

Department _____

Subject **Misc Hardware III**

Name **SEGAL**

Address _____

Nation's Brand

Computation Notebook

11 3/4" x 9 1/4", 4 x 4 Quad., 75 Sheets

43-648



0 73333 43648 8



**AVERY
DENNISON**

Office Products
Chicopee, MA 01022

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Aluminum bench plots

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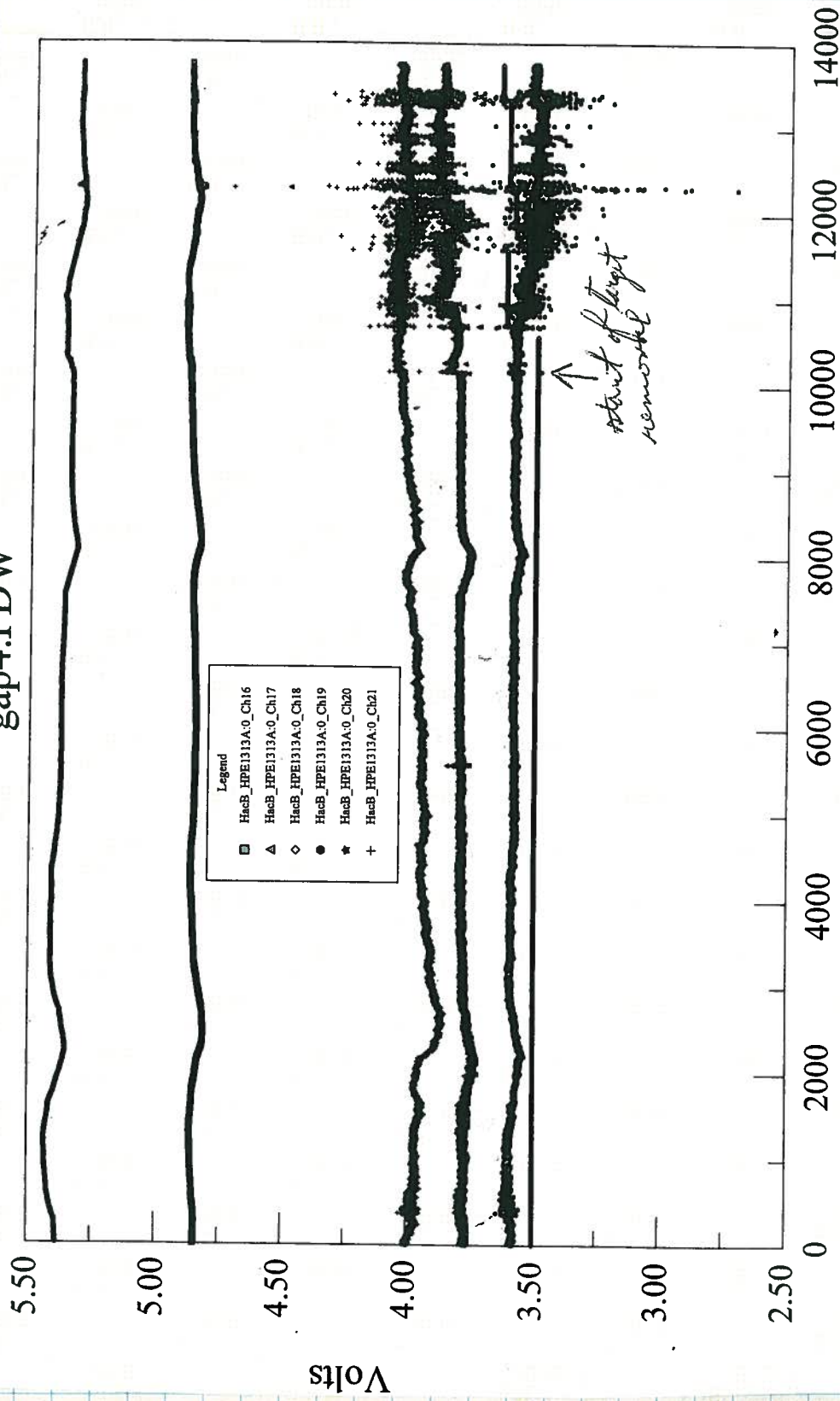
Checking some AMI 136 LHe Level Meters

150

Schematic of AMI 136 Drive Circuit

152

gap4.PDW



~5:57 PM
12/6/99

5 Second Intervals

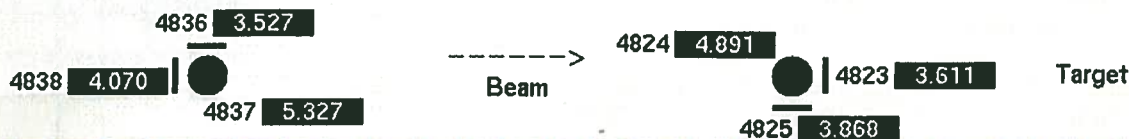
~1:04 PM
12/7/99

Dec 7, 1999

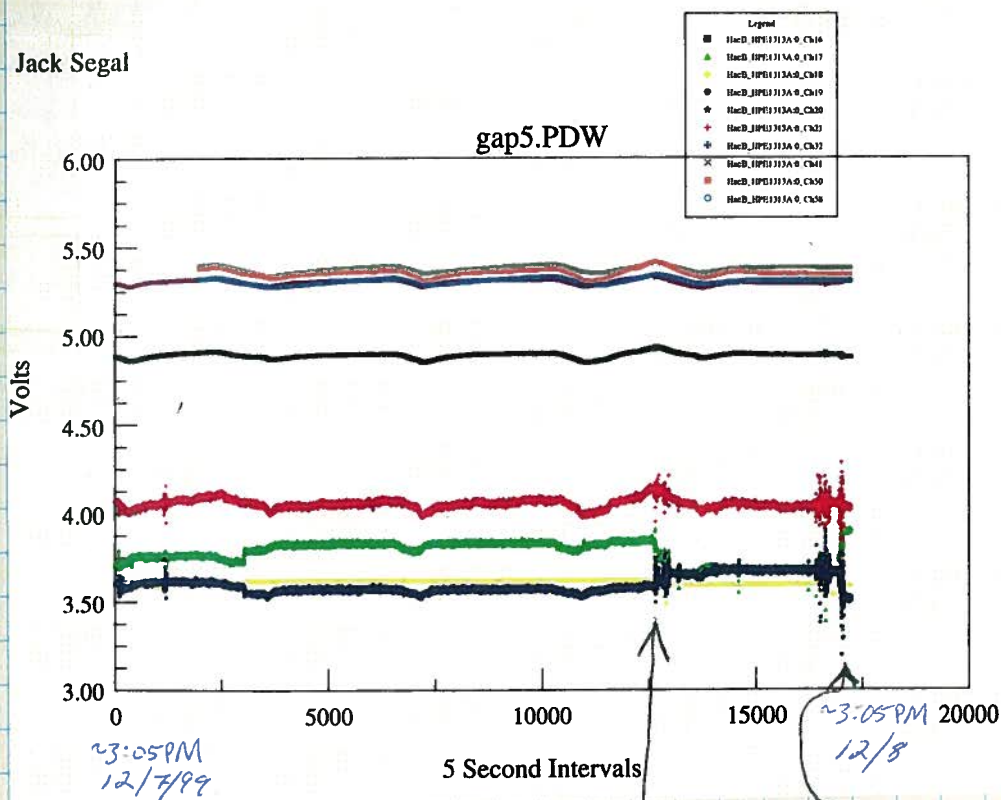
13:39:37

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.321 71.80	2 L 5.372 70.97	3 L 5.399 70.53	4 L 5.391 70.66
1 B 5.341 71.47	2 B 5.355 71.25	3 B 5.402 70.49	4 B 5.399 70.53
1 R 5.333 71.66	2 R 5.377 70.89	3 R 5.400 70.52	4 R 5.392 70.65
A1 BR 5.342 70.93	S1 Top 5.315 71.41	A2 BL 5.370 70.44	S2 Top 5.374 70.37
A1 BF 5.350 70.79	S1 Mid 5.371 70.99	A2 BB 3.429	S2 Mid 5.414 70.29
A1 LT 5.349 70.81	S1 Bot 5.373 70.39	A2 LT 2.164	S2 Bot 5.386 70.16
A1 LM 5.372 70.40		A2 LM 1.384	
A1 LB 5.396 69.98		A2 LB 0.949	

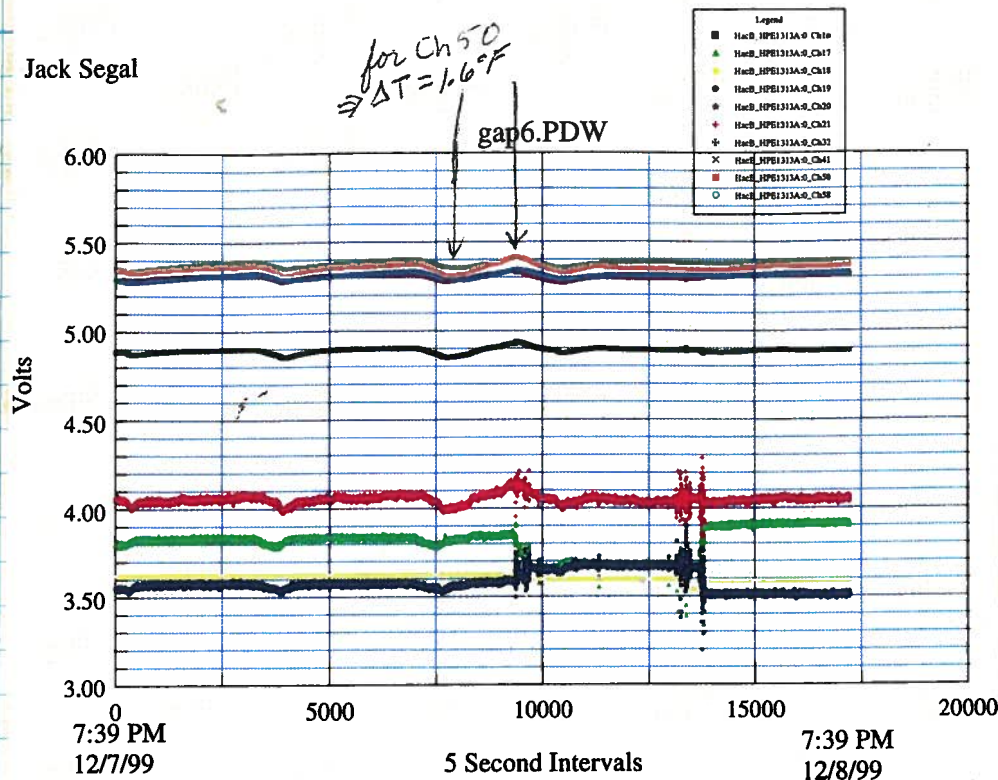


Jack Segal



suspected → surveyor
 (after discussion with) attach "C" clamp
 & bar to side of
 bench
 (left side
 ~ center of bench)
 clamp &
 bar
 removed

Jack Segal



Dec 9, 1999

12:27:56

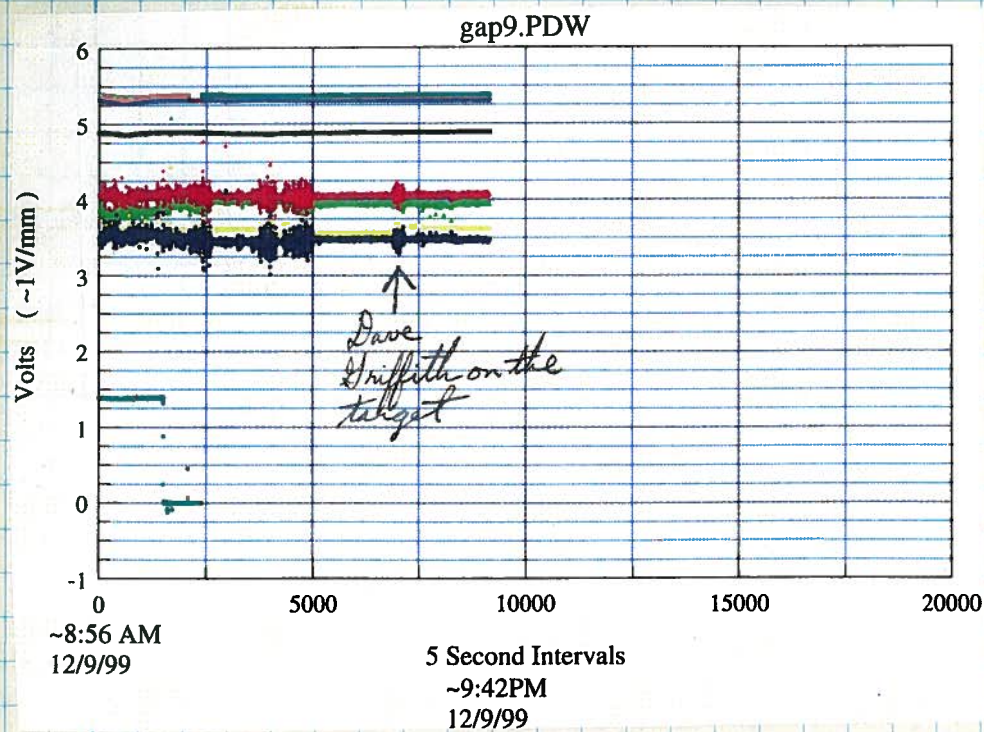
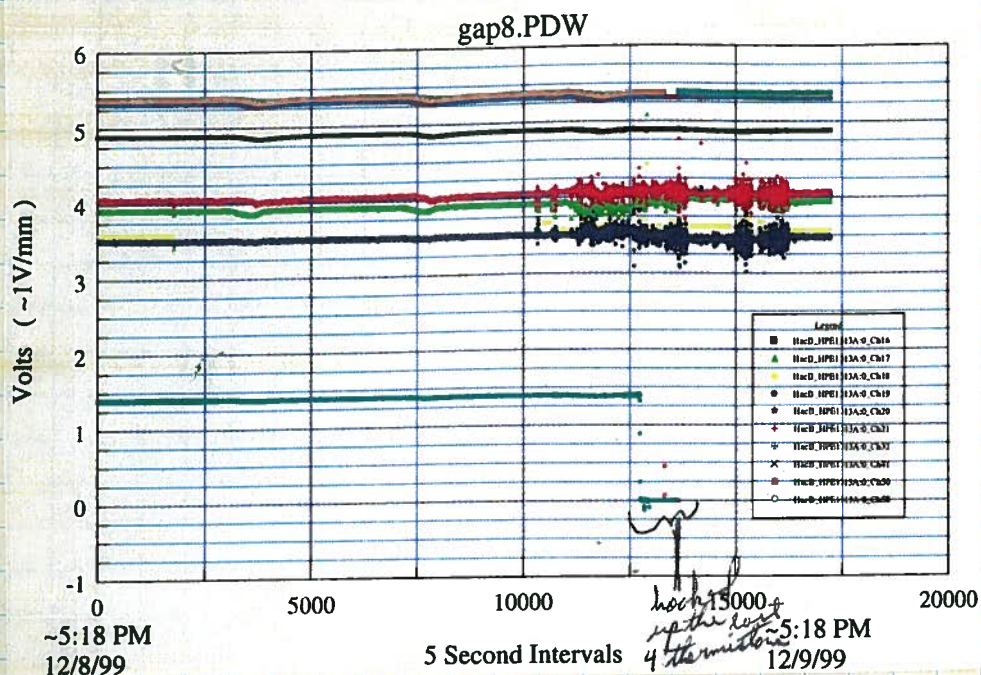
Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.322	2 L 5.365	3 L 5.393	4 L 5.389
1 B 5.339	2 B 5.353	3 B 5.394	4 B 5.394
1 R 5.333	2 R 5.370	3 R 5.393	4 R 5.389
A1 BR 5.343	S1 Top 5.313	A2 BL 5.363	S2 Top 5.373
A1 BF 5.350	S1 Mid 5.362	A2 BB 5.374	S2 Mid 5.413
A1 LT 5.352	S1 Bot 5.365	A2 LT 5.373	S2 Bot 5.385
A1 LM 5.370		A2 LM 5.377	
A1 LB 5.385		A2 LB 5.379	
4836 3.420		4824 4.882	4823 3.604
4838 4.052	4837 5.312	4825 4.001	Target

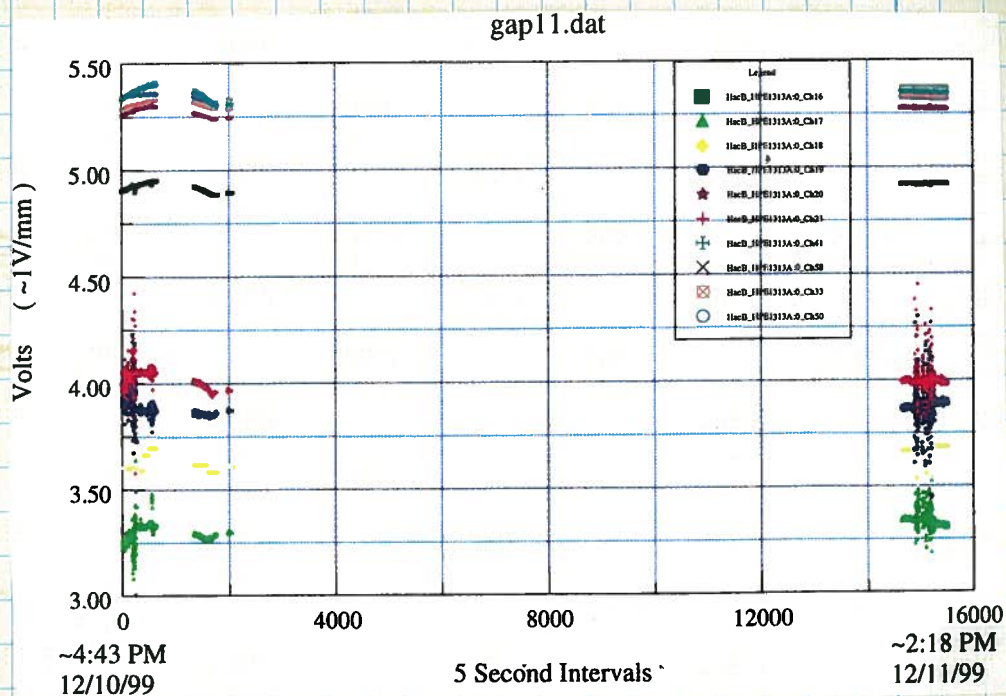
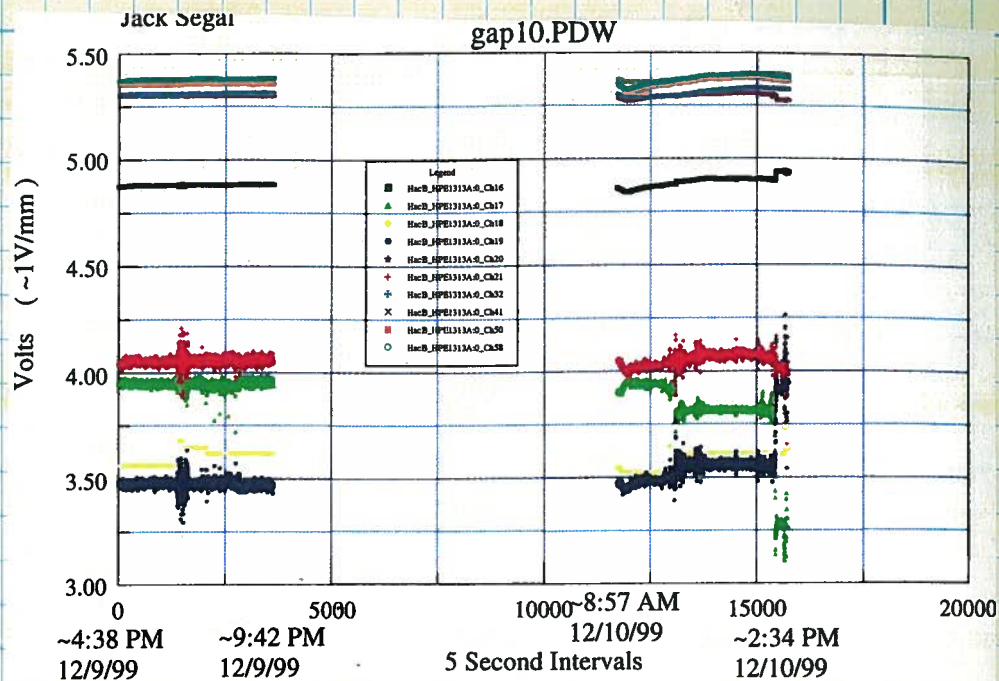
Beam

I hooked up the last four thermistors just before lunch. Above is the MEDM display just after I'd finished.

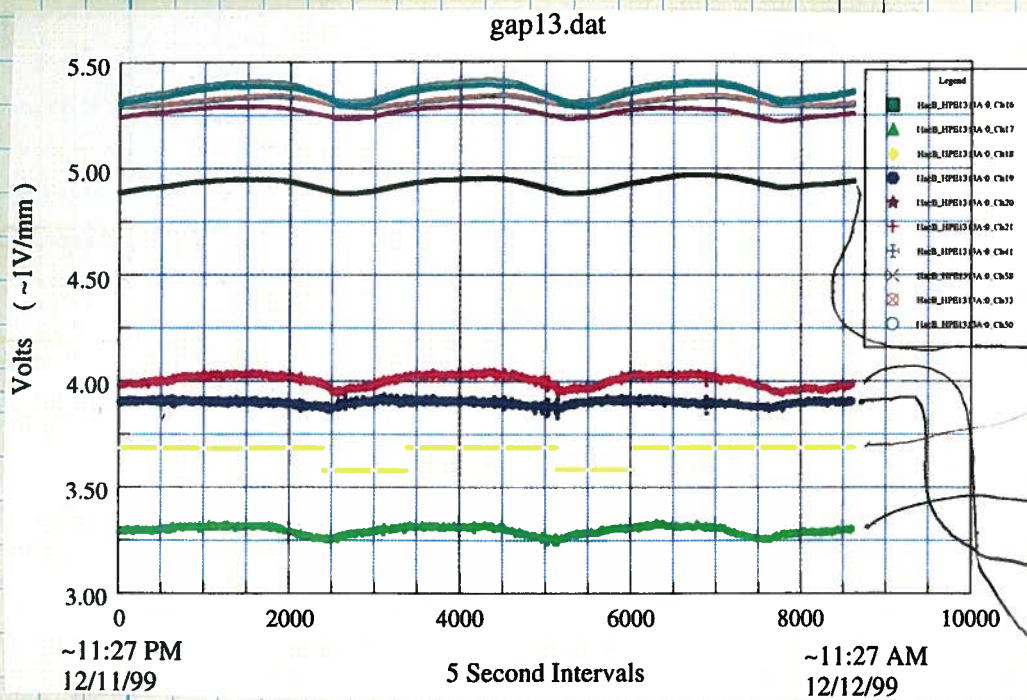
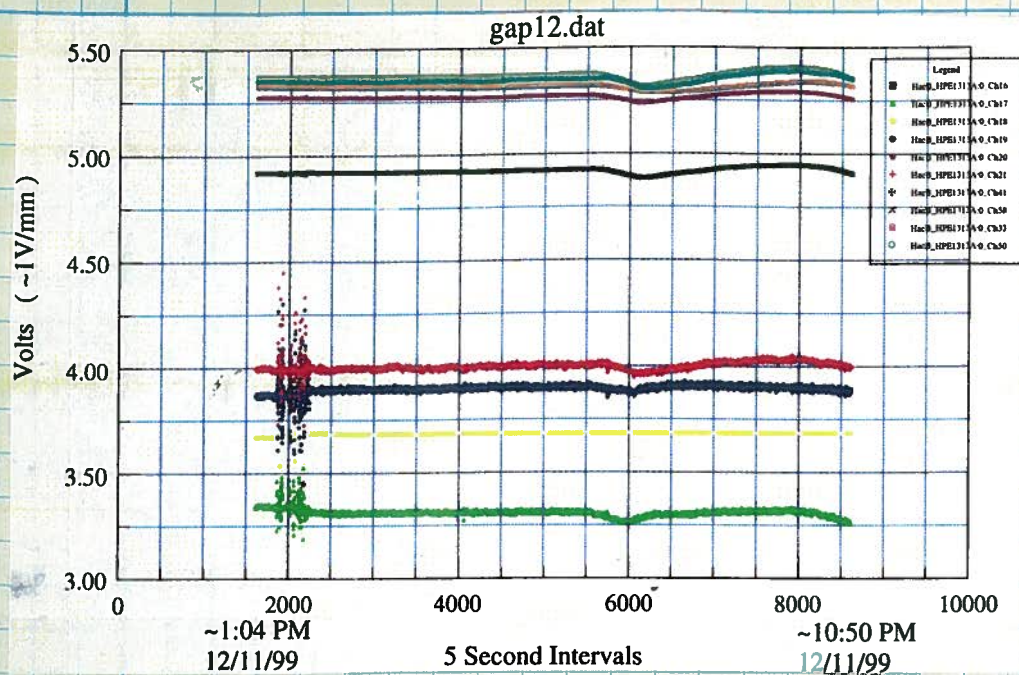
Jack Segal



Some problem with the strip tool software.
It keeps running but doesn't save any data.



Myer Proffitt had said HAC only has ~90Meg of memory.
 Perhaps my tool was too much. I reduced the
 tool size from 24 hrs down to 12 hrs.



Ezlog Readout Channels

11

HRSE_DTECTR_HPE1313A:0_Ch63
HRSE_DTECTR_HPE1313A:0_Ch62
HRSE_DTECTR_HPE1313A:0_Ch61
HRSE_DTECTR_HPE1313A:0_Ch60
HRSE_DTECTR_HPE1313A:0_Ch59
HRSE_DTECTR_HPE1313A:0_Ch58
HRSE_DTECTR_HPE1313A:0_Ch57
HRSE_DTECTR_HPE1313A:0_Ch56
HRSE_DTECTR_HPE1313A:0_Ch55
HRSE_DTECTR_HPE1313A:0_Ch54
HRSE_DTECTR_HPE1313A:0_Ch53
HRSE_DTECTR_HPE1313A:0_Ch52
HRSE_DTECTR_HPE1313A:0_Ch51
HRSE_DTECTR_HPE1313A:0_Ch50
HRSE_DTECTR_HPE1313A:0_Ch49
HRSE_DTECTR_HPE1313A:0_Ch48
HRSE_DTECTR_HPE1313A:0_Ch35
HRSE_DTECTR_HPE1313A:0_Ch34
HRSE_DTECTR_HPE1313A:0_Ch33
HRSE_DTECTR_HPE1313A:0_Ch32
HRSE_DTECTR_HPE1313A:0_Ch0
HRSE_DTECTR_HPE1313A:0_Ch1
HRSE_DTECTR_HPE1313A:0_Ch2
HRSE_DTECTR_HPE1313A:0_Ch3
HRSE_DTECTR_HPE1313A:0_Ch5
HRSE_DTECTR_HPE1313A:0_Ch6

electron
12/12/99

Hrsh_VDC_rCURTop
Hrsh_VDC_rCURBot
Hrsh_VDC_rHVTot
Hrsh_VDC_rHVBot
Hrsh_GAS_rVDCbot
Hrsh_GAS_rFPPc1
Hrsh_GAS_rFPPc2
Hrsh_GAS_rFPPc3
Hrsh_GAS_rFPPc4
Hach_DTC_HPE1313A:0_Ch63
Hach_DTC_HPE1313A:0_Ch62
Hach_DTC_HPE1313A:0_Ch61
Hach_DTC_HPE1313A:0_Ch60
Hach_DTC_HPE1313A:0_Ch59
Hach_DTC_HPE1313A:0_Ch55
Hach_DTC_HPE1313A:0_Ch52
Hach_DTC_HPE1313A:0_Ch49
Hach_DTC_HPE1313A:0_Ch46
Hach_DTC_HPE1313A:0_Ch43
Hach_DTC_HPE1313A:0_Ch40
Hach_DTC_HPE1313A:0_Ch36
Hach_DTC_HPE1313A:0_Ch33

hadron
12/12/99

*These are the channels
set up to be read by
ezlog-hpux-09*

*12/19 - I recently added a
time & date channel to
the beamline readout*

HacB_HPE1313A:0_Ch16
HacB_HPE1313A:0_Ch17
HacB_HPE1313A:0_Ch18
HacB_HPE1313A:0_Ch19
HacB_HPE1313A:0_Ch20
HacB_HPE1313A:0_Ch21
HacB_HPE1313A:0_Ch32
HacB_HPE1313A:0_Ch33
HacB_HPE1313A:0_Ch34
HacB_HPE1313A:0_Ch35
HacB_HPE1313A:0_Ch37
HacB_HPE1313A:0_Ch38
HacB_HPE1313A:0_Ch39
HacB_HPE1313A:0_Ch40
HacB_HPE1313A:0_Ch41
HacB_HPE1313A:0_Ch42
HacB_HPE1313A:0_Ch43
HacB_HPE1313A:0_Ch44
HacB_HPE1313A:0_Ch45
HacB_HPE1313A:0_Ch46
HacB_HPE1313A:0_Ch47
HacB_HPE1313A:0_Ch48
HacB_HPE1313A:0_Ch49
HacB_HPE1313A:0_Ch50
HacB_HPE1313A:0_Ch51
HacB_HPE1313A:0_Ch52
HacB_HPE1313A:0_Ch53
HacB_HPE1313A:0_Ch54
HacB_HPE1313A:0_Ch55
HacB_HPE1313A:0_Ch56
HacB_HPE1313A:0_Ch57
HacB_HPE1313A:0_Ch58
HacB_HPE1313A:0_Ch59
HacB_HPE1313A:0_Ch60
HacB_HPE1313A:0_Ch61

*beamline
at bench chan-log*
12/12/99

hallasc12:date
HacB_HPE1313A:0_Ch16
HacB_HPE1313A:0_Ch17
HacB_HPE1313A:0_Ch22
HacB_HPE1313A:0_Ch19
HacB_HPE1313A:0_Ch20
HacB_HPE1313A:0_Ch21
HacB_HPE1313A:0_Ch32
HacB_HPE1313A:0_Ch33
HacB_HPE1313A:0_Ch34
HacB_HPE1313A:0_Ch35
HacB_HPE1313A:0_Ch37
HacB_HPE1313A:0_Ch38
HacB_HPE1313A:0_Ch39
HacB_HPE1313A:0_Ch40
HacB_HPE1313A:0_Ch41
HacB_HPE1313A:0_Ch42
HacB_HPE1313A:0_Ch43
HacB_HPE1313A:0_Ch44
HacB_HPE1313A:0_Ch45
HacB_HPE1313A:0_Ch46
HacB_HPE1313A:0_Ch47
HacB_HPE1313A:0_Ch48
HacB_HPE1313A:0_Ch49
HacB_HPE1313A:0_Ch50
HacB_HPE1313A:0_Ch51
HacB_HPE1313A:0_Ch52
HacB_HPE1313A:0_Ch53
HacB_HPE1313A:0_Ch54
HacB_HPE1313A:0_Ch55
HacB_HPE1313A:0_Ch56
HacB_HPE1313A:0_Ch57
HacB_HPE1313A:0_Ch58
HacB_HPE1313A:0_Ch59
HacB_HPE1313A:0_Ch60
HacB_HPE1313A:0_Ch61

*note!
switched
channels
for sensor*

*Beamline would go down with a "file table overflow
error writing snapshot".*

Thermistors and Epoxy Used on the Bench

Physical Properties*

Service Temperature	-67°F to 221°F (-55°C to 105°C)
Thermal Conductivity (BTU) (in/hr) (ft²) (°F):	7.2
Thermal Conductivity (cal) (cm/sec) (cm²) (°C):	0.0025
Volume Resistivity, ohm-cm:	10 ¹⁵
Tensile Shear, 1/2" (1.27cm) overlap, psi:	2,200, min. (154 kg/sq. cm)
Flexural Strength, psi:	12,000, min. (840 kg/sq. cm)
Coefficient of Thermal Expansion:	20 x 10 ⁻⁶ in/in/°F (36 x 10 ⁻⁶ in/in/1°C)
Chemical and Solvent Resistance:	Excellent
Color:	White

*Determined under laboratory conditions using applicable ASTM procedures. Actual field data may vary. Do not use Physical Properties for warranty specifications.

NOTE

The Material Safety Data Sheet (MSDS-0107) for OMEGA's OB-101 cement is included with each cement kit.

2

LOT: 99H0145

YSI 44036
**PRECISION
THERMISTOR**

Resistance 10,000 Ohms @ 25°C
Interchangeability: ±0.1°C from 0°C to 70°C
Max. Transient Temperature: 75°C (167°F)
Storage/Operating Temperature: -80° to +75°C

WARNING: Use heat sinks when soldering
or welding to thermistor leads


YSI Incorporated

Yellow Springs, Ohio 45387 USA
800-765-4974 or FAX at 937-767-9383

WWW.YSI.COM

LOT: 99H0298

YSI 44031
**PRECISION
THERMISTOR**

Resistance 10,000 Ohms @ 25°C
Interchangeability: ±0.1°C from 0°C to 70°C
Max. Transient Temperature: 75°C (167°F)
Storage/Operating Temperature: -80° to +75°C

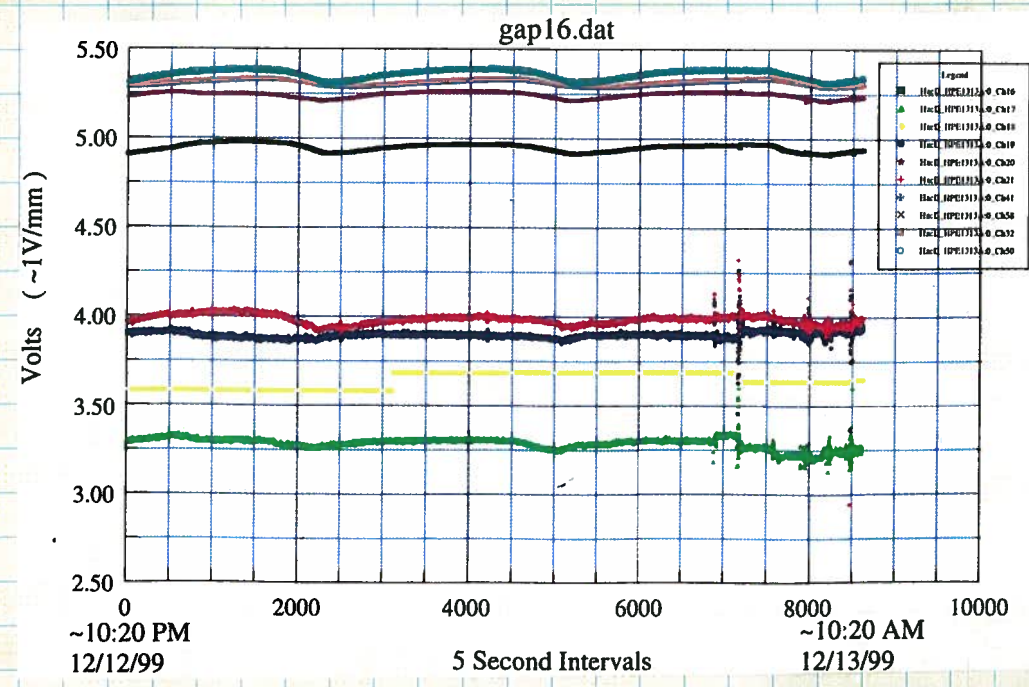
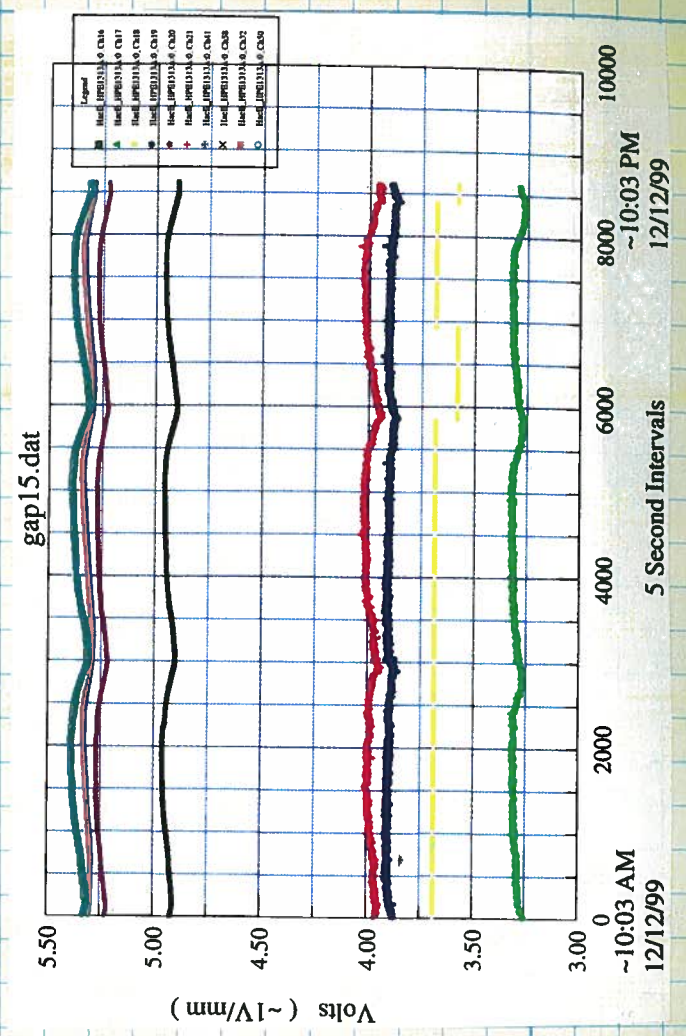
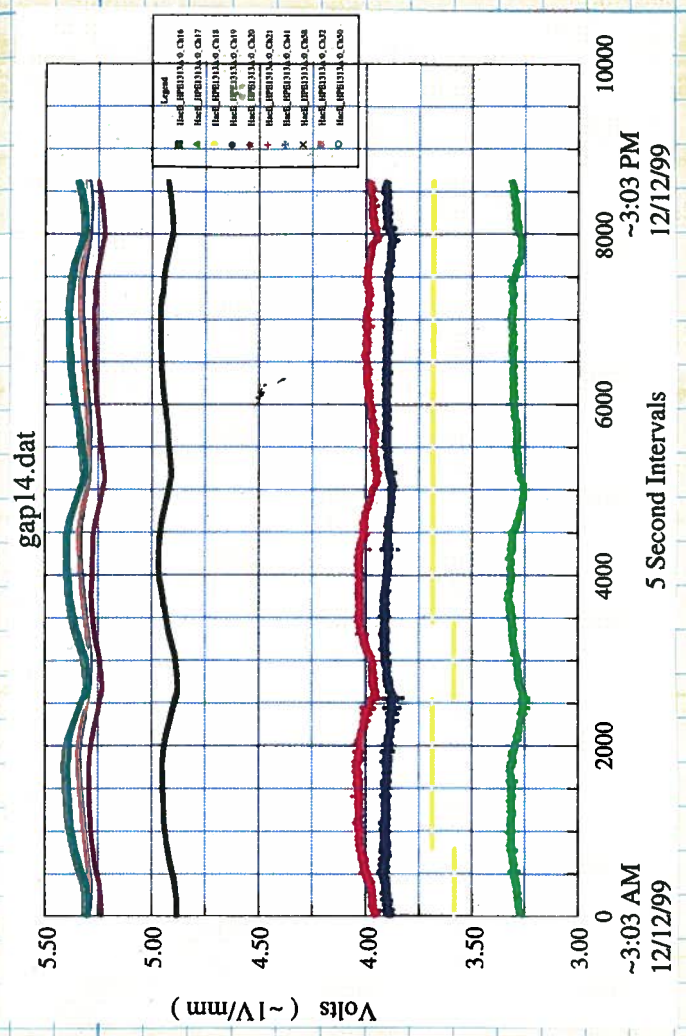
WARNING: Use heat sinks when soldering
or welding to thermistor leads


YSI Incorporated

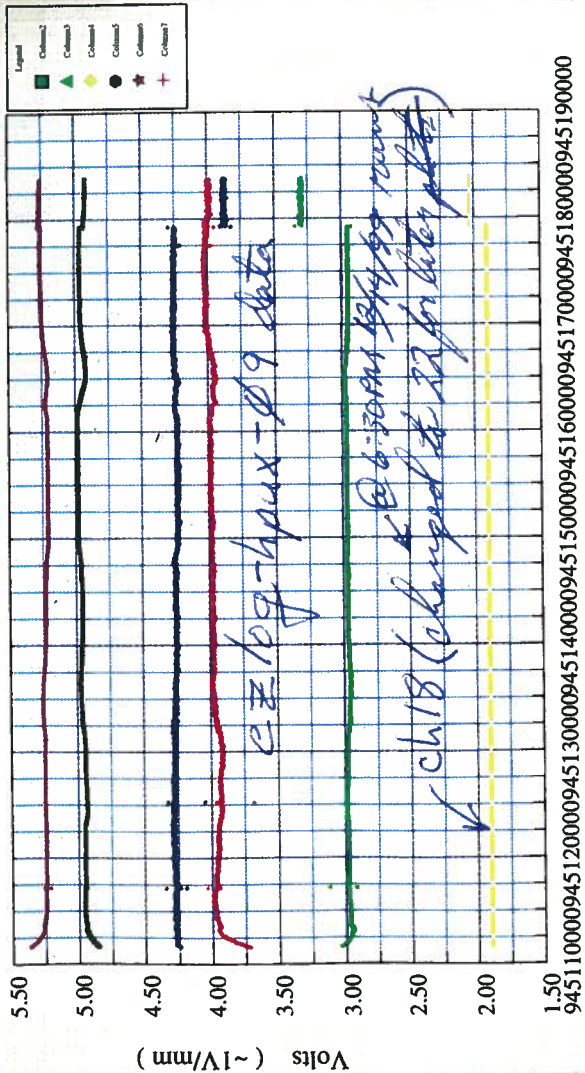
Yellow Springs, Ohio 45387 USA
800-765-4974 or FAX at 937-767-9383

WWW.YSI.COM

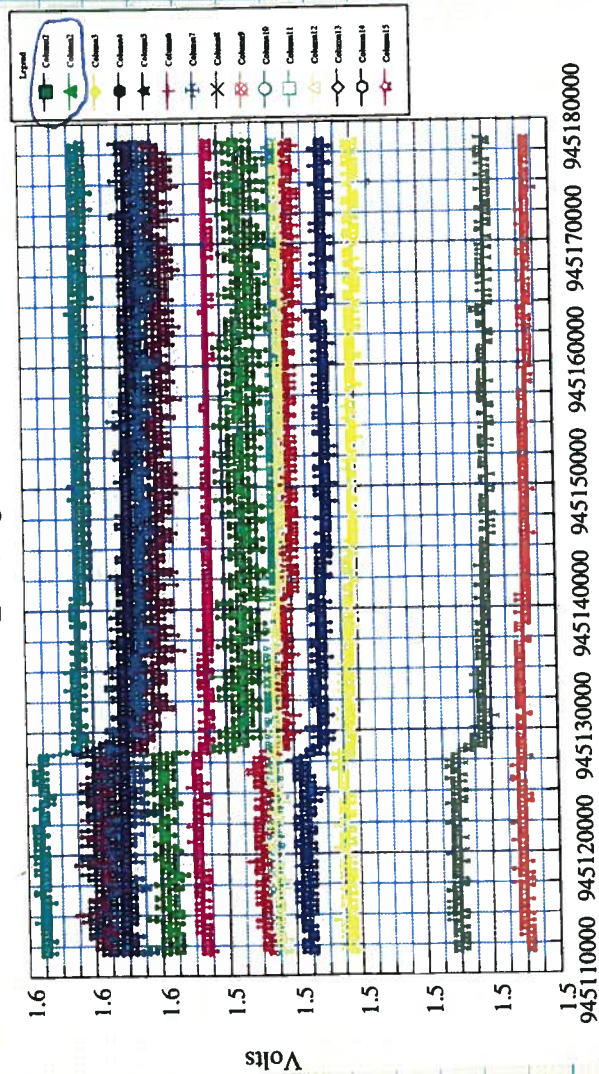
This epoxy was used to completely cover the thermistors and bond them to the surfaces of the bench and supports.



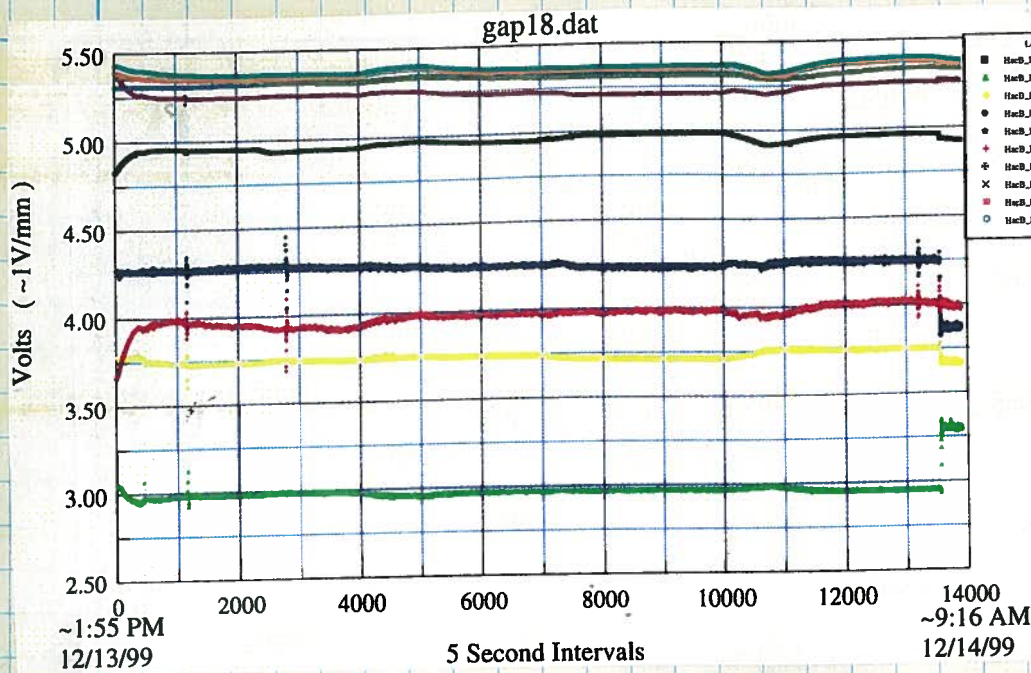
al_bench_log.dat

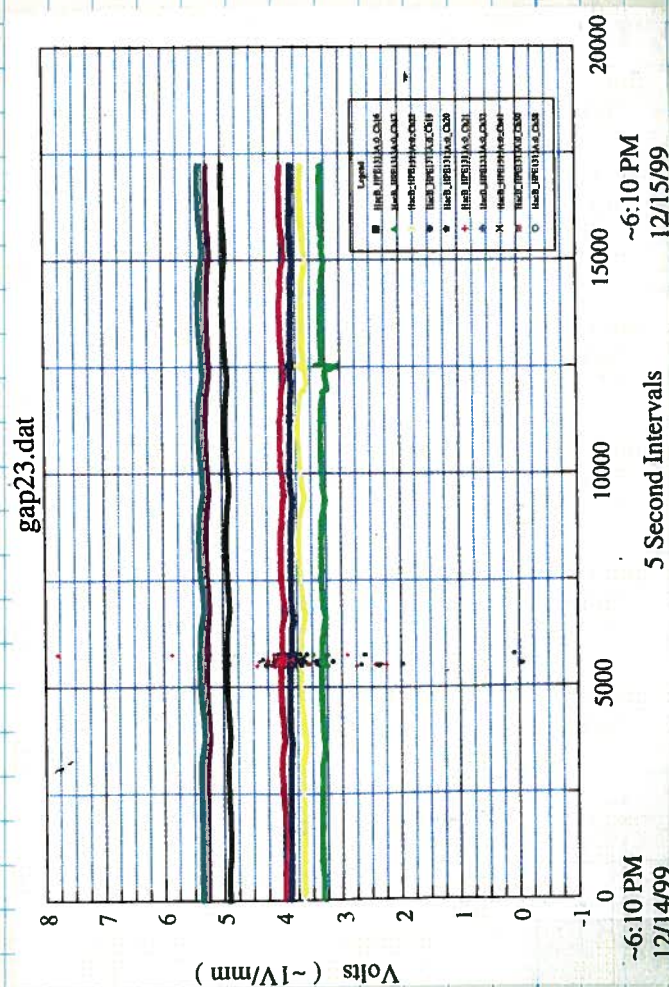
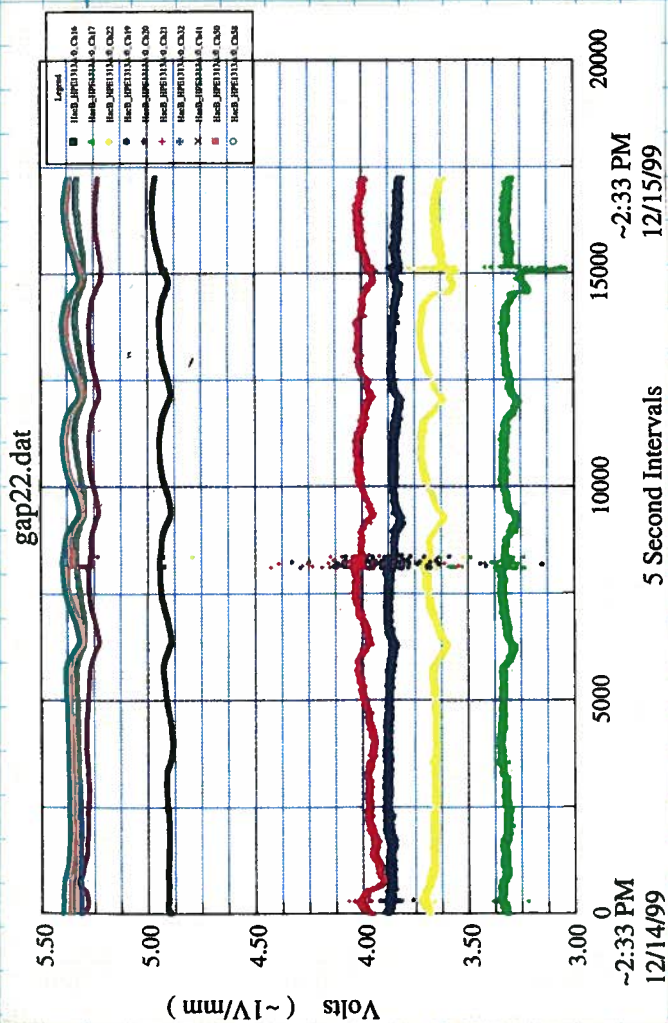
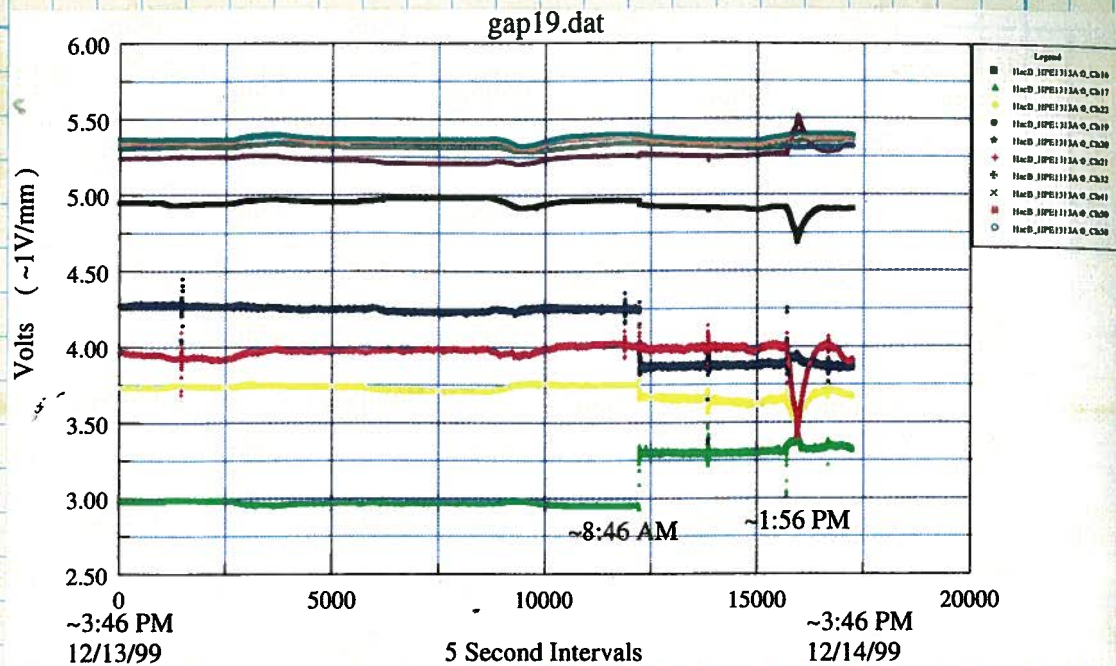


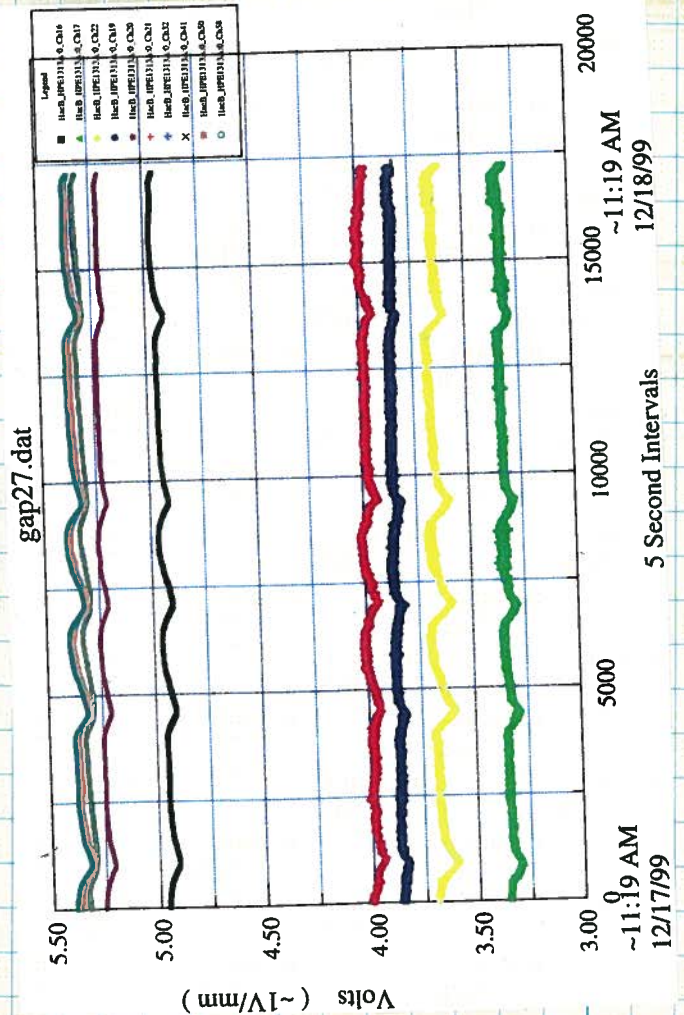
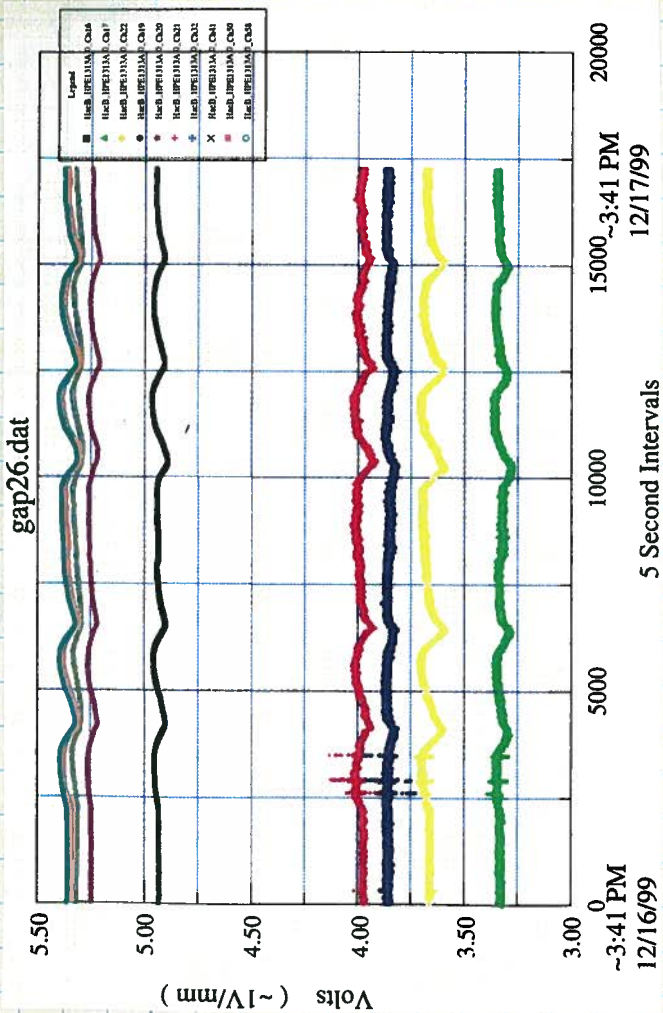
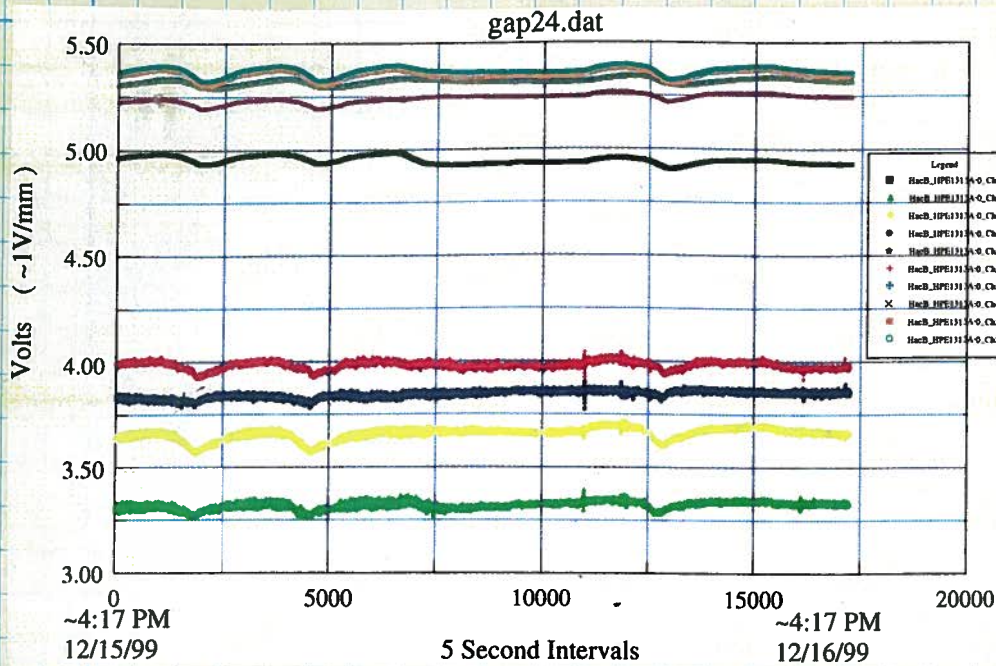
e_arm_log.txt



Column1







Calibration Check of YSI 44036

12/18/99

Calibrating the thermistor used for the ethanol prefridge.

