

KEITH WALKING FLOOR India
 +91-44-48526805
 solutions@keithwalkingfloor.in

NOTE: Drive is pictured upside down, as it is assembled at Keith Manufacturing Co.

It is recommended to place a drip pan under the drive unit before conducting any maintenance or repairs. Any time a fitting is removed, it is recommended to plug the fittings to reduce the loss of oil and to avoid any contamination.

Remove/Replace the Control Valve

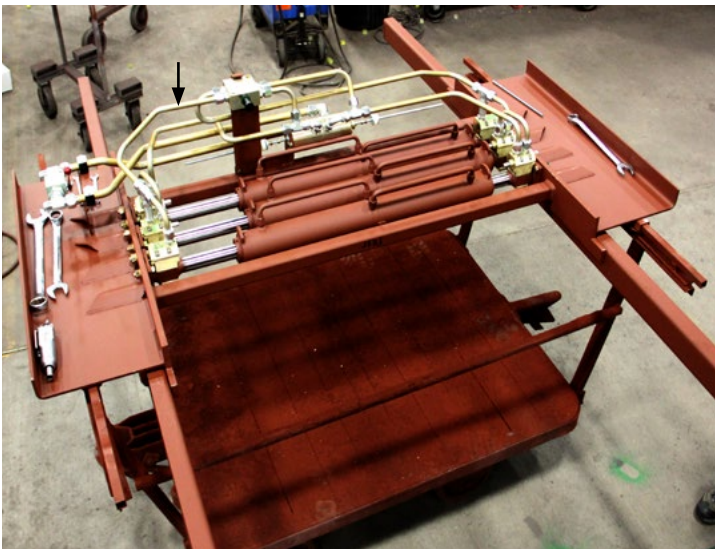
Tool List:

1-1/8" Wrench

1-1/4" Wrench

17mm Wrench (2)

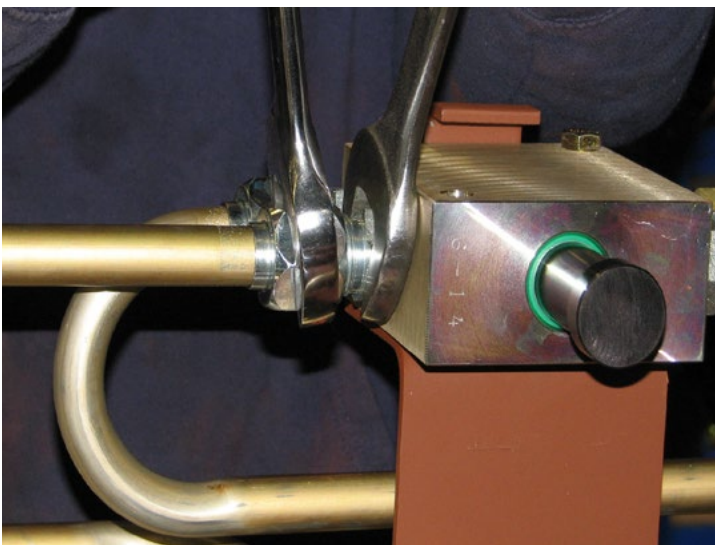
**1) Remove All Tubes Attached to the Control Valve
Control Valve to Front of Cylinder #3**



•Locate tube connecting Control Valve to Rear of Cylinder #3.
(Right side of picture)



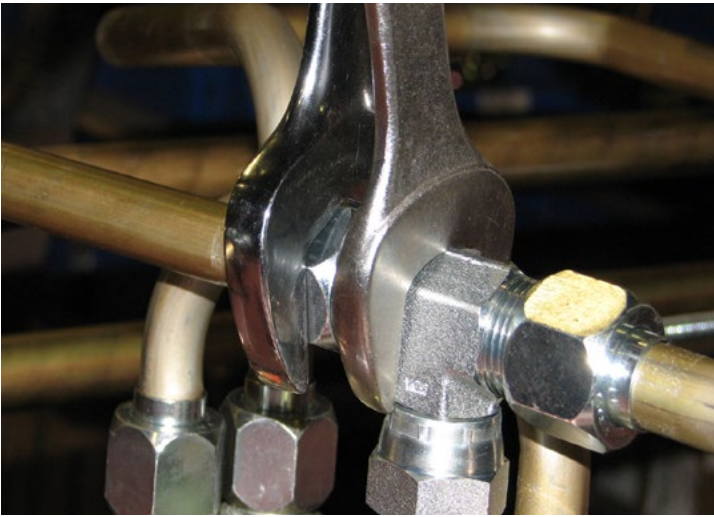
•At Control Valve end, loosen fitting using 1-1/8" wrench and a 1-1/4" wrench.



•Detach tube from Control Valve and plug fitting with clean plug.



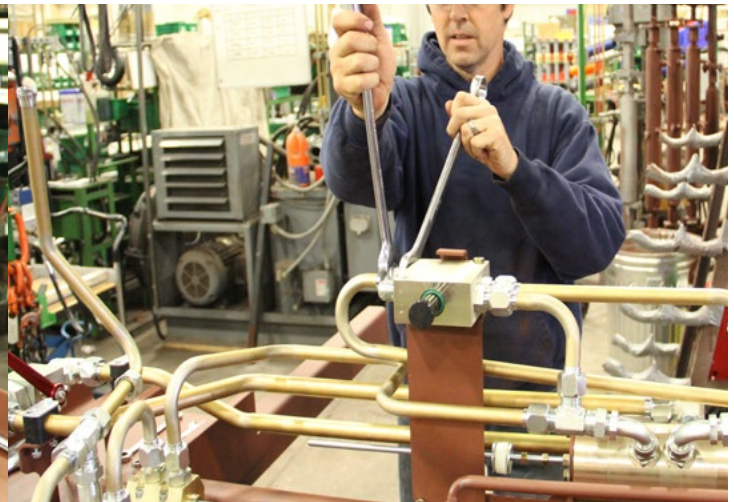
•At Check Valve end, loosen fitting connecting the Front of Cylinder #3 to Control Valve using 1-1/8" wrench and a 1-1/4" wrench.



