NSCL


Blue
Refrigerator
2500 Liter
Helium Dewar
Control Room
Main Distribution Box
Green Cold Box

Liquefier characteristics

1.75 kW at 4.5K “Exell” plant from Bureau of mines

Two turbines; J.T. or wet expander.

600 W at 4.5K build by CCI now used as purifier

Two dry expanders plus J.T. or wet expander.

Dual 300 W at 4.5 K build by CCI for helium recovery

One dry expander per side and one common J.T. or wet expander.

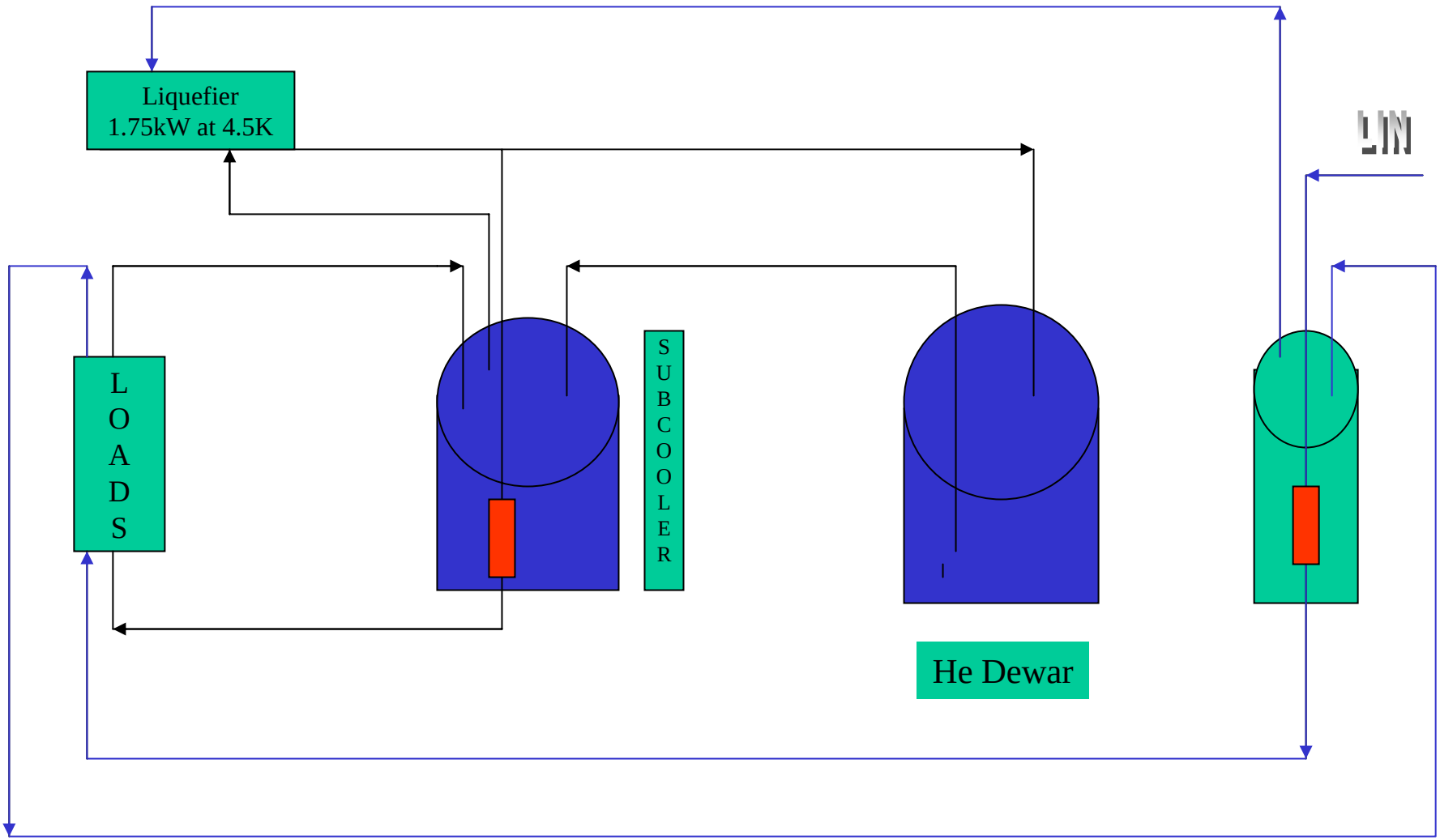
Liquid helium production and Cryogen Distribution System

