance

Every time the lift truck is serviced or every 100 hours of truck operation, whichever comes first, complete the following maintenance on the attachment:

- Check for loose or missing bolts, worn or damaged hoses and hydraulic leaks.

NOTE: Nylon protection sleeves are available to prevent hoses from rubbing (Cascade part number 6086044 and 6088062).

- Inspect faceplate and frame sliding bearing blocks for lubrication. Lubricate as necessary with Dubois FG-2 food industry grease (Cascade Part No. 669306).

2.1-2 500-Hour Maintenance

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

- Inspect all mechanism pivot point bushings and pins for excessive wear and replace as necessary. See the service section of this manual.
- Tighten the mechanism pivot pin retainer capscrews to 10 ft.-lbs. (13 Nm).
- Tighten the gripper assembly capscrews to 120 ft.-lbs. (165 Nm).
- Tighten the platen hook capscrews to 120 ft.-lbs. (165 Nm).



WARNING: Platen capscrews must be tightened regularly to prevent equipment damage or personnel injury.

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

Quick-Change Hooks – 3/16 in. (5 mm) maximum.

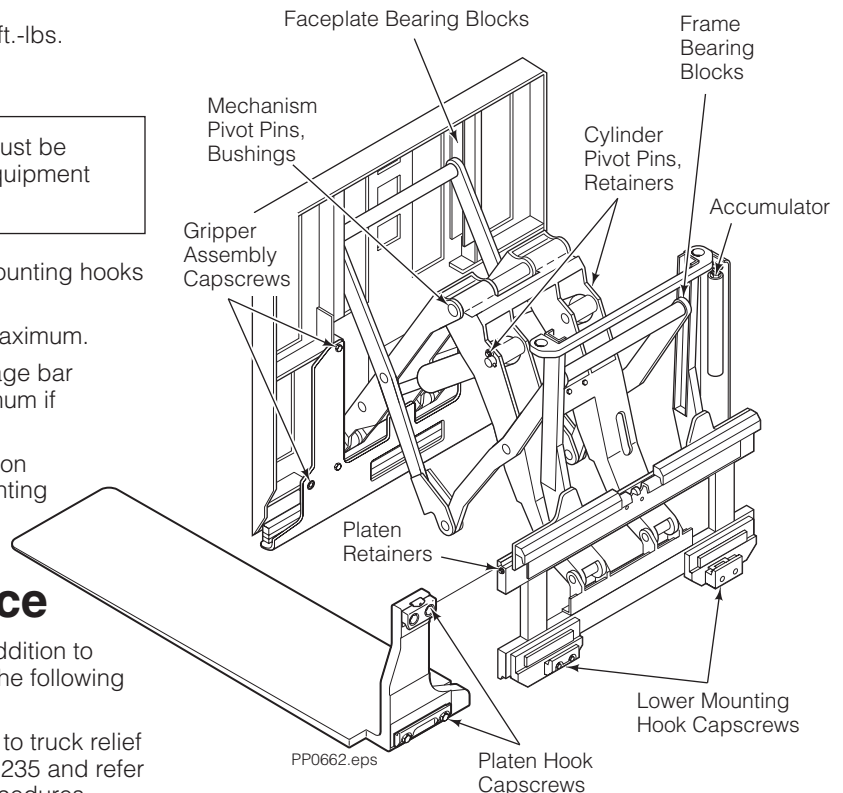
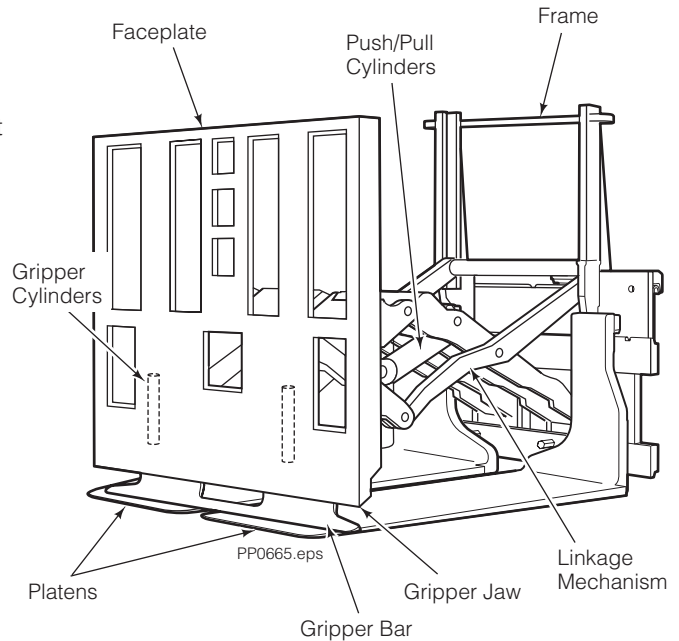
Bolt-on Hooks – Tight against lower carriage bar if non-sideshifting or 3/16 in. (5 mm) maximum if sideshifting.

- If hook adjustment is necessary, refer Section 4.1-1, Step 6. Tighten the lower hook mounting capscrews to 120 ft.-lbs. (165 Nm).

2.1-3 1000-Hour Maintenance

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

- Check accumulator pre-charge and adjust to truck relief pressure if required. Use Charging Kit 228235 and refer to Accumulator User Guide 227196 for procedures.



2.1-4 2000-Hour Maintenance

After 2000 hours of truck operation, in addition to the 100, 500 and 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 ANSI B56.1-2005.

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 6104118 (Class IV).

2.2 QFM™ Push/Pulls

2.2-1 100-Hour Maintenance

Every time the lift truck is serviced or every 100 hours of truck operation, whichever comes first, complete the following maintenance on the attachment:

- Check for loose or missing bolts, worn or damaged hoses and hydraulic leaks.
- Inspect faceplate and frame sliding bearing blocks for lubrication. Lubricate as necessary with Dubois FGG-2 food industry grease (Cascade Part No. 669306).

2.2-2 500-Hour Maintenance

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

- Inspect all mechanism pivot point bushings and pins for excessive wear and replace as necessary. See the service section of this manual.
- Tighten the mechanism pivot pin retainer capscrews to 10 ft.-lbs. (13 Nm).
- Tighten the gripper assembly capscrews to 120 ft.-lbs. (165 Nm)
- Tighten the platen mounting capscrews to 40 ft.-lbs. (60 Nm).



WARNING: Platen capscrews must be tightened regularly to prevent equipment damage or personnel injury.

- Check for .125 in. (3.2 mm) maximum clearance between lower mounting hooks and truck carriage bar. Refer to Step 5 in this manual if adjustment is necessary.
- Check for .06 in. (1.6 mm) maximum clearance between upper hook setscrews and truck carriage bar. Refer to Section 4.1-2, Step 6 in this manual if adjustment is necessary.
- Tighten lower hook capscrews to 60 ft.-lbs. (80 Nm).

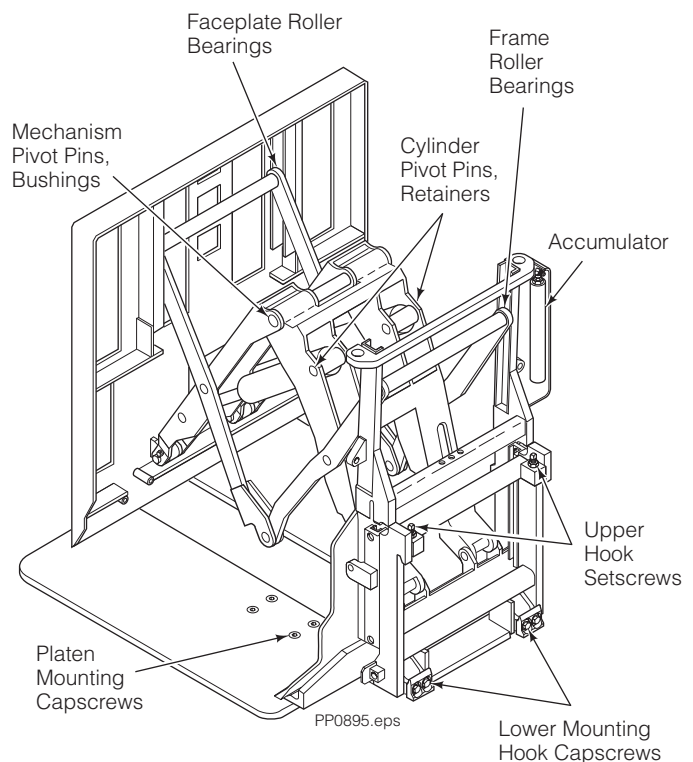
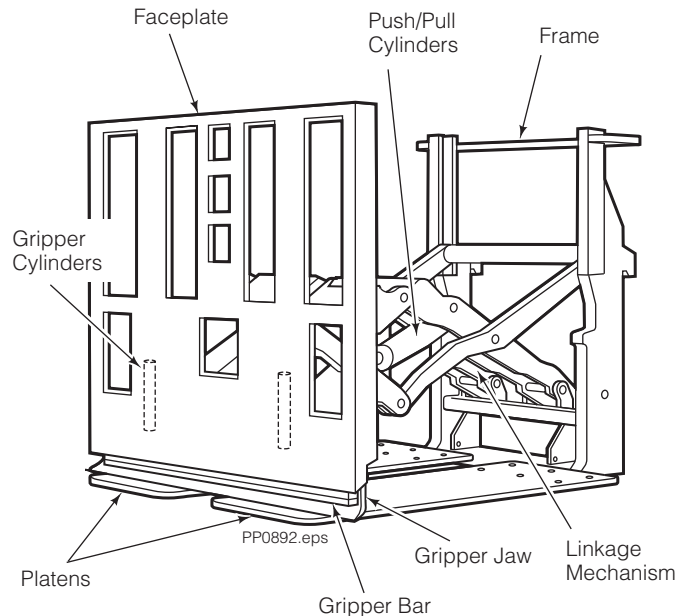
2.2-3 1000-Hour Maintenance

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

- Check accumulator pre-charge and adjust to truck relief pressure if required. Use Charging Kit 228235 and refer to Accumulator User Guide 227196 for procedures.



WARNING: After completing maintenance procedures, 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.



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 volume range as shown in Specifications, Section 5.1.
- Hydraulic fluid supplied to the attachment must meet the requirement 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

3.13 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:

Push/Pull Circuit

- Attachment will not pull the load.
- Faceplate will not extend or retract.
- Faceplate operates slowly.
- Gripper bar will not lower or raise.
- Gripper bar is not sequenced with push/pull function.
- Gripper bar will not hold the slip sheet when pulling load onto platens.

To correct one of these problems, see Section 3.3.

Sideshift Circuit

- Attachment will not sideshift.
- Attachment sideshifts slowly.

To correct this problem, see Section 3.4.

Hydraulically Positioned Platen Circuit

- Attachment will not position platens.
- To correct this problem, see Section 3.5.

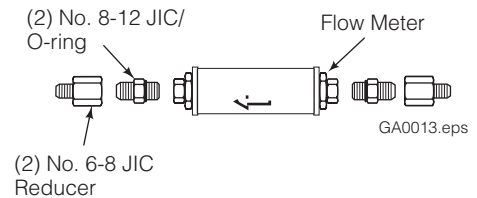


WARNING: Before servicing any hydraulic component, relieve pressure in the system. Turn the truck off and move the truck auxiliary control valves several times in both directions.

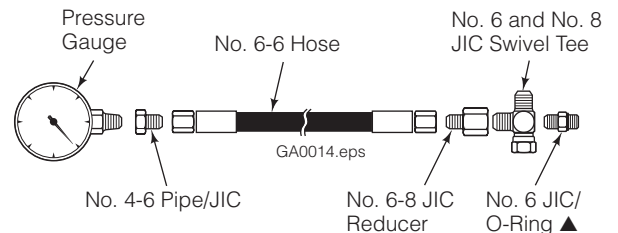
After completing any service procedure, test the attachment through several cycles. First test the attachment empty to bleed any air trapped in the system to the truck tank. Then test the attachment with a load to be sure it operates correctly before returning to the job.

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



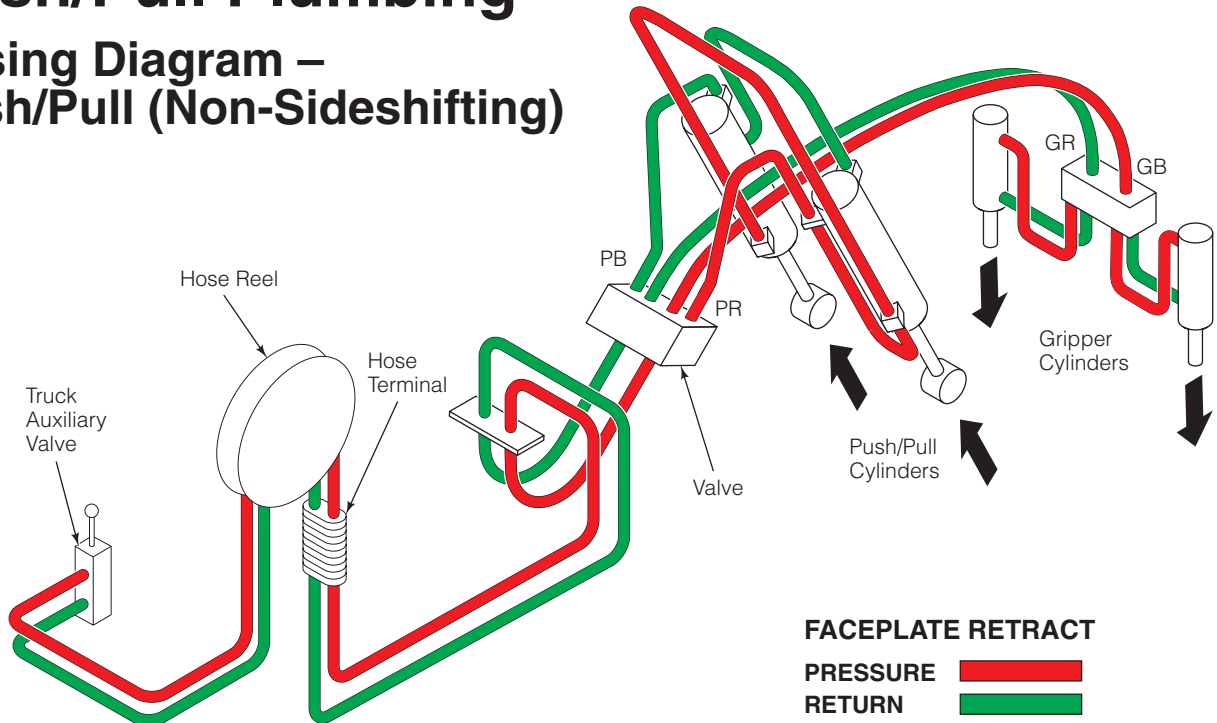
Pressure Gauge Kit 671212



▲ Not included in Pressure Gauge Kit 671212

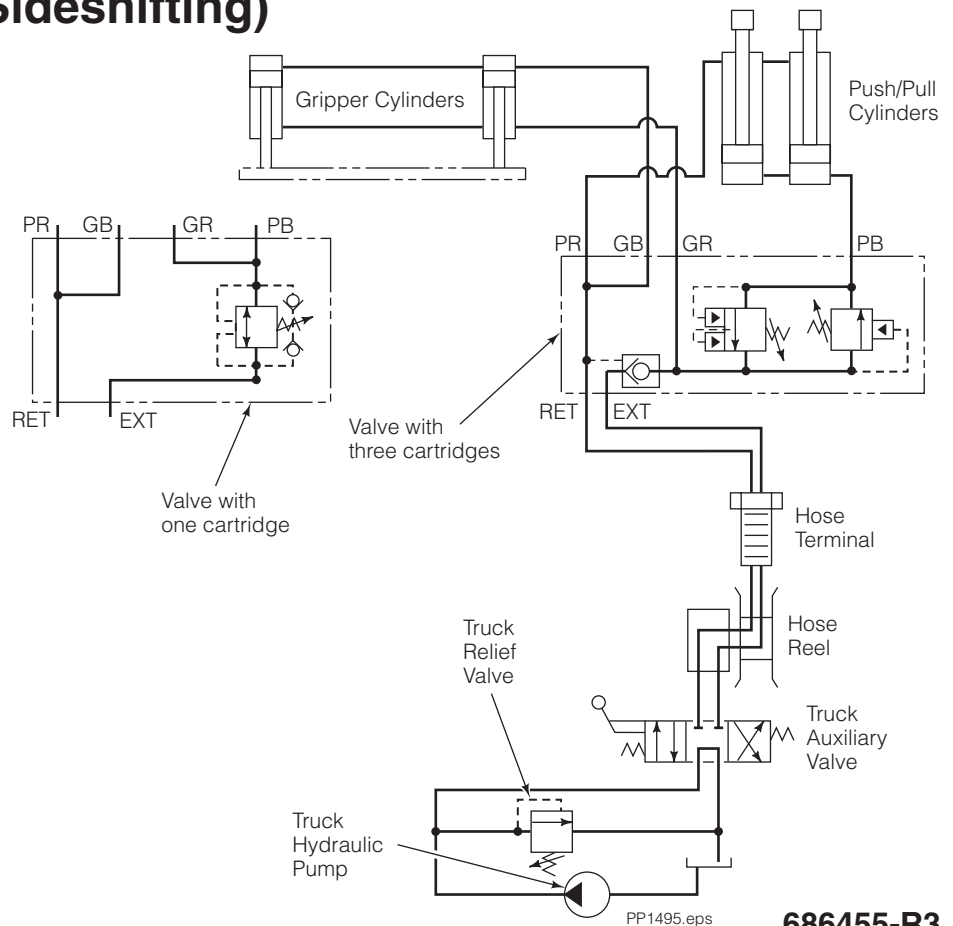
3.2 Push/Pull Plumbing

3.2-1 Hosing Diagram – Push/Pull (Non-Sideshifting)



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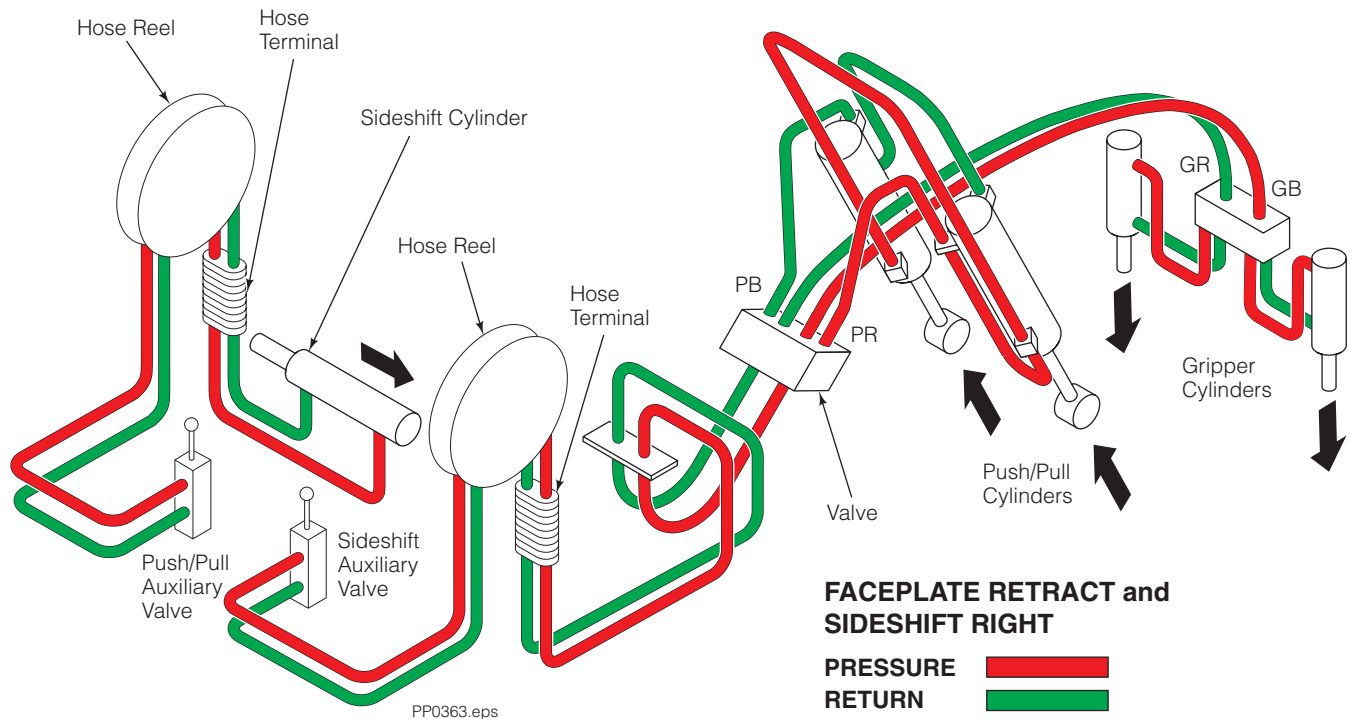
3.2-2 Circuit Schematics – Push/Pull (Non-Sideshifting)



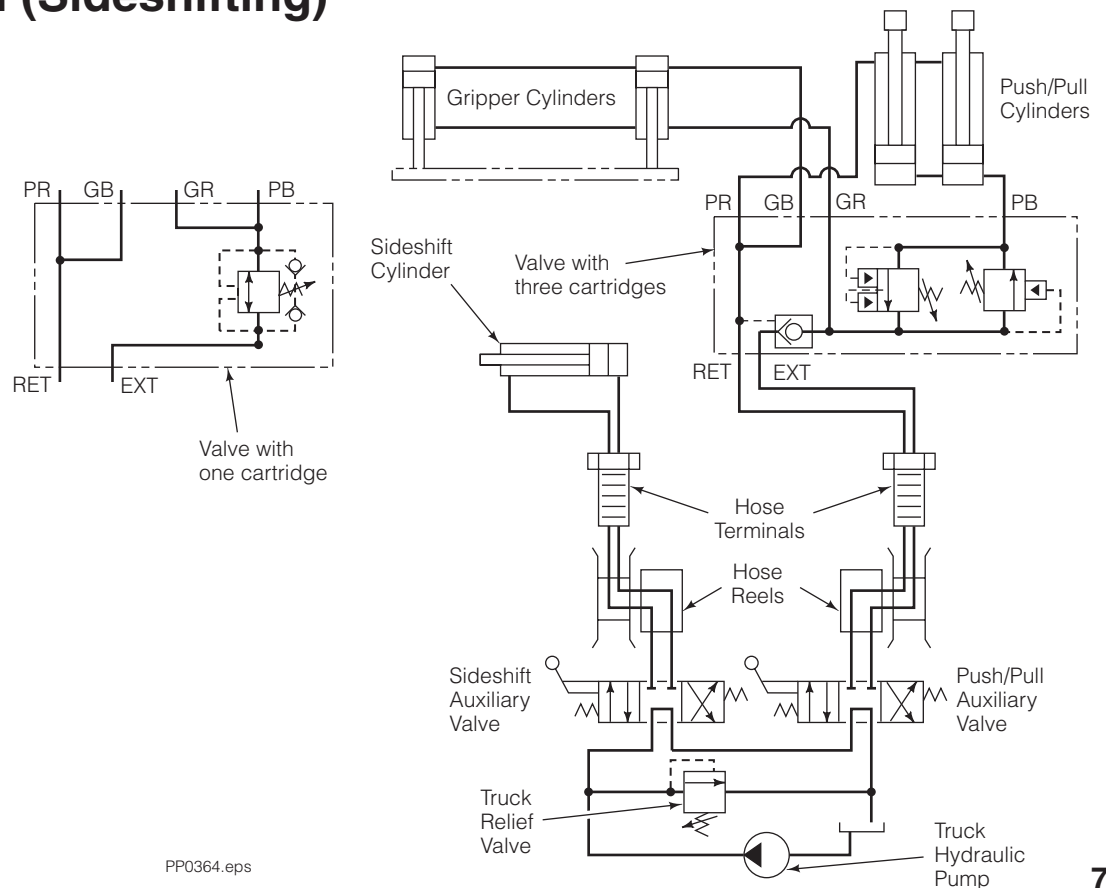
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3.2-3 Hosing Diagram – Push/Pull (Sideshifting)



3.2-4 Circuit Schematics – Push/Pull (Sideshifting)

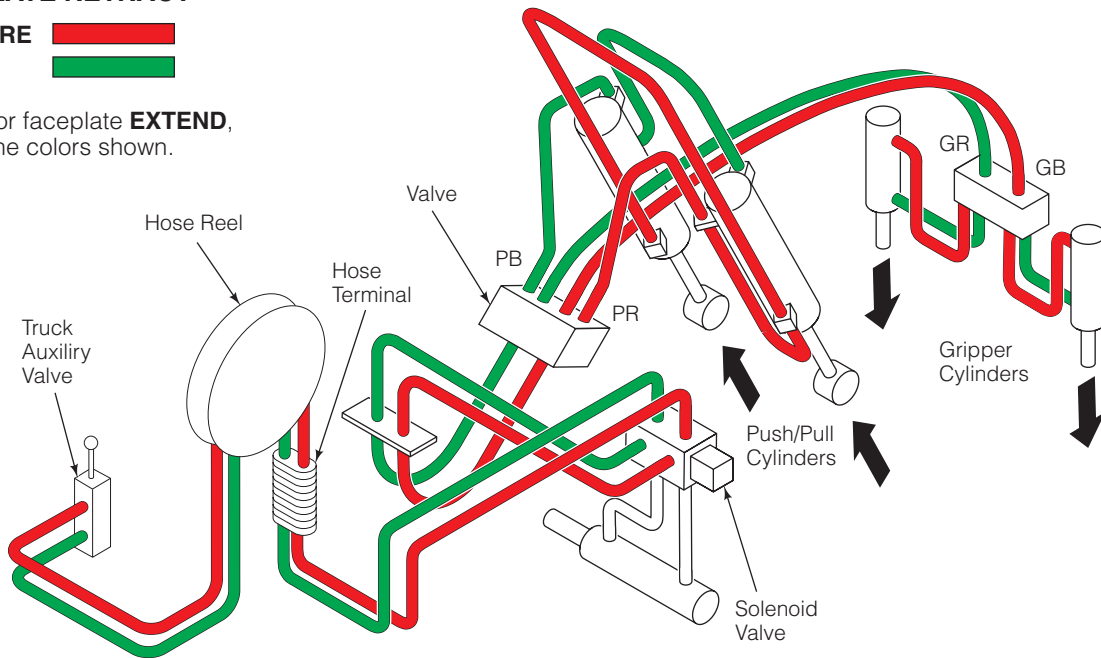


3.2-5 Hosing Diagram – Push/Pull (Sideshift with Solenoid)

FACEPLATE RETRACT

PRESSURE ■
RETURN ■

NOTE: For faceplate **EXTEND**, reverse the colors shown.

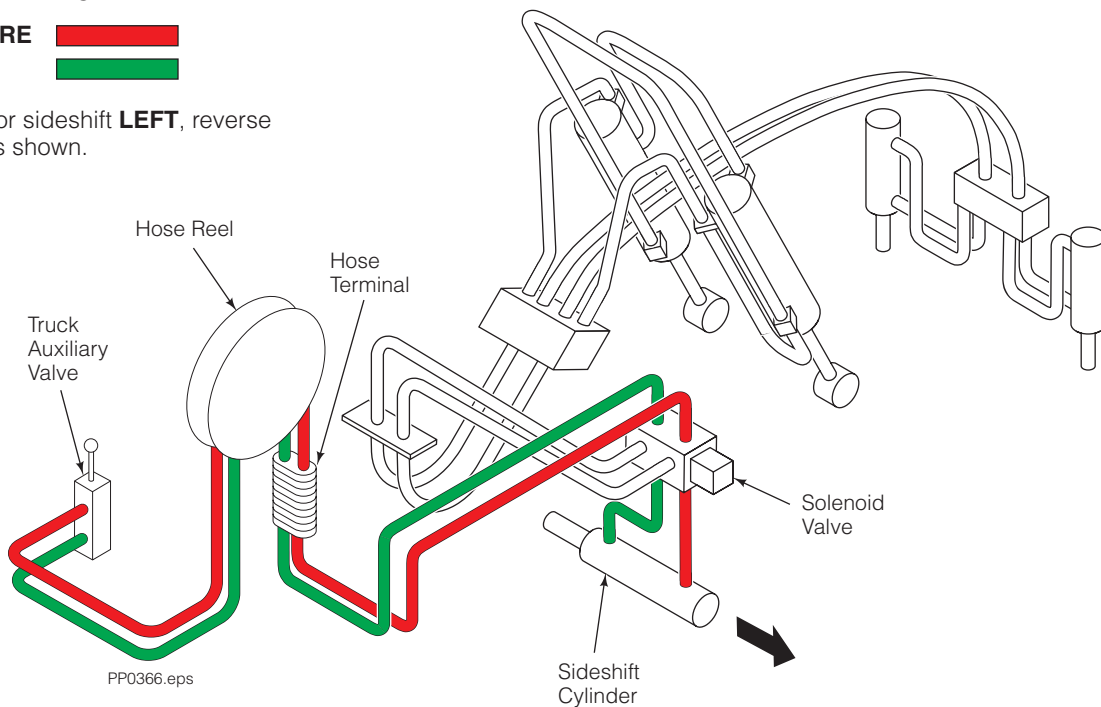


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SIDESHIFT RIGHT

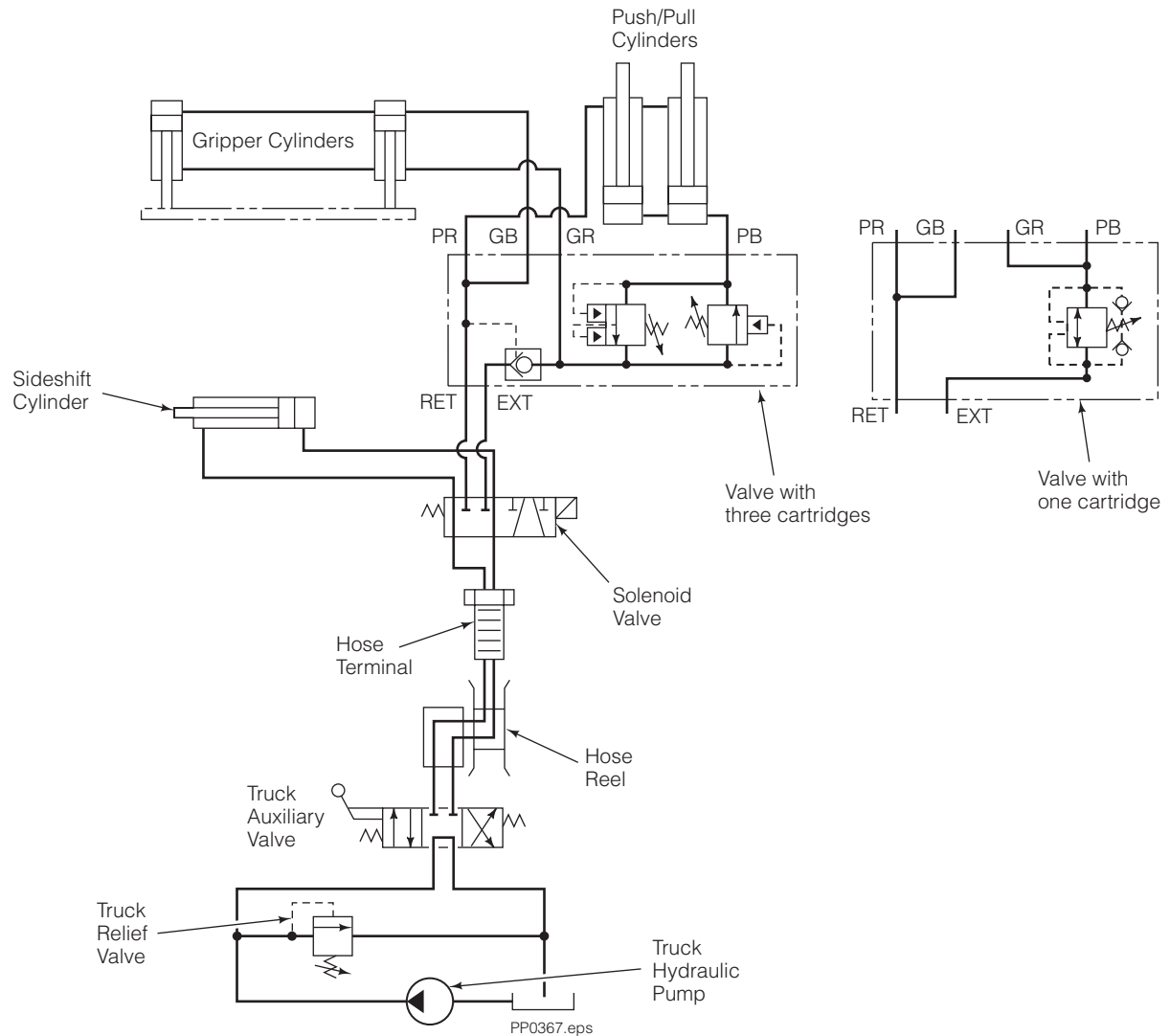
PRESSURE ■
RETURN ■

NOTE: For sideshift **LEFT**, reverse the colors shown.