• At Check Valve end, loosen fitting connecting the Front of Cylinder #3 to Control Valve using 1-1/8" wrench and a 1-1/4" wrench.

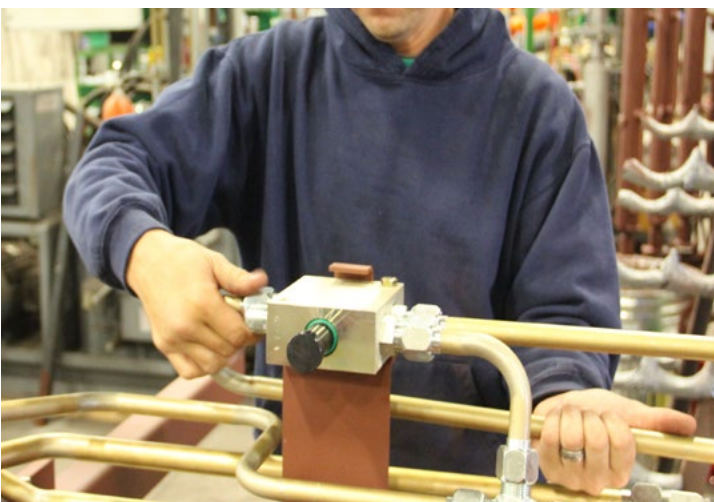
•Detach Control Valve tube from tube connecting to Check Valve at Cylinder # 1 rear check valve plug the fitting and move tube out of the way.

Control Valve to Rear of Cylinder #1



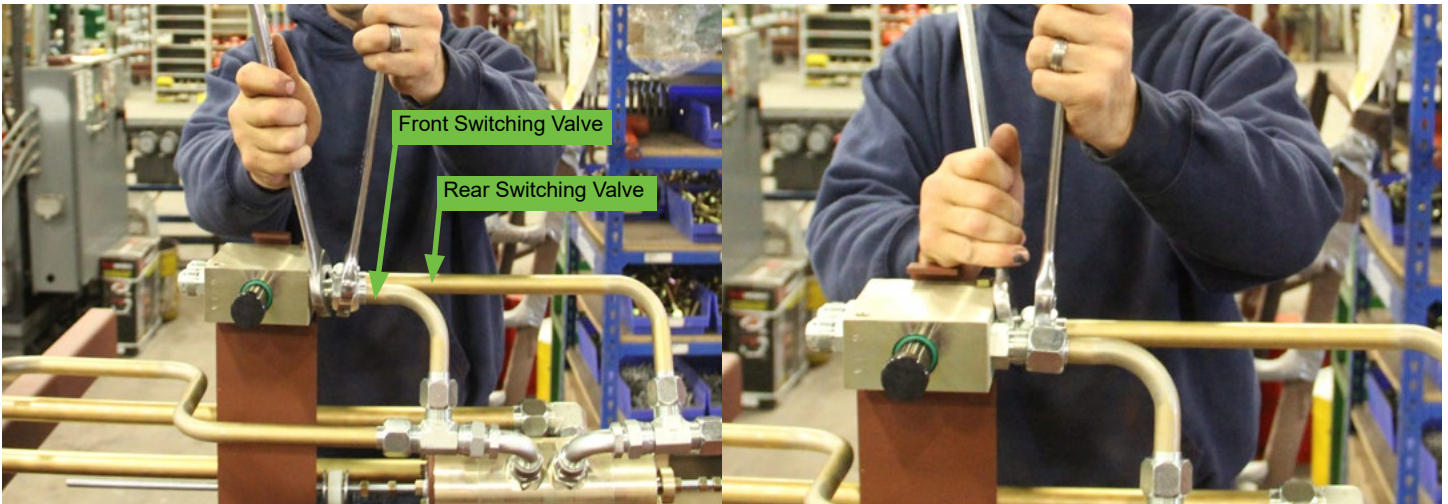
•Locate tube connecting Control Valve to Rear of Cylinder #1.

•At Control Valve end, loosen fitting using 1-1/8" wrench and a 1-1/4" wrench.



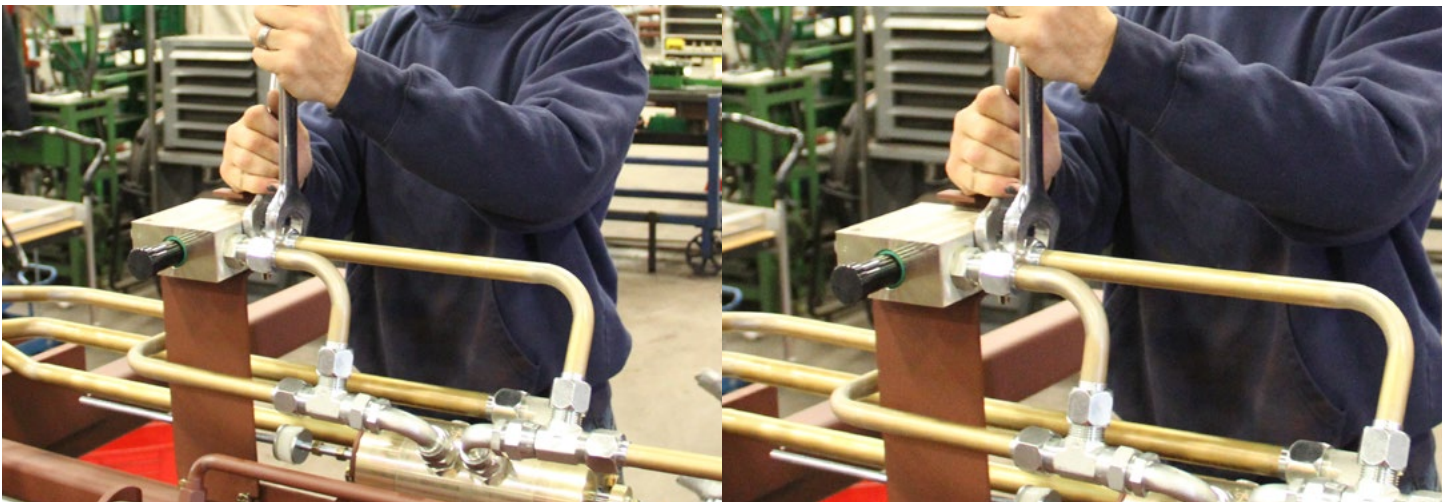
•Detach tube from Control Valve and plug fitting.

