40m Vacuum System States and Sequences

Last updated 10/24/01

Recognized States

(Note: devices in brackets may be either open/on or closed/off in the given state)

any pressure — default: EQ, OR no AC power, OR no NZ, OR other emergency ?

State: All Off

Open: None — PSL SHUTTER MUST BE CLOSED TOO

On: None

State: Chamber Open
Open: V4, V5, VM3, [VABSSCI], [VABSSCO]
On: TP1, TP2, TP3, [IPEE], [IPEV], [IPSV], [IPSE]

State: Vacuum Normal (maglev/annulus only)
Open: V1, V4, V5, VA6, VAEE, VAEV, VABS, VASV, VASE, VABSSCI, VABSSCO, [VM1]
On: TP1, TP2, TP3, [IPEE], [IPEV], [IPSV], [IPSE]

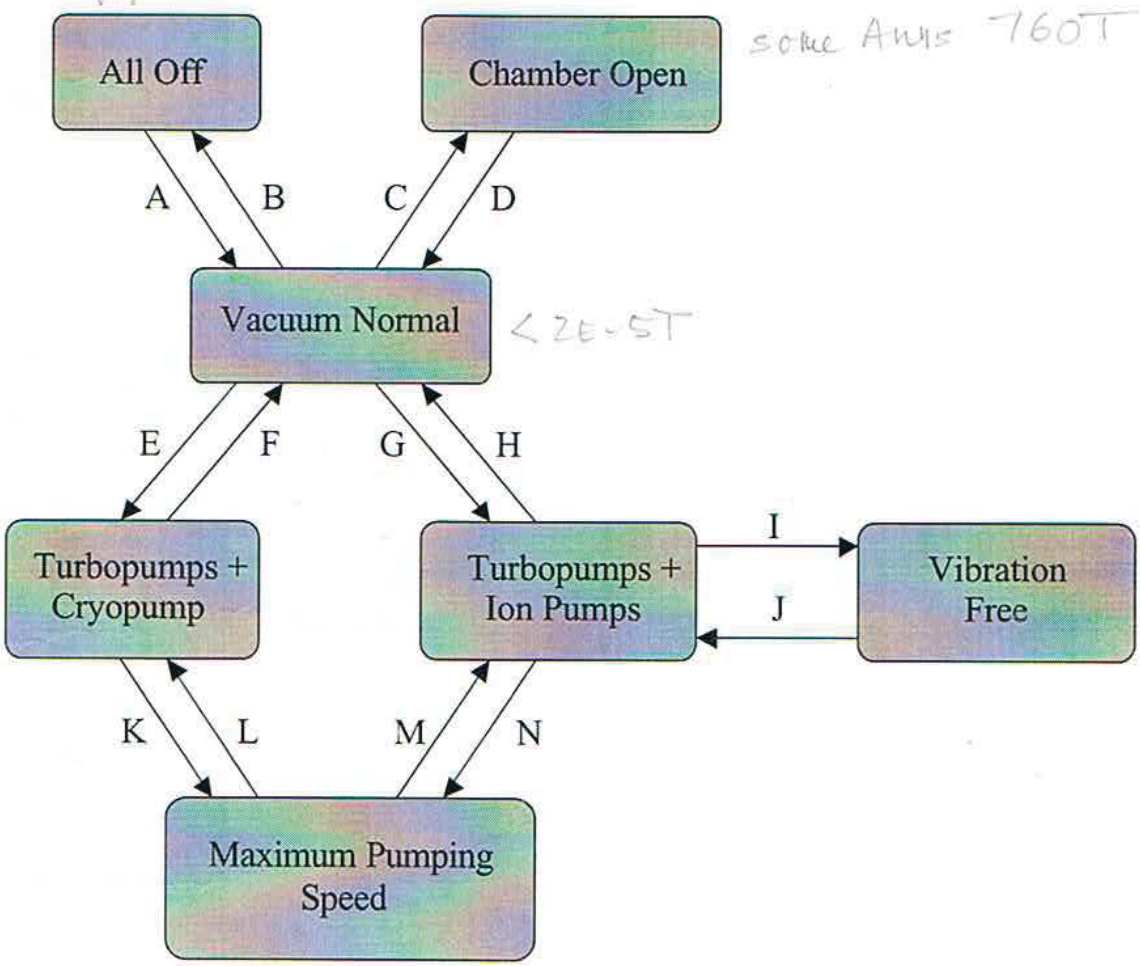
State: Turbopumps + Cryopump
Open: V1, V4, V5, VC1, VA6, VAEE, VAEV, VABS, VASV, VASE, VABSSCI, VABSSCO, [VM1]
On: TP1, TP2, TP3, CP1, [IPEE], [IPEV], [IPSV], [IPSE]

State: Turbopumps + Ion Pumps
Open: V1, V4, V5, VC1, VA6, VAEE, VAEV, VABS, VASV, VASE, VABSSCI, VABSSCO, VM1, VIPEE, VIPEV, VIPSV, VIPSE
On: TP1, TP2, TP3, IPEE, IPEV, IPSV, IPSE

State: Maximum Pumping Speed (all pumps running)
Open: V1, V4, V5, VC1, VA6, VAEE, VAEV, VABS, VASV, VASE, VABSSCI, VABSSCO, VM1, VIPEE, VIPEV, VIPSV, VIPSE
On: TP1, TP2, TP3, CP1, IPEE, IPEV, IPSV, IPSE

State: Vibration-Free (ion pumps only)
Open: VM1, VIPEE, VIPEV, VIPSV, VIPSE
On: IPEE, IPEV, IPSV, IPSE

State Transition Diagram



A: ALL OFF → VACUUM NORMAL

A001 ~~IPEE ON~~ read P1 or CC1
A002 IPEV ON
A003 IPSV ON
A004 IPSE ON
A005 OPERATOR: Connect N2 cylinder to vent line
A006 VV1 OPEN
A007 CONDITION: Wait until P1 > 25 torr
A008 OPERATOR: Close N2 cylinder, replace with dry air cylinder
A009 CONDITION: Repeat until P1 = atmospheric pressure
A010 VV1 CLOSE
A011 V7 OPEN
A012 CONDITION: RGA filament must be OFF.
A013 VM3 OPEN
A014 VA6 OPEN
A015 TP2 ON
A016 OPERATOR: Switch TP2 controller to STANDBY
A017 CONDITION: Wait until TP2 rotation frequency > 950 Hz
A018 TP3 ON
A019 OPERATOR: Switch TP3 controller to STANDBY
A020 CONDITION: Wait until TP3 rotation frequency > 950 Hz
A021 V7 CLOSE
A022 VA6 CLOSE
A023 VM3 CLOSE
A024 OPERATOR: Connect roughing pump line
A025 RP1 ON
A026 RP2 ON
A027 RP3 ON
A028 CONDITION: Wait until PRP < 0.35 torr
A029 VC2 OPEN
A030 V6 OPEN
A031 CONDITION: Wait until P3 < 0.5 torr
A032 V6 CLOSE
A033 V5 OPEN
A034 CONDITION: Wait until CC3 < 10^{-4} torr
A035 VC2 CLOSE
A036 V5 CLOSE
A037 V7 OPEN
A038 V6 OPEN
A039 CONDITION: Wait until P2 < 0.5 torr
A040 V6 CLOSE
A041 V7 CLOSE
A042 V4 OPEN
A043 TP1 ON
A044 VM3 OPEN

A045 V6 OPEN
A046 CONDITION: Wait until P3 < 0.5 torr
A047 V6 CLOSE
A048 VM3 CLOSE
A049 VA6 OPEN
A050 V6 OPEN
A051 CONDITION: Wait until PAN < 0.5 torr
A052 V6 CLOSE
A053 V5 OPEN
A054 V3 OPEN
A055 RV1 OPEN
A056 CONDITION: Wait until P1 < 0.5 torr (about 3 hours)
A057 V3 CLOSE
A058 RV1 CLOSE
A059 VA6 CLOSE
A060 V7 OPEN
A061 V1 OPEN
A062 VM1 OPEN
A063 RP1 OFF
A064 RP2 OFF
A065 RP3 OFF
A066 OPERATOR: Disconnect roughing pump line
A067 CONDITION: Wait until P2 < 0.05 torr (about 1 hour)
A068 V7 CLOSE
A069 VA6 OPEN
A070 VAEE OPEN
A071 CONDITION: Wait until PAN < 1 torr
A072 VAEV OPEN
A073 CONDITION: Wait until PAN < 1 torr
A074 VABS OPEN
A075 CONDITION: Wait until PAN < 1 torr
A076 VABSSCI OPEN
A077 CONDITION: Wait until PAN < 1 torr
A078 VABSSCO OPEN
A079 CONDITION: Wait until PAN < 1 torr
A080 VASV OPEN
A081 CONDITION: Wait until PAN < 1 torr
A082 VASE OPEN
A083 CONDITION: If CC3 < 10^{-5} torr, turn RGA filament ON

3 > 2 OR 2 < 3

P1 = 760T or CC1 1E-6T

B: VACUUM NORMAL → ALL OFF can be

B001 OPERATOR: Turn RGA filament OFF
B002 V1 CLOSE 160
B003 VM1 CLOSE RGA
B004 V4 CLOSE TP
B005 V5 CLOSE TP
B006 TP1 OFF MAG
B007 OPERATOR: Wait until TP1 indicates "OFF" (about 8 minutes)
B008 VA6 CLOSE
B009 VAEE CLOSE
B010 VAEV CLOSE
B011 VABSSCO CLOSE
B012 VABSSCI CLOSE
B013 VABS CLOSE
B014 VASV CLOSE
B015 VASE CLOSE
B016 TP2 OFF
B017 TP3 OFF
B018 OPERATOR: Make sure calibrated leaks are closed IP gate valves must be closed
B019 IPEE OFF
B020 IPEV OFF
B021 IPSV OFF
B022 IPSE OFF