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3.2-6 Circuit Schematics – Push/Pull (Sideshift with Solenoid)

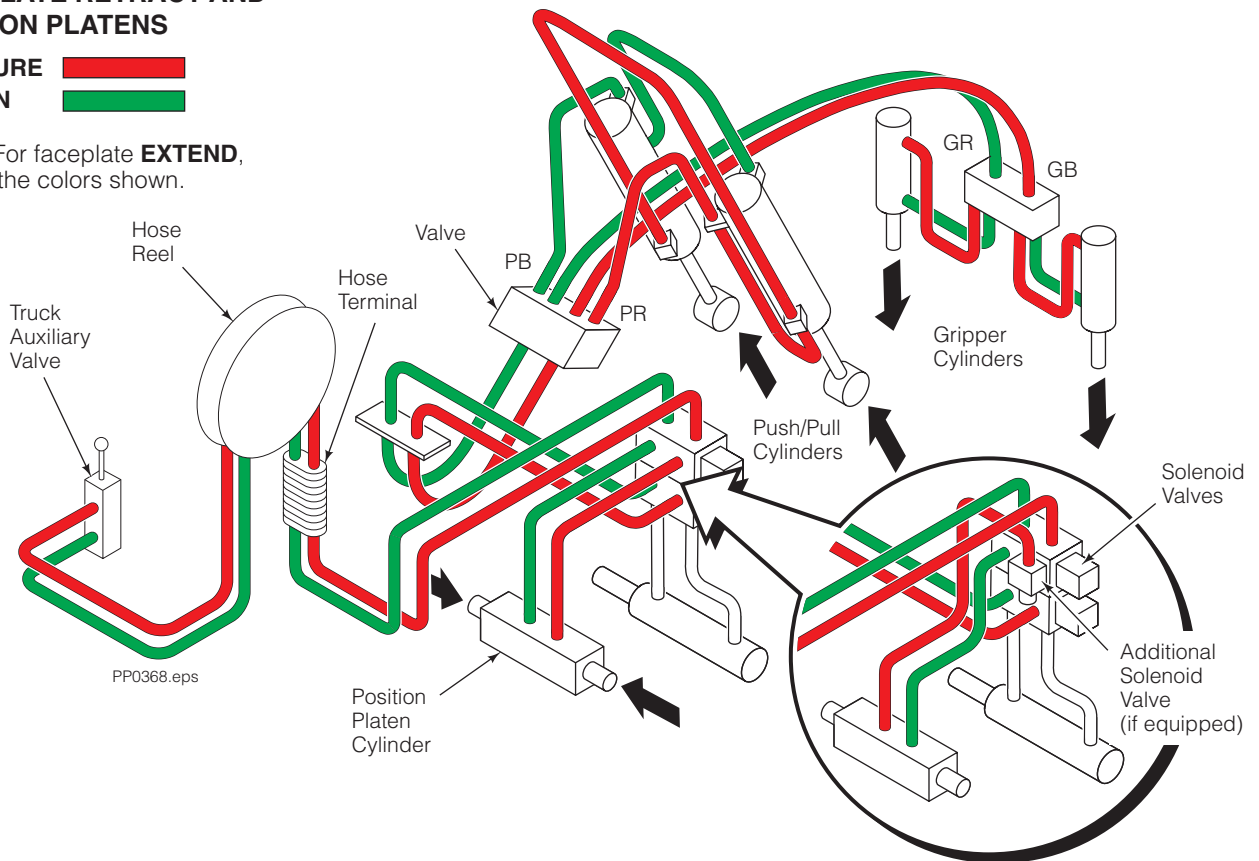


3.2-7 Hosing Diagram – Push/Pull (Solenoid Sideshift and Hydraulically Positioned Platens)

FACEPLATE RETRACT AND POSITION PLATENS

PRESSURE █
RETURN █

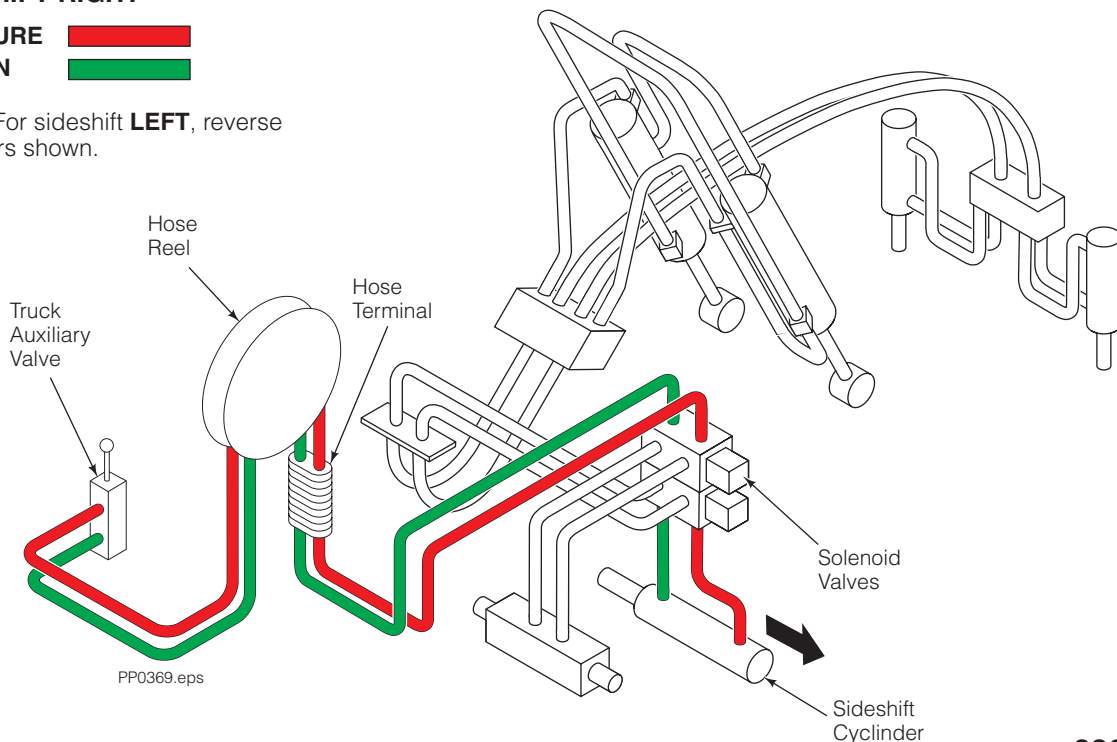
NOTE: For faceplate **EXTEND**, reverse the colors shown.



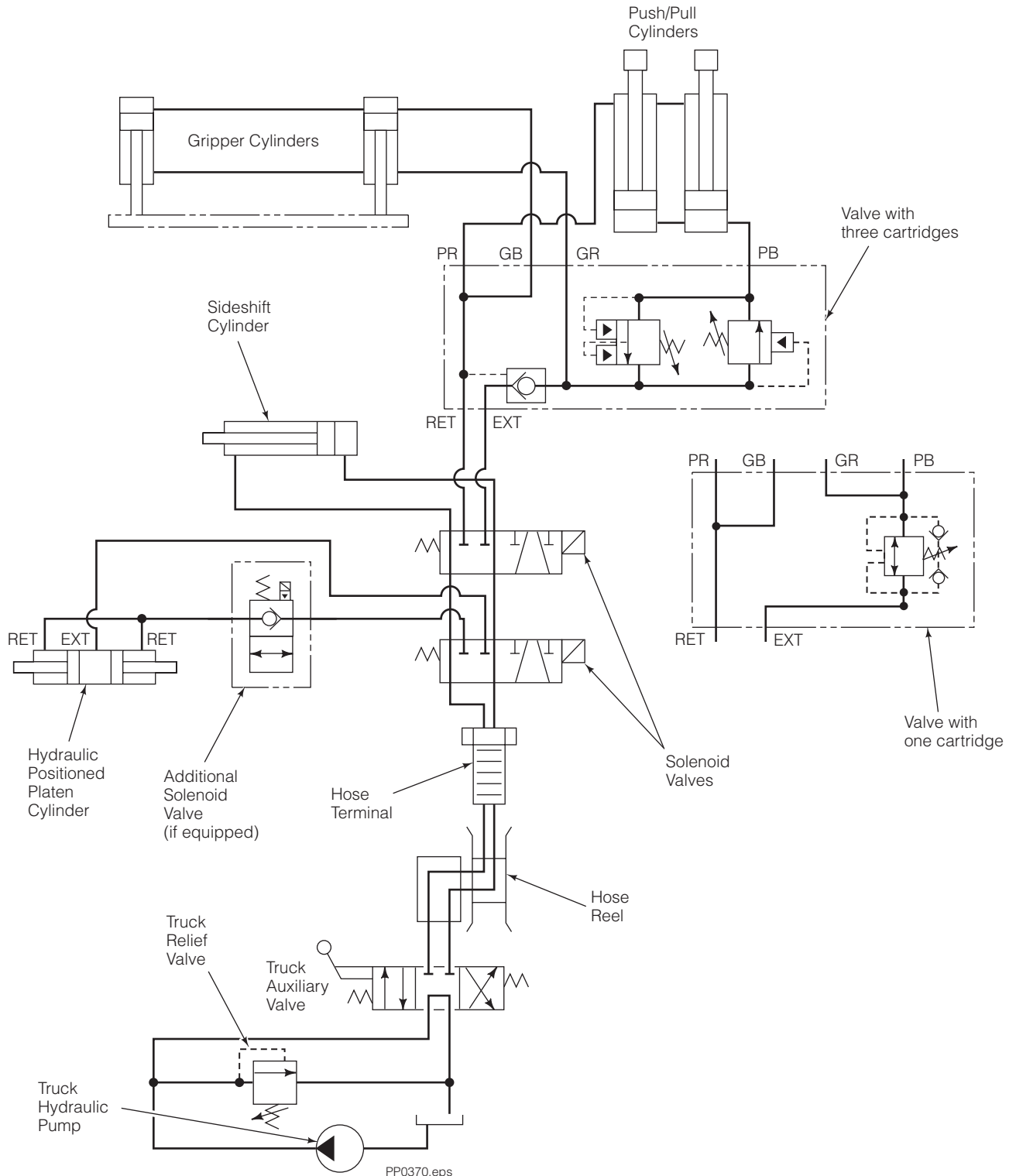
SIDESHIFT RIGHT

PRESSURE █
RETURN █

NOTE: For sideshift **LEFT**, reverse the colors shown.



3.2-8 Circuit Schematic – Push/Pull (Solenoid Sideshift and Hydraulically Positioned Platens)

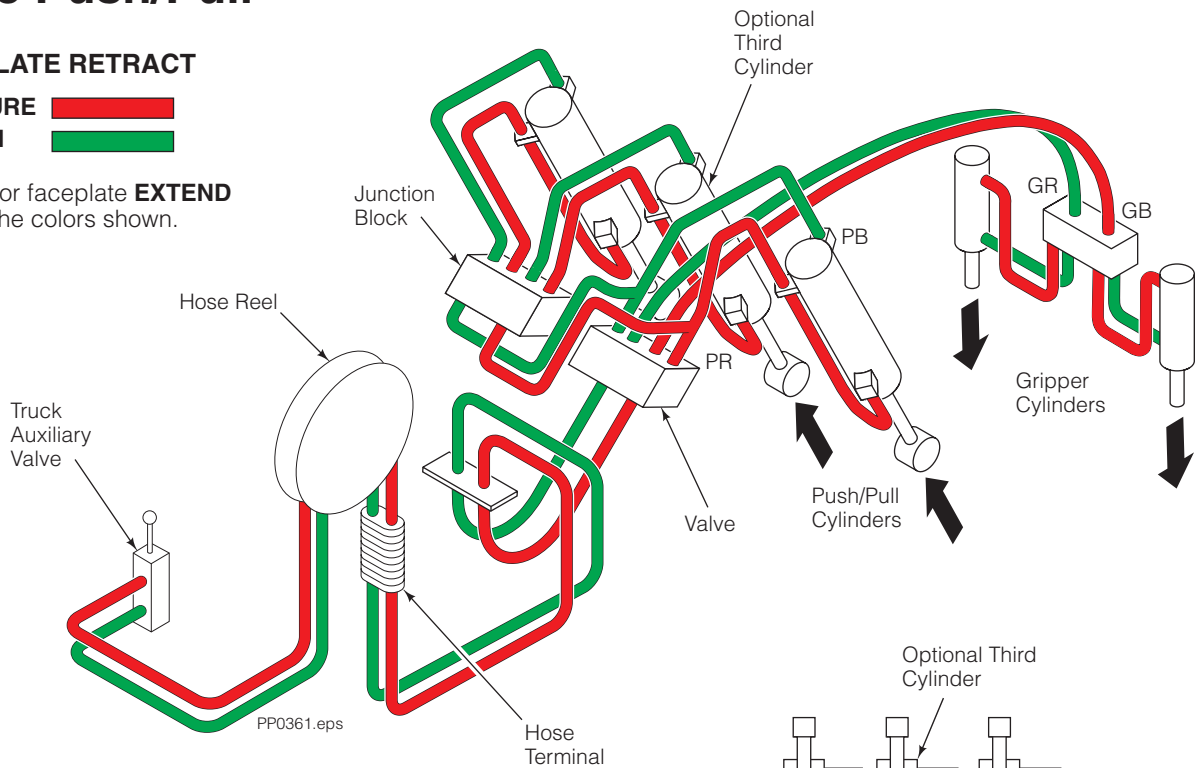


3.2-9 Hosing Diagram – Wide Push/Pull

FACEPLATE RETRACT

PRESSURE ■
RETURN ■

NOTE: For faceplate **EXTEND** reverse the colors shown.



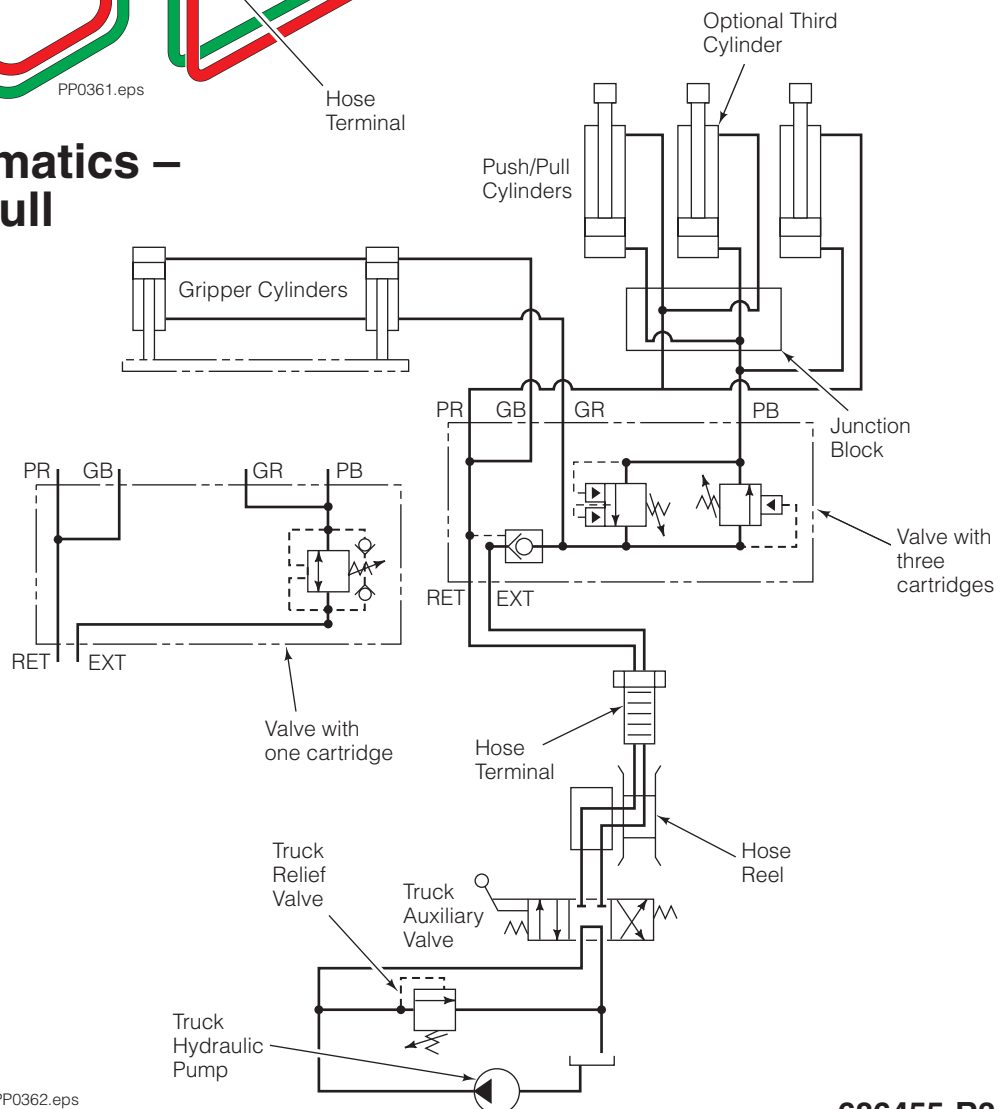
3.2-10 Circuit Schematics – Wide Push/Pull

Units with Non-Solenoid Activated Sideshifting

See Sideshift hosing and circuit schematics in Sections 4.2-3 and 4.2-4

Units with Solenoid Activated Sideshifting

See Sideshift hosing and circuit schematics in Sections 4.2-5 and 4.2-6



3.3 Load Push Plumbing

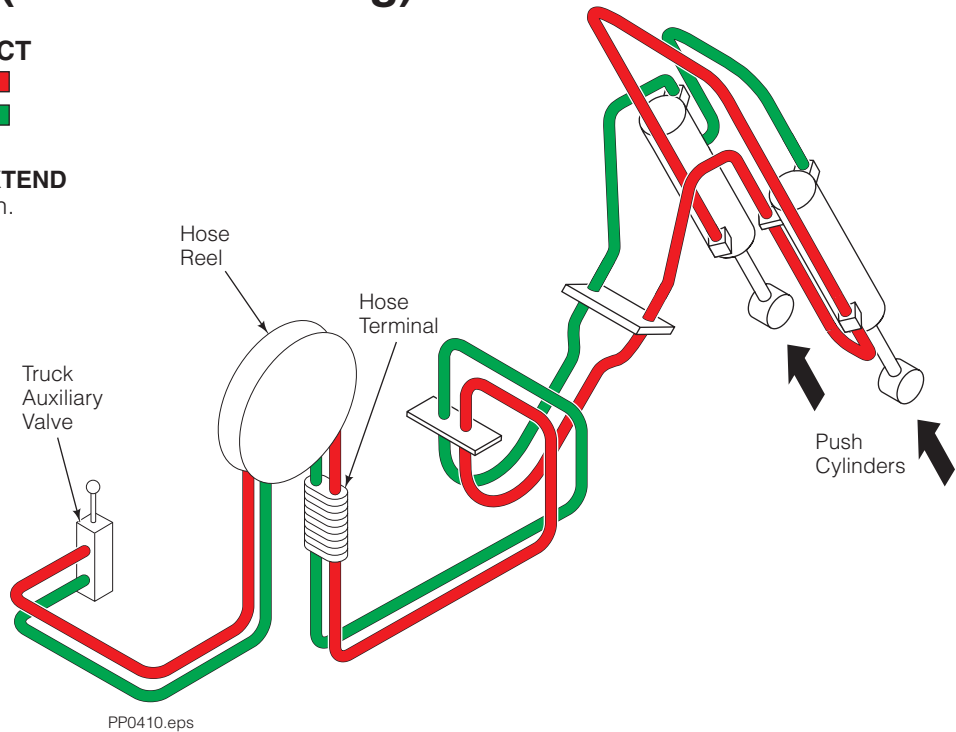
3.3-1 Hosing Diagram – Load Push (Non-Sideshifting)

FACEPLATE RETRACT

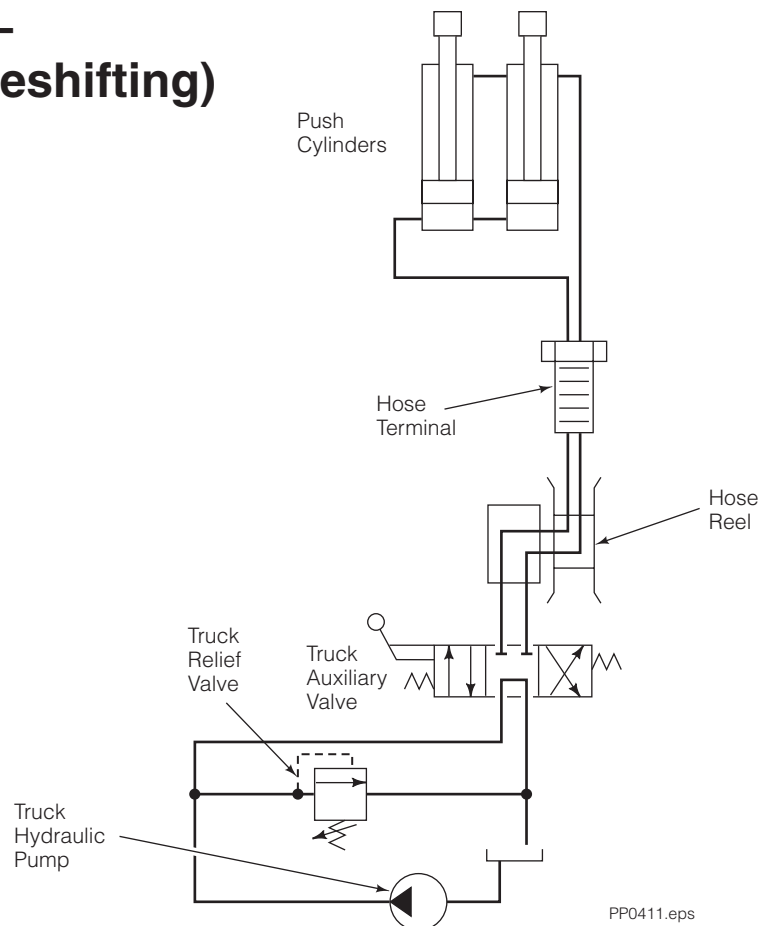
PRESSURE

RETURN

NOTE: For faceplate **EXTEND** reverse the colors shown.



3.3-2 Circuit Schematics – Load Push (Non-Sideshifting)

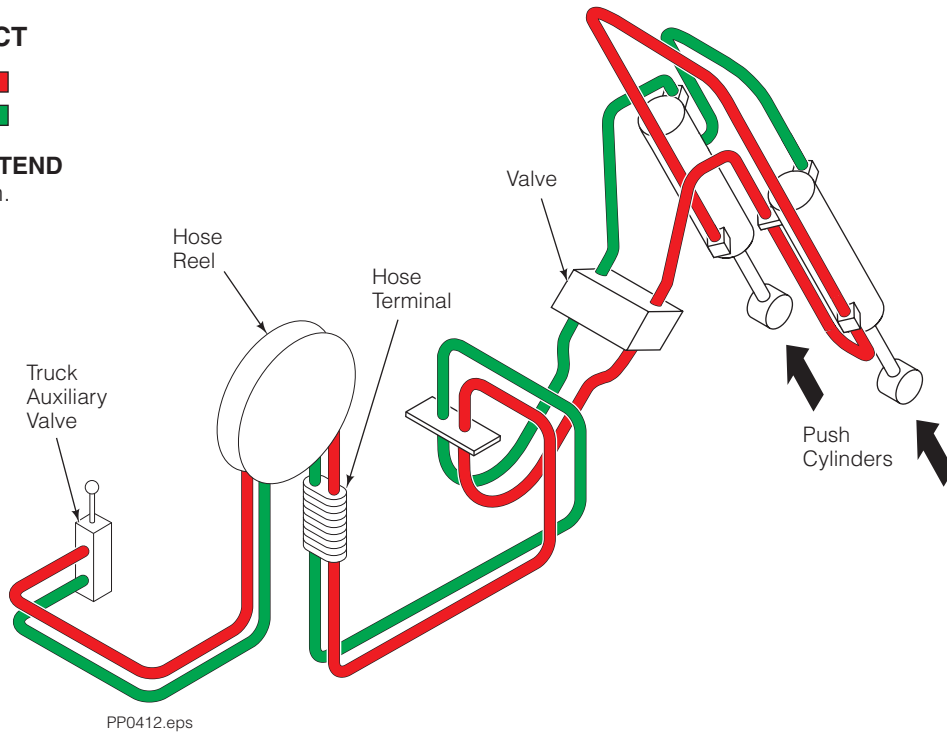


3.3-3 Hosing Diagram – Load Push with Pressure Relief (Non-Sideshifting)

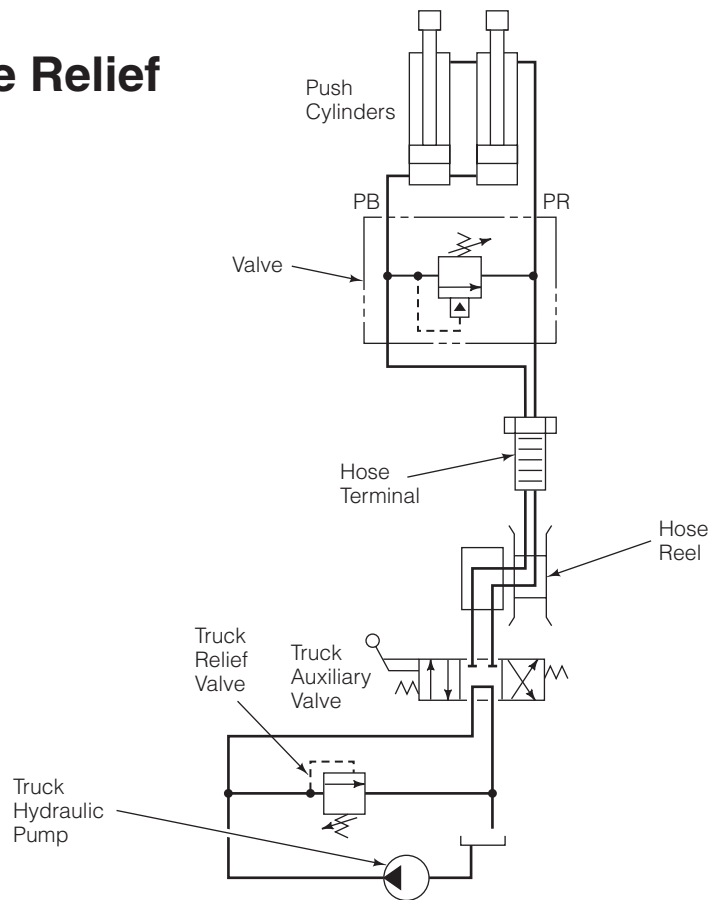
FACEPLATE RETRACT

PRESSURE ■
RETURN ■

NOTE: For faceplate **EXTEND** reverse the colors shown.