•At Check Valve end, loosen fitting connecting the Rear of Cylinder #1 to Control Valve using 1-1/8" wrench and a 1-1/4" wrench



•Locate tube connecting Control Valve to Front of Switching Valve.

•At Control Valve end, loosen fitting using 1-1/8" wrench and a 1-1/4" wrench and detach tube from Control Valve. Plug fitting.



• Locate tube connecting Control Valve to Front of Switching Valve.

•At Control Valve end, loosen fitting using 1-1/8" wrench and a 1-1/4" wrench.

2) Removing Control Valve



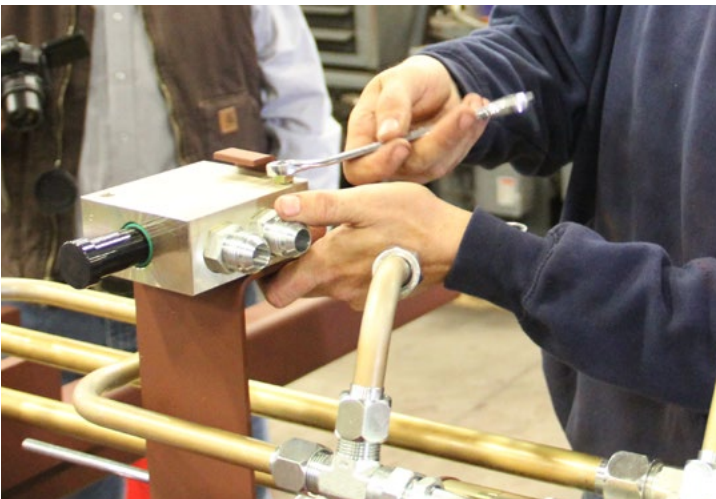
•Detach Control Valve tube from tube connecting to Check Valve and plug fitting. Move tube out of the way.



•Position a 17mm wrench on the head of one of the bolts securing the Control Valve body to the drive frame bracket.



•Position another 17mm wrench on the bottom of the bolt, removing the nut and lock washer. This will free the bolt.



•Repeat the above steps with the second bolt.



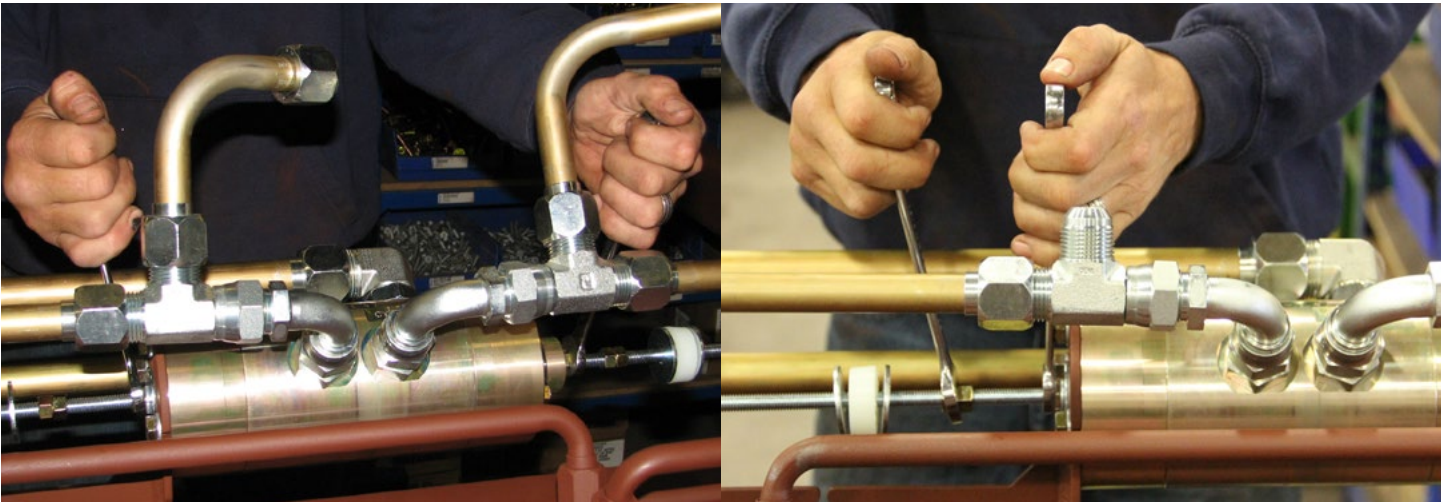
•The Control Valve can now be removed. Repeat steps in reverse order to replace the Control Valve.