C: VACUUM NORMAL → CHAMBER OPEN

C001 VM1 CLOSE
C002 VM3 OPEN ~~VA6~~ VM3 closed open
C003 V1 CLOSE
C004 OPERATOR: Connect N2 cylinder to vent line
C005 OPERATOR: Set regulator to 30 psi
C006 OPERATOR: Make sure interferometer high voltages are off
C007 VV1 OPEN
C008 CONDITION: Wait until P1 > 25 torr
C009 OPERATOR: Replace N2 cylinder with dry air cylinder
C010 CONDITION: Add air cylinders until P1 = atmospheric pressure
C011 VAEE CLOSE
C012 VAEV CLOSE
C013 VABS CLOSE
C014 VASV CLOSE
C015 VASE CLOSE
C016 VAV** OPEN (** corresponds to chamber you wish to open)
C017 CONDITION: Wait until PA** = atmospheric pressure
C018 VAV** CLOSE
C019 OPERATOR: Repeat C016-C018 for each chamber to be opened

CHECK SINGE-O-RING SHIMS

D: CHAMBER OPEN → VACUUM NORMAL

CHECK JAM NUTS! 3 devices

D001 OPERATOR: Turn RGA filament OFF
D002 VM3 CLOSE
D003 VABSSCI CLOSE
D004 VABSSCO CLOSE
D005 VAEE OPEN
D006 CONDITION: Wait until PAN < 1 torr
D007 VAEV OPEN
D008 CONDITION: Wait until PAN < 1 torr
D009 VABS OPEN
D010 CONDITION: Wait until PAN < 1 torr
D011 VABSSCI OPEN
D012 CONDITION: Wait until PAN < 1 torr
D013 VABSSCO OPEN
D014 CONDITION: Wait until PAN < 1 torr
D015 VASV OPEN
D016 CONDITION: Wait until PAN < 1 torr
D017 VASE OPEN
D018 CONDITION: Wait until PAN < 1 torr
D019 VV1 CLOSE
D020 OPERATOR: Connect roughing pump line
D021 RP1 ON
D022 RP2 ON
D023 RP3 ON
D024 CONDITION: Wait until PRP < 0.35 torr
D025 V3 OPEN
D026 RV1 OPEN
D027 CONDITION: Wait until P1 < 0.5 torr (about 3 hours)
D028 V3 CLOSE
D029 RV1 CLOSE
D030 VA6 CLOSE
D031 V7 OPEN
D032 V1 OPEN
D033 RP1 OFF
D034 RP2 OFF
D035 RP3 OFF
D036 OPERATOR: Disconnect roughing pump line
D037 CONDITION: Wait until P2 < 0.05 torr (about 1 hour)
D038 V7 CLOSE
D039 VA6 OPEN
D040 CONDITION: If CC3 < 10^{-5} torr, turn RGA filament ON

VA6 OPEN AND CHECK THAT TP3 IS IN STANDY MODE TP2

ANNULUSES MUST BE ROUGHED DOWN BY RP-1 (small drypumps can not handle load)

Look at oil levels in RPs

ONE OPERATOR MUST BE PRESENT DURING THIS TIME PERIOD!

"17cfm" open manual valve of additional drypump in the pl of tp2 & 3

turn on exterior fan

2mT w dry fp

OPEN VM1

E: VACUUM NORMAL → TURBOPUMPS + CRYOPUMP

E001 OPERATOR: Switch cryopump compressor and controller ON
E002 CONDITION: Wait until CP1 reads COLD
E003 OPERATOR: Reset CP1 interlock to turn CP1 ON
E004 VC1 OPEN

F: TURBOPUMPS + CRYOPUMP → VACUUM NORMAL

F001 VC1 CLOSE
F002 VC2 OPEN
F003 OPERATOR: Switch cryopump compressor and controller OFF
F004 CONDITION: Wait until cryopump fully warms up
F005 CONDITION: Wait until CC3 < 10^{-4} torr
F006 VC2 CLOSE

G: VACUUM NORMAL → TURBOPUMPS + ION PUMPS

G001 CONDITION: Wait until CC1 < $4*10^{-6}$ torr
G002 VIPEE OPEN
G003 VIPEV OPEN
G004 VIPSV OPEN
G005 VIPSE OPEN

H: TURBOPUMPS + ION PUMPS → VACUUM NORMAL

H001 VIPEE CLOSE
H002 VIPEV CLOSE
H003 VIPSV CLOSE
H004 VIPSE CLOSE

I: TURBOPUMPS + ION PUMPS → VIBRATION FREE

I001 V1 CLOSE
I002 TP1 OFF
I003 CONDITION: Wait until TP1 indicates OFF (about 8 minutes)
I004 V4 CLOSE
I005 TP2 OFF
I006 V5 CLOSE
I007 TP3 OFF

J: VIBRATION FREE → TURBOPUMPS + ION PUMPS

J001 TP2 OFF
J002 OPERATOR: Switch TP2 controller to standby
J003 CONDITION: Wait until TP2 rotation frequency > 950 Hz
J004 TP3 ON
J005 OPERATOR: Switch TP3 controller to standby
J006 CONDITION: Wait until TP3 rotation frequency > 950 Hz
J007 V4 OPEN
J008 TP1 ON
J009 CONDITION: Wait until TP1 indicates ON
J010 V5 OPEN
J011 V1 OPEN

K: TURBOPUMPS + CRYOPUMP → MAXIMUM PUMPING SPEED

K001 CONDITION: Wait until CC1 < $4*10^{-6}$ torr
K002 VIPEE OPEN
K003 VIPEV OPEN
K004 VIPSV OPEN
K005 VIPSE OPEN

L: MAXIMUM PUMPING SPEED → TURBOPUMPS + CRYOPUMP

L001 VIPEE CLOSE
L002 VIPEV CLOSE
L003 VIPSV CLOSE
L004 VIPSE CLOSE

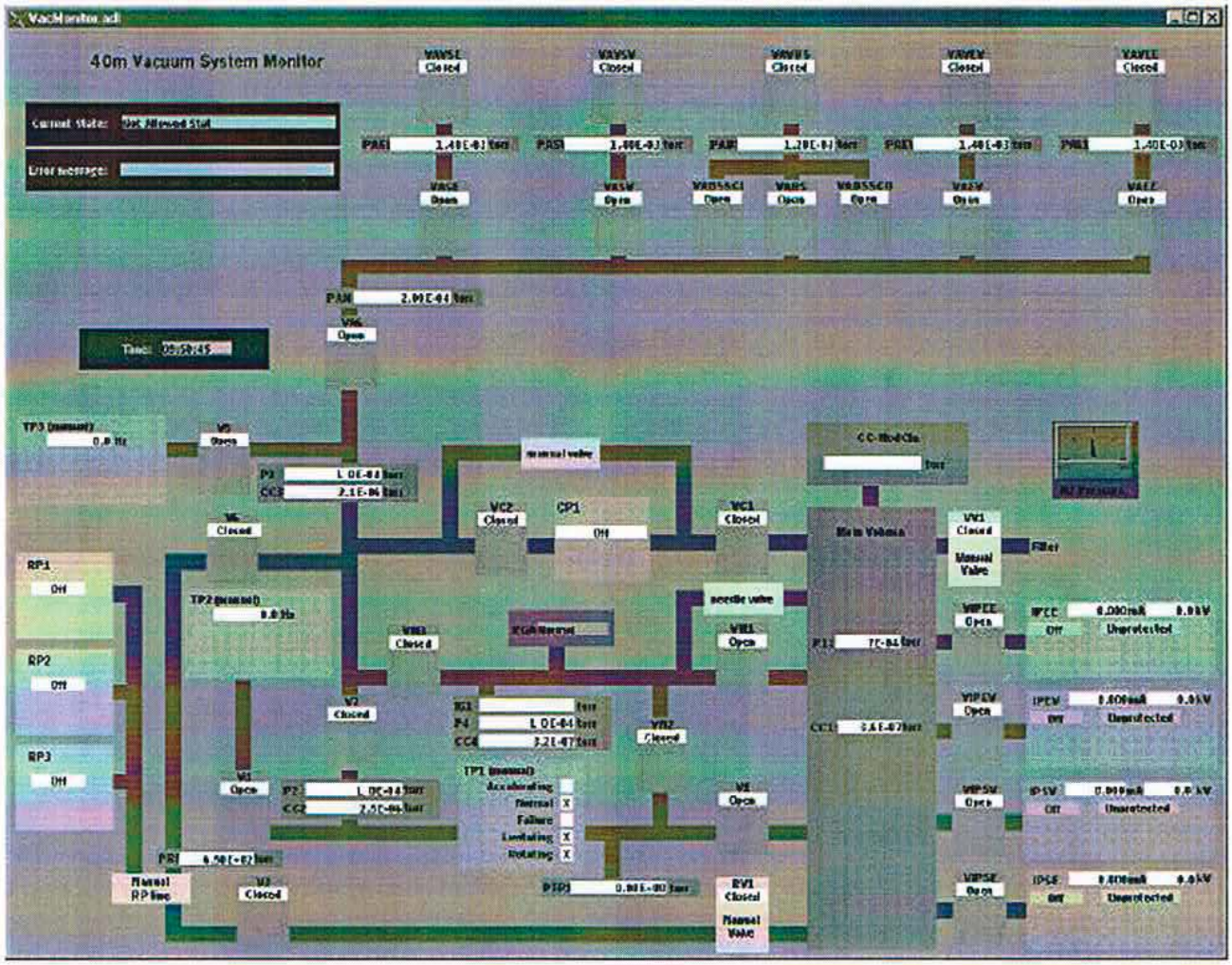
M: MAXIMUM PUMPING SPEED → TURBOPUMPS + ION PUMPS

