

1.1 Hydraulic Cart Commissioning Procedure

Operational Guidance

1.1 Hydraulic Cart Commissioning Procedure

This procedure is applicable to the initial setup, commissioning and testing of a COUPP 1L hydraulic cart under the control of a LabVIEW VI.

The operational control of the hydraulic cart is accomplished via LabVIEW software through a KICP direct server. Starting with a new cart and/or a new DAQ computer it is necessary to install KICP direct on the DAQ computer and may involve re-installing the KICP firmware on the Hydraulic Cart itself. Configuration of the communications is also required. This requires specifying an IP address for the Hydraulic Cart and making that known to both computers. Downloads or modifications to the cart firmware are done by Jerry Zimmerman as is the communications configuration.

- 1) Call Jerry Zimmerman. (630) 840-4571 *or email: jerryz@fnal.gov*

Once Jerry has established the proper communications and verified the basic operations of the cart one can proceed with the commissioning.

- 2) Blank off the cart and set up for testing. We have in the past used a section of pipe to provide a modest fluid volume. The test and set up can also be done on a larger volume as long as the vessel is appropriate for the pressures involved and you have enough glycol to fill it. Ideally, the test setup should be instrumented with an independently calibrated pressure transducer. There should be a valve port (preferably low) for filling. There should be a valve port (preferably high) for pumping.
- 3) Set the position¹ of the hydraulic cylinder to a point midway through its range. Actually you can set it where ever you like. I prefer half way. No particular reason.
- 4) Pump down the cart and plumbing volumes.
- 5) Close off the pumping port.
- 6) Open the filling port to a glycol reservoir (a pipe sticking down to the bottom of a glycol can or barrel is sufficient) and suck in the glycol.
- 7) Close off the filling port.
- 8) Apply compressed air to the air input. Use the on-board regulator to set the air pressure > 25 psig.² **Please, do not apply compressed air before you put in fluid. That will slam the air piston down hard on its stop and could break it.**

¹ "Pressure Enabled" & "Piston Control Mode" & "UP or Down" See *Hydraulic Cart Software Manual*

² The expand/compress controls cannot be activated without a minimum air pressure of 25 psig.

1.1 Hydraulic Cart Commissioning Procedure

Operational Guidance

- 9) Operate the expansion/compression mechanism. Note that you can adjust the expansion speed using the output port valve on the compression solenoid valve.
- 10) Manipulate the piston position³ to push the air piston up to its stop (be careful, the pressure goes up *very* fast once you hit the stop.)
- 11) Expand the chamber.
- 12) Confirm pressure regulation.⁴ Pick a pressure. Watch it regulate. Pick a different one. Watch it change. **Don't move the pressure in very large steps.** You will overdrive the stepping motor and it will not be happy. In normal use, we scan the pressure slowly and only make small incremental changes.
- 13) A *cautionary note* regarding initial setup prior to pressure regulation operation. When you have been off for a while, or if the last pressure set point was very different from where you are planning to operate it is easy to inadvertently ask for a large rapid change from the stepping motor. Best practice is to follow (11-12), *expand the chamber* to see where it is, then *change the set point in small increments* to work your way slowly to the where you want to operate.
- 14) Test it to your hearts content. You're done. Put a fork in it.

³ This requires a jumper shorting pins () and () in connector ()

⁴ "Pressure Enabled" & "Pressure Control Mode" & "P Set Point" See *Hydraulic Cart Software Manual*