Remove/Replace the Switching Valve

Tool List:

- 1-1/8" Wrench
- 1-1/4" Wrench
- 1-1/2" Wrench
- 1-5/16" Wrench
- 17mm" Wrench (2)

1) Remove the Threaded Rod

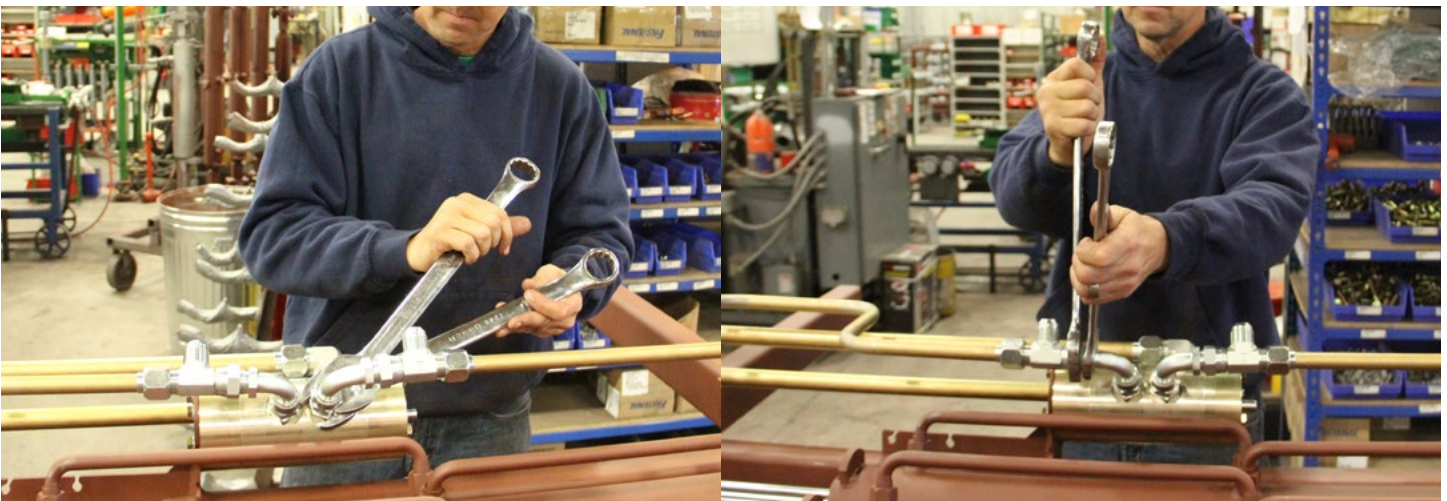


•Using a 17mm wrench, hold the double nut with one wrench and loosen the other.

•Use another 17mm wrench and loosen the nut closest to the Switching Valve. If you do not secure the other nut, the threaded rod will spin and you will be unable to loosen the nuts.

•Repeat the above steps on the other side of the threaded rod.

2) Remove All Hydraulic Lines From Switching Valve



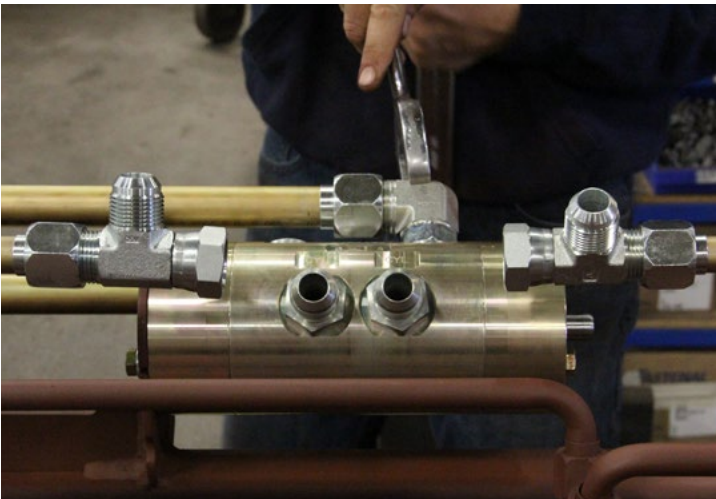
•Remove 90° fittings from Switching Valve using a 1-1/8" wrench and a 1-1/4" wrench

•Loosen and remove the fitting on the tube side. Plug fittings.



- Loosen and remove the fitting on the Switching Valve side.
- Repeat the above steps on the remaining fitting.

Remove Return Tube Fitting



- Locate the Switching Valve fitting to the Return Tube.



- Use 1-5/16" wrench and a 1-1/2" wrench to remove Return Tube fitting.