I got a thermistor with water and ice. It's been sitting for about 20-30 minutes. Drove in from home with water & ice in it. Ice melted. Went to 7-11 and bought a bag of ice.

Set E2 log program to read every 10 sec. Not sure of GDC update rate for IOC.

on my watch

11:25 AM remove thermistor from fridge.
 11:26 put thermometer in ice + water - stir occasionally
 11:28 reads 0.2°C
 11:30 inserted thermistor
 11:36 remove thermistor & hold in my hand
 11:37 thermometer reads 0.2°C
 11:38 leave thermistor hanging in free air
 11:53 filled thermos with hot water from water fountain
 11:57 thermometer reads 69°C - inserted thermistor
 11:59 68.8°C
 12:00 68.6°C - removed thermistor
 added ice to the water
 12:03 58.2°C
 12:04:30 insert thermistor
 12:04:30 remove thermistor
 12:05 thermometer reads 58.0°C
 add more ice to water
 12:08 43.8°C - insert thermistor
 12:10 remove thermistor
 12:10:30 43.5°C
 add more ice
 12:14 thermometer reads 27.8°C
 12:16 remove thermistor
 12:16:30 thermometer reads 27.8°C
 12:18:15 found ezlog terminated, it was still running when I went for hot water

Data from ezlog is too erratic.

This check prompted because thermistor readout has been about 7°C . A few days ago I left the thermistor in the fridge. When I checked it the next day it read $\sim 2^{\circ}\text{C}$. I did not get the thermistor value at the same time. (over)

I recently added
a time & date channel
to the e-log

```
hallasc17:date
Shed_gas_CO2
Shed_gas_ETH
Shed_gas_ARG
Shed_gas_ArBotL
Shed_gas_ArBotR
Shed_gas_EthBotL
Shed_gas_EthBotR
Shed_gas_CO2BotL
Shed_gas_CO2BotR
Shed_gas_TempBubb
Shed_gas_TempRack
Shed_gas_AtmPres
```

~~also add to
time & date
channel~~[illegible]

f cont.
(from p. 17)

The thermometer had been placed across the top of the metal reservoir can in the fridge.

I filled the thermos with hot water. I removed the thermistor from the HP AD input and connected the Fluke 8060A DMM to it to measure the resistance.

thermometer	thermistor
68.7	1.760 k Ω
68.6	1.780
54.0	3.040
41.0 $^{\circ}$	5.060
35.2	6.336
35.4	6.345
28.9	8.279
24.1	10.158
14.6	15.709
14.5	15.716
$\downarrow$ maybe	32.43
0 $^{\circ}$ C ($\sim 0.2^{\circ}$ C?)	32.27

added ice each time to lower temperature

$$\frac{9.998}{V} \times \frac{32270}{32270 + 10000} = \frac{7.633}{V} @ 0^{\circ}\text{C}$$

for YSI 44036. FOR and using catalog values for R & T I get

$$A = 1.130876 \times 10^{-3}$$

$$B = 2.337937 \times 10^{-4}$$

$$C = 8.913299 \times 10^{-8}$$

V of 7.633 gives $\frac{32.51}{32.48}^{\circ}\text{F}$

for YSI 2. FOR and using 68.6, 35.4 and 0.2 $^{\circ}$ C values above I get

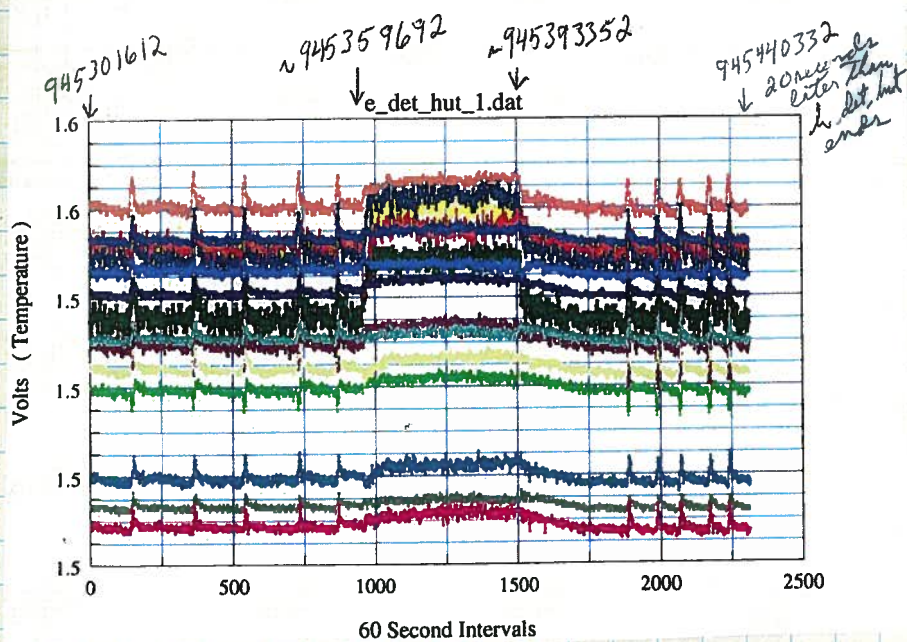
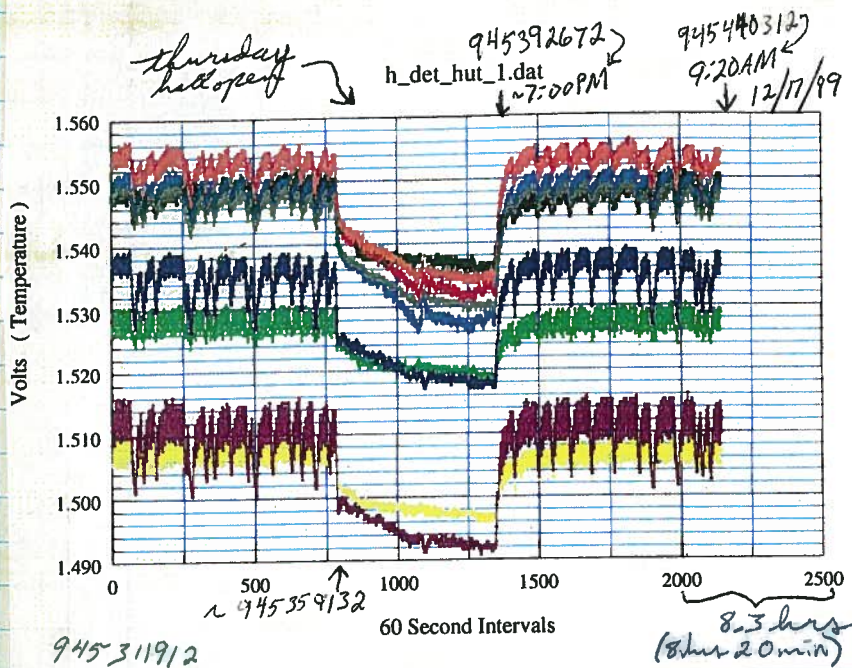
$$A = 1.194811 \times 10^{-3}$$

$$B = 2.248677 \times 10^{-4}$$

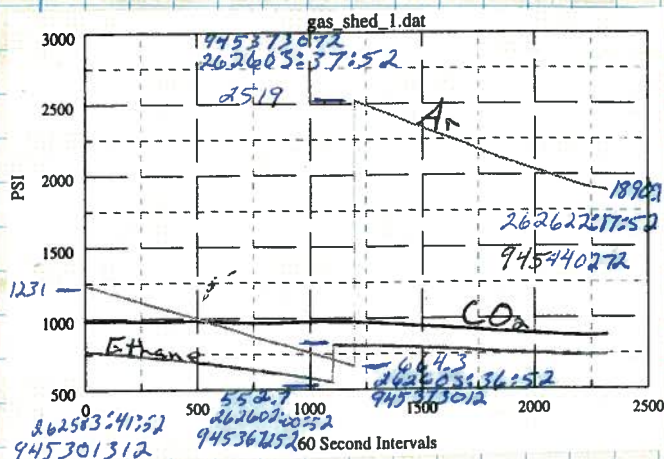
$$C = 1.152377 \times 10^{-7}$$

V of 7.633 gives 32.35 $^{\circ}\text{F}$

Some Hut Temperatures



Rate of Argon Gas Use in HAWGS



from ezylog

for Ar

$$\begin{array}{r} 2519 \text{ PSI} \\ - 1890 \text{ PSI} \\ \hline 629 \text{ PSI} \end{array}$$

$$\begin{array}{r} 945440272 \\ - 945373012 \\ \hline 67200 \text{ seconds} = 18 \text{ hrs } 40 \text{ min} \end{array}$$

$$\begin{array}{r} 42.95 \\ 4.005 \\ \hline 629 \overline{) 2519.000} \\ 1854.7 \end{array}$$

$$\Rightarrow \begin{array}{l} 55.04 \\ 74.76 \text{ hrs per bottle} \\ 3.11 \text{ days} \\ 2.29 \end{array}$$

$$\begin{array}{r} 2519.0 \\ - 664.3 \\ \hline 1854.7 \text{ PSI} \end{array}$$

from a full cylinder

$$\begin{array}{r} 1231.0 \\ - 664.3 \\ \hline 566.7 \text{ PSI} \end{array}$$

$$\begin{array}{r} 945373012 \\ - 945301312 \\ \hline 71700 \text{ seconds} = 19.92 \text{ hrs} \end{array}$$

$$\begin{array}{r} 3.27 \\ 1.145 \\ \hline 566.7 \overline{) 2519} \\ 1854.7 \end{array}$$

$$\Rightarrow \begin{array}{l} 65.19 \\ 88.55 \text{ hrs per bottle} \\ 3.69 \text{ days} \\ 2.72 \end{array}$$

~~for 44036 using ezylog T & R values for 44036 I get~~
 (FORTRAN version)
 $A = 1.13087 \times 10^{-3}$
 $B = 2.33794 \times 10^{-4}$
 $C = 8.91330 \times 10^{-8}$

wrong page
for this

12/20

H.

Looking in an old CRC we found the permittivity of air varies as

$$\frac{(\epsilon - 1)_{t,p}}{(\epsilon - 1)_{20^\circ\text{C}, 1\text{atm}}} = \frac{P}{760 [1 + 0.003411(t - 20)]}$$

$P \equiv$ pressure in mm Hg
 $t \equiv$ temperature in $^\circ\text{C}$

ϵ for dry air (no CO_2 !) at 760 mm Hg is 1.000590

The above eqⁿ is said to be good to 0.1% from $10^\circ\text{C} - 30^\circ\text{C}$ and 700 mm - 800 mm

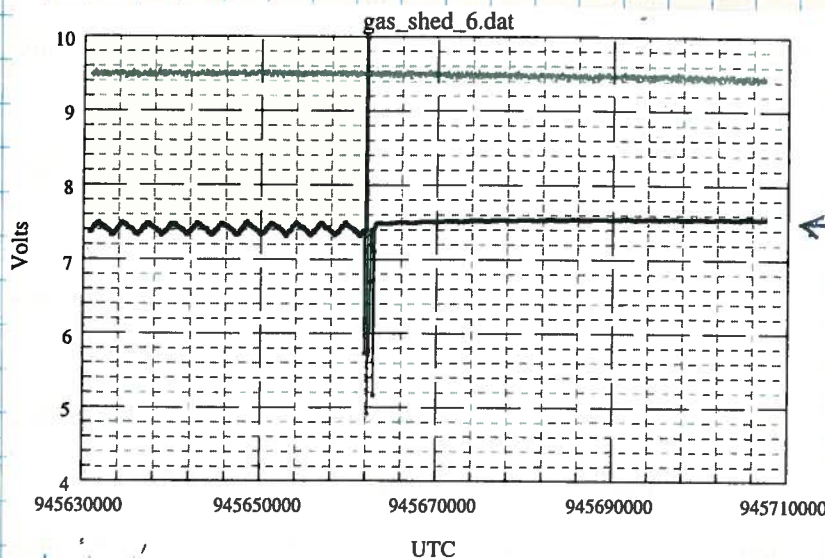
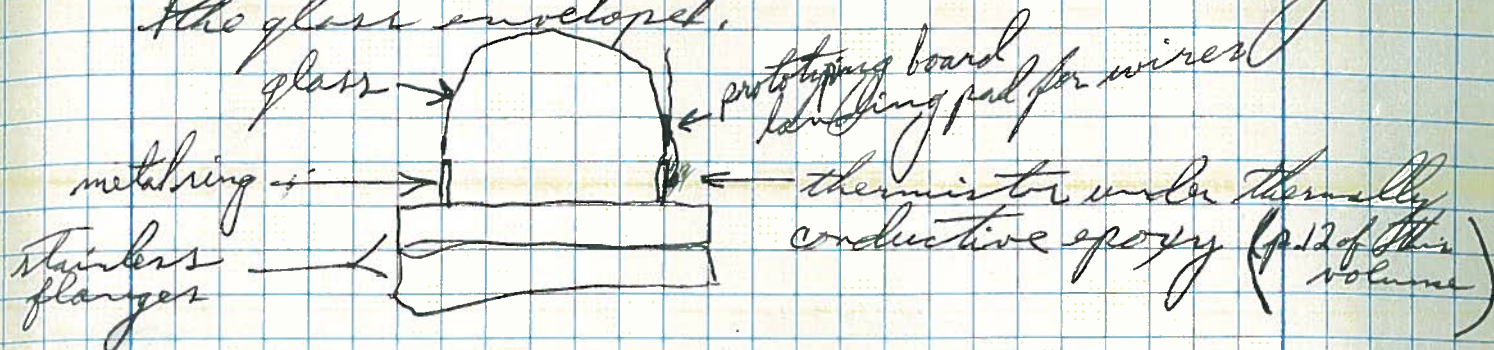
For a constant pressure and Δt of 1°C

$$\frac{(\epsilon - 1)_{t,p}}{(\epsilon - 1)_{20^\circ\text{C}, 1\text{atm}}} = .9966 \quad @ 5V \quad .34\% = 17\text{mV}$$

for aluminum the coeff. of thermal expansion is around
 $25 \times 10^{-6}/^\circ\text{C}$ (11.6 to 12.9 $\mu\text{in/in}^\circ\text{F}$) (from a CRC)
 iron $12 \times 10^{-6}/^\circ\text{C}$ (6.6 to 9 $\mu\text{in/in}^\circ\text{F}$)

12/20

Last night I epoxied the thermistor in the ethanol refrigerator to the metal base of the bubbler itself. Well, to the metal ring on the glass envelope.

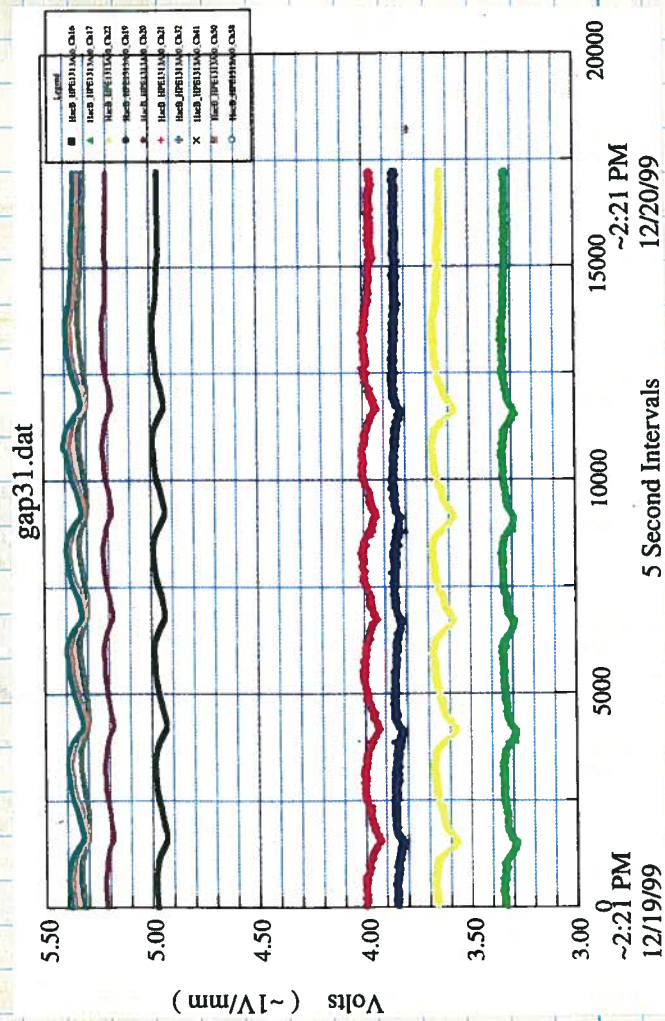
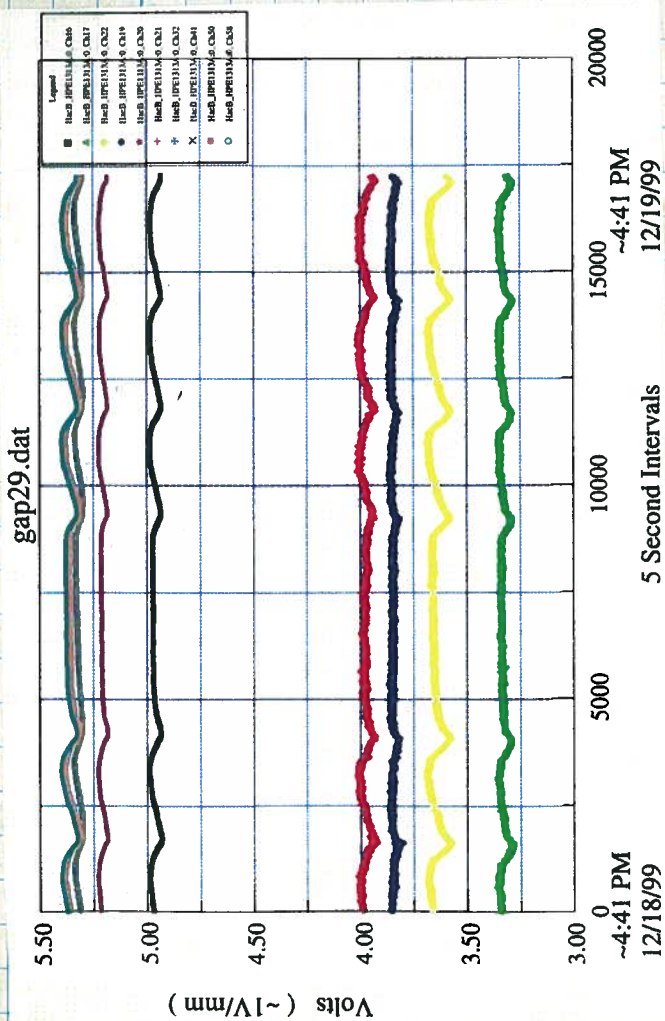
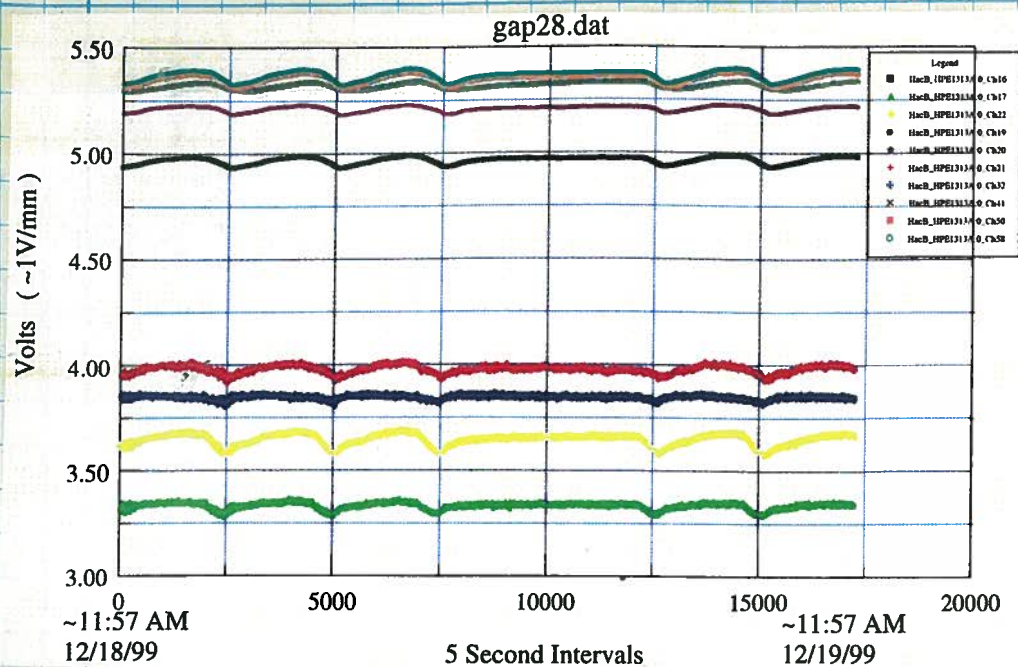


exlog data of before, during & after.

34.25°F

Note that the bubbler temperature is LOWER than the average air temperature in the fridge. The liquid ethanol is chilled by the evaporating ethanol. Howard had set the fridge thermostat by reading the thermocouple bolted to the stainless flanges. Thus taking into account the cooling by evaporation.

Or perhaps the bottom flange is cooled due to the flow rate and pressure drop across the "airstone" in it. Both probably contribute a little.



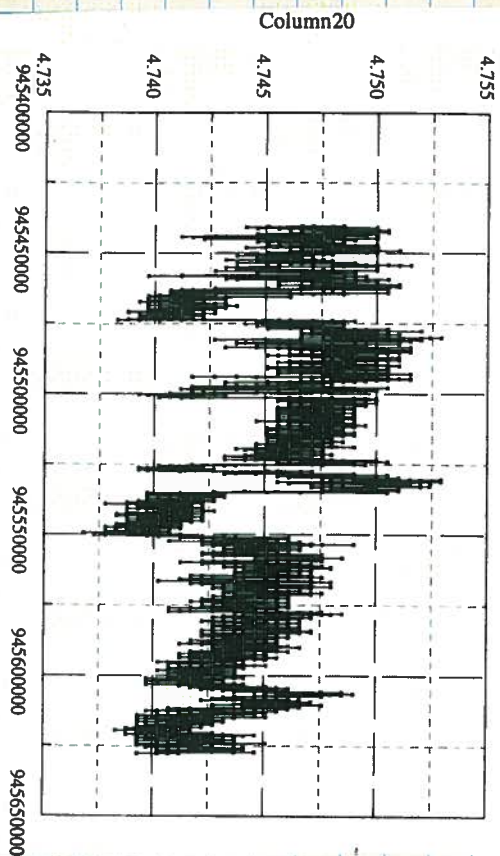
I've been having trouble with one of the VIKs on the cf arm. The low voltages are varying.

Jeff Templon looked at some of the events from various runs. While there are some slight differences between the e + H runs, the differences don't seem significant.

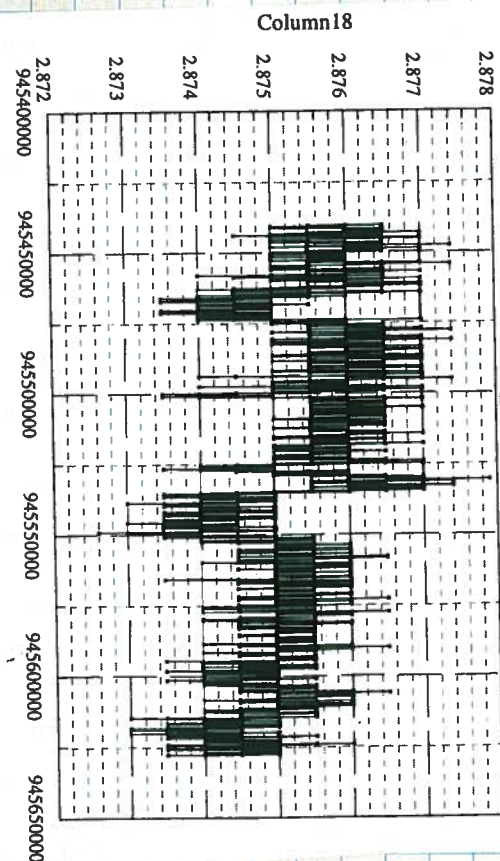
I think this voltage variation is indicative of a problem local to the card they are being read from. Or at least the problem is not enough to appear obvious from the data being collected.

The +5V, -5.2V and only one of the thresholds seem affected. It may all be off the same card. The ground connection may not be stable.

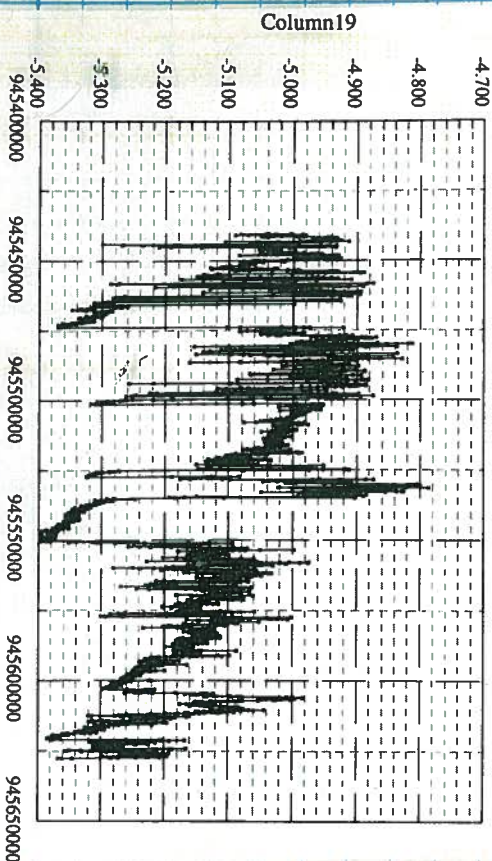
e_det_hut_2.dat



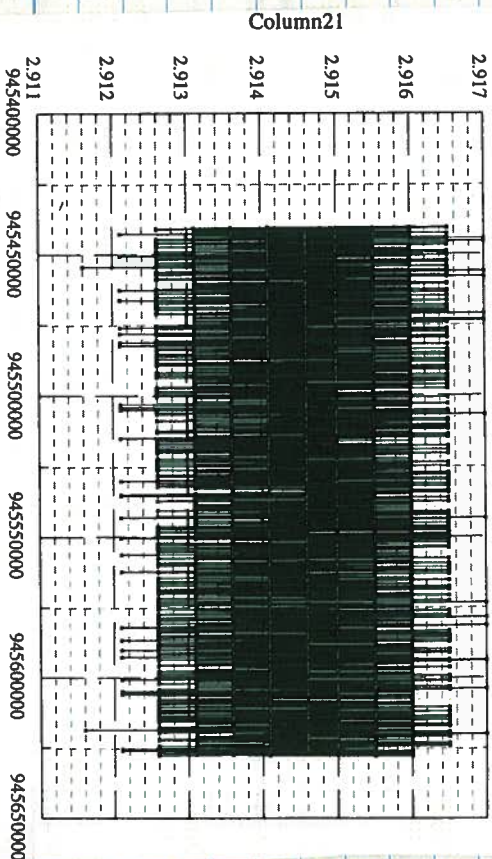
e_det_hut_2.dat

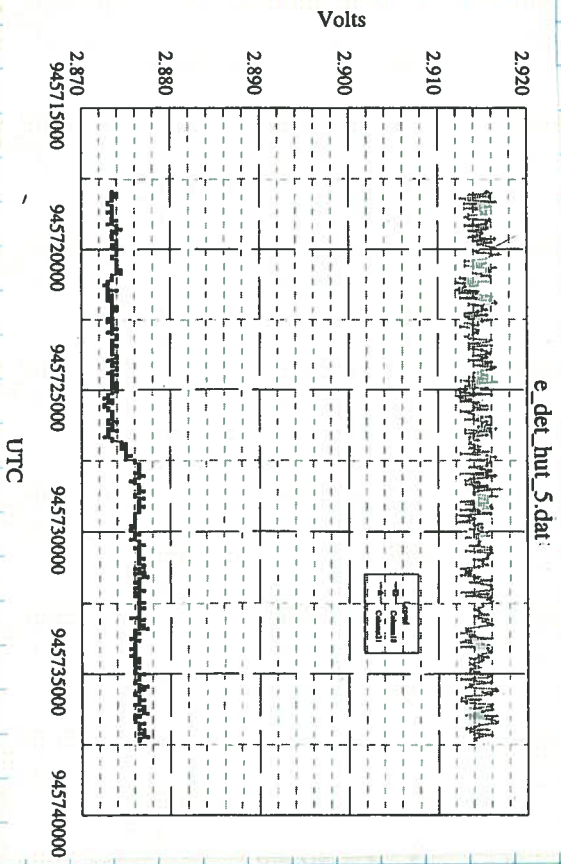
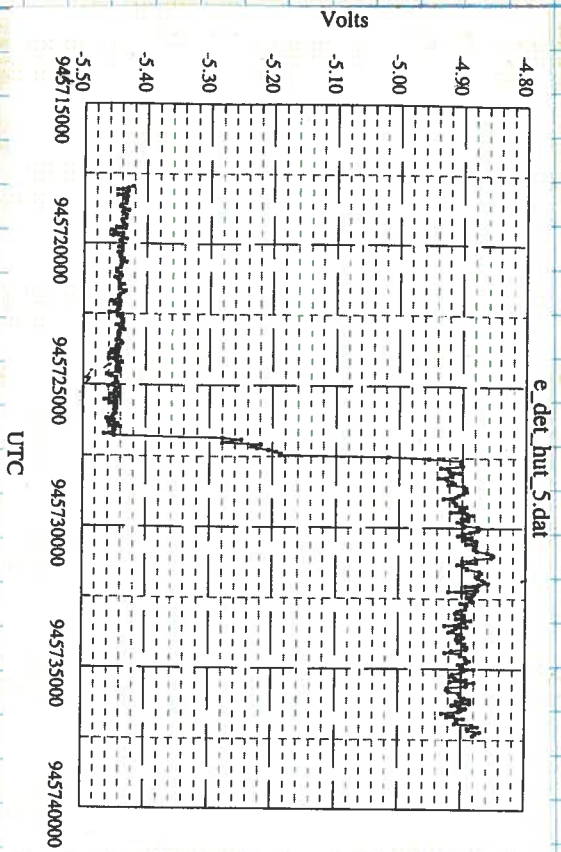
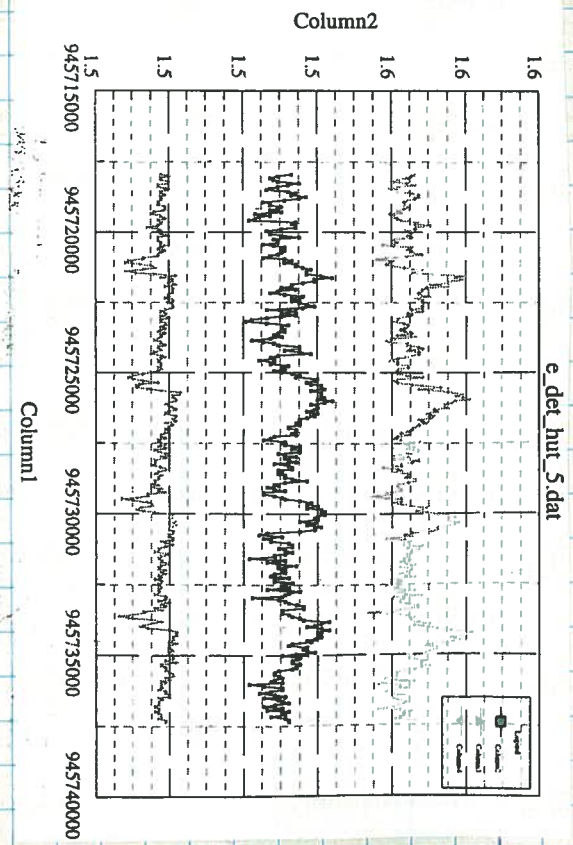
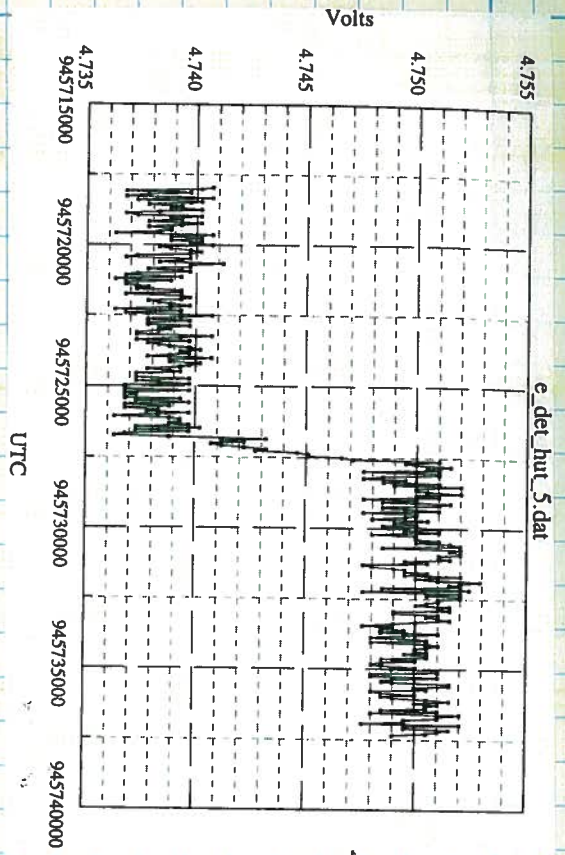


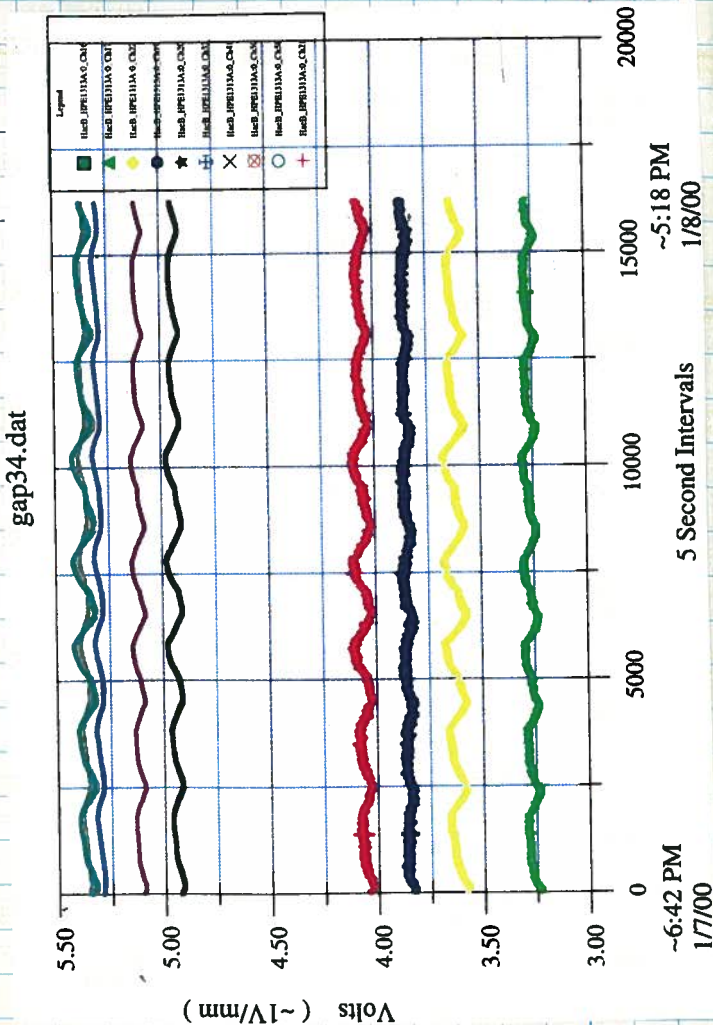
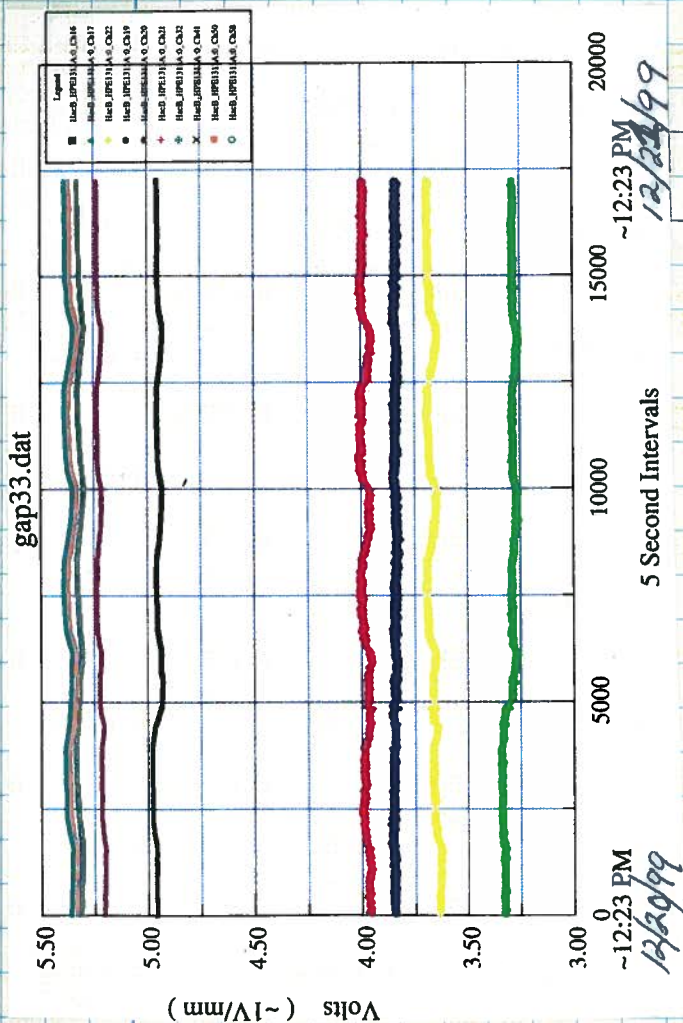
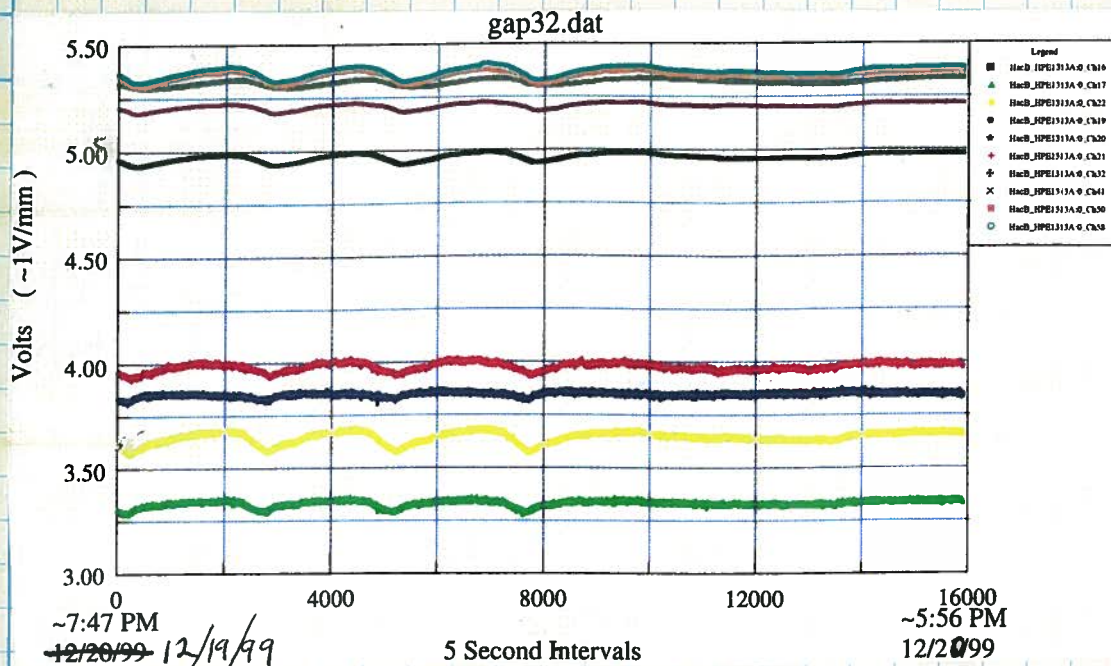
e_det_hut_2.dat



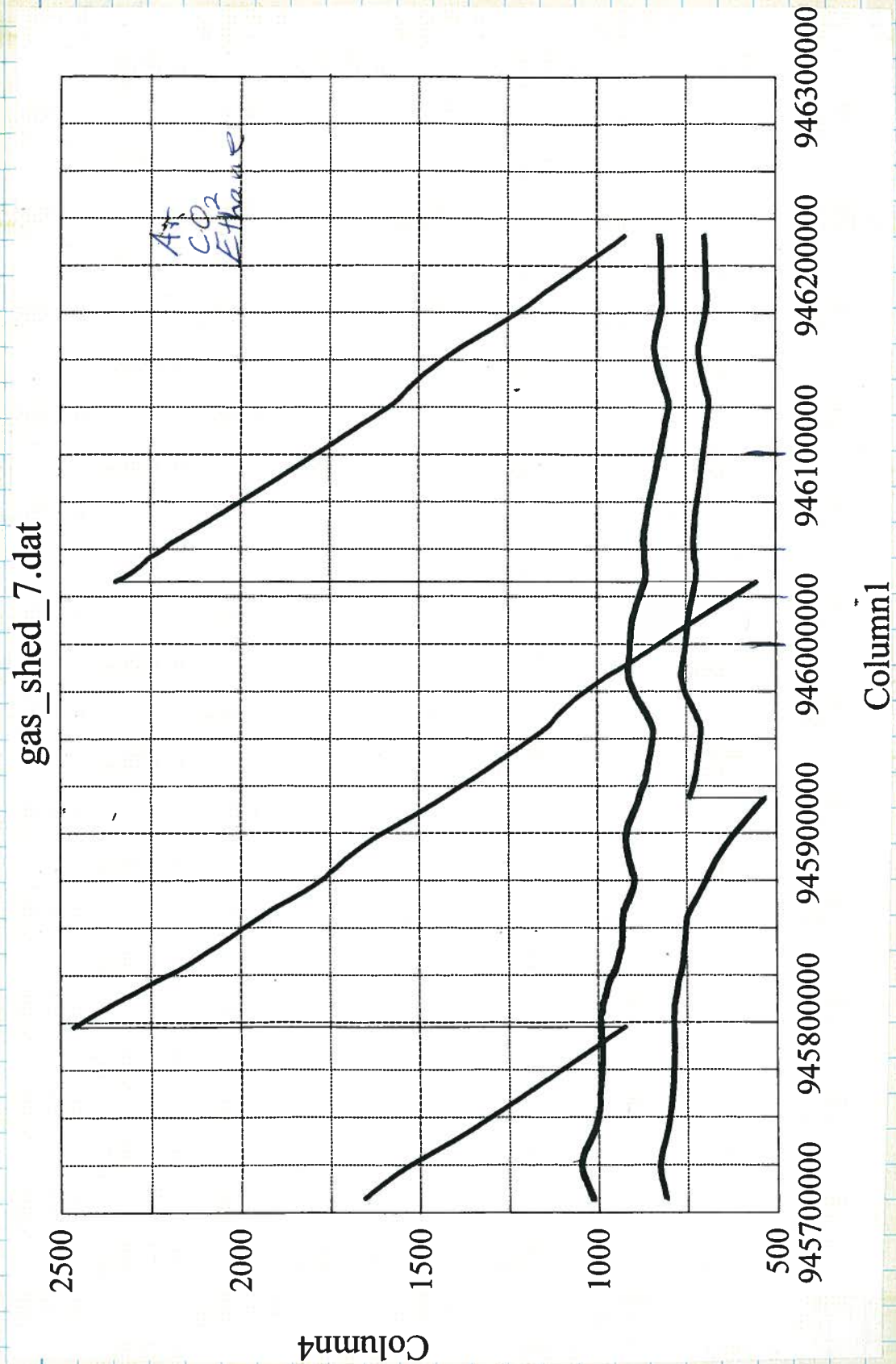
e_det_hut_2.dat







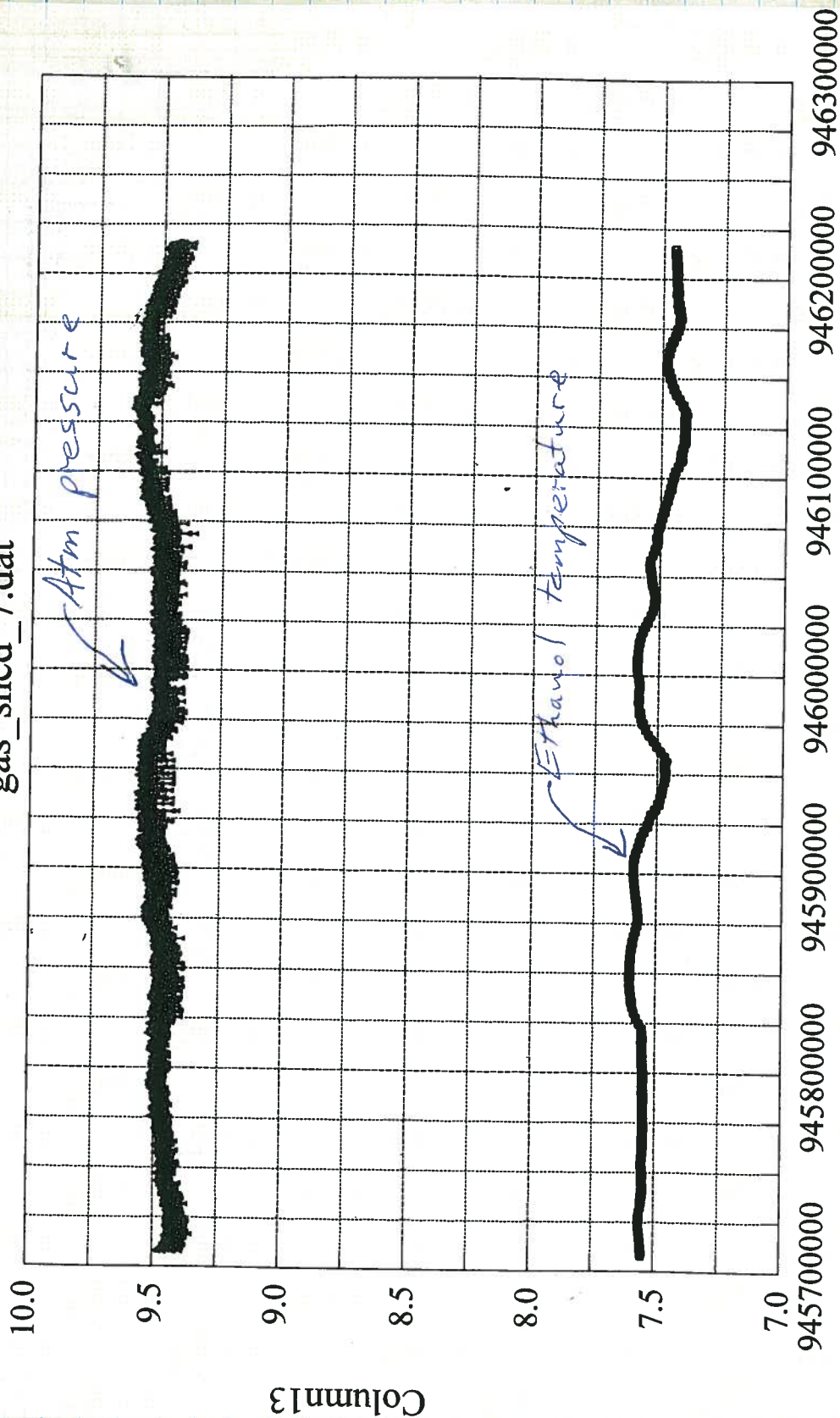
This shed data from before christmas. Only shown here because it contains an Ar bottle cycle.