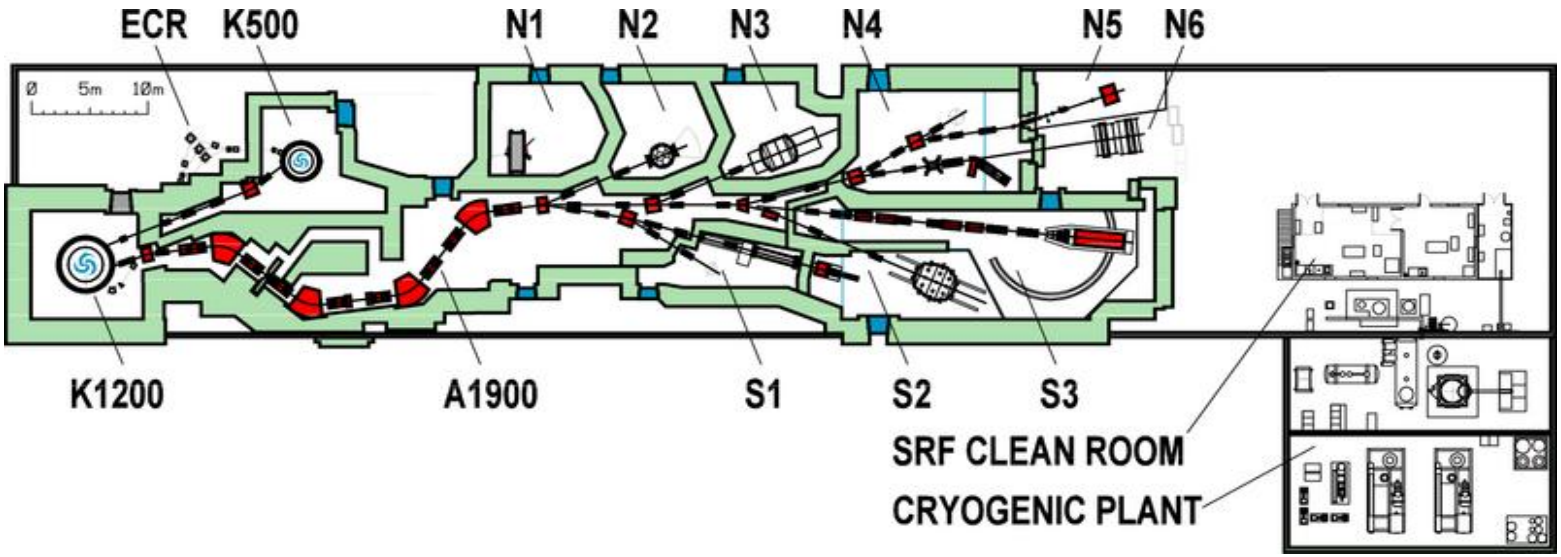
TJLAB collaboration

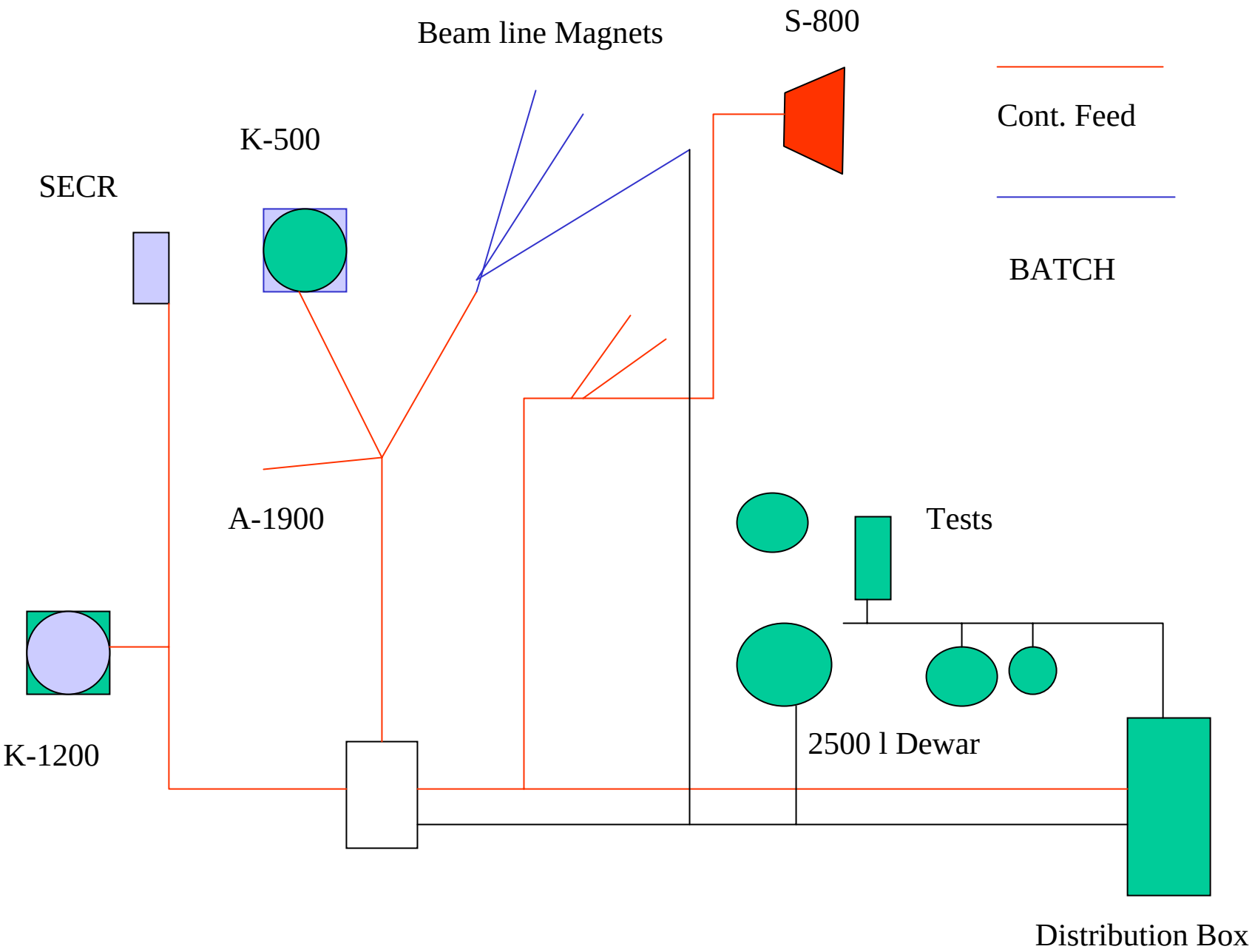
80% of system is reconfigured from pre CCF set up.

