

4th International Workshop on Sample Environment

Cryofurnace Made Simple

Bruce Hill, John Wenzel and Lou Santodonato

SNS Sample Environment Team

Sept 6, 2006

Cryofurnace Made Simple

- Temperature Control
- Exchange Gas Pressure Control
- Cold Valve Control
- Heater Selection
- Simple User Interface



Background

- **Cryofurnace specifications**
 - 2 to 600 K
 - Liquid helium
 - Top loading
 - Static exchange gas
- **Purchased from Janis Research Inc. in 2003**
- **Manual operation as-delivered**



Initial Operation

- Commissioned at the HFIR with manual operation
- Labor-intensive
 - Cold valve adjustment
 - Distinct high and low temperature operating modes

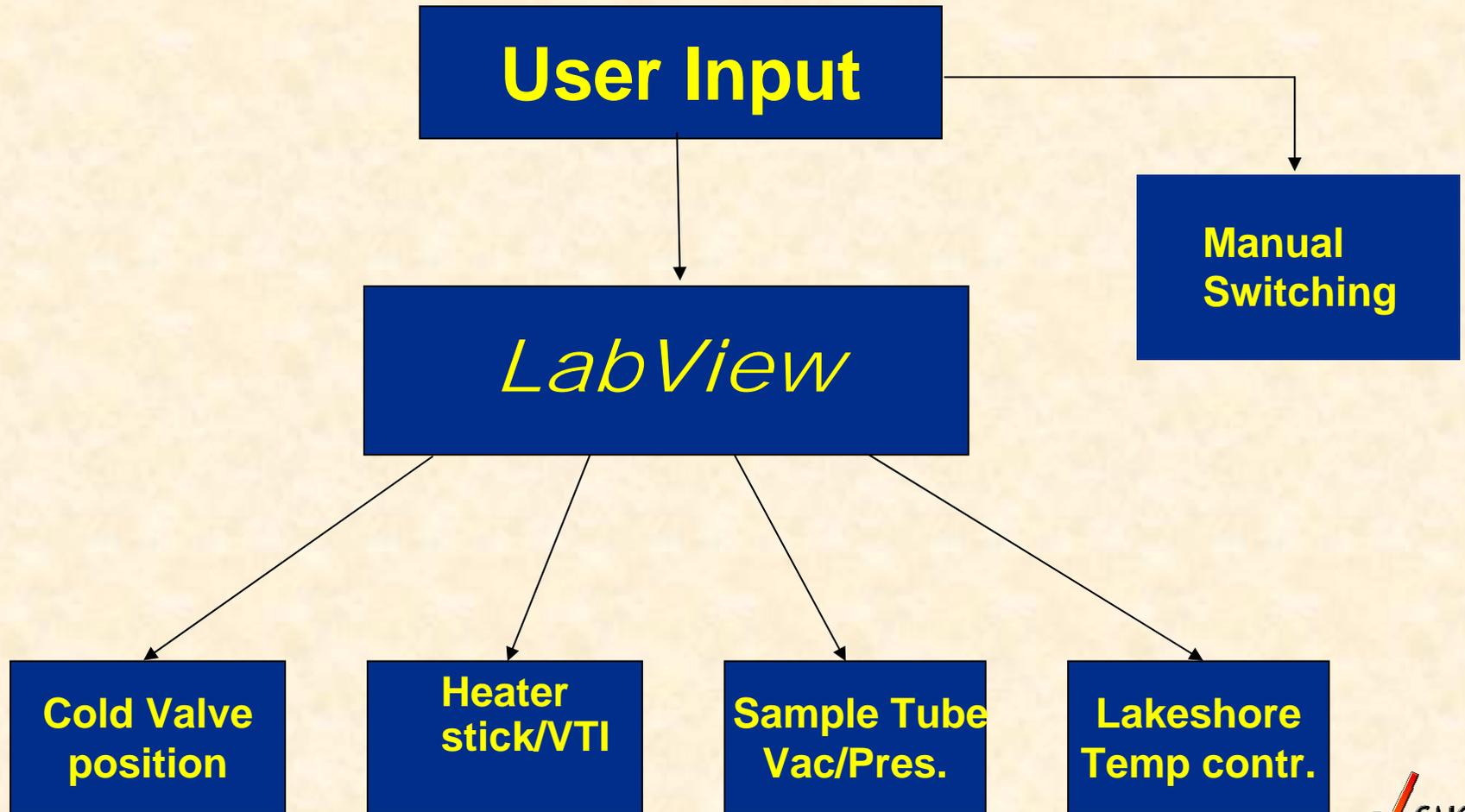
Switch between VTI and stick heaters

Switch between exchange gas and evacuated

- But it works as specified



Cryofurnace Made Simple



Temperature Control

LabView



Temperature Controller

Heater
Switch

stick or
VTI

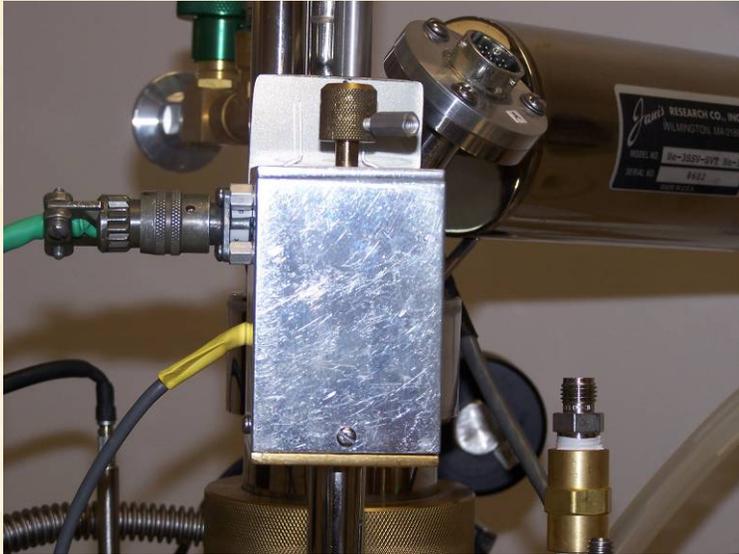
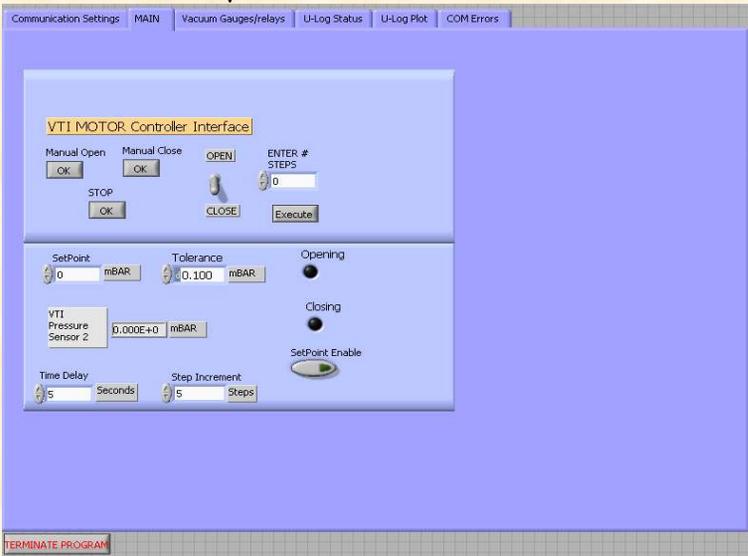
Sensors
Diode, T/C