3.3-4 Circuit Schematics – Load Push with Pressure Relief (Non-Sideshifting)

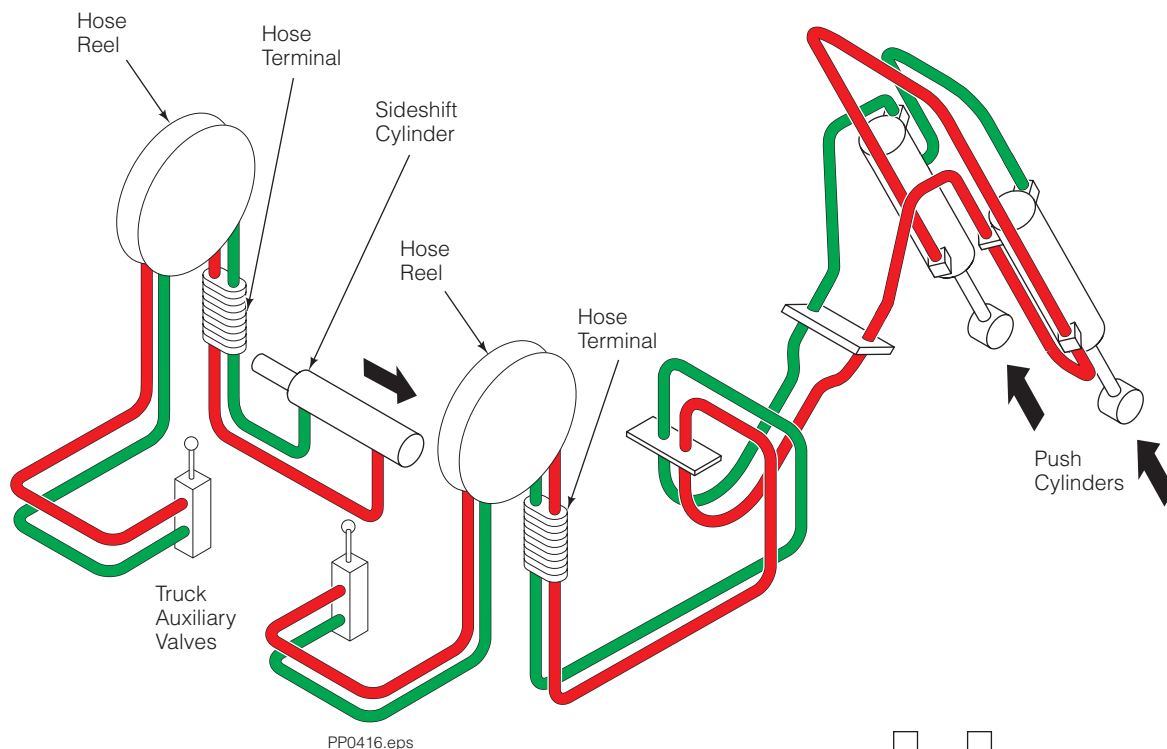


3.3-5 Hosing Diagram – Load Push (Sideshifting)

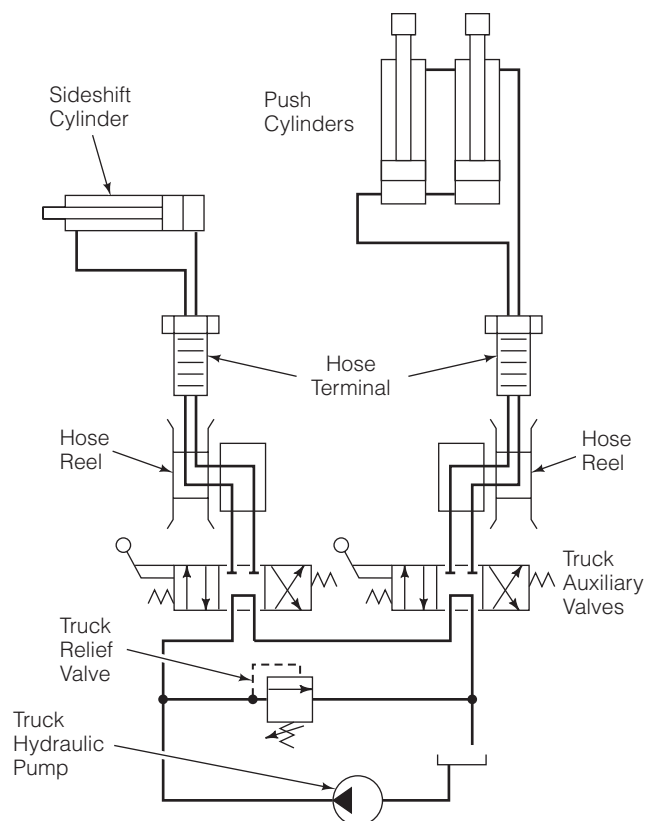
FACEPLATE RETRACT and SIDESHIFT RIGHT

PRESSURE █
RETURN █

NOTE: For faceplate **EXTEND** and **SIDESHIFT LEFT** reverse the colors shown.



3.3-6 Circuit Schematics – Load Push (Sideshifting)

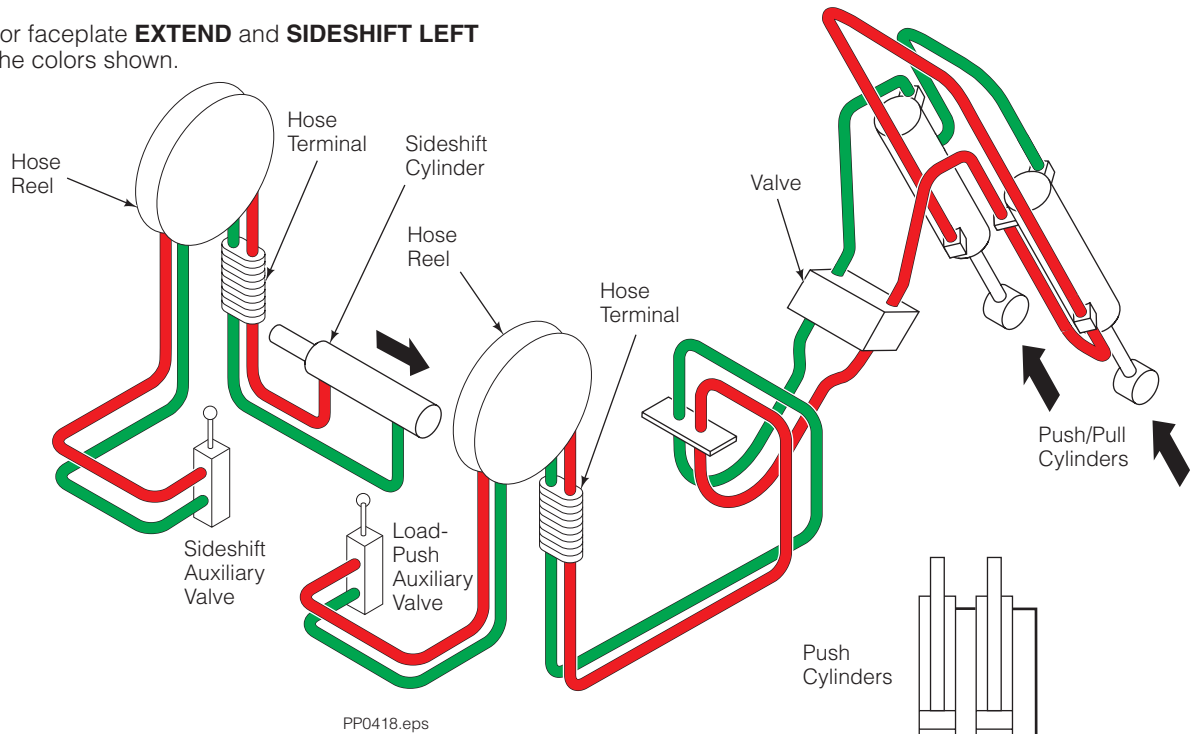


3.3-7 Hosing Diagram – Load Push with Pressure Relief (Sideshifting)

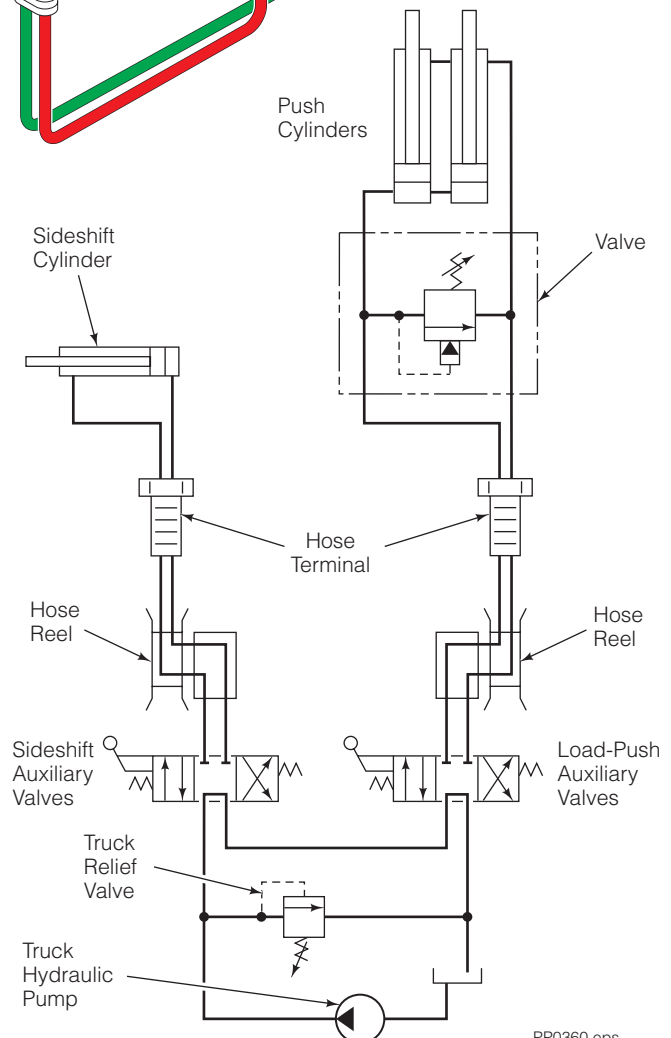
FACEPLATE RETRACT and SIDESHIFT RIGHT

PRESSURE █
RETURN █

NOTE: For faceplate **EXTEND** and **SIDESHIFT LEFT** reverse the colors shown.



3.3-8 Circuit Schematics – Load Push with Pressure Relief (Sideshifting)



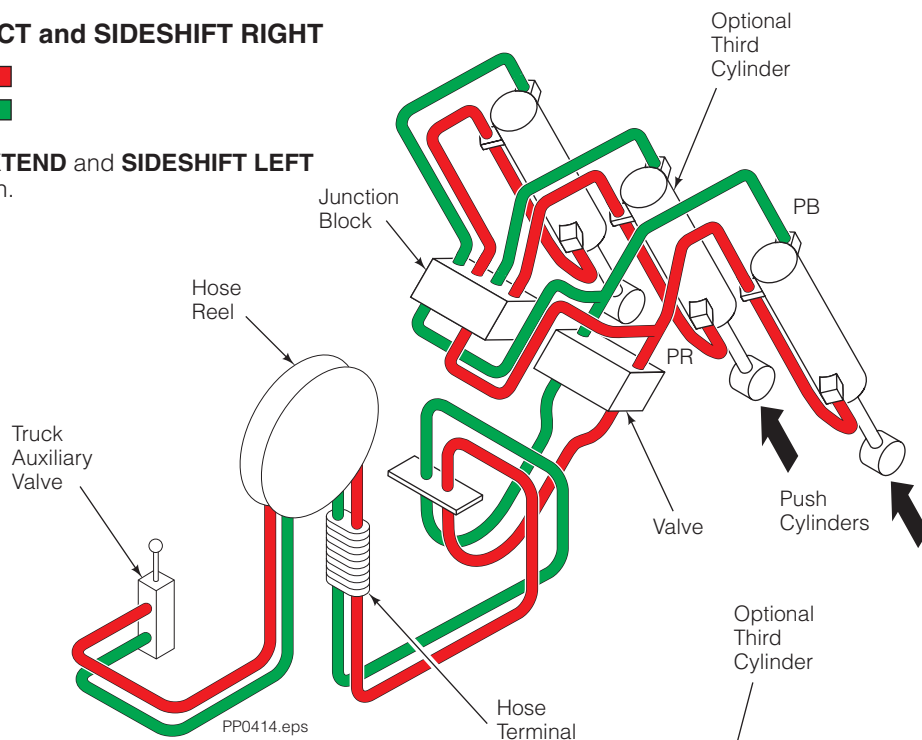
3.3-9 Hosing Diagram – Wide Load Push

FACEPLATE RETRACT and SIDESHIFT RIGHT

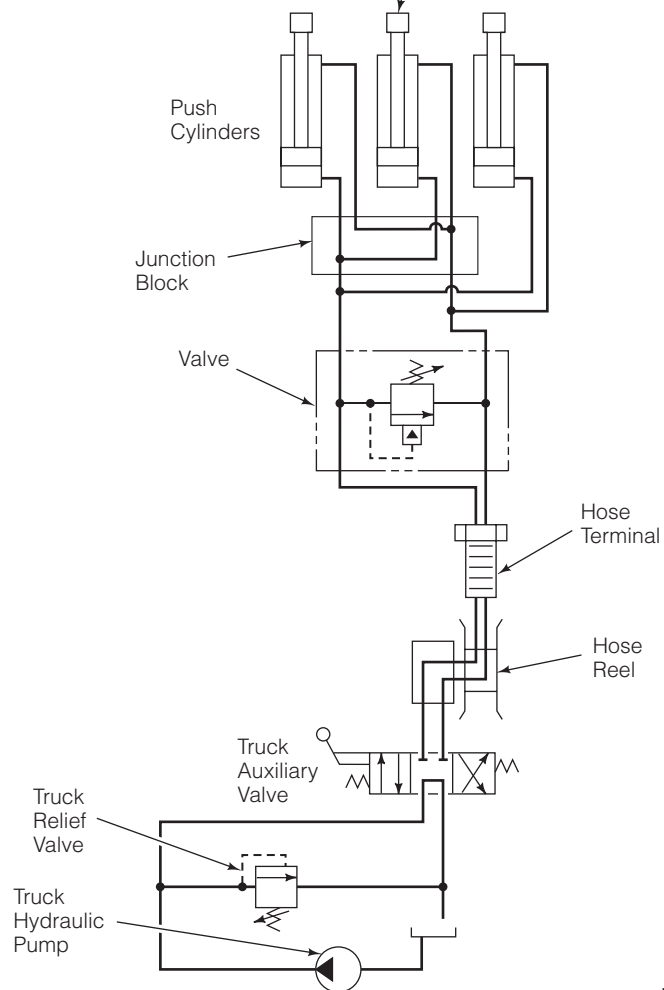
PRESSURE █

RETURN █

NOTE: For faceplate **EXTEND** and **SIDESHIFT LEFT** reverse the colors shown.



3.3-10 Circuit Schematics – Wide Load Push



3.4 Sheet-Save™ Plumbing

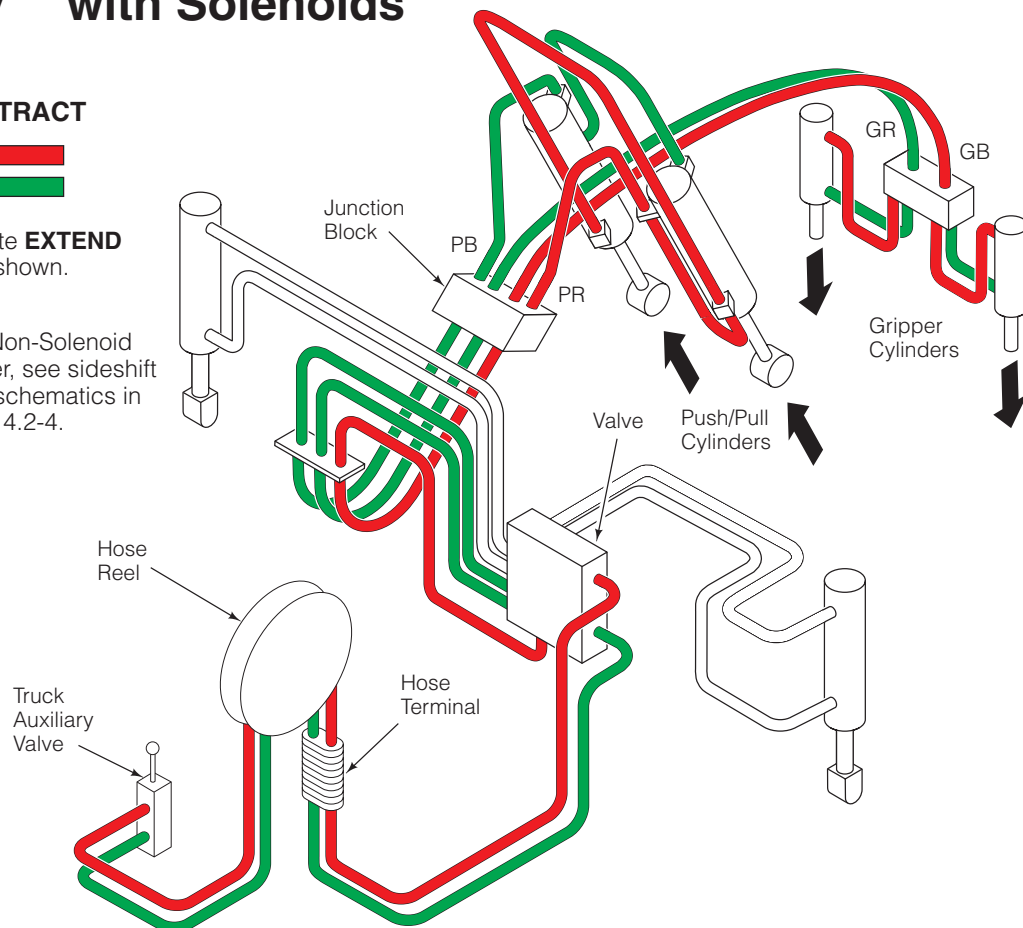
3.4-1 Hosing Diagram – Sheet-Sav™ with Solenoids

FACEPLATE RETRACT

PRESSURE █
RETURN █

NOTE: For faceplate **EXTEND** reverse the colors shown.

NOTE: Units with Non-Solenoid activated sidsifter, see sidsift hosing and circuit schematics in Sections 4.2-3 and 4.2-4.

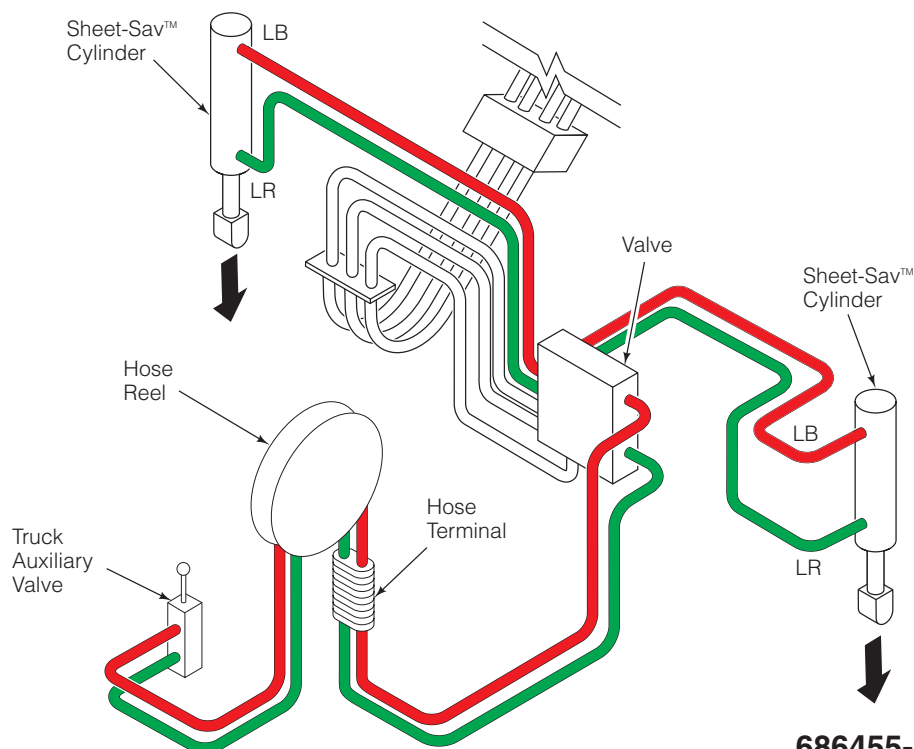


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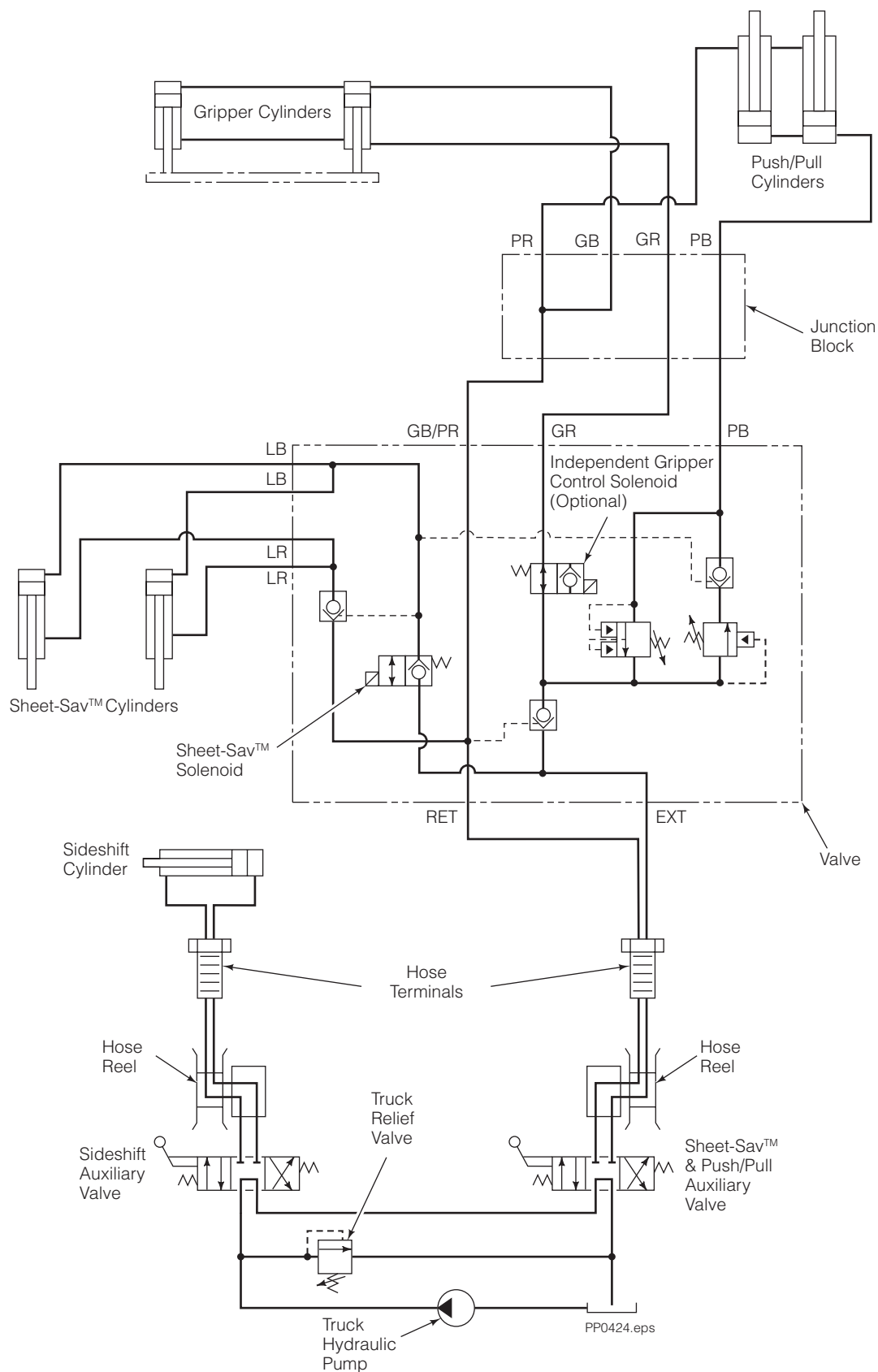
SHEET-SAV™ LIFT

PRESSURE █
RETURN █

NOTE: For Sheet-Sav™ **STOMP** reverse the colors shown.



3.4-2 Circuit Schematics – Sheet-Sav™ with Solenoids (Sideshifting)

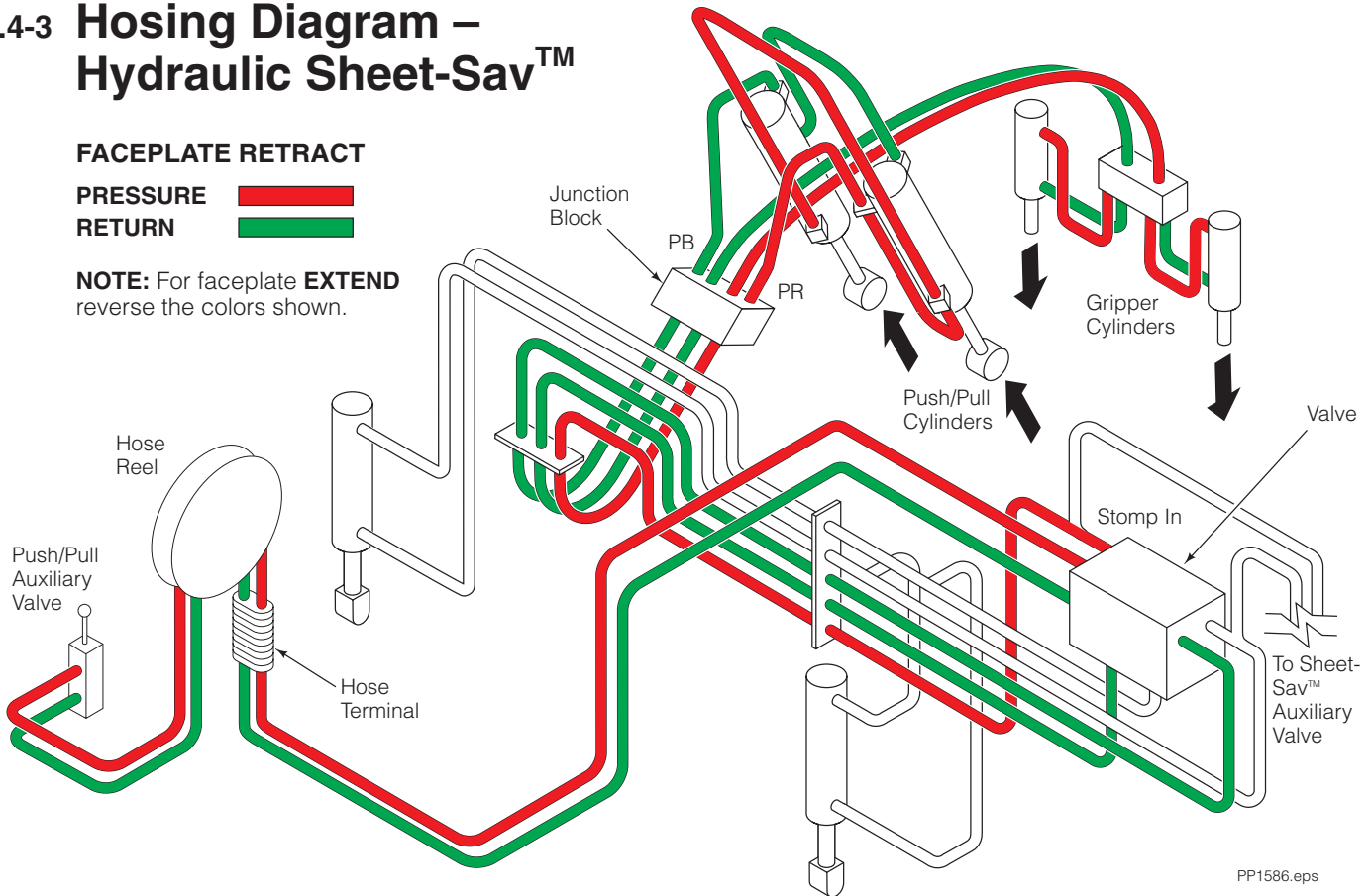


3.4-3 Hosing Diagram – Hydraulic Sheet-Sav™

FACEPLATE RETRACT

PRESSURE —
RETURN —

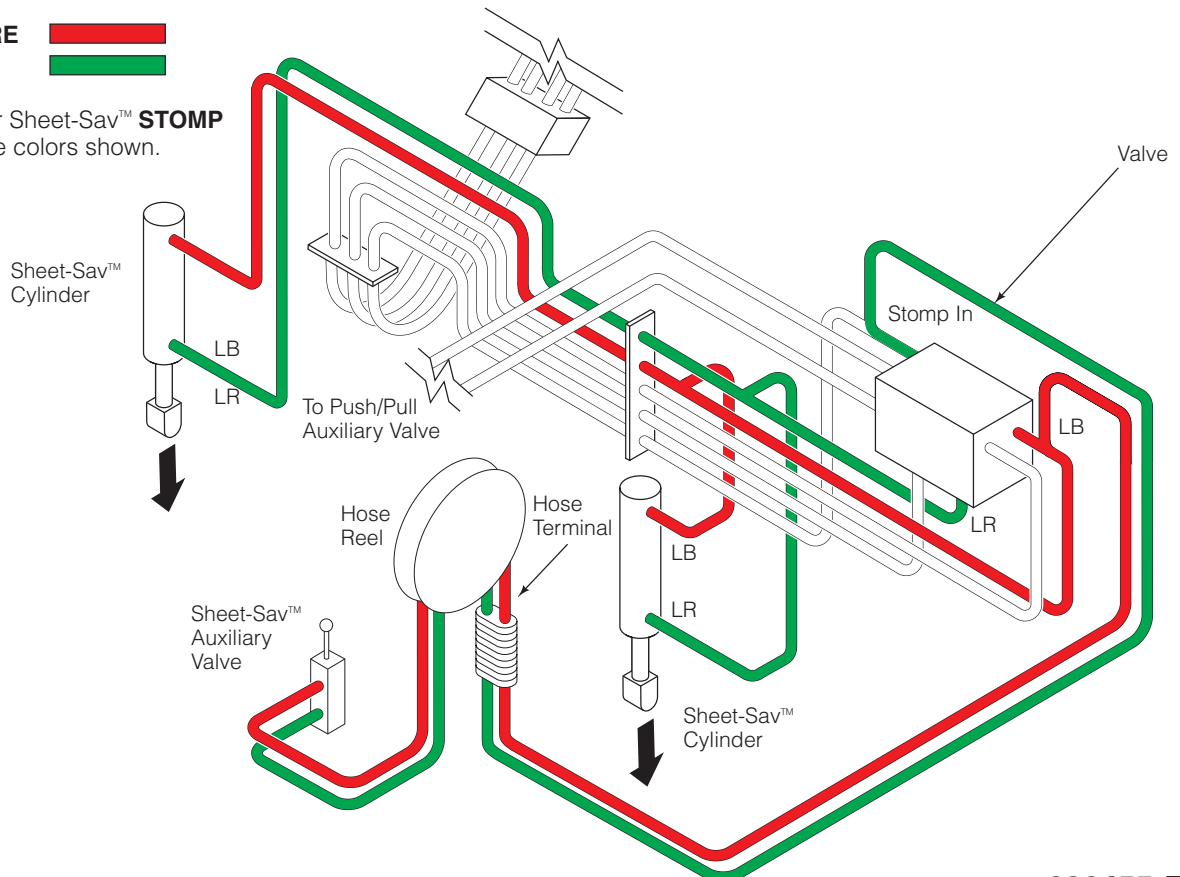
NOTE: For faceplate **EXTEND** reverse the colors shown.



