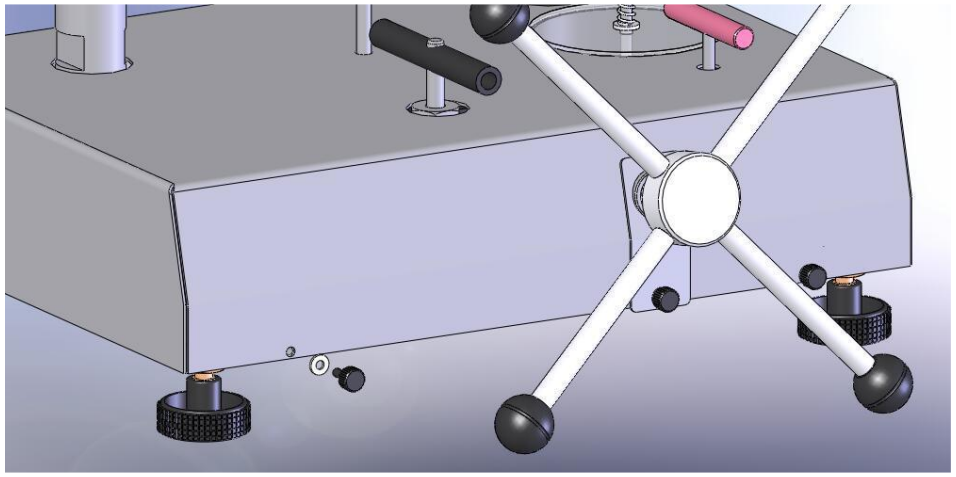
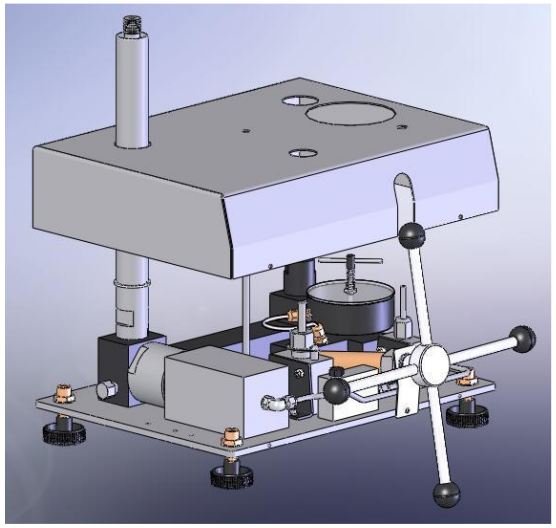
P3800 high pressure deadweight tester - Cover removal and leak inspection

(covers P3830, P3840 and P3860 models)

1. Remove weights, sleeve weight and any TEST port fittings and adapters that will interfere with removal of the cover.
2. Remove the 2 handles from the valves.
3. Remove the 5 thumbscrews and nylon washers holding the cover on the deadweight tester (DWT).