~ 946030000
- 945800000
230,000 records
63.89 hrs
~ 2.7 days

Assume 2.5 days/cyl
365
÷ 2.5
146 cyl/yr
@\$90/cyl
\$13,200/yr
for Ar only

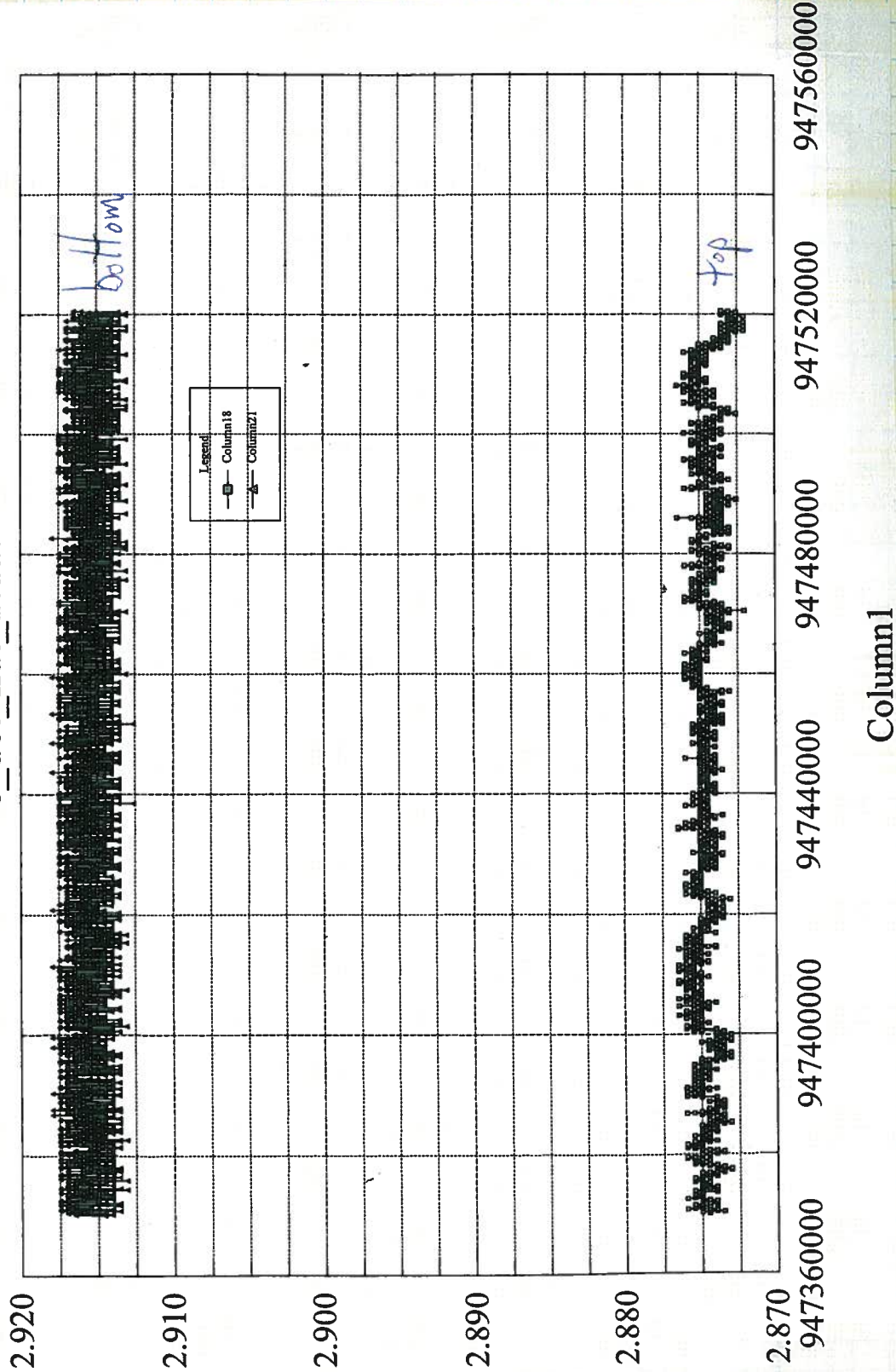
gas_shed_7.dat



Column1

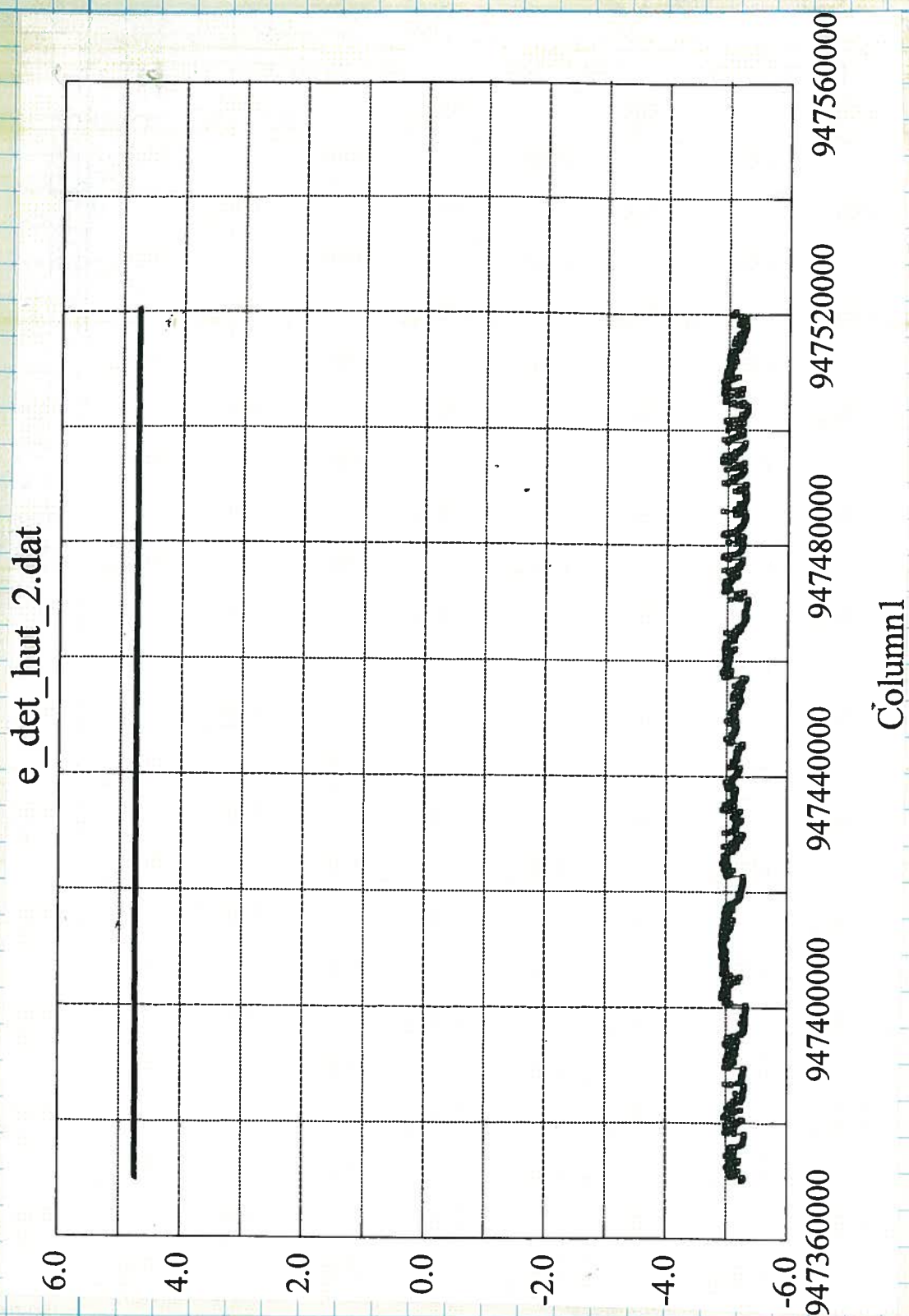
ADC Chan Column n
 → 35 18
 34 19 } top
 33 20 } 100C
 32 21 } bottom

e_det_hut_2.dat

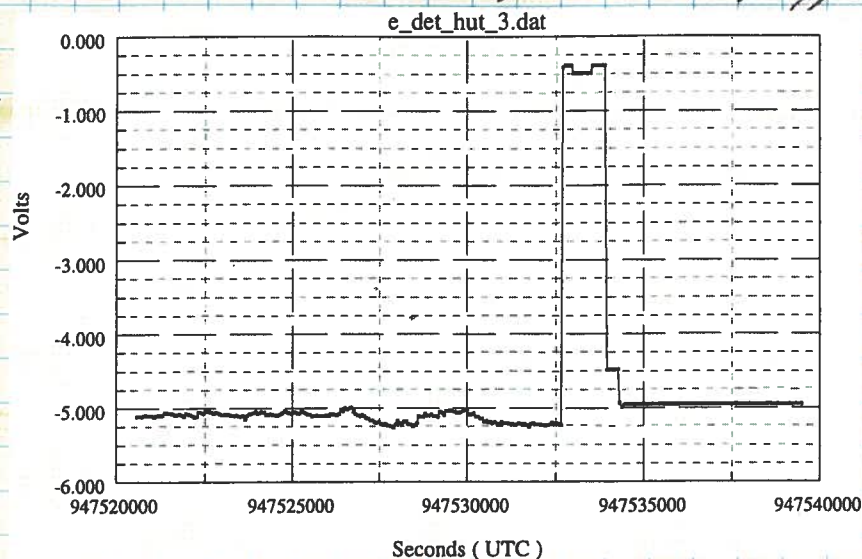


Went upon the ^{Election} Hallway Arm to look at the 52V supply on the VDC's. The clog data before christmas showed it was erratic.

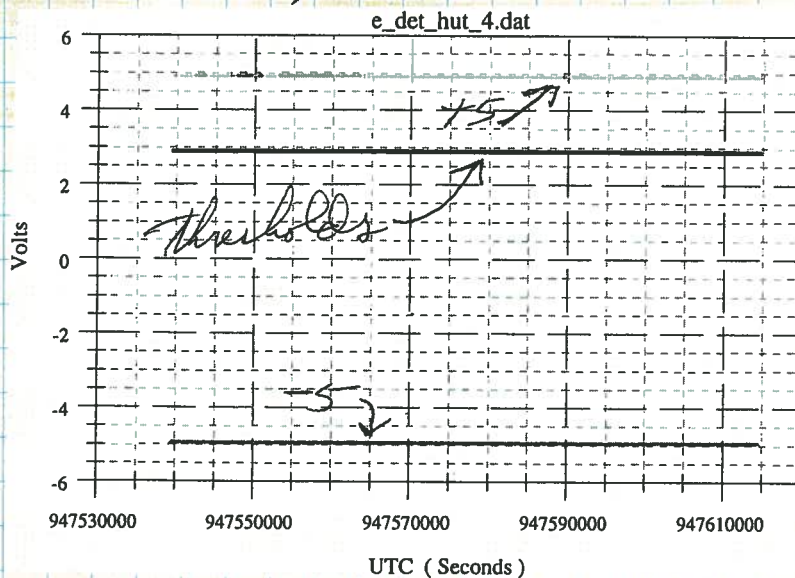
1/10/80
 1/1/80
 showed

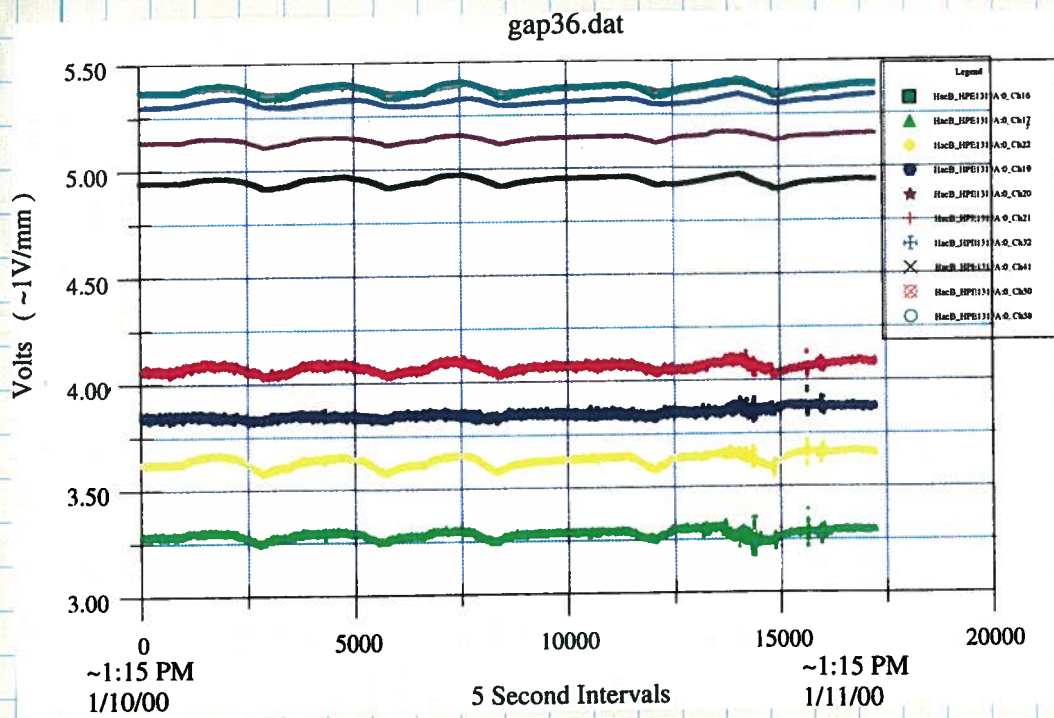
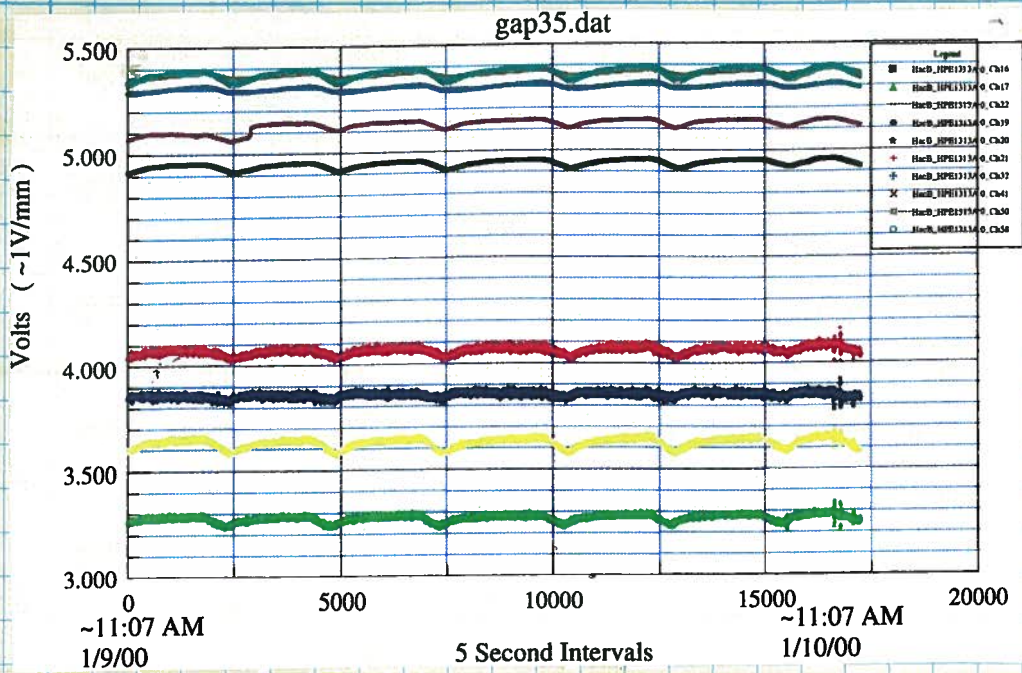


The +5 and -5.2V are measured off the last card on the bottom VDC of the Electron Arm. Since the threshold on the top VDC was looking bad too I figured the -5.2V supply regulation was bad. I swapped out the Regulated supply.



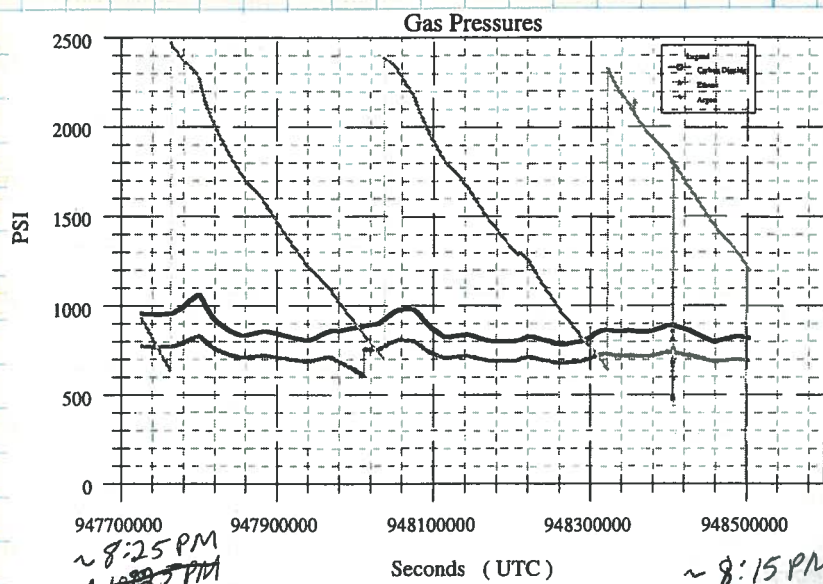
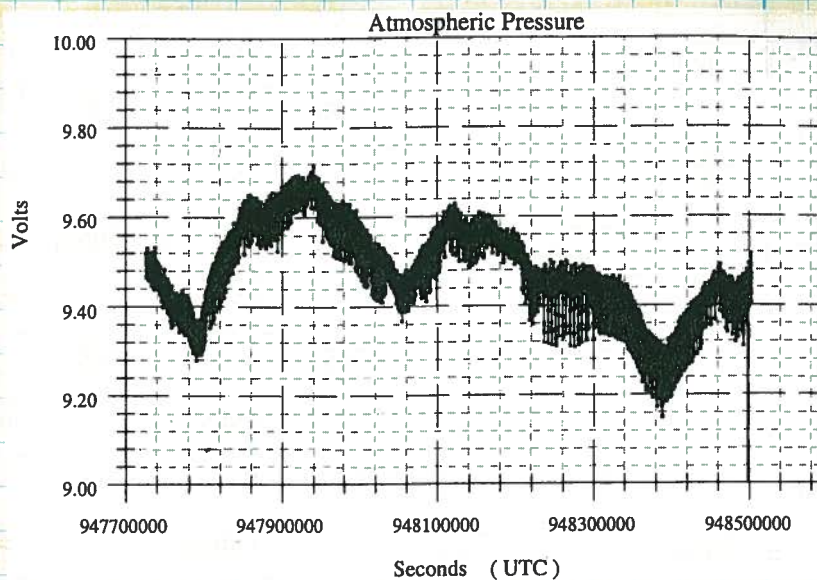
Seems to be ok, now.





Today I consolidated what I could of the
 sylog data files.

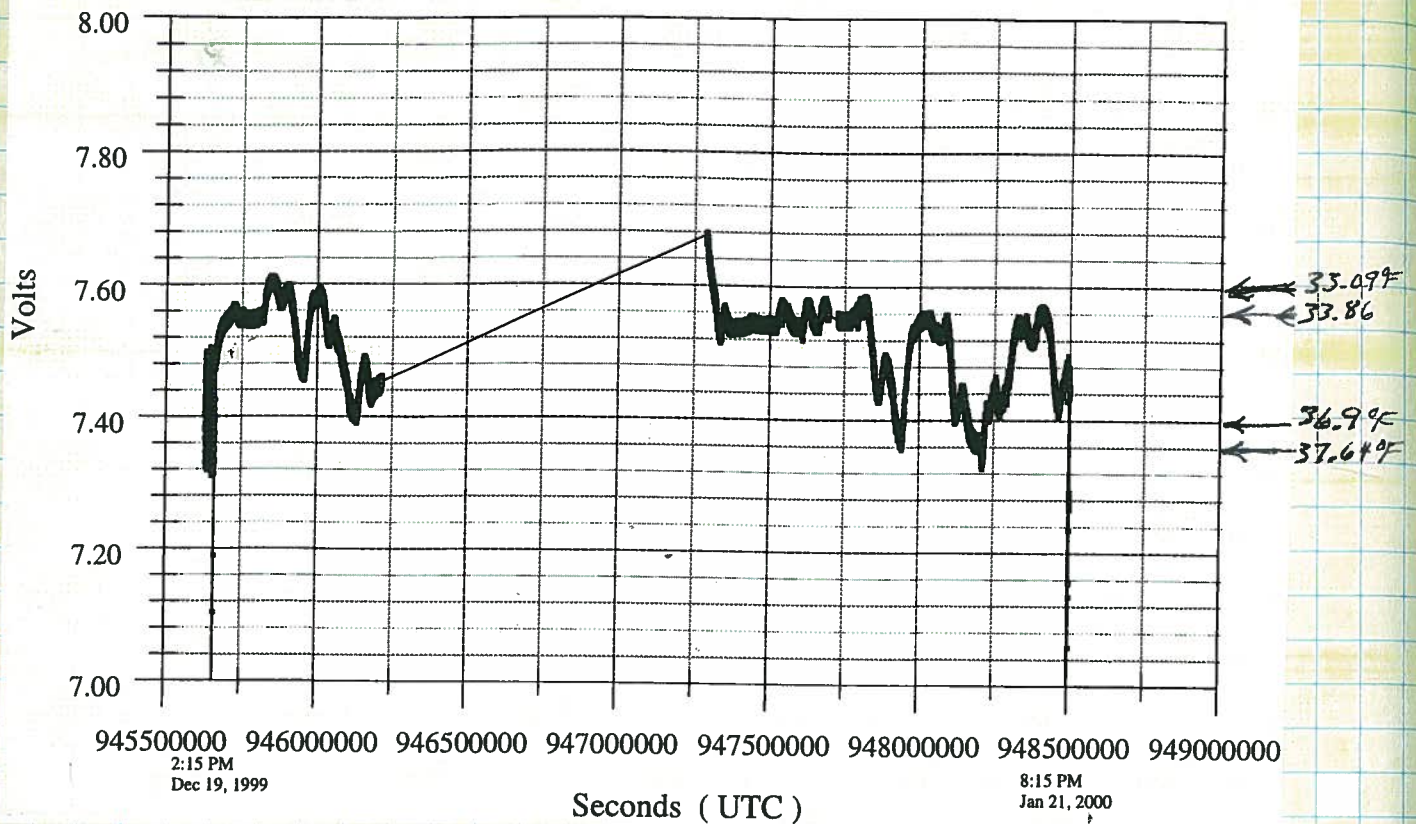
1/22
 PS



~ 8:25 PM
 ~ 10:25 PM
 1/12/00

~ 8:15 PM
 1/21/00

Ethanol Bubbler Temperature



from HAWGS ethanol vapor pressure is
 $\log_{10} P = (-0.2185 A/K) + B$ $A = 9673.9$ $B = 8.827392$

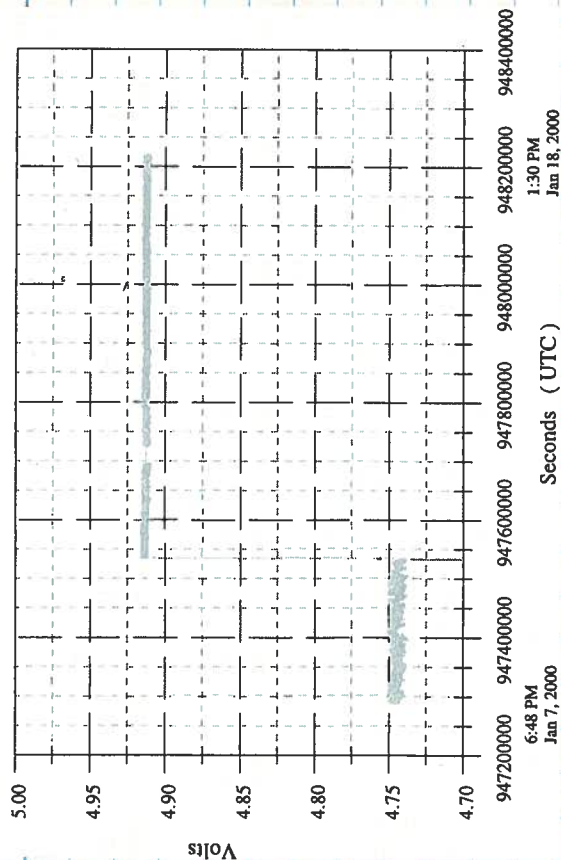
$$33.09^{\circ}\text{F} = 0.61^{\circ}\text{C} = 273.76^{\circ}\text{K}$$

$$\Rightarrow 0.84\% \text{ ethanol}$$

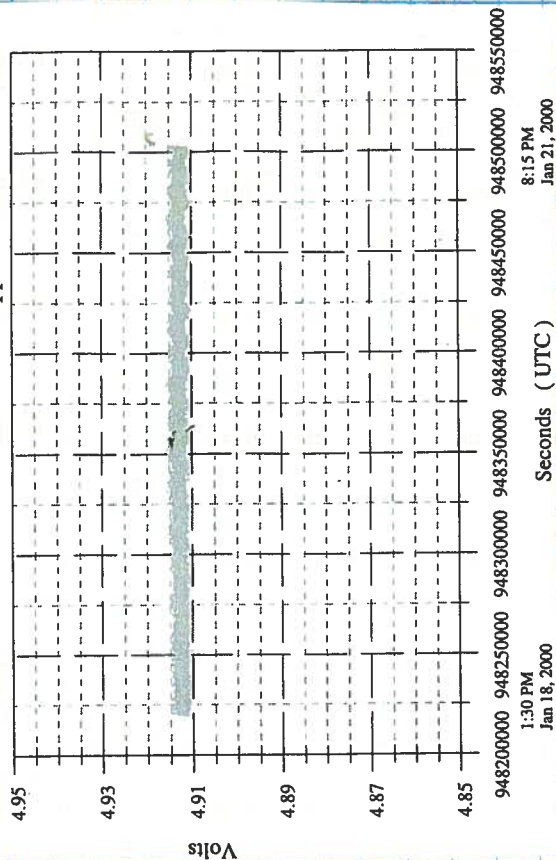
$$37.64^{\circ}\text{F} = 3.13^{\circ}\text{C} = 276.28^{\circ}\text{K}$$

$$\Rightarrow 0.99\% \text{ ethanol}$$

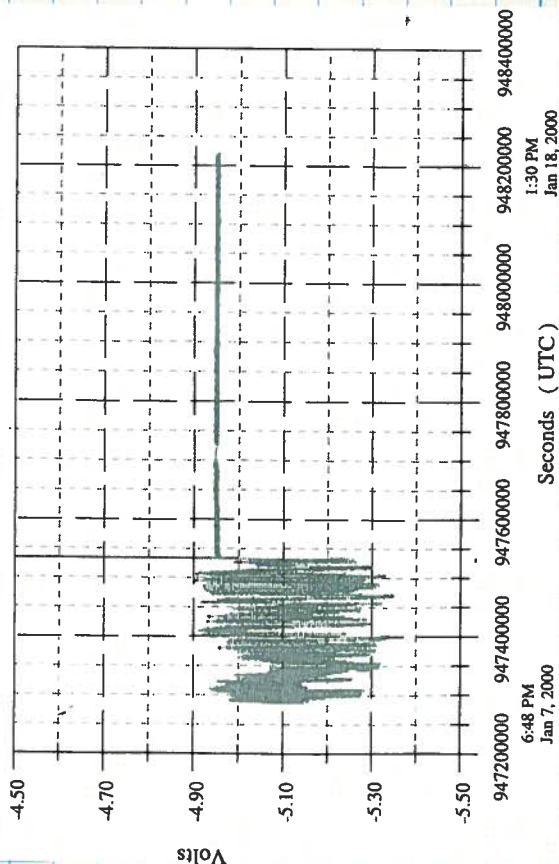
Electron Arm VDC LV Supplies



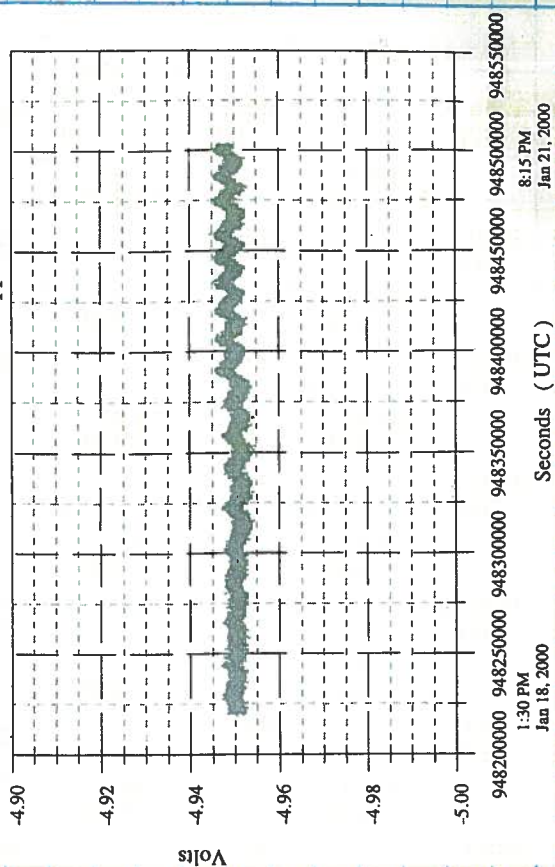
Electron Arm VDC LV Supplies



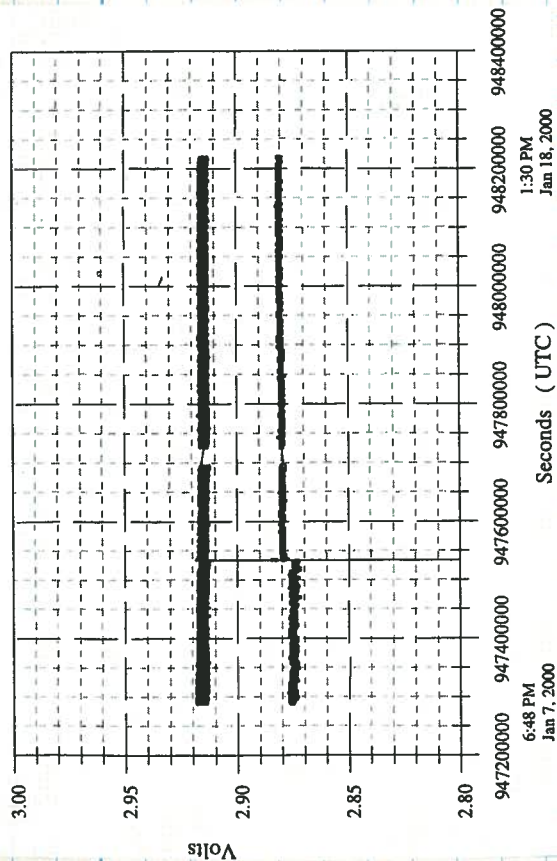
Electron Arm VDC LV Supplies



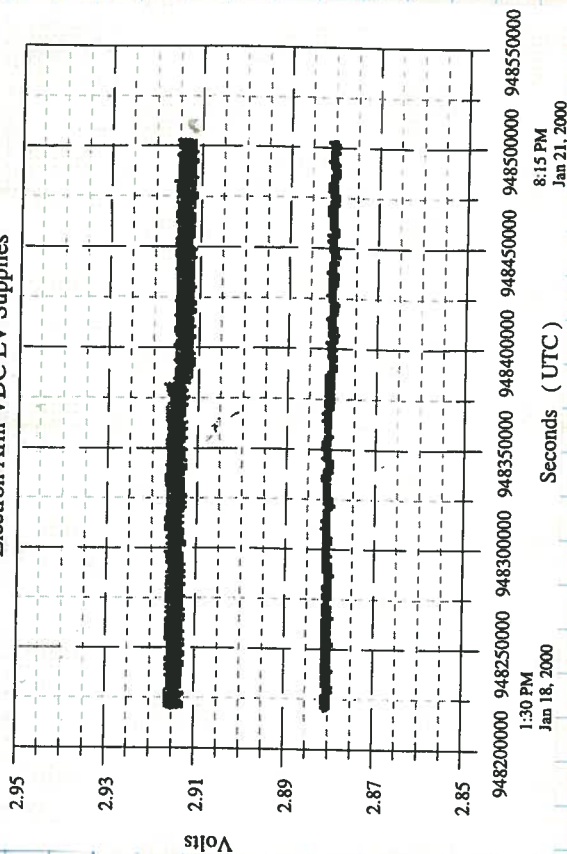
Electron Arm VDC LV Supplies



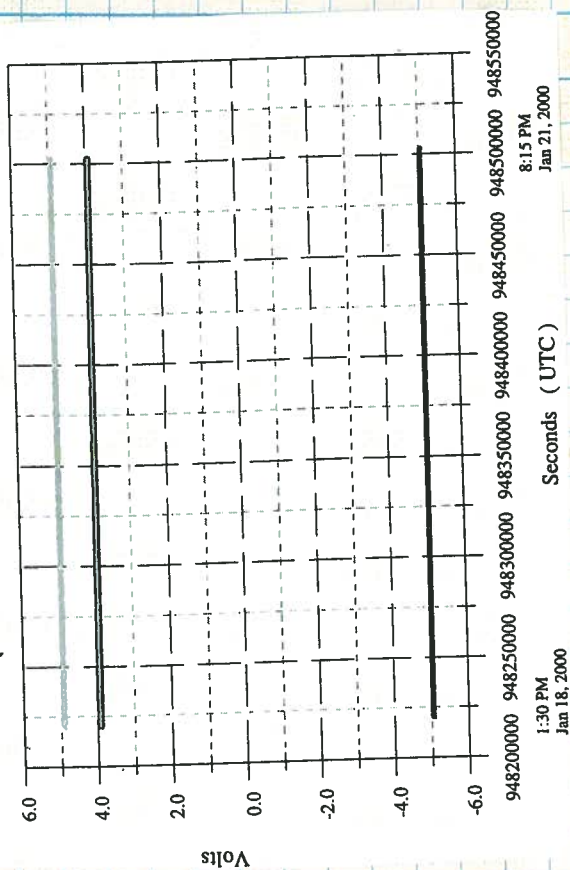
Electron Arm VDC LV Supplies



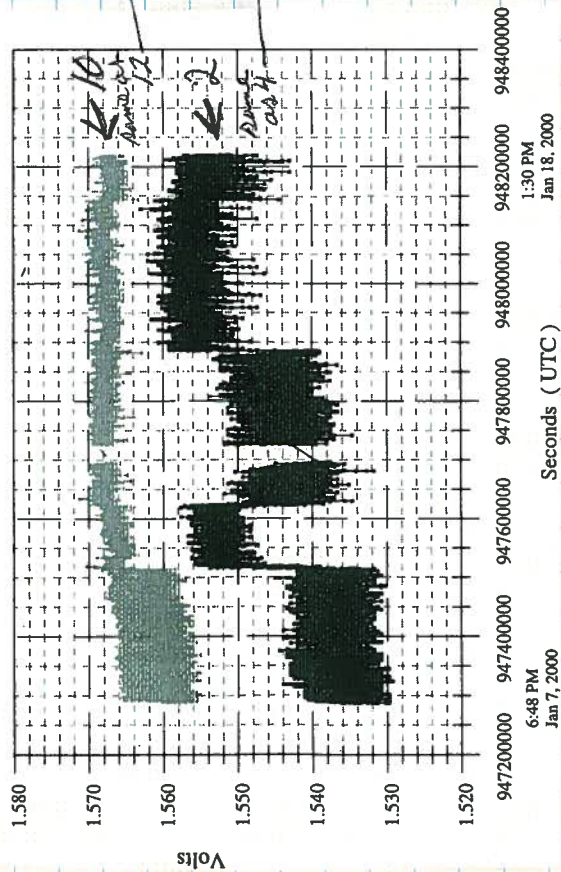
Electron Arm VDC LV Supplies



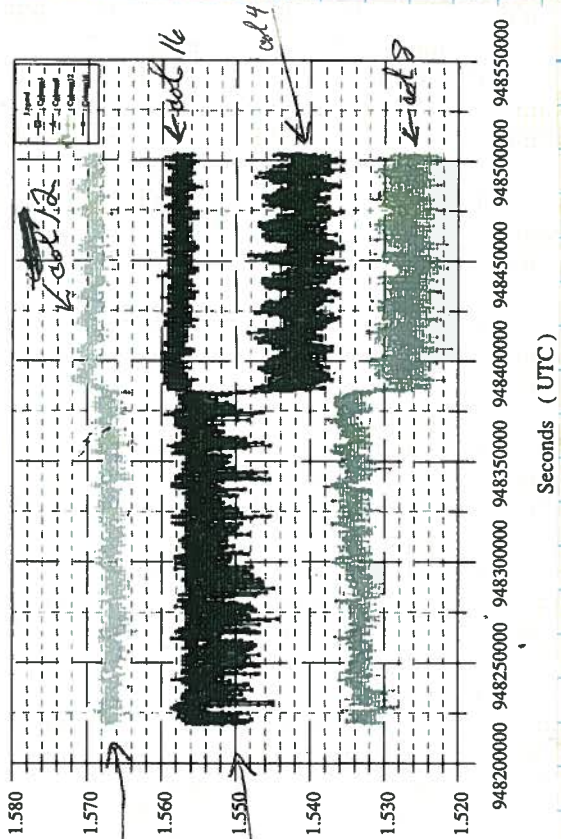
Hadron Arm VDC LV Supplies



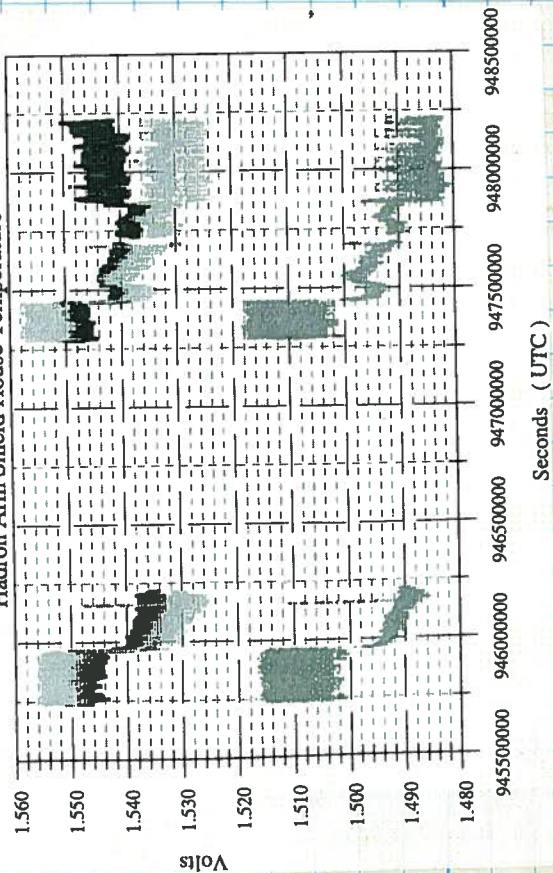
Electron Arm Shield House Temperature



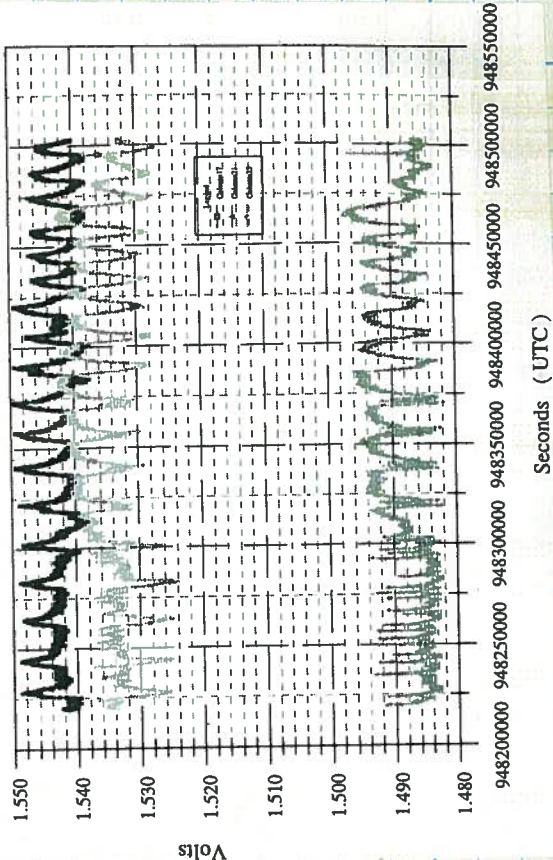
Electron Arm Shield House Temperature



Hadron Arm Shield House Temperature

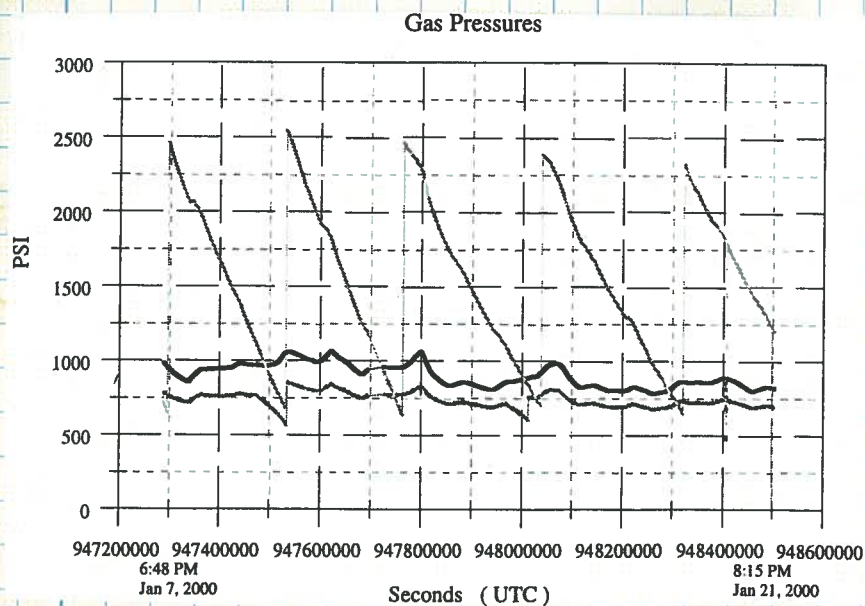
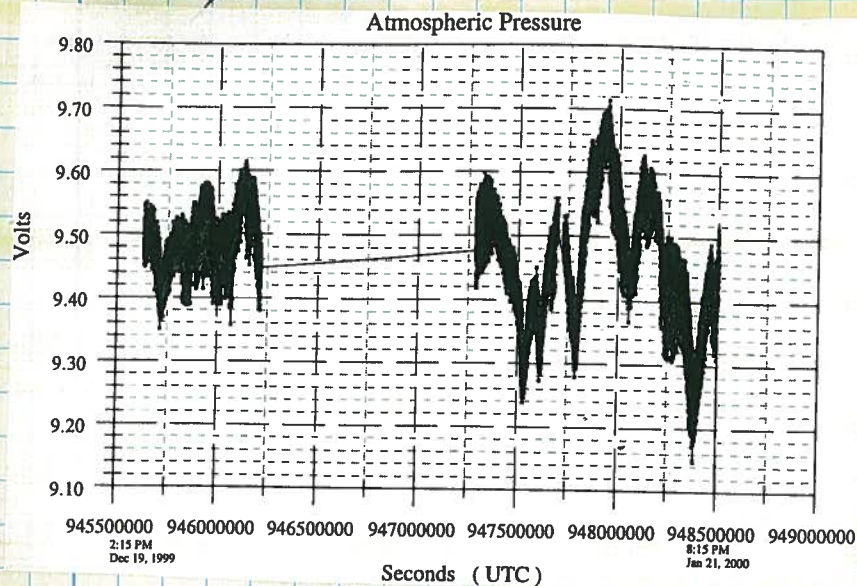


Hadron Arm Shield House Temperature



1/23

I printed a couple more extended versions of the plots.



for Argon
 11.83 days to go
 through 4 cylinders
 2.96 days/cyl.
 $\Rightarrow 124 \text{ cyl./year}$
 $\$14,200/\text{yr}$

Ethane is $\sim 5 \times 10^5 \text{ sec}$ for the one cylinder used upon
 this plot. $\sim 5.79 \text{ days} \Rightarrow 63 \text{ cyl./year}$
 $\$12,700/\text{yr}$
 13,950

Column in PSI Plot

1/24
AJ

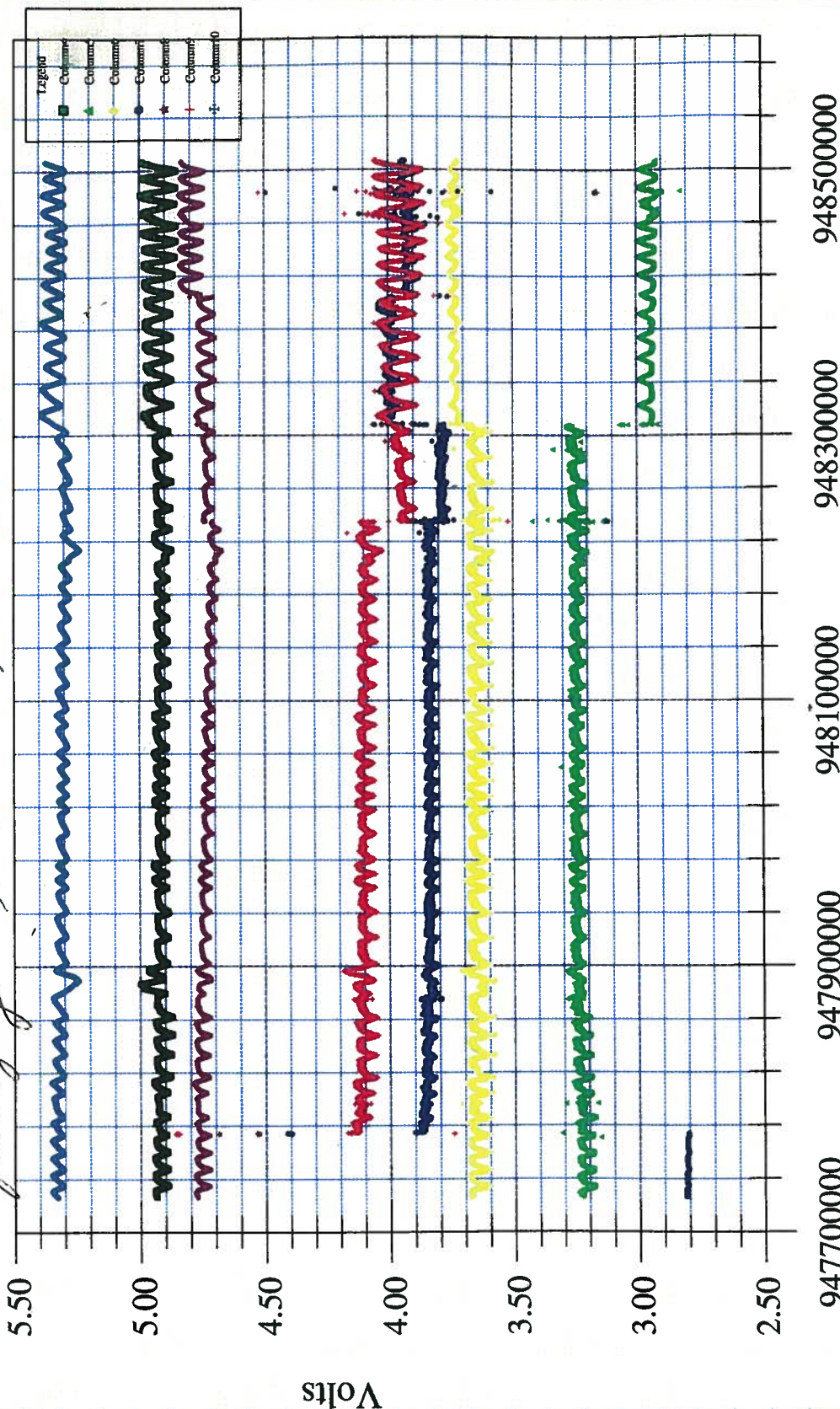
hallasc12:date - Column 243
 Shed_gas_CO2 column 4
 Shed_gas_ETH
 Shed_gas_ARG
 Shed_gas_ArBotL
 Shed_gas_ArBotR column 8
 Shed_gas_EthBotL
 Shed_gas_EthBotR
 Shed_gas_CO2BotL
 Shed_gas_CO2BotR
 Shed_gas_TempBubb column 13
 Shed_gas_TempRack column 14
 Shed_gas_AtmPres column 15
 Shed_gas_TempFridge column 16
 Shed_gas_TempOutside column 17

Col 243 hallasc12:date

HacB_HPE1313A:0_Ch16 "floor" sensor by Target
 5 HacB_HPE1313A:0_Ch17 "X" sensor by Target
 HacB_HPE1313A:0_Ch22 "Z" sensor by Target
 HacB_HPE1313A:0_Ch19 "X" sensor upstream
 HacB_HPE1313A:0_Ch20 "Y" sensor upstream
 HacB_HPE1313A:0_Ch21 "Z" sensor upstream
 10 HacB_HPE1313A:0_Ch32
 HacB_HPE1313A:0_Ch33
 HacB_HPE1313A:0_Ch34
 HacB_HPE1313A:0_Ch35
 HacB_HPE1313A:0_Ch37
 15 HacB_HPE1313A:0_Ch38
 HacB_HPE1313A:0_Ch39
 HacB_HPE1313A:0_Ch40
 HacB_HPE1313A:0_Ch41
 HacB_HPE1313A:0_Ch42
 20 HacB_HPE1313A:0_Ch43
 HacB_HPE1313A:0_Ch44
 HacB_HPE1313A:0_Ch45
 HacB_HPE1313A:0_Ch46
 HacB_HPE1313A:0_Ch47
 25 HacB_HPE1313A:0_Ch48
 HacB_HPE1313A:0_Ch49
 HacB_HPE1313A:0_Ch50
 HacB_HPE1313A:0_Ch51
 HacB_HPE1313A:0_Ch52
 30 HacB_HPE1313A:0_Ch53
 HacB_HPE1313A:0_Ch54
 HacB_HPE1313A:0_Ch55
 HacB_HPE1313A:0_Ch56
 HacB_HPE1313A:0_Ch57
 35 HacB_HPE1313A:0_Ch58
 HacB_HPE1313A:0_Ch59
 HacB_HPE1313A:0_Ch60
 HacB_HPE1313A:0_Ch61
 HacB_HPE1313A:0_Ch62
 40 HacB_HPE1313A:0_Ch63

Capacitive Sensor Outputs

from exlog data, not the strip chart



948500000

948300000

948100000

947900000

947700000

9:18 PM

Jan 21, 2000

8:26 PM

Jan 12, 2000

Seconds (UTC)