M001 VC1 CLOSE
M002 VC2 OPEN
M003 OPERATOR: Switch cryopump compressor and controller OFF
M004 CONDITION: Wait until cryopump fully warms up
M005 CONDITION: Wait until CC3 < 10^{-4} torr
M006 VC2 CLOSE

N: TURBOPUMPS + ION PUMPS → MAXIMUM PUMPING SPEED

N001 OPERATOR: Switch cryopump compressor and controller ON
N002 CONDITION: Wait until CP1 reads COLD
N003 OPERATOR: Reset CP1 interlock to turn CP1 ON
N004 VC1 OPEN

Mark III Vacuum Schematic



MASTER COPY

```
= ##: File: SEQUENCES15.TXT      8-19-1994
= ##:
= ##:
= ++: ALL OFF
= ##: OPEN: ,
= ##: ON: ,
= ##:
= ++: VACUUM NORMAL
= ##: OPEN: V1, V4, V5, VM1, VAEE, VAEV, VABS, VASV, VASE
= ##: ON: TP1, TP2, TP3, IP1
= ##:
= ++: CHAMBER OPEN
= ##: OPEN: V4, V5, VM3, VV1
= ##: ON: TP1, TP2, TP3, IP1
= ##:
= ++: VIBRATION FREE PUMPING
= ##: OPEN: VM1, VAEE, VAEV, VABS, VASV, VASE
= ##: ON: IP1, IP2, IP3, IP4, IP5
= ##:
= ##:
```

```
1000= START SEQUENCES
1001= STATE:_____ALL OFF_____1
    = ##:_____TO VACUUM NORMAL_____
    = ##:
1002= OPERATOR: open valve on N2 cylinder for vent line
1003= VV1 OPEN
1004= CONDITION: P1 < 2.5 E+01: WAIT
1005= OPERATOR: close valve on N2 cylinder and open lab air vent valve
1006= CONDITION: P1 < atmospheric pres.: WAIT
1007= V7 OPEN
1008= VM3 OPEN
1009= VA6 OPEN
1010= OPERATOR: open valve VM4
1011= OPERATOR: fully open leak valve
1012= TP2 ON
1013= OPERATOR: switch TP2 controller to standby
1014= CONDITION: TP2 rotation frequency < 950 HZ : WAIT
1015= TP3 ON
1016= OPERATOR: switch TP3 controller to standby
1017= CONDITION: TP3 rotation frequency < 950 HZ : WAIT
1018= CONDITION: P1 NOT EQUAL PTP1 (within 20 Torr): WAIT
1019= VV1 CLOSE
1020= V7 CLOSE
1021= VA6 CLOSE
1022= VM3 CLOSE
1023= OPERATOR: close valve VM4
1024= OPERATOR: connect roughing pump line
1025= RP1 ON
1026= RP2 ON
1027= RP3 ON
1028= CONDITION: PRP > 3.5 E-01: WAIT
1029= VC2 OPEN
1030= V6 OPEN
1031= CONDITION: P3 > 5.0 E-01: WAIT
1032= V6 CLOSE
1033= V5 OPEN
1034= CONDITION: CC3 > 1.0 E-04: WAIT
1035= VC2 CLOSE
1036= V5 CLOSE
1037= V7 OPEN
1038= V6 OPEN
1039= CONDITION: P2 > 5.0 E-01: WAIT
1040= V6 CLOSE
1041= V7 CLOSE
1042= V4 OPEN
1043= TP1 ON
1044= VM3 OPEN
1045= V6 OPEN
1046= CONDITION: P3 > 5.0 E-01: WAIT
1047= V6 CLOSE
1048= VM3 CLOSE
1049= VA6 OPEN
1050= V6 OPEN
1051= CONDITION: PAN > 5.0 E-01: WAIT
1052= V6 CLOSE
1053= V5 OPEN
1054= V3 OPEN
1055= RV1 OPEN
1056= CONDITION: P1 > 5.0 E-01: WAIT
1057= V3 CLOSE
1058= RV1 CLOSE
1059= VA6 CLOSE
1060= V7 OPEN
1061= V1 OPEN
1062= VM1 OPEN
```

```
1063= RP1 OFF
1064= RP2 OFF
1065= RP3 OFF
1066= CONDITION: P2 > 5.0 E-02: WAIT
1067= OPERATOR: disconnect roughing pump line
1068= V7 CLOSE
1069= VA6 OPEN
1070= VAEE OPEN
1071= CONDITION: PAN > 1.0 E+00: WAIT
1072= VAEV OPEN
1073= CONDITION: PAN > 1.0 E+00: WAIT
1074= VABS OPEN
1075= CONDITION: PAN > 1.0 E+00: WAIT
1076= VASV OPEN
1077= CONDITION: PAN > 1.0 E+00: WAIT
1078= VASE OPEN
1079= CONDITION: CC3 > 1.0 E-05: WAIT
1080= IP1 ON
1081= CONDITION: CC3 > 1.0 E-05: WAIT
1082= VA6 CLOSE
1083= CONDITION: IP1 current > 3.0 E-01: WAIT
1084= OPERATOR: toggle IP1 into PROTECT mode
1085= OPERATOR: turn RGA filament on
    = ##:_____VACUUM NORMAL_____
```