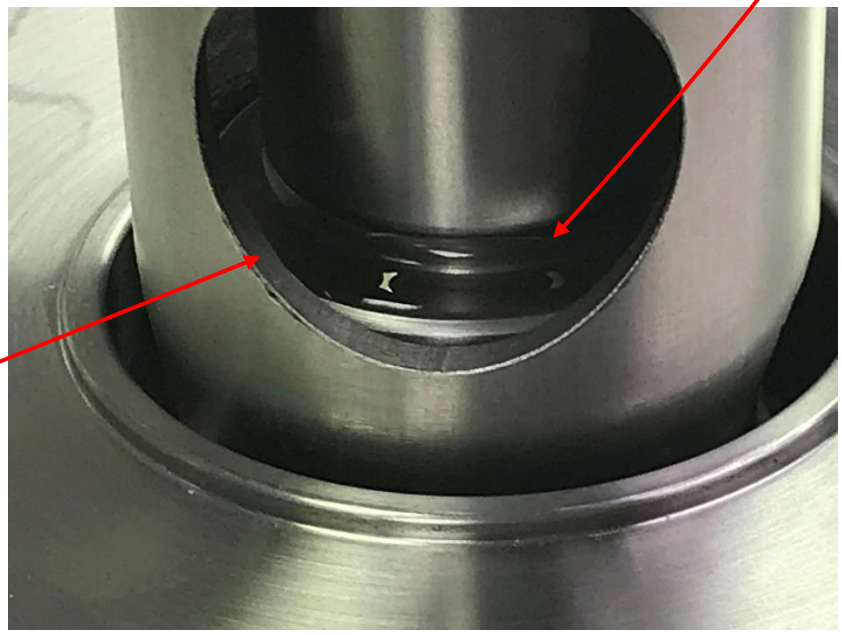


4. Remove the cover

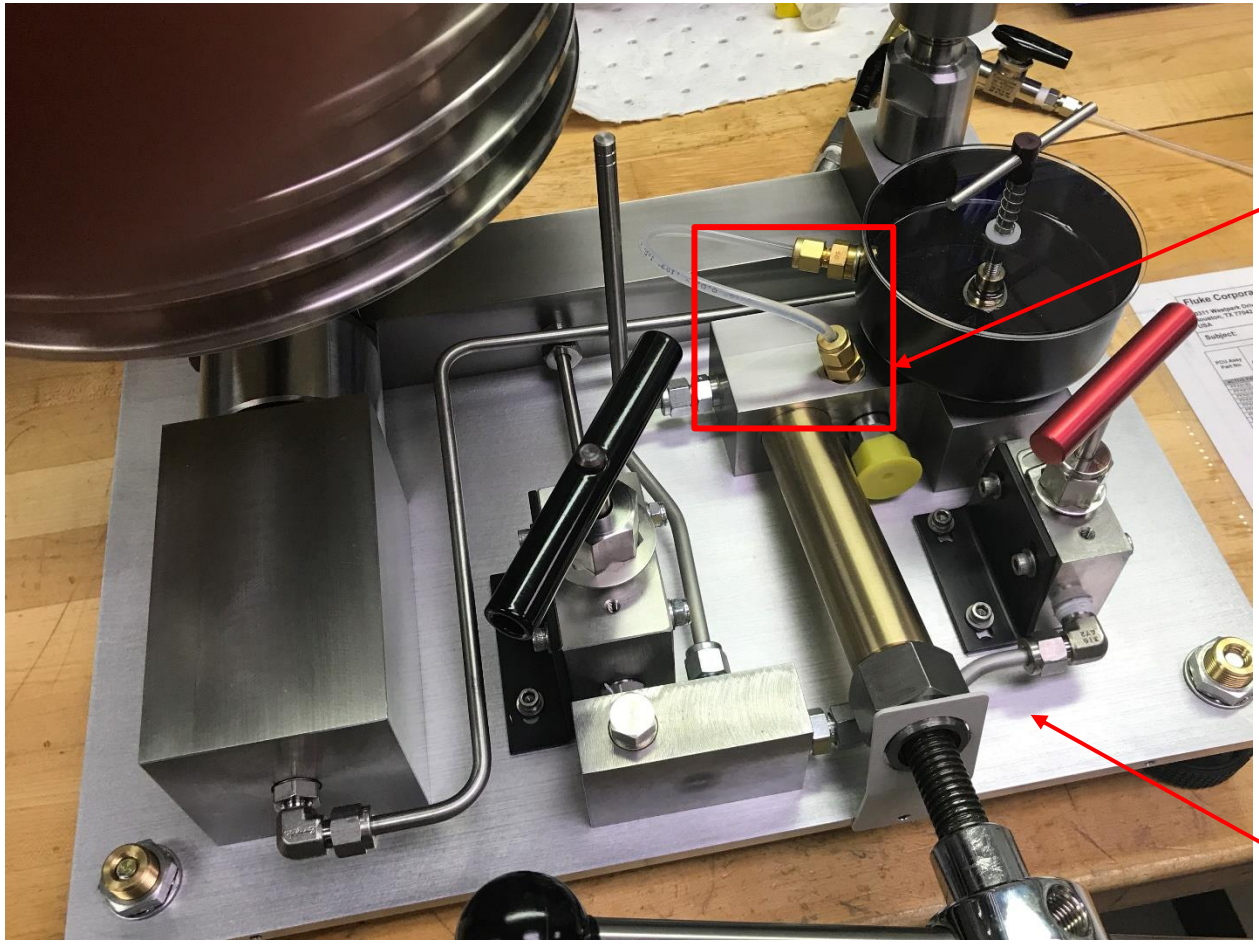


5. Look for any oil that would indicate a leak and take photos.
    a. Check for oil leaking down the mounting post to the base plate from the piston-cylinder interface. It is recommended to clean any oil from the mounting post, weight carrier tube and deadweight tester regularly.