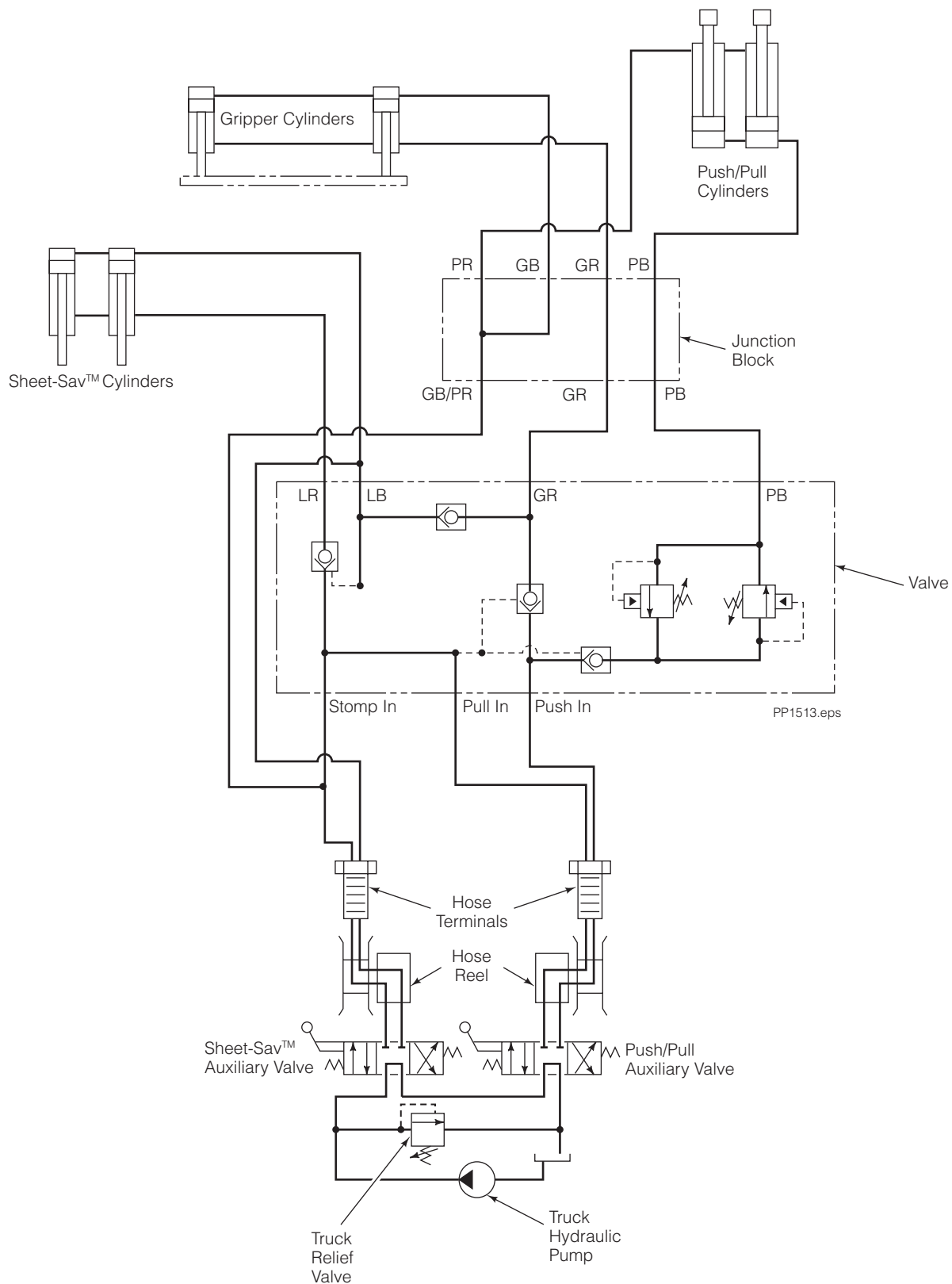
SHEET-SAV™ LIFT

PRESSURE —
RETURN —

NOTE: For Sheet-Sav™ **STOMP** reverse the colors shown.



3.4-4 Circuit Schematics – Hydraulic Sheet-Sav™



3.5 Push/Pull Circuit

There are seven potential problems that could affect push/pull operation.

- Incorrect hydraulic pressure/volume from truck.
- Physically jammed mechanism.
- External leaks.
- Worn or defective cylinder seals.
- Valve assembly malfunction.
- Kinked supply hoses.
- Incorrect adjustment on gripper sequence control valves.



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

- 1** 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. **TRUCK PRESSURE MUST NOT EXCEED 2300 PSI (160 BAR)**, measured at the truck 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 troubleshooting.

3.5-1 Push Function

Gripper bar will not raise –

- Kinked hoses.
- Physically jammed jaw assembly.
- Valve out of sequence. Refer to Section 4.3-3.

Gripper bar drifts down –

- Valve's check valve cartridge is stuck in open position due to contamination or damaged seals. Refer to Section 4.3-3.
- Damaged seal in gripper cylinder. Refer to Section 4.4-1.

Gripper bar raises but faceplate does not extend –

- Valve is out of sequence. Refer to Section 4.3-3.
- Valve's relief cartridge is stuck in closed position due to contamination or damaged seals. Refer to Section 4.4-1.

Faceplate extends slowly –

- Worn seal in push/pull or gripper cylinders. Refer to Section 4.4.

3.5-2 Pull Function

Faceplate retracts before gripper bar fully closes –

- Gripper sequence valve requires adjustment. Refer to Section 4.3-3.
- Check gripper hose size and length. Hoses must be Parker Twinline 550 H-5 (or equivalent), 41 in. (104 cm) long with No. 6 fittings.

Gripper bar will not lower –

- Physically jammed mechanism.
- Valve's check valve cartridge is stuck in closed position due to contamination or damaged seals. Refer to Section 4.3-1 or 4.3-2.

Gripper bar lowers but faceplate does not retract –

- Valve's check valve cartridge is stuck in closed position due to contamination or damaged seals. Refer to Section 4.3-1 or 4.3-2.
- Worn seals in the push/pull cylinders. Refer to Section 4.4.

Gripper bar does not hold slipsheet during faceplate retract –

- Damaged gripper pad or jaw.
- Worn seals in gripper cylinders. Refer to Section 4.4.

3.6 Sideshift Circuit

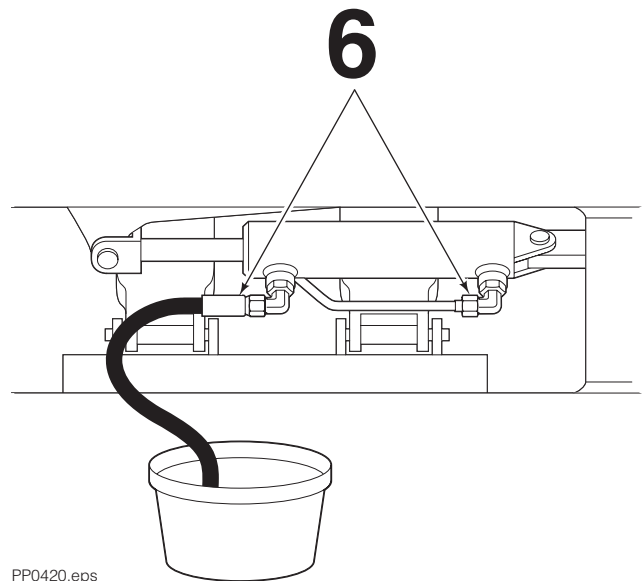
There are seven potential problems that could affect sideshifting operation.

- Insufficient hydraulic pressure/volume from the truck.
- External leaks.
- Faulty electrical connection (solenoid-equipped attachments).
- Defective solenoid valve (solenoid equipped attachments).
- Lower mounting hooks installed incorrectly. See Section 4.1-1 Step 2 or 4.1-2 Step 3.
- Worn bearings. See Section 4.5-2.
- Worn or defective cylinder seals.



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

- 1 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. **TRUCK PRESSURE 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 troubleshooting.
- 3 **Solenoid equipped attachments** – Press the control knob push/pull button.
 - If the solenoid valve 'clicks', it is working correctly. Continue the troubleshooting check list.
 - If the solenoid valve does not 'click', the solenoid valve is faulty. Troubleshoot the electrical circuit as described in Section 3.8.
 - If the solenoid still does not 'click', the solenoid valve is faulty. Service the solenoid valve as described in Section 4.8-1.
- 4 Inspect the sideshift bearing blocks between the truck carriage and attachment frame for excessive wear. Replace if necessary. Refer to Section 4.5-2.
- 5 Sideshift completely to the left and hold the control handle in this position for 5 seconds. Check for external leaks at the cylinder, fittings and hoses.
- 6 Disconnect and plug the cylinder rod end hose or tube. Install a drain hose and place the hose end in a bucket. Start the truck. Actuate the control handle to pressure the base end of the cylinder for 5 seconds.
 - If there is oil flowing out of the rod end of the cylinder, the cylinder seals are defective and require service. Refer to section 4.4-3.
 - If there is no oil flow out of the rod end of the cylinder, the problem is not hydraulic.



PP0420.eps

3.7 Hydraulically Positioned Platen Circuit

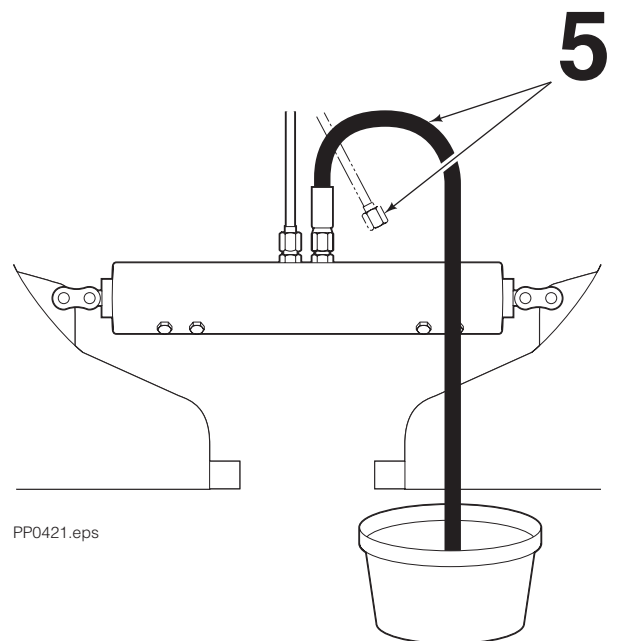
There are five potential problems that could affect sideshifting operation.

- Insufficient hydraulic pressure/volume from the truck.
- External leaks.
- Faulty electrical connection (solenoid-equipped attachments).
- Defective solenoid valve (solenoid equipped attachments).
- Worn or defective cylinder seals.



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

- 1** 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. **TRUCK PRESSURE 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 troubleshooting.
- 3** Press the control knob push/pull button.
 - If the solenoid valve 'clicks', it is working correctly. Continue the troubleshooting check list.
 - If the solenoid valve does not 'click', the solenoid valve is faulty. Troubleshoot the electrical circuit as described in Section 3.8.
 - If the solenoid still does not 'click', the solenoid valve is faulty. Service the solenoid valve as described in Section 4.8-1.
- 4** Extend faceplate. Position the platens outward and hold the control handle in this position for 5 seconds. Check for external leaks at the cylinder, fittings and hoses.
- 5** Disconnect and plug the cylinder rod side hose or tube. Install a drain hose and place the hose end in a bucket. Start the truck. Actuate the control handle to pressure the base end of the cylinder for 5 seconds.
 - If there is oil flowing out of the rod side of the cylinder, the cylinder seals are defective and require service. Refer to section 4.4-4.
 - If there is no oil flow out of the rod side of the cylinder, the problem is not hydraulic.



3.8 Electrical Circuit (Solenoid equipped attachments)

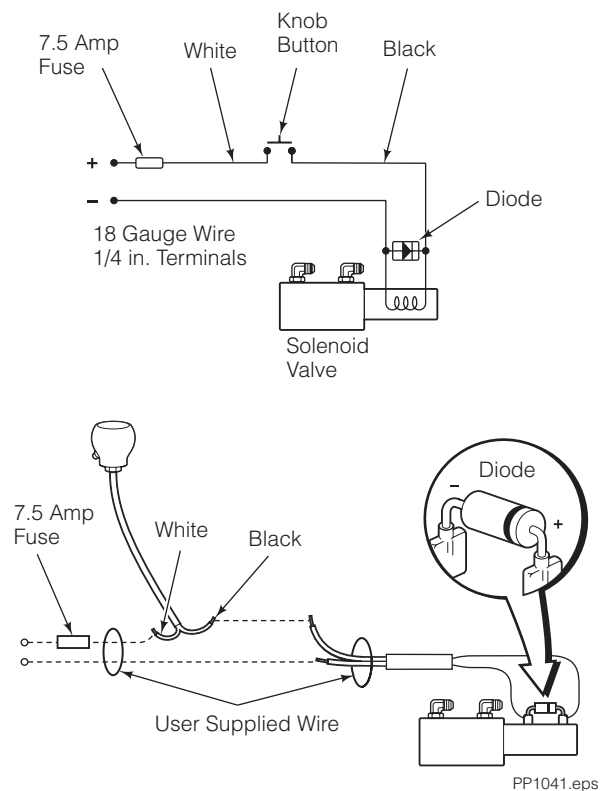
See the wire diagrams and schematic shown. Use the proper schematic while following the steps below.

- 1 Check the control knob circuit fuse. Replace as necessary.
- 2 Check the solenoid coil to make sure it matches the truck voltage. The coil voltage is marked at the terminals. Verify by checking the resistance across the terminal with wired disconnected.

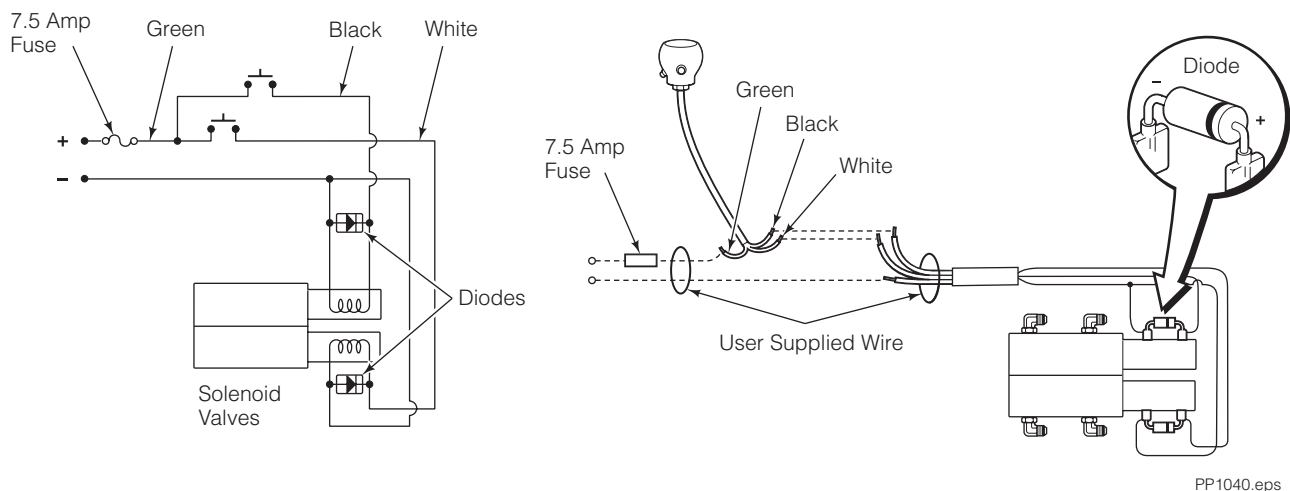
Coil Voltage	Ohms Resistance
12V	2
24V	14
36V	36
48V	44

 - If there is no ohmmeter reading shown, the solenoid coil is defective and requires replacing. Refer to Section 4.8-1
- 3 Check for truck voltage at the solenoid coil terminals when the knob button is pushed.
- 4 Check for loose electrical connection at the truck ignition switch, control knob button(s), solenoid valve terminals and diodes.
- 5 Remove the diode(s) from the solenoid valve terminals. 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.

Two Function (One Button Control Knob)



Three Function (Two Button Control Knob)



4.1 Attachment Removal

4.1-1 Dedicated Push/Pulls

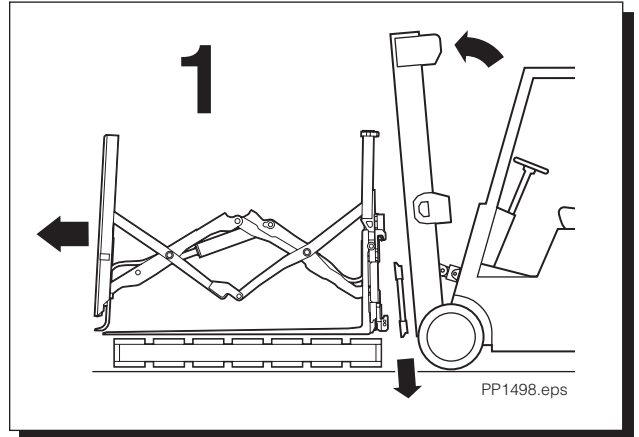
- 1 Fully extend the faceplate. Lower the attachment onto a pallet.
- 2 Disconnect the lower hooks.

Bolt-On Hooks – Remove the lower mounting hooks. For reassembly, tighten the capscrews to a torque of 125 ft.-lbs. (170 Nm).

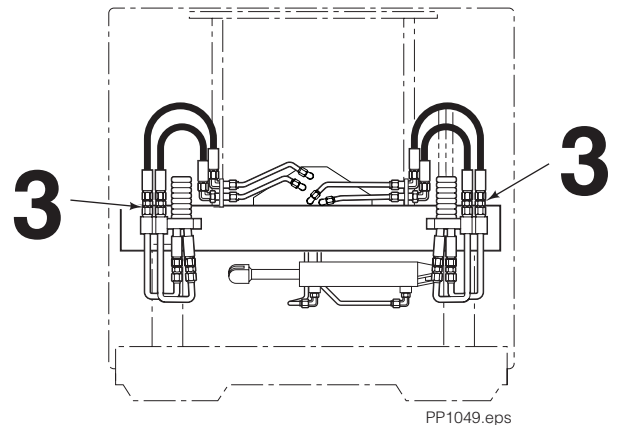
Quick-Change Hooks – Pull out the retaining pins, slide the hooks down and reinstall the pins in the lower holes. For reassembly, slide the hooks up and install the pins in the top holes.



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

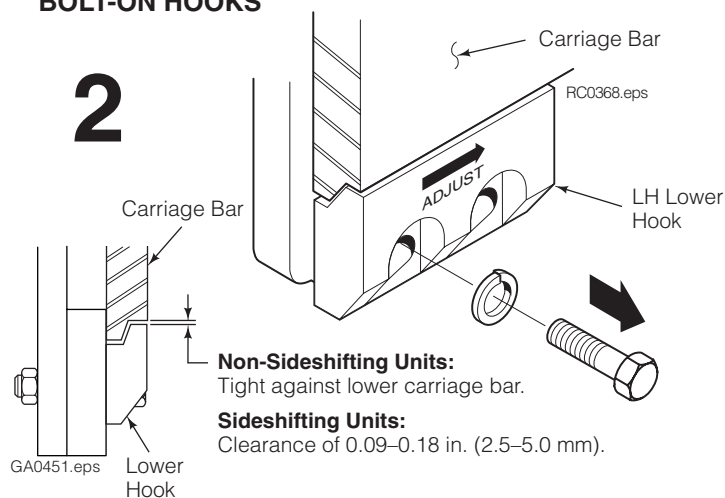


- 3 Disconnect, tag and plug the hoses at the carriage hose terminals.
- 4 **Solenoid Equipped Attachments** – Disconnect the electrical connection at the truck carriage.
- 5 Lower the truck carriage and back away from the attachment.
- 6 For installation, reverse the above procedures excepts the following items:
 - For complete installation procedures, refer to Installation Manual 684944.



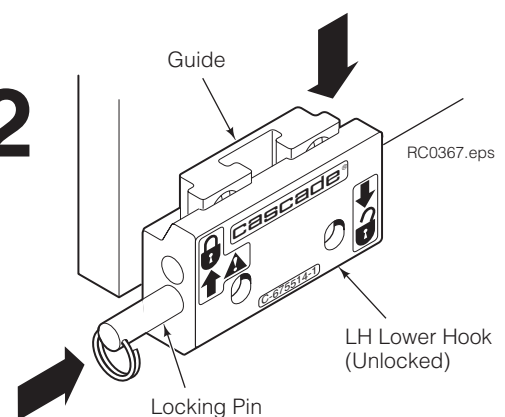
BOLT-ON HOOKS

2



QUICK-CHANGE HOOKS

2



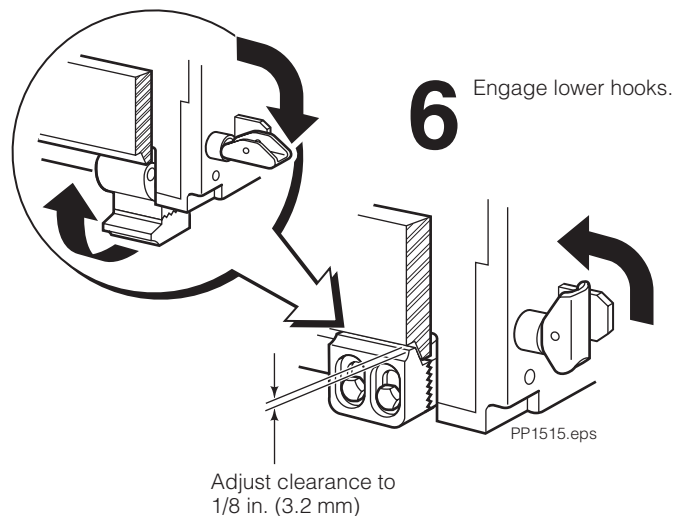
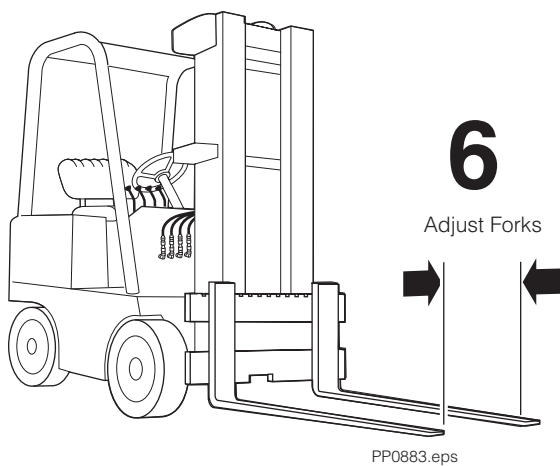
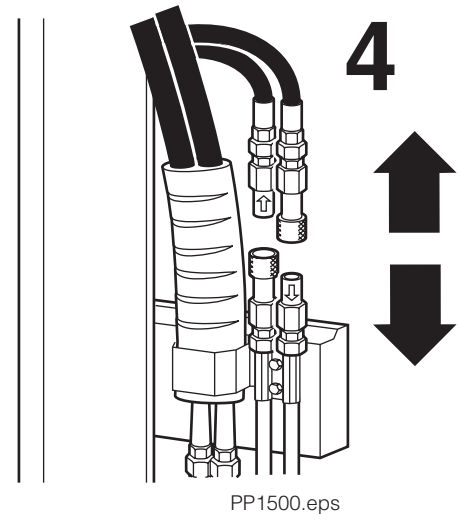
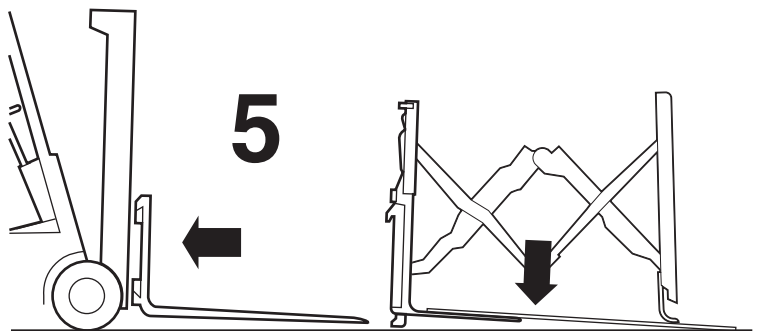
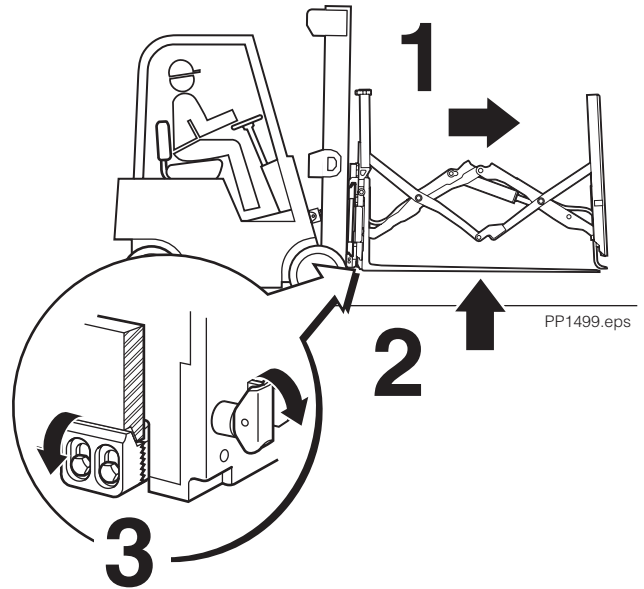
4.1-2 QFM™ Push/Pulls

- 1 Extend the faceplate.
- 2 Raise the platens 2 ft. (60 cm) off the floor.



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

- 3 Disengage the hooks from the lower carriage bar.
- 4 Disconnect, tag and plug the hoses at the carriage hose terminals.
- 5 Lower the attachment to the floor and back away.
- 6 For reassembly, reverse the above procedures excepts the following items:
 - For complete installation procedures, refer to Installation Manual 684948.



4.2 Faceplate and Arm Mechanism

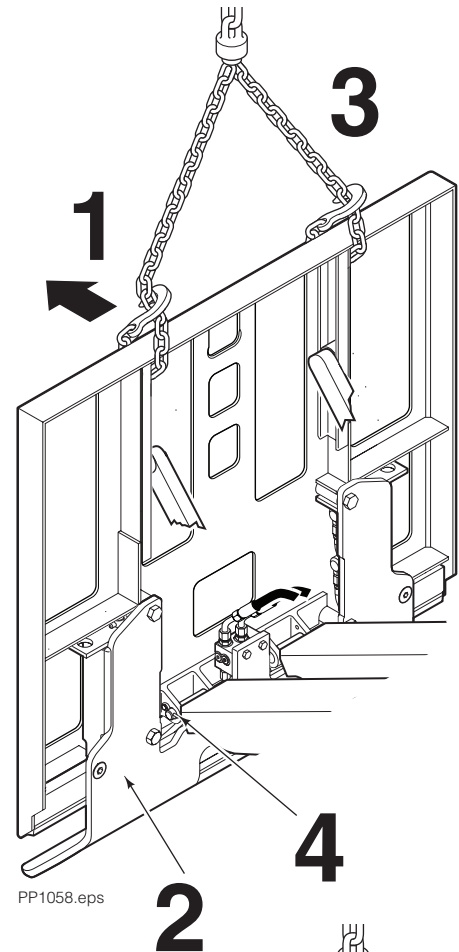
4.2-1 Faceplate Removal

- 1 Fully extend the faceplate.



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

- 2 Remove the gripper assembly from the faceplate as described in Section 4.2-2.
- 3 Attach an overhead hoist to the top of the faceplate and take up slack.
- 4 Remove the capscrews and eyepins from the inner secondary arm lower pivot pins. Remove the pivot pins. For reassembly, tighten the capscrew to a torque of 10 ft.-lbs. (13 Nm).
- 5 Remove the faceplate with the hoist. Tilt the faceplate to disengage the outer secondary arm bearings from the faceplate channels. Set the faceplate face down.



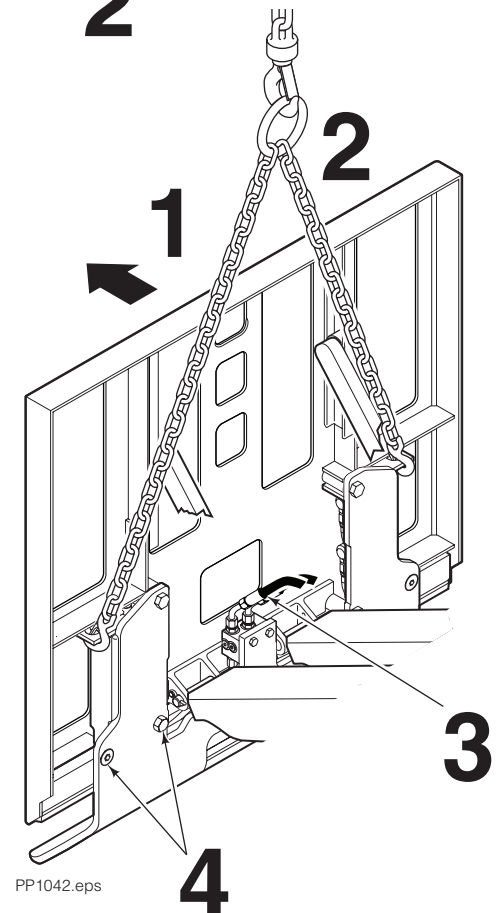
4.2-2 Gripper Assembly Removal

- 1 Fully extend the faceplate.