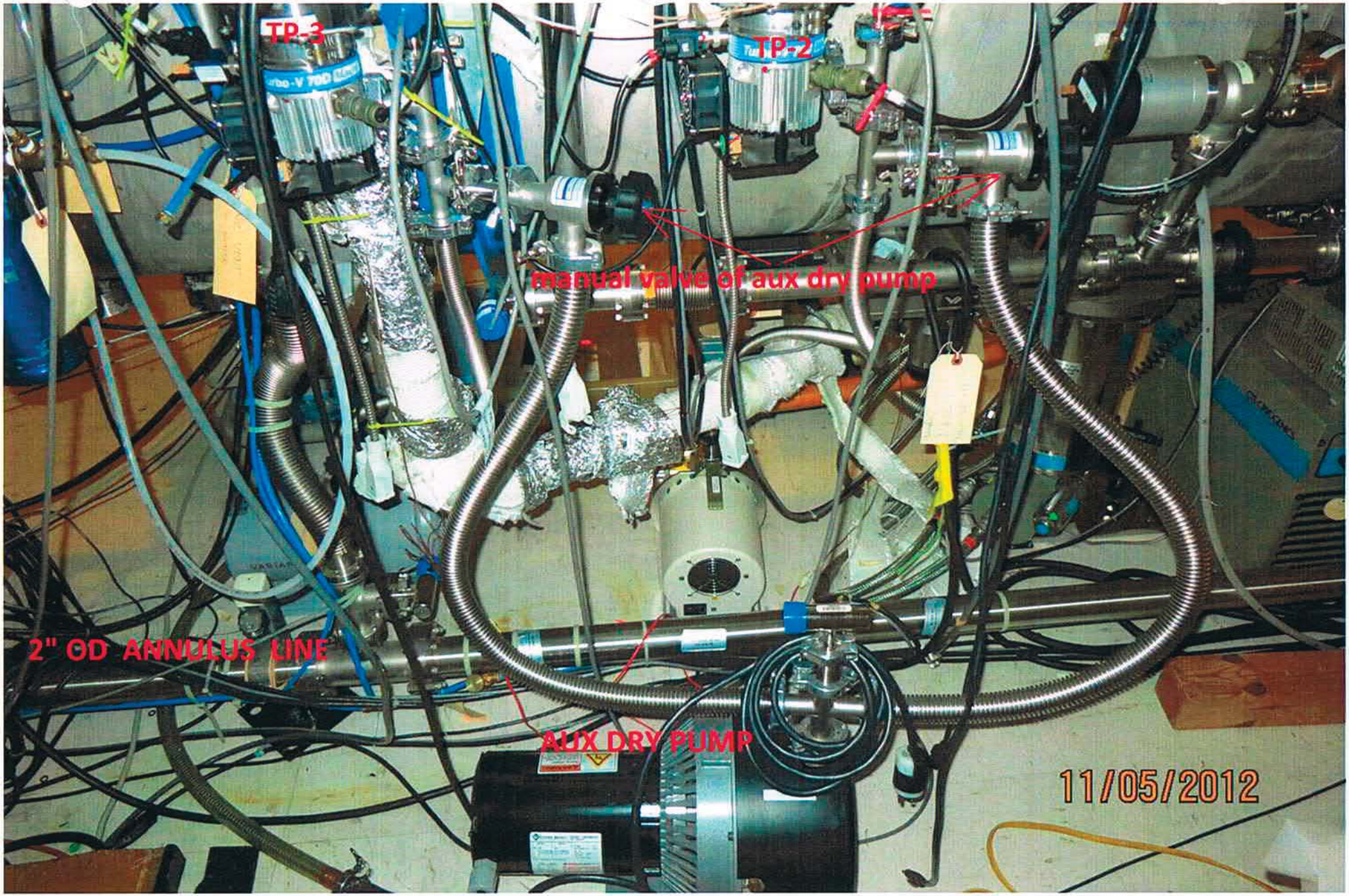
i.e. open TP1 manual valve

REMEMBER 3041

```
2001= STATE:_____VACUUM NORMAL_____
    = ##:_____TO CHAMBER OPEN_____
    = ##:
2002= VM1 CLOSE
2003= VM3 OPEN
2004= V1 CLOSE                    LABELED VENT  set regulator to 10 psi
2005= OPERATOR: open valve on N2 cylinder for vent line, check pressure setting
2006= OPERATOR: check that lab air vent valve is closed, and N2 line hooked up.
2007= OPERATOR: check that interferometer HV's are off , CHECK PARTICAL LEVEL
2008= VV1 OPEN  #2007B CLOSE MANUAL VALVE OF 'ANNULOS ION PUMP !
2009= CONDITION: P1 < 2.5 E+01: WAIT  CHECK LAB AIR PARTICLE COUNTER AND
2010= OPERATOR: close valve on N2 cylinder and open lab air vent valve LOCAL O.D
2011= CONDITION: P1 < atmospheric pres.: WAIT                ARE CENTERED
2012= VAEE CLOSE
2013= VAEV CLOSE
2014= VABS CLOSE                                  PERIOD!  4/22/96
2015= VASV CLOSE
2016= VASE CLOSE   CLOSE MANUAL VALVE OF IP1 OR * 8-30-95 SIV.
2016B
2017= OPERATOR: proceed depending on which chambers are going to be opened !
2018= VAVEE OPEN
2019= CONDITION: PAEE < atmospheric pres.: WAIT
2020= VAVEE CLOSE
2021= VAVEV OPEN
2022= CONDITION: PAEV < atmospheric pres.: WAIT
2023= VAVEV CLOSE
2024= VAVBS OPEN
2025= CONDITION: PABS < atmospheric pres.: WAIT
2026= VAVBS CLOSE
2027= VAVSV OPEN
2028= CONDITION: PASV < atmospheric pres.: WAIT
2029= VAVSV CLOSE
2030= VAVSE OPEN
2031= CONDITION: PASE < atmospheric pres.: WAIT
2032= VAVSE CLOSE
    = ##:_____CHAMBER OPEN_____
```

* CHECK IP1 CURRENT AND RECHECK IT TO AN HOUR, IF IT EXCEEDS 10 mA CLOSE MANUAL VALVE OF IP1 (8-30-95 SIV)

4/22/96 ANDY, ROBERT, DENNIS, STEVE: APPROVED THIS CHANGE
SEE VMI4p70


TP-3
TP-2
manual valve of aux dry pump
2" OD ANNULUS LINE
AUX DRY PUMP
11/05/2012

CHECK: AC JAM NUTS: MUST BE LOCKED! S/V
(FIRST INSIDE, THAN OUTSIDE) SINGLE-O-RING SHIMS

3001= STATE: CHAMBER OPEN
= ##: TO VACUUM NORMAL
= ##:
3002= IP1 OFF ← i.e. CLOSE IP MANUAL VALVE
3003= OPERATOR: turn RGA filament off and switch RGA T-switch to "A" — HALT LOGGING
3004= VM3 CLOSE
3005= VA6 OPEN
3006= VAEE OPEN
3007= CONDITION: PAN > 1.0 E+00: WAIT CHECK TEST MASSES ON LOCAL CONTROL
3008= VAEV OPEN
3009= CONDITION: PAN > 1.0 E+00: WAIT
(*) 3010= VABS OPEN — CLOSE MANUAL VALVE ON BS/SC ANNULUS LINE
3011= CONDITION: PAN > 1.0 E+00: WAIT — WAIT UNTIL PAN < 1TORR, OPEN MANUAL VALVE
3012= VASV OPEN
3013= CONDITION: PAN > 1.0 E+00: WAIT
3014= VASE OPEN ← 3014.5 CONDITION: PAN > 1 Torr WAIT
3015= VV1 CLOSE
3016= OPERATOR: connect roughing pump line W. SLOW BUTTERFLY VALVE
3017= RP1 ON
3018= RP2 ON DO NOT USE RP2 — OUT OF ORDER
3019= RP3 ON
3020= CONDITION: PRP > 3.5 E-01: WAIT AND SEE THAT PRESSUR DOES NOT GO BELLOW
3021= V3 OPEN
3022= RV1 OPEN MANUAL 1/2 TURN FOR SLOW MODE
3023= CONDITION: P1 > 5.0 E-01: WAIT
3024= V3 CLOSE
3025= RV1 CLOSE EXTERNAL COOLING FAN ON FOR MAGLEV
3026= VA6 CLOSE
3027= V7 OPEN DRY PUMP #3 ON & OPEN TO TP2-TP3
3028= V1 OPEN INTERLOCK HAS CHEATER!
3029= RP1 OFF
3030= RP2 OFF
3031= RP3 OFF
3032= OPERATOR: disconnect roughing pump line
3033= CONDITION: P2 > 5.0 E-02: WAIT 1 hr
3034= V7 CLOSE, CLOSE OFF DRYPUMP #3 AND SHUT IT DOWN cc1 =
⇒ 3035= VA6 OPEN STOP HERE ANDY! HV/RF INTERLOCK COULD BE RESET AT 10^{-4}
3036= VM1 OPEN ONLY CC1 < 1E-5
3037= OPERATOR: turn RGA filament on ← CC4 > $1 \cdot 10^{-4}$: WAIT, T-SWITCH TO "C"
3038= CONDITION: CC3 > 1.0 E-05: WAIT EXTERNAL FAN OFF
3039= IP1 ON
3040= CONDITION: CC3 > 1.0 E-05: WAIT
3041= VA6 CLOSE
3042= CONDITION: IP1 current > 3.0 E-01: WAIT
3043= OPERATOR: toggle IP1 into PROTECT mode
= ##: VACUUM NORMAL

Stop at 3038 Don't turn on IP1.