P3800 piston is about 2 mm diameter (3.14 mm^2 area).
As the piston drops, oil leaks from the piston-cylinder interface. The volume of this oil is the area times the drop rate (up to 1.5 mm/min) and is 4.7 mm^3/min (0.0047 cm^3/min or 0.0003 in^3/min). Over one hour this is 280 mm^3/min (0.3 cm^3/min or 0.017 in^3/min). This oil collects on the top of the piston column (mounting post) where there is a slight depression that forms a reservoir to catch the oil (see Figure 4-1 in the P3800 manual). When the oil overflows this depression it will run down the sides of the mounting post and eventually end up on the base plate. It is recommended to clean the mounting post, weight carrier tube and deadweight tester regularly.



b. Check for oil leaking from the reservoir



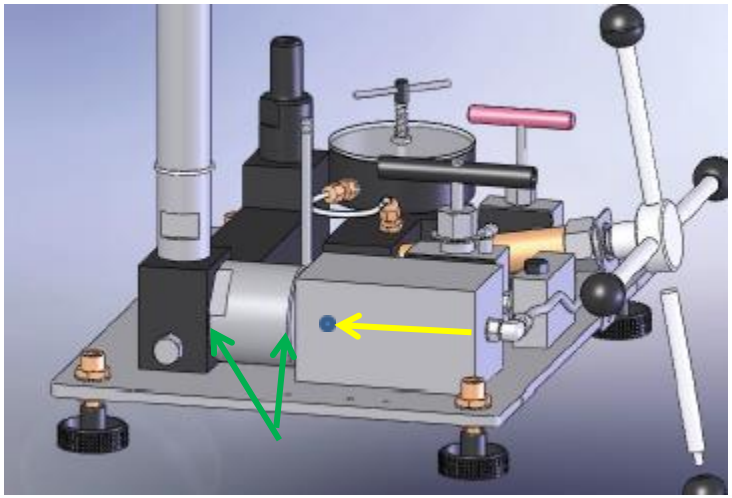
If the reservoir vent valve is opened with pressure in the system some oil may spray up and out of the reservoir lid onto the surfaces next to the reservoir, especially on this raised area.

Of course care must be taken to not spill oil when filling the reservoir.

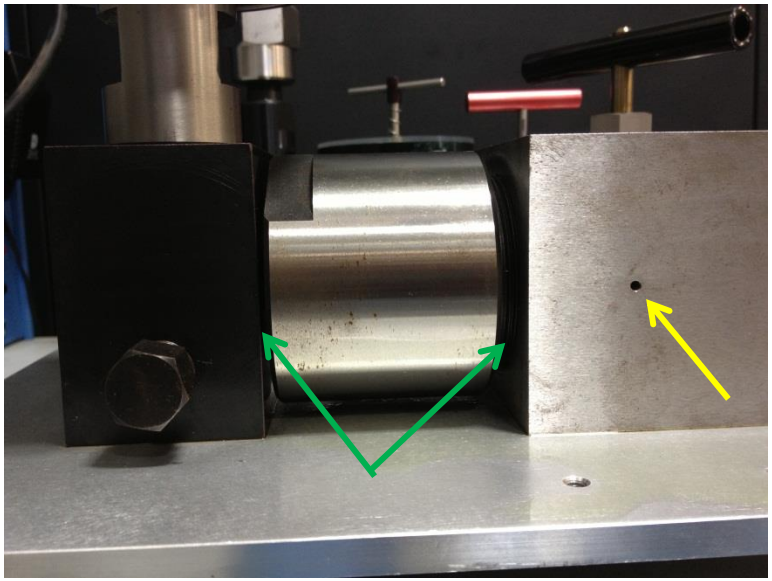
The small amount of oil that leaks from the piston-cylinder interface will run down the mounting post and onto the base plate.