11.5 l/hr $\Leftarrow$ 35-38 Bottom VDC-1 ~50 $\rightarrow$ 65 s/cm out
8 l/hr $\Leftarrow$ 22-25 TOP VDC-2 ~50 $\rightarrow$ 70 s/cm out

bubbles/sec 20 in 6.30 sec for TOP $\Rightarrow$ 275ccm
20 in 8.07 sec for Bottom $\Rightarrow$ 215ccm

bubbles for TOP are



 8 mm
 8 mm
 3 mm
 say $\sim 144 \text{ mm}^3$
 $\sim 144 \text{ cm}^3$

backpressure of photohelic is $\sim .125''$

flowmeters are
Controls Corp of America VA beach
ASSY. No. 5605121

TOP is ser. no. 3-96
Bottom is ser. no. 3-96

Bottom,

$11.5 \text{ l/hr} = 192 \text{ sccm}$
 $8 = 134 \text{ sccm}$

 326 sccm

losing $132 \text{ sccm} = 7.9 \text{ l/hr}$
 $120 \text{ sccm} = 7.2 \text{ l/hr}$
 $70 \text{ sccm} = 4.2 \text{ l/hr}$
 Top ↑

on radon @ ~13 PSI

Bottom VDC 26-29 9 l/hr 35-55 sccm
 Top VDC 29-32 10 l/hr 4-20 sccm

FPP1 38-41 13 l/hr ~116 sccm
 2 35-38 12 l/hr ~116 sccm

3 12-15 38-47 } vent to hut
 4 13-16 14-28 }

3 & 4 use Omega model FL-3505 ST
 calibration 102-05 ST

Bottom 20 in 7.26 sec $\Rightarrow 19\text{ sccm}$
 Top 20 in 23.23 sec $\Rightarrow 7\text{ sccm}$

FPP1 20 in maybe 5.08 sec
 2 20 in maybe 7.41

Ch 3 X .4 SCFH
 $\nwarrow$ bottom of ball

20 in maybe 6.47 sec

VDC

$9\text{ l/hr} = 150\text{ sccm}$
 $10\text{ l/hr} = 167\text{ sccm}$
 317

losing 100 sccm = 6.0 l/hr
 150 = 9.0 l/hr

Bottom
 Top

FPP1 $13\text{ l/hr} = 217\text{ sccm}$ losing 100 sccm = 6.0 l/hr
 FPP2 $12\text{ l/hr} = 200$ 85 = 5.1 l/hr
 734 sccm
 417

in shed during "fill cycle"

37-40	¹¹⁴ 46 l/hr	1904 sccm
56-59	160 l/hr	2672 sccm
		<u>4576</u>

flowmeters are Assy. No. 5606320

test straw tube is flowing .15 SCFH
and bubbler more $\Rightarrow 70 \text{ sccm}$

not an important number

e VDCs	326 sccm
H VDCs & FPM 1 & 2	<u>734</u>
	1060 sccm

e VDCs 326 sccm going IN $\Rightarrow 8.3 \text{ l/hr}$ leak ~~gas~~
H VDCs 317 sccm going IN $\Rightarrow 17.5/2 = 8.7 \text{ l/hr}$ each
643

full cycle time is 4 min 43 sec 283 sec
on time is 2 min 17 sec 137 sec

$$4576 \times .484 = 2215 \text{ sccm}$$

$$1904 \times .484 = 921 \text{ sccm}$$

.484 duty cycle

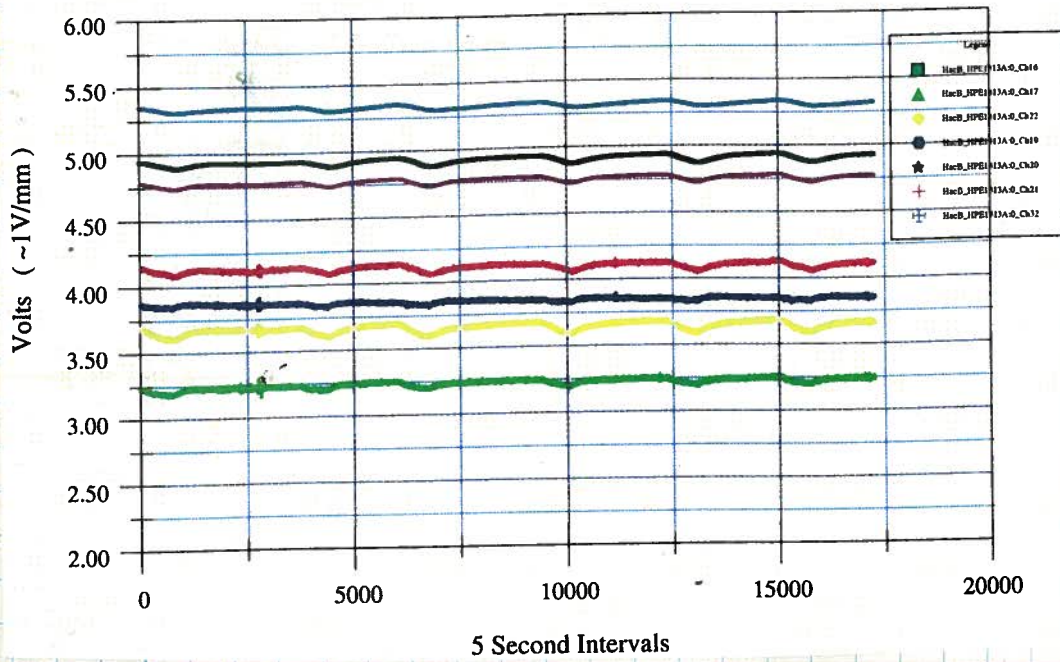
MFCs show flows of
529 & 850
 $\times 3.5 \Rightarrow 1852 \quad 2975$

$$4827 \text{ sccm}$$

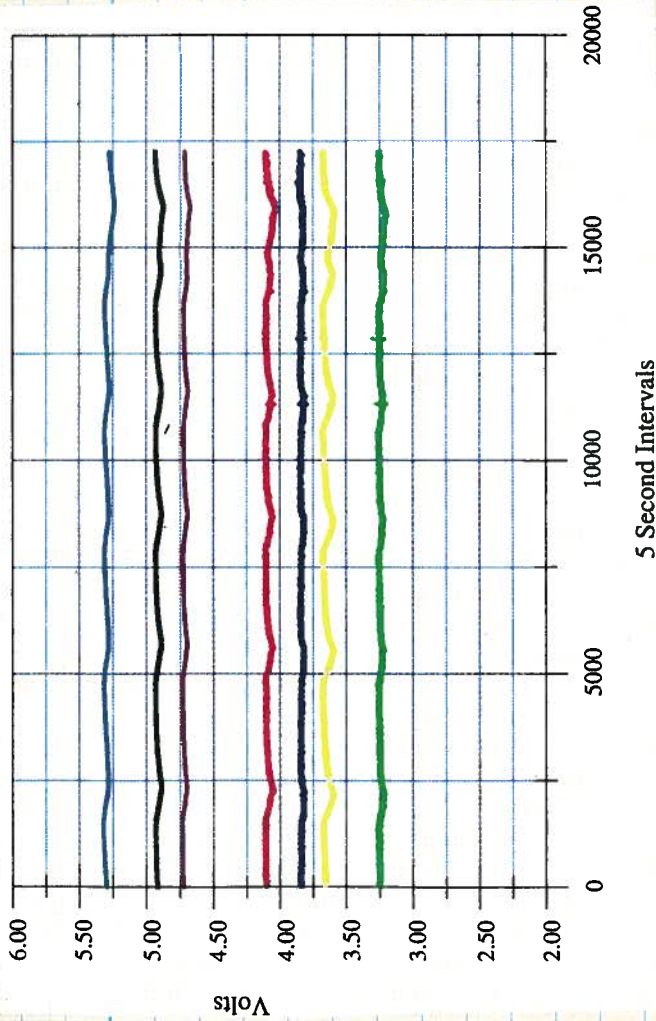
$$\times .484$$

$$\underline{2336 \text{ sccm}} \text{ average}$$

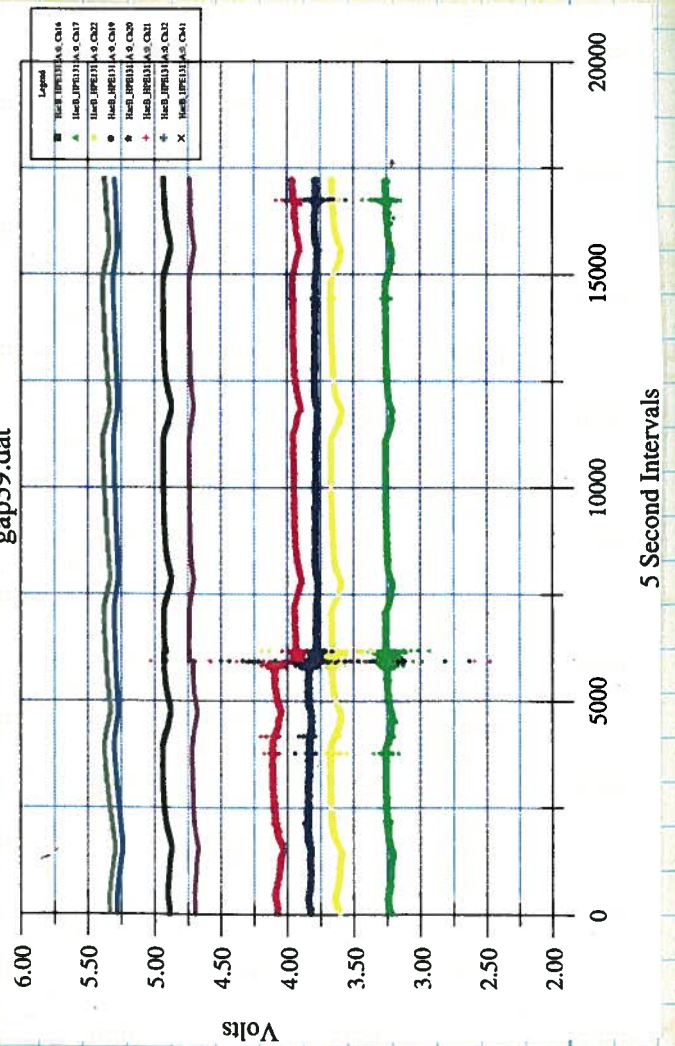
gap37.dat



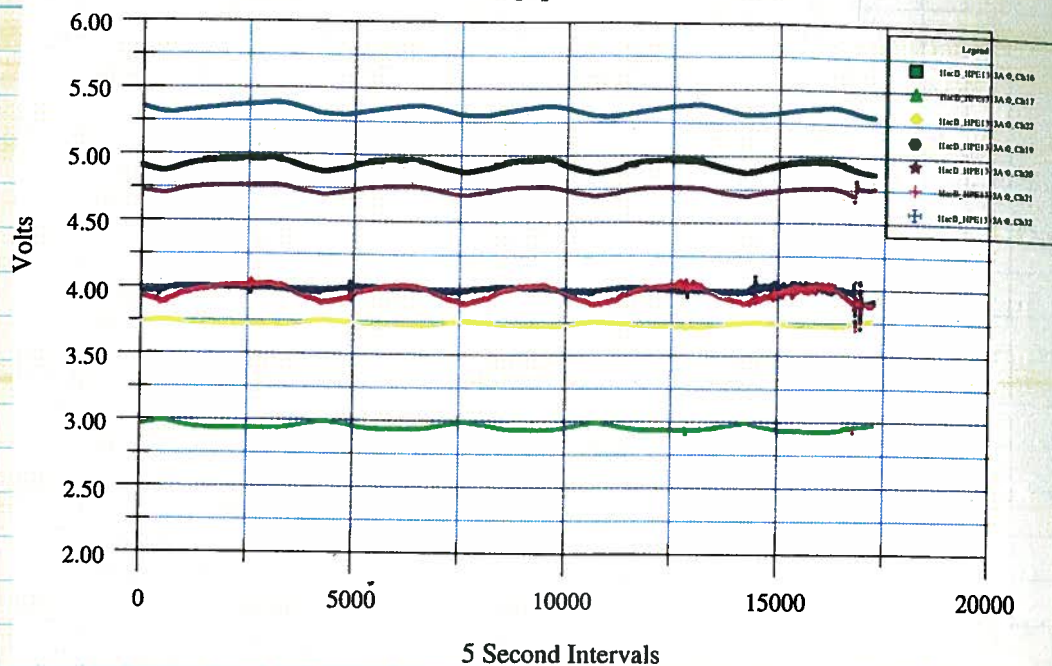
gap38.dat



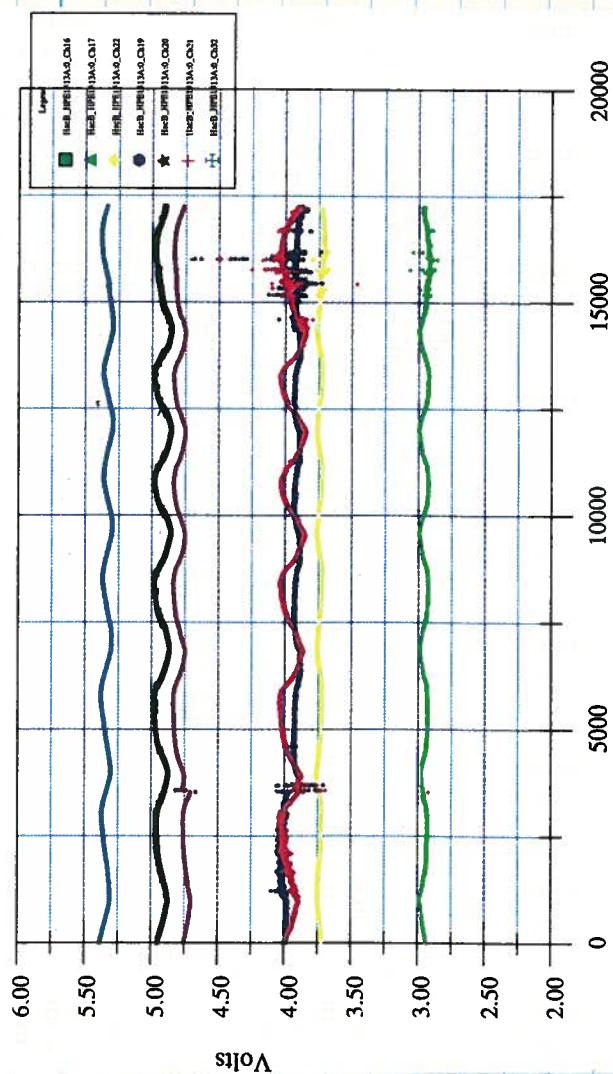
gap39.dat



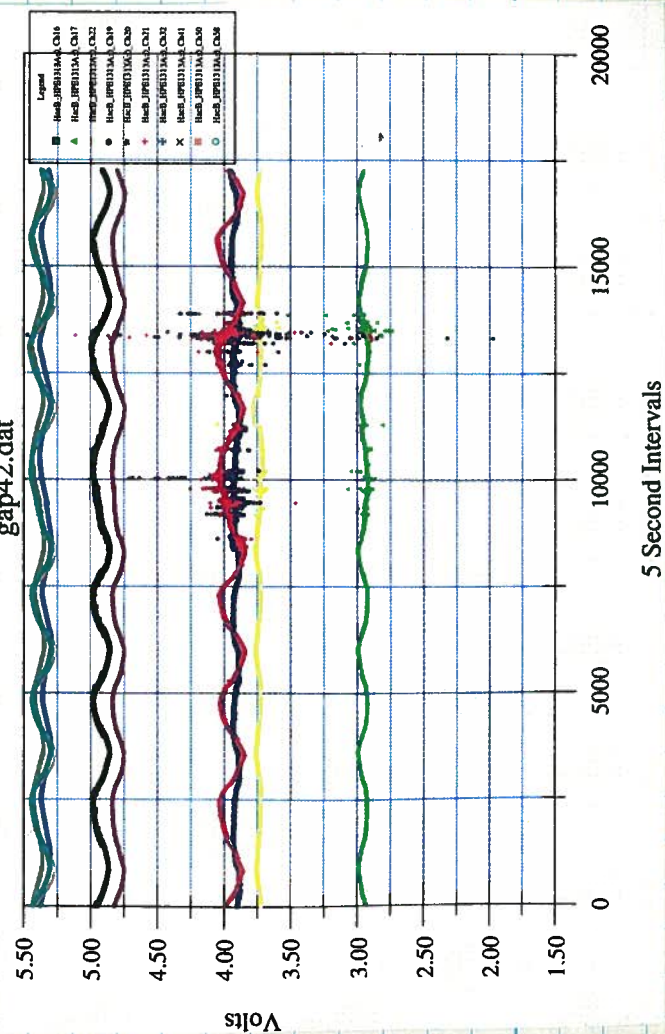
gap40.dat

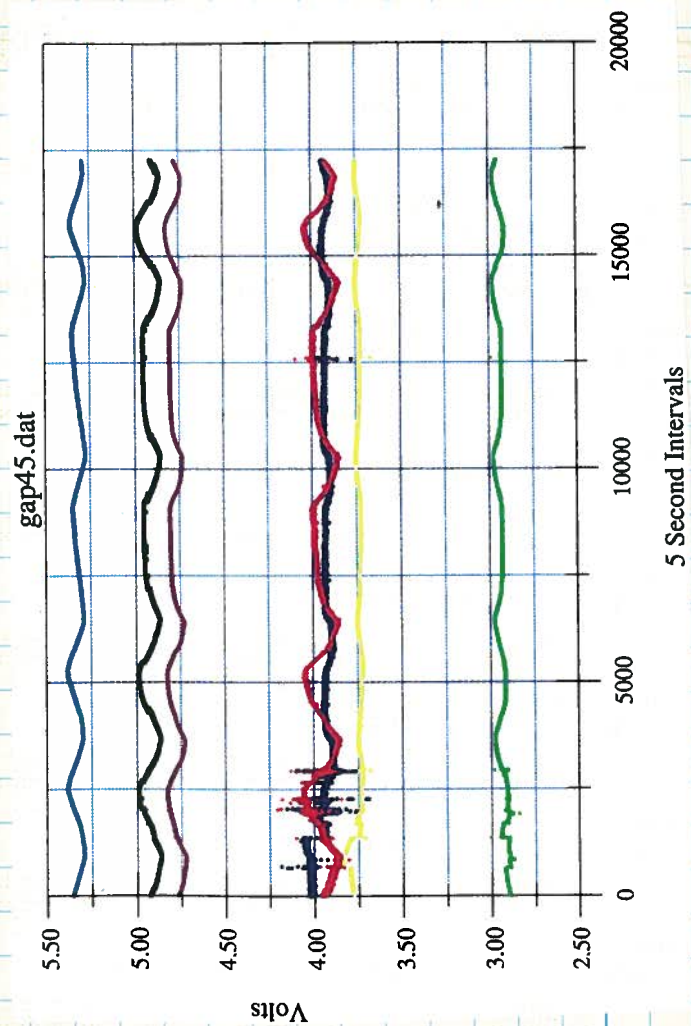
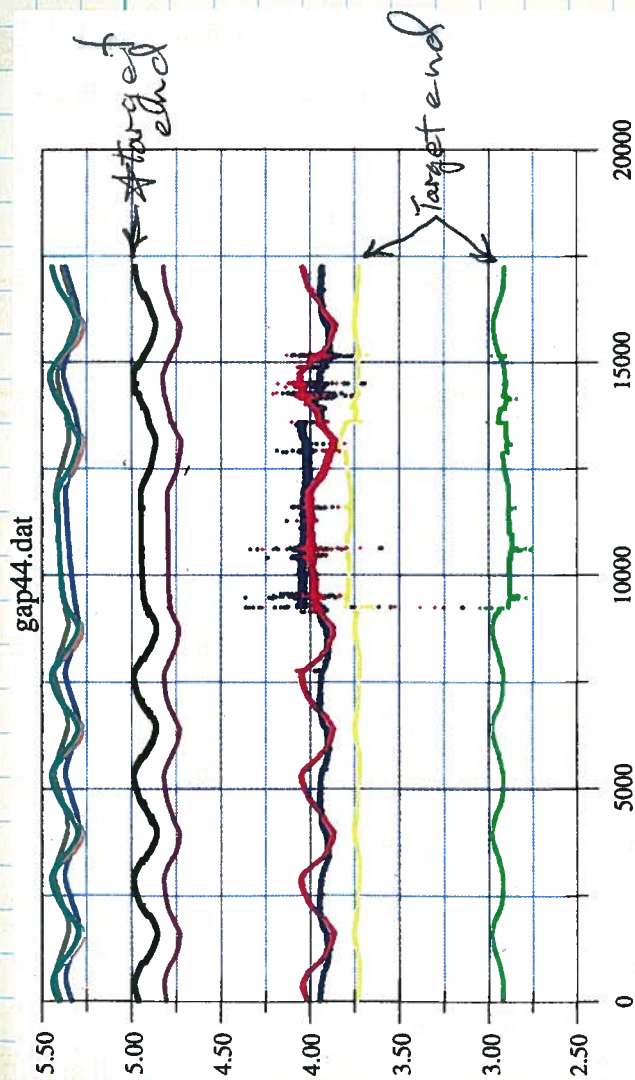
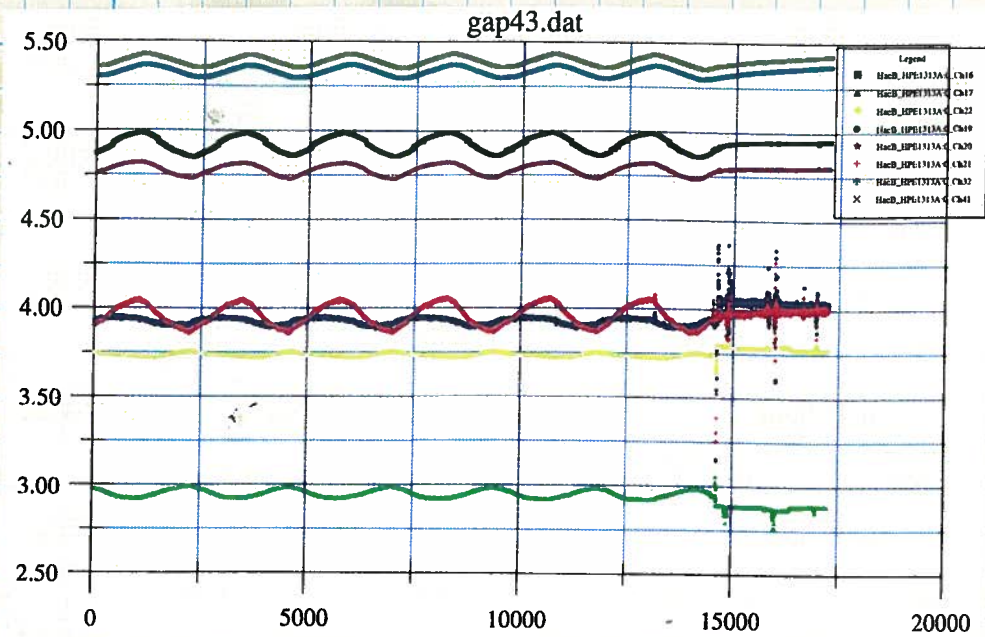


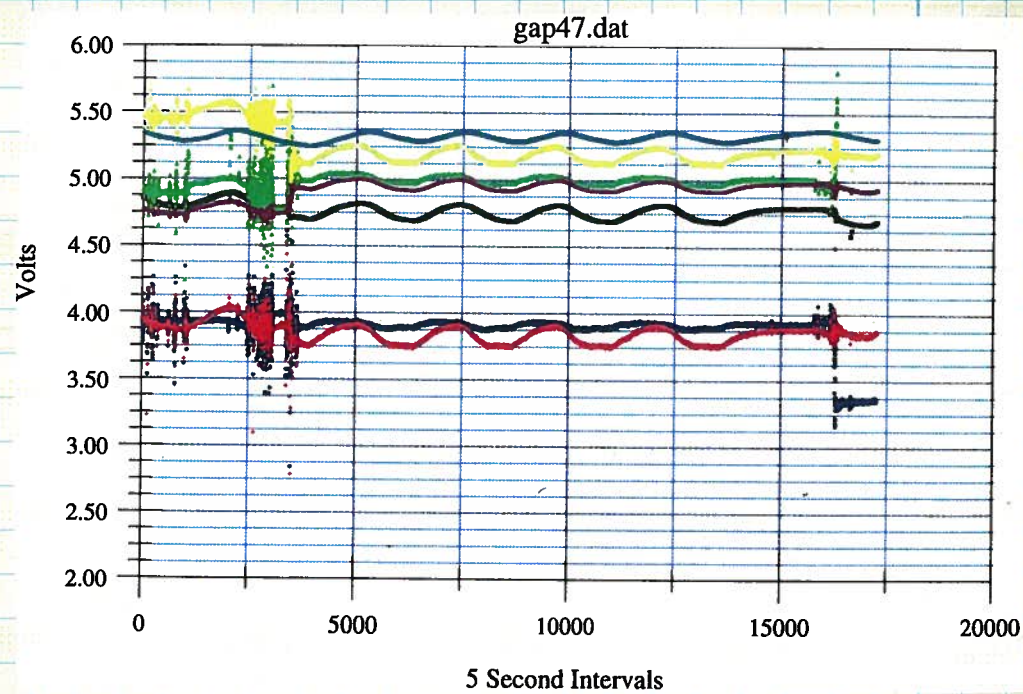
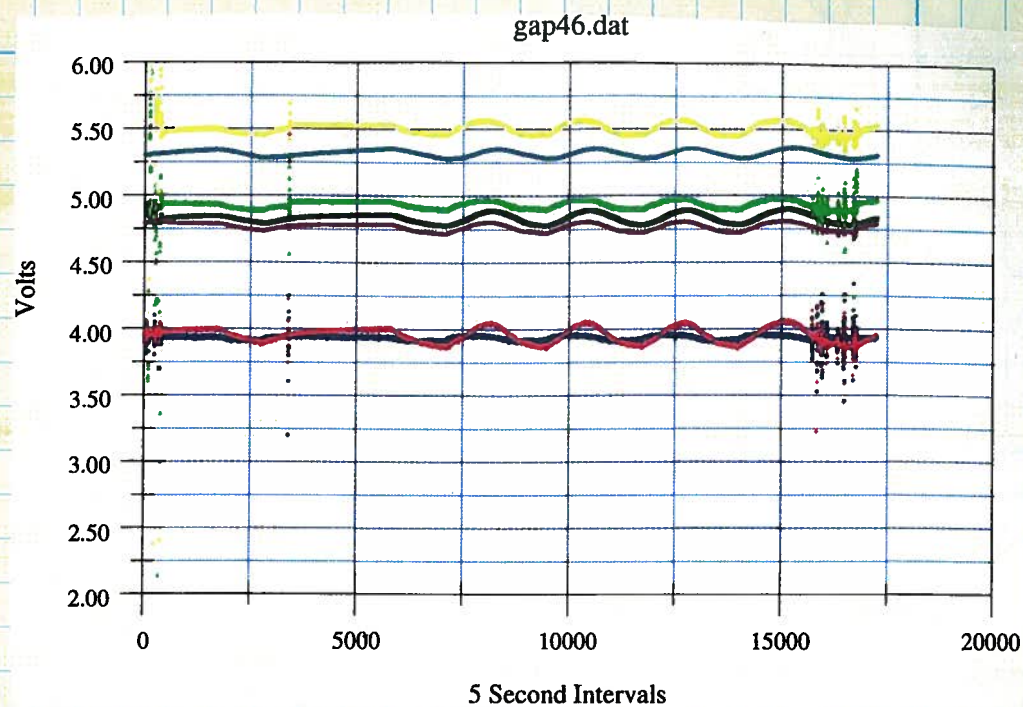
gap41.dat



gap42.dat







1/26 Channels Being Read By En Log
date returns of numbers, date & time

hallasc11:date

HRSE_DTECTR_HPE1313A:0_Ch63
 HRSE_DTECTR_HPE1313A:0_Ch62
 HRSE_DTECTR_HPE1313A:0_Ch61
 HRSE_DTECTR_HPE1313A:0_Ch60
 HRSE_DTECTR_HPE1313A:0_Ch59
 HRSE_DTECTR_HPE1313A:0_Ch58
 HRSE_DTECTR_HPE1313A:0_Ch57
 HRSE_DTECTR_HPE1313A:0_Ch56
 HRSE_DTECTR_HPE1313A:0_Ch55
 HRSE_DTECTR_HPE1313A:0_Ch54
 HRSE_DTECTR_HPE1313A:0_Ch53
 HRSE_DTECTR_HPE1313A:0_Ch52
 HRSE_DTECTR_HPE1313A:0_Ch51
 HRSE_DTECTR_HPE1313A:0_Ch50
 HRSE_DTECTR_HPE1313A:0_Ch49
 HRSE_DTECTR_HPE1313A:0_Ch48
 HRSE_DTECTR_HPE1313A:0_Ch35
 HRSE_DTECTR_HPE1313A:0_Ch34
 HRSE_DTECTR_HPE1313A:0_Ch33
 HRSE_DTECTR_HPE1313A:0_Ch32
 HRSE_DTECTR_HPE1313A:0_Ch0
 HRSE_DTECTR_HPE1313A:0_Ch1
 HRSE_DTECTR_HPE1313A:0_Ch2
 HRSE_DTECTR_HPE1313A:0_Ch3
 HRSE_DTECTR_HPE1313A:0_Ch5
 HRSE_DTECTR_HPE1313A:0_Ch6

hallasc12:date

HacB_HPE1313A:0_Ch16
 HacB_HPE1313A:0_Ch17
 HacB_HPE1313A:0_Ch22
 HacB_HPE1313A:0_Ch19
 HacB_HPE1313A:0_Ch20
 HacB_HPE1313A:0_Ch21
 HacB_HPE1313A:0_Ch32
 HacB_HPE1313A:0_Ch33
 HacB_HPE1313A:0_Ch34
 HacB_HPE1313A:0_Ch35
 HacB_HPE1313A:0_Ch37
 HacB_HPE1313A:0_Ch38
 HacB_HPE1313A:0_Ch39
 HacB_HPE1313A:0_Ch40
 HacB_HPE1313A:0_Ch41
 HacB_HPE1313A:0_Ch42
 HacB_HPE1313A:0_Ch43
 HacB_HPE1313A:0_Ch44
 HacB_HPE1313A:0_Ch45
 HacB_HPE1313A:0_Ch46
 HacB_HPE1313A:0_Ch47
 HacB_HPE1313A:0_Ch48
 HacB_HPE1313A:0_Ch49
 HacB_HPE1313A:0_Ch50
 HacB_HPE1313A:0_Ch51
 HacB_HPE1313A:0_Ch52
 HacB_HPE1313A:0_Ch53
 HacB_HPE1313A:0_Ch54
 HacB_HPE1313A:0_Ch55
 HacB_HPE1313A:0_Ch56
 HacB_HPE1313A:0_Ch57
 HacB_HPE1313A:0_Ch58
 HacB_HPE1313A:0_Ch59
 HacB_HPE1313A:0_Ch60
 HacB_HPE1313A:0_Ch61
 HacB_HPE1313A:0_Ch62
 HacB_HPE1313A:0_Ch63

hallasc4:date

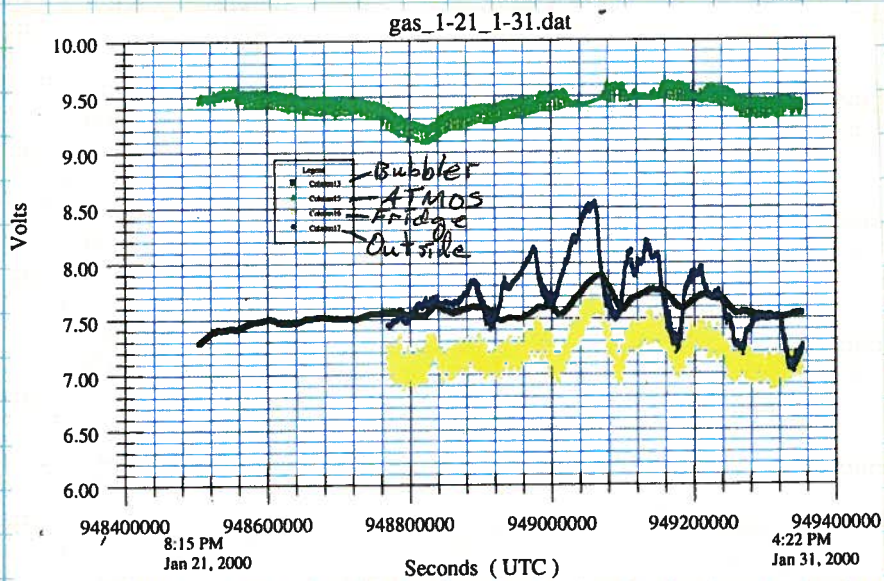
HrsH_VDC_rCURTop
 HrsH_VDC_rCURBot
 HrsH_VDC_rHVTop
 HrsH_VDC_rHVBot
 HrsH_GAS_rVDCbot
 HrsH_GAS_rFPPc1
 HrsH_GAS_rFPPc2
 HrsH_GAS_rFPPc3
 HrsH_GAS_rFPPc4
 HacH_DTC_HPE1313A:0_Ch63
 HacH_DTC_HPE1313A:0_Ch62
 HacH_DTC_HPE1313A:0_Ch61
 HacH_DTC_HPE1313A:0_Ch60
 HacH_DTC_HPE1313A:0_Ch59
 HacH_DTC_HPE1313A:0_Ch55
 HacH_DTC_HPE1313A:0_Ch52
 HacH_DTC_HPE1313A:0_Ch49
 HacH_DTC_HPE1313A:0_Ch46
 HacH_DTC_HPE1313A:0_Ch43
 HacH_DTC_HPE1313A:0_Ch40
 HacH_DTC_HPE1313A:0_Ch36
 HacH_DTC_HPE1313A:0_Ch33

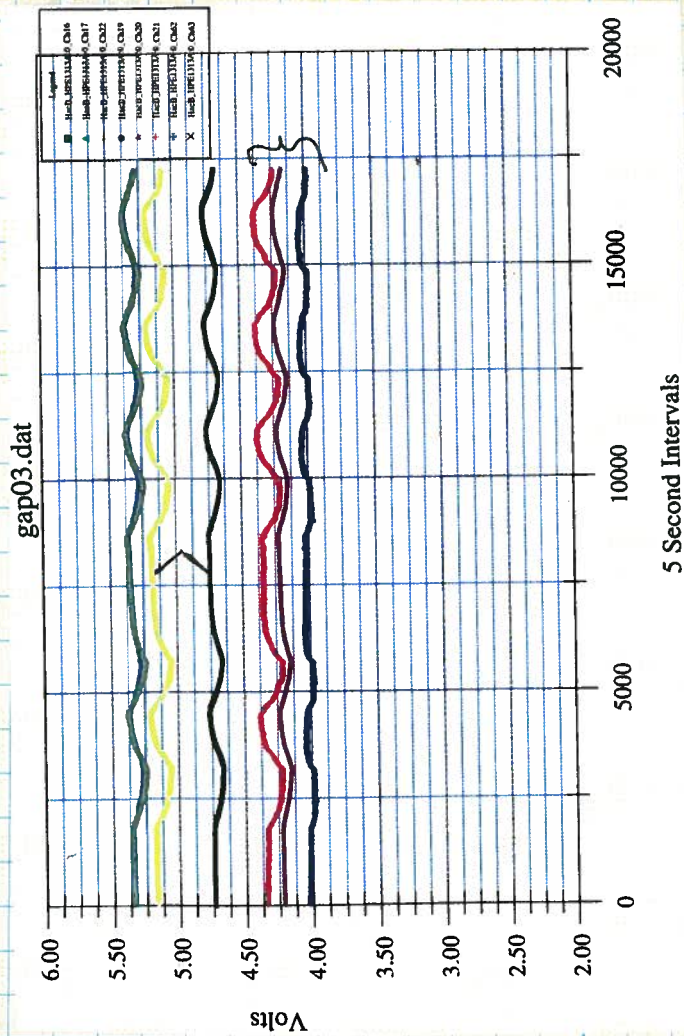
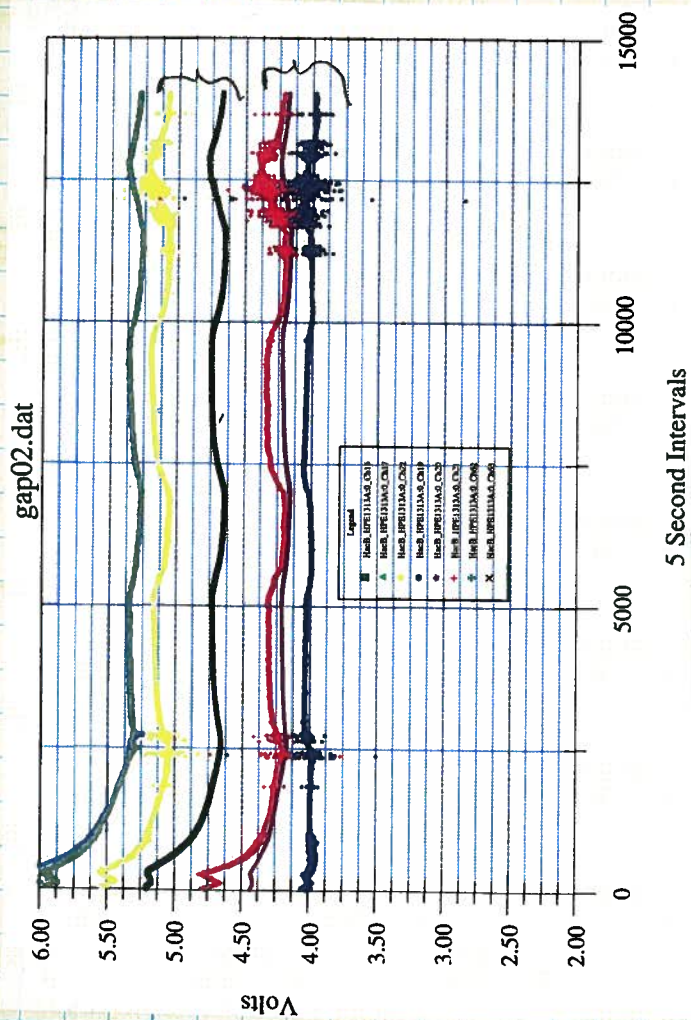
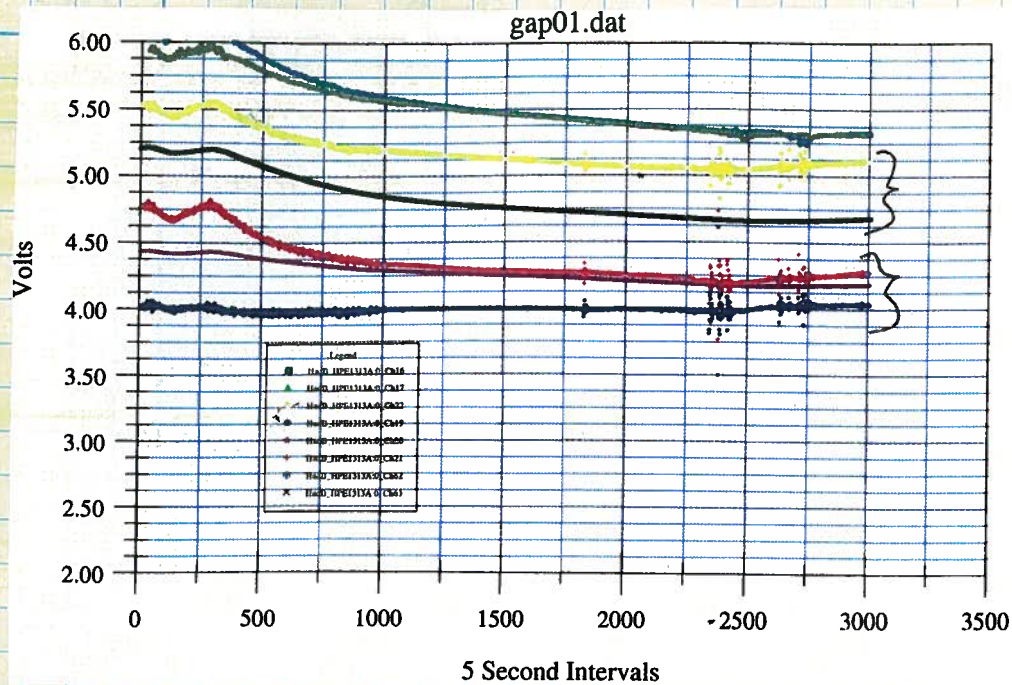
hallasc12:date

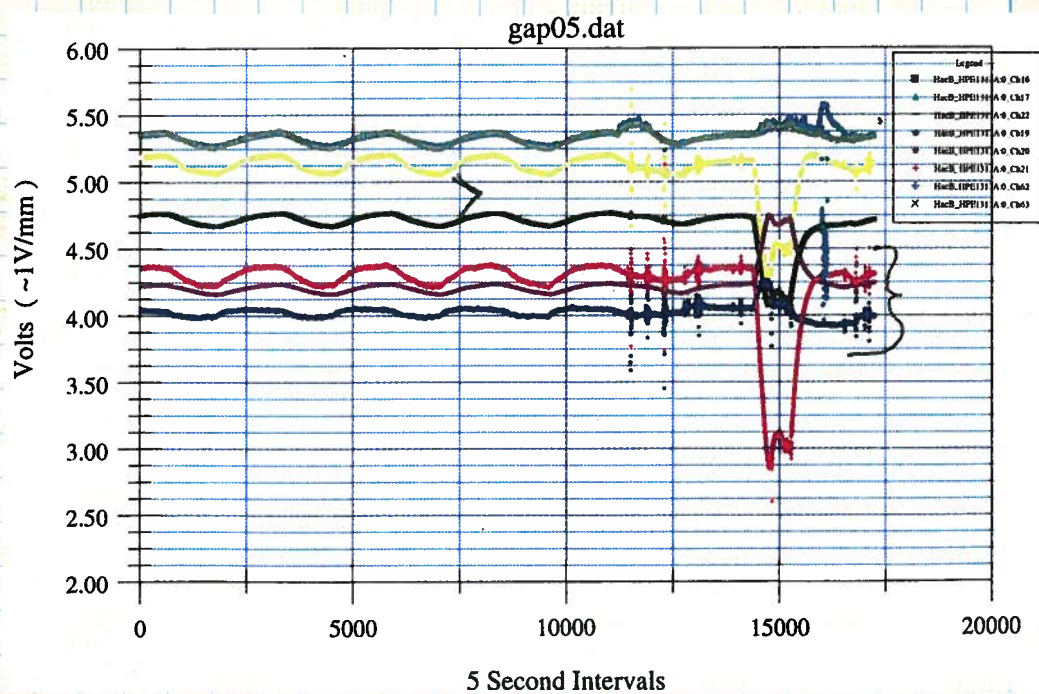
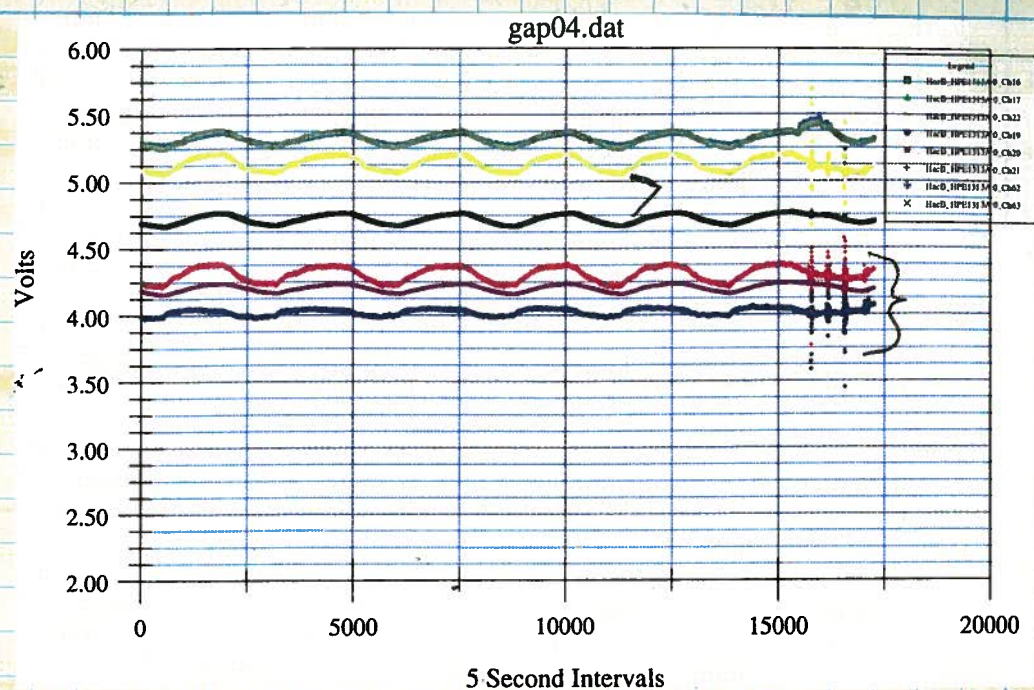
HacE_HPM_LVDT:VALr
 HacE_VPM_LVDT:VALr
 HacE_HPE1313A:0_Ch58
 HacE_HPE1313A:0_Ch54
 HacE_HPE1313A:0_Ch55
 HacE_alignROLL
 HacE_alignPITCH
 HacE_alignHPT
 HacE_alignAGL
 HacE_alignSTAT
 HacH_HPM_LVDT:VALr
 HacH_VPM_LVDT:VALr
 HacH_HPE1313A:0_Ch58
 HacH_HPE1313A:0_Ch54
 HacH_HPE1313A:0_Ch55
 HacH_alignROLL
 HacH_alignPITCH
 HacH_alignHPT
 HacH_alignAGL
 HacH_alignSTAT

hallasc12:date

Shed_gas_CO2
 Shed_gas_ETH
 Shed_gas_ARG
 Shed_gas_ArBotL
 Shed_gas_ArBotR
 Shed_gas_EthBotL
 Shed_gas_EthBotR
 Shed_gas_CO2BotL
 Shed_gas_CO2BotR
 Shed_gas_TempBubb
 Shed_gas_TempRack
 Shed_gas_AtmPres
 Shed_gas_TempFridge
 Shed_gas_TempOutside

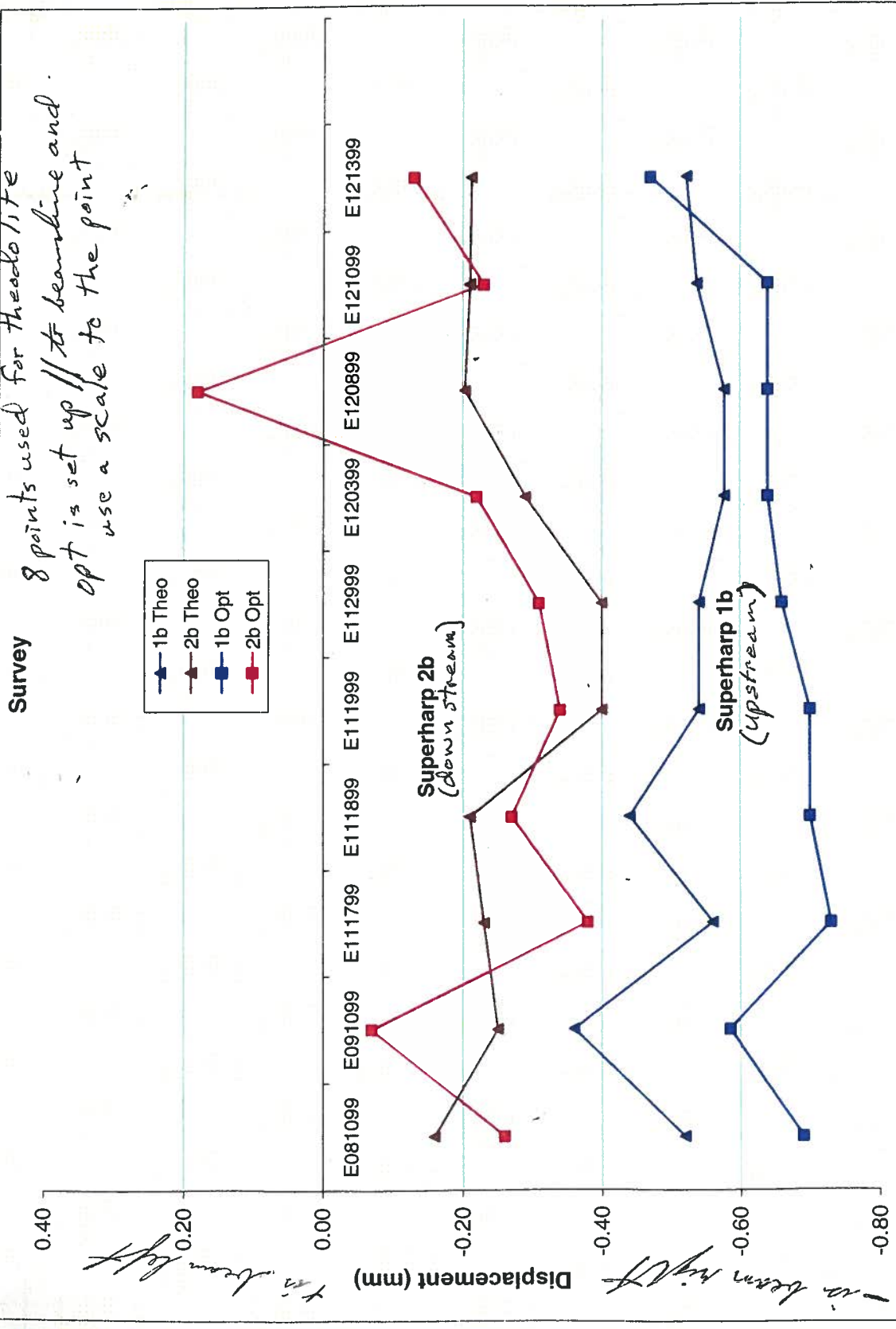
2/1
RS





3/14/00 Survey Crew Bench Measurement Results

Graph of Superharp Movement Trends
(horizontal movement)



Test of Hadron Detector Not Sealing for Inergen 3/17

Scott Spiegel had replaced the flammable foam with non-flammable foam (fire retardant) Rickward - RG31. This foam is to seal the gaps around the box beam and doors.

Setup is similar to that used on p 78 & 80 of Misc Hardware II. O₂ sensors are in the same places. This test was run on 3/15 with help from Rusty.

Set PC clock to time on my pager.

No one in hut. No one had been working under box beam.

Did not turn off HVC units.

Shut doors.

Started program & then right away opened gas cylinders (4 cyl. of N₂, industrial grade).