LAST UPDATE 6/30/2010

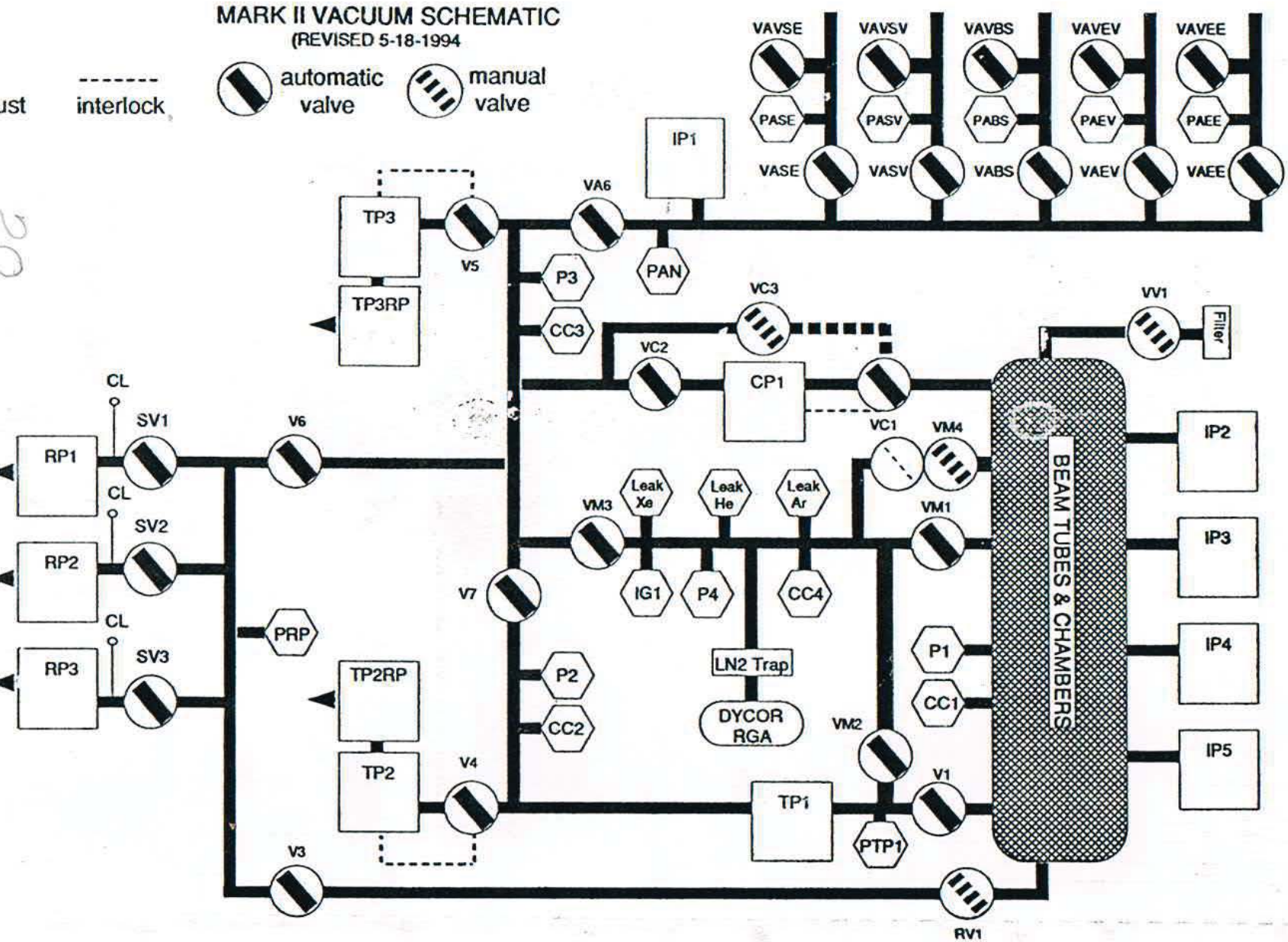
system unattended after #3036

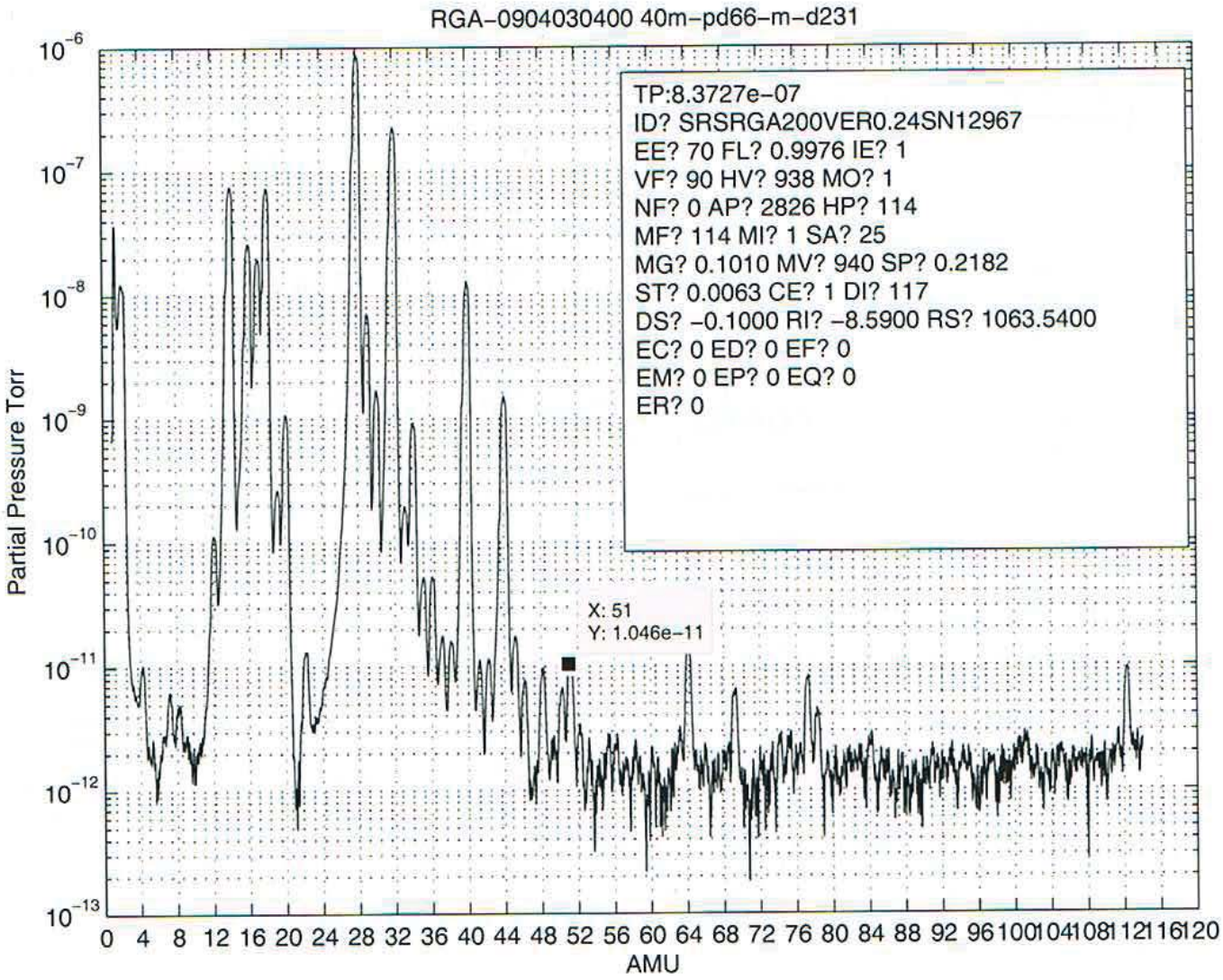
(*) 3009b Manual valve on IOC (INPUT OPTIC CHAMBER) should be closed at first.

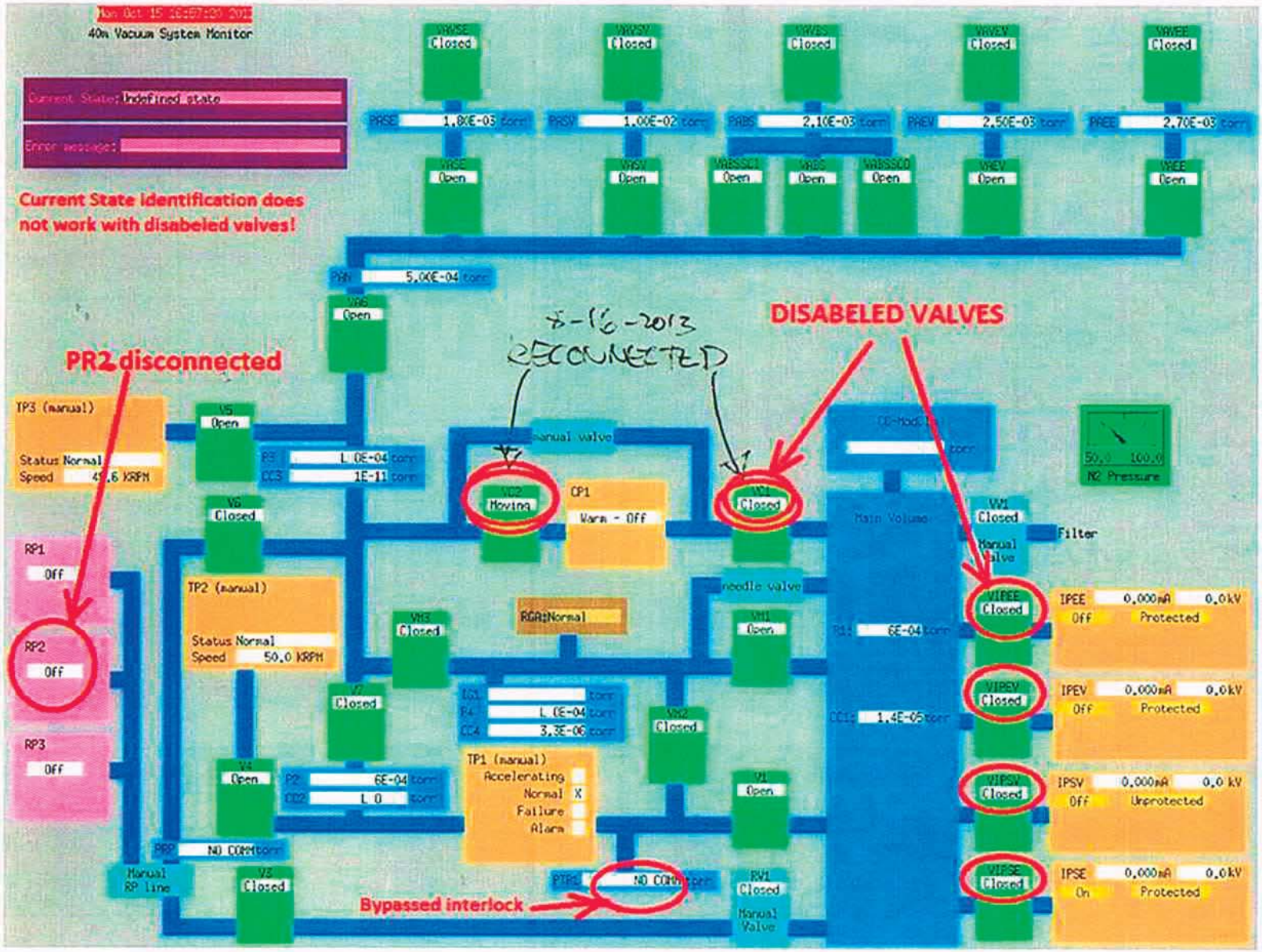
```
4001= STATE:_____VACUUM NORMAL_____4
    = ##:_____TO VIBRATION FREE PUMPING_____
    = ##:
4002= OPERATOR: switch cryo-pump compressor and controller on
4003= CONDITION: cryo-pump NOT cold: WAIT
4004= OPERATOR: to switch CP1 on, check that cryo-pump is cold and reset interloc
4005= CP1 ON        (ie, display reads 'cold')
4006= VC1 OPEN
4007= CONDITION: CC1 > 1.0 E-06: WAIT
4008= IP2 ON      IP 5
4009= IP3 ON      IP 4
4010= IP4 ON      IP 3
4011= IP5 ON      IP 2
4012= CONDITION: IP2 current > 1.5 E-01 Amps: WAIT
4013= OPERATOR: toggle IP2 into PROTECT mode
4014= CONDITION: IP3 current > 1.5 E-01 Amps: WAIT
4015= OPERATOR: toggle IP3 into PROTECT mode
4016= CONDITION: IP4 current > 1.5 E-01 Amps: WAIT
4017= OPERATOR: toggle IP4 into PROTECT mode
4018= CONDITION: IP5 current > 1.5 E-01 Amps: WAIT
4019= OPERATOR: toggle IP5 into PROTECT mode
4020= V1 CLOSE
4021= TP1 OFF    CHECK CONDITION INDICATOR : MUST INDICATE "WARM"
4022= OPERATOR: wait until TP1 indicates "OFF" !
4023= V4 CLOSE
4024= TP2 OFF
4025= VC1 CLOSE
4026= VC2 OPEN
4027= OPERATOR: switch cryo-pump compressor and controller OFF
4028= CP1 OFF
4029= CONDITION: cryo-pump NOT fully warmed up: WAIT
4030= CONDITION: CC3 > 1.0 E-04: WAIT
4031= VC2 CLOSE
4032= V5 CLOSE
4033= TP3 OFF
    = ##:_____VIBRATION FREE PUMPING_____
```

