Hydraulic System Commissioning Procedure
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You wouldn’t start an engine with no oil in the crankcase – not knowingly anyway. And yet what amounts to the same thing happens to a LOT of pricey hydraulic components.

Fact is, if the right steps aren’t followed during initial start-up, hydraulic components can be seriously damaged. In some cases they may work OK for a while, but the harm done at start-up dooms them to premature failure.

You’d be amazed at the number of these types of failures which wrongly end up as warranty claims by hydraulic equipment owners. And it’s frustrating for everyone concerned – because they’re totally preventable.

There’s two parts to getting this right: knowing what to do; and remembering to do it. If you don’t know what to do that’s one thing. However if you do know, but forget to do it, well that’s soul destroying. You can’t pat yourself on the back for filling the pump housing with clean oil when you forgot to open the intake isolation valve before starting the engine!

This sort of mistake is easily prevented by using a start-up procedure and check list. Trouble is, to be MOST effective, it must be machine specific. The pre-flight check list for a Boeing 747 is not much use to a pilot flying an Airbus A380!

HOWEVER, if a machine-specific start-up procedure is not available, the generic procedure below is definitely better than nothing at all.

Oh, and keep an eye on your inbox, because in a couple of days time I’m going to share some more hydraulic maintenance tips and insights, which I know you’ll find invaluable. But in the meantime, here’s the start-up procedure:

Pre-start

If the hydraulic system is down as a result of a major component failure:
• Drain and clean the reservoir, to ensure that it is free from metallic debris and other contamination. Failure to do so may result in damage to the pump(s) and/or other components on start-up.
• Change all the filters.
• Change the fluid. On large systems, where the cost of changing the fluid may be prohibitive, the fluid should be flushed until a cleanliness level of ISO 4406 16/13 or better is achieved.

When installing pumps and motors, check the drive coupling for fit on the pump or motor shaft. Loose fitting couplings cause accelerated wear of the drive shaft and should be replaced. Conversely, NEVER hammer or otherwise force the drive coupling onto the pump or motor shaft; it should be sliding fit. Alignment and fit-up of flexible drive coupling halves must be carried out in accordance with the coupling manufacturer’s specifications.
On closed-circuit systems (hydrostatic transmissions), closely inspect the high-pressure hoses or pipes between the pump and motor, and replace any suspect lines. A burst hose or pipe in service can result in the destruction of the pump and/or motor through cavitation.

**Cylinders** - Fill cylinders with clean hydraulic fluid through their service ports, before connecting service lines. This reduces the risk of air compression within the cylinder (dieseling) on start-up, which will result in damage to the cylinder and its seals.

**Motors** - Fill the case of piston-type motors with clean hydraulic fluid through the highest case drain port and connect the case drain line. Failure to do so will result in damage to the motor through inadequate lubrication on start-up. Units that are mounted vertically, with the shaft up, require special attention to ensure that the fluid level in the case is high enough to lubricate the front shaft bearing(s).

**Pumps** - After installing the pump(s) and connecting service lines:
- Open the intake line isolation valve at the reservoir.
- On pumps with a flooded inlet, i.e. pump inlet is below reservoir fluid level, carefully loosen the intake line fitting at the pump, to allow trapped air to escape. This ensures that the intake line is full of fluid. This step is not necessary with piston-type pumps that have a flooded housing (see below).
- On piston-type pumps fitted with an external case drain line, fill the pump case with clean hydraulic fluid through the highest case drain port and connect the case drain line. Failure to do so will result in damage to the pump through inadequate lubrication on start-up. Units that are mounted vertically with the shaft up require special attention, to ensure that the fluid level in the case is high enough to lubricate the front shaft bearing(s).
- On piston-type pumps with a flooded housing, i.e. pump case and inlet are connected internally and are below reservoir fluid level, carefully loosen the uppermost plug in the pump case to allow trapped air to escape. This ensures that the case is full of fluid. Failure to do so will result in damage to the pump through inadequate lubrication on start-up.
- On closed-circuit pumps (hydrostatic transmissions) install a 0-900 PSI pressure gauge in the charge circuit – refer to the machine manufacturer’s instructions for guidance.

**Start-up**
- Check all pipe and hose connections are tight.
- Confirm reservoir fluid level is above minimum.
- **CAUTION! Confirm all controls are in neutral to ensure that the system will start unloaded. Take safety precautions to prevent machine movement, in the event that the system is activated during initial start-up.**
- If the prime mover is electric, momentarily start and then stop the electric motor to visually confirm that the direction of motor rotation is correct for the pump. Rotating the pump in the wrong direction can damage the pump.
- Start the prime mover and run at the lowest possible rpm.
• On closed-circuit systems (hydrostatic transmissions) monitor the pressure gauge previously installed in the charge circuit. If the manufacturer’s specified charge pressure, typically 110 to 360 PSI, is not established within 20 to 30 seconds, shut down the prime mover and investigate the problem. Do not operate the system without adequate charge pressure - damage to the transmission pump and/or motor will result.

• On variable-displacement pumps and motors with external, low-pressure pilot lines, carefully loosen the pilot line fitting at the pump or motor to allow trapped air to escape. This ensures that the pilot line is full of fluid. **CAUTION! Do not bleed pilot lines carrying high-pressure fluid. Personal injury may result. If in doubt, do not bleed pilot lines!**

• Allow the system to run at idle and unloaded for ten minutes. Monitor pump(s) for unusual noise or vibration, inspect system for leaks and observe reservoir fluid level.

• Function the system without load. Stroke cylinders slowly, taking care not to develop pressure at the end of stroke, to avoid compression of trapped air, which can result in damage to the cylinder and seals through the diesel effect. Continue to function the system until all air is expelled and all actuators operate smoothly.

• With the system at operating temperature check, and if necessary adjust settings of circuit protection devices according to manufacturers’ specifications.

• Function-test the system under load.

• Inspect the system for leaks.

• Shut down prime mover, remove all gauges fitted during commissioning, check reservoir fluid level and, if necessary, fill to the correct level.

• Return machine to service.