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

- 2 Attach an overhead hoist to the gripper assembly lifting holes and take up slack.
- 3 Disconnect, tag and plug the hoses from the junction block.
- 4 Remove the hex capscrews fastening the gripper assembly to the faceplate. For reassembly, clean and dry capscrews. Apply Loctite 242 (blue) to capscrews and tighten to a torque of 125 ft.-lbs. (170 Nm).
- 5 For reassembly, reverse the above procedures.

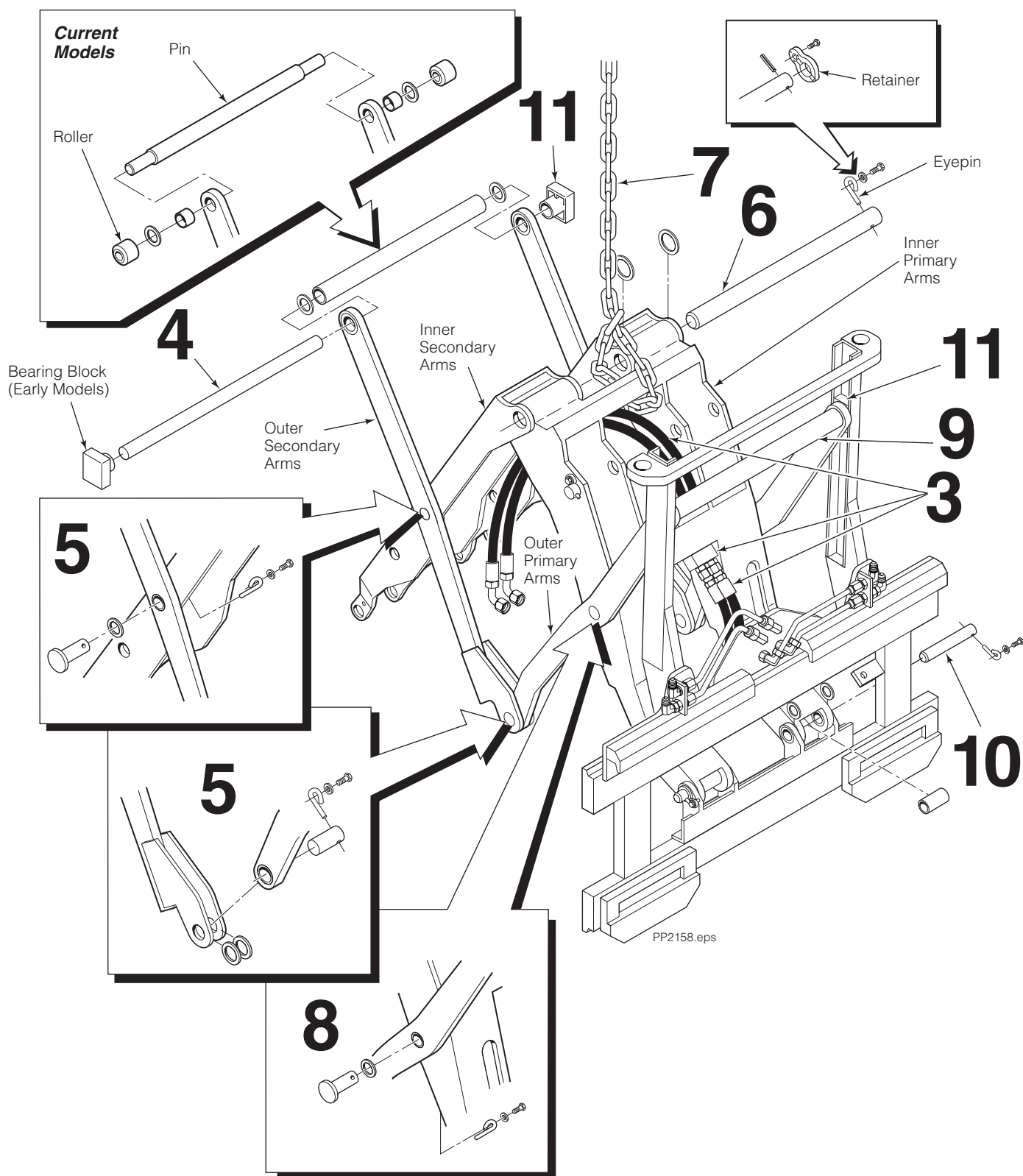


4.2-3 Arm Mechanism Disassembly



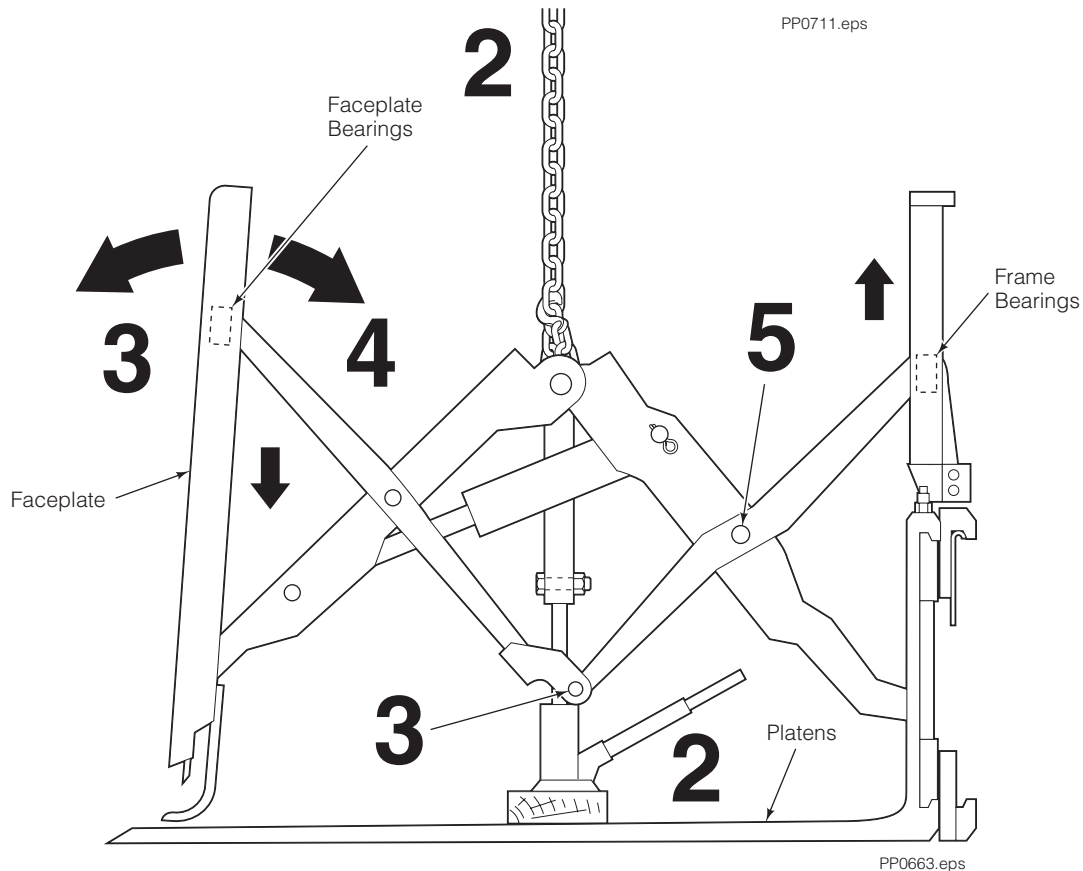
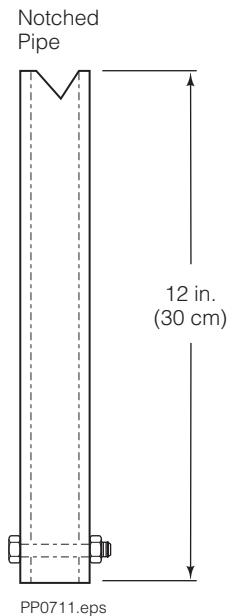
WARNING: Before removing any hoses, relieve pressure in the hydraulic system. With the truck off, open the truck auxiliary control valve(s) several times in both directions.

- 1 Remove the faceplate from the arm mechanism as described in Section 4.2-1.
- 2 Remove the push/pull cylinders from the mechanism arms as described in Section 4.4-2.
- 3 Disconnect, plug and tag the four hoses from the valve. Remove the valve from the inner primary arm. For reassembly, tighten the capscrews to a torque of 15 ft.-lbs. (20 Nm).
- 4 Remove the bearing blocks/roller, pin, spacer tube and shims from the outer secondary arms. Note the location of the shims for reassembly.
- 5 Remove the capscrews and eyepins from the outer secondary arm pivot pins points. Remove the pivot pins to remove the arms. For reassembly clean and dry capscrews. Apply Loctite 242 (blue) to capscrews and tighten to a torque of 10 ft.-lbs. (13 Nm).
- 6 Remove the capscrew and eyepins or retainers from the R.H. Inner Secondary Arm upper pivot point. Drive out the pivot pin to remove the inner secondary arms. Note the location of the shims for reassembly. For reassembly clean and dry capscrews. Apply Loctite 242 (blue) to capscrews and tighten to a torque of:
Eyepin Capscrews – 10 ft.-lbs. (13 Nm)
Retainer Capscrews – 21 ft.-lbs. (28 Nm)
- 7 Attach a hoist to the inner primary arm.
- 8 Remove the capscrews and eyepins from the outer primary arm center pivot points. Remove the pivot pins. Raise the primary arms out through the top of the frame guides.
- 9 Remove the bearing blocks, pin, spacer tube and shims from the outer primary arms. Note the location of the shims for reassembly.
- 10 Remove the capscrews and eyepins from the inner primary arm lower pivot pins. Note the location of the shim for reassembly. Remove the pivot pins and lift away the arm. For reassembly clean and dry capscrews. Apply Loctite 242 (blue) to capscrews and tighten to a torque of 10 ft.-lbs. (13 Nm).
- 11 For reassembly, reverse the above procedures except as follows:
 - Apply waterproof chassis grease (Whitmore OmniTask EP2 NLGI grade 2) to the bearing blocks/roller and faceplate and frame channels.



4.2-4 Frame and Faceplate Bearing Service

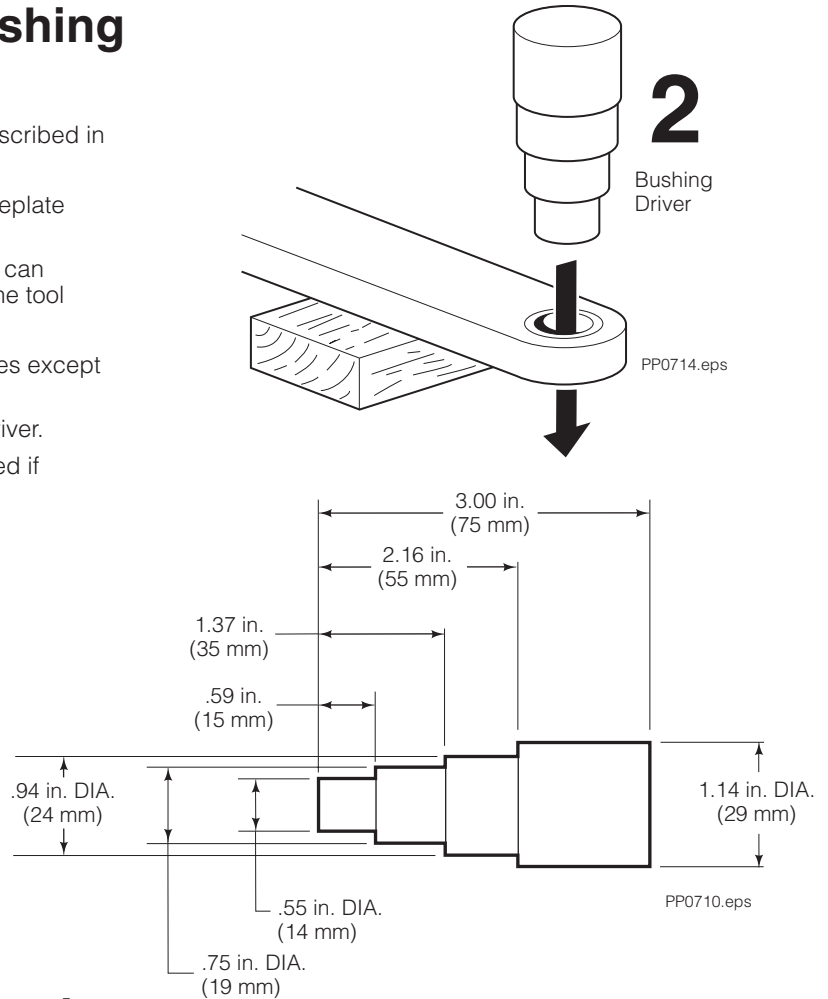
- 1 Extend the faceplate to the position shown.
- 2 Support the upper arm pivot pin using one of the following methods:
 - An overhead hoist hooked to the pin.
 - If an overhead hoist is unavailable, support the top pivot pin with a notched pipe (see pipe illustration), bottle jack and wood block placed on the platens.
- 3 Remove the outer secondary arm lower pins. Tilt the faceplate forward to disengage the bearings from the channels.
- 4 Install new faceplate bearings and reinstall to the faceplate channels. Tilt the faceplate back to support while removing frame bearings.
- 5 Remove the outer primary arm middle pivot pins. Raise the arms out through the top of the frame channels.
- 6 Install new frame bearings and reinstall to the frame channels.
- 7 Reinstall the pivot pins to the arms. Clean and dry capscrews. Apply Loctite 242 (blue) and tighten the retaining capscrews to a torque of 10 ft.-lbs. (13 Nm).



4.2-5 Arm and Faceplate Bushing Service

- 1 Remove the arms from the attachment as described in Section 4.2-3.
- 2 Remove the bushings from the arms and faceplate using a bushing driver:
 - If you do not have a bushing driver, a tool can be fabricated for bushing removal. See the tool illustrated for bushing driver dimensions.
- 3 For reassembly, reverse the above procedures except as follows:
 - Install new bushings using the bushing driver.

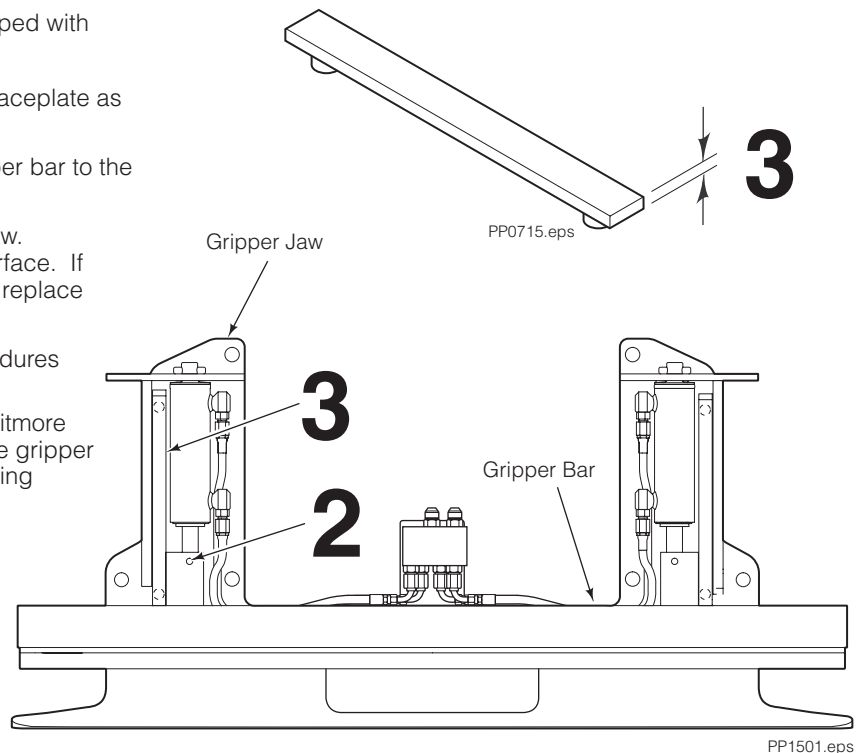
CAUTION: The bushings may be damaged if installed without a bushing driver.



4.2-6 Gripper Bar Bearing Service

NOTE: Early production units are not equipped with gripper bar bearing strips.

- 1 Remove the gripper assembly from the faceplate as described in Section 4.2-2.
- 2 Drive out the roll pins fastening the gripper bar to the gripper cylinder rods.
- 3 Remove the bearings from the gripper jaw. Measure the thickness of the bearing surface. If the thickness is less than 1/8 in. (3 mm), replace the bearings.
- 4 For reassembly, reverse the above procedures except as follows:
 - Apply waterproof chassis grease (Whitmore OmniTask EP2 or NLGI grade 2) to the gripper jaw and bearing contact surfaces during assembly.



4.3 Valve

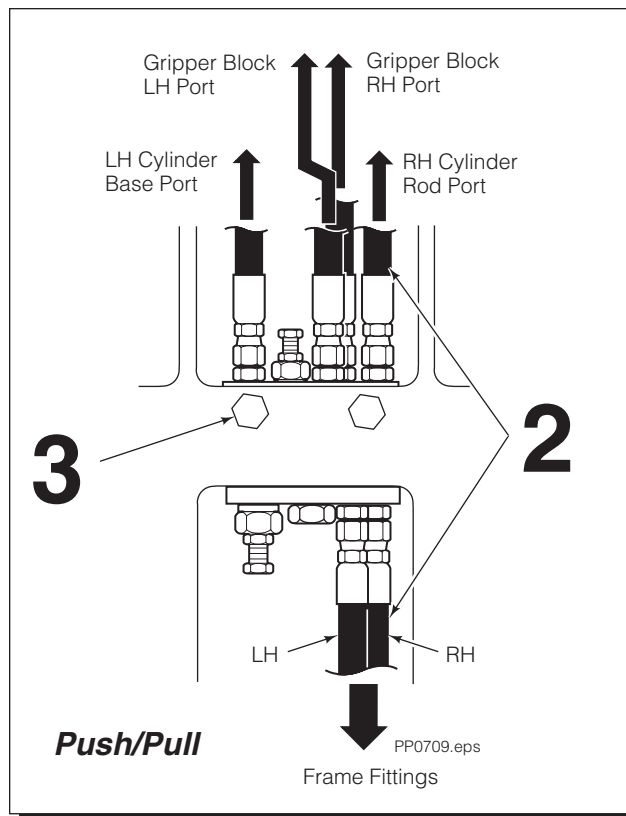
4.3-1 Push/Pull Valve Removal – Three Cartridge Valve

- 1 Fully extend the faceplate.

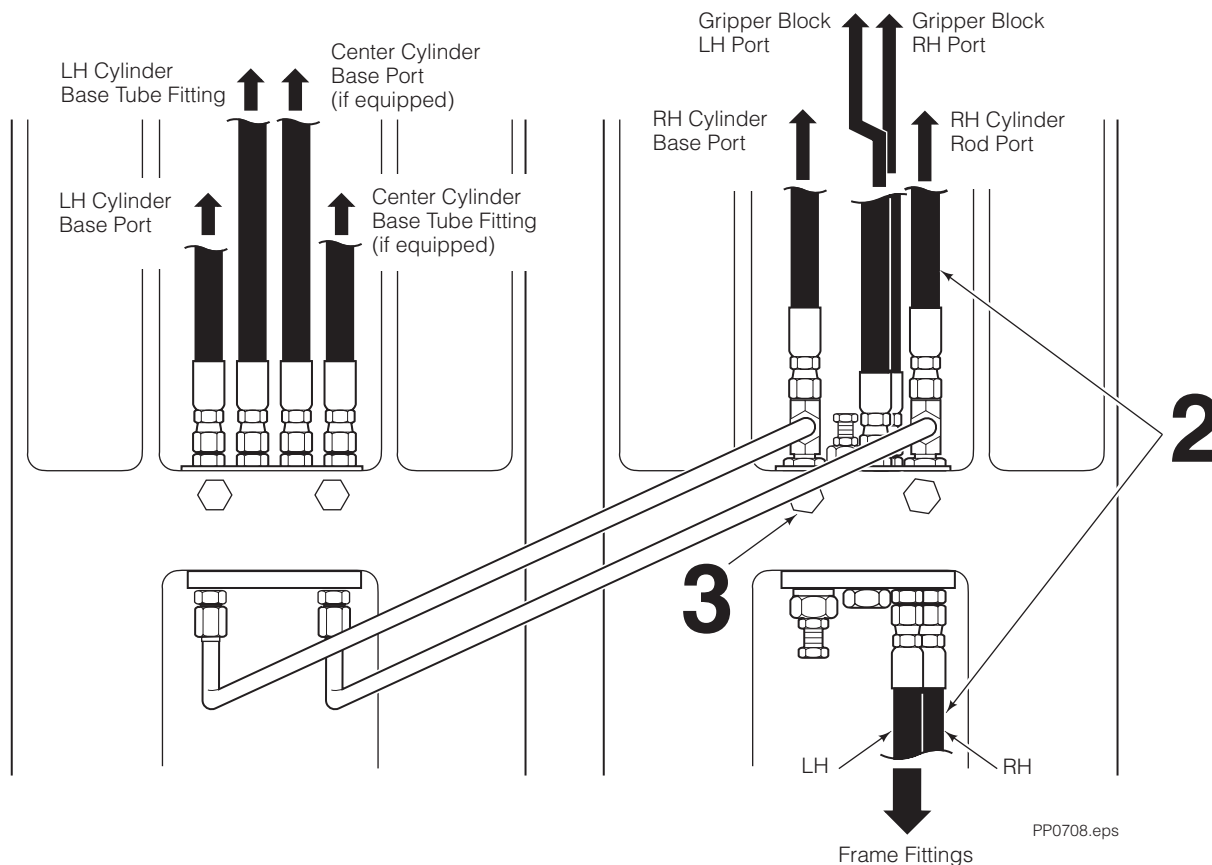


WARNING: Before removing any hoses, relieve pressure in the hydraulic system. With the truck off, open the truck auxiliary control valve(s) several times in both directions.

- 2 Disconnect, tag and plug the hoses from the valve fittings.
- 3 Remove the capscrews securing the valve to the arm. For reassembly, tighten the capscrews to a torque of 15 ft.-lbs. (20 Nm).



Wide Push/Pull



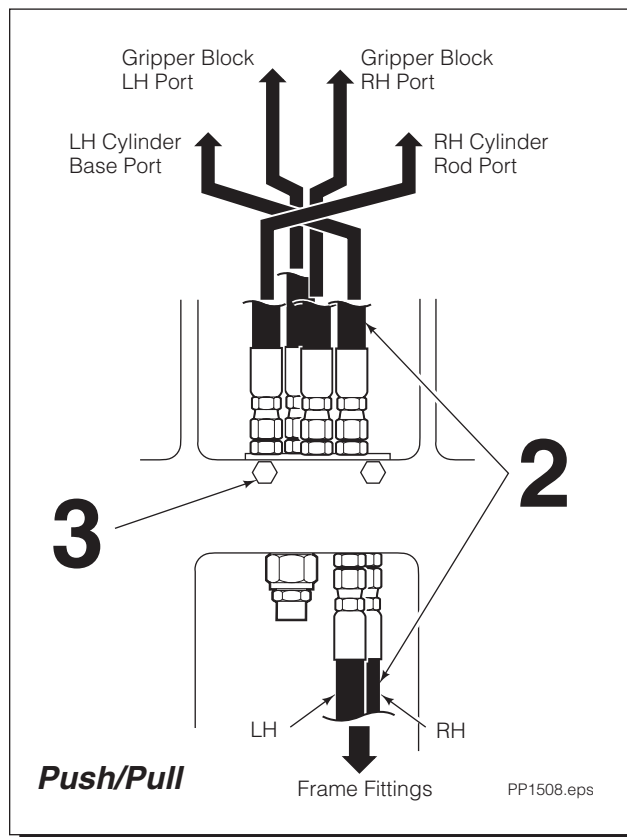
4.3-2 Push/Pull Valve Removal – One Cartridge Valve

1 Fully extend the faceplate.

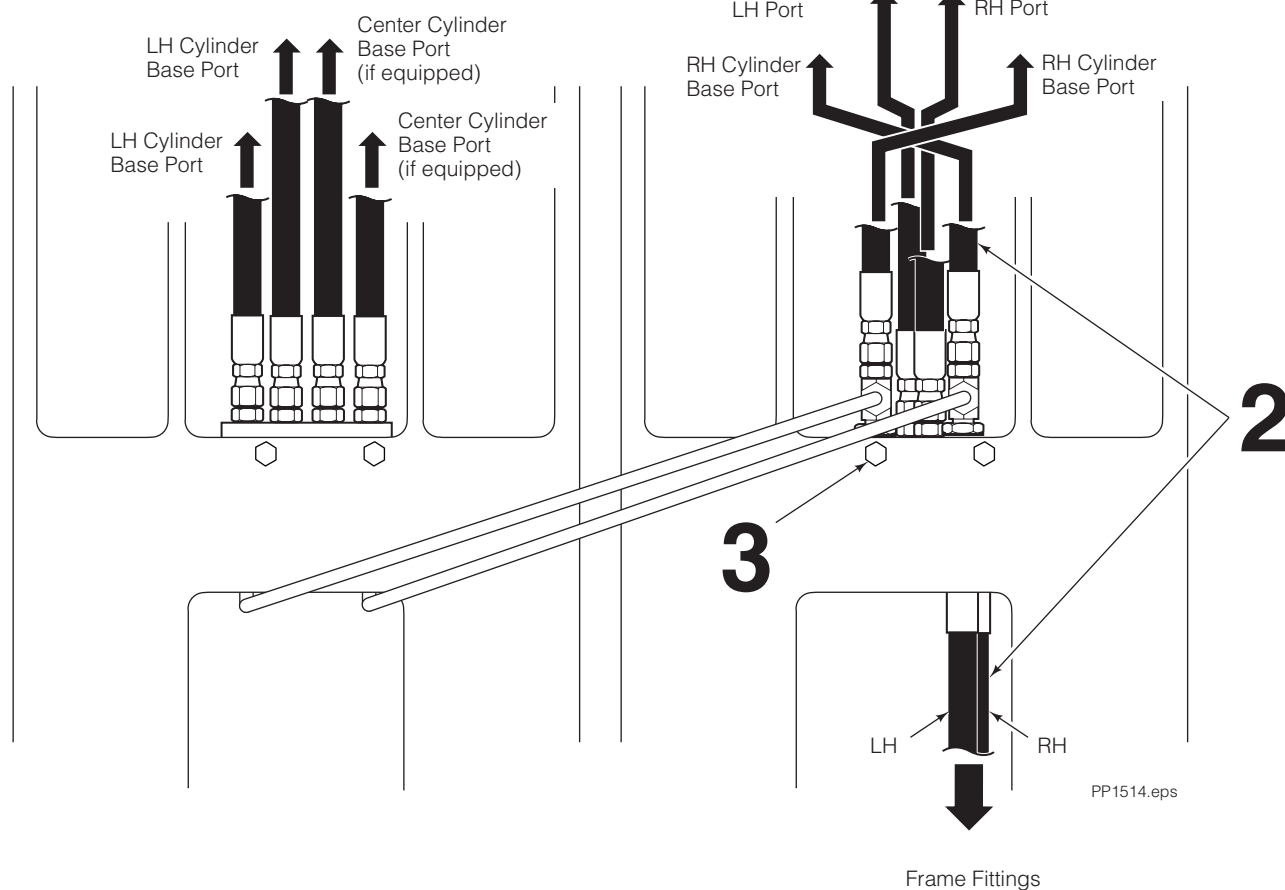


WARNING: Before removing any hoses, relieve pressure in the hydraulic system. With the truck off, open the truck auxiliary control valve(s) several times in both directions.

- 2 Disconnect, tag and plug the hoses from the valve fittings.
- 3 Remove the capscrews securing the valve to the arm. For reassembly, tighten the capscrews to a torque of 15 ft.-lbs. (20 Nm).



Wide Push/Pull

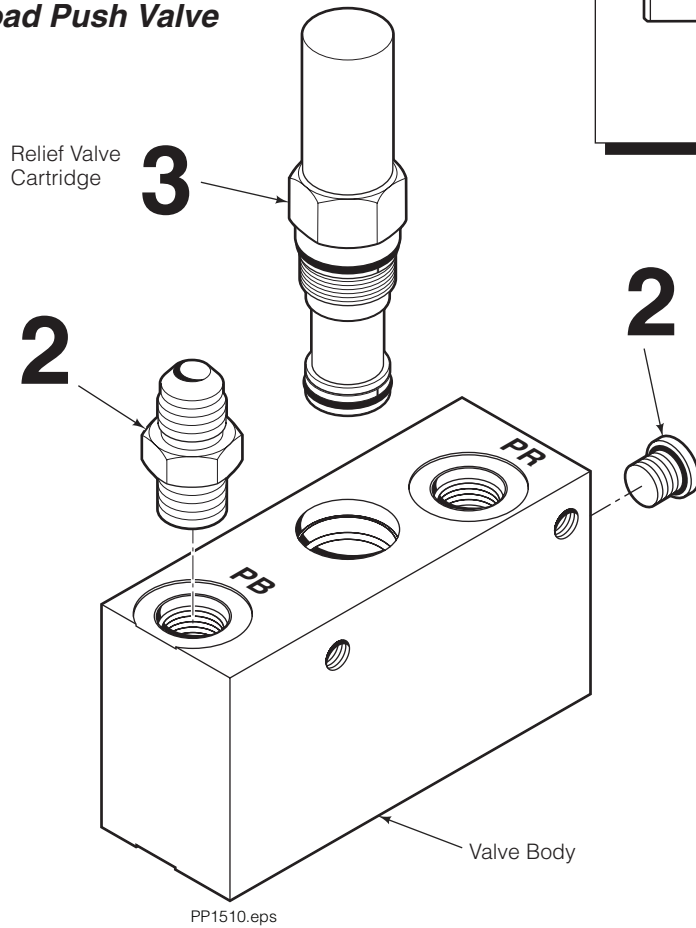


4.3-3 Valve Service

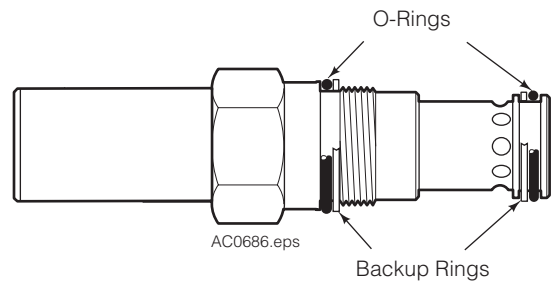
IMPORTANT: Service that valve in a clean work area.