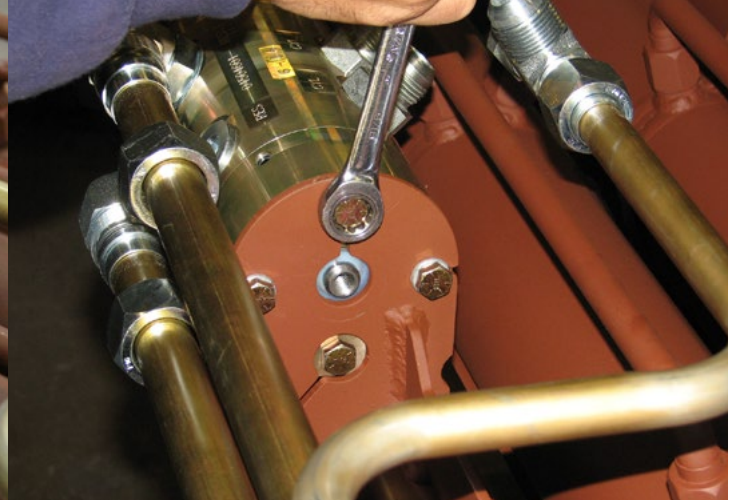
- Repeat for Pressure Tube

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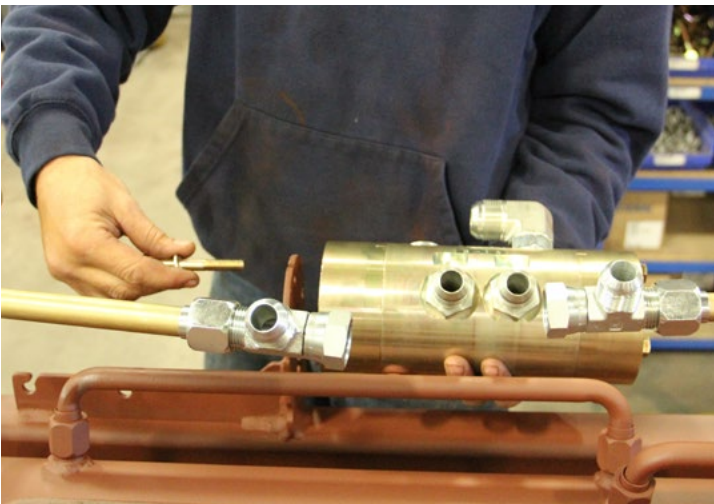
3) Remove the Switching Valve



- Make sure to support the Switching Valve before removing the last bolt.



- Use a 17mm wrench to remove the bolts attaching the Switching Valve to the drive frame bracket.



- The Switching Valve can now be removed.
- Repeat steps in reverse order to replace the Switching Valve.

Remove/Replace Check Valve

Tool List:

- 1-1/4" Wrenches (2)
- 1/4" Hex Key or Allen Wrench
- 6" or 12" extension
- Ratchet

Before removing any fittings or bolts, run the cylinder away from the Check Valve in order to free it.

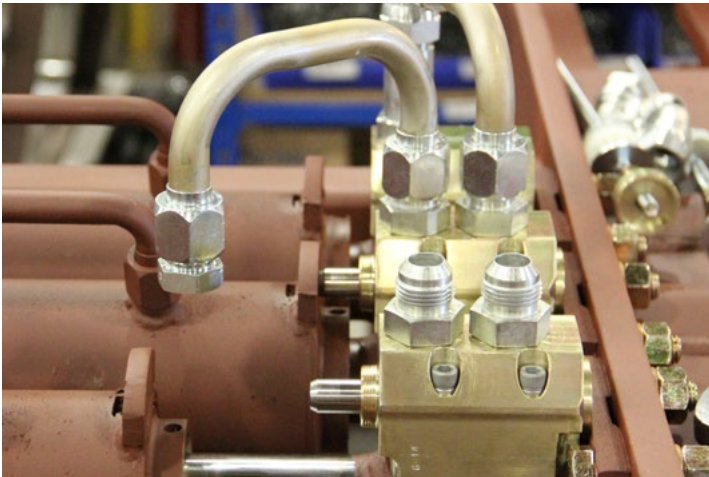
1) Remove Hydraulic Lines

Remove Check Valve (Before you loosen any fittings, ensure cylinder tab is not pushing check valve plunger..)



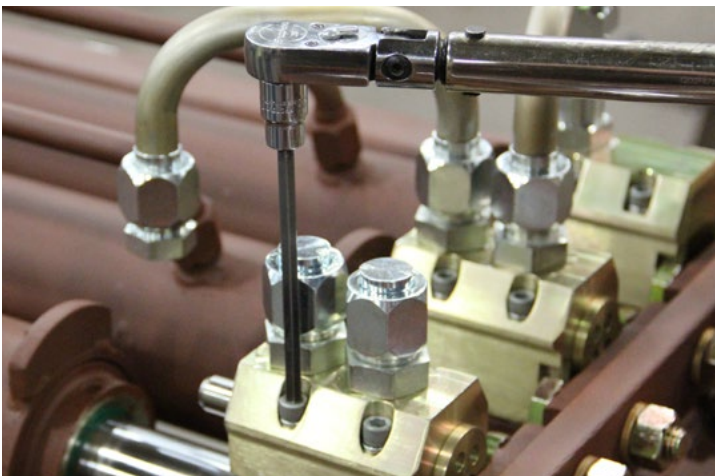
•Loosen and remove the fitting on the Cross-Over Tube on the inside Check Valve using (2) 1-1/4" wrenches.

•Loosen fitting connecting the Cross-Over Tube to the adjacent Check Valve using (2) 1-1/4" wrenches.



•After disconnecting tube plug it and swing it out of the way.