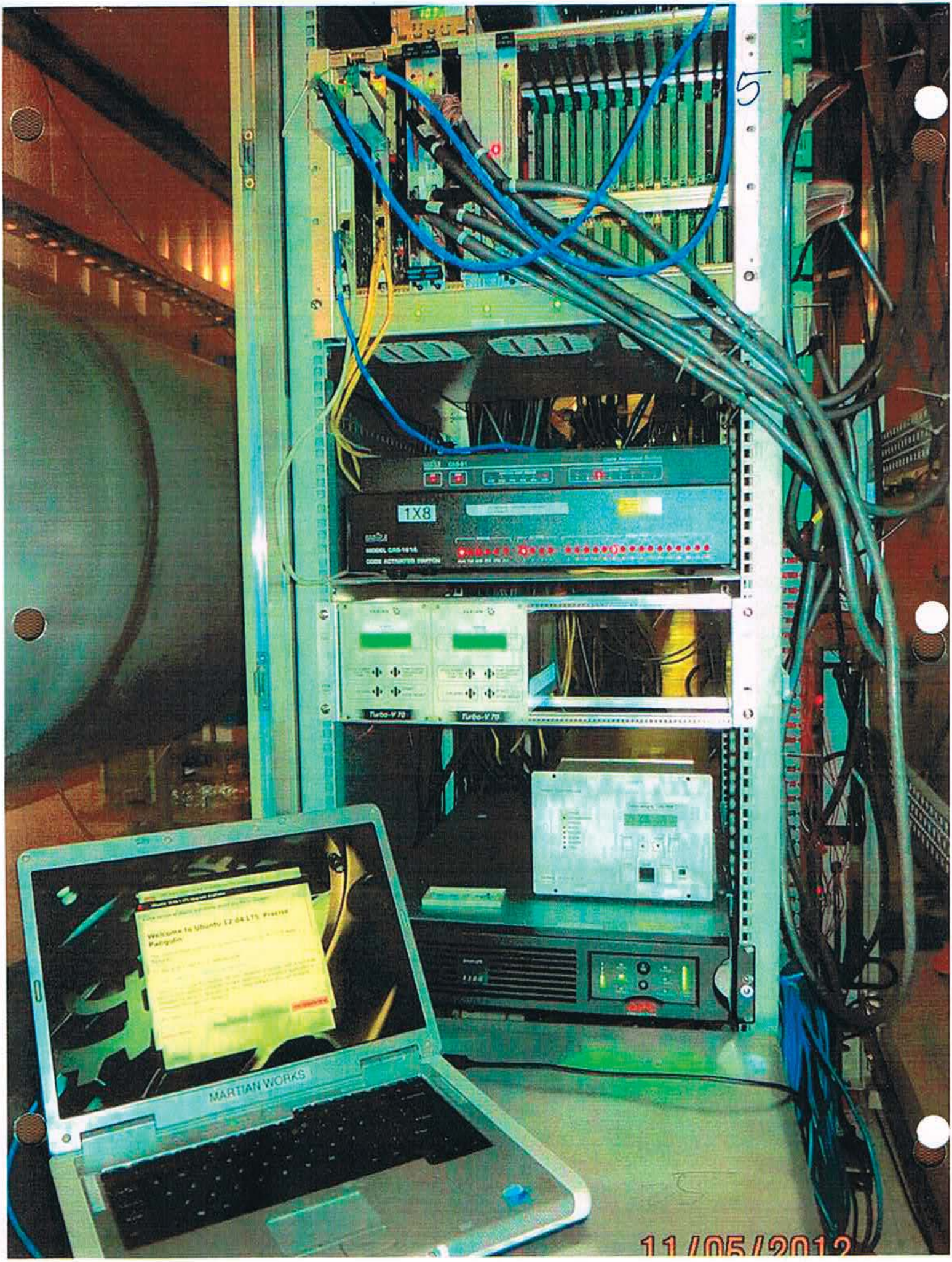
```
5001= STATE:_____VIBRATION FREE PUMPING_____5.
    = ##:_____TO VACUUM NORMAL_____
5002= TP2 ON
5003= OPERATOR: switch TP2 controller to standby
5004= CONDITION: TP2 rotation frequency < 950 Hz : WAIT
5005= TP3 ON
5006= OPERATOR: switch TP3 controller to standby
5007= CONDITION: TP3 rotation frequency < 950 Hz : WAIT
5008= V4 OPEN
5009= TP1 ON
5010= OPERATOR: wait until TP1 indicates "ON" !
5011= V5 OPEN
5012= V1 OPEN
5013= IP2 OFF
5014= IP3 OFF
5015= IP4 OFF
5016= IP5 OFF
    = ##:_____VACUUM NORMAL_____
```

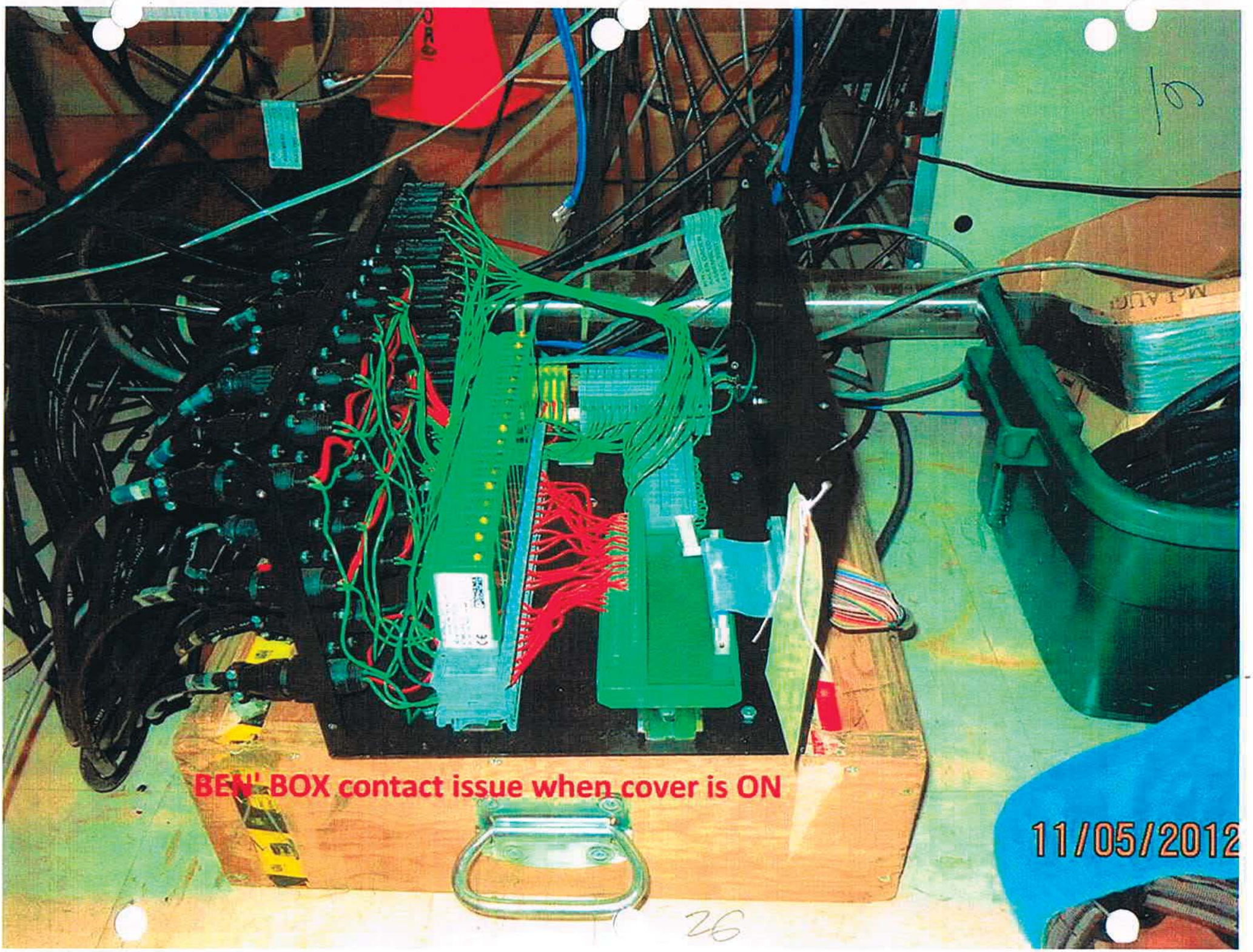
```
6001= STATE:_____VACUUM NORMAL_____6
    = ##:_____TO ALL OFF_____
    = ##:
6002= V1 CLOSE
6003= VC1 CLOSE
6004= OPERATOR: turn RGA filament off
6005= VM1 CLOSE
6006= V4 CLOSE
6007= V5 CLOSE
6008= TP1 OFF
6009= OPERATOR: wait until TP1 indicates "OFF" !
6010= VAEE CLOSE
6011= VAEV CLOSE
6012= VABS CLOSE
6013= VASV CLOSE
6014= VASE CLOSE
6015= IP1 OFF
6016= TP2 OFF
6017= TP3 OFF
6018= OPERATOR: switch cryo-pump compressor and controller OFF
6019= CP1 OFF
6020= OPERATOR: close calibrated leaks
6021= STATE:_____ALL OFF_____
    = ##:
    = END SEQUENCES
```