Liquefier is moved

Push to operate some equipment early leads to redundant supply routes.


Liquefier
1.75kW at 4.5K
LIN
LOADS
SUBCOOLER
He Dewar


ECR
K500
N1
N2
N3
N4
N5
N6
Ø 5m 10m
K1200
A1900
S1
S2
S3
SRF CLEAN ROOM
CRYOGENIC PLANT


Beam line Magnets
S-800
Cont. Feed
K-500
SECR
BATCH
A-1900
Tests
K-1200
2500 l Dewar
Distribution Box

Loads

4.5K cold mass is 109 tons

Cool-down 3-4 weeks

4.5K average load is 1kW

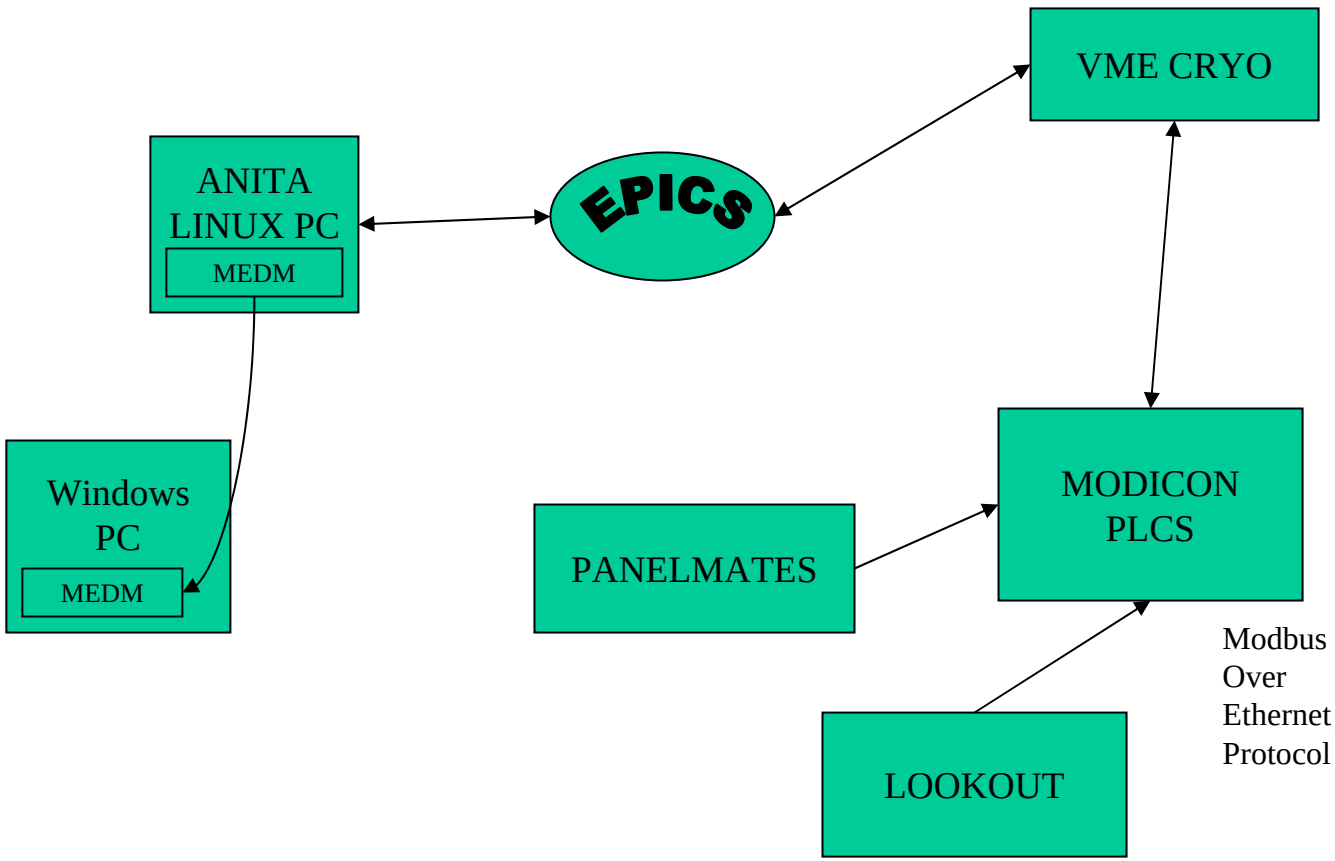
Cryostats with He leaks

Cryostats with LIN leaks

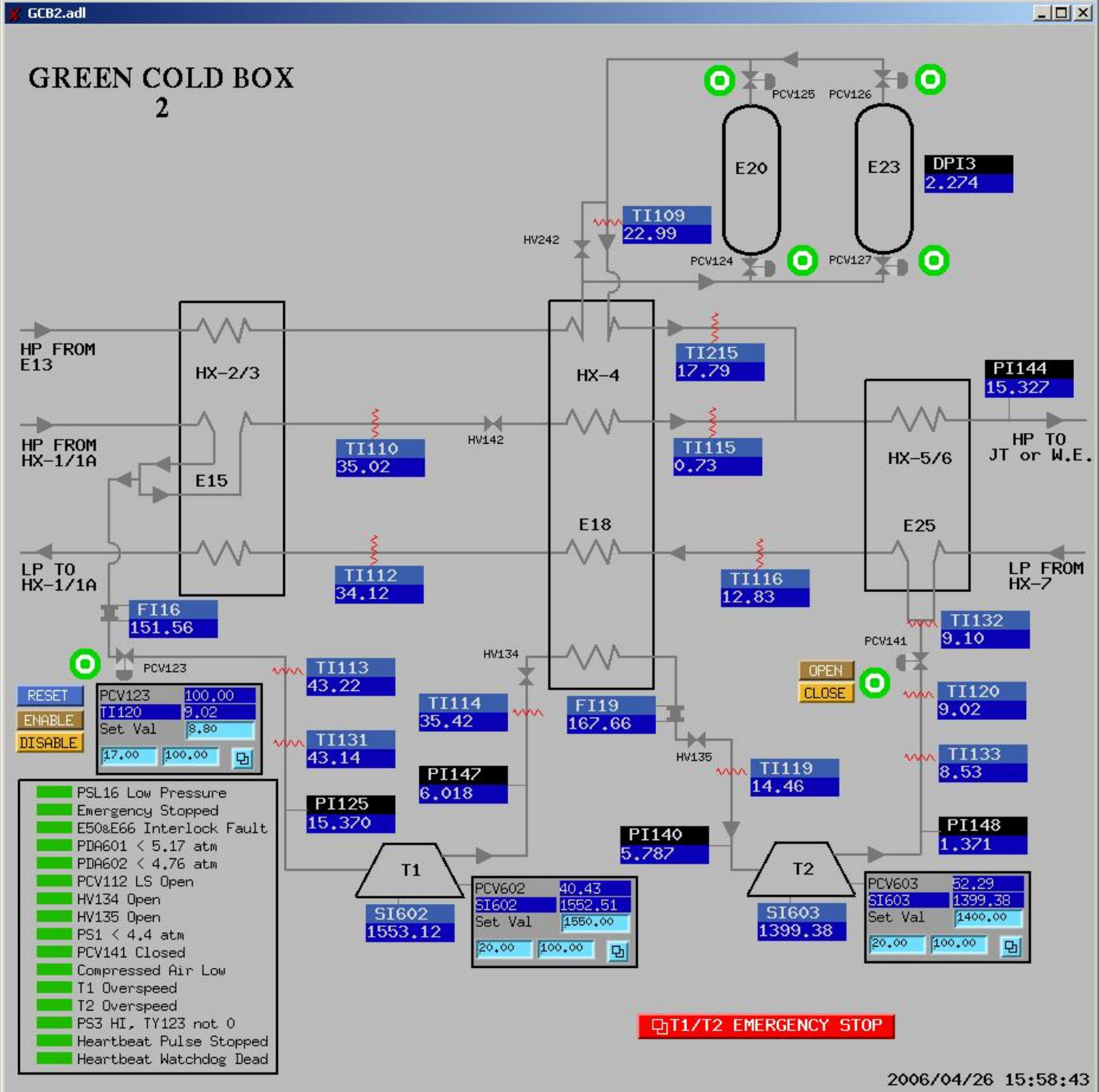
He filling cycles