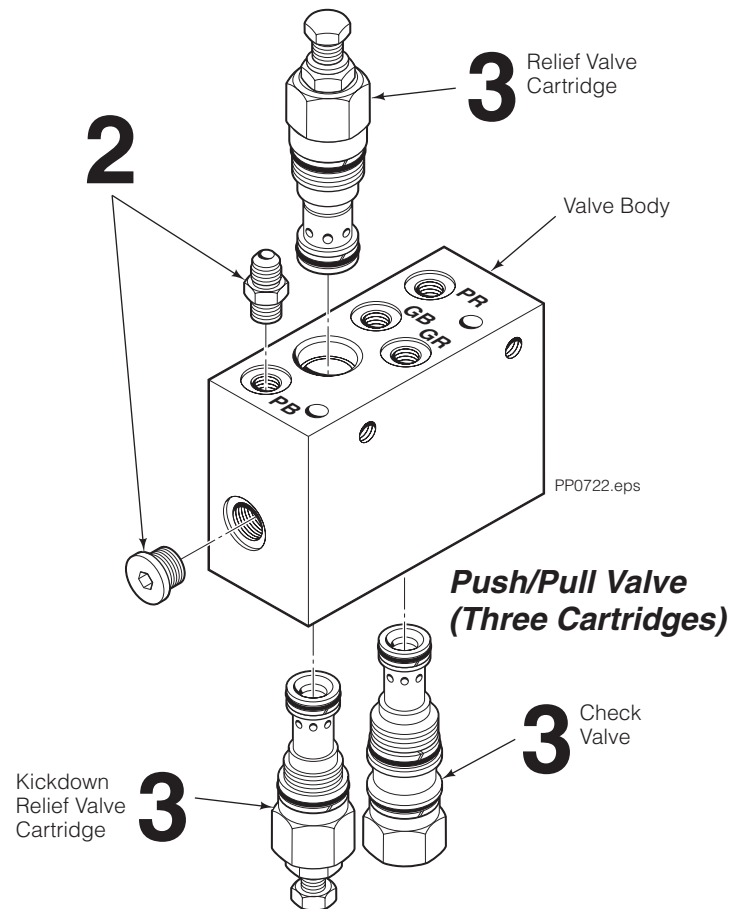
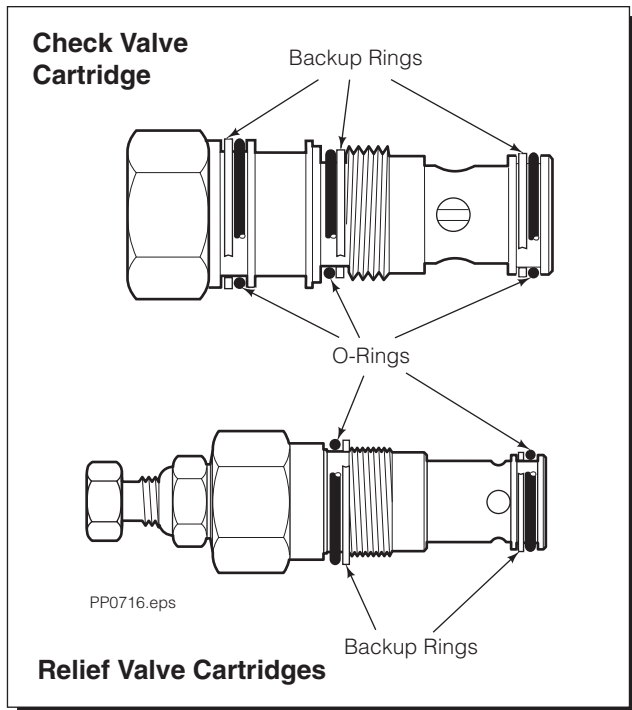
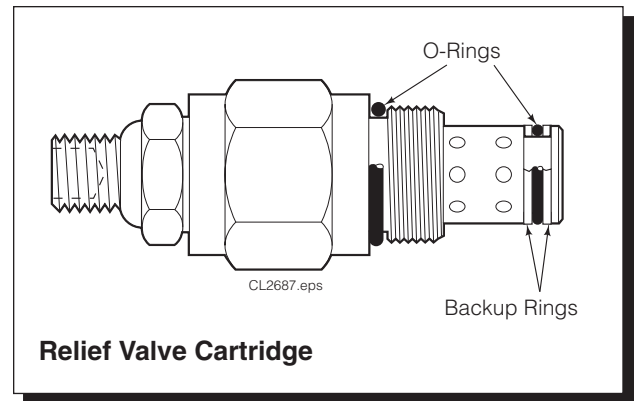
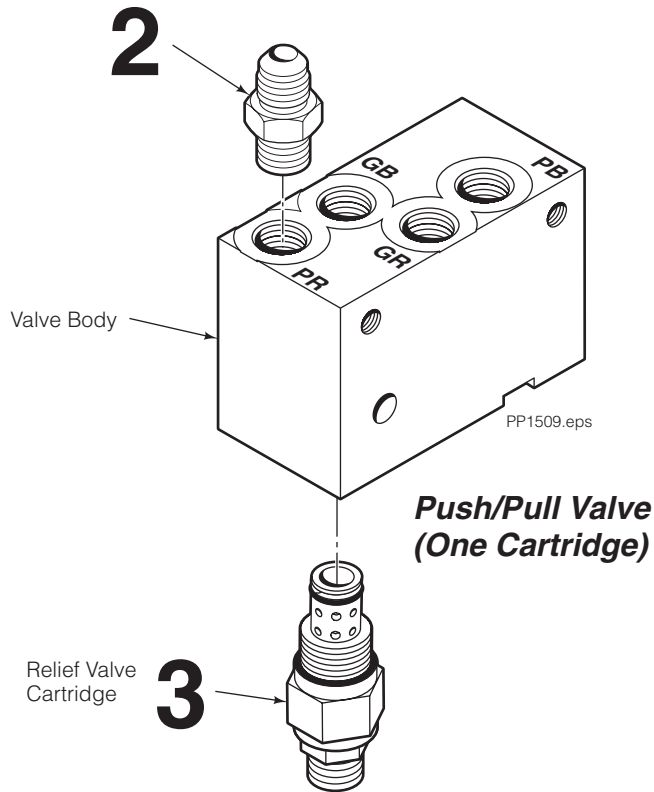
- 1 Remove the valve from the attachment as described in Section 4.3-1.
- 2 Remove fittings, plugs and cartridges.
- 3 Clean all parts with clean solvent. Remove any burrs or sharp edges with emery cloth
- 4 For reassembly, reverse the above procedures except as follows:
 - Install new O-rings and back-up rings on the cartridges.
 - Lubricate the cartridges with petroleum jelly prior to reassembly.
 - Tighten all fittings and cartridges to a torque of 15 ft.-lbs. (19 Nm).

Load Push Valve

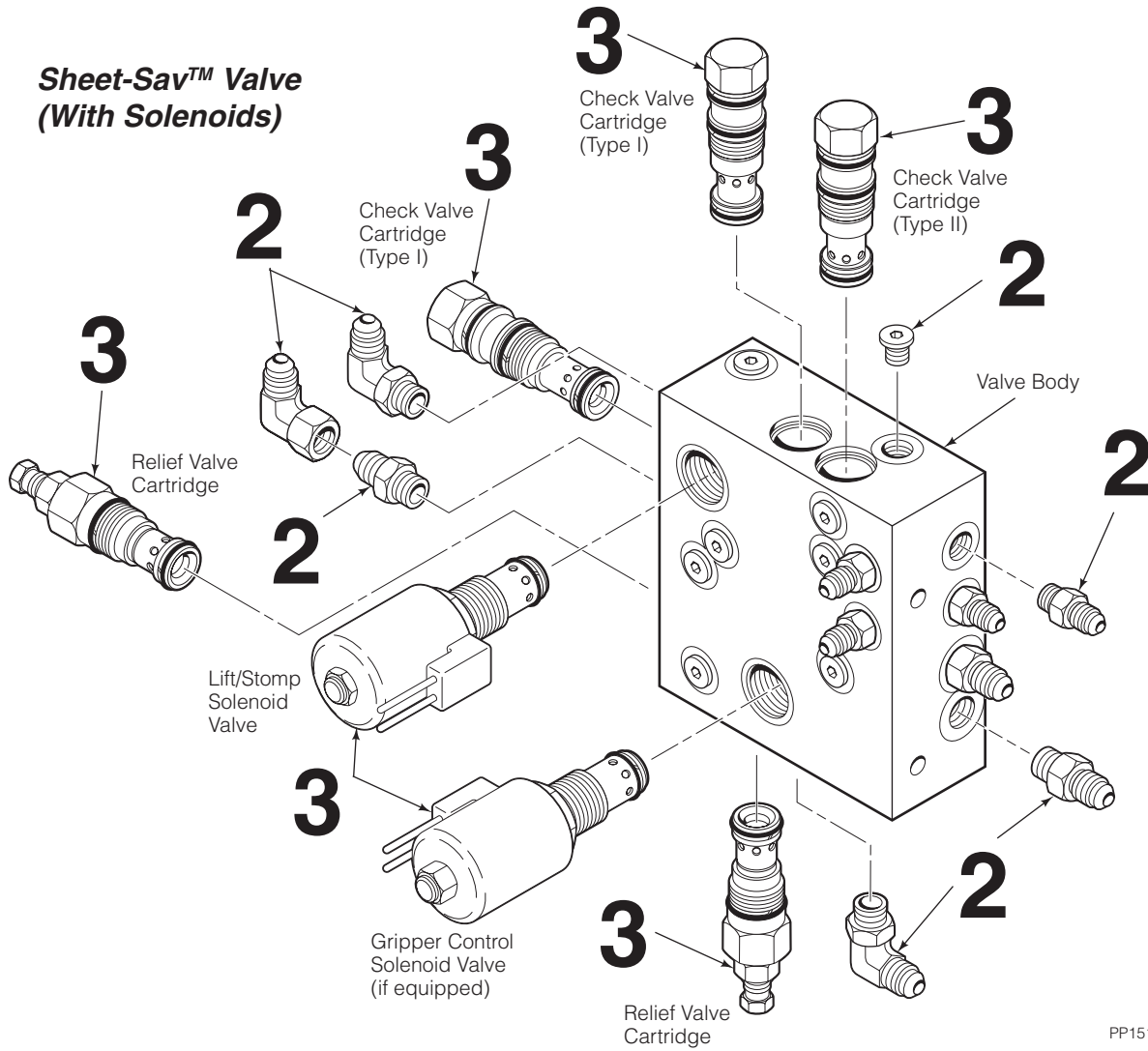


Relief Valve Cartridge



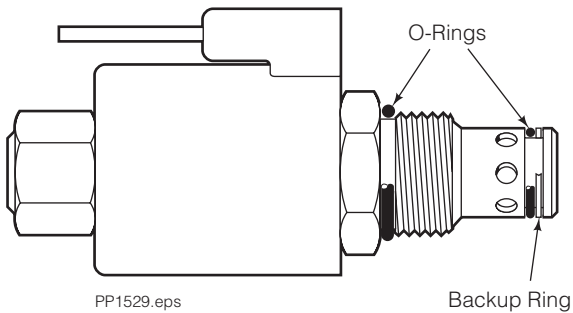


Sheet-Sav™ Valve (With Solenoids)



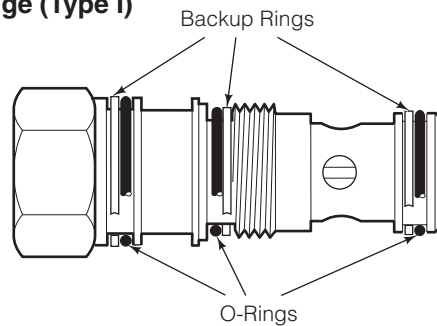
PP1511.eps

Solenoid Valve Cartridge

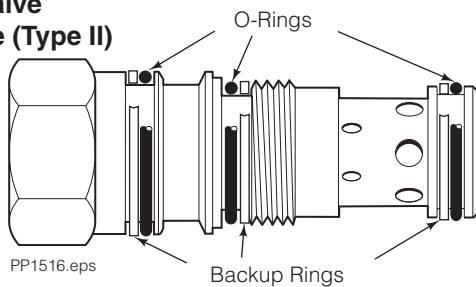


PP1529.eps

Check Valve Cartridge (Type I)

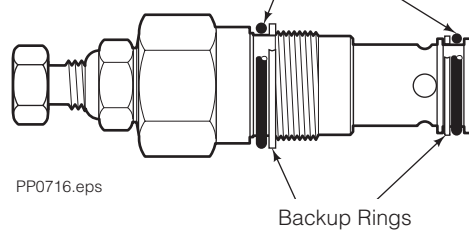


Check Valve Cartridge (Type II)



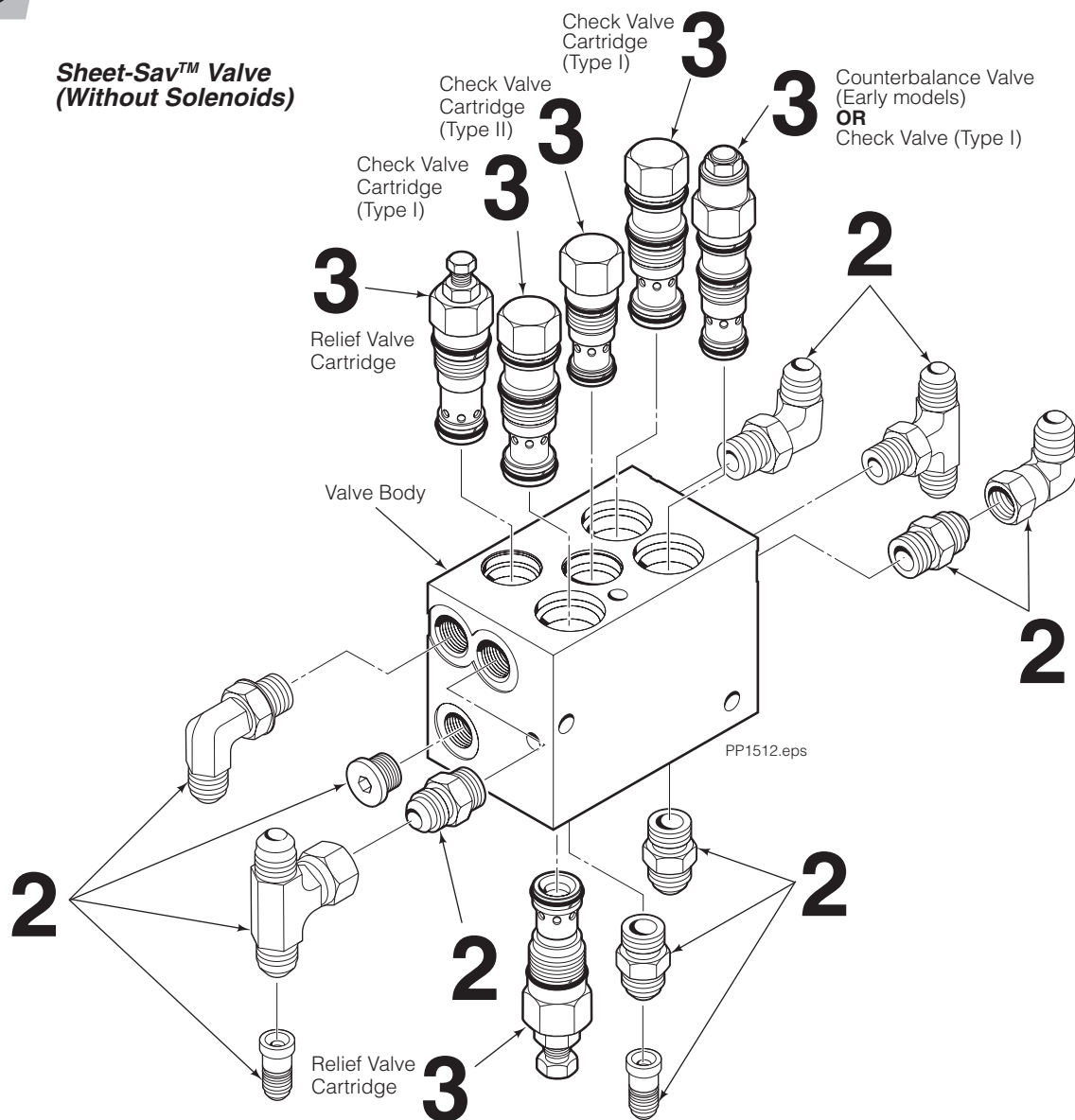
PP1516.eps

Relief Valve Cartridge



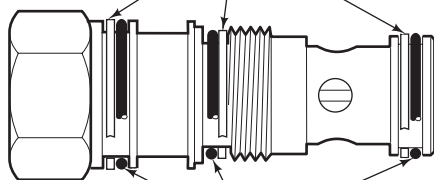
PP0716.eps

Sheet-Sav™ Valve (Without Solenoids)



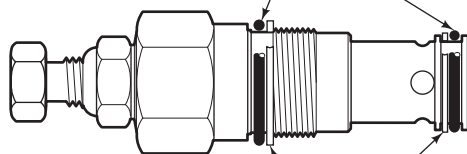
Check Valve Cartridge (Type I)

Backup Rings



Relief Valve Cartridge

O-Rings

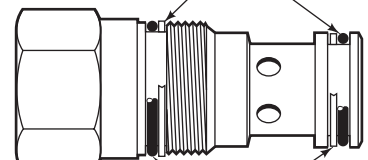


PP0716.eps

Backup Rings

Check Valve Cartridge (Type II)

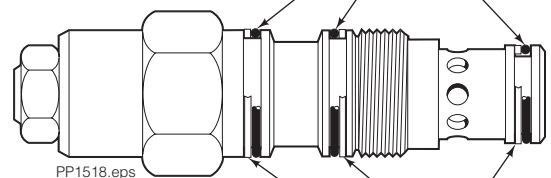
Backup Rings



PP1517.eps

O-Rings

Counterbalance Valve Cartridge



PP1518.eps

Backup Rings

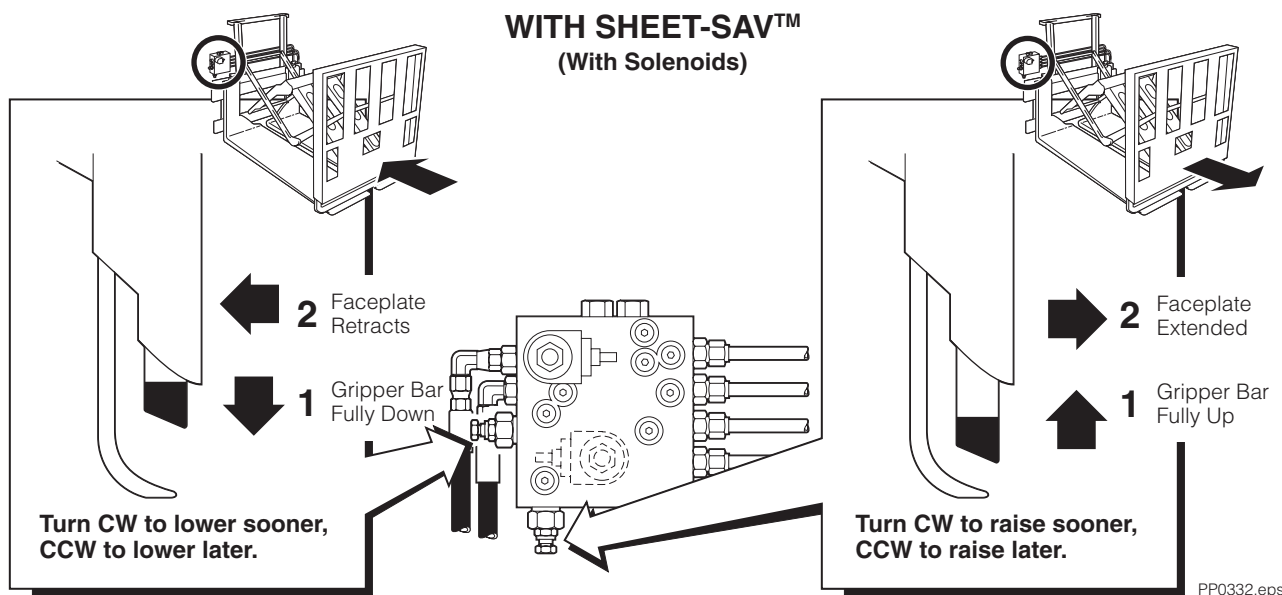
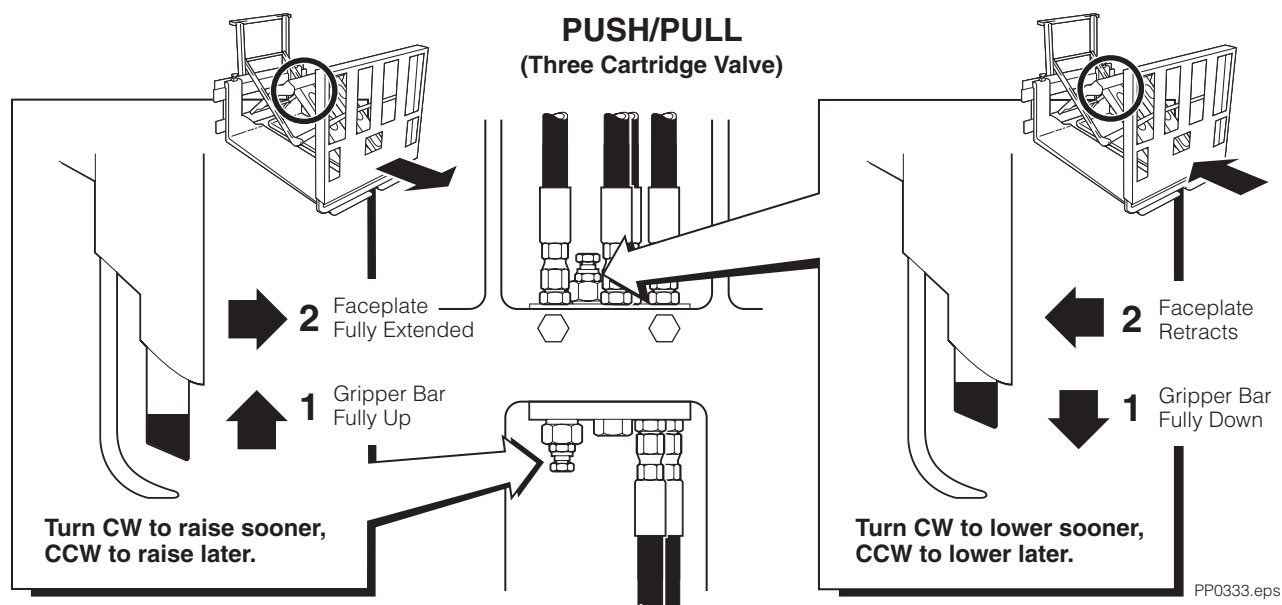
4.3-4 Load Push/Pull Valve Sequence Adjustment

The gripper bar should be adjusted to operate as follows:

Faceplate Extend – Gripper bar fully retracted (up) when the faceplate reaches full extension.

Faceplate Retract – Gripper bar fully down before the faceplate retracts.

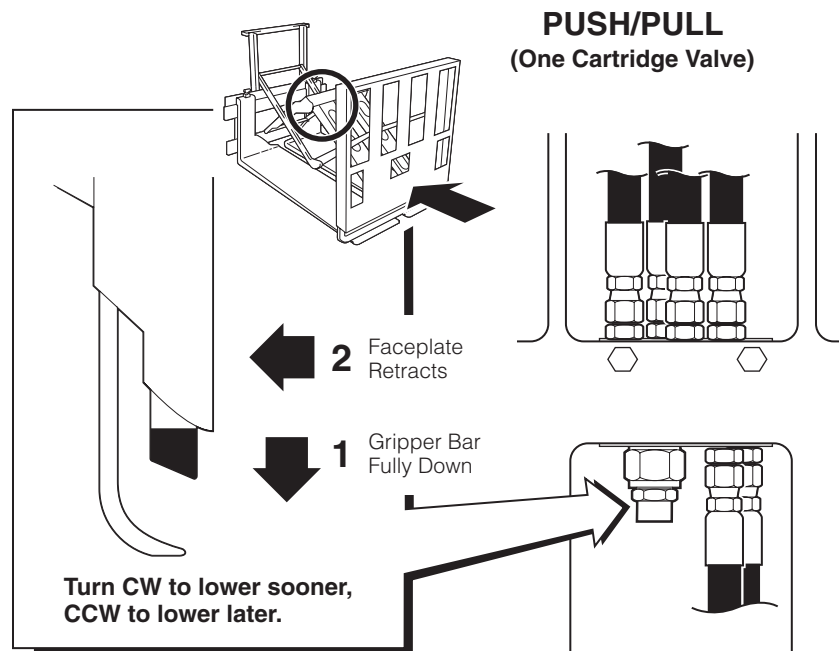
- 1 Loosen a cartridge adjustment locknut. Operate the truck at half throttle.
- 2 Adjust the screw so the gripper bar is fully retracted when the faceplate reaches full extension. Operate the faceplate through several cycles to confirm the setting. Tighten the locknut.



One Cartridge Valve

Faceplate Retract – Gripper bar fully down before the faceplate retracts.

- 1** Loosen the valve cartridge adjustment locknut. Operate the truck at half throttle.
- 2** Adjust the screw for the gripper bar to be fully lowered before the faceplate retracts. Operate the faceplate through several cycles to confirm the setting. Tighten the locknut.



PP1531.eps

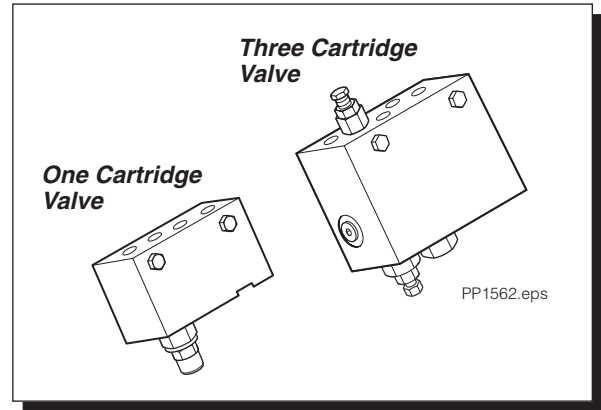
4.4 Cylinders

4.4-1 Gripper Cylinder Removal

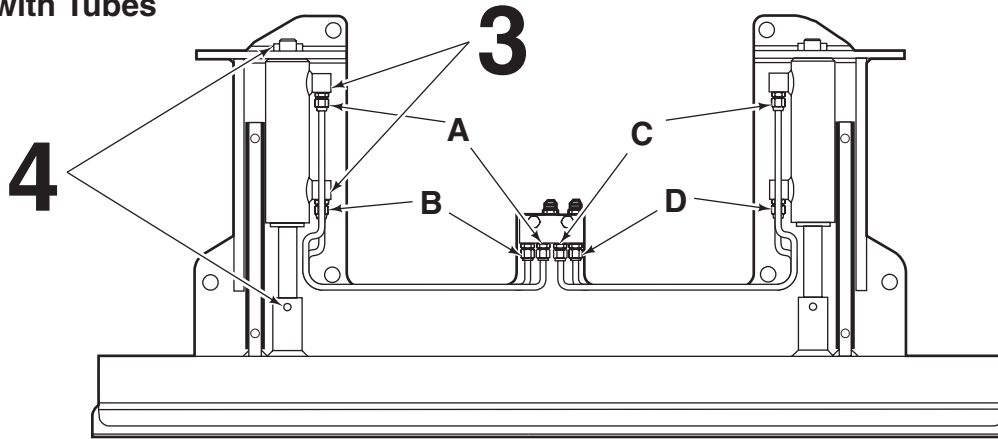
- 1 Remove the gripper assembly from the faceplate as described in Section 4.2-2.
- 2 Lay the assembly on the floor with the cylinders exposed.
- 3 Disconnect the tubes or hoses from the cylinder fittings.
- 4 Drive out the anchor pins from the cylinder base and rod.
- 5 For reassembly, reverse the above procedures except as follows:
 - Check tube or hose clearances with tips of arms.



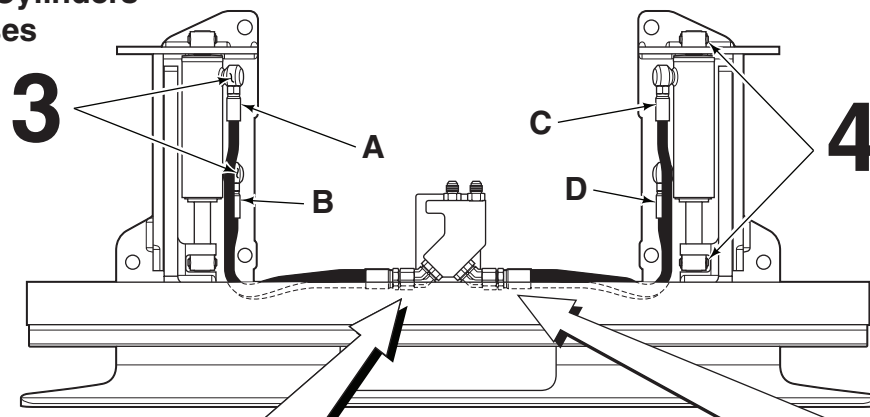
WARNING: Before removing any hoses, relieve pressure in the hydraulic system. With the truck off, open the truck auxiliary control valve(s) several times in both directions.