Base plate

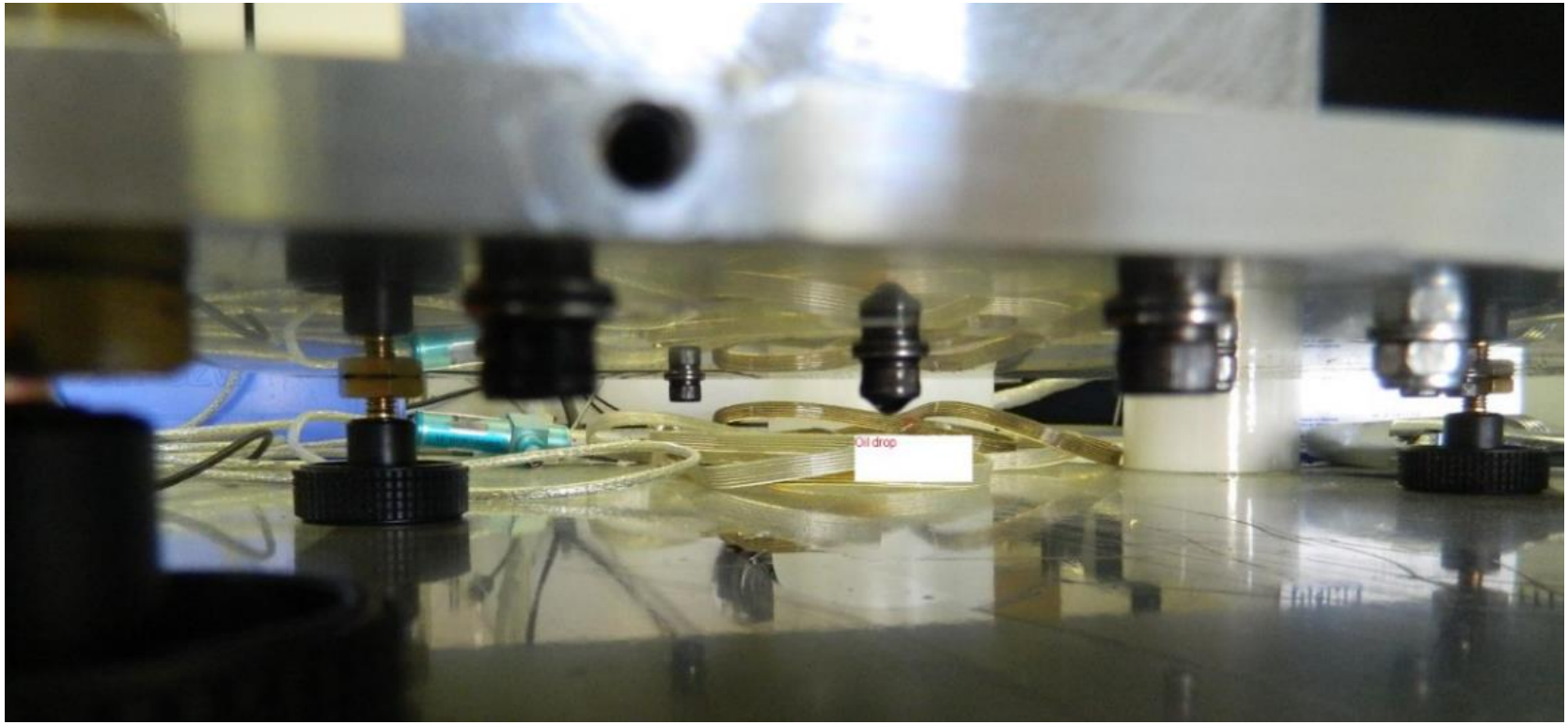
c. Check for oil leaking from the intensifier
    i. Oil from the weep hole (yellow arrow) might indicate that the high pressure piston seal is leaking. Tip the deadweight on its side to check if oil comes from this weep hole (make sure not to hit the piston cap on anything)



    ii. Oil from the threaded areas (green arrows) would be unusual. Check that a leak here is not from the piston-cylinder interface (see a. above)



6. Look under the DWT also



7. Clean all oil from all surfaces except in the reservoir before doing leak testing
8. Install the two valve handles
9. Run the DWT with the cover off and see where the leak is coming from. This might take hours so leave it overnight if possible.
10. Take photos of any leaks and send to Fluke Calibration Technical Support at pressuresupport@flukecal.com

11. Note that measuring the piston drop rate of a deadweight tester is a better way to evaluate performance rather than trying to do a leak check and measuring a pressure decay rate. Leak checks can be difficult to do because the piston is typically floating and dropping slowly, and some oil leaks from the piston-cylinder interface.
    a. Use a dial gauge (or similar) to measure the drop rate of the piston at full pressure of the deadweight tester. From DWT Uncertainty Analysis (Technical Note 2170TN13), the drop rate specification for P3800 deadweight testers at full pressure is -1.5 mm/min (-0.059 in/min).