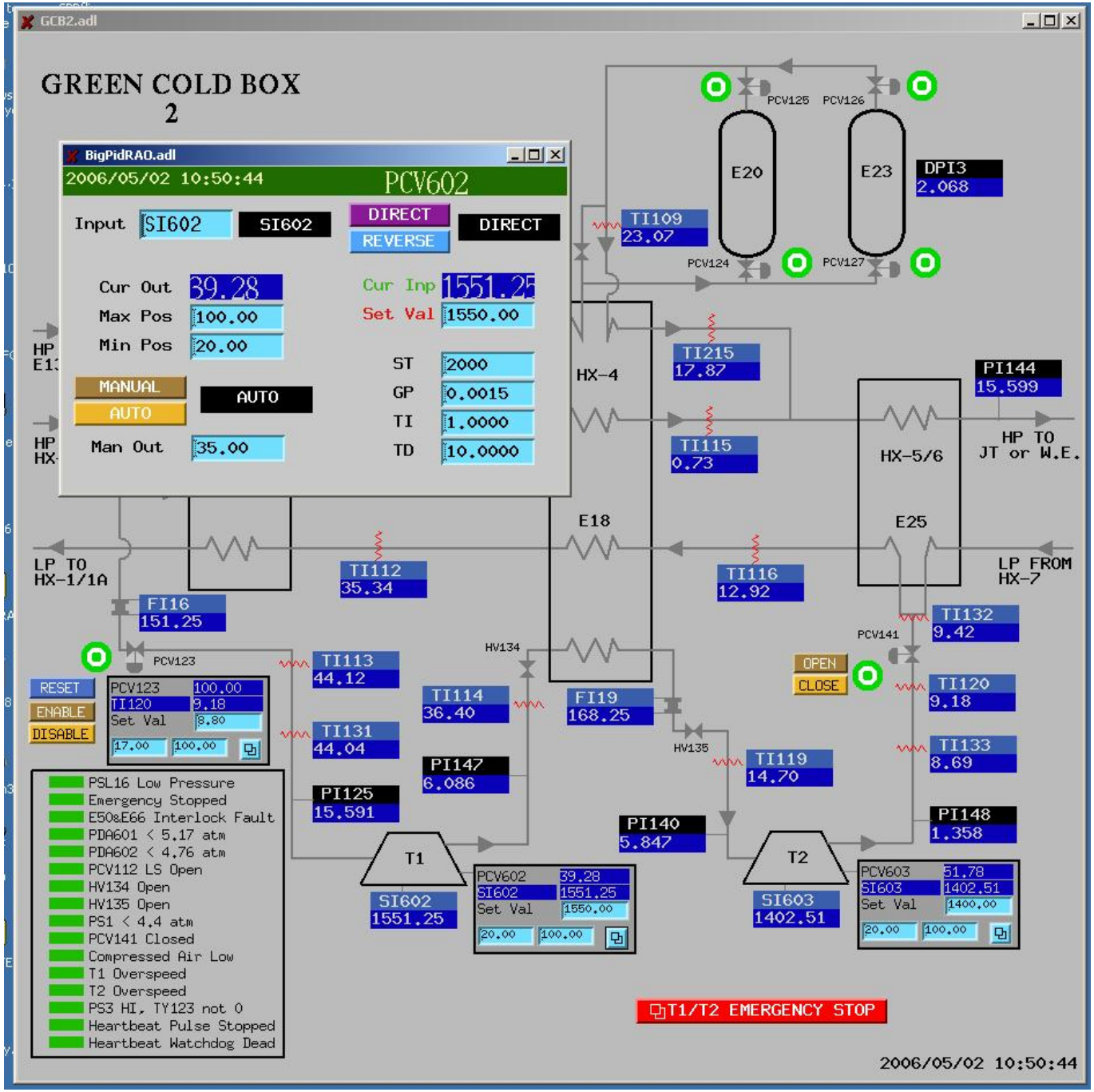
LIN filling cycles

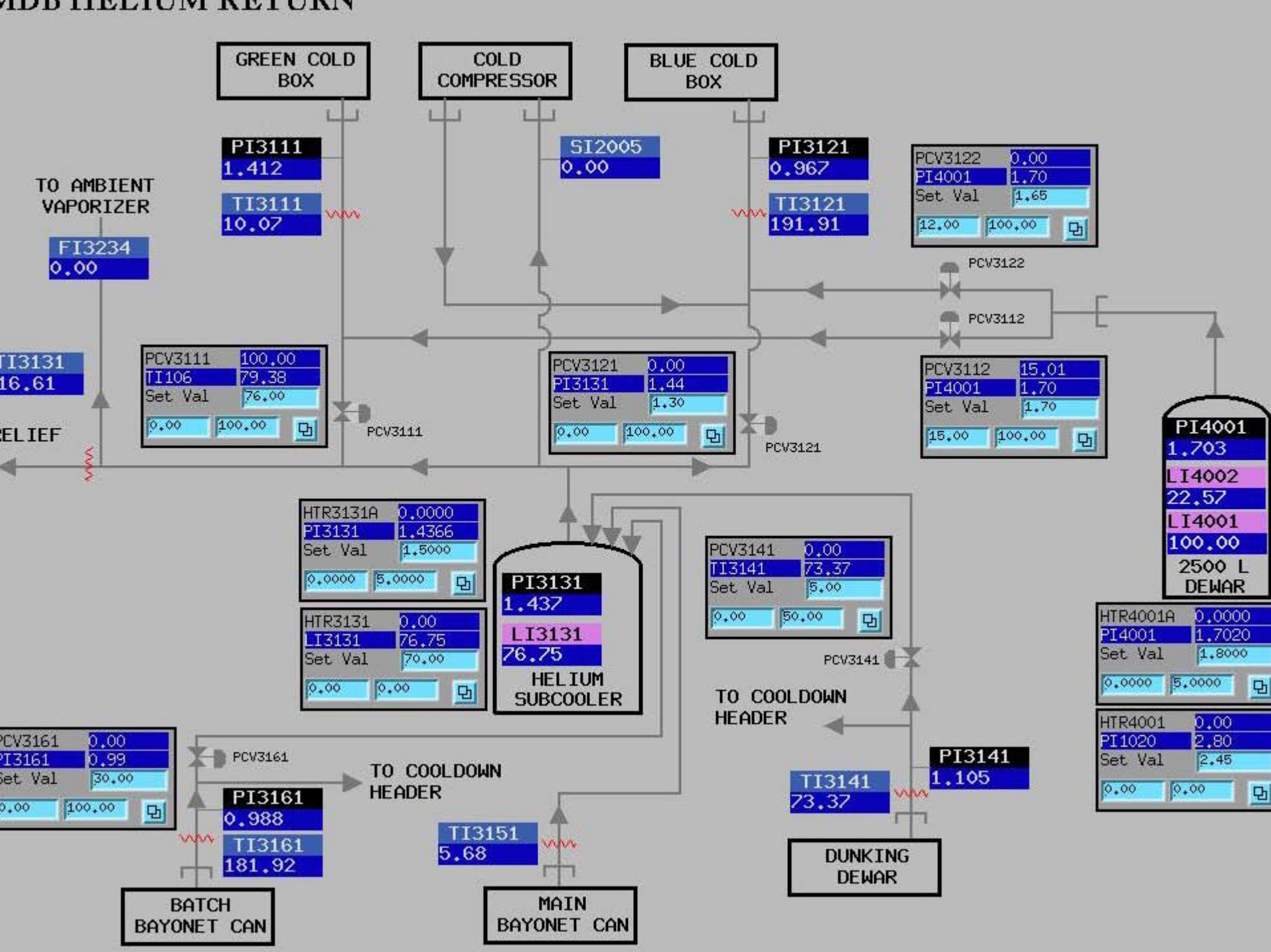
Control

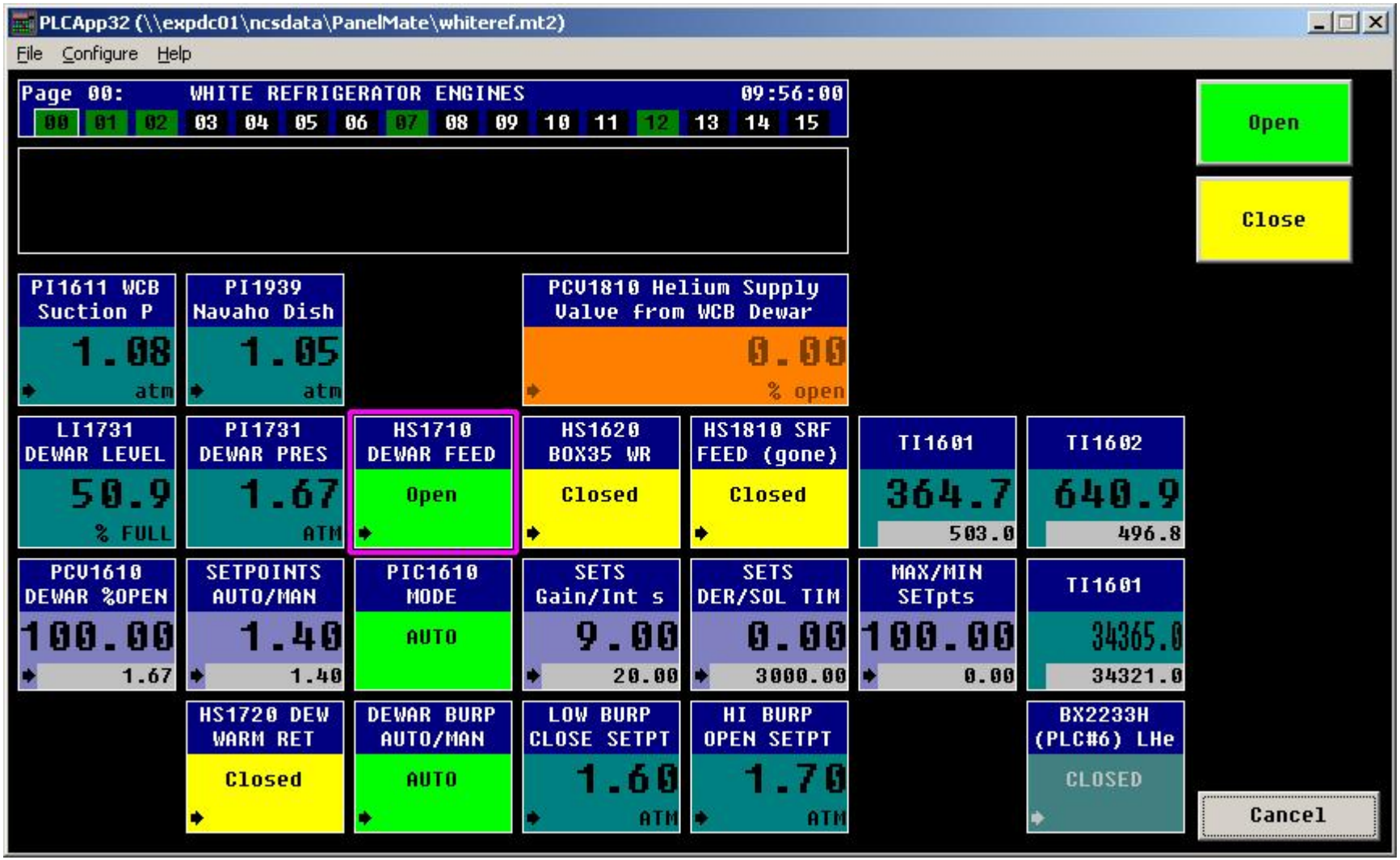


national Instruments

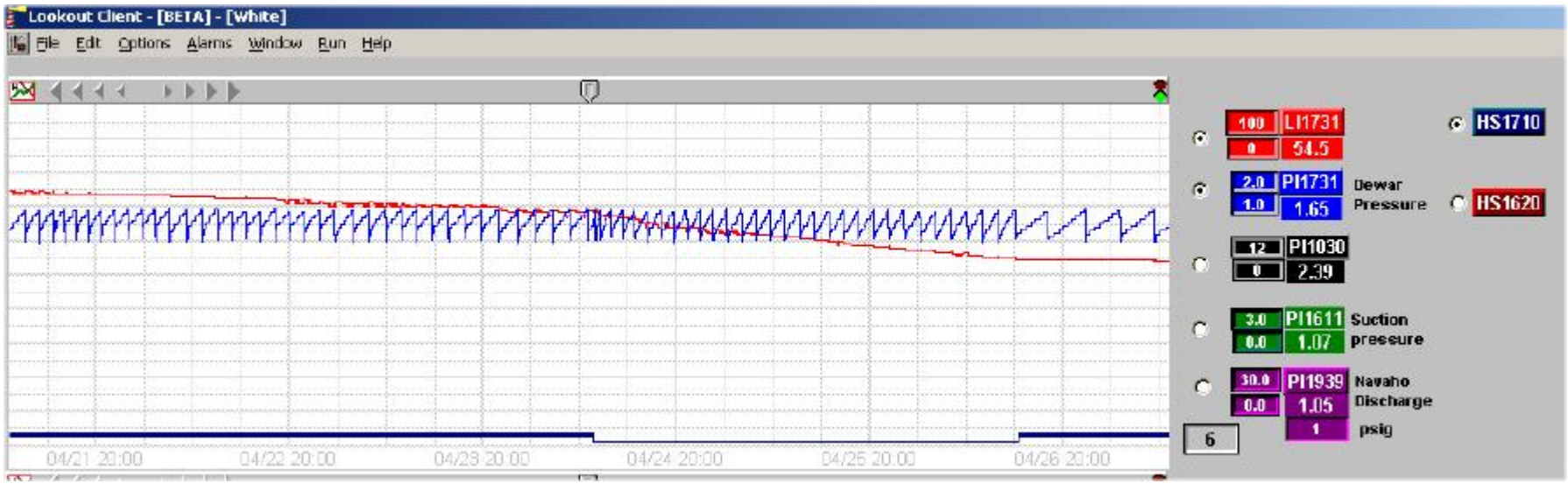

GCB2.adl
GREEN COLD BOX
2
PCV125
PCV126
E20
E23
DPI3
2.274
TI109
22.99
HV242
PCV124
PCV127
HP FROM
E13
HX-2/3
HX-4
TI215
17.79
PI144
15.327
HP FROM
HX-1/1A
E15
TI110
35.02
HV142
TI115
0.73
HX-5/6
HP TO
JT or W.E.
E18
E25
LP TO
HX-1/1A
TI112
34.12
TI116
12.83
LP FROM
HX-7
FI16
151.56
TI132
9.10
PCV141
HV134
PCV123
OPEN
CLOSE
TI113
43.22
TI114
35.42
FI19
167.66
TI120
9.02
RESET
ENABLE