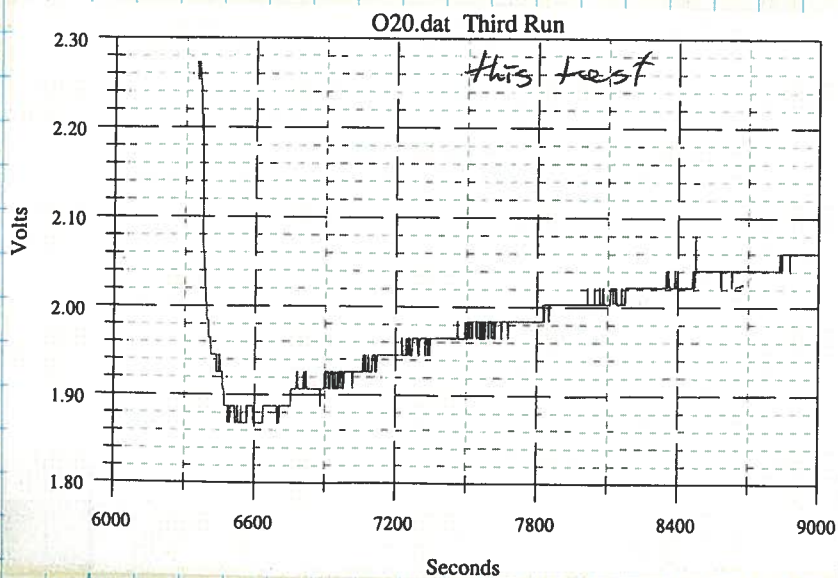
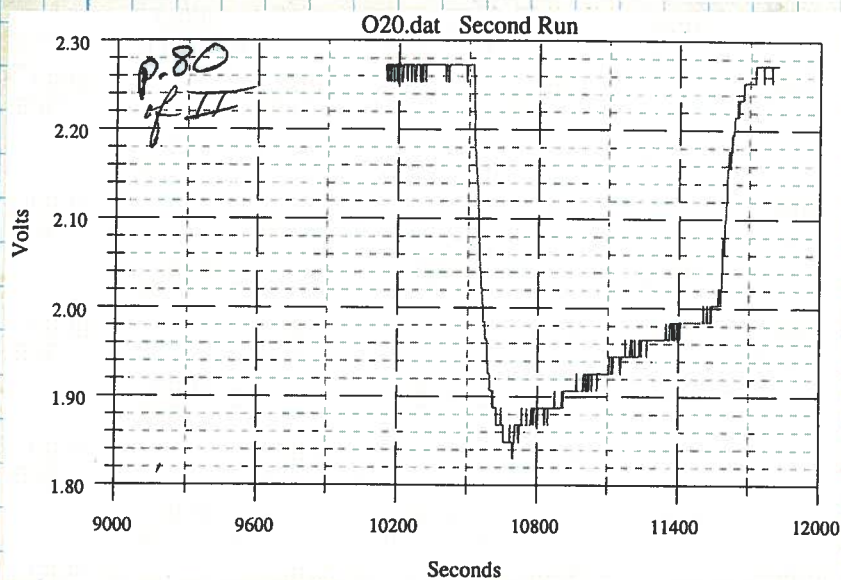
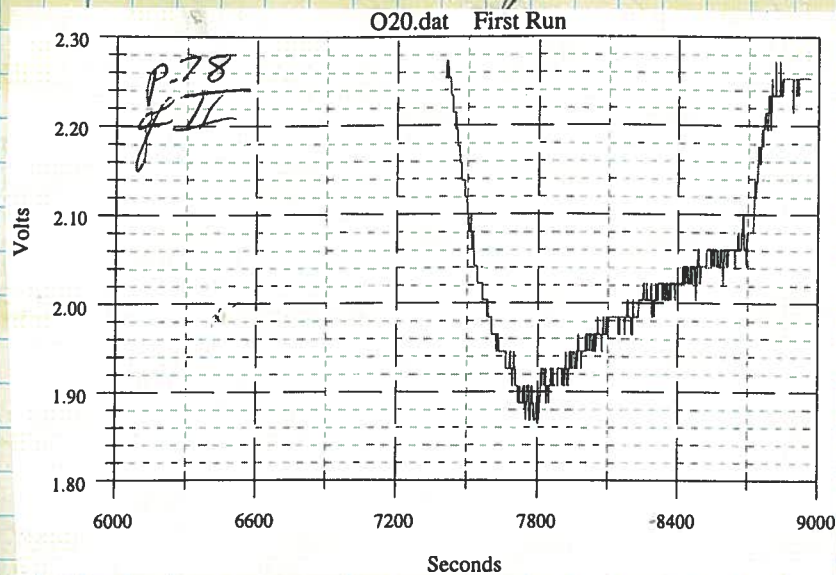
Let program run for a good while.

Terminated program & removed empty cylinders from the hall.

The gas losses were at:

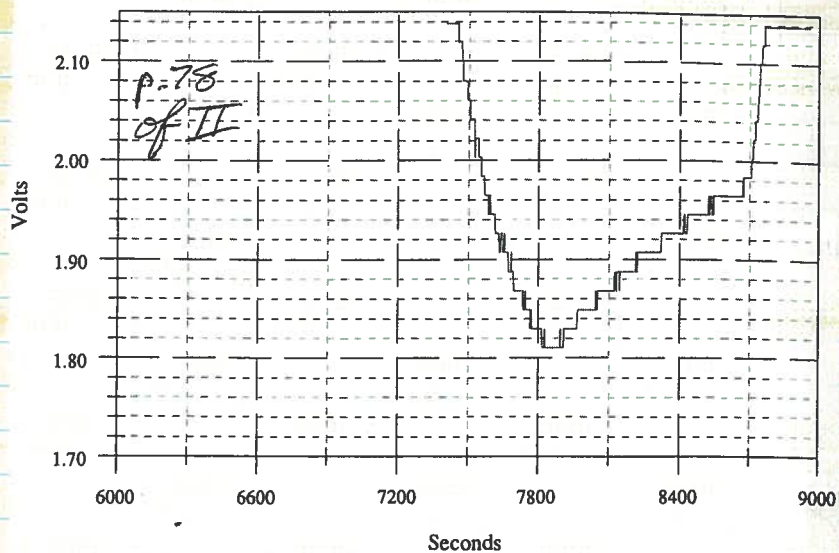
- top of shield hut, by inergen outlet pipe
- halfway up a wall ladder on left side, by FPP
- on left side hand rail of 1st level platform
- on right side wall ladder, just past 1st level platform, 2nd rung

Sensor at rear of detector stack

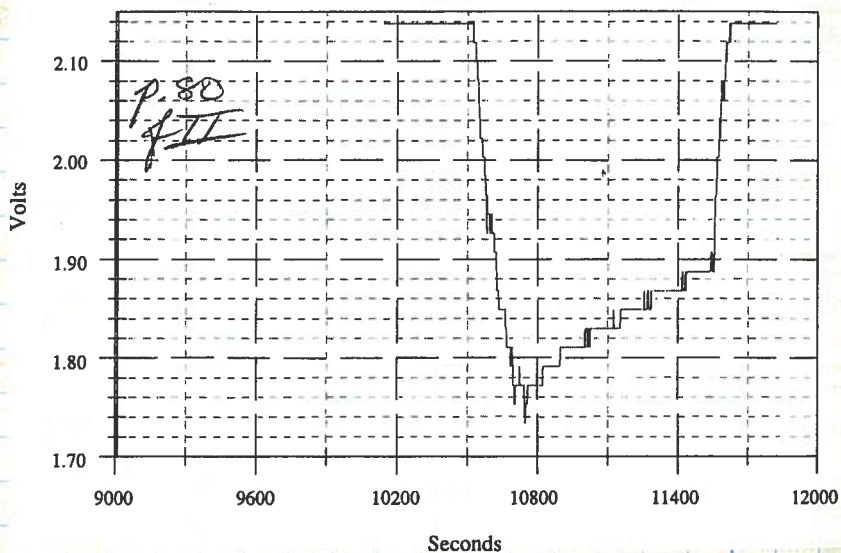


sensor next to (on top of right side of) VDC

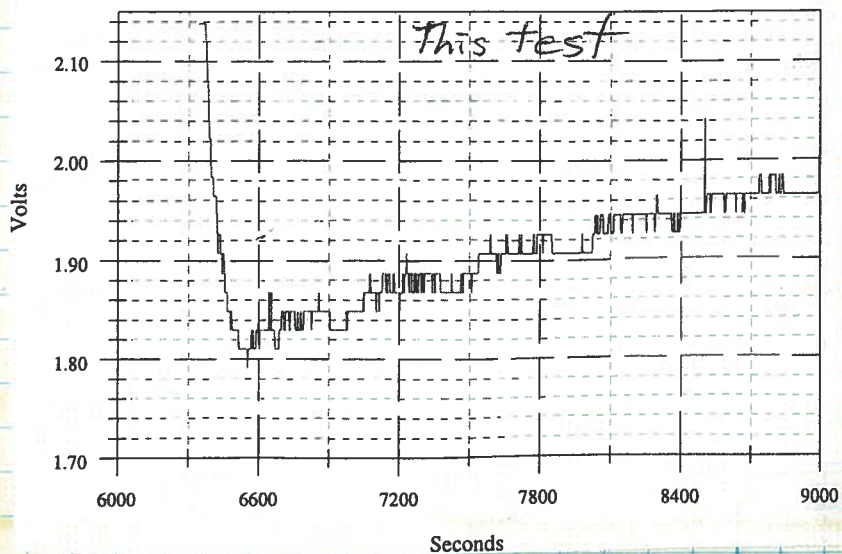
O21.dat First Run



O21.dat Second Run

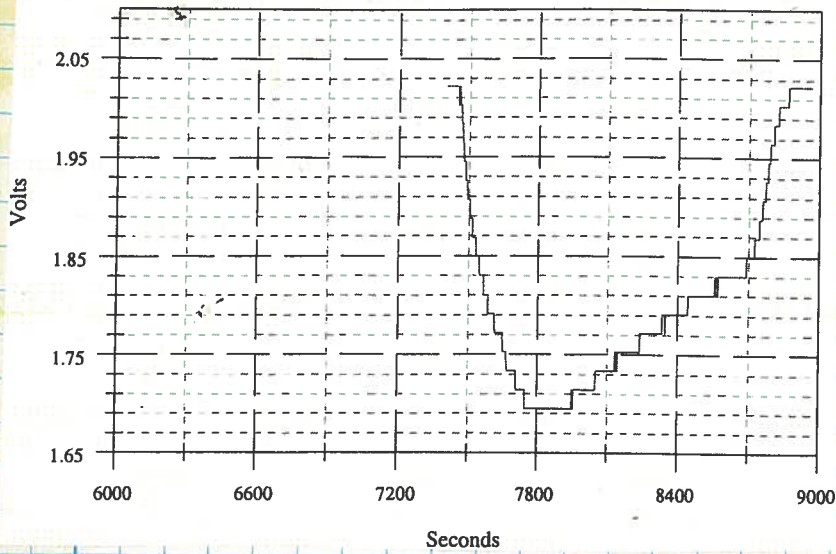


O21.dat Third Run

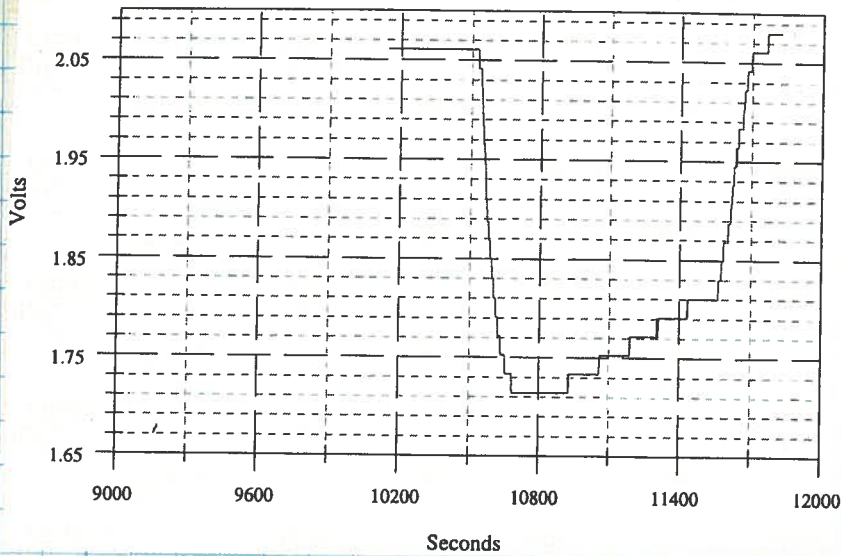


Sensor behind rack on 2nd level

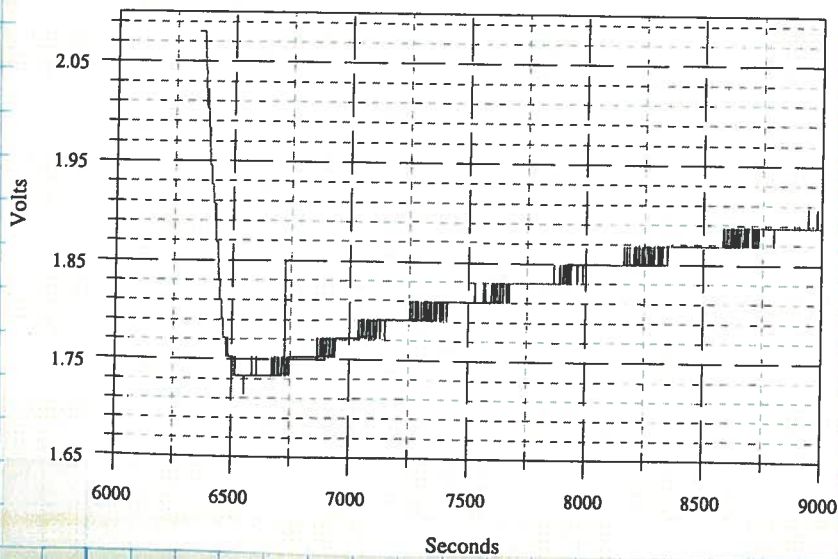
O22.dat First Run



O22.dat Second Run

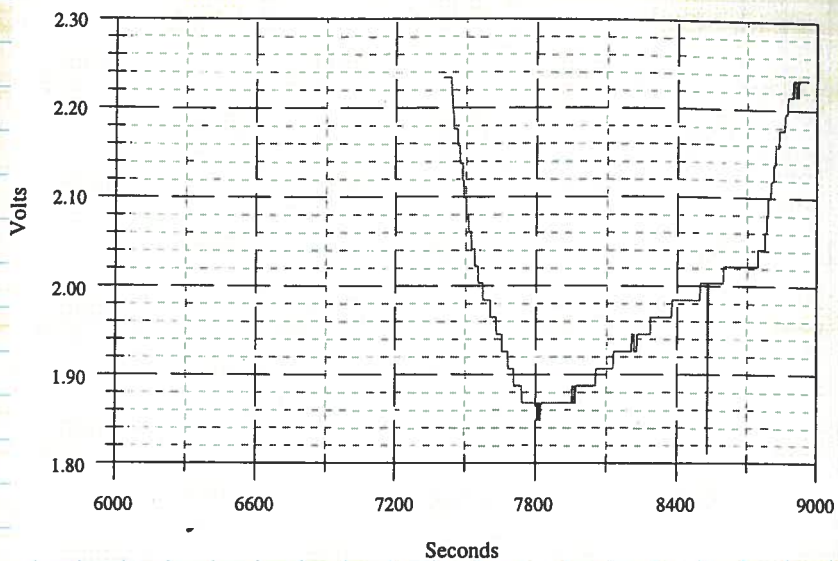


O22.dat Third Run

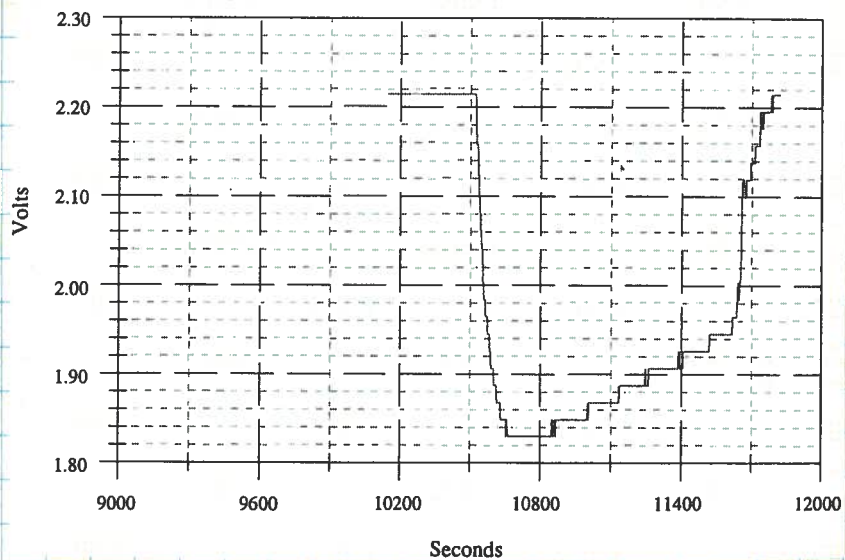


Sensor at Top of Pb-glass (Pion Rejection)

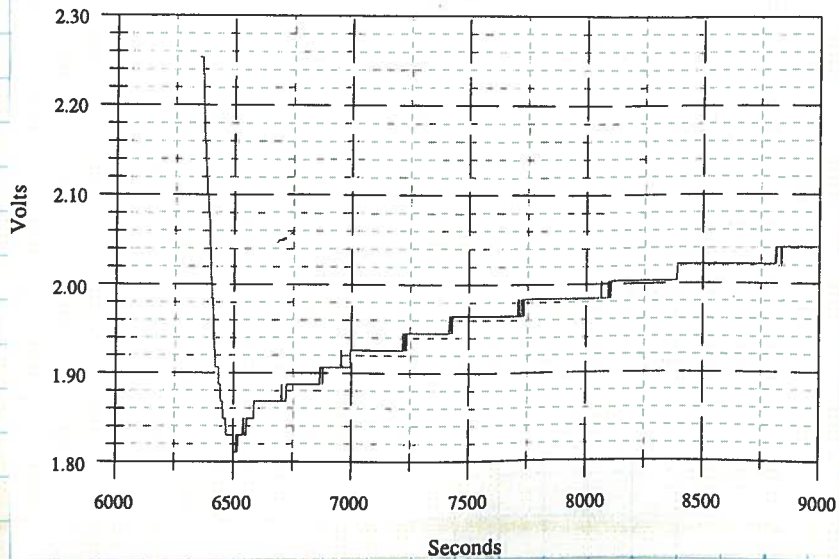
O23.dat First Run



O23.dat Second Run



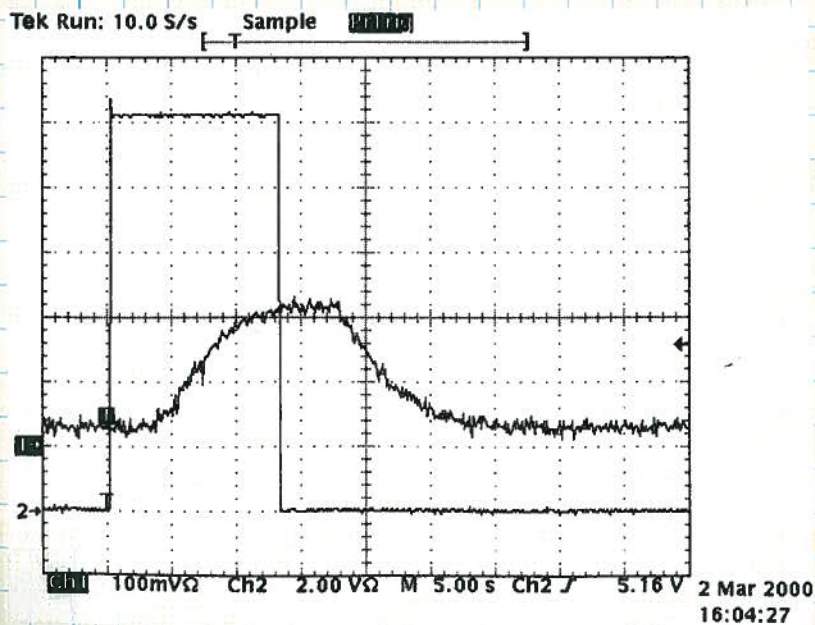
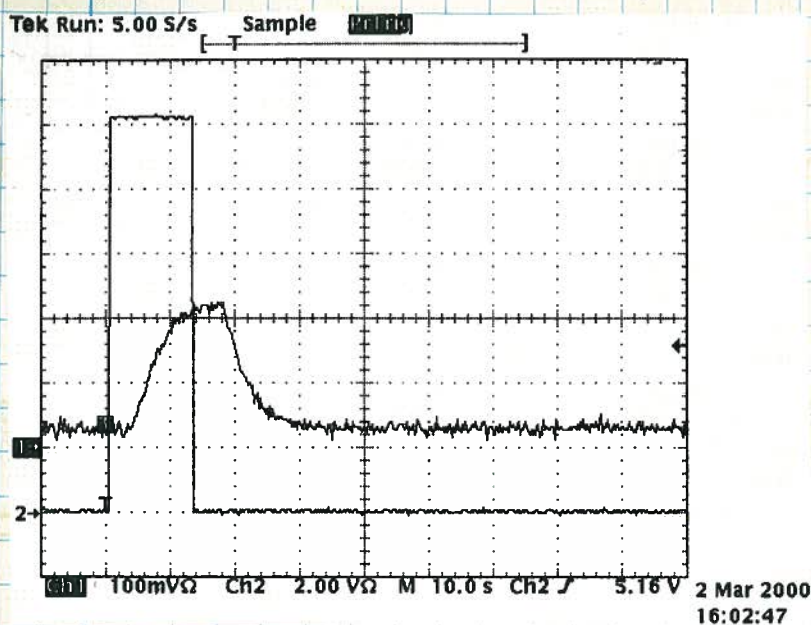
O23.dat Third Run



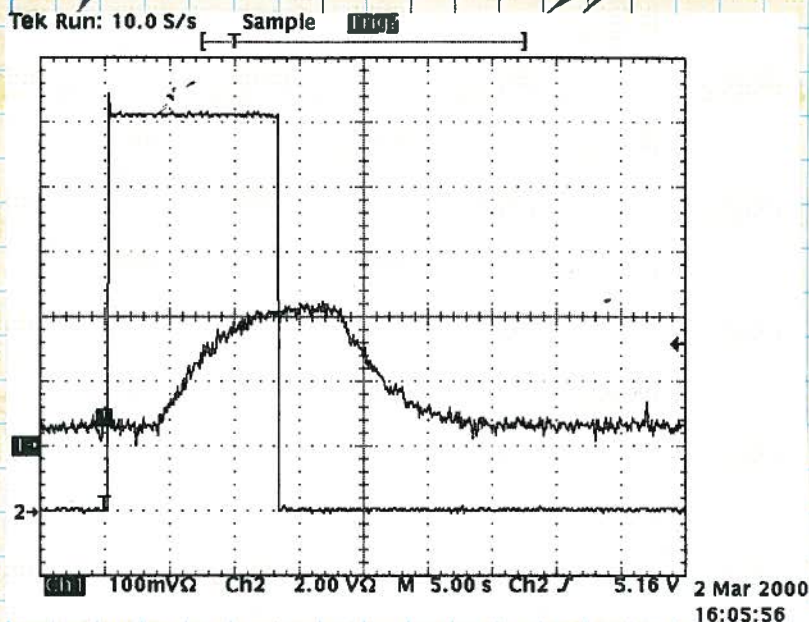
3/900 Mark's Products Helium Detector

Prior to going on vacation I took a look at the He detector Bogdan bought. It has a "gas column" and looks at the thermal conductivity of the gas which passes through it. There is a microcontroller which takes a reading at the point He should exit from the "GC".

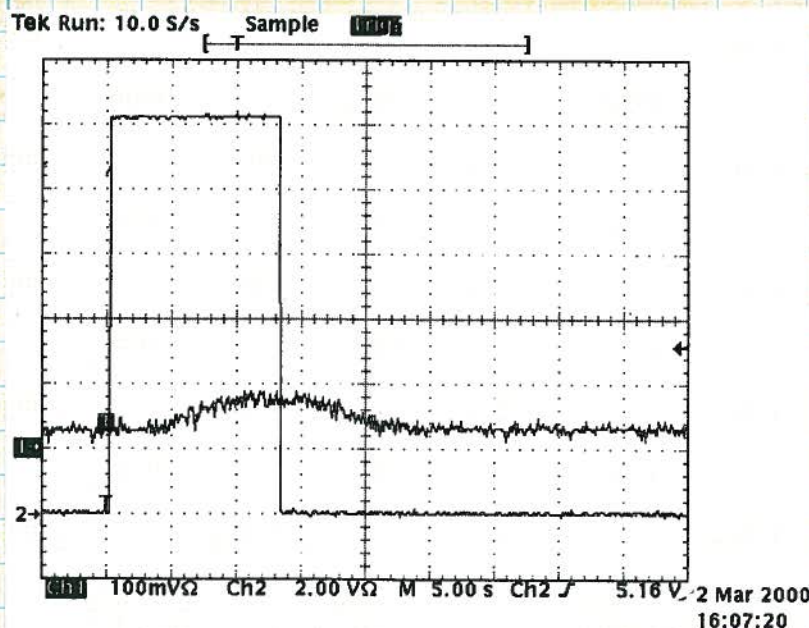
I took a couple of scope pictures to get an idea of the readout timing. Ch2 is the voltage drop across the Dynamics DM2202 valve. Ch1 is the voltage at pin 4 of the AD654 V to F chip.



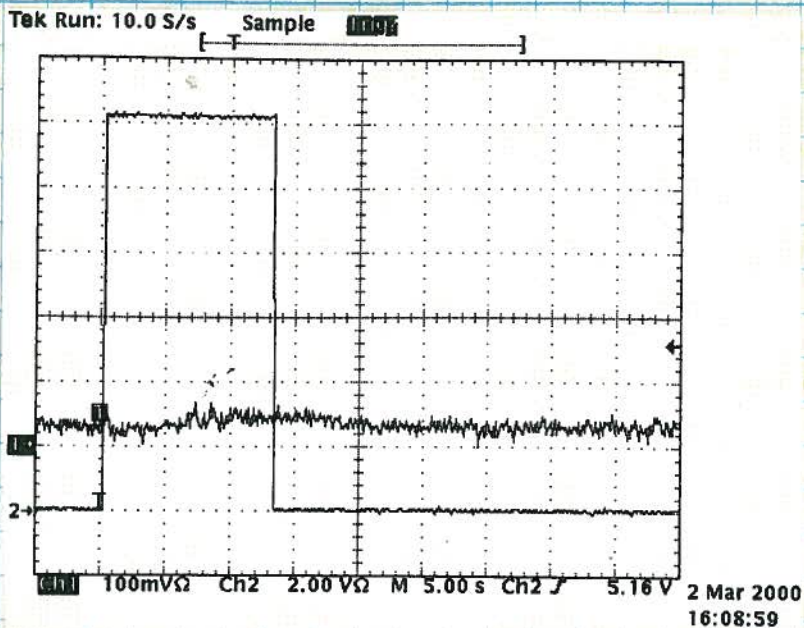
I'd had the probe tip up to a $\frac{1}{4}$ " polyflo tube coming off a He bottle with a regulator on it. I then checked the display reading ~~of the~~ for various tube vs. probe configurations. The detector was in batch mode. I would press "force trigger" scope was set to trigger on valve status change.



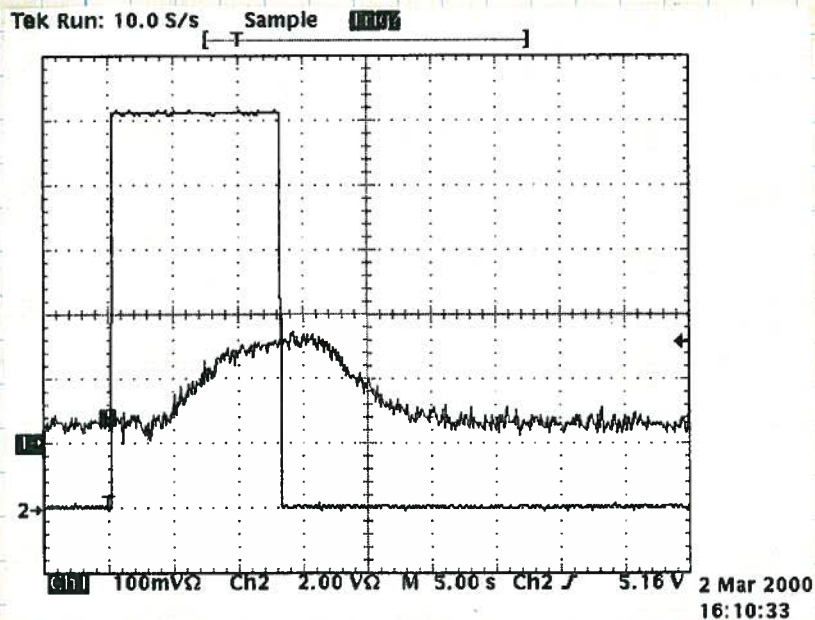
display reading was 55%



display reading was 13%



display showed 4.6%



display showed 3.7%



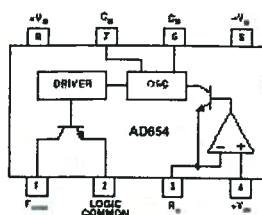
Low Cost Monolithic Voltage-to-Frequency Converter

AD654

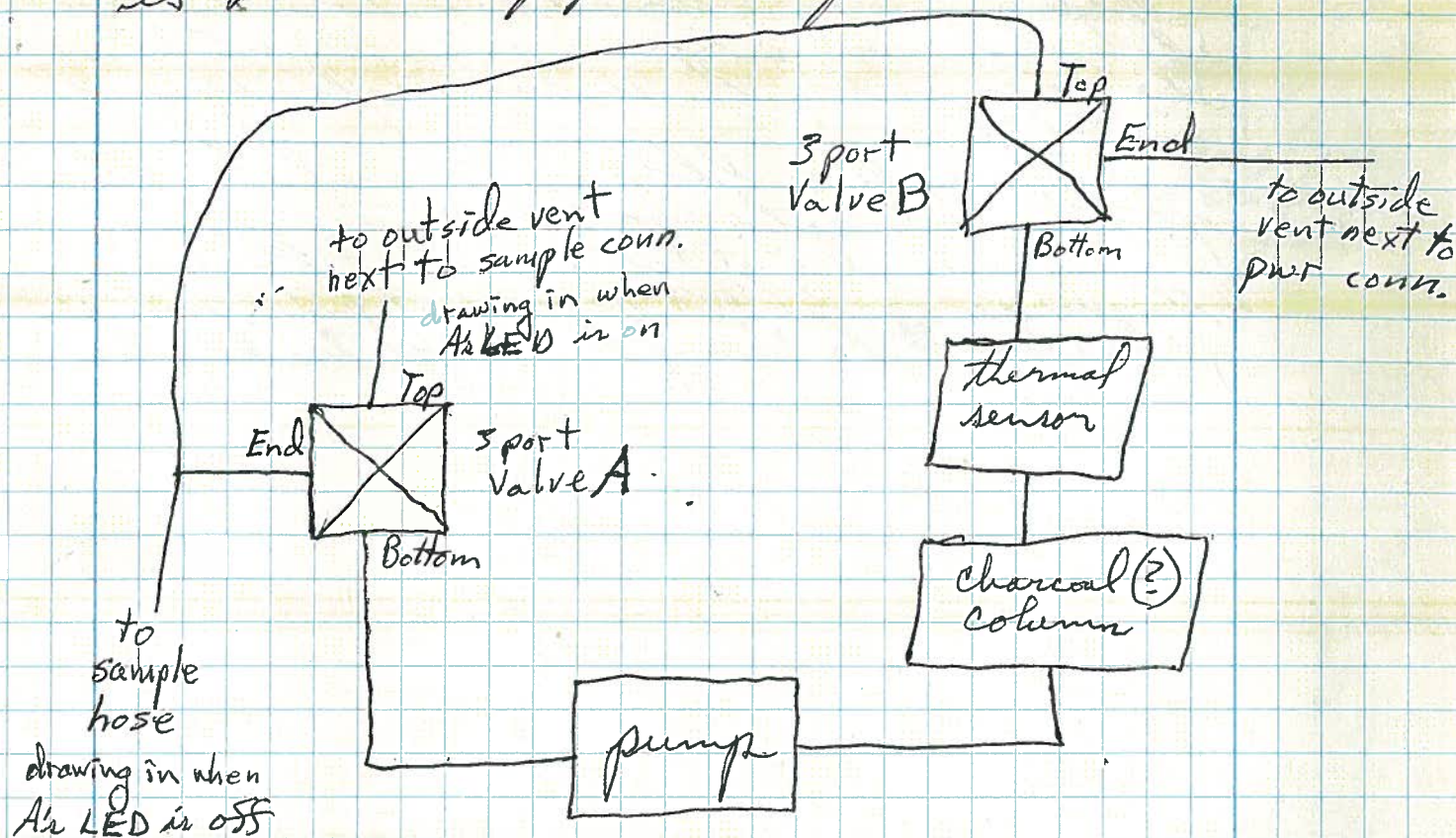
FEATURES

Low Cost
Single or Dual Supply, 5 V to 36 V, ± 5 V to ± 18 V
Full-Scale Frequency Up to 500 kHz
Minimum Number of External Components Needed
Versatile Input Amplifier
Positive or Negative Voltage Modes
Negative Current Mode
High Input Impedance, Low Drift
Low Power: 2.0 mA Quiescent Current
Low Offset: 1 mV

FUNCTIONAL BLOCK DIAGRAM



The general configuration of the He detector is



LED on flow goes from Top to Bottom
 off End Bottom

Each valve has a driving transistor. The voltage at the collector is low when the LED of the corresponding valve is lit. So, current through the valve when LED is on. Each base has a $2K\Omega$ resistor in series with it. Trace goes to one of the pins on the 16 pin conn. on the board. The line carries a TTL level signal from the processor board. TTL high on the line and the LED turns on.

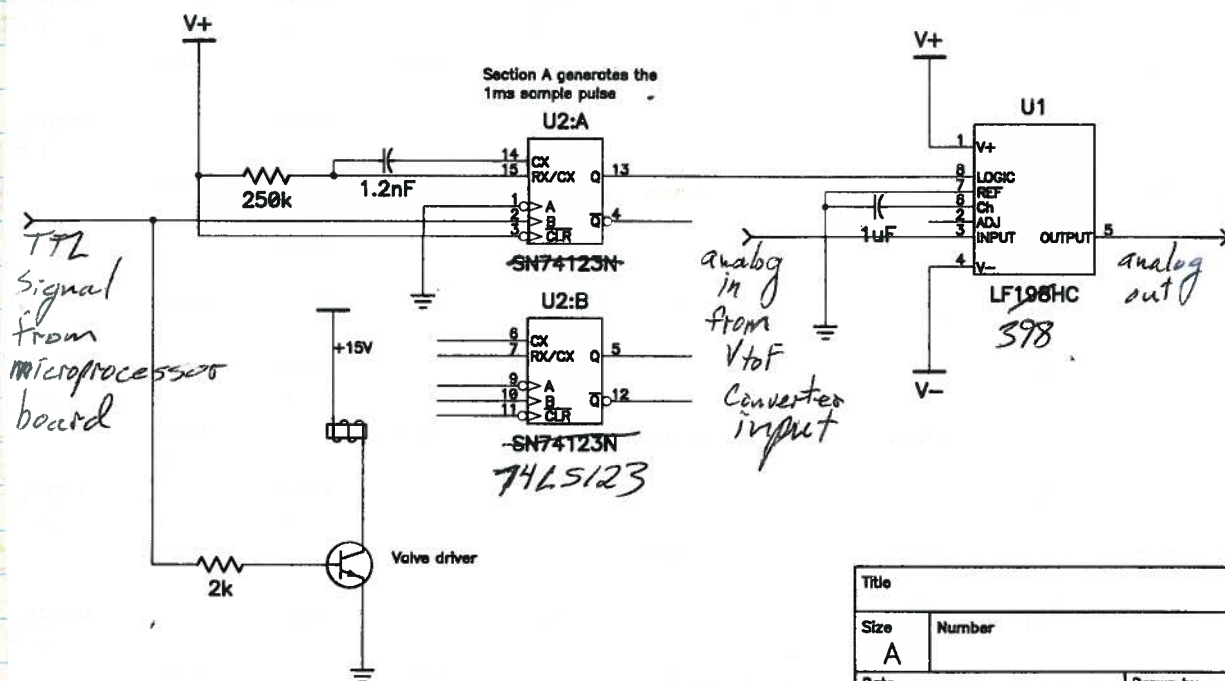
So, valve A control line goes TTL low when drawing in a sample. It goes back to TTL high when the READ cycle light turns off.

During PURGE cycle both valves' LEDs turn on, which is what we expect from the above info. This draws air from the outside vent and blows it all the way through sample hose to clear all the gas out.

3/23

Yesterday I got a sample and hold together up to the analog signal of the He detector. The idea is to get a signal usable by an ADC in EPTCS.

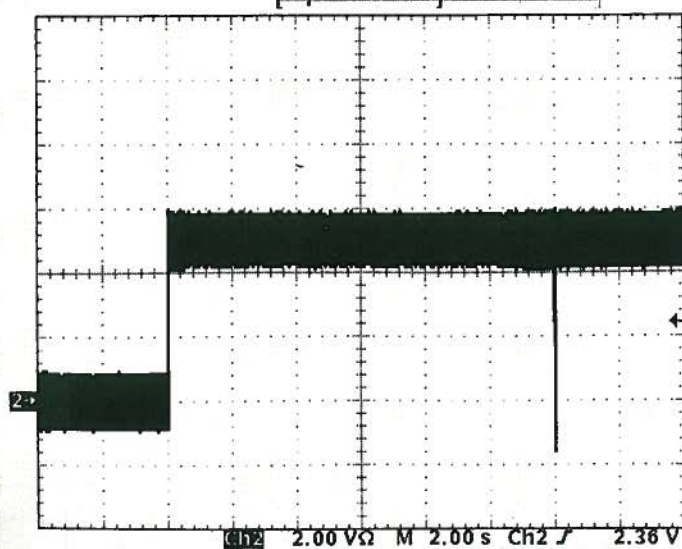
The sample and hold would reset its output after the He detector cycled. Investigating further I found a "glitchy" signal at the end of the purge cycle. Glitch is a short pulse from the processor to the base of the driver transistor.



Title		
Size	Number	R
A		
Date		Drawn by

Tek STOP 12.5 S/s

1 Acqs

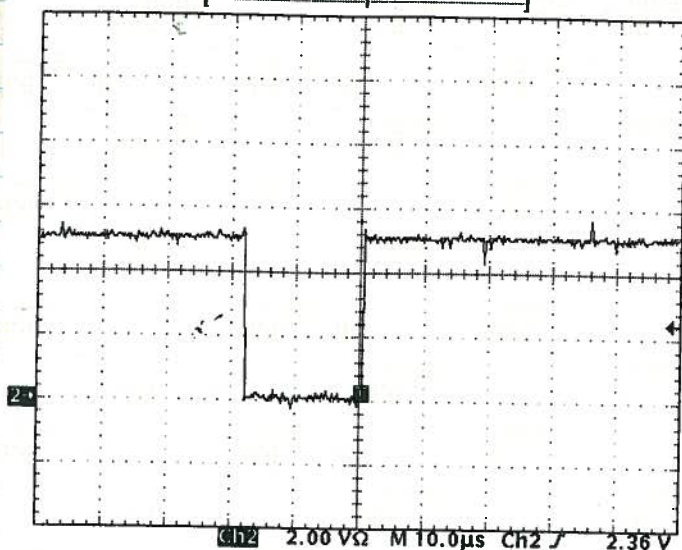


2.00 V 2.00 s Ch2 2.36 V 22 Mar 2000 20:14:43

envelope mode

FET probe on TTL signal from processor

Tek Run: 5.00MS/s Sample 1102

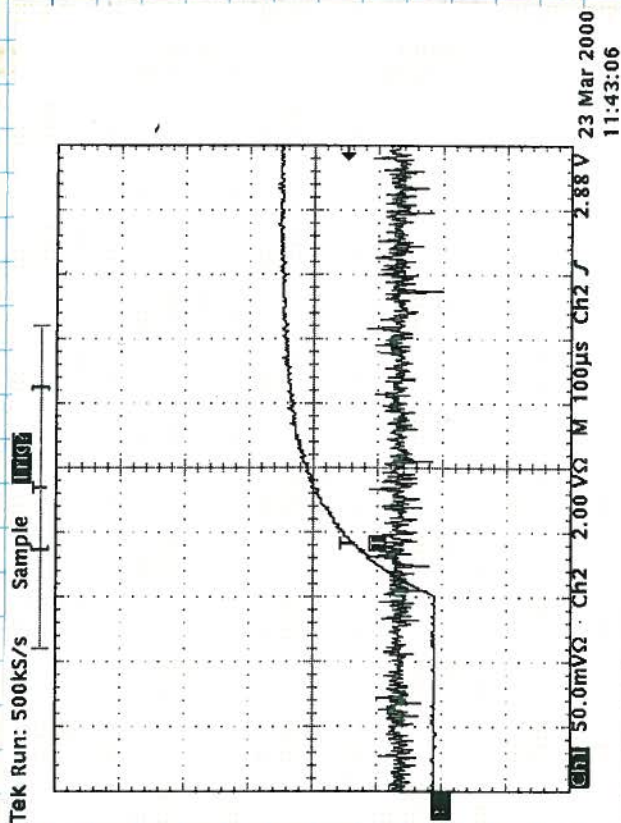
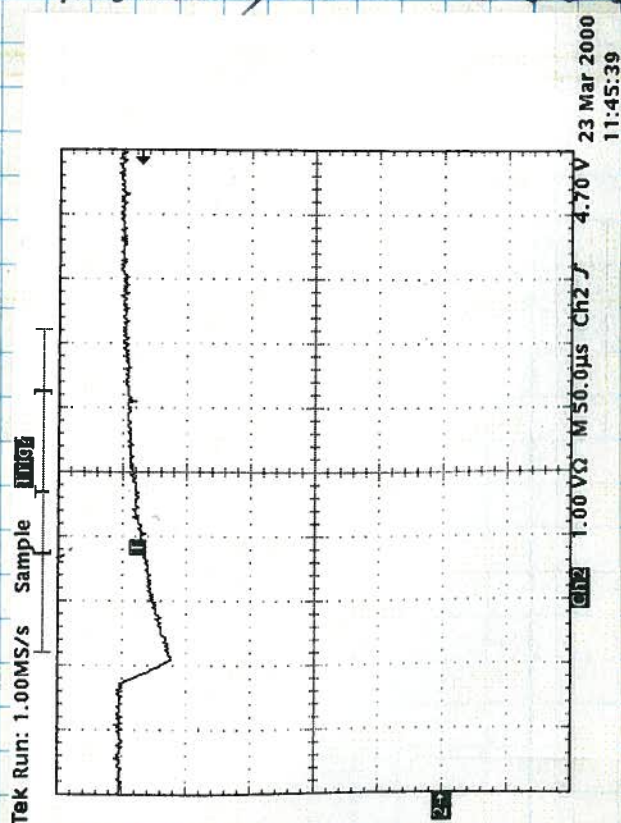
22 Mar 2000
20:19:07

expanded horiz. scale
and sample mode
"glitch" signal from
processor at the end of
the purge cycle.

Today I put $1k\Omega$ & $0.1\mu F$ on the TTL line

TTL pulse turning valve
now looks like this

"Glitch" at the end
of the PURGE cycle now
looks like this & does not affect
the sample and hold chip.

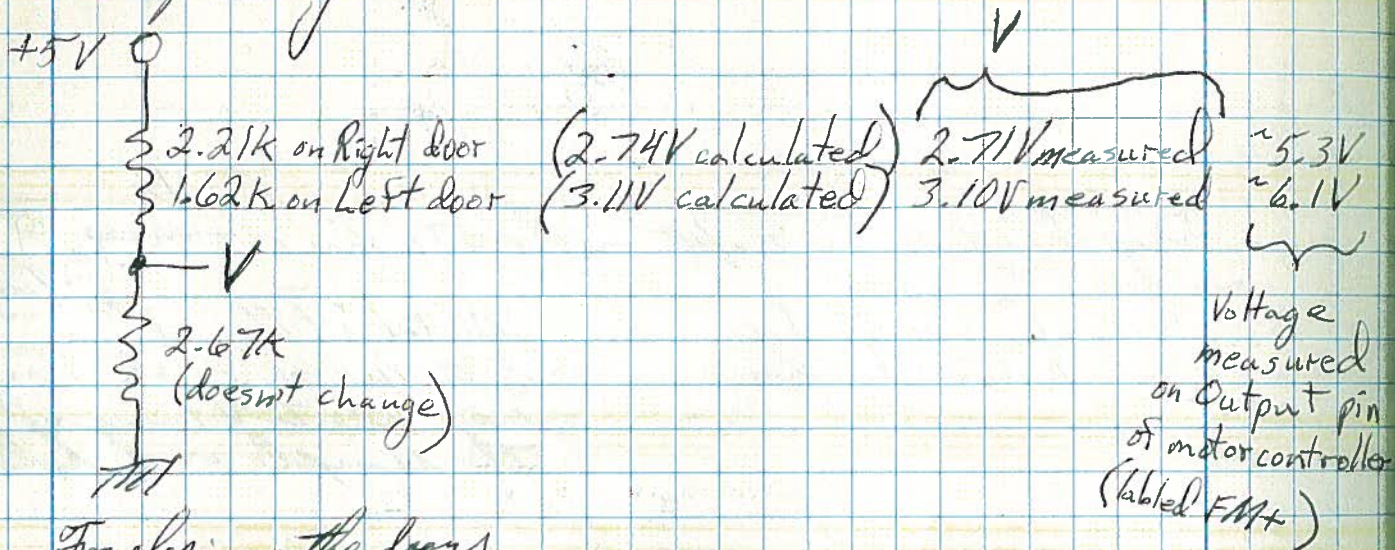
23 Mar 2000
11:43:0623 Mar 2000
11:45:39

4/19/00 Electron Shield House Door Speeds

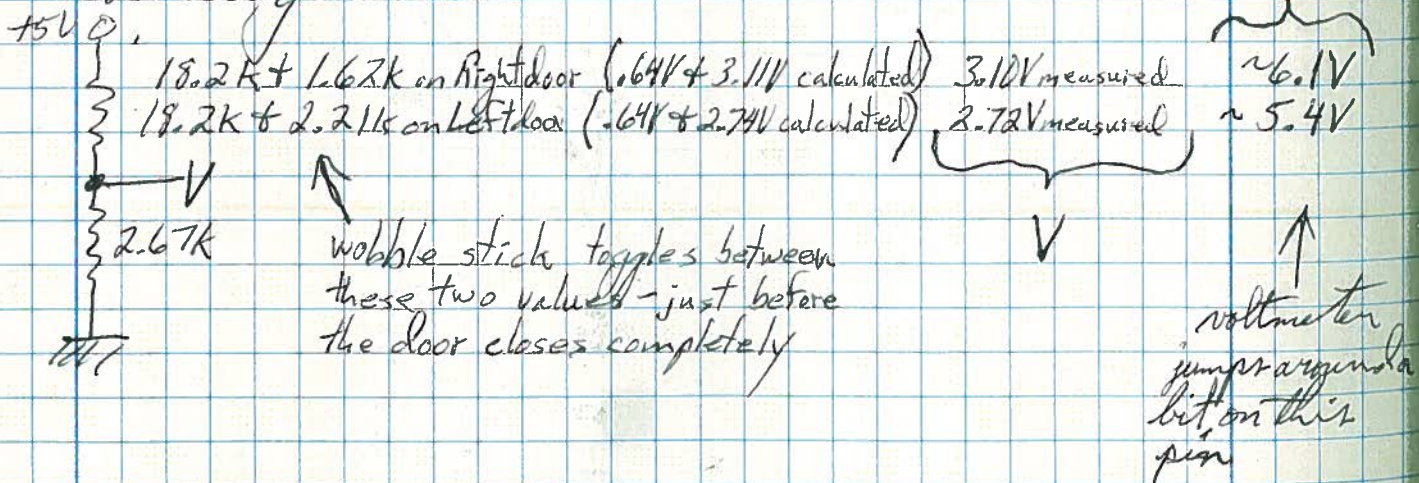
The e-arm doors do not seem to be opening at the correct relative speeds.

Looking at the schematic the door speeds are determined by a voltage applied from a voltage divider. The values of the top portion of the divider are selected by the OPEN, OPEN/CLOSE and various toggle switches.