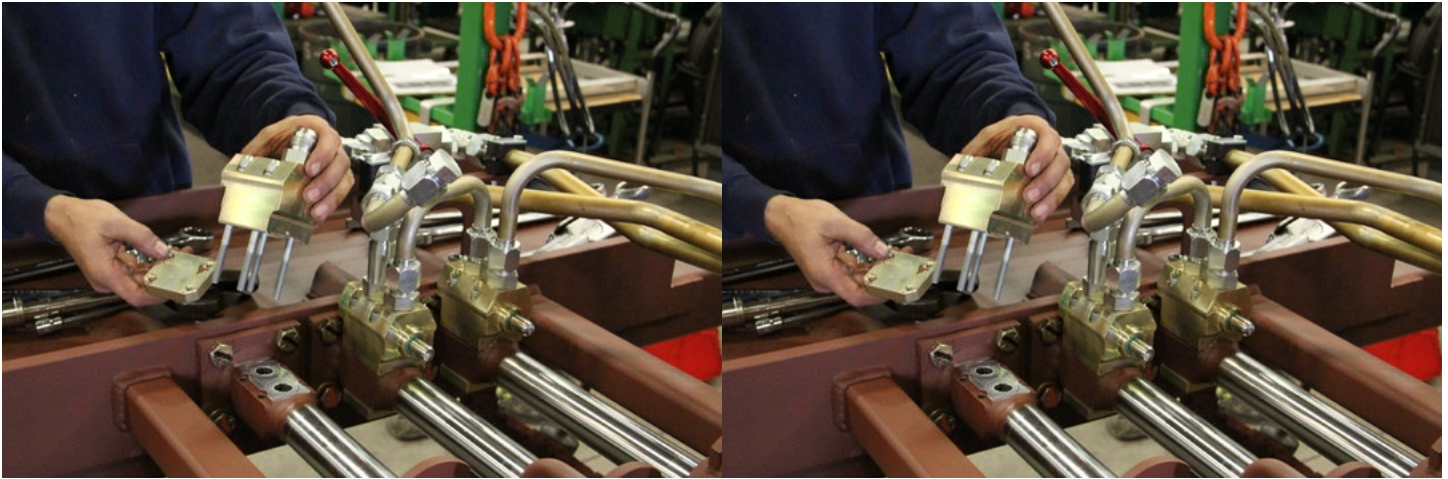
2) Remove Check Valve



•Using 1/4" Allen key and ratchet, remove Check Valve bolts, making sure not to lose the lock washer on the bolt.

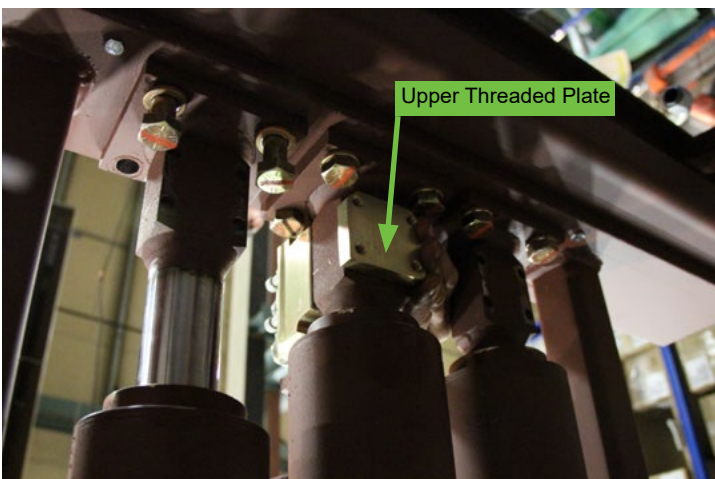
•After bolts have been removed, support Check Valve from underneath. While removing Check Valve and upper plate, pull the Check Valve straight down making sure not to lose O-Rings on the bottom of Check Valve.

3) Replace Check Valve

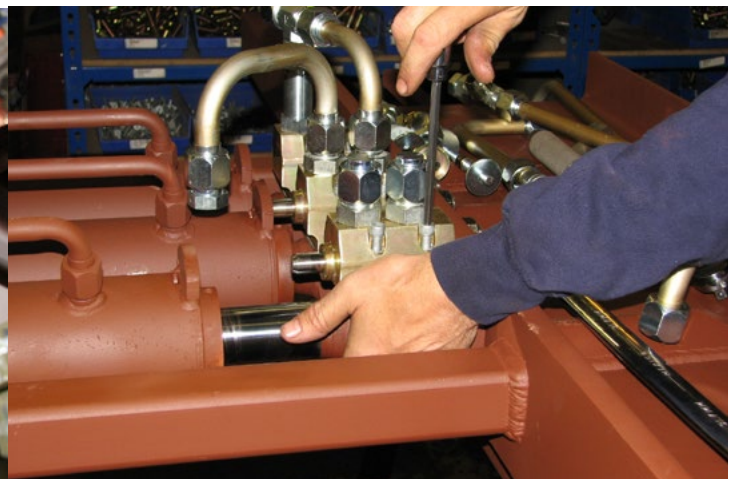


•Before replacing Check Valve, make sure the surface is clean, all grease is removed.

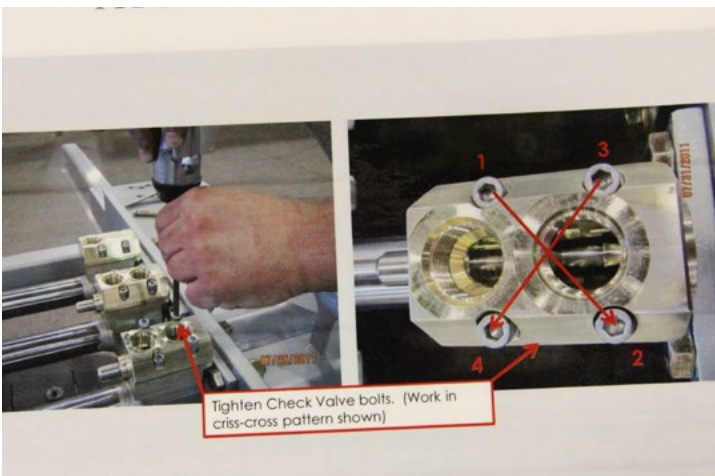
•Make sure Check Valve is properly placed with O-Rings aligned with the ports and lubricate with clean hydraulic oil.



•Place the upper plate over the cylinder rod block making sure that the beveled edges of the plate point to the outside. This is to provide clearance for the cylinder bolts.