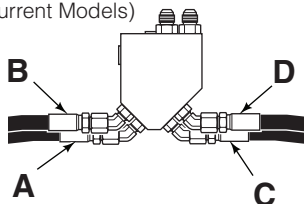
Gripper Cylinders with Tubes



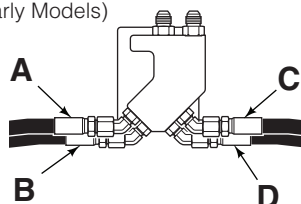
Gripper Cylinders with Hoses



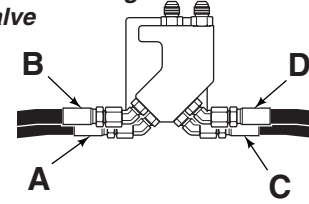
One Cartridge Valve (Current Models)



One Cartridge Valve (Early Models)



Three Cartridge Valve



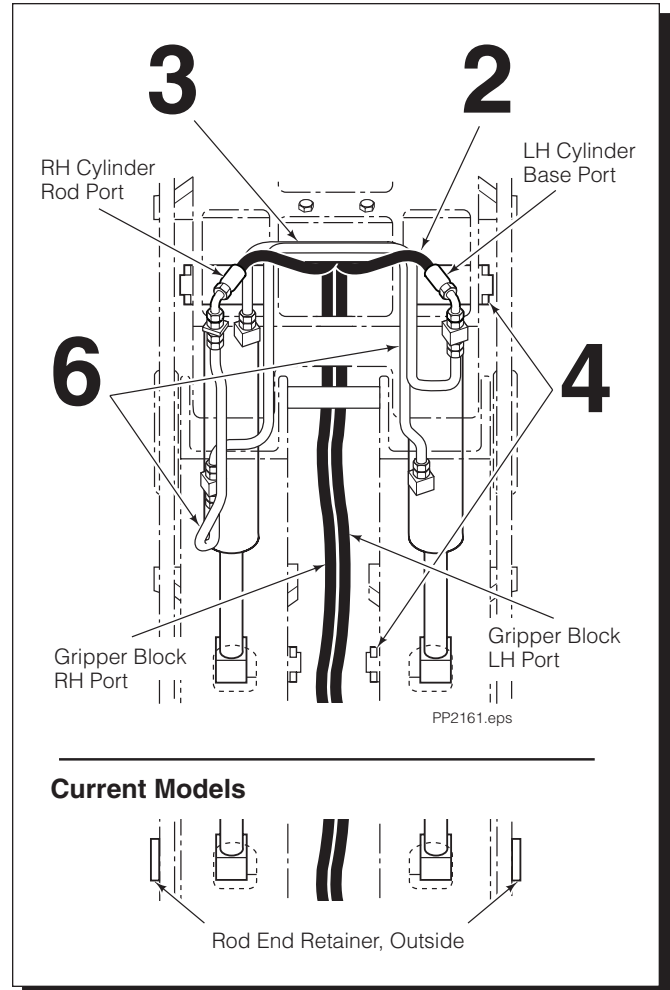
4.4-2 Push/Pull Cylinder Removal

- 1 Fully extend the faceplate.



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

- 2 Disconnect the hose ends from the cylinder fittings. Tag and plug the hoses for reassembly.
- 3 Remove the crossover tubes from the cylinder fittings.
- 4 Remove the capscrews fastening the cylinder anchor pins to the arms. For reassembly, clean and dry capscrews. Apply Loctite 242 (blue) and tighten to a torque of:
 - Eyepin Capscrews** – 10 ft.-lbs. (13 Nm)
 - Retainer Capscrews** – 21 ft.-lbs. (28 Nm)
- 5 Drive out anchor pins.
- 6 For reassembly, reverse the above procedures except as follows:
 - Make sure the cylinder tubes do not interfere with the secondary arms when they close.



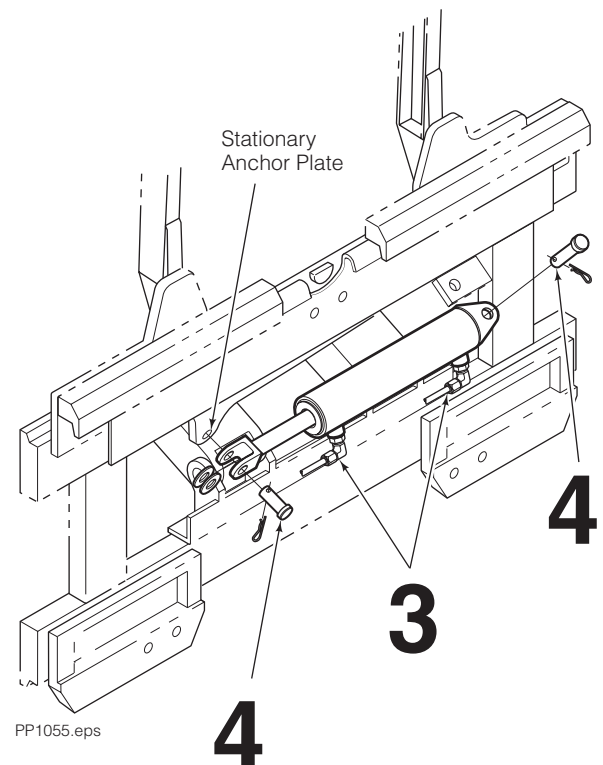
4.4-3 Sideshift Cylinder Removal

- 1 Fully extend the faceplate.



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

- 2 Remove the attachment from the truck as described in Section 4.1.
- NOTE:** Units with hose hook up to the sideshift cylinder, have the cylinder base attached to the stationary anchor plate.
- 3 Disconnect the hoses and/or tubes from the cylinder fittings. Tag hoses or tubes for reassembly.
 - 4 Remove the cotter pins from the cylinder anchor pins. Remove the anchor pins.
 - 5 For reassembly, reverse the above procedures.



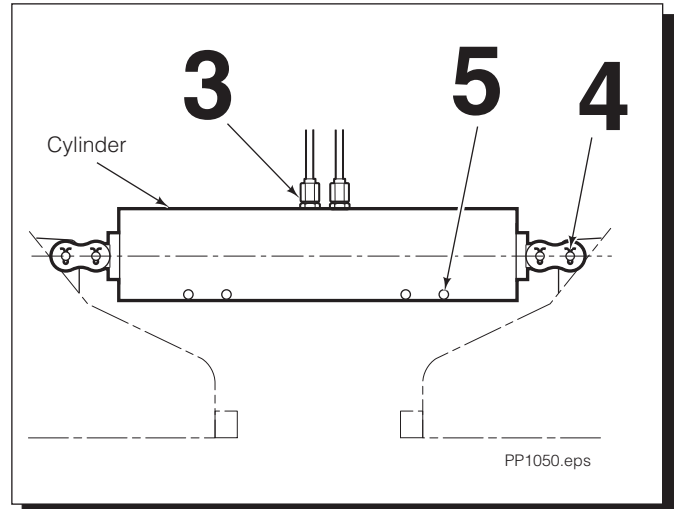
4.4-4 Hydraulically Positioned Platen Cylinder Removal

- 1 Fully extend the faceplate.



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

- 2 Remove the attachment from the truck as described in Section 4.1.
- 3 Disconnect the hoses or tubes from the cylinder fittings. Tag hoses or tubes for reassembly.
- 4 Remove the chain link cotter pins and pins from the cylinder rods.
- 5 Remove the capscrews fastening the cylinder to the frame. For reassembly, tighten the capscrews to a torque of 15 ft.-lbs. (20 Nm).
- 6 For reassembly, reverse the above procedures.



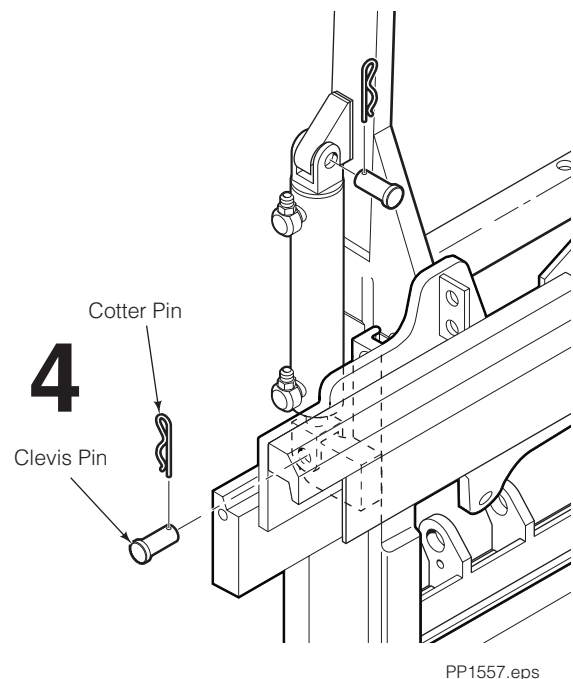
4.4-5 Sheet-Sav™ Cylinder Removal

- 1 Extend the faceplate to gain access to cylinder.



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

- 2 Disconnect the hoses or tubes from the cylinder fittings. Tag hoses or tubes for reassembly.
- 3 Remove the cotter pins and clevis pins from the cylinder.
- 4 For reassembly, reverse the above procedures.



4.4-6 General Cylinder Service Procedures

Cylinder Disassembly

- Clamp the cylinder in a soft-jawed vise. Clamp at the extreme base end only. **Never clamp at the middle of the cylinder shell or on the rod sealing area.**
- Place the piston and retainer in a soft-jawed vise to remove the seals. Pry the seals up with a blunt screwdriver. Cut the seal to remove.

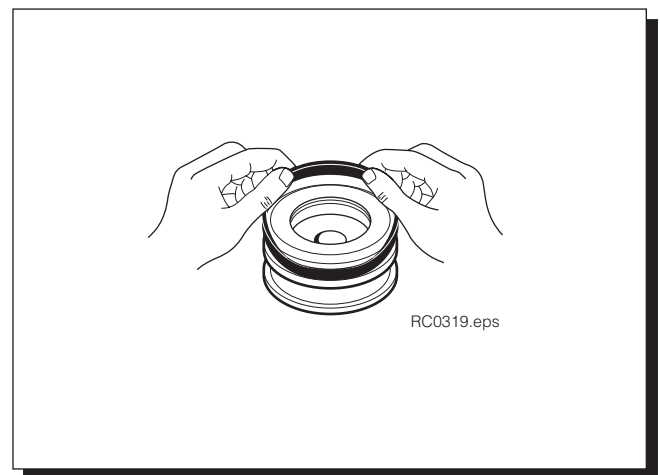
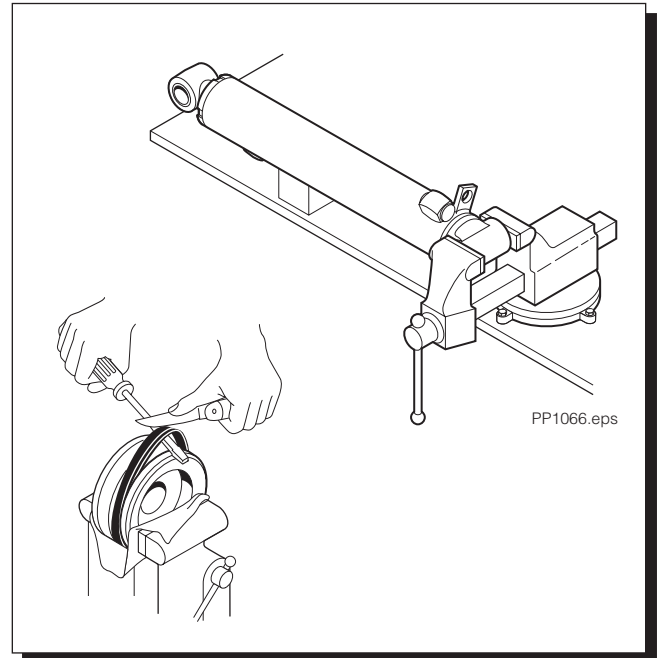
CAUTION: Do not scratch the seal grooves.

Cylinder Inspection

- Inspect the rod, piston and retainer for nicks or burrs. Minor nicks and burrs can be removed with emery cloth. If they cannot be removed with emery cloth, replace the part.
- Inspect the cylinder shell bore. Remove any minor nicks and burrs with a butterfly hone. If they cannot be removed with the butterfly hone, the shell must be replaced.
- Inspect the outside of the shell for any defects that could weaken its performance when under pressure. Replace if necessary.

Cylinder Reassembly

- Lubricate all new seals with petroleum jelly before installing.
- Install new seal on a piston or retainer by hooking one side of the seal in the groove and pushing it over the piston or retainer.
NOTE: Polishing the chamfer angle will allow the seal to slide into the groove much easier. Use 400-grit emery cloth to polish.
- Note the direction of the U-cup seals. If they are installed backwards, the seals will not seal properly. Refer to the illustration of the cylinder being serviced.
- Reassemble the rod assembly by sliding the retainer on first, then the piston assembly. Install and tighten the piston retaining nut before sliding the rod assembly into the shell.
- For ease of installment, use petroleum jelly inside cylinder shell, piston OD, and retainer ID, as needed.

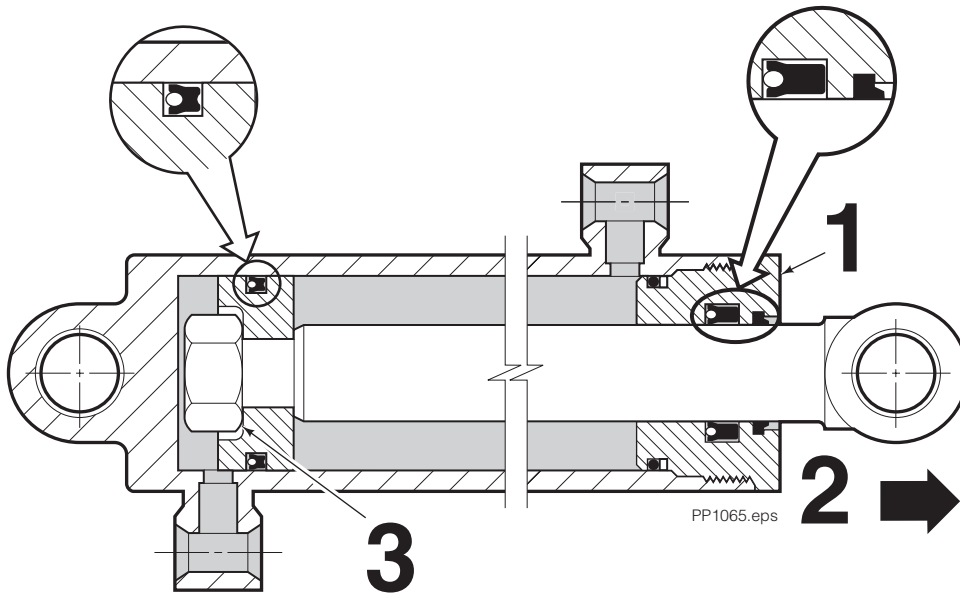
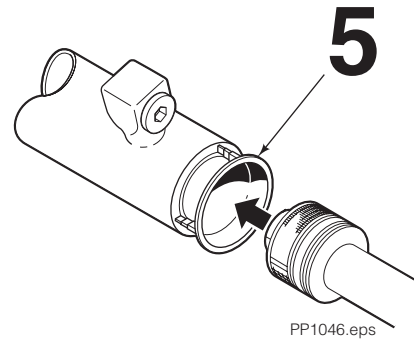
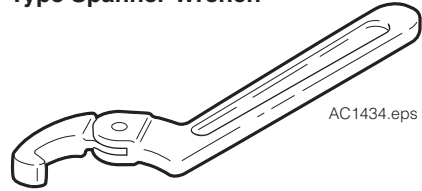


4.4-7 Push/Pull Cylinder Service

Read the General Cylinder Service Procedures for Cylinder Disassembly in Section 4.4-5.

- 1** Use a claw type spanner wrench to remove the retainer. For reassembly, tighten the retainer to a torque of 275 ft.-lbs. (372 Nm).
- 2** Pull the rod assembly from the shell.
- 3** Remove the nut fastening the piston to the rod. Remove the retainer from the rod. For reassembly, tighten the piston nut to a torque of 130 ft.-lbs. (176 Nm).
- 4** Remove all seals.
- 5** For reassembly, reverse the above procedures including the following items:
 - Read the General Service procedures for Inspection and Reassembly in Section 4.4-5.
 - Note the direction of the U-cup seals. If installed backwards, the seal will not work properly. See the illustration for correct seal placement.
 - Use the piston seal loader to install the piston/rod assembly into the shell.

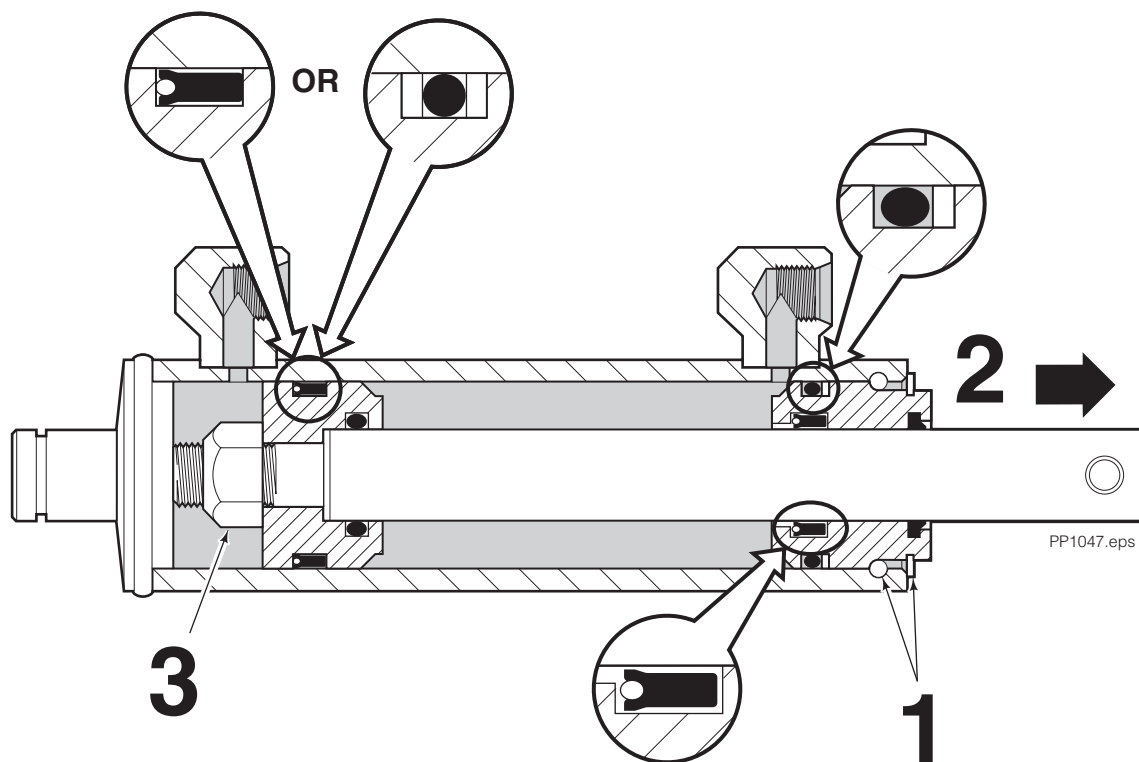
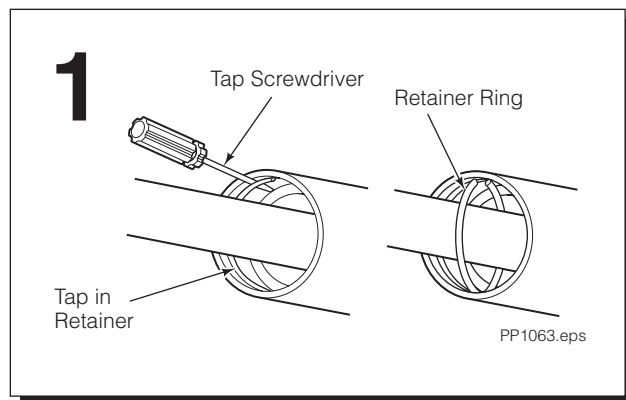
Claw Type Spanner Wrench



4.4-8 Gripper Cylinder Service

Read the General Cylinder Service Procedures for Cylinder Disassembly in Section 4.4-5.

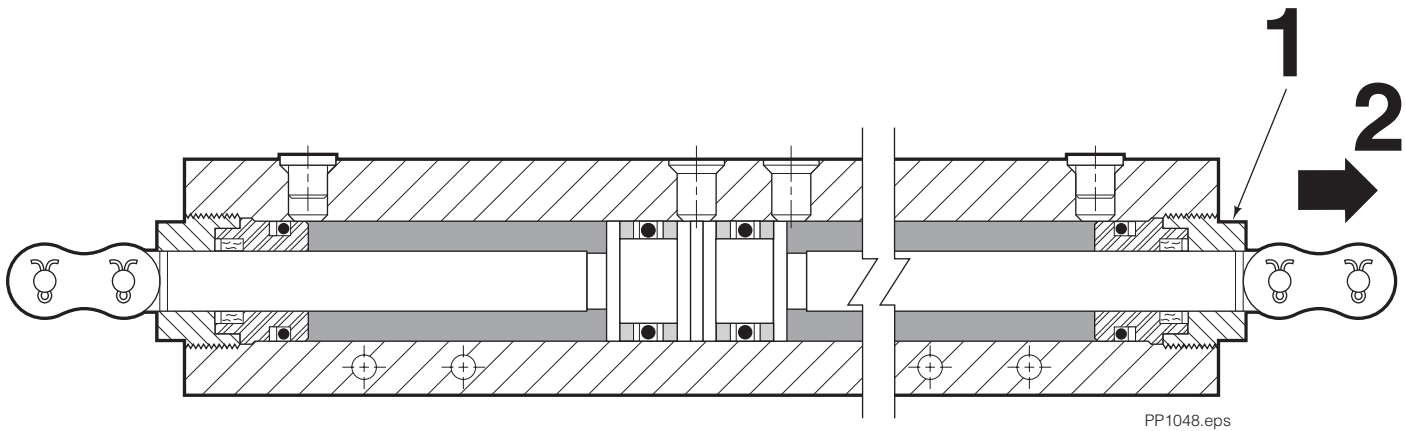
- 1** Remove the snap ring from the retainer. Tap the retainer into the cylinder bore. Use a screwdriver to tap on the retaining ring and turn it sideways.
- 2** Pull the rod assembly from the shell.
- 3** Remove the nut fastening the piston to the rod. Remove the retainer from the rod. For reassembly, tighten the piston nut to a torque of 45 ft.-lbs. (60 Nm).
- 4** Remove all seals.
- 5** For reassembly, reverse the above procedures including the following items:
 - Read the General Service procedures for Inspection and Reassembly in Section 4.4-5.
 - Note the direction of the U-cup seals. If installed backwards, the seal will not work properly. See the illustration for correct seal placement.
 - Use the piston seal loader to install the piston/rod assembly into the shell.



4.4-9 Hydraulic Positioned Platen Cylinder Service

Read the General Cylinder Service Procedures for Cylinder Disassembly in Section 4.4-5.

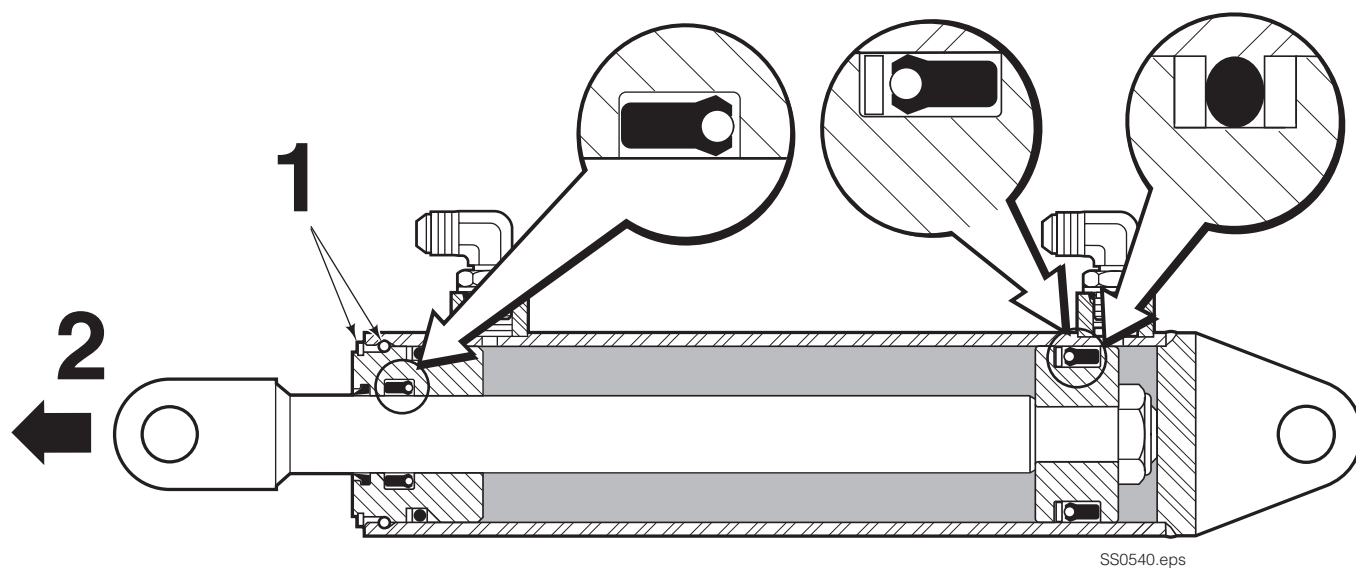
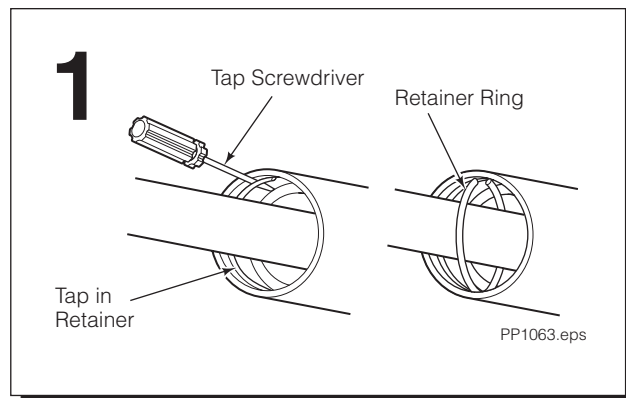
- 1** Unthread the retainers. For reassembly, tighten the retainers to a torque of 65 ft.-lbs. (90 Nm).
- 2** Pull the rod assemblies from the shell.
- 3** Remove all seals.
- 4** For reassembly, reverse the above procedures including the following items:
 - Read the General Service procedures for Inspection and Reassembly in Section 4.4-5.
 - Note the position of the seals. See the illustration for correct seal placement.



4.4-10 Sideshift Cylinder Service

Read the General Cylinder Service Procedures for Cylinder Disassembly in Section 4.4-5.

- 1** Remove the snap ring from the retainer. Tap the retainer into the cylinder bore. Use a screwdriver to tap on the retaining ring and turn it sideways.
- 2** Pull the rod assembly from the shell.
- 3** Remove the nut fastening the piston to the rod. Remove the retainer from the rod. For reassembly, tighten the piston nut to a torque of 45 ft.-lbs. (60 Nm).
- 4** Remove all seals.
- 5** For reassembly, reverse the above procedures including the following items:
 - Read the General Service procedures for Inspection and Reassembly in Section 4.4-5.
 - Note the position of the seals. See the illustration for correct seal placement.



4.4-11 Sheet-Sav™ Cylinder Service

Read the General Cylinder Service Procedures for Cylinder Disassembly in Section 4.4-5.

- 1 Remove the snap ring from the retainer. Tap the retainer into the cylinder bore. Use a screwdriver to tap on the retaining ring and turn it sideways.

CAUTION: Do not scratch the cylinder bore.

- 2 Pull the rod assembly from the cylinder.

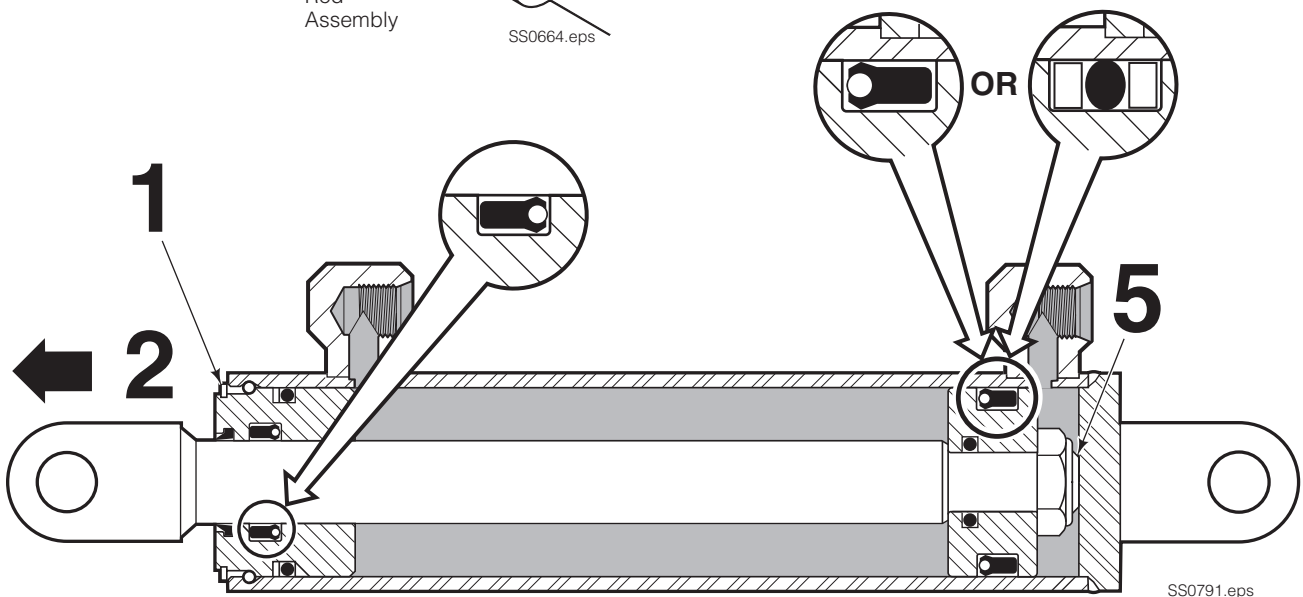
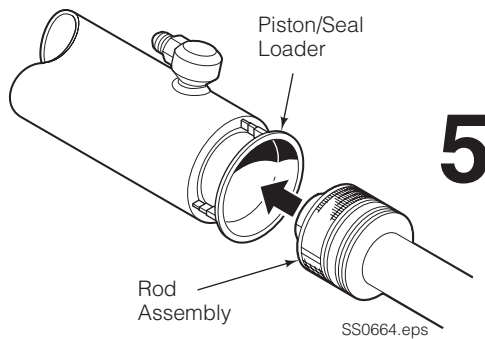
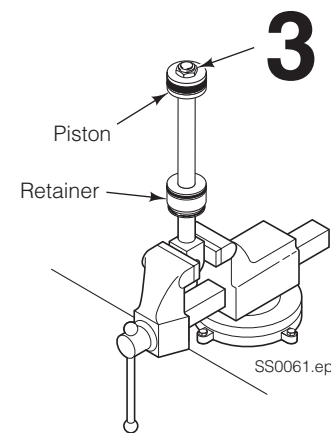
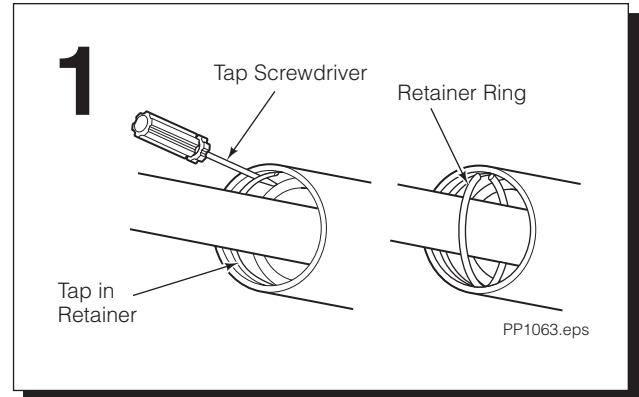
- 3 To remove the piston, clamp the rod assembly in a vise on the clevis end as shown.