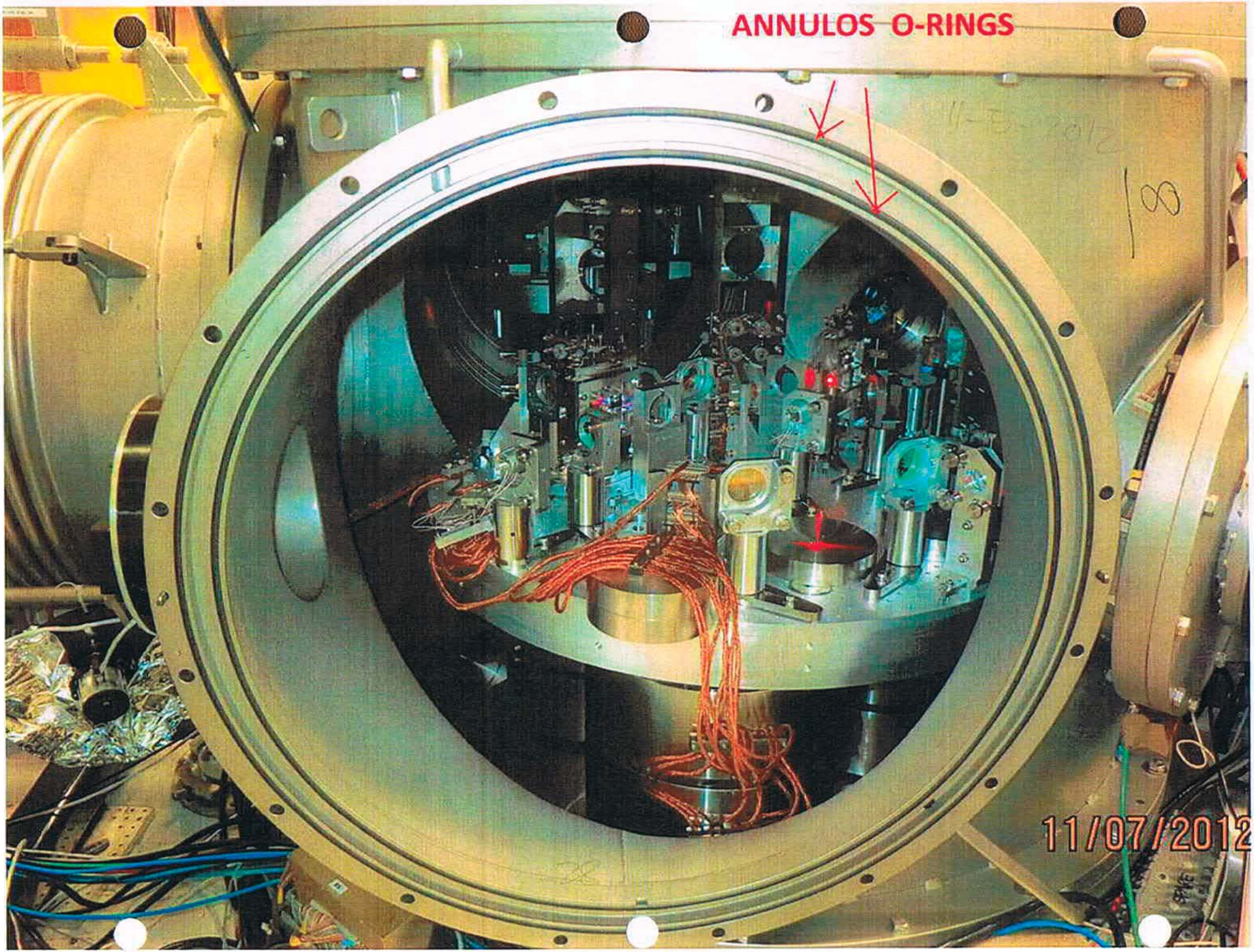

MARK II VACUUM SCHEMATIC
(REVISED 5-18-1994
automatic valve
manual valve
interlock
VAVSE
VAVSV
VAVBS
VAVEV
VAVEE
PASE
PASV
PABS
PAEV
PAEE
VASE
VASV
VABS
VAEV
VAEE
IP1
VA6
TP3
V5
P3
PAN
TP3RP
CC3
VC3
VV1
Filter
VC2
CP1
VC1
VM4
CL
SV1
V6
RP1
CL
SV2
RP2
CL
SV3
RP3
VM3
Leak Xe
Leak He
Leak Ar
VM1
IG1
P4
CC4
V7
PRP
P1
CC1
LN2 Trap
P2
TP2RP
DYCOR RGA
CC2
VM2
V4
TP2
V1
TP1
PTP1
V3
RV1
BEAM TUBES & CHAMBERS
IP2
IP3
IP4
IP5


RGA-0904030400 40m-pd66-m-d231
TP:8.3727e-07
ID? SRSRGA200VER0.24SN12967
EE? 70 FL? 0.9976 IE? 1
VF? 90 HV? 938 MO? 1
NF? 0 AP? 2826 HP? 114
MF? 114 MI? 1 SA? 25
MG? 0.1010 MV? 940 SP? 0.2182
ST? 0.0063 CE? 1 DI? 117
DS? -0.1000 RI? -8.5900 RS? 1063.5400
EC? 0 ED? 0 EF? 0
EM? 0 EP? 0 EQ? 0
ER? 0
X: 51
Y: 1.046e-11
Partial Pressure Torr
AMU


40m Vacuum System Monitor
Current State: Undefined state
Error message:
Current State identification does not work with disabeled valves!
PR2 disconnected
8-16-2013
DISCONNECTED
DISABELED VALVES
Bypassed interlock
TP3 (manual)
Status Normal
Speed 47.6 KRPM
TP2 (manual)
Status Normal
Speed 50.0 KRPM
TP1 (manual)
Accelerating
Normal X
Failure
Alarm
CP1
Warm - Off
Main Volume
Filter
N2 Pressure
RP1
Off
RP2
Off
RP3
Off
IPEE 0.000mA 0.0kV
Off Protected
IPEV 0.000mA 0.0kV
Off Protected
IPSV 0.000mA 0.0 kV
Off Unprotected
IPSE 0.000mA 0.0kV
On Protected


5
1X8
Turbo-V 70
Turbo-V 70
MARTIAN WORKS
11/05/2012


BEN' BOX contact issue when cover is ON
11/05/2012


ANNULOS O-RINGS
11/07/2012

Mon Jun 09 11:42:00 2014, Jenne, Update, CDS, Computer status
Mon Jun 09 12:19:17 2014, ericq, Update, CDS, Computer status
Mon Jun 09 22:26:44 2014, rana, zach, Update, CDS, SLOW controls recovery
Wed Jun 11 14:36:57 2014, Jenne, Update, CDS, SLOW controls recovery
Wed Jun 11 15:57:18 2014, Jenne, Update, CDS, Note on cables for talking to slow computers
Thu Jun 12 15:31:47 2014, Jamie, Update, CDS, Note on cables for talking to slow computers
Wed Jun 11 16:01:31 2014, Steve, Update, CDS, c1Vac1 and c1vac2 rebooted
Mon Jun 09 22:40:36 2014, Jenne, Update, CDS, Fast front end computers up
Tue Jun 10 09:25:29 2014, Jamie, Update, CDS, Computer status: should not be changing names

Message ID: **10028** Entry time: **Wed Jun 11 16:01:31 2014** In reply to: **10025**

Author:	Steve
Type:	Update
Category:	CDS
Subject:	c1Vac1 and c1vac2 rebooted

Quote:

I have brought back c1auxex and c1auxey. Hopefully this elog will have some more details to add to Rana's elog 10015, so that in the end, we have the whole process documented.

The old Dell computer was already in a Minicom session, so I didn't have to start that up - hopefully it's just as easy as opening the program.

I plugged the DB9-RJ45 cable into the top of the RJ45 jacks on the computers. Since the aux end station computers hadn't had their bootChanges done yet, the prompt was "VxWorks Boot" (or something like that). For a computer that was already configured, for example the psl machine, the prompt was "c1psl", the name of the machine. So, the indication that work needs to be done is either you get the Boot prompt, or the computer starts to hang while it's trying to load the operating system (since it's not where the computer expects it to be). If the computer is hanging, key the crate again to power cycle it. When it gets to the countdown that says "press any key to enter manual boot" or something like that, push some key. This will get you to the "VxWorks Boot" prompt.

Once you have this prompt, press "?" to get the boot help menu. Press "p" to print the current boot parameters (the same list of things that you see with the bootChange command when you telnet in). Press "c" to go line-by-line through the parameters with the option to change parameters. I discovered that you can just type what you want the parameter to be next to the old value, and that will change the value. (ex. "host name : linux1 chiara" will change the host name from the old value of linux1 to the new value that you just typed of chiara).

After changing the appropriate parameters (as with all the other slow computers, just the [host name] and the [host inet] parameters needed changing), key the crate one more time and let it boot. It should boot successfully, and when it has finished and given you the name for the prompt (ex. c1auxex), you can just pull out the RJ45 end of the cable from the computer, and move on to the next one.

Koji, Jenne and Steve

Preparation to reboot:

1, closed VA6, V5 disconnected cable to valves (closed all annuloses)

2, closed V1, disconnected it and stopped Maglev rotation

3, closed V4, disconnected its cable

See Atm1, This set up is insured us so there can not be any accidental valve switching to vent the vacuum envelope if

reboot-caos strikes.[moving=disconnected]

4, RESET c1Vac1 and c1Vac2 one by one and together. They both went at once. We did NOT power recycled.

Jenne entered the new "carma" words on the old Dell laptop and checked the good answers. The reboot was done.