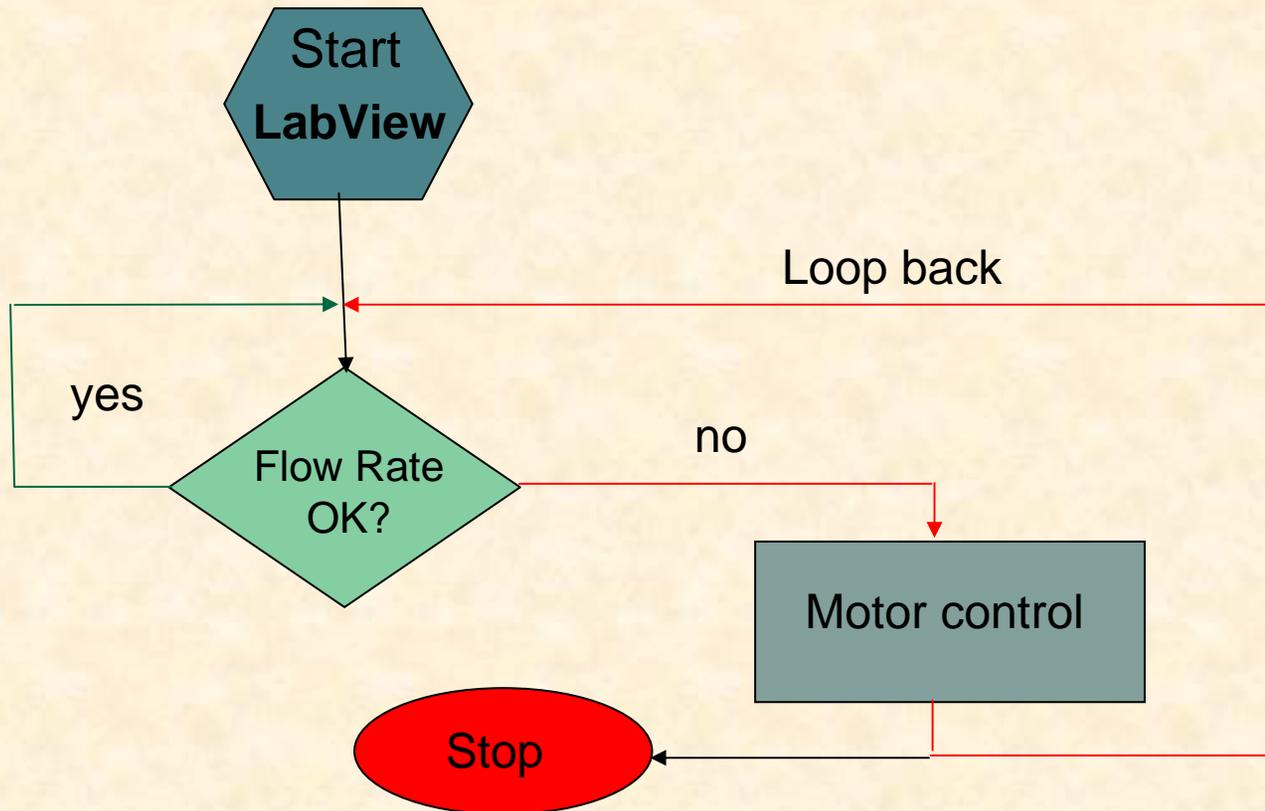
Cold Valve Motor Control

LabView Controller

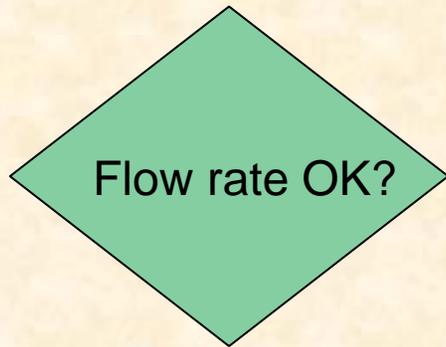
Motor w/limit switches