DISABLE
PCV123 100.00
TI120 9.02
Set Val 8.80
17.00 100.00
TI131
43.14
HV135
TI119
14.46
TI133
8.53
PI147
6.018
PI125
15.370
PI140
5.787
PI148
1.371
T1
T2
PCV602 40.43
SI602 1552.51
Set Val 1550.00
20.00 100.00
SI602
1553.12
SI603
1399.38
PCV603 52.29
SI603 1399.38
Set Val 1400.00
20.00 100.00
PSL16 Low Pressure
Emergency Stopped
E50&E66 Interlock Fault
PDA601 < 5.17 atm
PDA602 < 4.76 atm
PCV112 LS Open
HV134 Open
HV135 Open
PS1 < 4.4 atm
PCV141 Closed
Compressed Air Low
T1 Overspeed
T2 Overspeed
PS3 HI, TY123 not 0
Heartbeat Pulse Stopped
Heartbeat Watchdog Dead
T1/T2 EMERGENCY STOP
2006/04/26 15:58:43


GCB2.adl
GREEN COLD BOX
2
BigPidRAO.adl
2006/05/02 10:50:44
PCV602
Input
SI602
SI602
DIRECT
REVERSE
DIRECT
Cur Out
39.28
Max Pos
100.00
Min Pos
20.00
Cur Inp
1551.25
Set Val
1550.00
ST
2000
GP
0.0015
TI
1.0000
TD
10.0000
MANUAL
AUTO
AUTO
Man Out
35.00
PCV125
PCV126
PCV124
PCV127
E20
E23
DPI3
2.068
TI109
23.07
TI215
17.87
TI115
0.73
HX-4
HX-5/6
E18
E25
PI144
15.599
HP TO
JT or W.E.
LP TO
HX-1/1A
LP FROM
HX-7
TI112
35.34
TI116
12.92
FI16
151.25
PCV123
RESET
ENABLE
DISABLE
PCV123 100.00
TI120 9.18
Set Val 8.80
17.00
100.00
TI113
44.12
TI131
44.04
HV134
TI114
36.40
FI19
168.25
PI147
6.086
PI125
15.591
HV135
TI119
14.70
PI140
5.847
PCV141
OPEN
CLOSE
TI132
9.42
TI120
9.18
TI133
8.69
PI148
1.358
PSL16 Low Pressure
Emergency Stopped
E50&E66 Interlock Fault
PDA601 < 5.17 atm
PDA602 < 4.76 atm
PCV112 LS Open
HV134 Open
HV135 Open
PS1 < 4.4 atm
PCV141 Closed
Compressed Air Low
T1 Overspeed
T2 Overspeed
PS3 HI, TY123 not 0
Heartbeat Pulse Stopped
Heartbeat Watchdog Dead
T1
SI602
1551.25
PCV602 39.28
SI602 1551.25
Set Val 1550.00
20.00
100.00
T2
SI603
1402.51
PCV603 51.78
SI603 1402.51
Set Val 1400.00
20.00
100.00
T1/T2 EMERGENCY STOP
2006/05/02 10:50:44