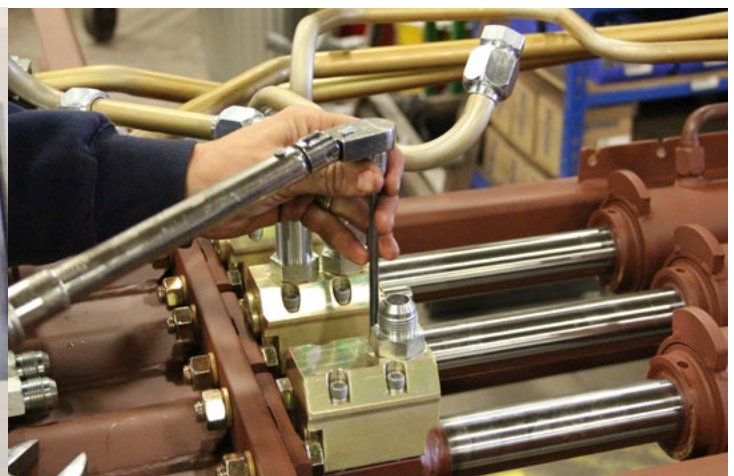


•Align bolt holes in the plate with the Check Valve body and hand-tighten the bolts to secure the plate.



Tighten Check Valve bolts. (Work in criss-cross pattern shown)

•Using ¼" Allen hex key and ratchet, tighten the bolts in the following pattern: (photo showing bolt pattern)



•Torque Check Valve bolts to 20 FT-LBS

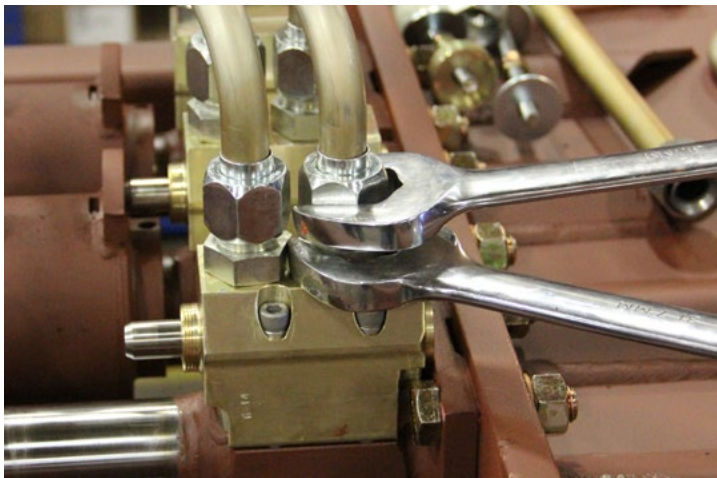
Remove/Replace Cylinder

Tool List:

- 1-1/4" Wrenches (2)
- 1/4" Allen Hex Key or Allen Wrench
- 6" or 12" extension
- Ratchet
- 15/16" Wrench (2)
- Pry Bar
- 1/2" Drive Torque Wrench
- 1/2" Impact Wrench

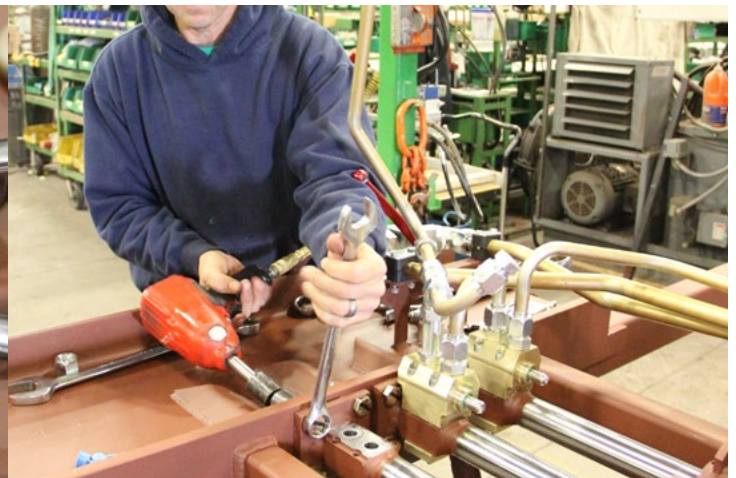
Remove Cylinder

1) Remove Check Valves

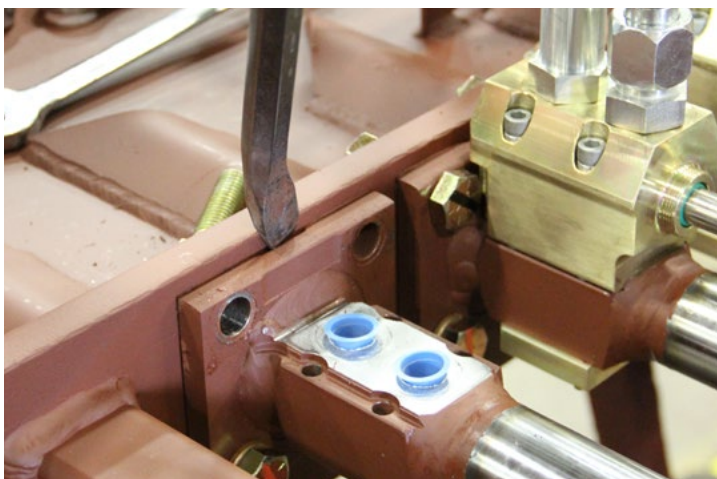


•Remove Check Valves at each end of the Cylinder. See instructions page 8. Plug all of the fittings and ports.

2) Remove Cylinder



•Loosen and remove the bolts from the rod end plates at each end of the Cylinder using (2) 15/16" wrenches.



•Using the pry bar, gently move the rod end plate away from the Cylinder mount plate to detach pins.



•Loosen the bolts to one of the lower cross-drive clamp bolts using 15/16" socket with 1/2" drive impact wrench.



•The Cylinder is heavy. Before loosening the bolts to the second cross-drive clamp, have another person available to support the cylinder.

•The cylinder can now be removed. Always use (2) people to move Cylinder out of frame.