Cold Valve Motor Control

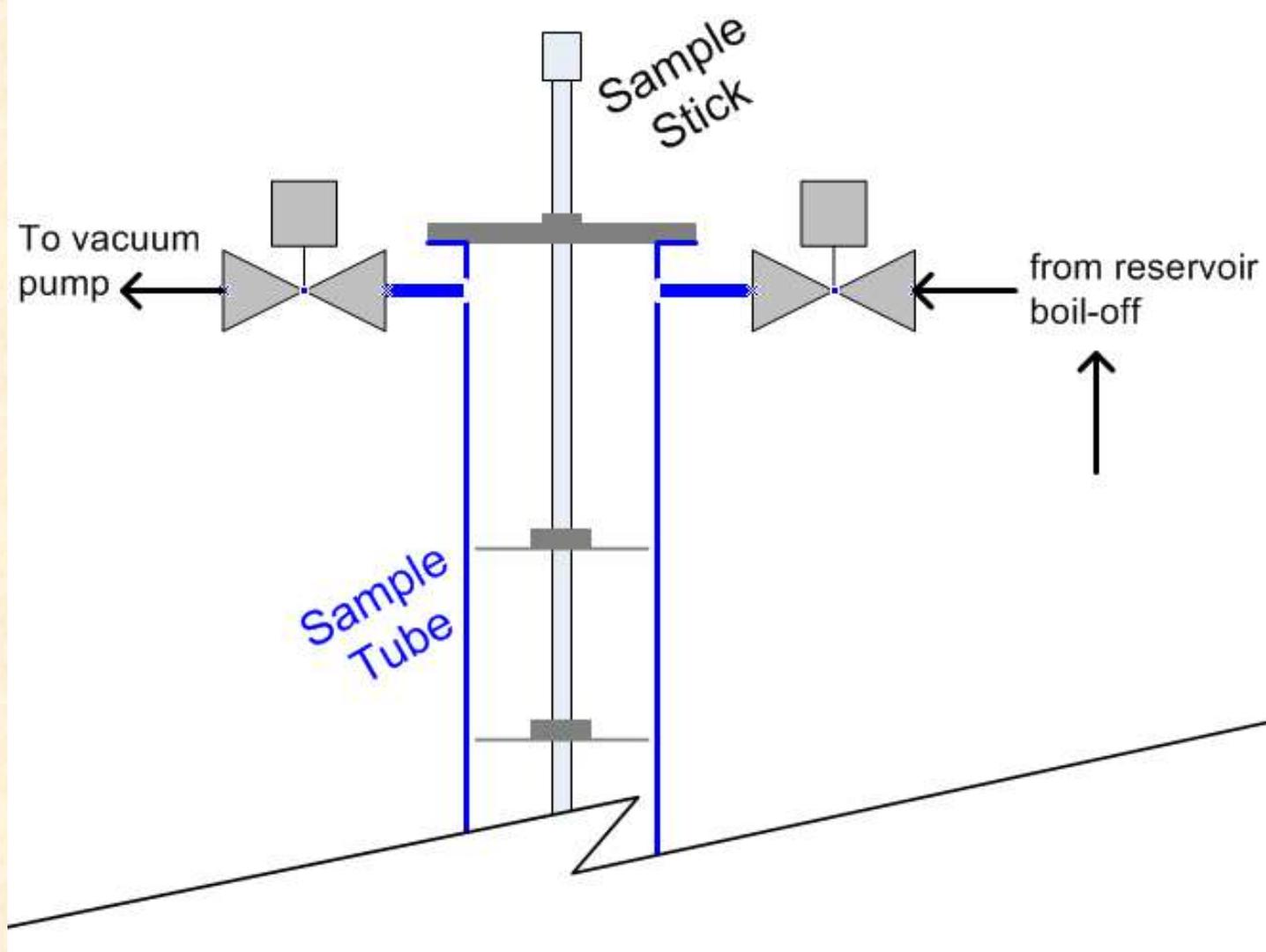


Cold Valve Motor Control

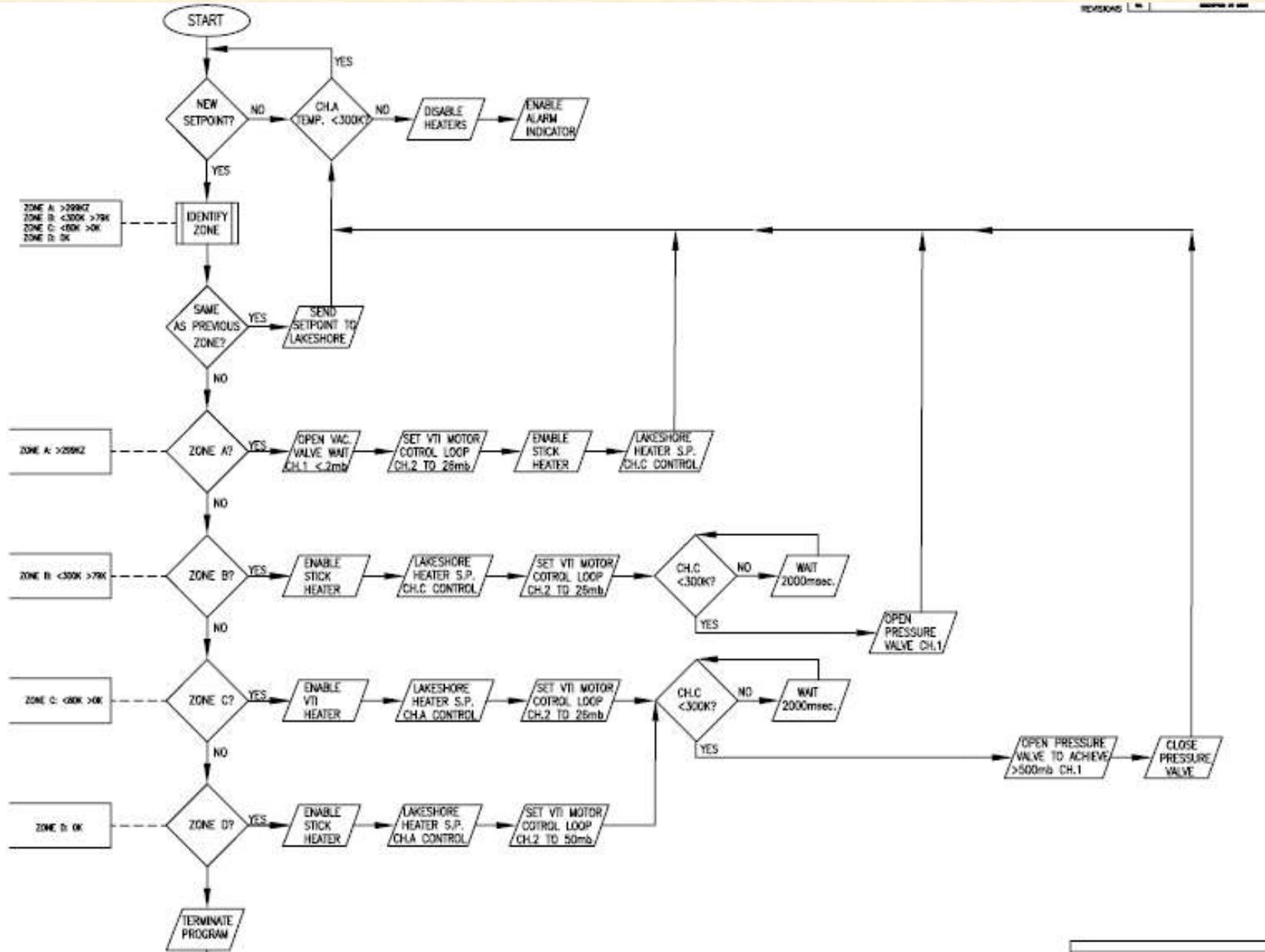


- Flow rate measured by pressure on pump line
- Optimum flow rates have been established by testing, and testing, and testing, ...
- Cold valve is adjusted slowly