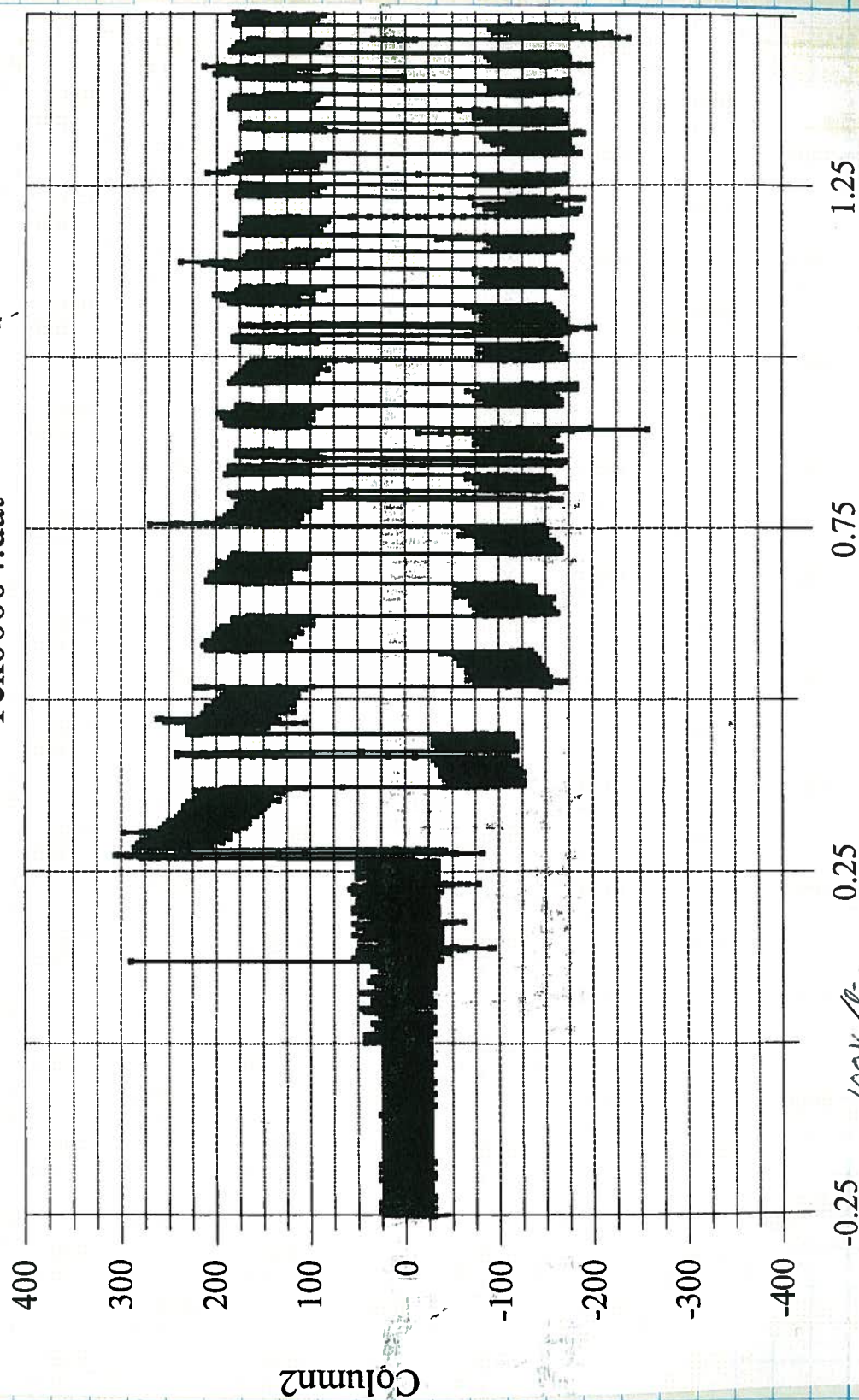
For opening the door



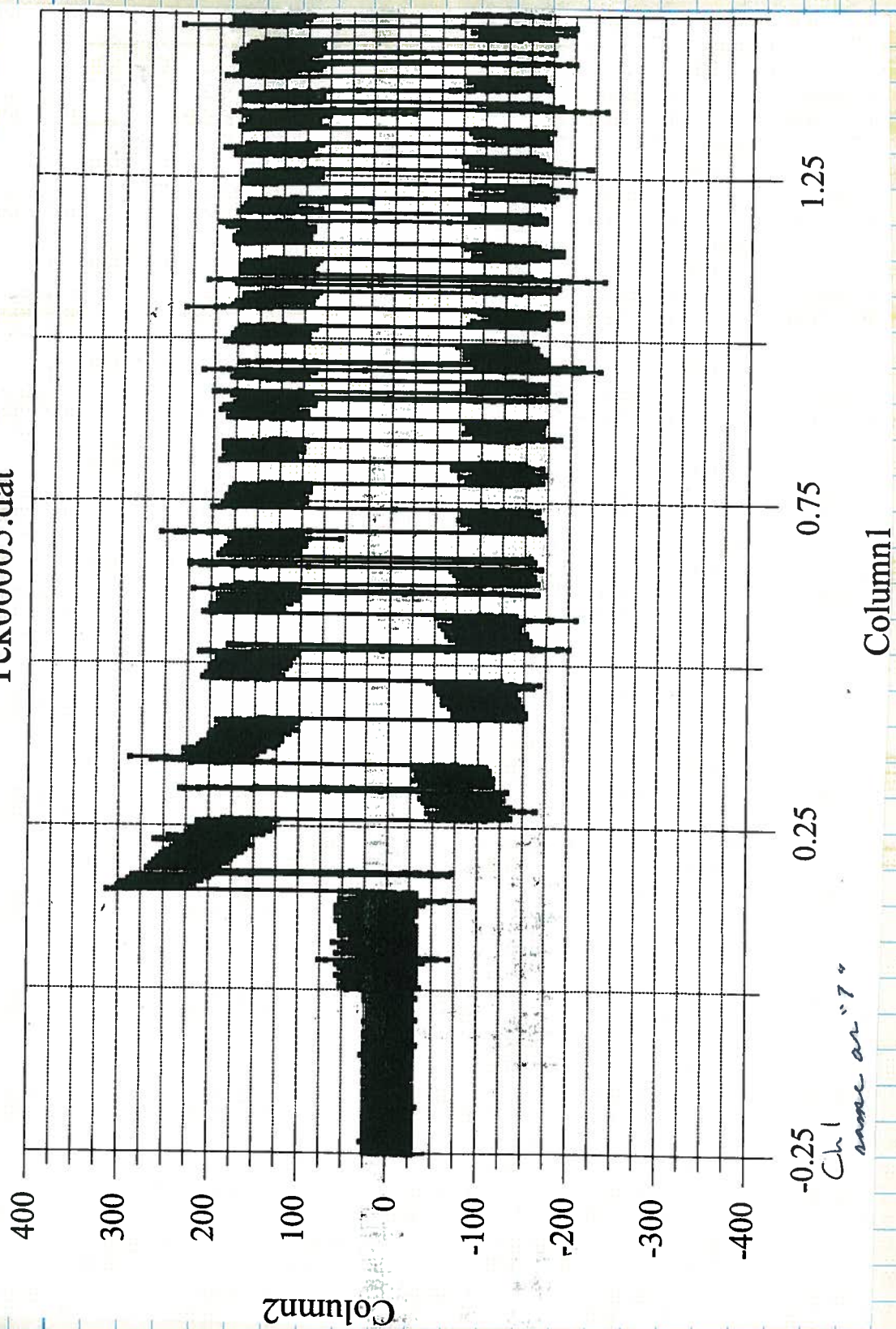
For closing the door



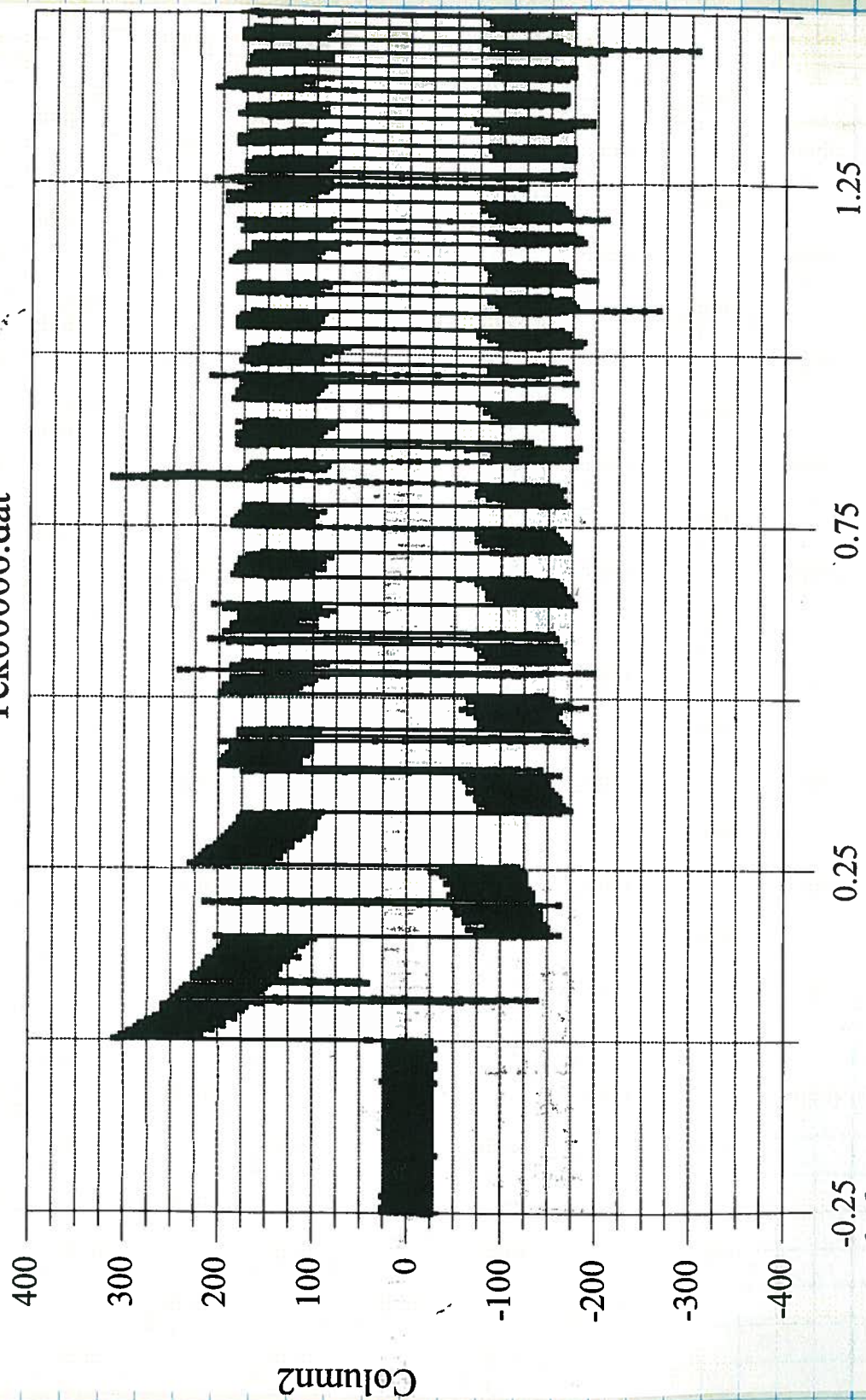
Tek000004.dat



Tek00005.dat



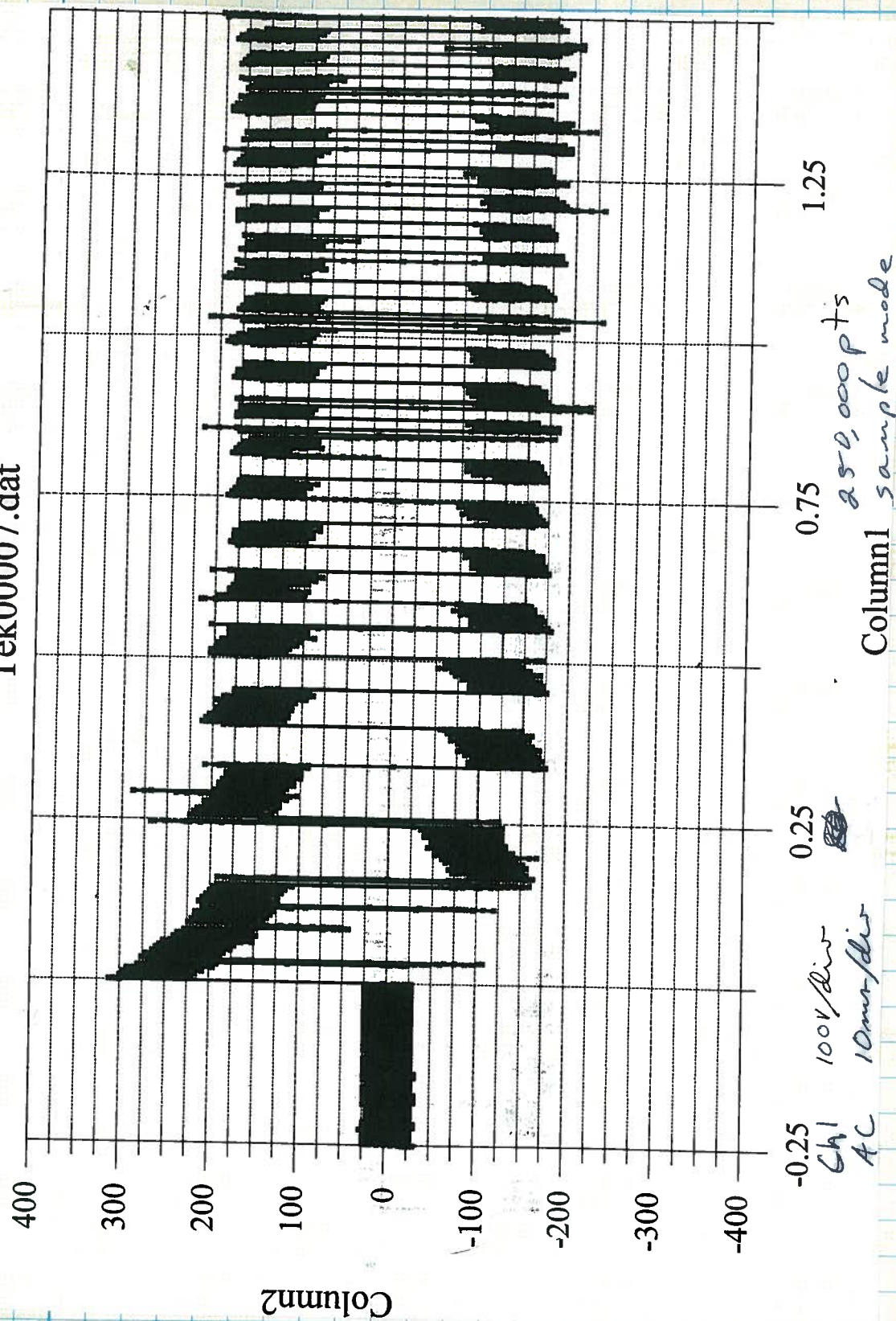
Tek000006.dat



-0.25
0.25
0.75
1.25

Ch2
same as v70

Tek00007.dat



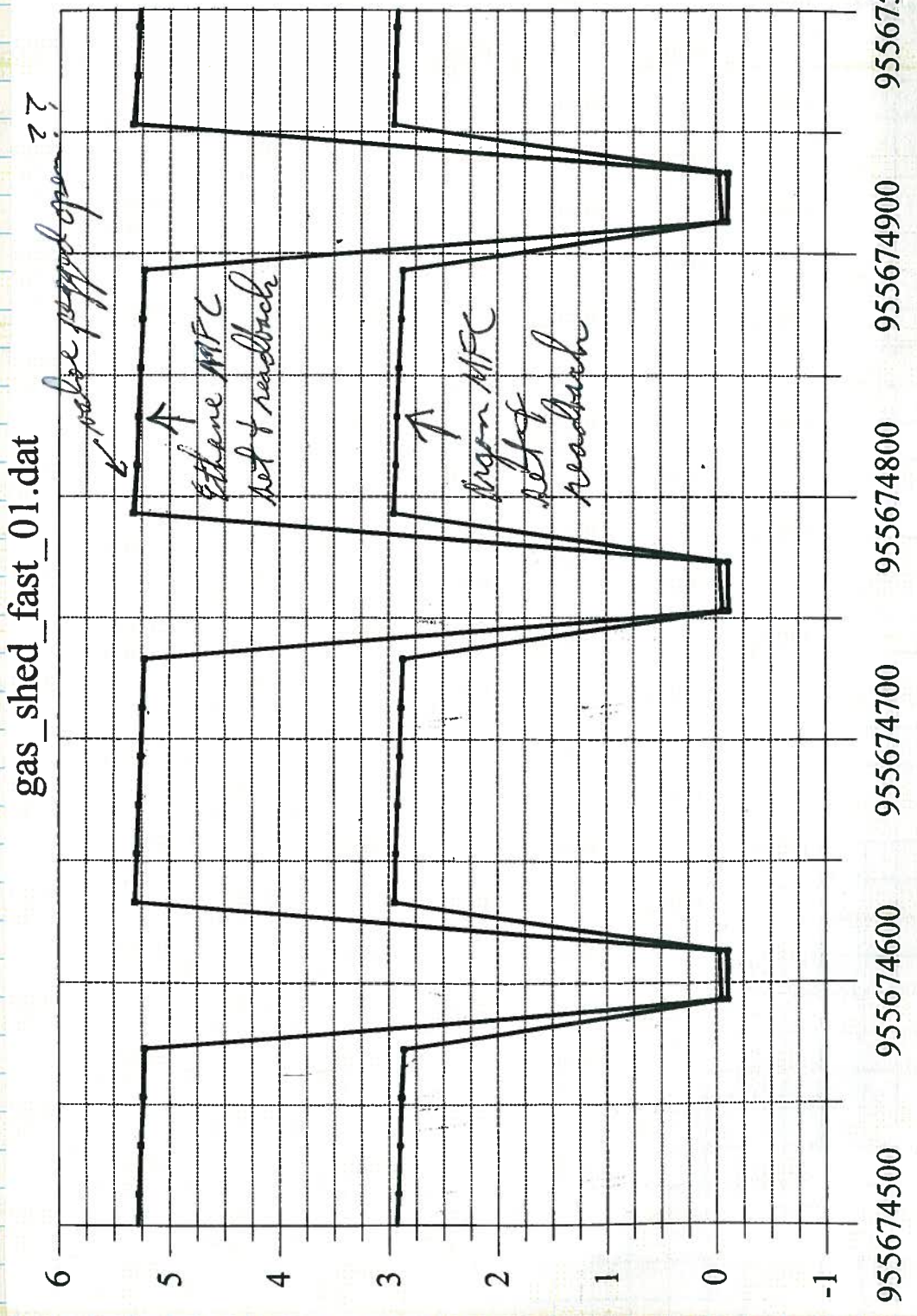
out of 8 points 5 are at 0V voltage.
 Duty cycle is somewhere between $\frac{5}{8}$ and $\frac{7}{8}$

63% 88%

Mass Flow Controller's Duty Cycle

71
 4/14/00

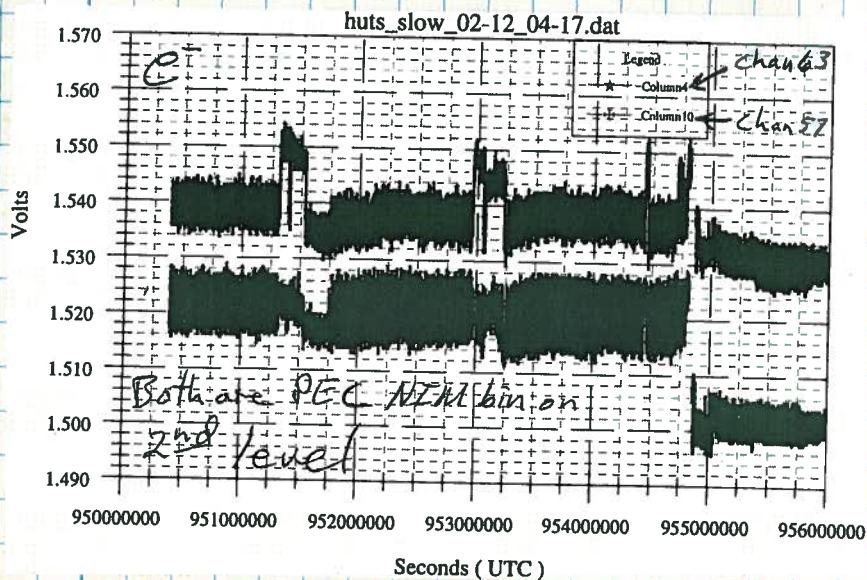
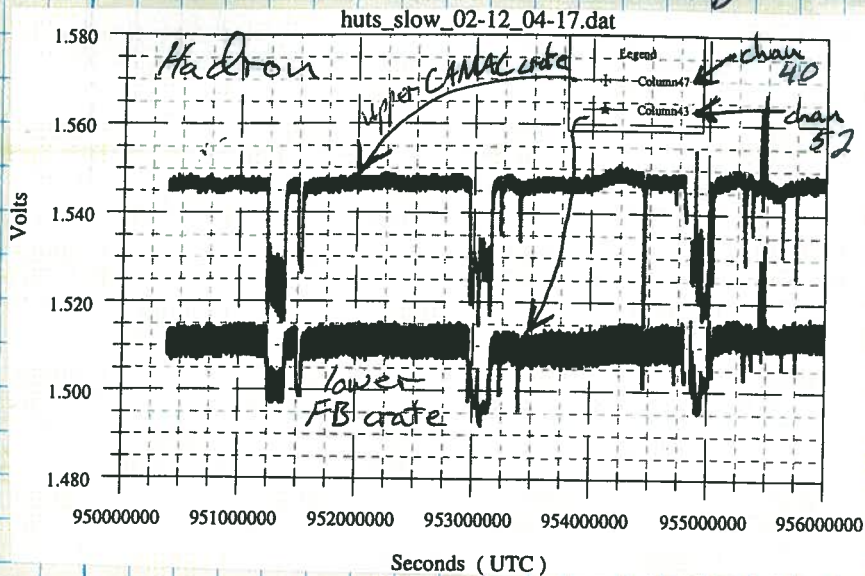
This last week I looked up the Ar + Ethane MFC set & readback voltages to the ADC in EPICS. Trying to find out the duty cycle of the MFC to see if we're at the limit of gas flow from the mixer.



4/18
JA

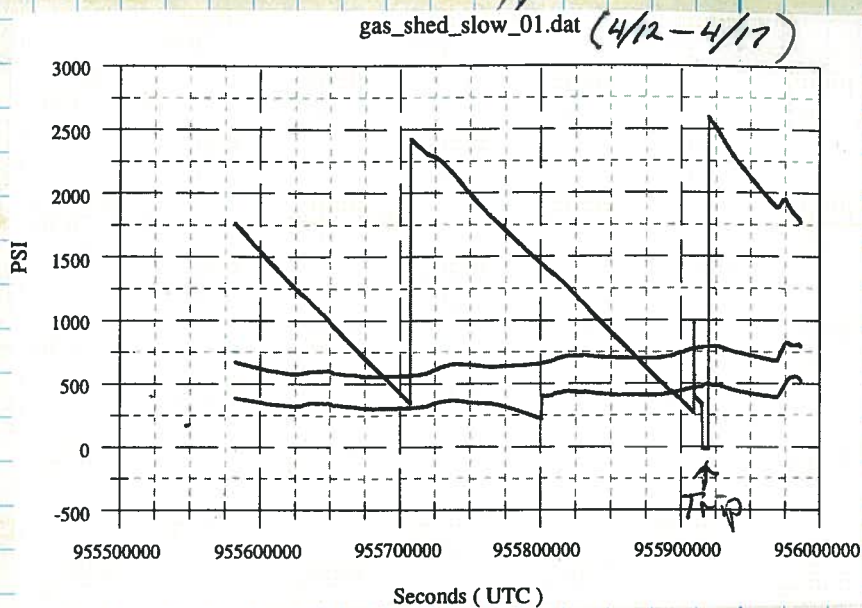
Detector Huts Temperature 2/12-4/17

Printed out some representative data from the ezlog program I've been running. Recently someone mentioned they had gone in to do some work on the Hadron argon AC unit.



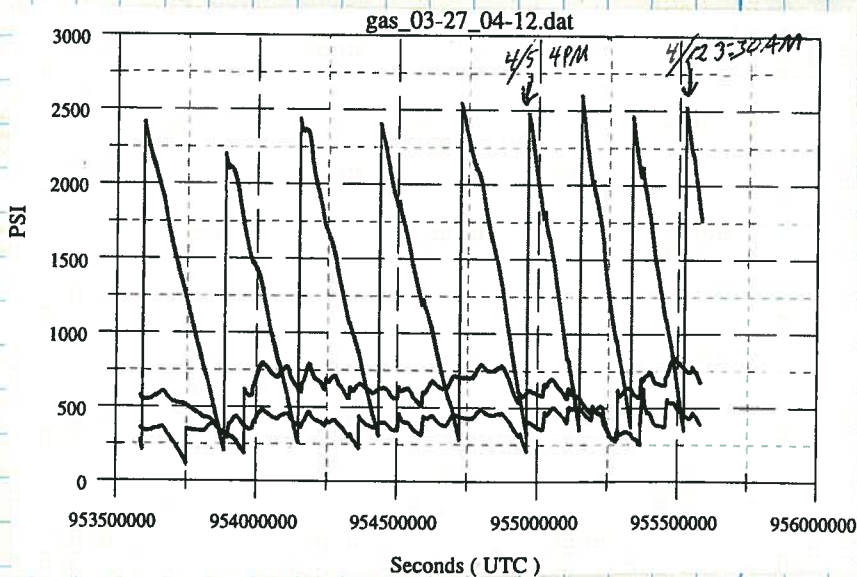
Present Gas Consumption of Ar/Eth 4/18
 On Sunday (4/16/00) the gas system tripped off due to both Ar bottles running out.

clm not sure why but it seems the 2nd Ar bottle came online with a very low pressure. Maybe a leak somewhere. I had recently installed new check valves on the Ar cylinders.



Mark Jones has been boosting the flow into the JFP.

3 cylinders in 6.5 days is 2.17 ~~days~~ days per cylinder

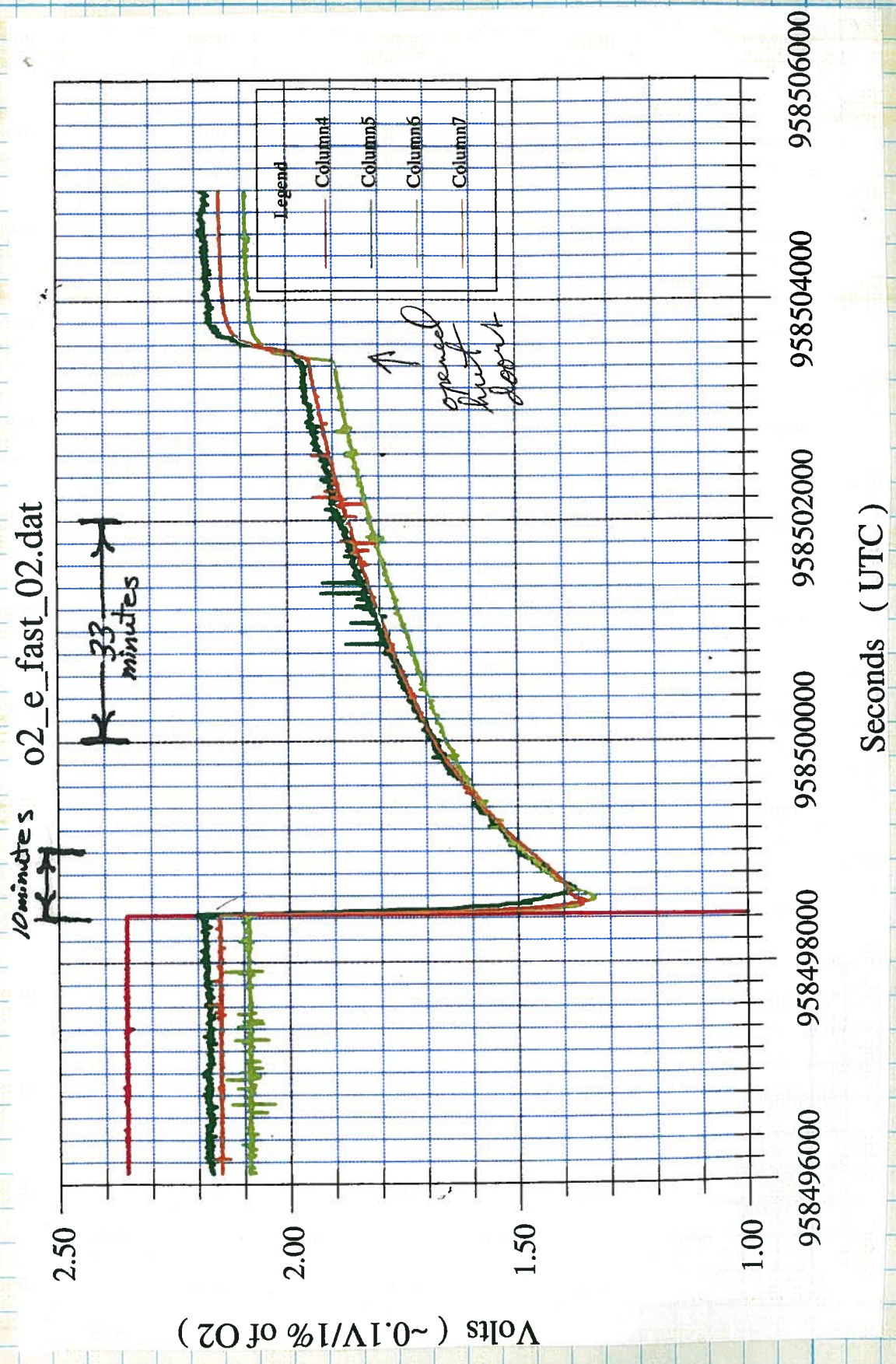


5/16/00 Electron Shield House Inergen Test

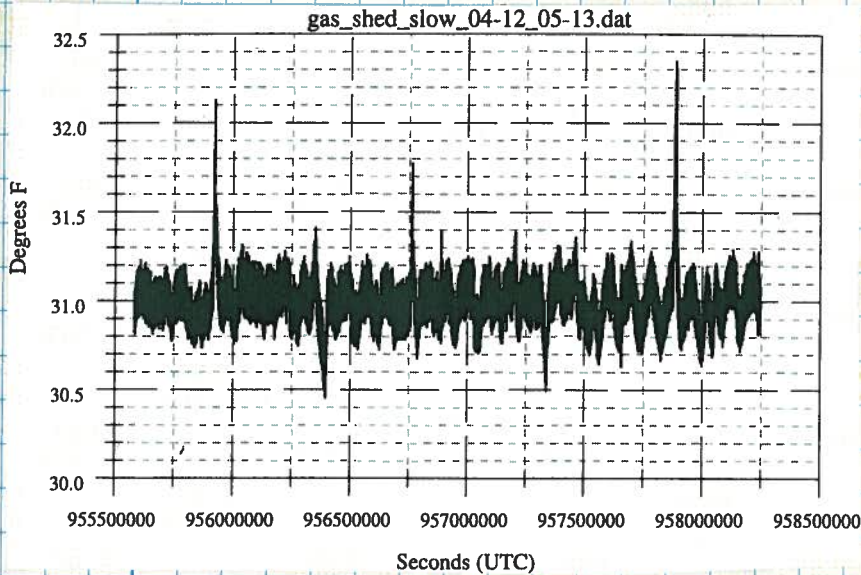
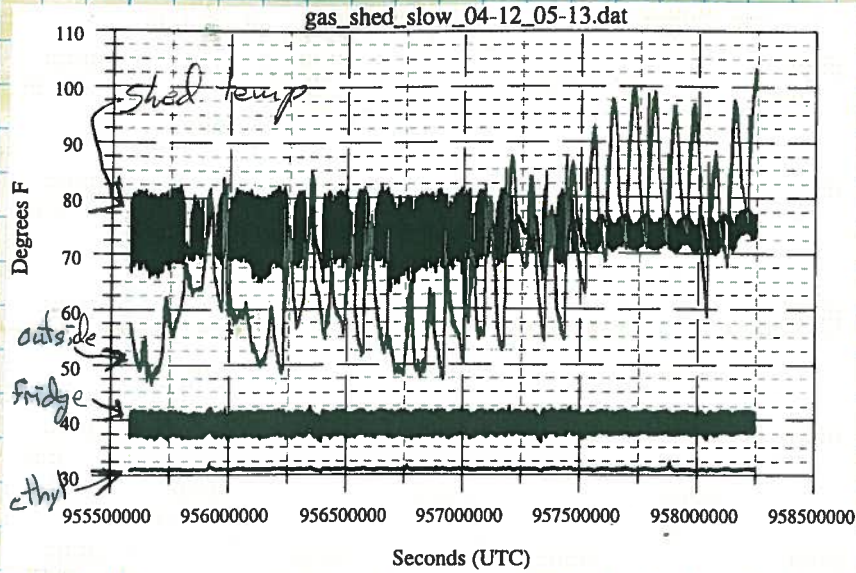
PS

The people from Hillar came in to test the Inergen. We had 6 full cylinders on the c arm. They set up an O_2 and CO_2 detector which pumped sample air through some tygon tubing to the sensor. Sensor output was logged on a laptop PC.

The output of the 4 sensors (O_2) I had installed in the hut is shown on the next page. The sensor at the top of the shield house got blown off its socket pins when the Inergen system fired. Too close to the nozzle.



Gas Shed Temperatures - One Month



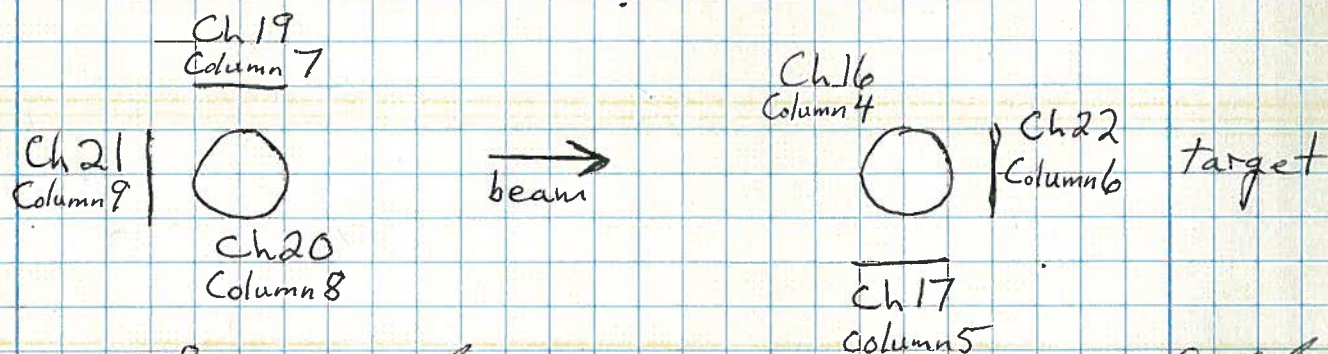
good ethanol temperature regulation.

Aluminum Bench Deflections Test 5/18 JS

On the 15th I did a crude check of the deflection of the aluminum bench in front of the target chamber.

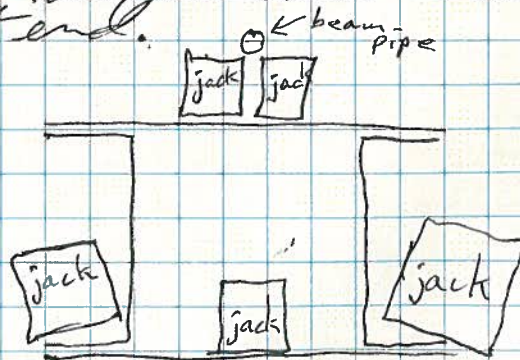
I ~~for~~ used two small bottle jacks. They weigh 12.3 lbs on the shipping scale at 5&R.

I placed the jacks at various points on the bench and ran an "ezlog" program to read the EPICS values for the gap sensors and the thermistors mounted in the air at the end of the aluminum angle used as the target for the gap sensors.



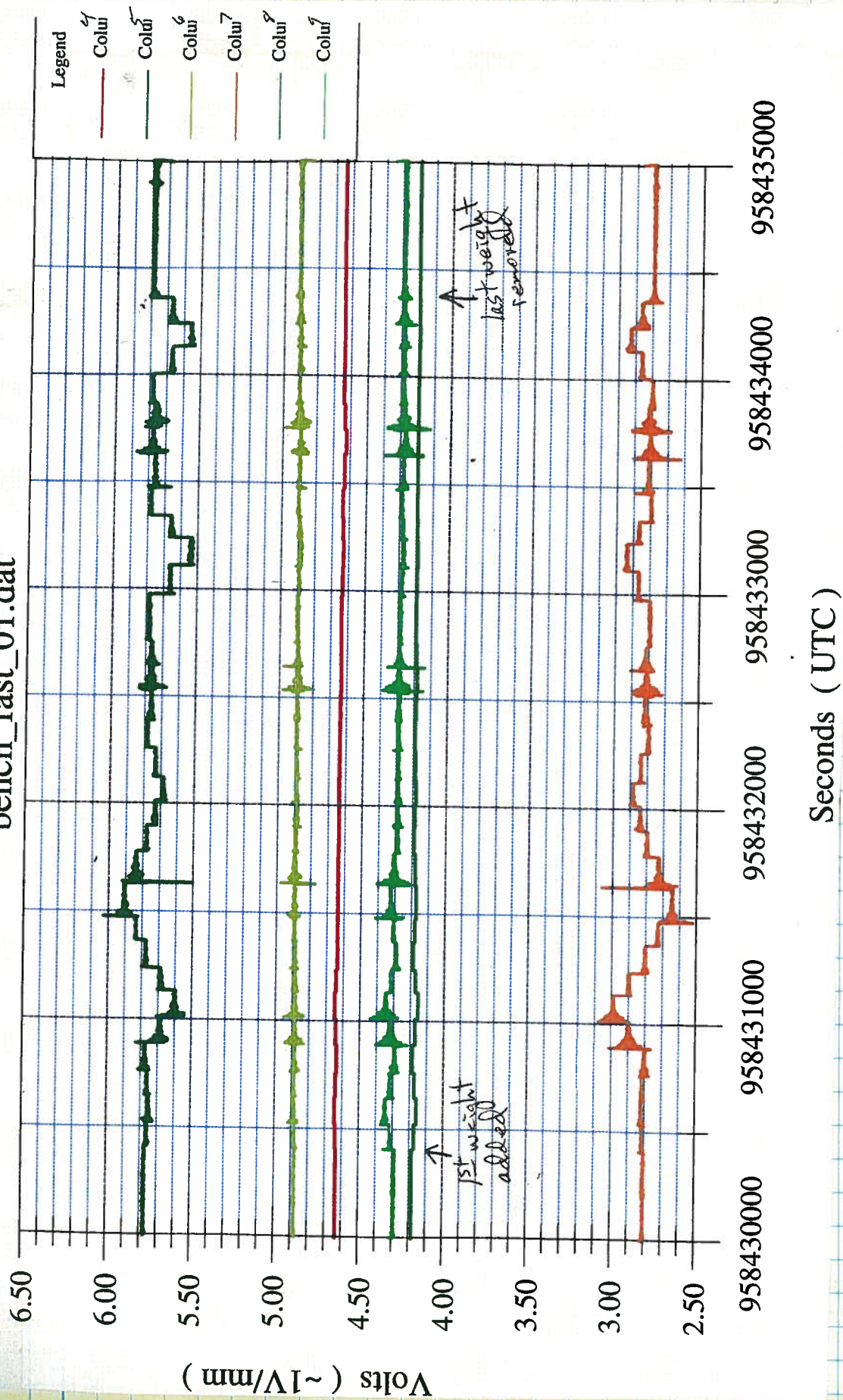
These are the EPICS ADC channels and the data columns in PsiPlot, the plotting program I use to graph the EPICS data.

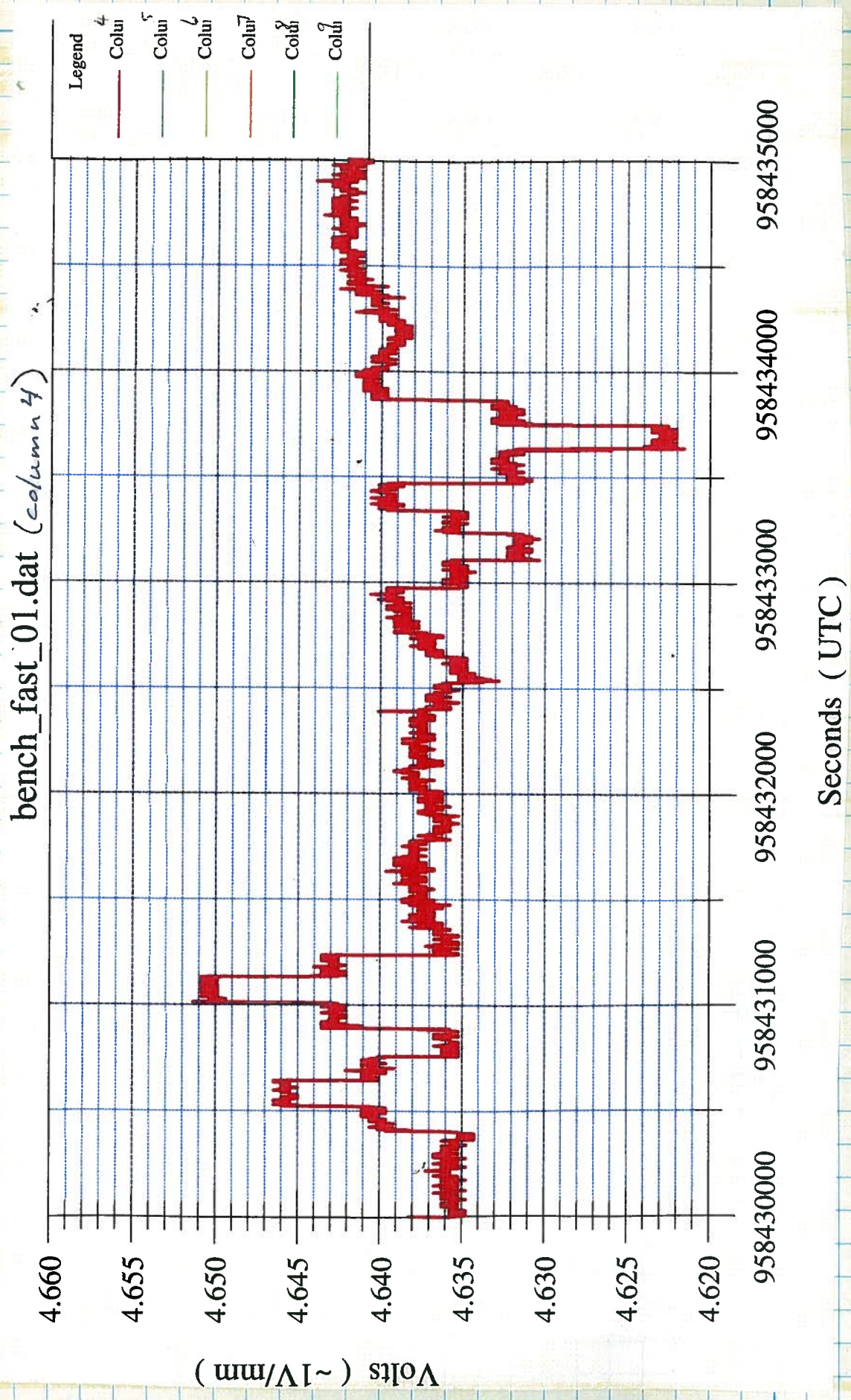
The jacks were placed on the bottom flange of the u-channel for the left & right side positions. On the upstream end the center of the bench is open. I placed the jacks at ~center of the bottom plate on that end.



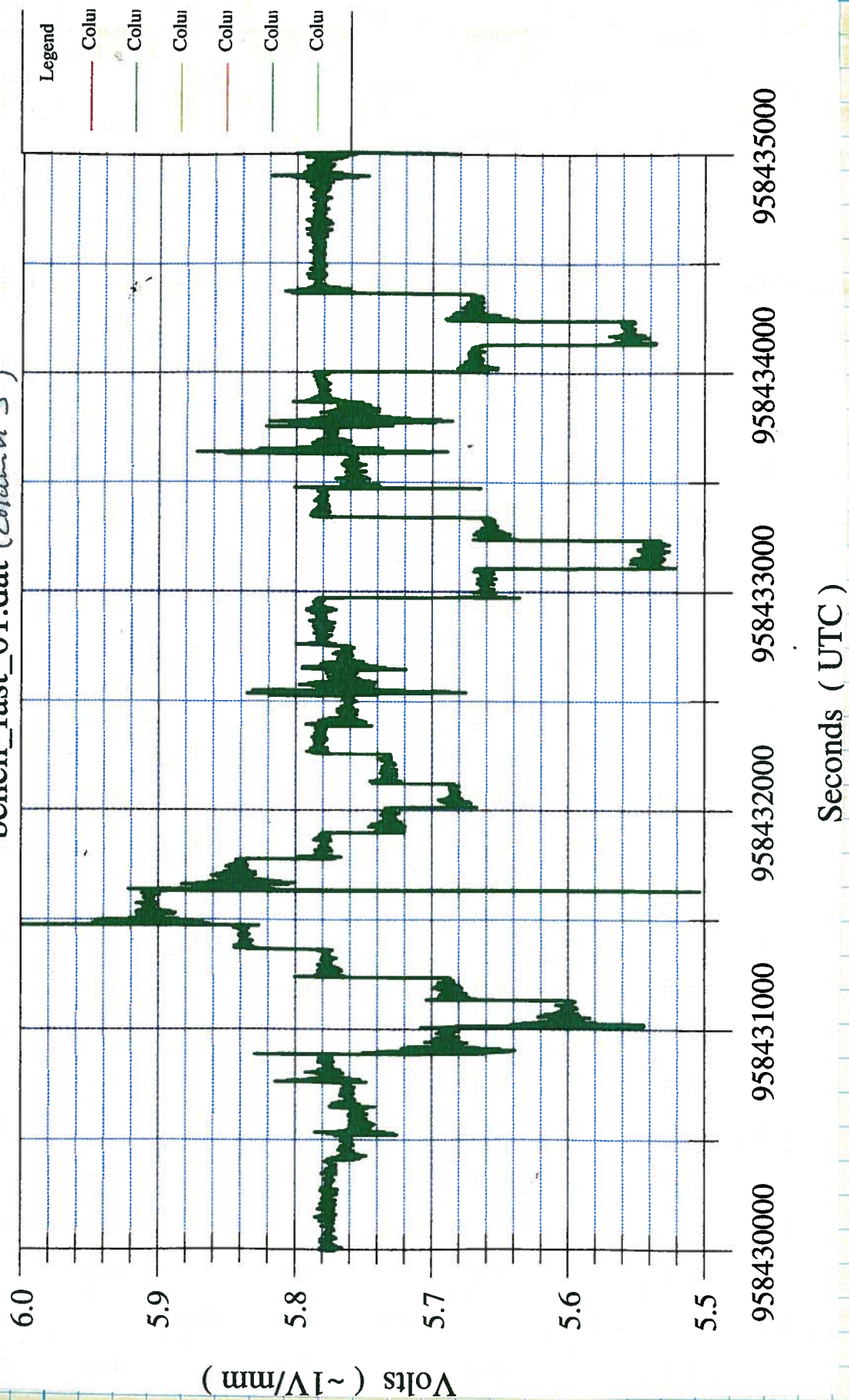
~ relative positions

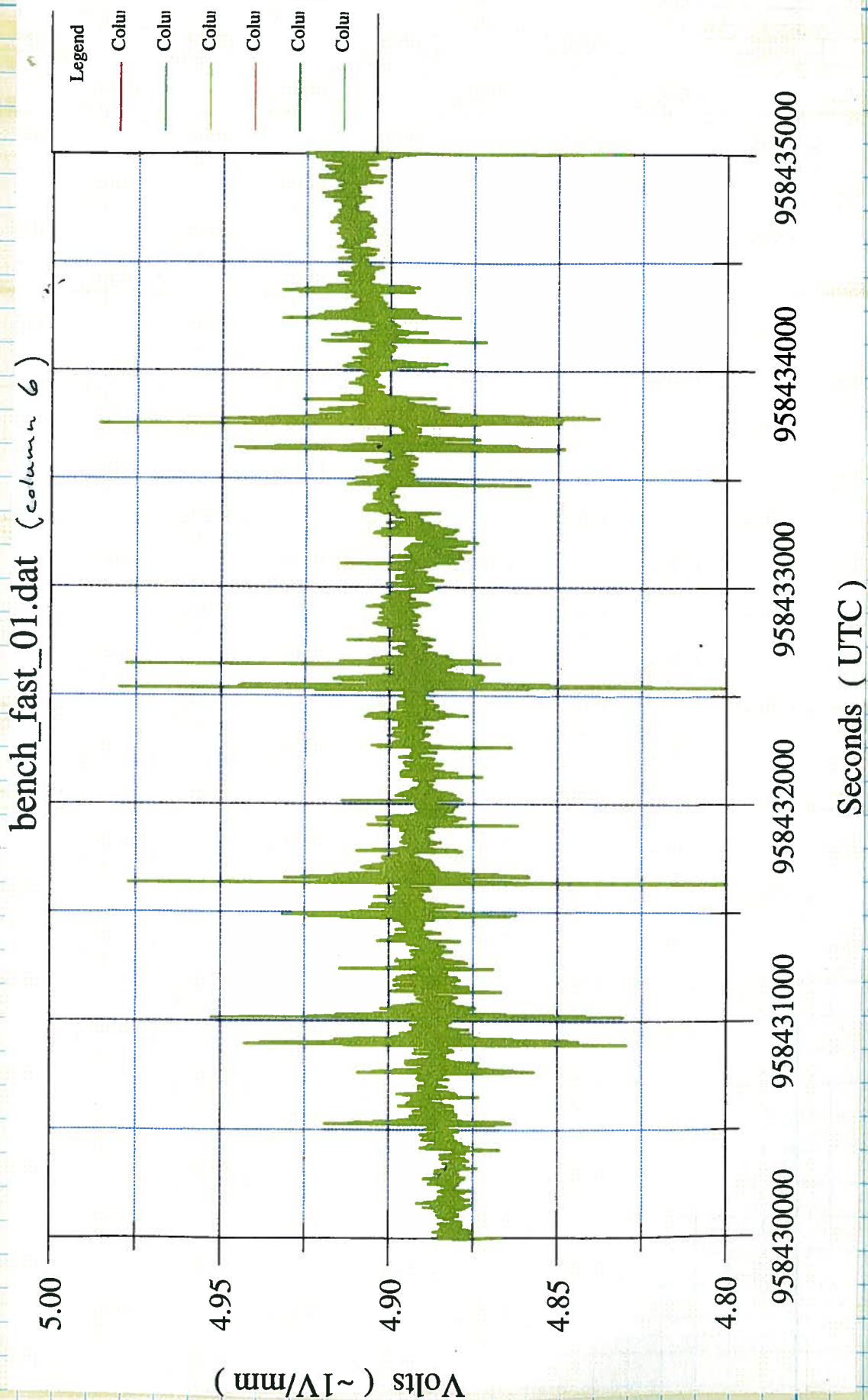
bench_fast_01.dat

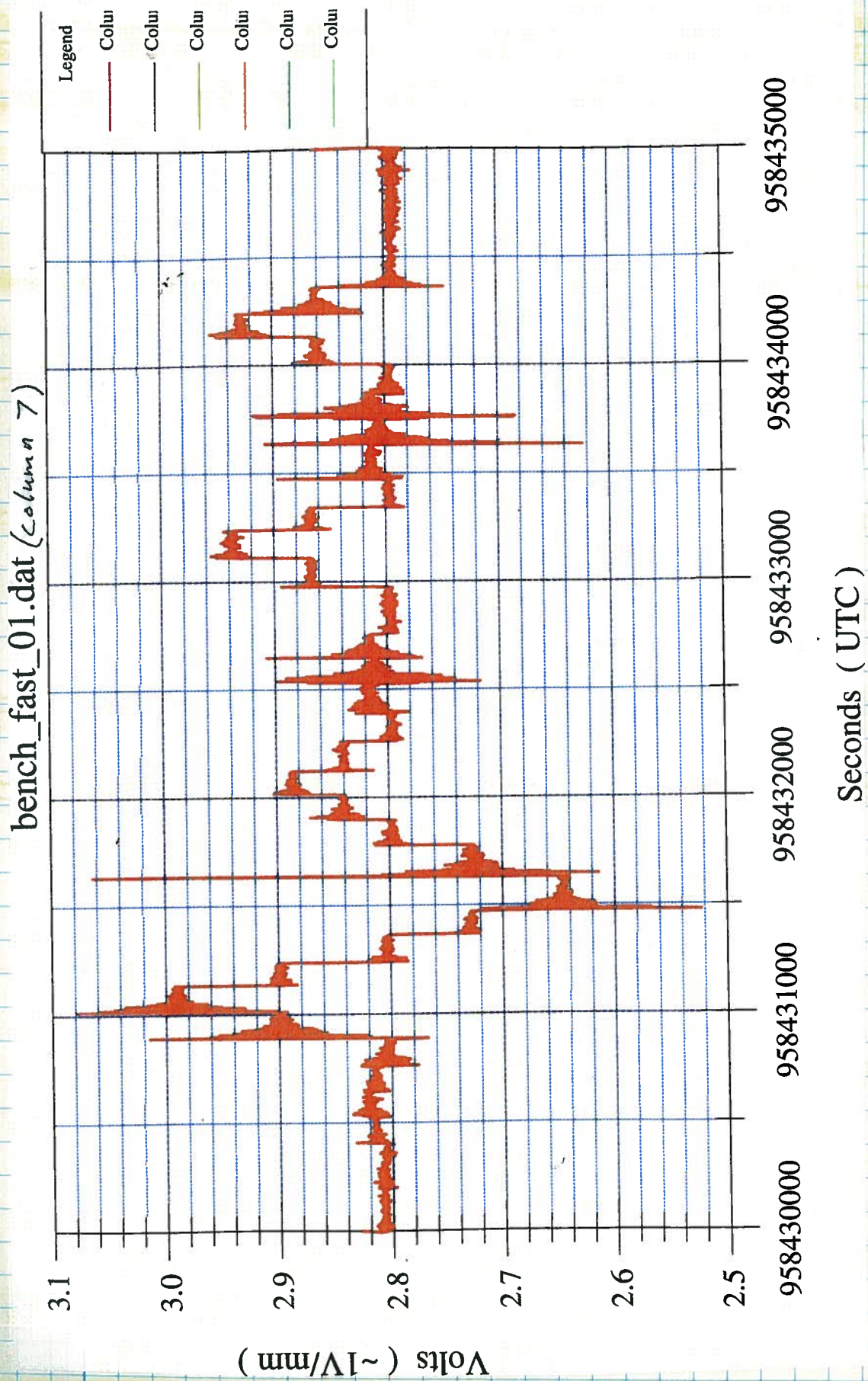


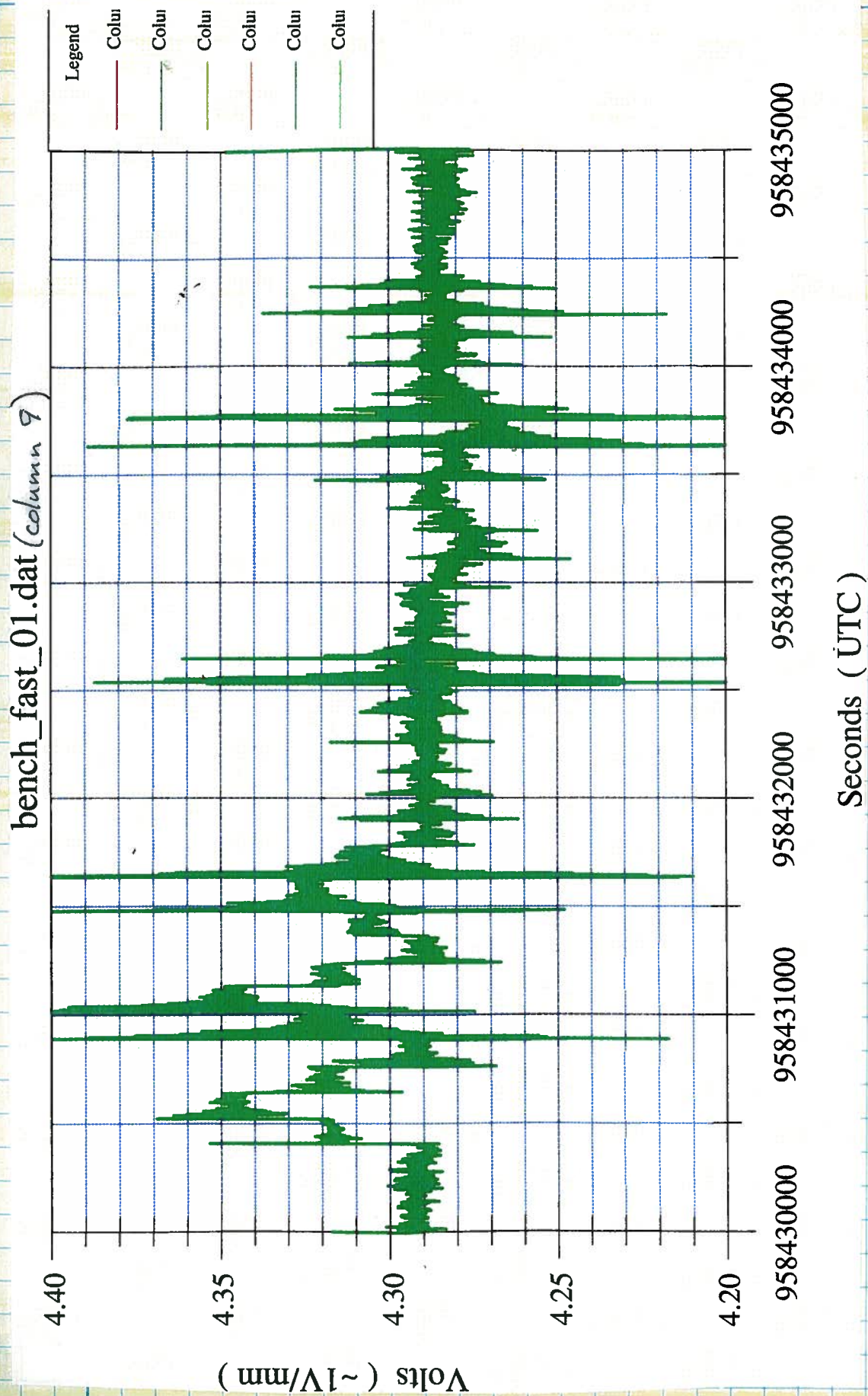


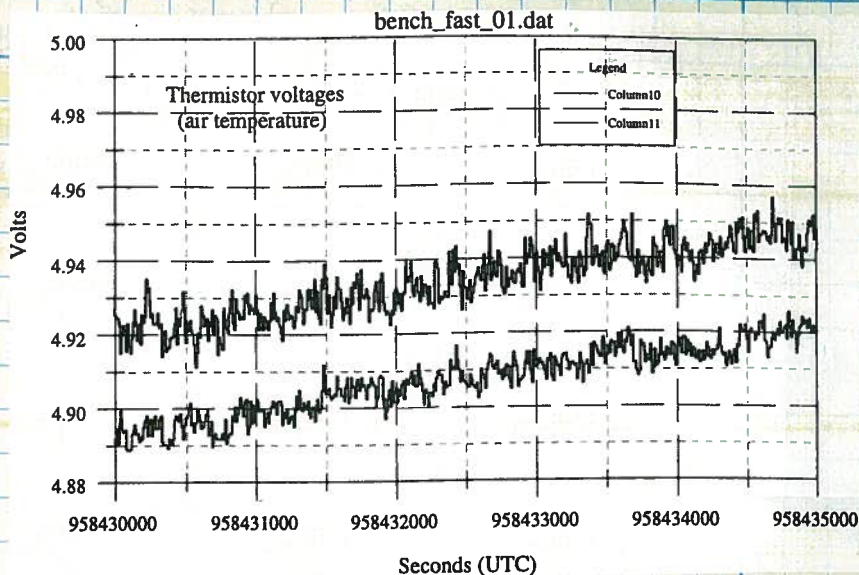
bench_fast_01.dat (column 5)









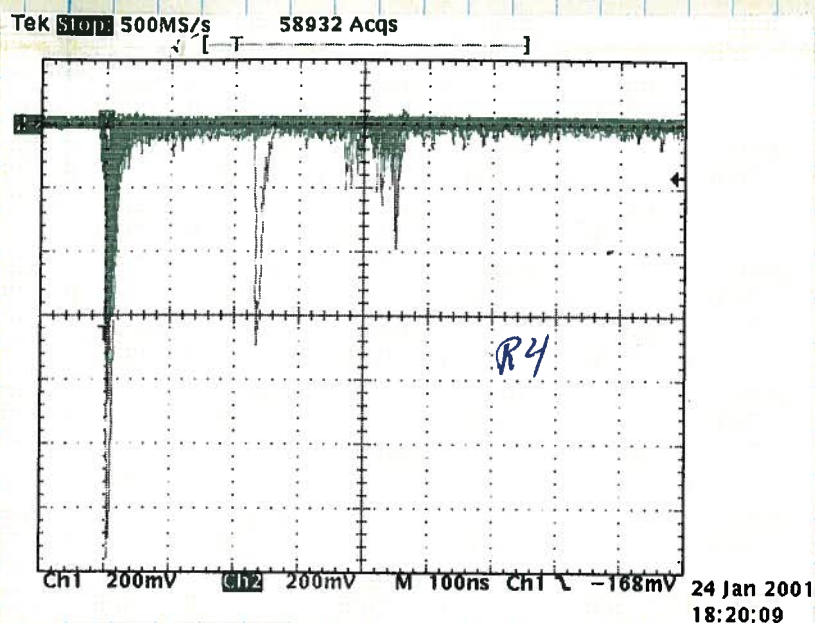


6:50 - put one short jack in end of bench
(upstream end)
6:52 - added a second jack
6:54 - removed one jack
6:56 - took other jack off
6:58 - put one jack on left side
7:00 - other jack on
7:02 - one off
7:04 - both off
7:06 - one on right
7:08 - 2 on
7:11 - one off
7:13 - both off
7:15 - one on left by upstream port
7:17 - 2 on
7:19 - one off
7:21 - both off
7:23 - one near center of top @ port
7:25 - 2 on - dirty corner across beam pipe
7:27 - one off
7:29 - both off
7:33 - one on - left side - midway between ports
7:35 - 2 on
7:37 - one off
7:39 - 2 off
7:41 - one near midway on top
7:44 - 2 on (dirty corner)
7:46 - one off
7:48 - both off
7:50 - one on left at downstream end
7:52 - 2 on
7:54 - one off
7:56 - both off

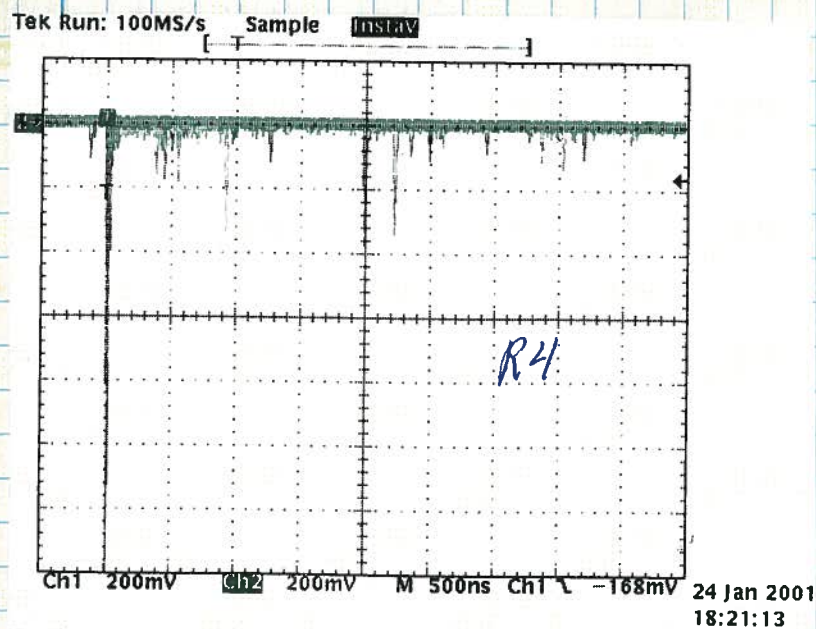
jacks removed
in order of
last on
first off

4/12/01 Left Arm S2 PMT Check

On Jan. 24 I went to the left arm detector
 but to look at S2 R4 PMT. These are the pictures
 I captured. They are here, not for anything
 of note, rather as a reference for any future
 work with the 8575 PMTs.