MDB HELIUM RETURN
GREEN COLD BOX
COLD COMPRESSOR
BLUE COLD BOX
PI3111
1.412
TI3111
10.07
SI2005
0.00
PI3121
0.967
TI3121
191.91
PCV3122
0.00
PI4001
1.70
Set Val
1.65
12.00
100.00
PCV3122
PCV3112
TO AMBIENT VAPORIZER
FI3234
0.00
TI3131
16.61
RELIEF
PCV3111
100.00
TI106
79.38
Set Val
76.00
0.00
100.00
PCV3111
PCV3121
0.00
PI3131
1.44
Set Val
1.30
0.00
100.00
PCV3121
PCV3112
15.01
PI4001
1.70
Set Val
1.70
15.00
100.00
PI4001
1.703
LI4002
22.57
LI4001
100.00
2500 L DEWAR
HTR3131A
0.0000
PI3131
1.4366
Set Val
1.5000
0.0000
5.0000
HTR3131
0.00
LI3131
76.75
Set Val
70.00
0.00
0.00
PI3131
1.437
LI3131
76.75
HELIUM SUBCOOLER
PCV3141
0.00
TI3141
73.37
Set Val
5.00
0.00
50.00
PCV3141
TO COOLDOWN HEADER
HTR4001A
0.0000
PI4001
1.7020
Set Val
1.8000
0.0000
5.0000
HTR4001
0.00
PI1020
2.80
Set Val
2.45
0.00
0.00
PCV3161
0.00
PI3161
0.99
Set Val
30.00
0.00
100.00
PCV3161
TO COOLDOWN HEADER
PI3161
0.988
TI3161
181.92
TI3151
5.68
PI3141
1.105
TI3141
73.37
DUNKING DEWAR
BATCH BAYONET CAN
MAIN BAYONET CAN


PLCApp32 (\\expdc01\ncsdata\PanelMate\whiteref.mt2)
File Configure Help
Page 00: WHITE REFRIGERATOR ENGINES 09:56:00
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15
Open
Close
PI1611 WCB Suction P
1.08
atm
PI1939 Navaho Dish
1.05
atm
PCV1810 Helium Supply Valve from WCB Dewar
0.00
% open
LI1731 DEWAR LEVEL
50.9
% FULL
PI1731 DEWAR PRES
1.67
ATM
HS1710 DEWAR FEED
Open
HS1620 BOX35 WR
Closed
HS1810 SRF FEED (gone)
Closed
TI1601
364.7
503.0
TI1602
640.9
496.8
PCV1610 DEWAR %OPEN
100.00
1.67
SETPOINTS AUTO/MAN
1.40
1.40
PIC1610 MODE
AUTO
SETS Gain/Int s
9.00
20.00
SETS DER/SOL TIM
0.00
3000.00
MAX/MIN SETpts
100.00
0.00
TI1601
34365.0
34321.0
HS1720 DEW WARM RET
Closed
DEWAR BURP AUTO/MAN
AUTO
LOW BURP CLOSE SETPT
1.60
ATM
HI BURP OPEN SETPT
1.70
ATM
BX2233H (PLC#6) LHe
CLOSED
Cancel

Thermal acoustic oscillation



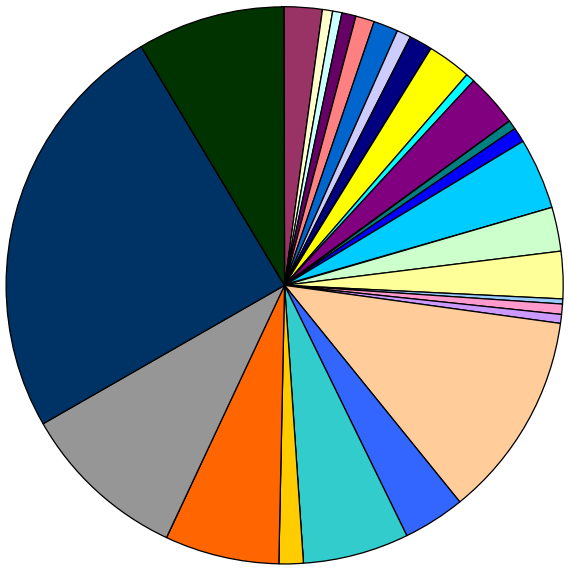
LOOKOUT


BOX35

Breakdown analysis CCF operation

Year	Run Time	Brake down	Cryo Brkdwn	Cryo %
2002	6702	2829	75	98.9
2003	5562	1886	180	96.8
2004	5156	1356	22.5	99.6
2005	5373	618	9	99.8

Turbine Starts



1
2
3
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