Exchange Gas Fill and Evacuation



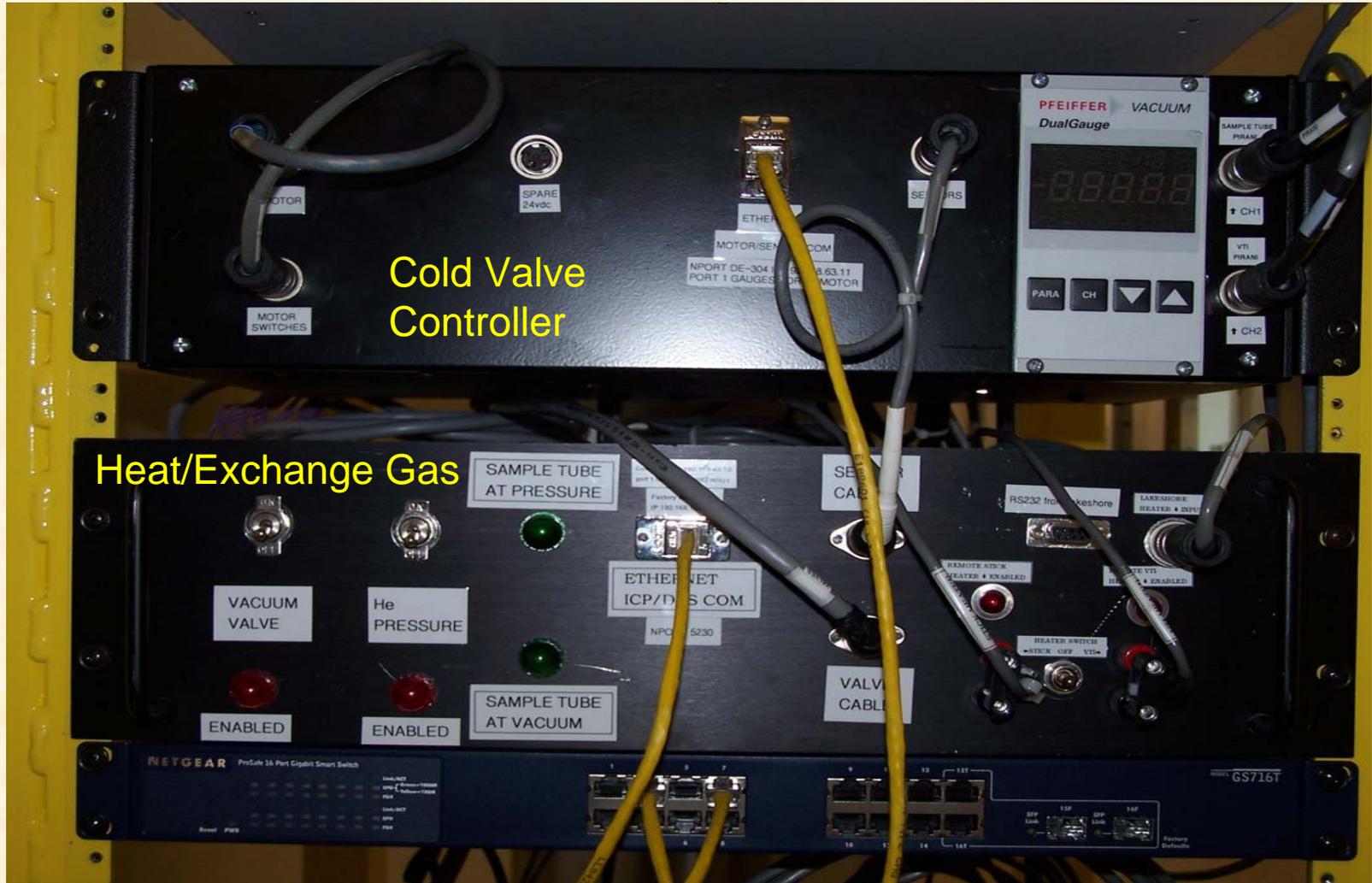
System Logic



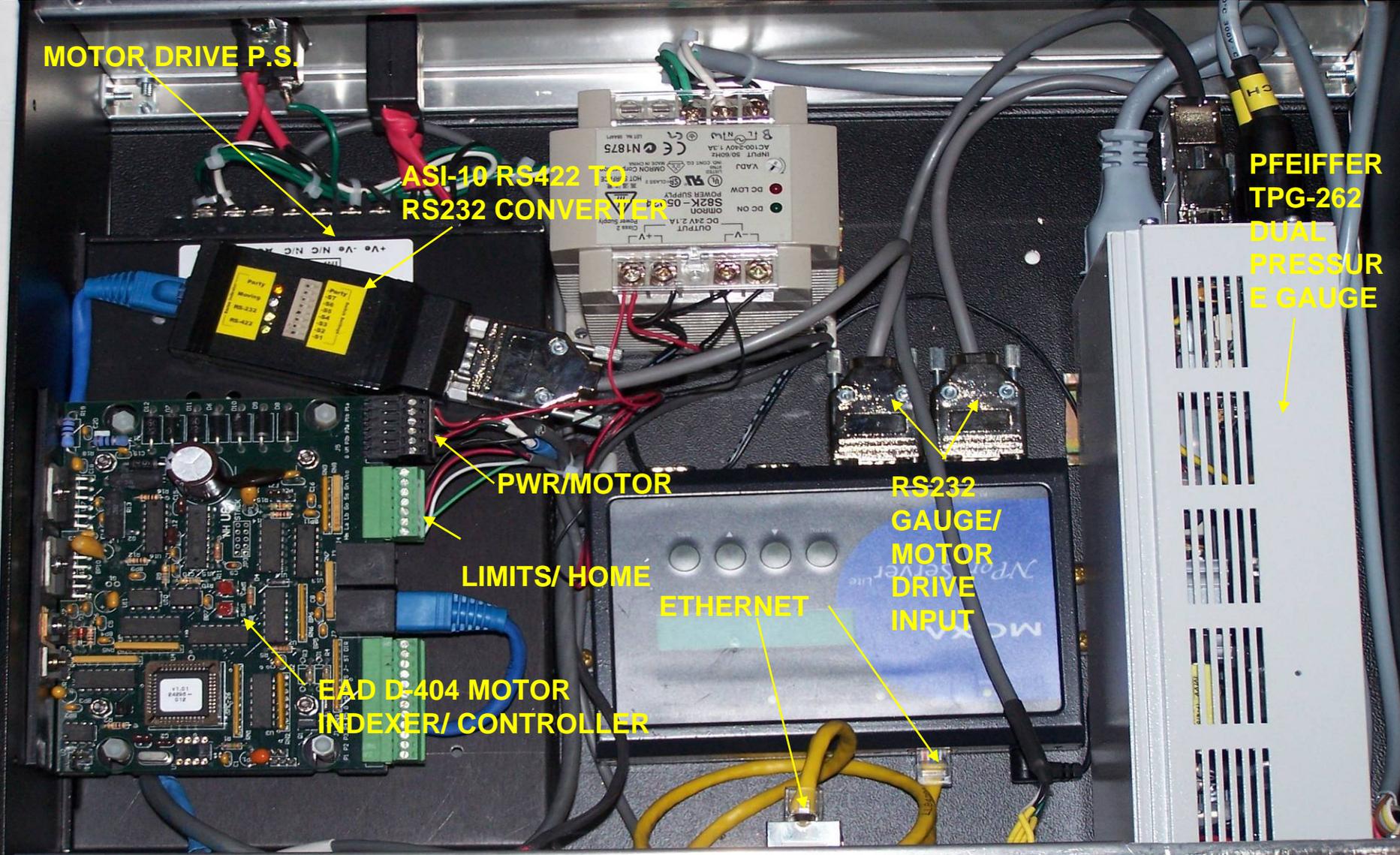
System on a Cart



Control Boxes



Cold Valve CONTROLLER



MOTOR DRIVE P.S.

ASI-10 RS422 TO RS232 CONVERTER

PFEIFFER TPG-262 DUAL PRESSURE GAUGE

PWR/MOTOR

RS232 GAUGE/MOTOR DRIVE INPUT

LIMITS/HOME

ETHERNET

EAD D-404 MOTOR INDEXER/CONTROLLER

Heat/Exchange Gas CONTROLLER

HEATER REMOTE
OVERRIDE PCB

+5 & +24vdc POWER
SUPPLY

ETHERNET

ICP/CON
I7065D RELAY
MODULE

RS485 ICP-
CON INPUT

RS232
LAKESHOR
E INPUT

VALVE MANUAL CONTROLS

ETHERNET

MANUAL HEATER SELECT