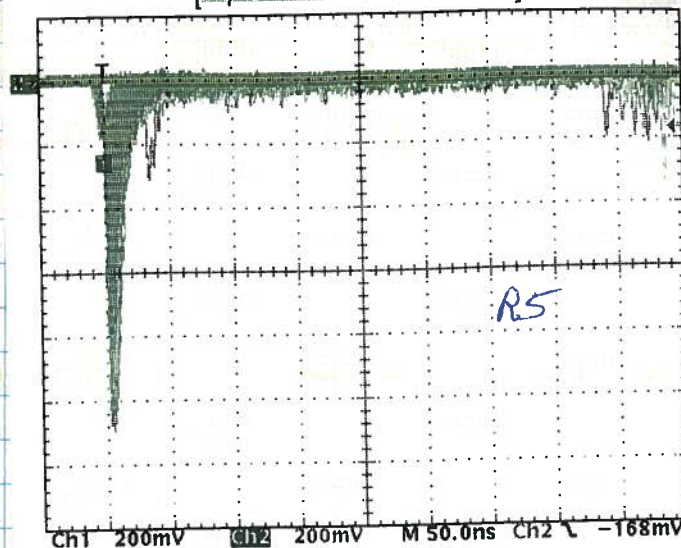


S2 R4

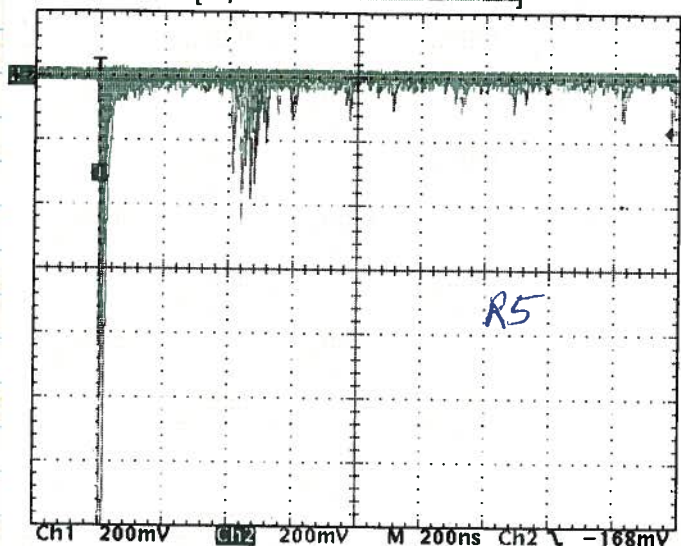


52R5

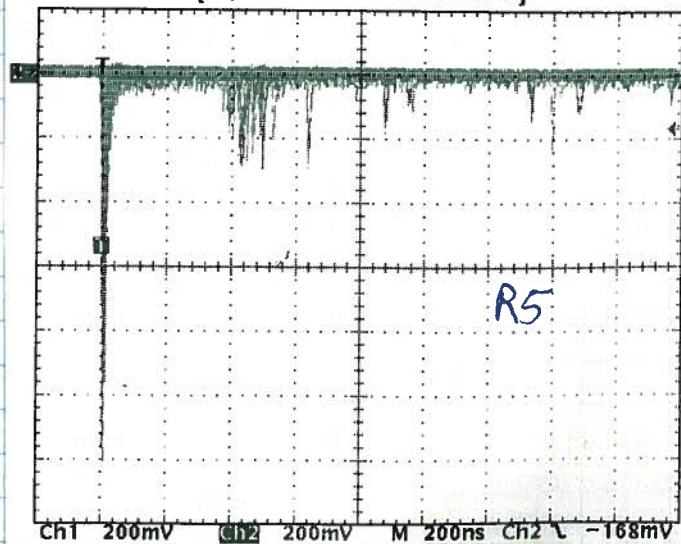
Tek Run: 1.00GS/s Sample Instav

24 Jan 2001
18:13:32

Tek Run: 250MS/s Sample Instav

24 Jan 2001
18:15:01

Tek Run: 250MS/s Sample Instav

24 Jan 2001
18:15:34

4/12/01

RICH Preliminary Operation

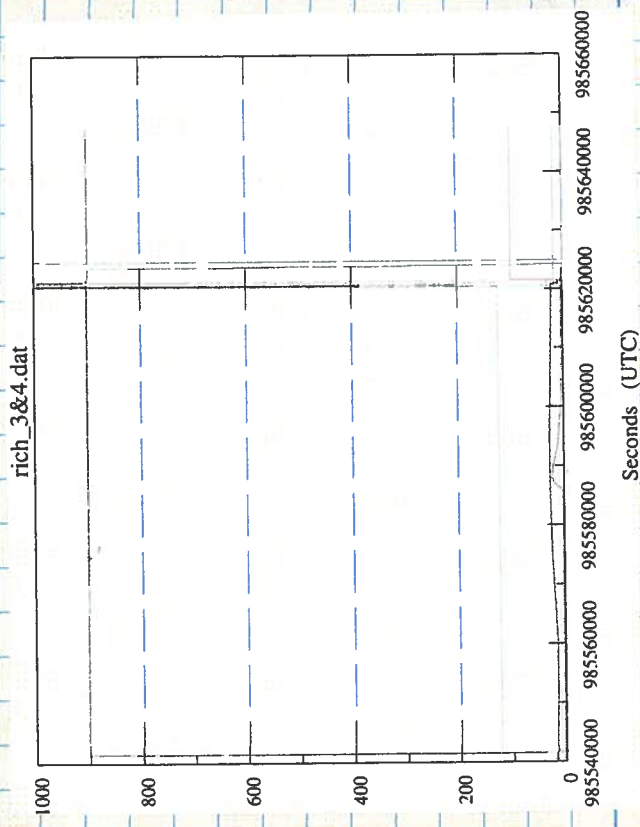
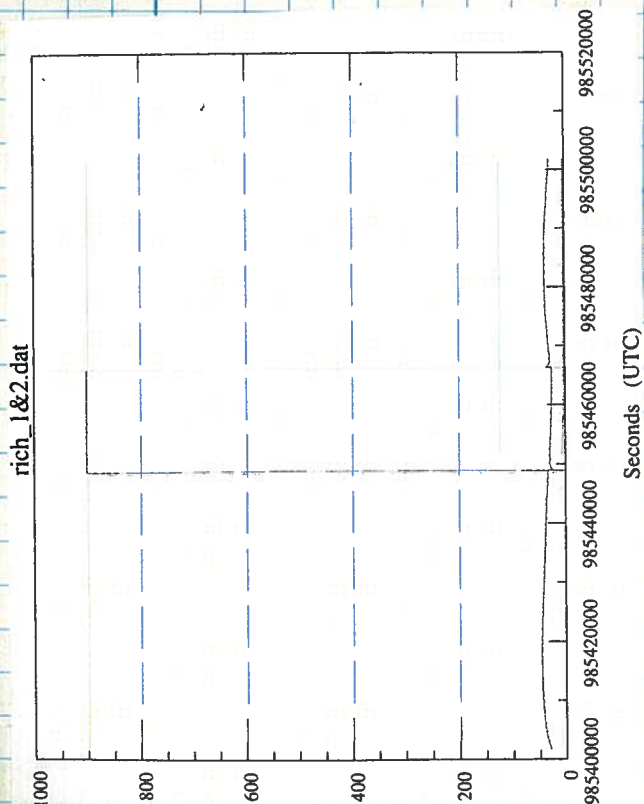
The INEN RICH detector was installed in the left arm detector stack. The installation was tight/rushed. There were various problems with the sensor readouts/controls.

The following plots are the first EPICS *ezlog* data from the

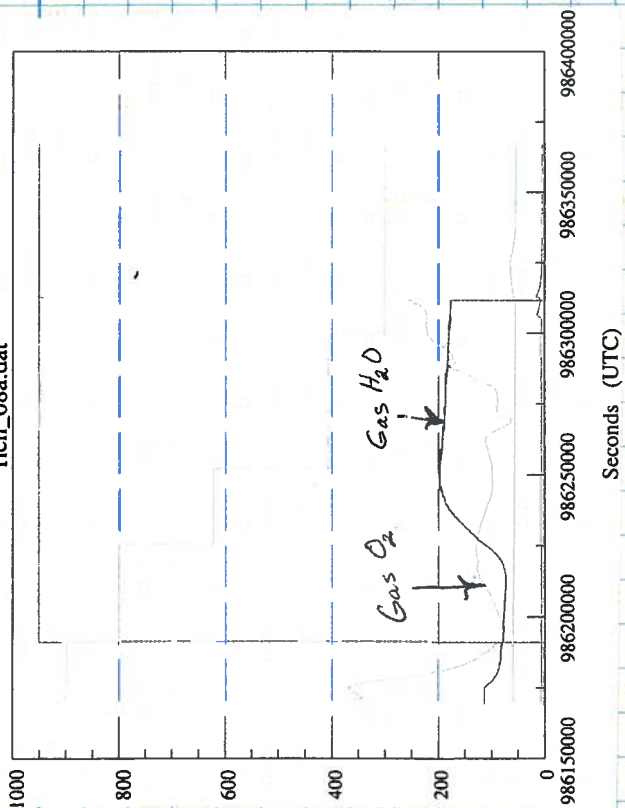
Arcord line flow controller readout
 Methane line flow controller readout
 Chamber exhaust O_2 sensor output
 Chamber exhaust H_2O sensor output
 N_2 flush O_2 sensor output
 N_2 flush H_2O sensor output

EPICS channels →
 recorded by "ezlog"

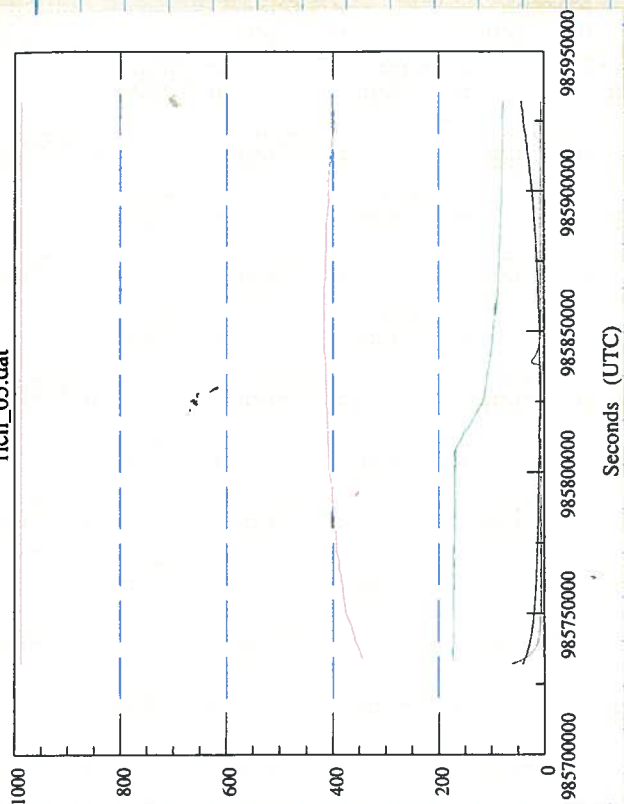
```
ocha3:date
acRICH_HPE1313A:0_GasO2
acRICH_HPE1313A:0_GasMoist
acRICH_HPE1313A:0_Ch4
acRICH_HPE1313A:0_Ch5
acRICH_HPE1313A:0_RadO2
acRICH_HPE1313A:0_RadMoist
acRICH_HPE1313A:0_Cond_Temp
```



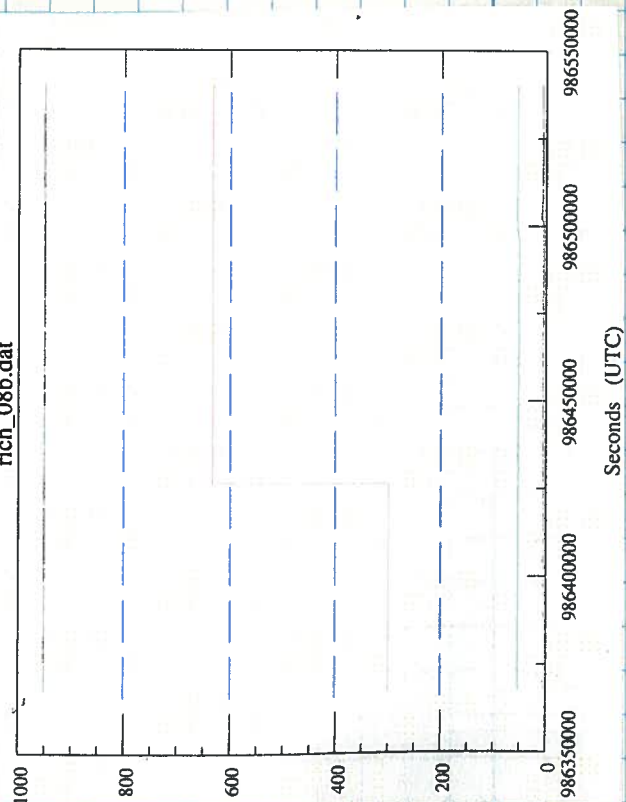
rich_08a.dat



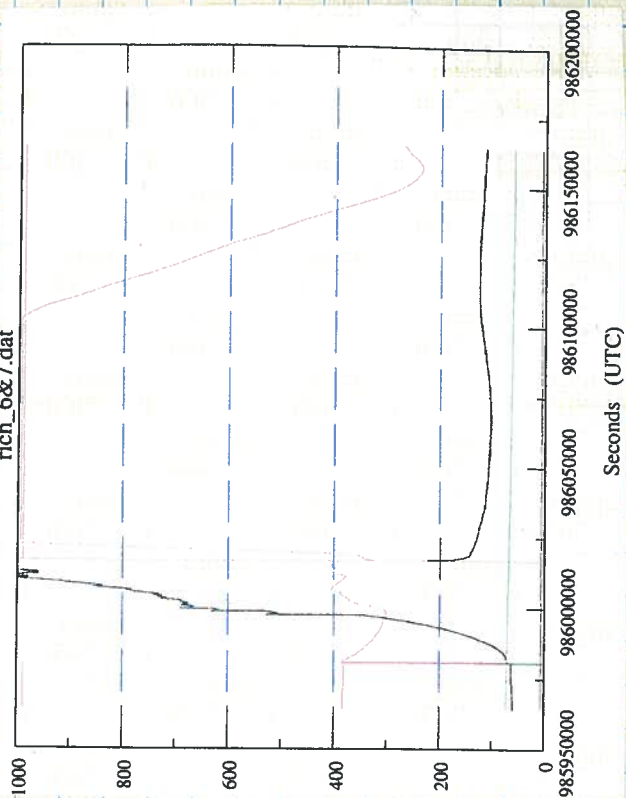
rich_05.dat

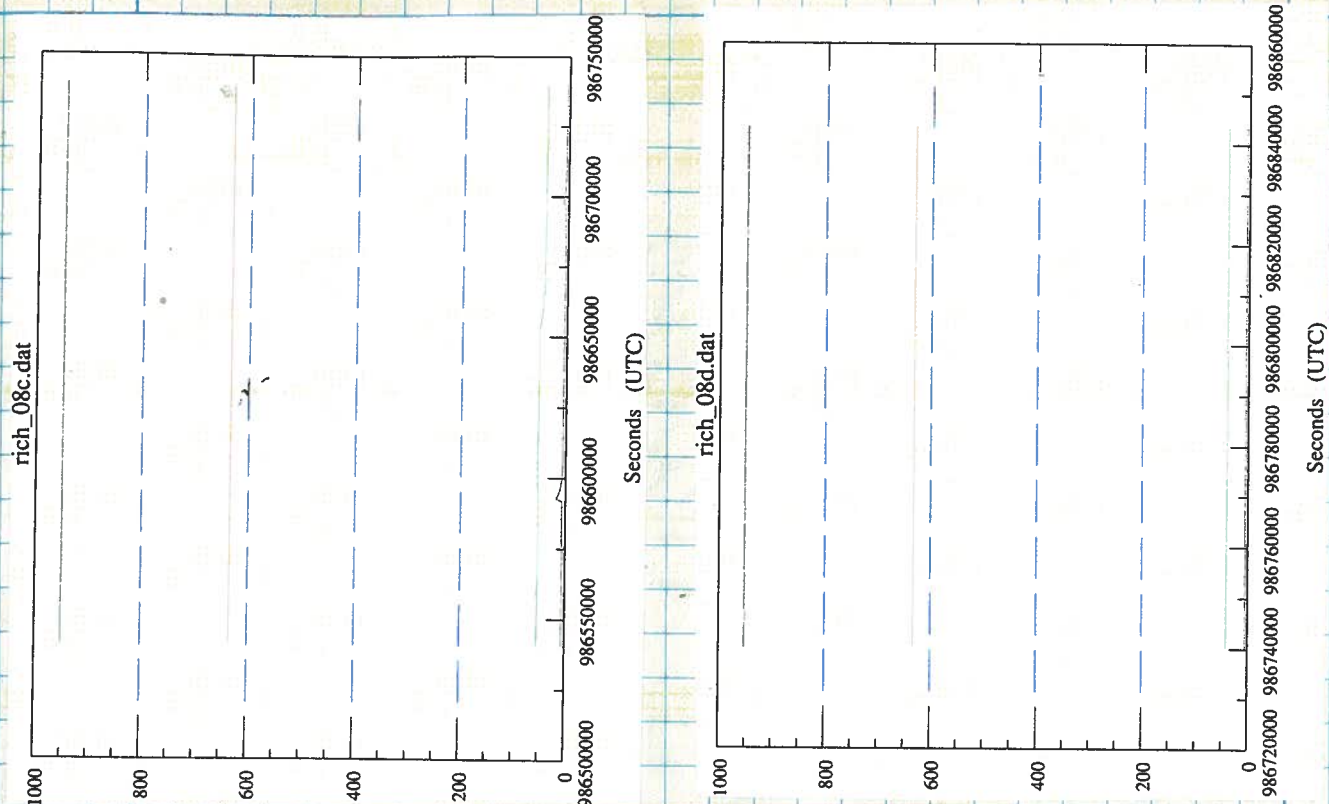


rich_08b.dat



rich_6&7.dat





As can be seen, the N_2 flush lines behaved in a reasonable fashion (once the sensor ranges/scale factors were adjusted). The behavior of the chamber sensors was such as to cause me to doubt their performance.

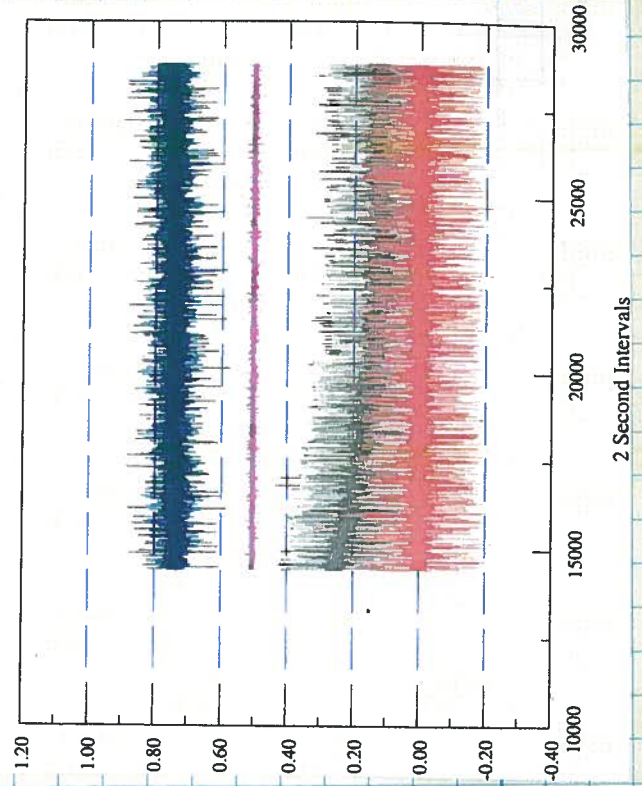
I removed the sensors from the hall just a little after 986300000 (UTC). I took them to the Gas Shed and hooked an Argon-Boro-Brade cylinder up to a kluge'd together gas system. The voltage control and readouts are done by a webDAQ by CEC.

[

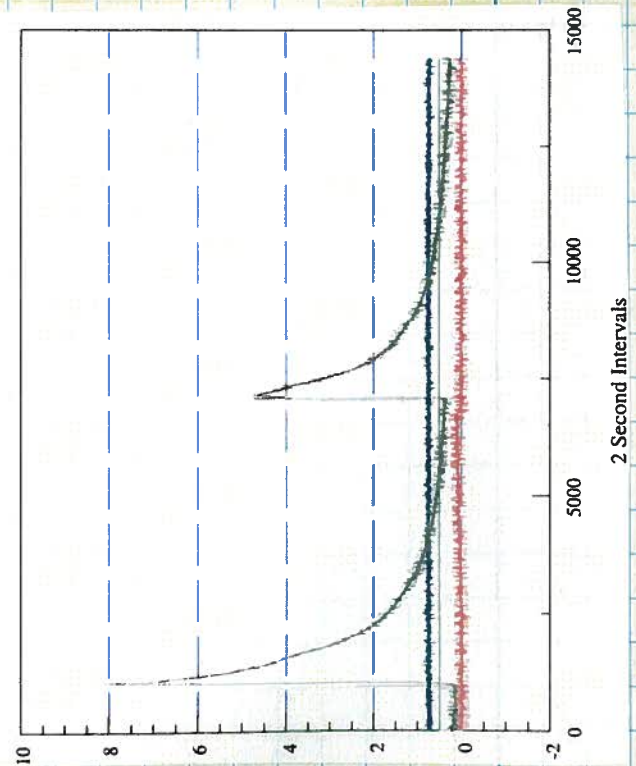
The first spike in the lower plot is on the H_2O sensor. I took off the ~5' of $\frac{1}{4}$ " OD copper tube from the regulator, to the flow controller and blew through it. Then I re-connected the section. The second spike is from the same procedure, except, I waved it around in the air and only blew through it a little bit.

While I was talking to Brian Cross, he said they had tried using a syringe of oxygen to inject O_2 into a gas line before the sensor. He said the sensor response is so slow it will not see a "slug" of O_2 like that.

data_2_20010410102906.dat



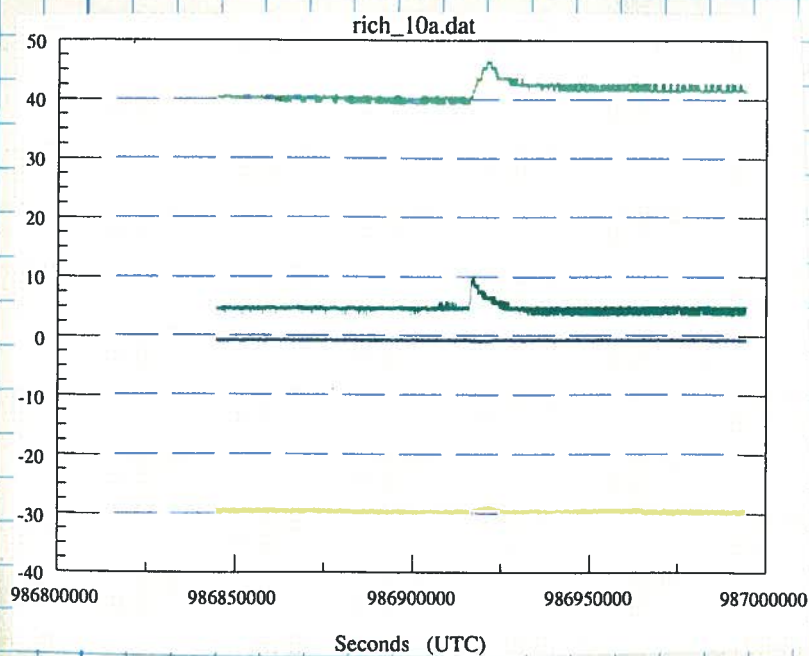
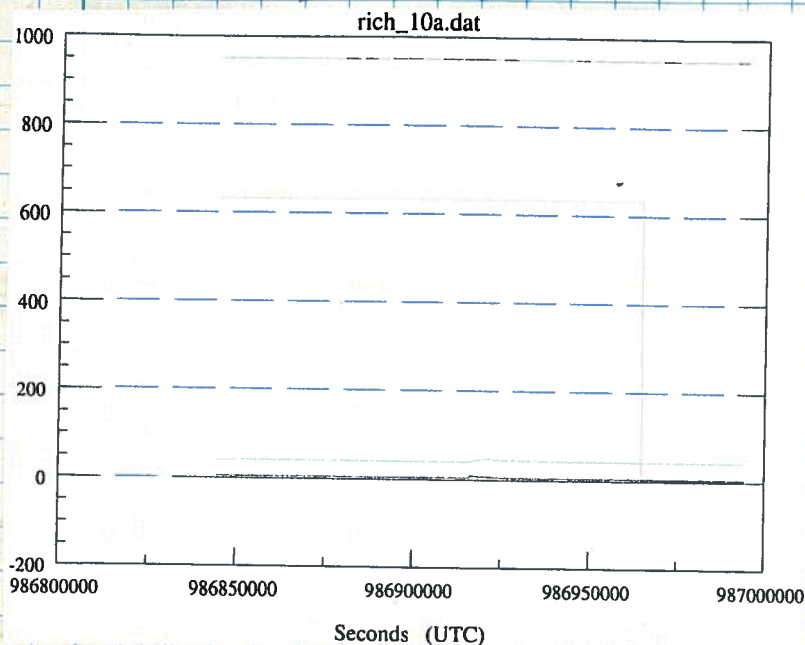
data_2_20010410022908.dat



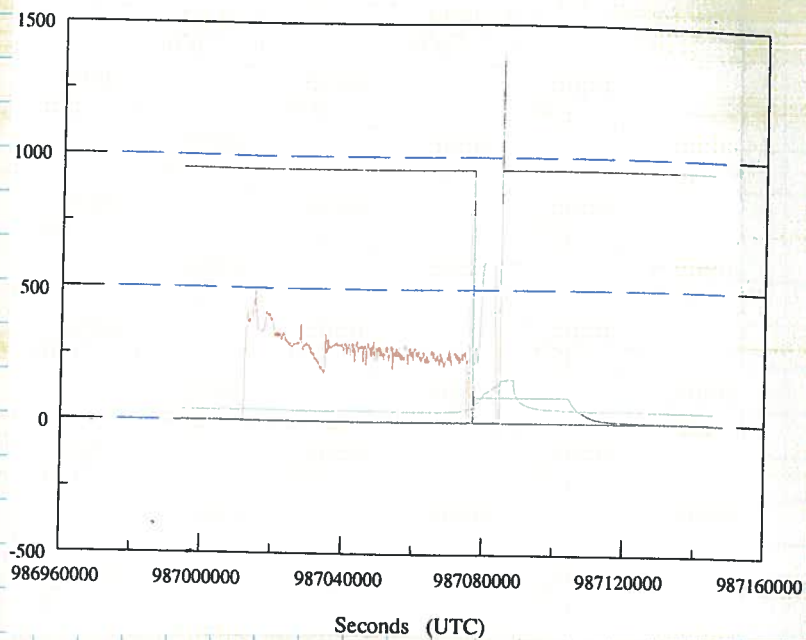
4/16

JS

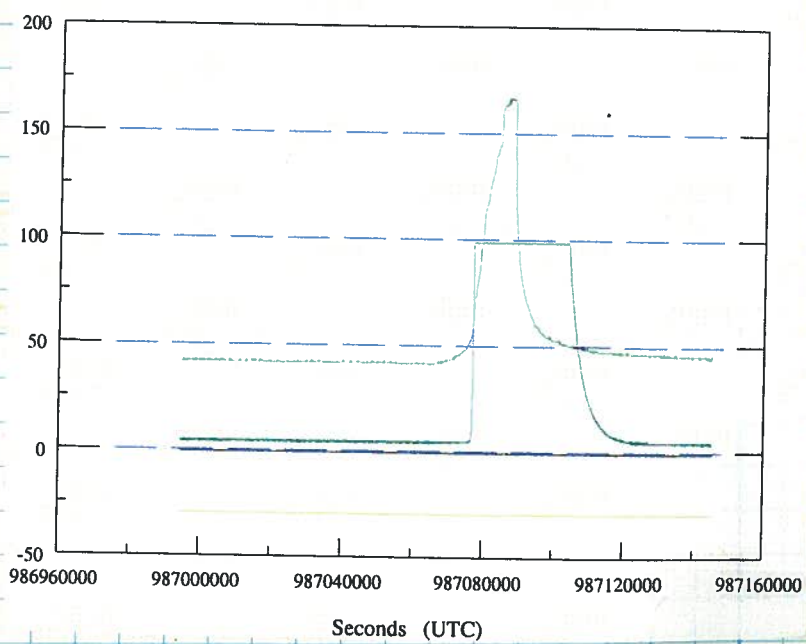
The following plots continue from p. 91 of this logbook. Shown here are a filter change and when the nitrogen cylinders ran out. The N_2 shuts down all the gases, which have pneumatically driven, normally closed valves. The N_2 supply is used to drive those valves, as well as flush the RTCH.



rich_10b.dat

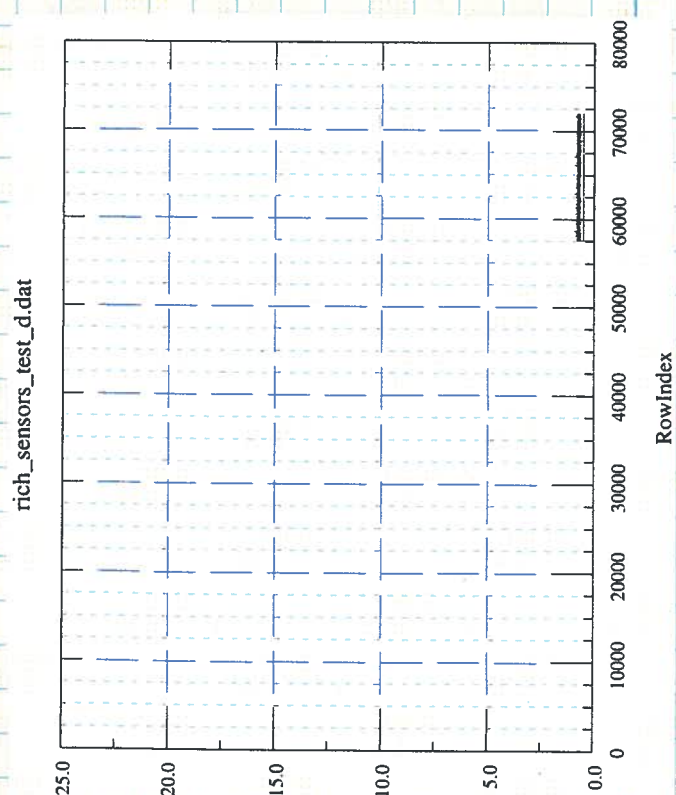
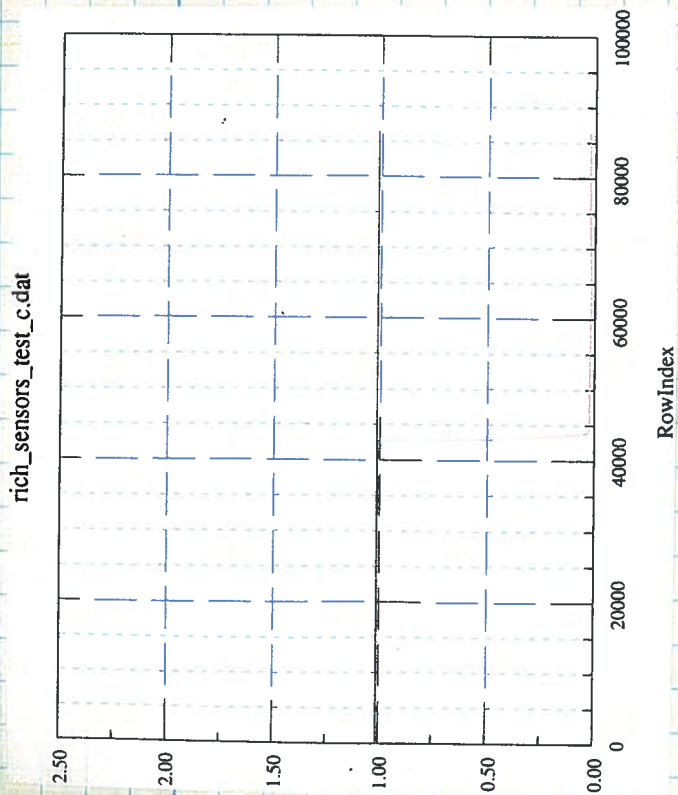
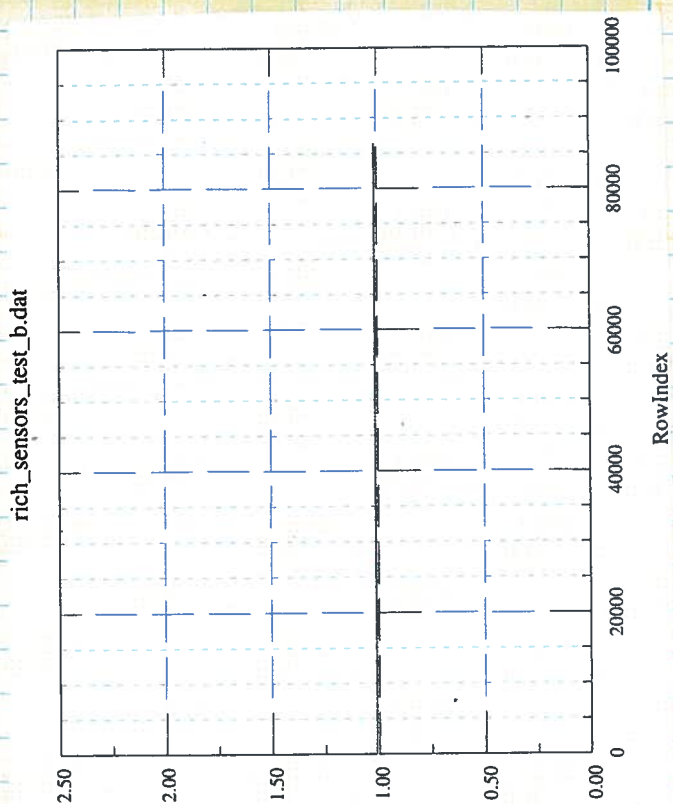
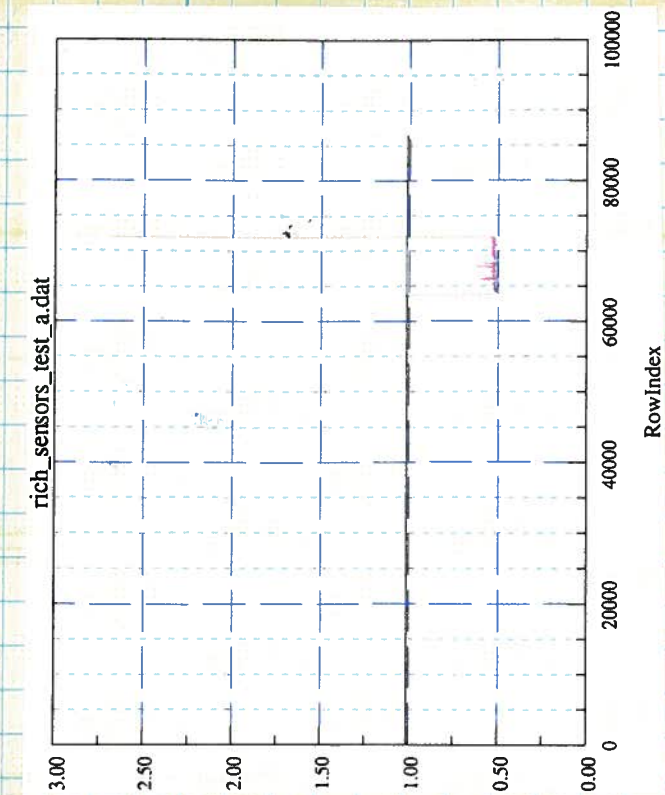


rich_10b.dat

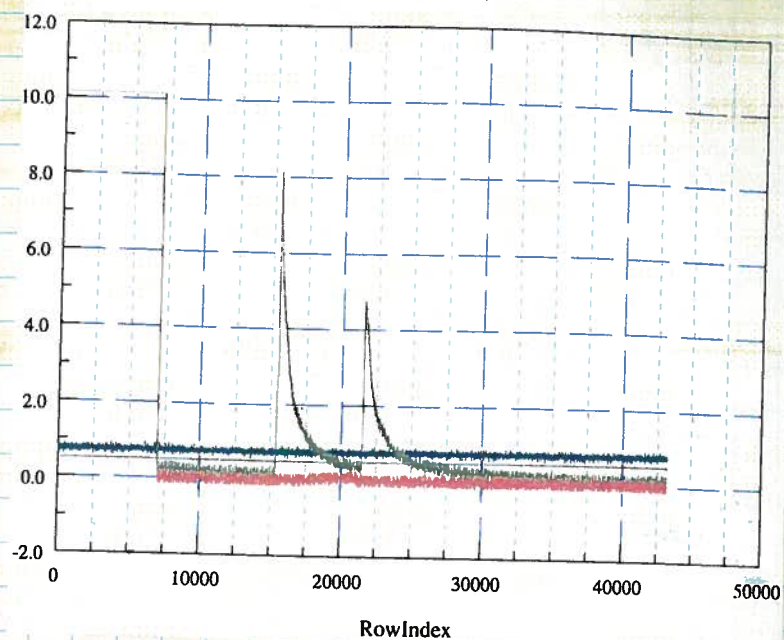


4/19

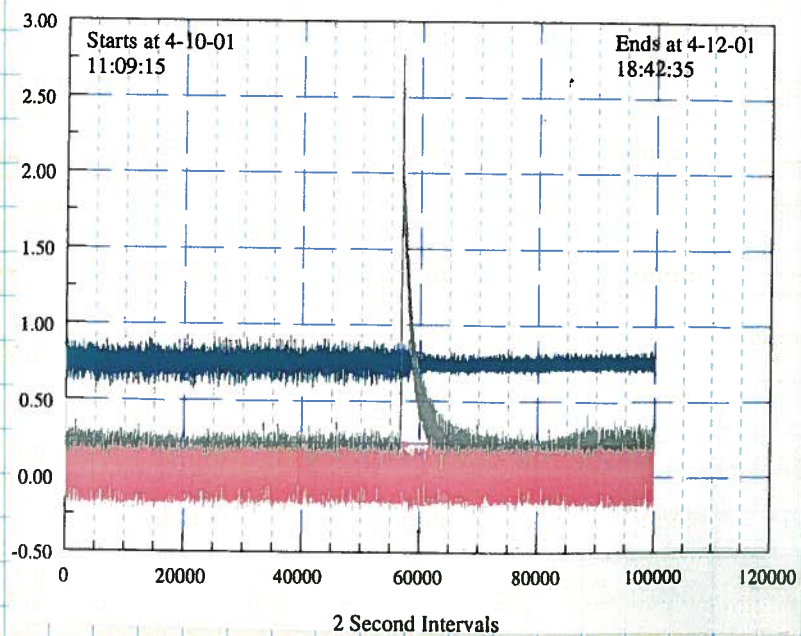
[Handwritten signature]

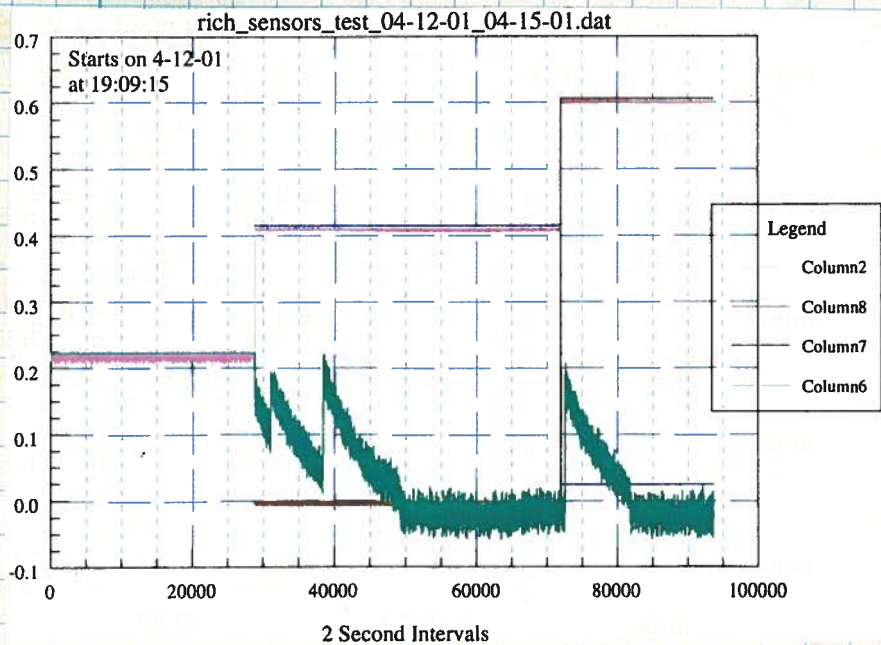
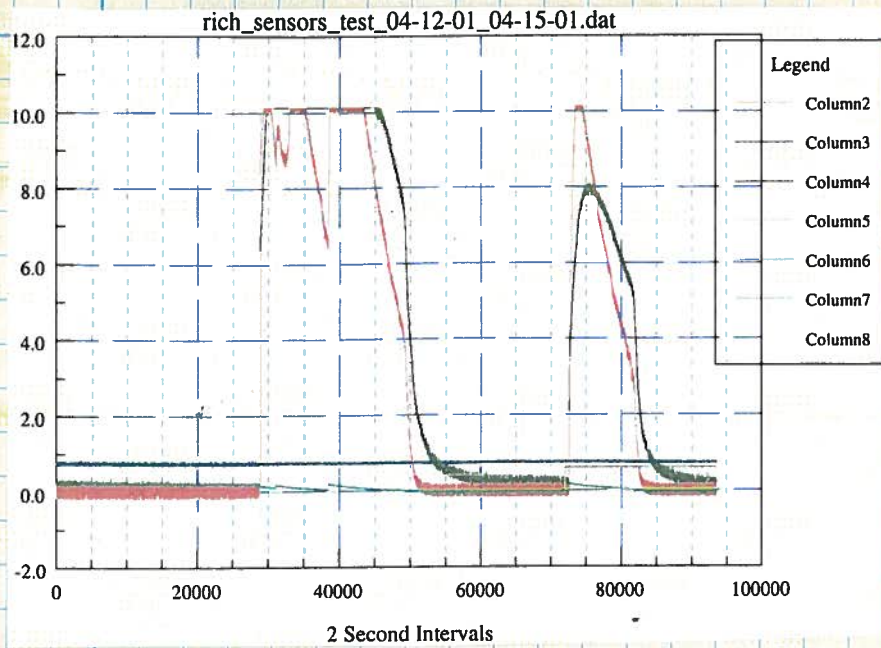