CAUTION: Do not clamp on the cylinder rod sealing surface.

- 4 Remove the piston nut and remove the piston from the cylinder rod. For reassembly, tighten the piston nut to a torque of 75 ft.-lbs. (100 Nm).

- 5 For Reassembly, reverse the above procedures including the following:

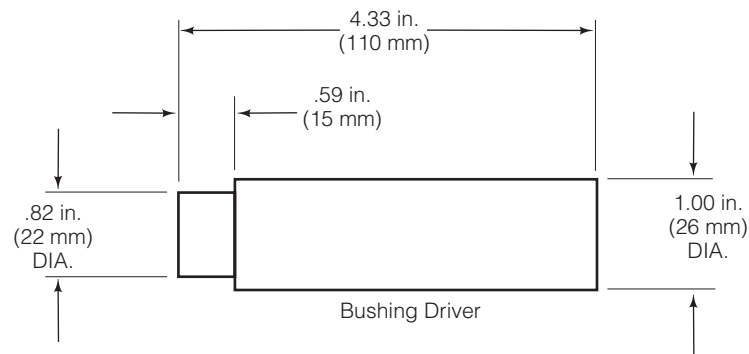
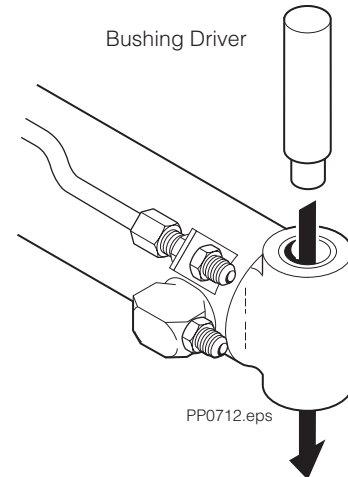
- Read the General Service procedures for Inspection and Reassembly in Section 4.4-5.
- Note the position of the seals. See the illustration for correct seal placement.



4.4-12 Push/Pull Cylinder Bushing Service

- 1** Remove the cylinders from the attachment as described in Section 4.4-2.
- 2** Remove the bushings from the cylinder using a bushing driver.
 - If you do not have a bushing driver, a tool can be fabricated for bushing removal. See the tool illustrated for bushing driver dimensions.
- 3** For reassembly, reverse the above procedures except as follows.
 - Install new bushings using the bushing driver.

CAUTION: The bushings may be damaged if installed without a bushing driver.

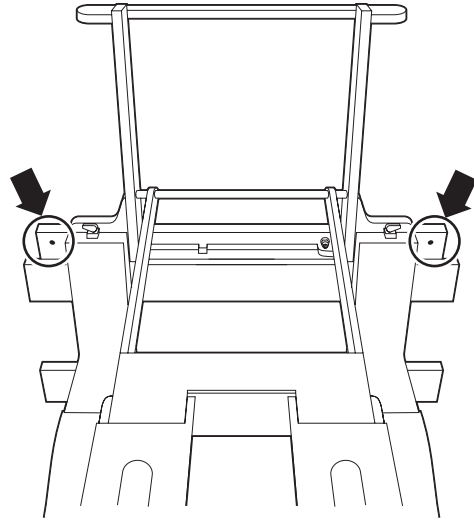


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4.5 Bearings

4.5-1 Bearing Lubrication

The upper bearings will require lubrication with chassis grease every 500 hours of operation. Apply waterproof chassis grease (Whitmore Onmi-Task EP2 or NLGI grade 2) at the zerk fitting lube points shown. Sideshift to expose the upper fittings.



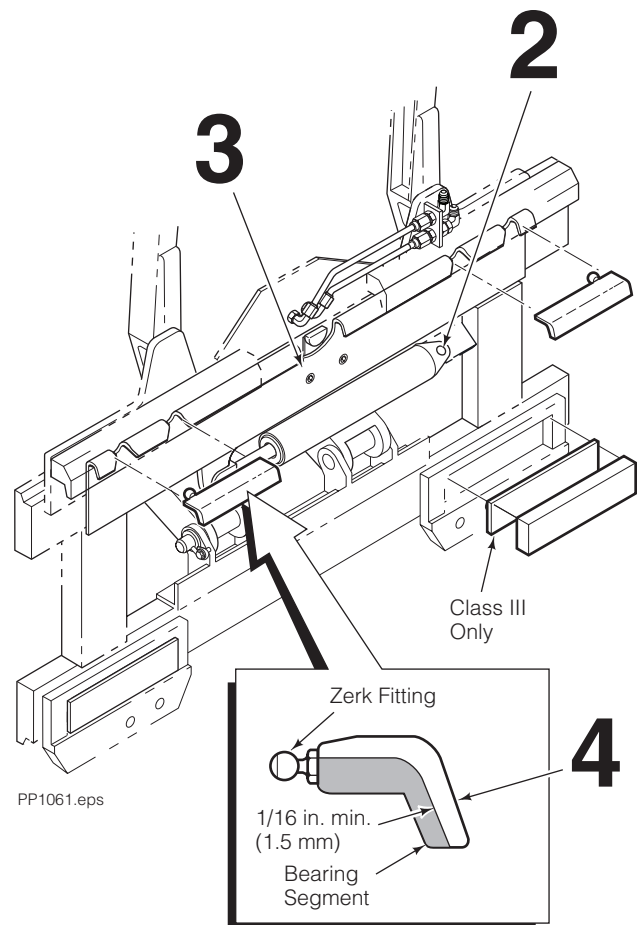
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4.5-2 Bearing Service

- 1 Remove the attachment from the truck as described in Section 4.1.
- 2 Disconnect the sideshift cylinder anchor pins from the frame and anchor bracket.
- 3 Screw out the setscrews to remove the anchor bracket from the frame.
- 4 Remove the upper bearing segments. Replace both bearing segments if either one is worn to less than 1/16 in. (1.5 mm) thick on the black surface.
- 5 Measure the **exposed** thickness of the lower bearings. If the thickness is less than 1/16 in. (1.5 mm), replace both bearings.

NOTE: The bearings have a tight press fit into the bearing pockets and must be driven in.

- 6 For reassembly, reverse the above procedures except for the following special instructions.
 - Clean the frame upper hook and lower bearing pockets of any built-up grease.
 - After the attachment is mounted on the truck, apply grease to the zerk fittings as described in Section 4.5-1.

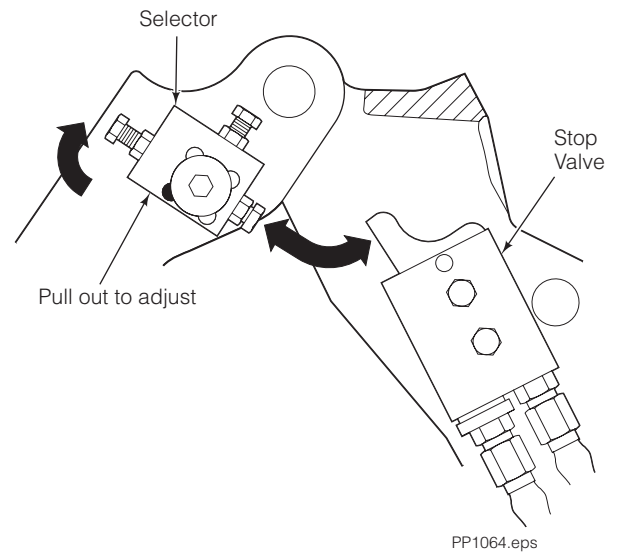
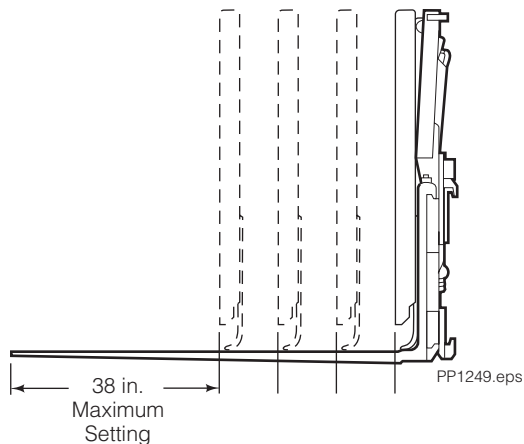


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4.6 Hydraulic Faceplate Stop

4.6-1 Adjustment

- 1 Extend the faceplate to expose the stop mechanism. Pull outward on the selector and turn to the required stop position. The selector should be turned so the corresponding adjusting capscrew will contact the lever on the stop valve.
- 2 Adjust the faceplate position by loosening the selector locknut and turning the capscrew (**counterclockwise to decrease** the distance to the platen tips or **clockwise to increase** the distance to the platen tips).



4.6-2 Stop Valve Service

- 1 Extend the faceplate to gain access to the stop valve.

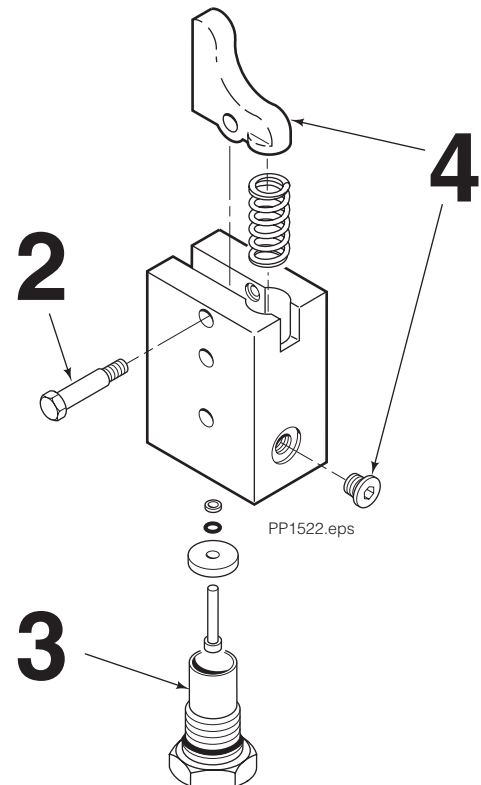


WARNING: Before removing any hoses, relieve pressure in the hydraulic system. With the truck off, open the truck auxiliary control valve(s) several times in both directions.

- 2 Disconnect, tag and plug the hose or tube from the valve fittings. Remove the capscrews fastening the stop valve to the arm.
- 3 Remove the cartridge, plunger and spacer. Remove the small O-ring and back-up ring using an O-ring removal tool.

CAUTION: Do not damage the inner valve surfaces.

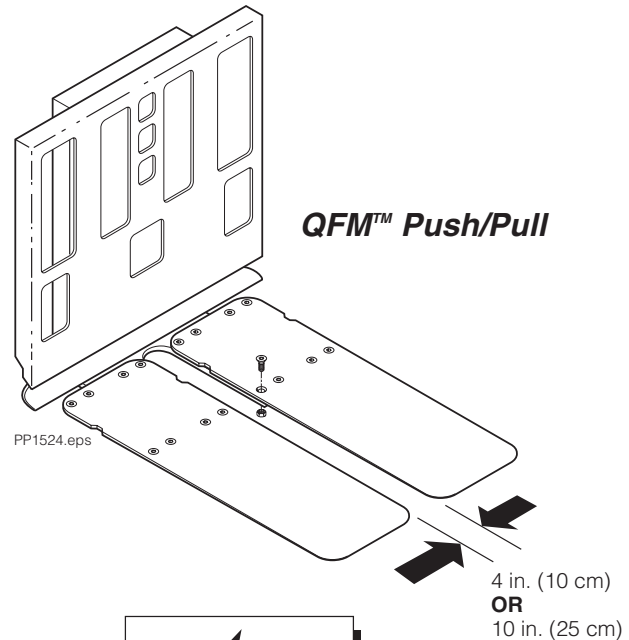
- 4 Remove the plug and actuator.
- 5 Wash the components with cleaning solvent and blow dry.
- 6 Lubricate all internal components with petroleum jelly prior to reassembly.
- 7 For reassembly, reverse the above procedures.



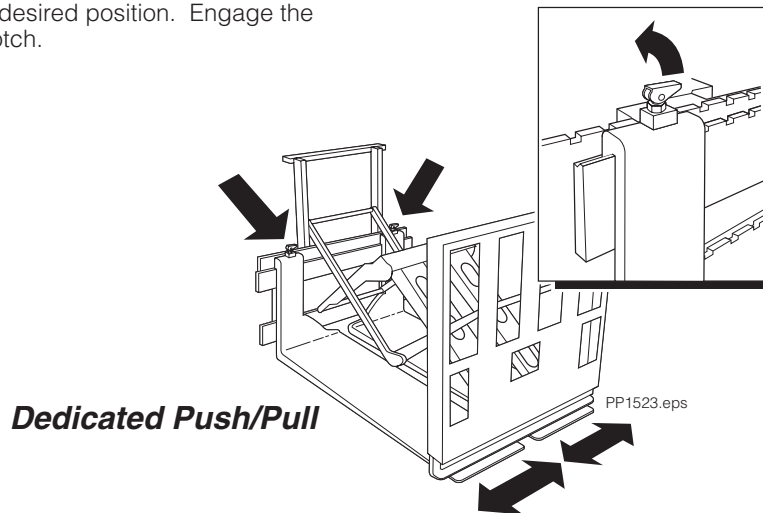
4.7 Platens

4.7-1 Platen Width Adjustment

QFM™ Push/Pulls – The platens are adjustable to provide 4 in. (10 cm) or 10 in. (25 cm) spacing between the platens. Remove the platen capscrews and align the platens with the alternate set of holes. Tighten the capscrews to a torque of 52 ft.-lbs. (70 Nm).



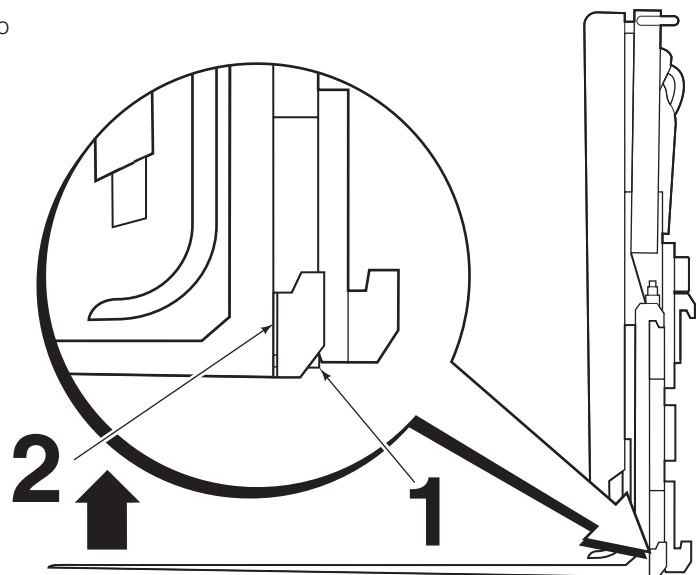
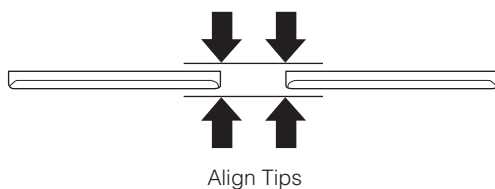
Dedicated Push/Pulls – The platen are adjustable to provide 4 in. (10 cm) to 12 in. (30 cm) spacing between the platens. Pull up the spring lock on the top of the platen. Adjust the platen to the desired position. Engage the spring lock in the bar notch.



4.7-2 Platen Tip Adjustment

Platen tips should align within .25 in. (6 mm). Add shims to raise the lower platen tip up even with the other tip.

- 1 Remove the lower hook capscrews and hook on the platen the low tip. For reassembly, tighten the capscrews to a torque of 125 ft.-lbs. (170 Nm).
- 2 Raise the platen tip to insert shims between the back of the platen and frame lower hook bar. Add shims as required to align the tips.
- 3 For reassembly, reverse the above procedure.



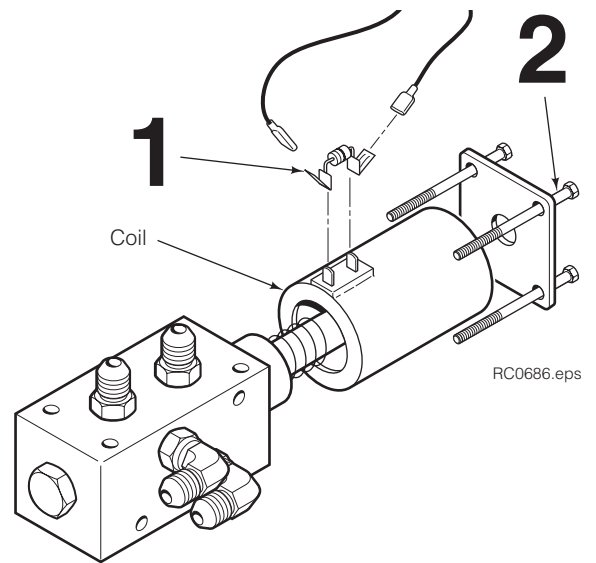
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4.8 Solenoid Valve

4.8-1 Solenoid Valve Service

IMPORTANT: Service the valve in a clean work area.

- 1** Disconnect the wires and diode from the coil terminals.
- 2** Remove the coil end cover from the valve assembly. Remove the coil. Note the position of the coil terminals in relation to the valve ports for reassembly.
- 3** Install the new coil and end cover making sure the terminals are positioned correctly.
- 4** For reassembly, reverse the above procedures except as follows:
 - See the electrical schematic in Section 3.6 for correct wire and diode installation.



5.1 Specifications

5.1-1 Hydraulics



WARNING: Rated Capacity of the truck/attachment combination is a responsibility of the original truck manufacturer and may be less than that shown on the attachment nameplate. Consult the truck nameplate.

Truck Relief Setting

2000 psi (140 bar) Recommended
2300 psi (160 bar) Maximum

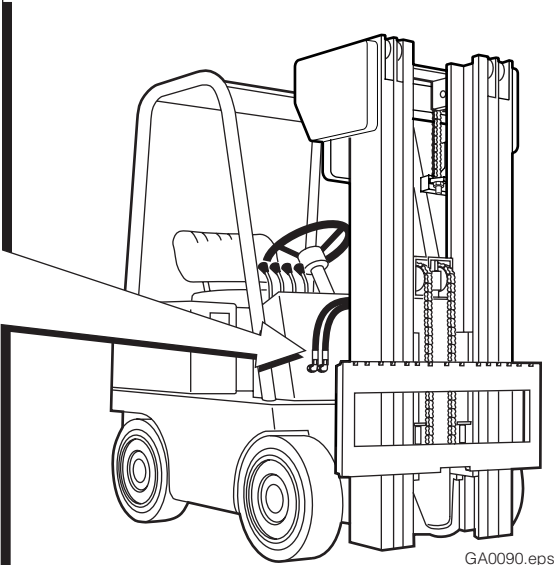
Truck Flow Volume ^①

	Min. ^②	Recommended	Max. ^③
35E, 45E	4 GPM (15 L/min.)	7 GPM (26 L/min.)	10 GPM (38 L/min.)

- ① Cascade E-Series Push/Pull and Load Push are compatible with SAE 10W petroleum base hydraulic fluid meeting Mil. Spec. MIL-0-5606 or MIL-0-2104B. Use of synthetic or aqueous base hydraulic fluid is not recommended. If fire resistant hydraulic fluid is required, special seals must be used. Contact Cascade.
- ② Flow less than recommended will result in reduced mechanism speeds.
- 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 orifices size of 9/32 in. (7mm)

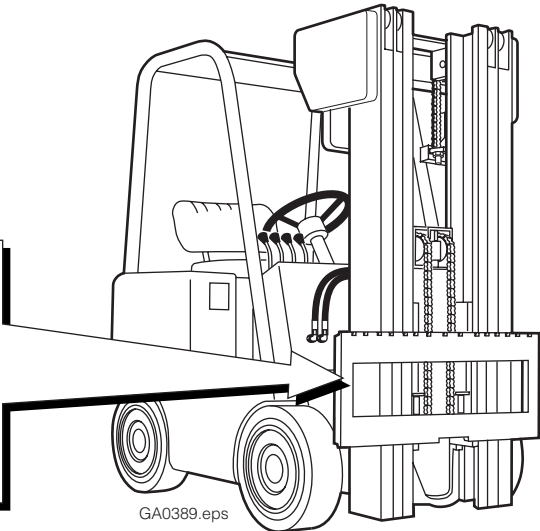


5.1-2 Truck Carriage



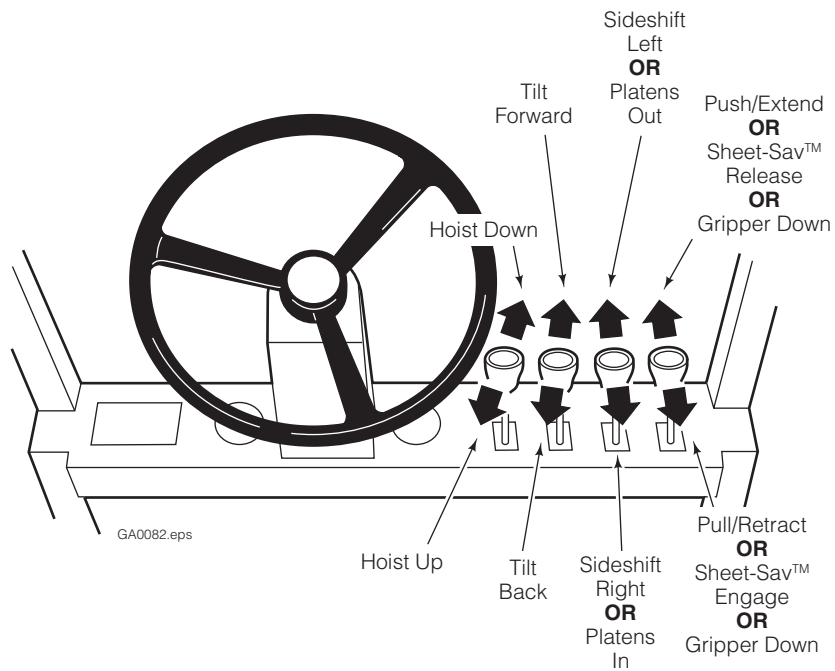
Carriage Mount Dimension (A) ITA (ISO)

	Minimum	Maximum
Class II	14.94 in. (380.0 mm)	15.00 in. (381.0 mm)
Class III	18.68 in. (474.5 mm)	18.74 in. (476.0 mm)



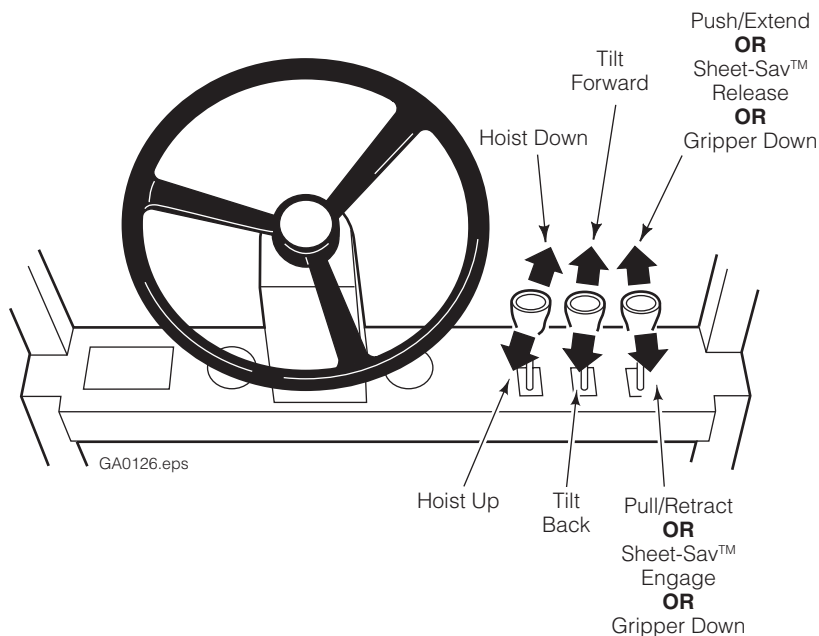
5.1-3 Auxiliary - Dedicated Push/Pulls

Check for compliance with ANSI (ISO) standards:



5.1-4 Auxiliary - QFM™ Push/Pulls

Check for compliance with ANSI (ISO) standards:



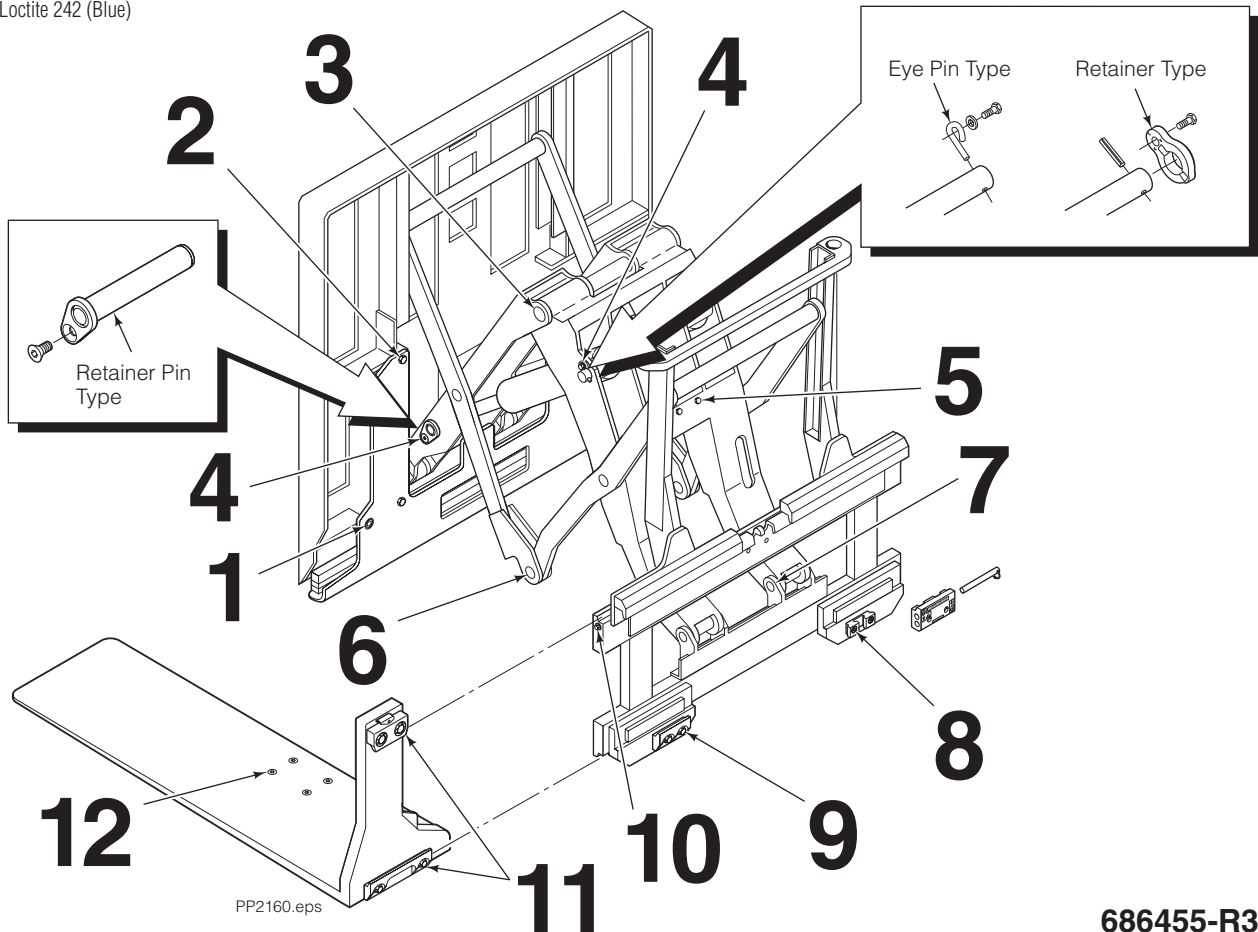
5.1-5 Torque Values

Fastener torque values for the Standard and QFM™ Push/Pulls 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	Gripper Assembly Socket Capscrews	M16	125	170 ■
2	Gripper Assembly Hex Capscrew	M16	165	225 ■
3	Inner Secondary Arm Pin Capscrews	-	-	-
	Eye Pin Type	M8	10	13
	Retainer Type	M8	21	28 ■
4	Push/Pull Cylinder Capscrews	-	-	-
	Eye Pin Type	M8	10	13
	Retainer Type & Retainer Pin Type	M8	21	28 ■
5	Valve Capscrews	M8	15	20
6	Outer Secondary Arm Pin Capscrews	M8	10	13 ■
7	Inner Primary Arm Pin Capscrews	M8	10	13 ■
8	Quick Disconnect Lower Hook Capscrews	M16	125	170
9	Bolt-On Lower Hook Capscrews	M16	125	170
10	Platen Stop Capscrew	M12	52	70
11	Platen Hook Capscrews	M16	170	230
12	QFM™ Bolt-On Platen Capscrews	M12	52	70

■ Use Loctite 242 (Blue)



BLANK

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answered right now? Call your nearest Cascade Service Department.

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