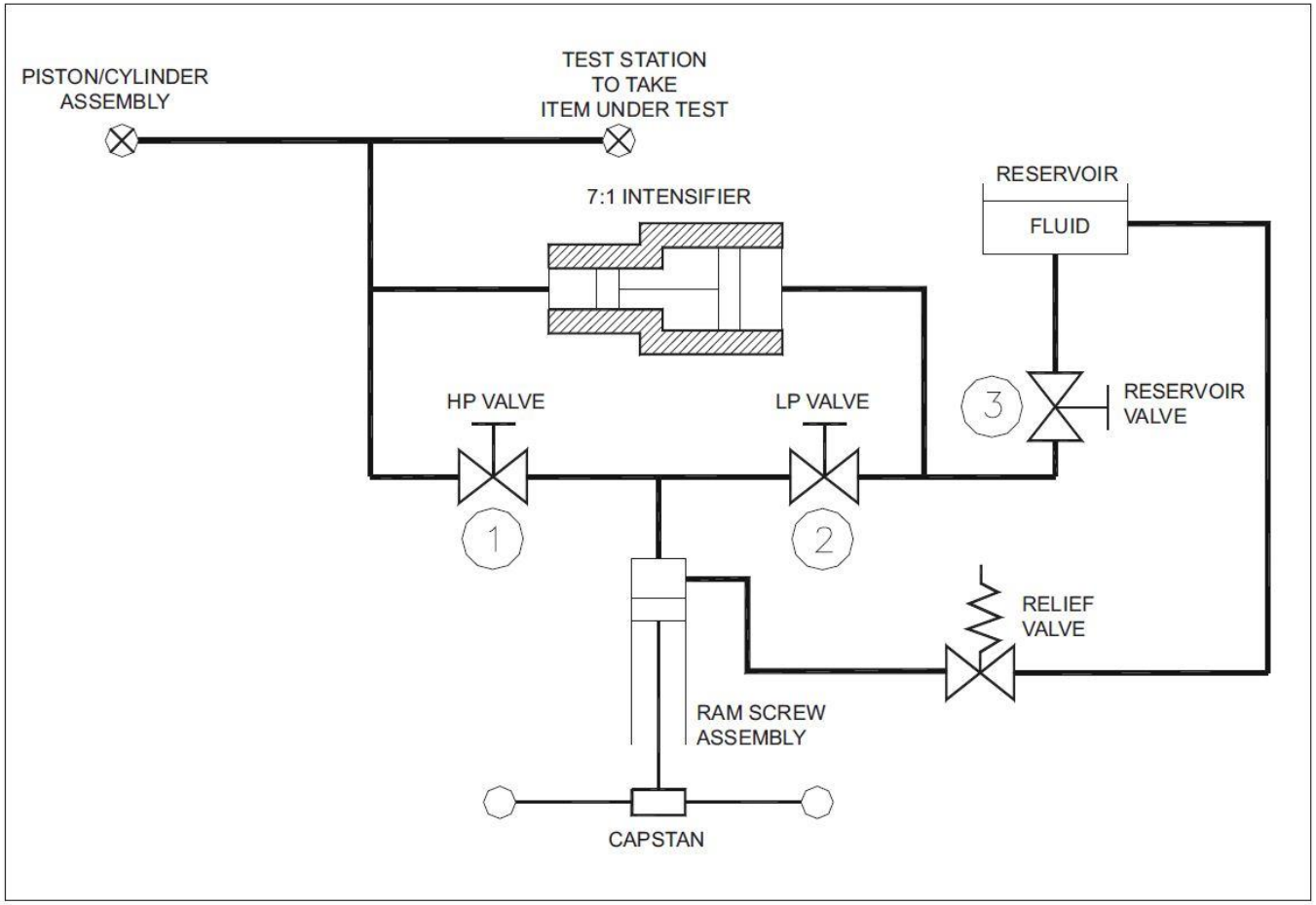


Figure 1-1. Hydraulic Circuit Schematic

End of procedure