3) Replace Cylinder



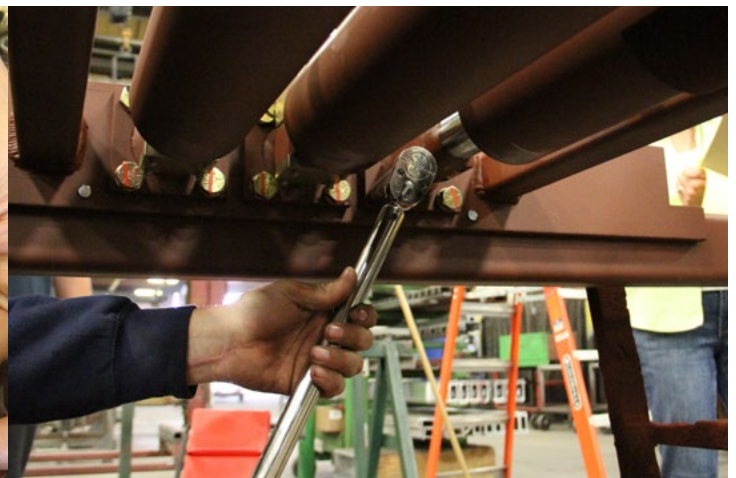
•The Cylinder is heavy. Always use (2) people to move Cylinder into frame.



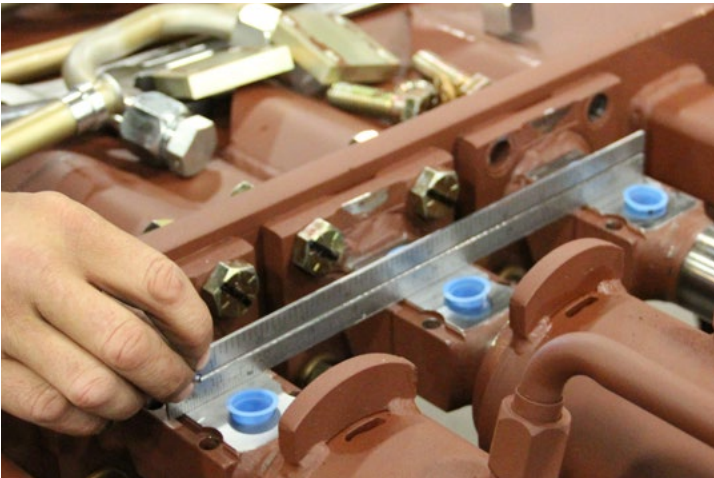
•Align bolt holes in the rod end plate with the bolt holes in the nut bar. Before torquing cylinder bolts, check all three cylinders for level.



•The nut bar is aluminum so make sure to use anti-seize compound before replacing the steel bolts. Start bolts by hand.



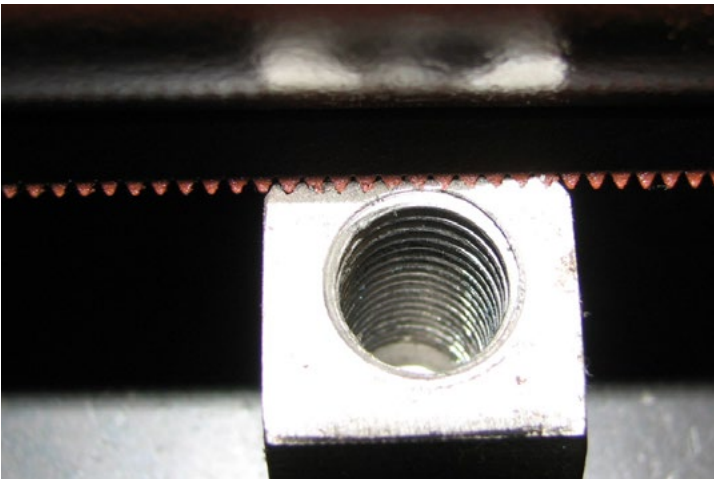
•Hand tighten bolts, then using a torque wrench, torque them to 135 FT-LBS.



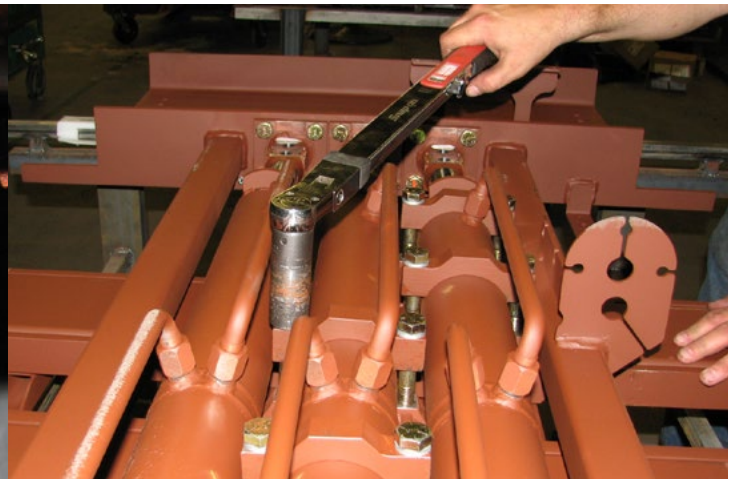
•After Cylinder is in place, make sure that Check Valve mounting surfaces are level using a straight edge. Replacing the Check Valve tubes will be problematic if mounts are not level.



•Replace the two lower cross-drive clamps by hand tightening the bolts. Then further tighten evenly, using the impact wrench.



•Replace lower clamp bolts by hand making sure the threads are matched and not cross-threaded. Make sure the Nordlock washers are in place. Do not torque until the bolts are all installed and torqued evenly.



•Torque the lower cross-drive clamps to 135 FT-LBS using the torque wrench. Over torque may distort the barrel enough to bind the piston.



•Replace Check Valves. See instructions page 9