Note: c1Vac1 green-RUN indicator LED is yellow. It is fine as yellow.

5, Checked and TOGGLED valve positions to be correct value (We did not correct the the small turbo pumps monitor positions, but they were alive)

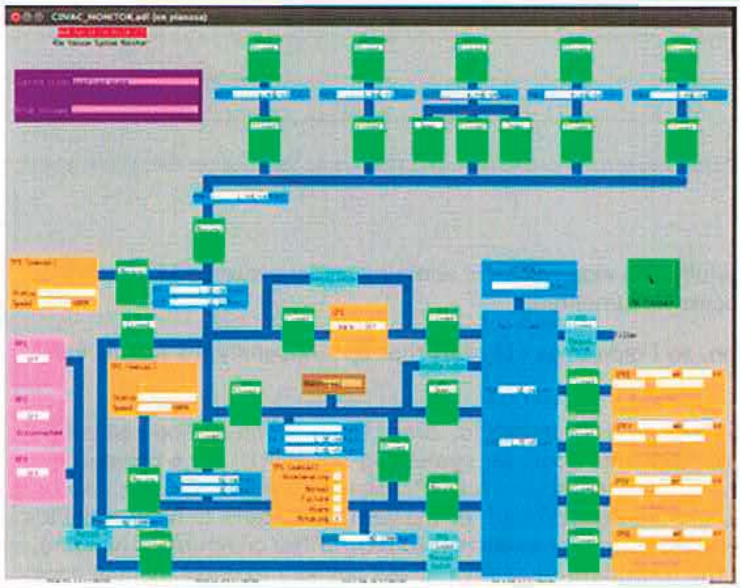
6, V4 was reconnected and opened. Maglev was started.

7, V1 cable reconnected and opened at full rotation speed of 560 Hz

8, V5 cable reconnected, valve opened.....VA6 cable connected and opened.....

9, Vacuum Normal valve configuration was reached.

Attachment 1: beforeReboot.png 40 kB Uploaded Wed Jun 11 17:04:44 2014 | Hide | Hide all



PRESSURE (TORR)
E-06
E-07
E-08
E-09
E-10
E-11
MASS (AMU)
10
20
30
40
H_2
^+H
He^+
N^{++}
O^{++}
C^+
$^{14}N^+$
$^{15}N^{14}N^+$
$^{15}N^+$
$^{16}O^+$
OH$^+$
H_2O^+
$H_2\,^{17}O^+$
Ar^{++}
CO_2^{++}
N_2^+
$^{15}N^{14}N^+$
$^{15}N_2^+$
O_2^+
$^{17}O^{16}O^+$
$^{18}O^{16}O^+$
$^{36}Ar^+$
$^{38}Ar^+$
$^{40}Ar^+$
CO_2^+

MU CHEMICAL NO.	SYMBOL	SOURCES F = Fragment P = Parent Ion DI = Doubly Ionized	
1	H	Water F or Hydrogen F	
2	H_2, D	Hydrogen, Deuterium (H^3)	
3	HD, H^3	Hydrogen-Deuterium, Tritium (H^3)	
4	He	Helium	
5		No known elements	
6	C^{++}	Doubly Ionized C^{12}	Rare
7	N^{++}	DI N^{14}	Rare
8	O^{++}	DI O^{16}	Rare
9		No known elements	
10	Ne^{++}	DI Ne^{20}	Rare
11	Ne^{++}	DI Ne^{22}	Rare
12	C	Carbon, Carbon Monoxide F, Carbon Dioxide F	
13	CH, C^{13}	Methane F, Carbon Isotope	
14	N, CH_2	Nitrogen, Methane F or Note 1	
15	CH_3	Methane F or Note 1	
16	O, CH_4, NH_2	Oxygen or Carbon Monoxide F, Methane P, Ammonia F	
17	OH, NH_3	Water F, Ammonia P	
18	H_2O	Water P	
19	F	Fluorine or Freon F	
20	Ar^{++}, Ne, HF	DI Argon, Neon Hydrofluoric acid	
21			
22	Ne^{22}	Neon isotope	
23			
24	C_2	See Note 1	
25	C_2H	See Note 1	
26	C_2H_2, CN	See Note 1. Hydrogen Cyanide F	
27	C_2H_3, Al, HCN	See Note 1. Aluminum, Hydrogen Cyanide	
28	N_2, CO, C_2H_4, Si	Nitrogen, Carbon Monoxide, Ethylene P, Silicon	
29	CH_3CH_2	Ethane F or Ethanol F or Isopropyl alcohol F	
30	C_2H_6, NO	Ethane P, Nitric Oxide	
31	P, CH_2OH, CF	Phosphorus, Methanol F, Ethanol F, Freon F	
32	O_2, CH_3OH, S	Oxygen, Methanol P, Sulfur	
33	HS	Hydrogen Sulfide F	
34	*H_2S, S^{34}	Hydrogen Sulfide P, Sulfur isotope	
35	*Cl	Chlorine isotope. See Note 2	
36	*HCl, Ar^{36}	Hydrochloric acid, Argon isotope	
37	*Cl^{37}	Chlorine isotope. See Note 2	
38	HCl^{37}	Hydrochloric acid or See Note 2	
39	C_3H_3	See Note 3	
40	Ar, C_3H_4	Argon. See Note 1	
41	C_3H_5	See Note 1	
42	C_3H_6	See Note 1	
43	C_3H_7, CH_3CO	Note 1. Acetone F or Methyl Ethyl Ketone F	
44	CO_2, C_3H_8	Carbon dioxide. See Note 3	
45	CH_3CH_2O	Ethanol F or Isopropyl alcohol F	
46	CH_3CH_2OH	Ethanol P	
47	CCl^{35}	See Note 2	
48	$HCCL^{35}$, SO	See Note 2, Sulfur Dioxide F	
49	CCl^{37}, SiOH	See Note 2, pump oil F	
50	CCl^{37}, CF_2, C_4H_2	See Note 2, Freon F, Note 3	

NOTE 1
Fragments of several hydrocarbons, such as mechanical pump oil, diffusion pump oil, vacuum grease, cutting oil, and organic solvents.

NOTE 2
Fragments of several chlorinated hydrocarbons, such as carbon tetrachloride, trichloroethylene and many Freons.

NOTE 3
Fragments for both straight chain hydrocarbons and benzene ring hydrocarbons.

*See Isotopic Ratio Chart in Table 19.

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Legend: Mass/Relative Abundance

Substance	1	2	3	4	5	6
Acetone	43/100	15/42	58/20	14/10	27/9	42/8
Air	28/100	32/27	14/6	16/3	40/1	
Ammonia	17/100	16/80	15/8	14/2		
Argon	40/100	20/10				
Benzene	78/100	77/22	51/18	50/17	52/15	39/10
Carbon dioxide	44/100	28/11	16/9	12/6	45/1	22/1
Carbon monoxide	28/100	12/5	16/2	29/1		
Carbon tetrachloride	117/100	119/91	47/51	82/42	35/39	121/29
Carbon tetrafluoride	69/100	50/12	31/5	19/4		
Chlorobenzene	77/100	112/89	51/57	50/48	38/31	114/25
DP oil DC705	78/100	76/83	39/73	43/59	91/32	
Dp oil Fomblin	69/100	20/28	16/16	31/9	97/8	47/8
DP oil PPE	50/100	77/89	63/29	62/27	64/21	38/7
Ethyl Alcohol	31/100	45/34	27/24	29/23	46/17	26/8
Halocarbon 11	101/100	103/60	35/16	66/15	47/12	31/10
Halocarbon 12	85/100	87/32	50/16	35/12		
Halocarbon 13	69/100	85/15	50/14	31/9	35/7	87/5
Halocarbon 23	51/100	31/58	69/40	50/19	52/1	25/1
Halocarbon 113	101/100	103/62	85/55	31/50	151/41	153/25
Helium	4/100					
Heptane	43/100	41/62	29/49	27/40	57/34	71/28
Hexane	41/100	43/92	57/85	29/84	27/65	56/50
Hydrogen	2/100	1/5				
Hydrogen sulfide	34/100	32/44	33/42	36/4	35/2	
Isopropyl alcohol	45/100	43/16	27/16	29/10	41/7	39/6
Krypton	84/100	86/31	83/20	82/20	80/4	
Methane	16/100	15/85	14/16	13/8	1/4	12/2
Methyl alcohol	31/100	29/74	32/67	15/50	28/16	2/2
Methyl ethyl ketone	43/100	29/25	72/16	27/16	57/6	42/5
MP oil	43/100	41/91	57/73	55/64	71/20	39/19
Neon	20/100	22/10	10/1			
Nitrogen	28/100	14/7	29/1			
Oxygen	32/100	16/11				
PFK*	69/100	119/17	51/12	131/11	100/5	31/4
PFTBA**	69/100	131/18	31/6	51/5	50/3	114/2
Silane	30/100	31/60	29/31	28/28	32/8	33/2
Silicon tetrafluoride	85/100	87/12	28/12	33/10	86/5	47/5
Toluene	91/100	92/62	39/12	65/6	45½/4	51/4
Trichloroethane	97/100	61/87	99/61	26/43	27/31	63/27
Trichloroethylene	95/100	130/90	132/85	97/64	60/65	35/40
Trifluoromethane	69/100	51/91	31/49	50/42	12/4	
Turbopump oil	43/100	57/88	41/76	55/73	71/52	69/49
Water	18/100	17/25	1/6	16/2	2/2	
Xenon	132/100	129/98	131/79	134/39	136/33	130/15

†Note: The six most intense peaks in the spectrum of each substance.
* Perfluorokerosene ** Perfluorotributylamine

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