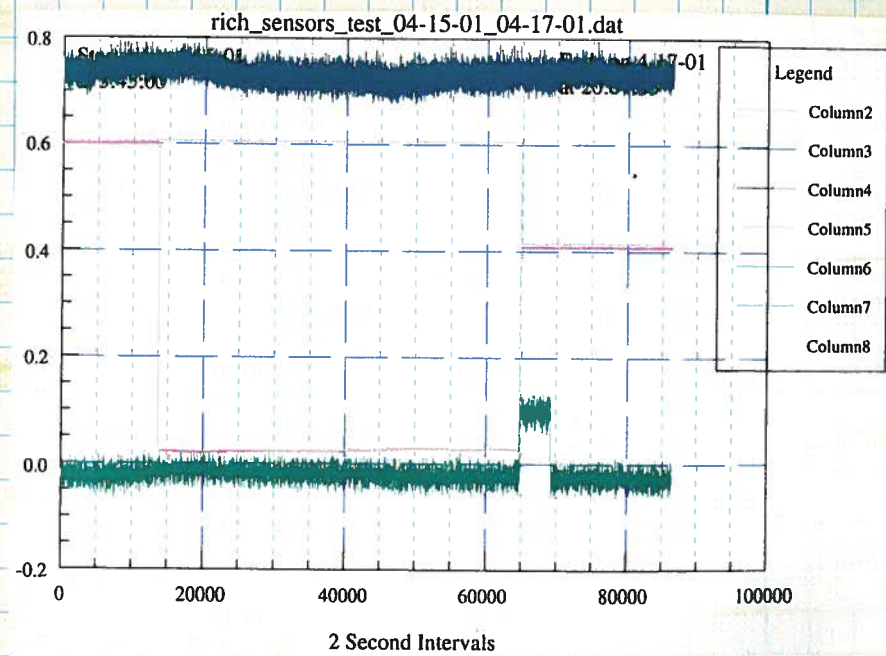
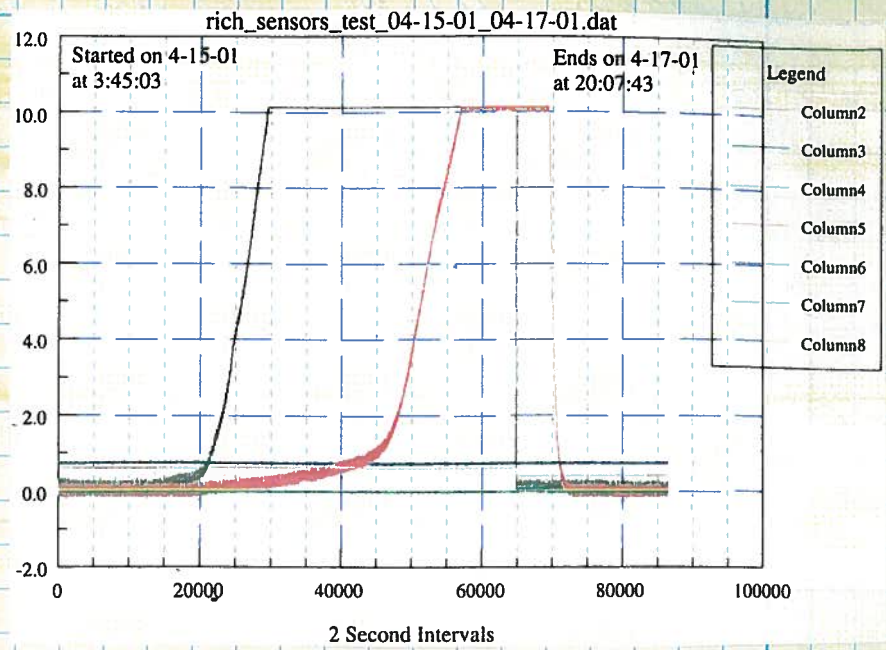
rich_sensors_test_e.dat



rich_sensors_test_04-10-01_04-12-01.dat



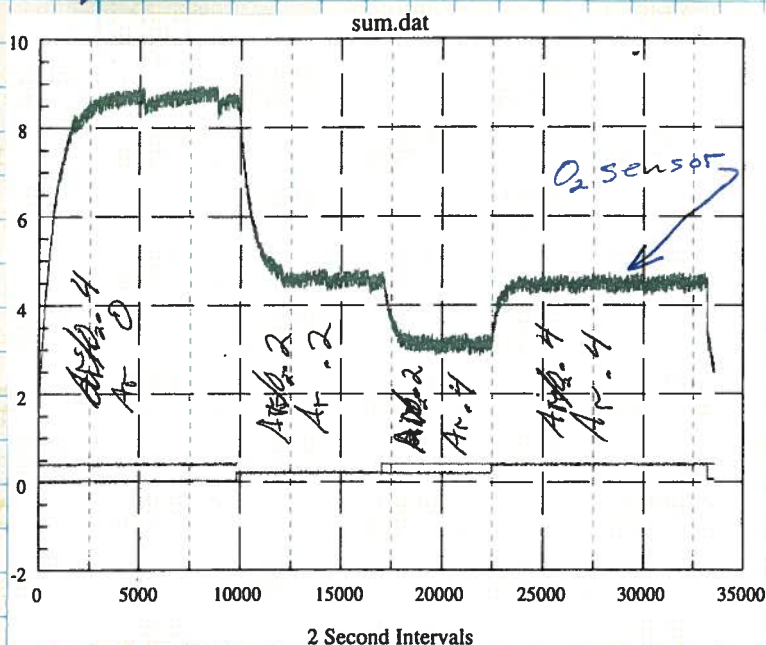


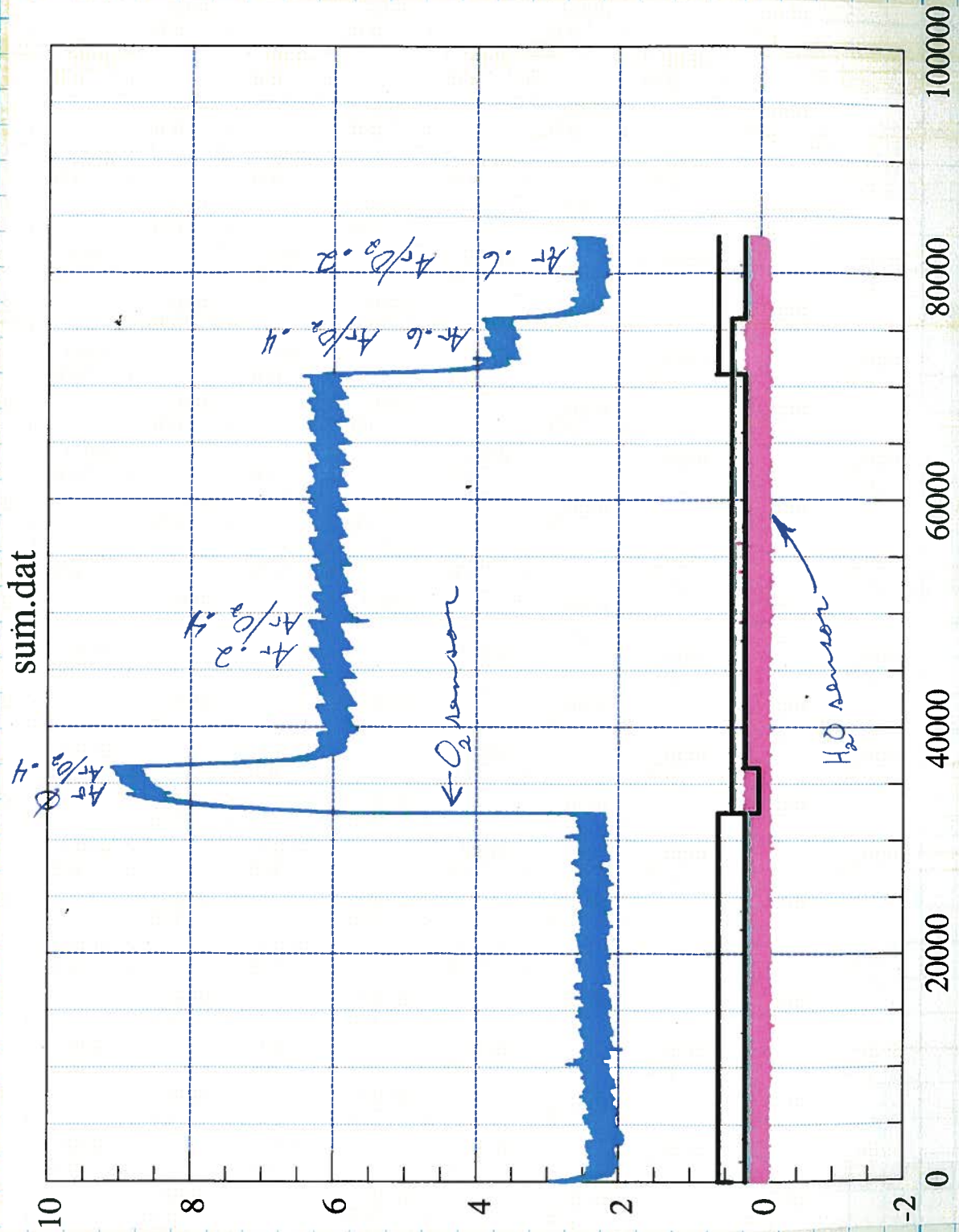


4/25 Oxygen & H₂O Sensors in The Gas Shed

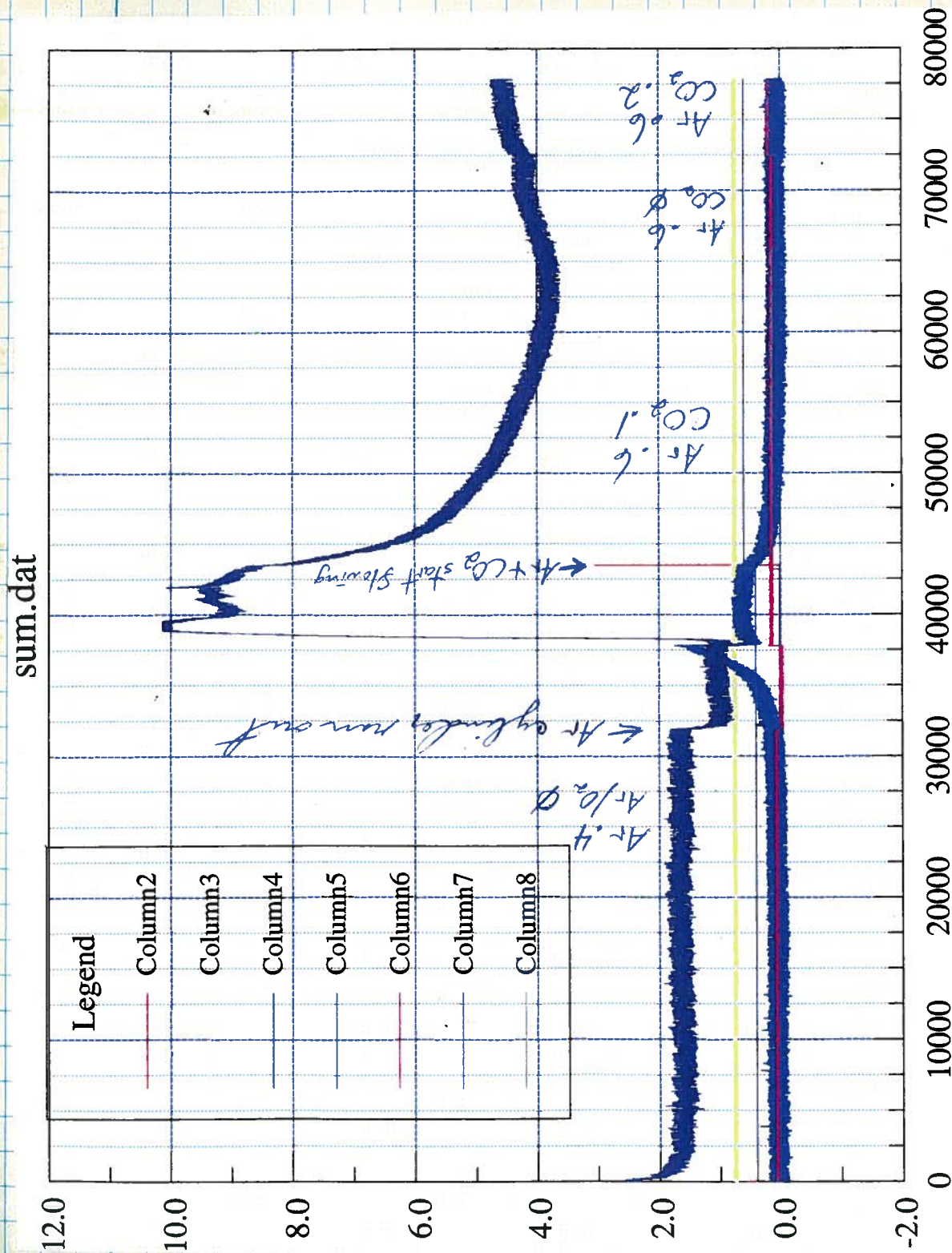
I put a cylinder of welding grade Ar and a cylinder of welding grade Ar/O₂ (98%/2%) on the portable mixing system. This allowed me to get the O₂ concentration low enough for the sensor.

The response from the H₂O sensor was consistently zero. I varied the set voltages of the flow controllers using the webDAQ DAC outputs. The DAC settings for the appropriate flow controllers are indicated on the plots.

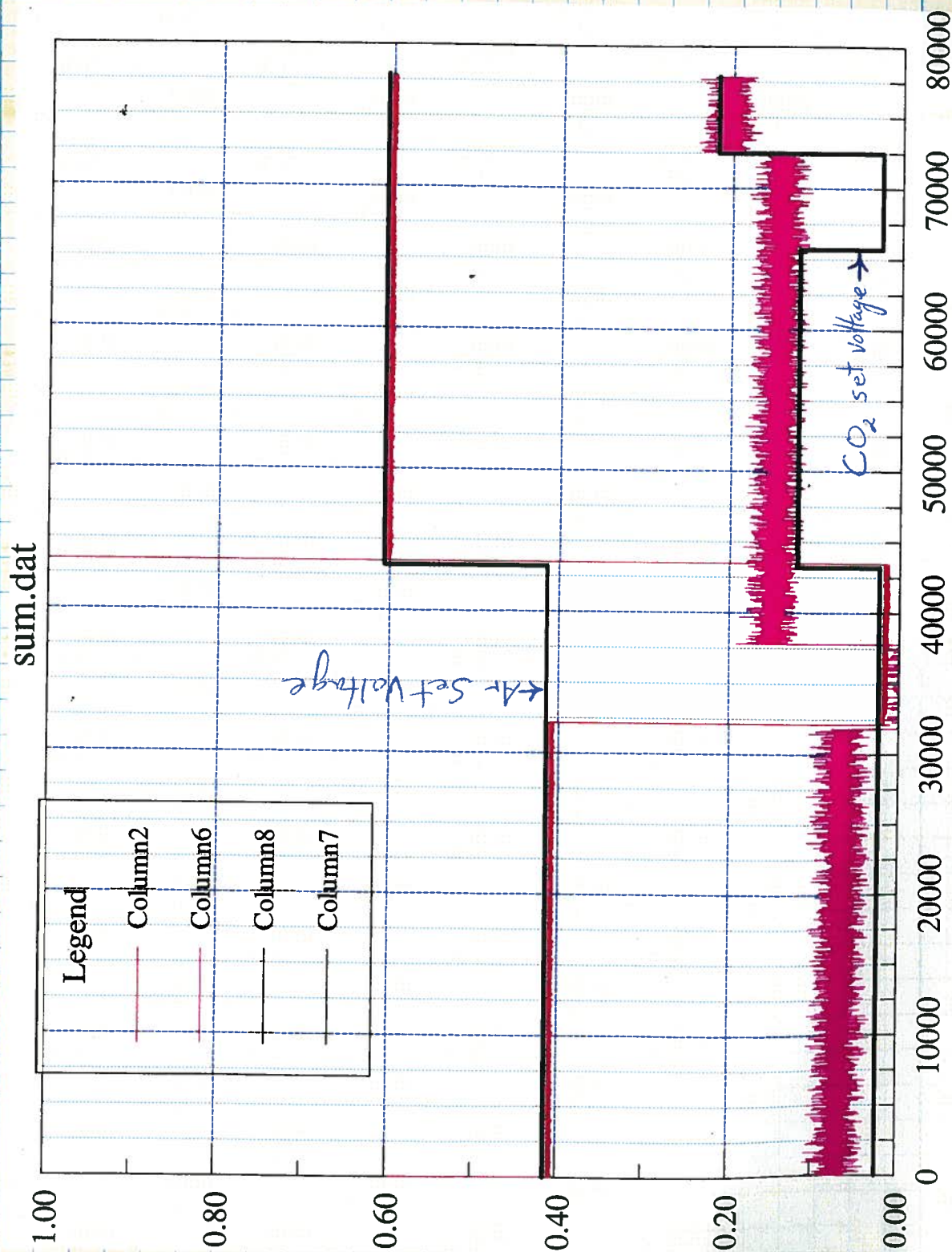




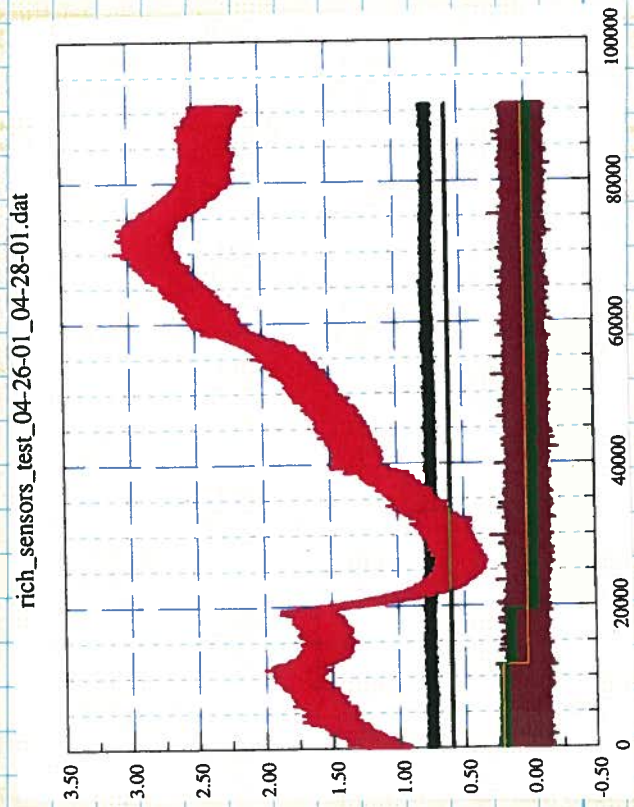
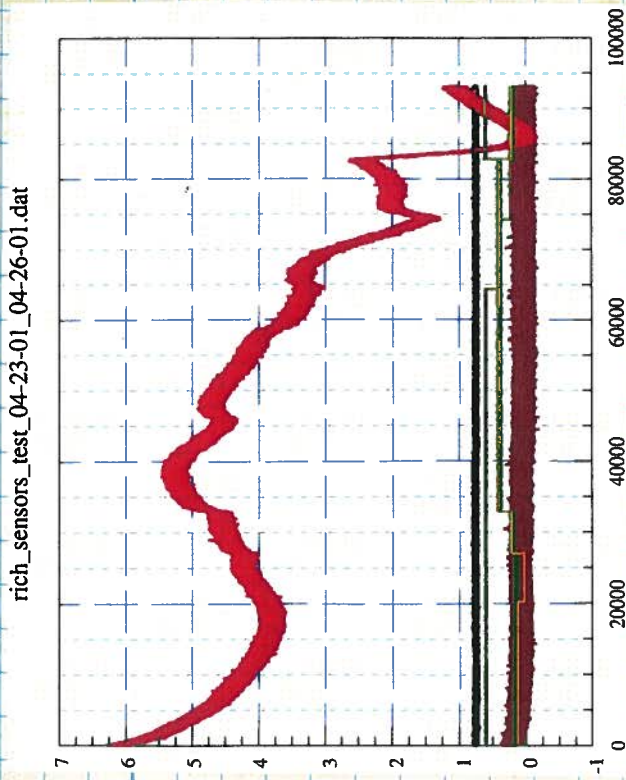
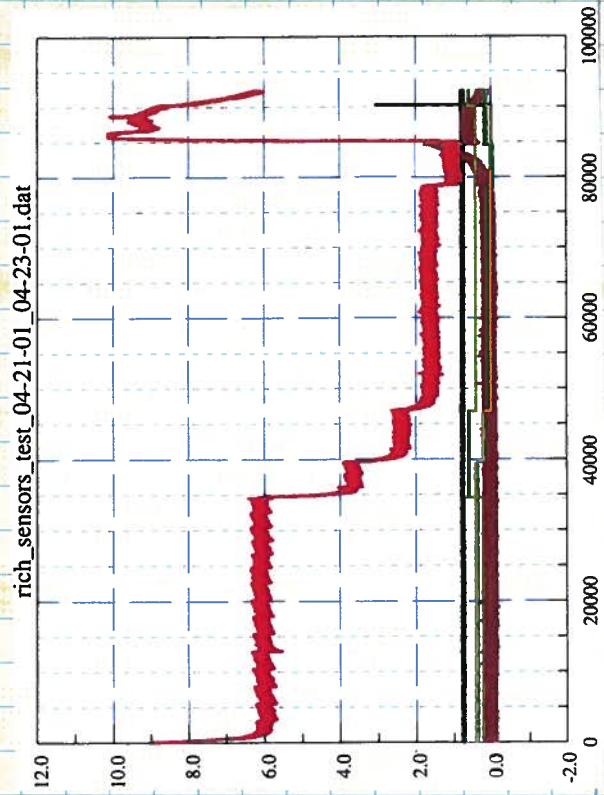
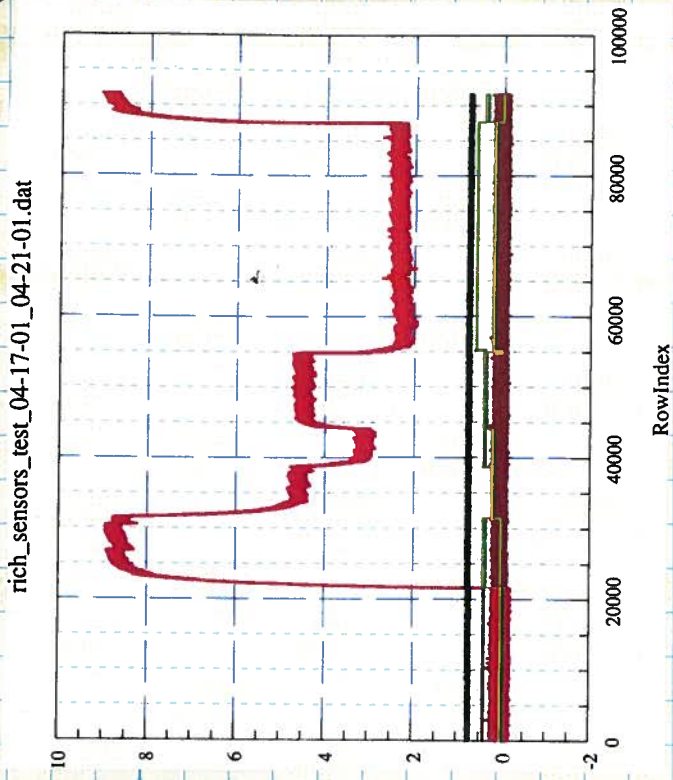
After running Ar/O_2 till clear happy I went to put a CO_2 cyl online. One of the sensors is probly sensitive to CO_2 . I found the Ar cylinder had run out. The Ar/O_2 still has gas. I valued the Ar/O_2 off at 2:40 PM on my watch. I changed the Ar cyl. I put a CO_2 cylinder on at 6 PM on my watch.



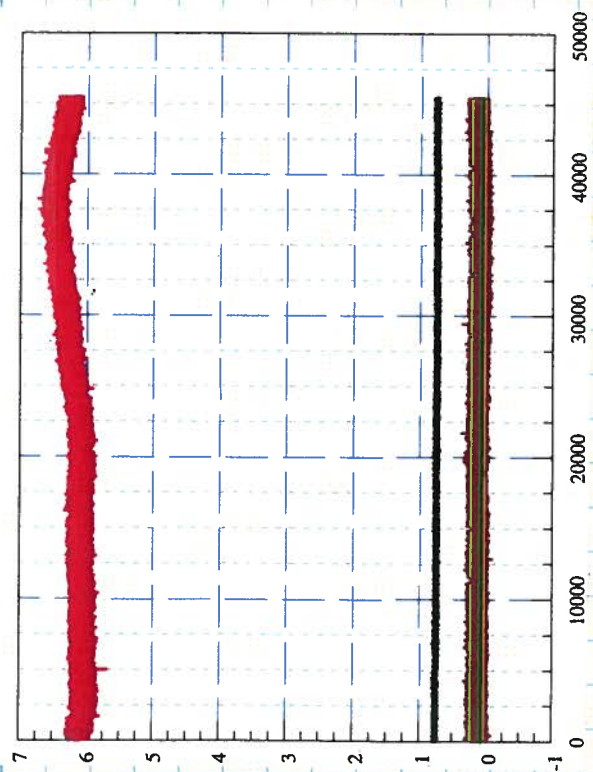
From the 2nd half of the plot it looks like the CO₂ flow controller doesn't behave differently for 0 & 1 V control voltages.



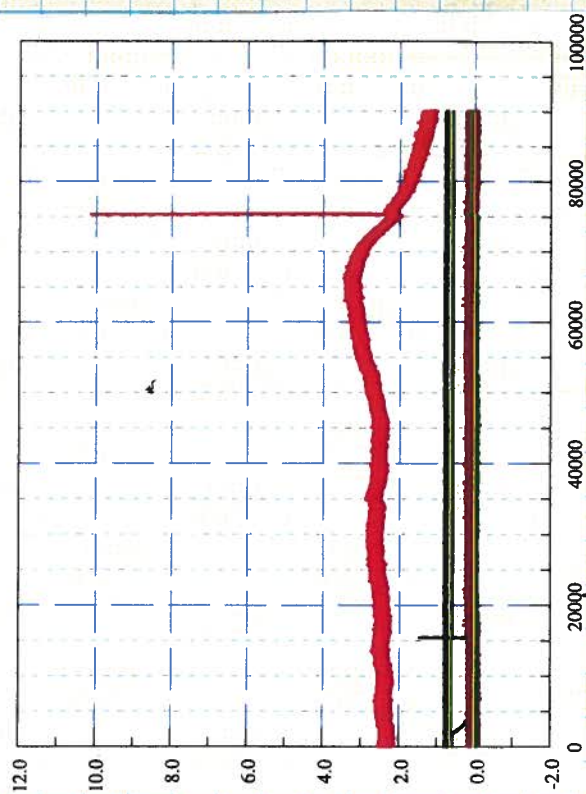
5/6 O₂ & H₂O Sensor Test Plots



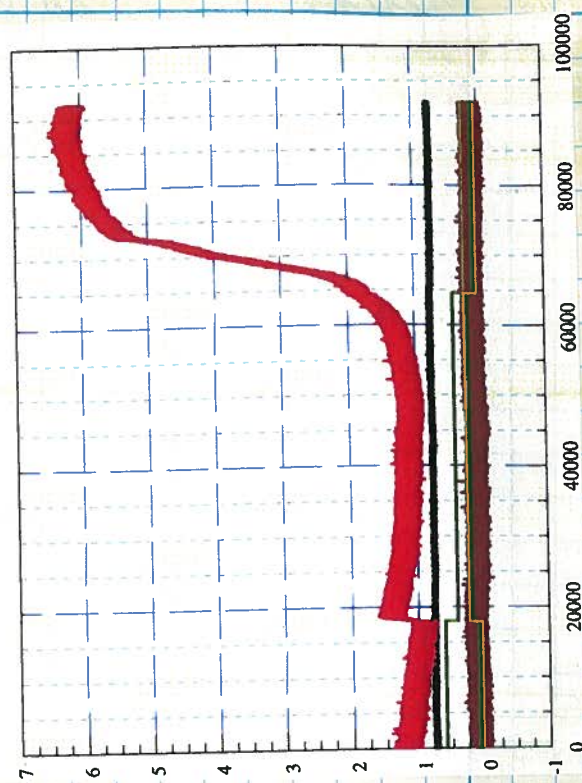
rich_sensors_test_05-02-01_05-03-01.dat



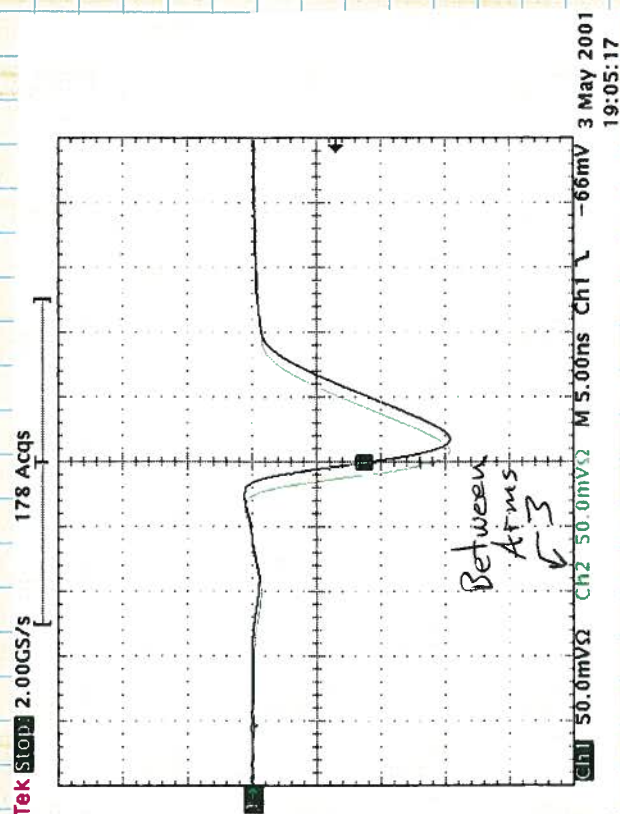
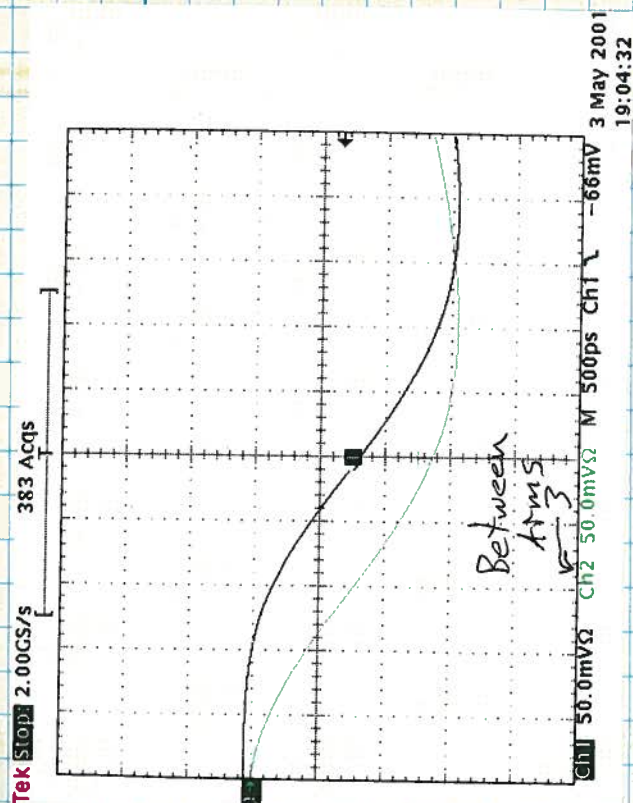
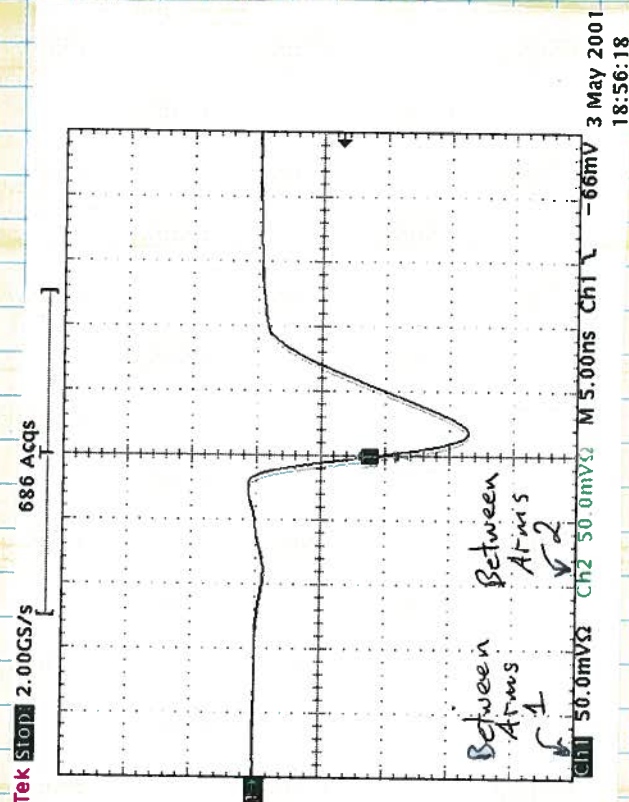
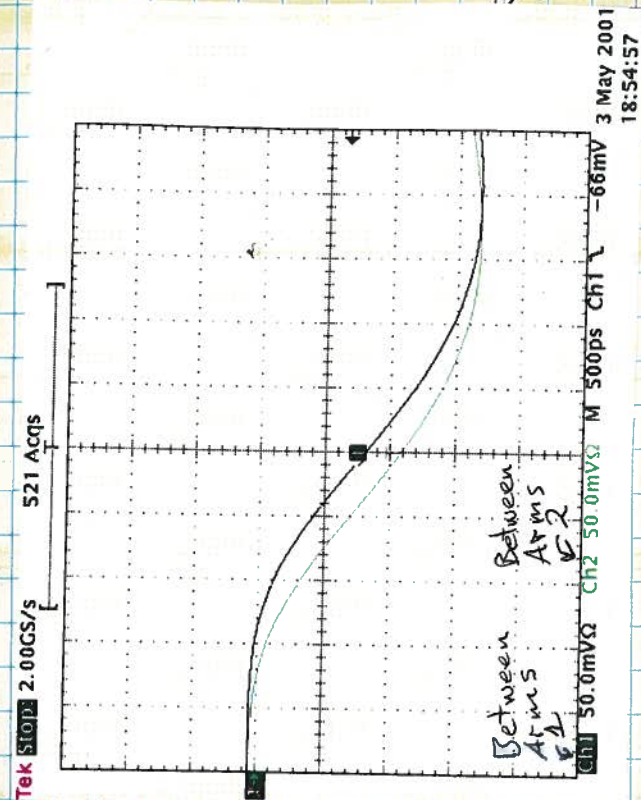
rich_sensors_test_04-28-01_04-30-01.dat



rich_sensors_test_04-30-01_05-02-01.dat

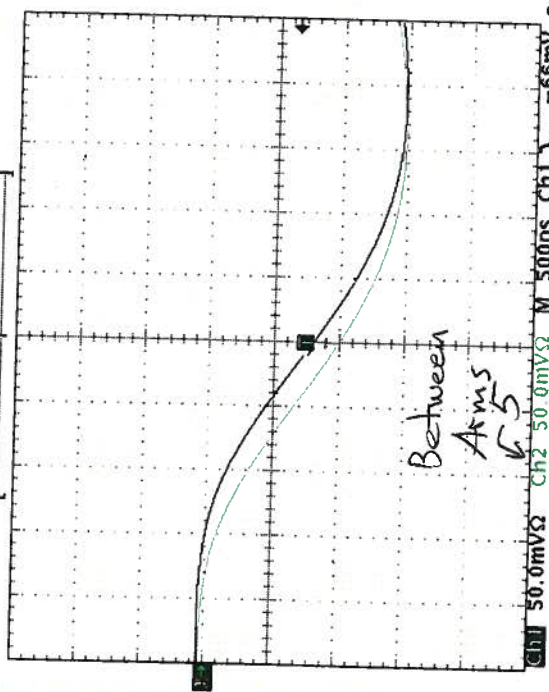


5/7 Heliax (5/8") Cable Timing Between Arms
 Relative timing of the 5/8" Heliax cables between the arms.



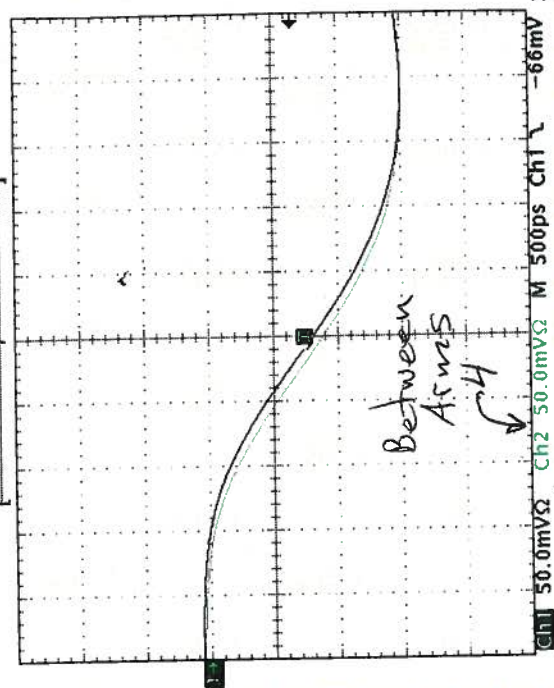
Tek STOP 2.00GS/s

262 Acqs



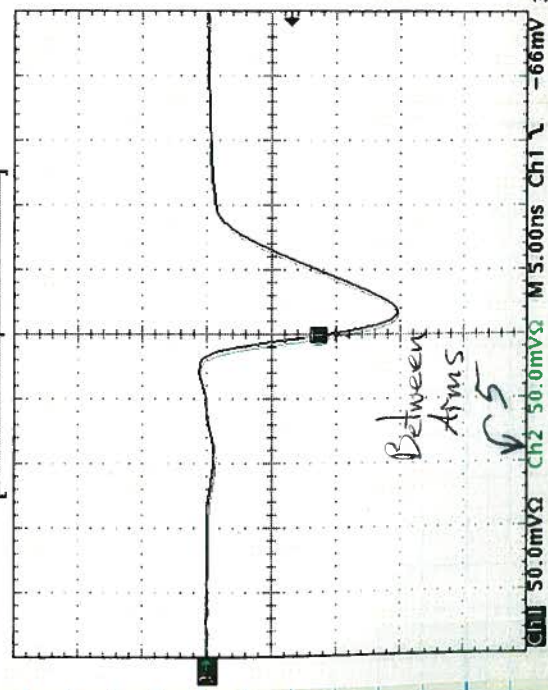
Tek STOP 2.00GS/s

321 Acqs



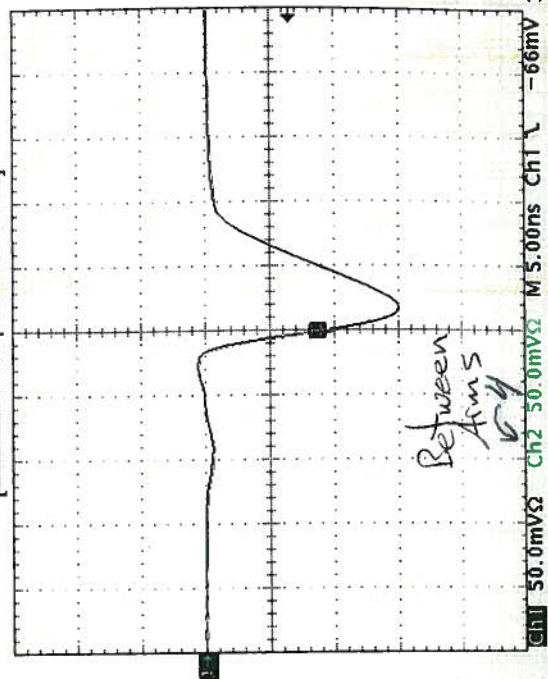
Tek STOP 2.00GS/s

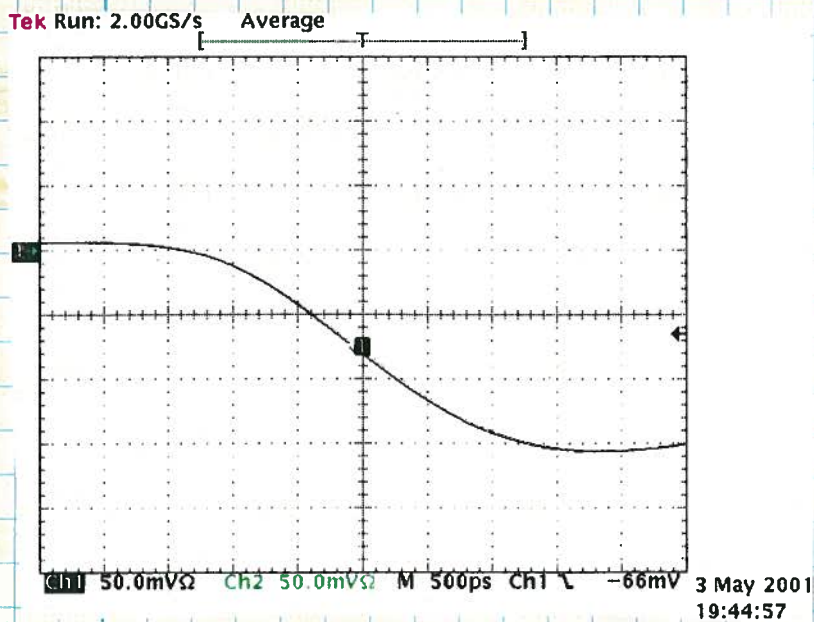
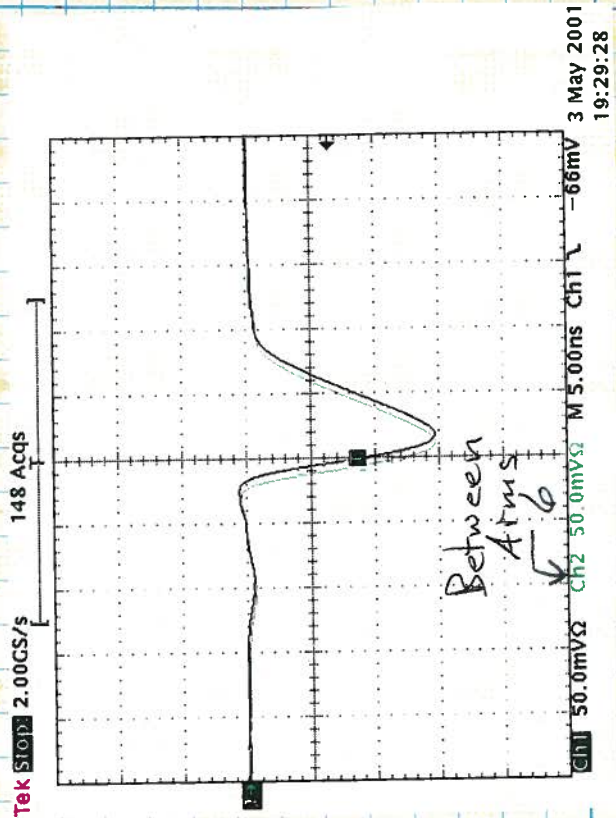
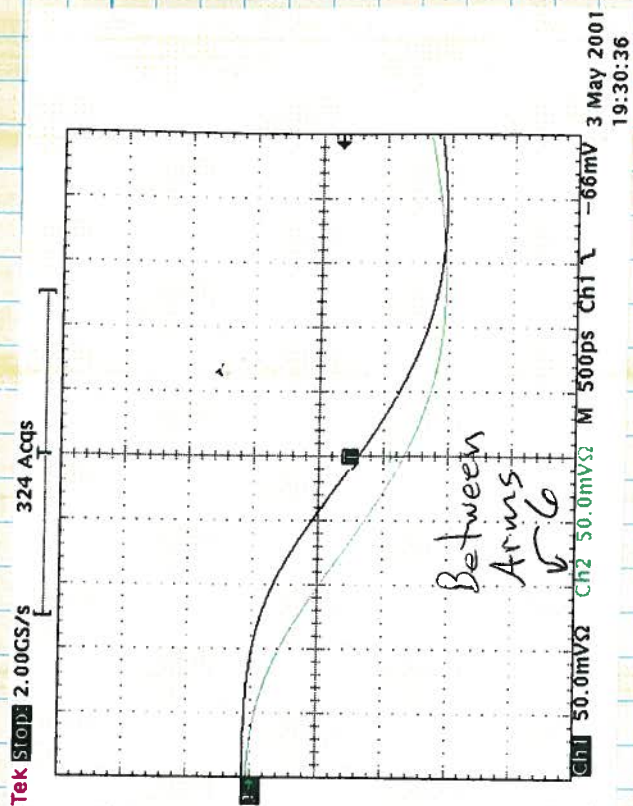
290 Acqs



Tek STOP 2.00GS/s

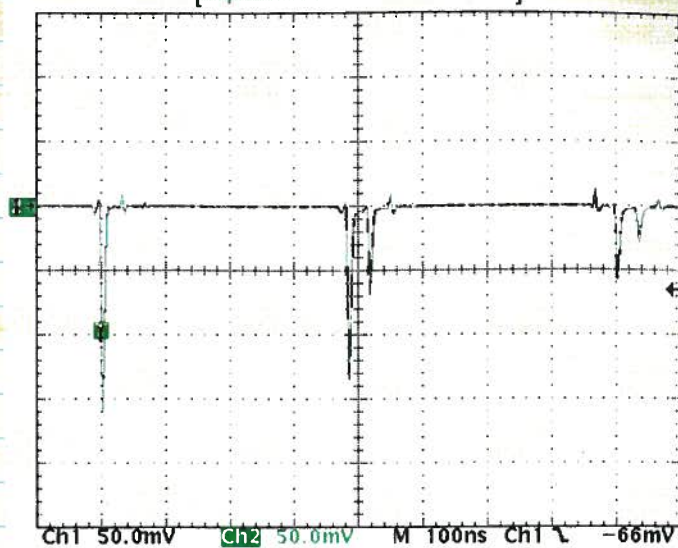
318 Acqs



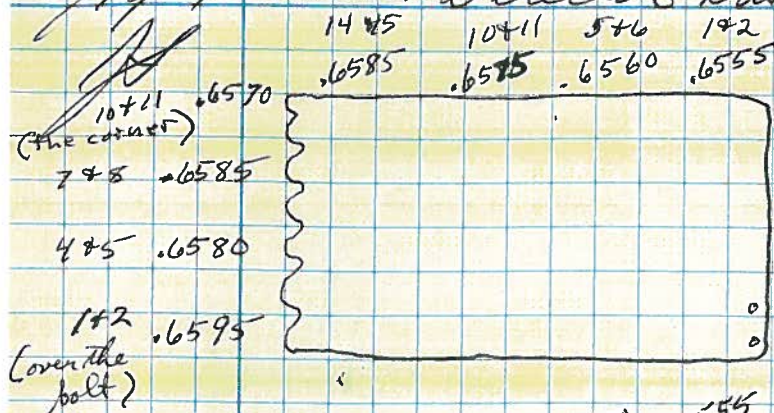


Tek Stop: 500MS/s

256 Acqs

3 May 2001
19:41:37

5/8/01 RICH Detector Dummy Aluminum Plates

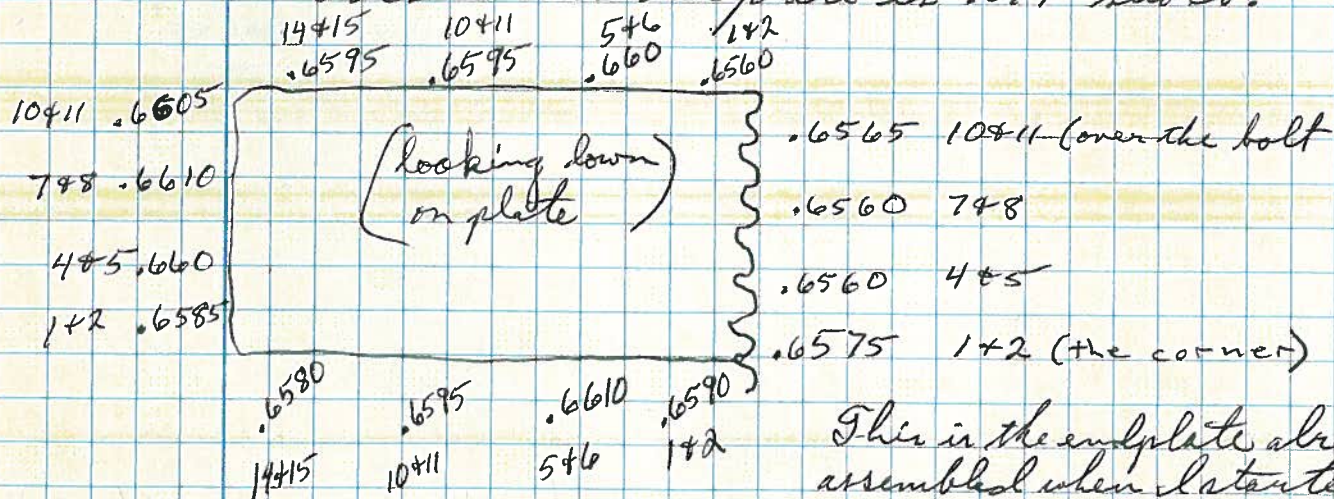


.6555 between 10x11
 .6550 between 7x8
 .6545 between 4x5
 .6555 between 1x2

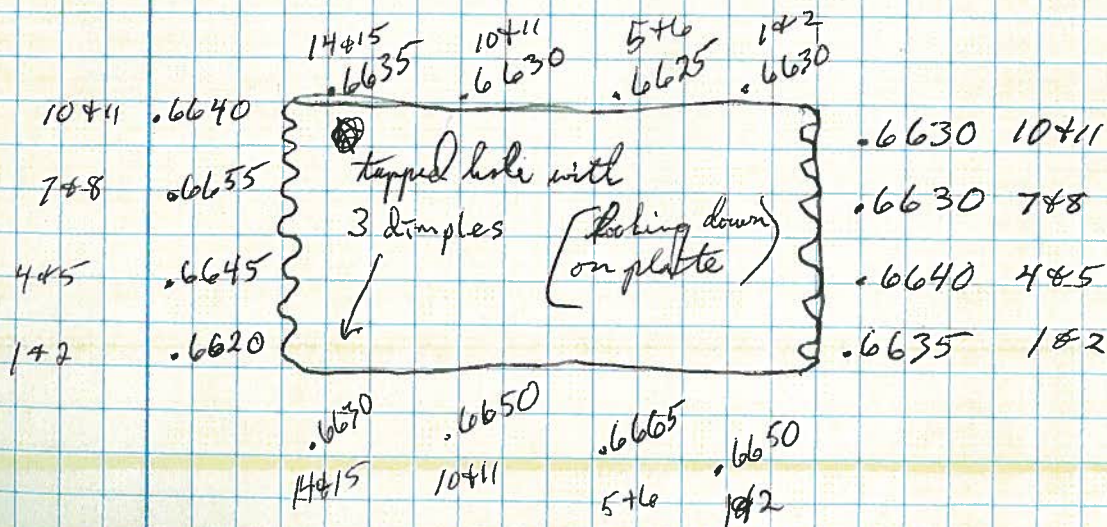
This is the latest plate from the shop.
 Measured using Mitutoyo
 depth gauge from the Machine
 Shop.

The desired shoulder height, as given to me by
 Mauro and Franco, is 17mm.

This means our plate is $\Rightarrow .669''$
 $.014''$ short.



This is the endplate already
 assembled when I started.



5/19

I pulled the center cathode plate out of the RICH (I put the dummy aluminum plate in place). Checking a few points around the edge I found a shoulder height of .6705" to .6745". This was only on a few random spots.

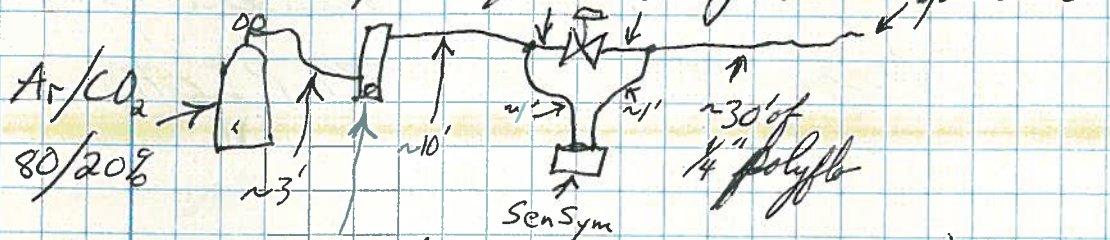
I put the cathode section back in the RICH.

9/8/01
JS

Clippard Minimate Pressure Drop

Trying to measure the pressure drop across a Clippard Minimate EC-2-12 VDC solenoid valve.

I setup the following (yesterday)



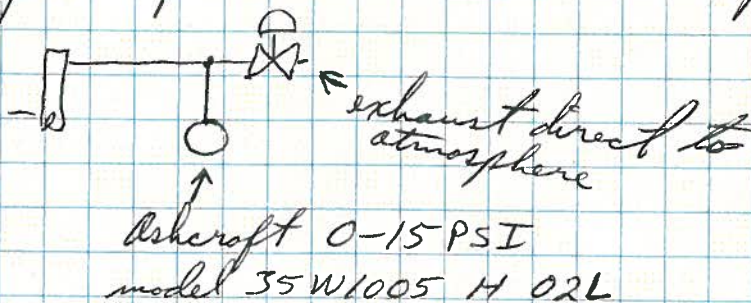
Air Products SCXL004DN (0-4" H₂O)
tube # E29-4-150MM3

Sensor and valve both powered by a bench top supply.
Both set at 12.0V on supply display.
Sensor read out with a Fluke 77III DMM.

DMM Reading	flow (center of black bead)
0	off
.003V	10
.011	20
.023	30
.090	60
.040	40

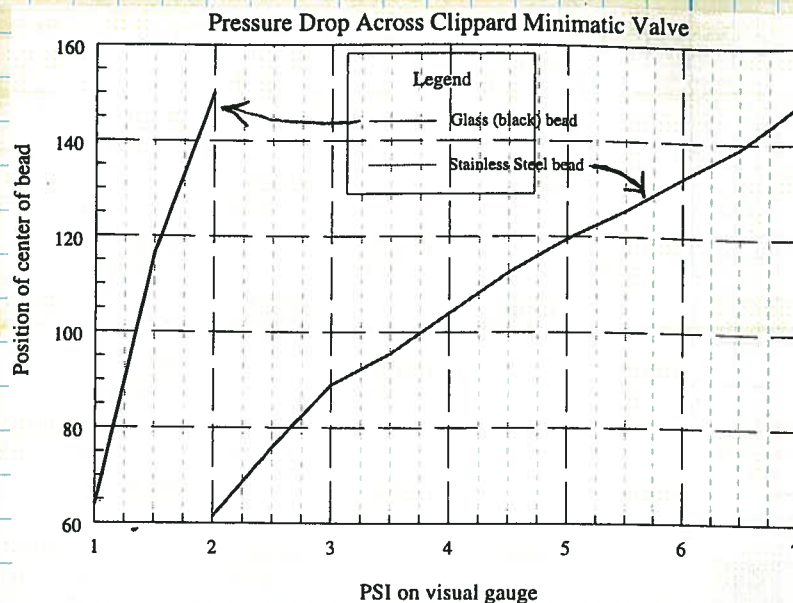
45 mV is full span (oops!)
(sensor still is ok)

Today I replaced the sensor with a pressure gauge



Clippard's webpage states 0.5 scfm @ 50 PSI
or 30 scfh @ 50 PSI

PSI	Middle of Bead
1	64 bb
1.5	116.5 bb
2	150 bb
2	61.5 ss
2.5	76 ss
3	89
3.5	98.5
4	104
4.5	112.5
5	119.5
5.5	125.5
6	132.5
6.5	139
7	148



150mm Flowmeter Tubes

Product Number	Maximum Flow Rates*			Float Material
	Water (ccm)	Air (ccm)	Air (scfh)	
E29-150MM1	0.61 2.5	51 148	0.108 0.314	Glass Stainless Steel
E29-150MM2	5.8 28.0	378 832	0.80 1.76	Glass Stainless Steel
E29-150MM3	53.2 133.4	2,327 4,640	4.93 9.83	Glass Stainless Steel
E29-150MM4	206 502	8,732 16,610	18.5 35.2	Glass Stainless Steel
E29-150MM5	564 1,323	23,320 43,420	49.2 92.0	Glass Stainless Steel

*Minimum flow rate is approximately 10% of maximum figure.

The following mathematical correction can be made for changes in specific gravity:

$$Q_a = Q_i \sqrt{\frac{sg_c}{sg_a}}$$

Air is .001633 g/mL
Air is 1.161 g/L
.001161 g/mL

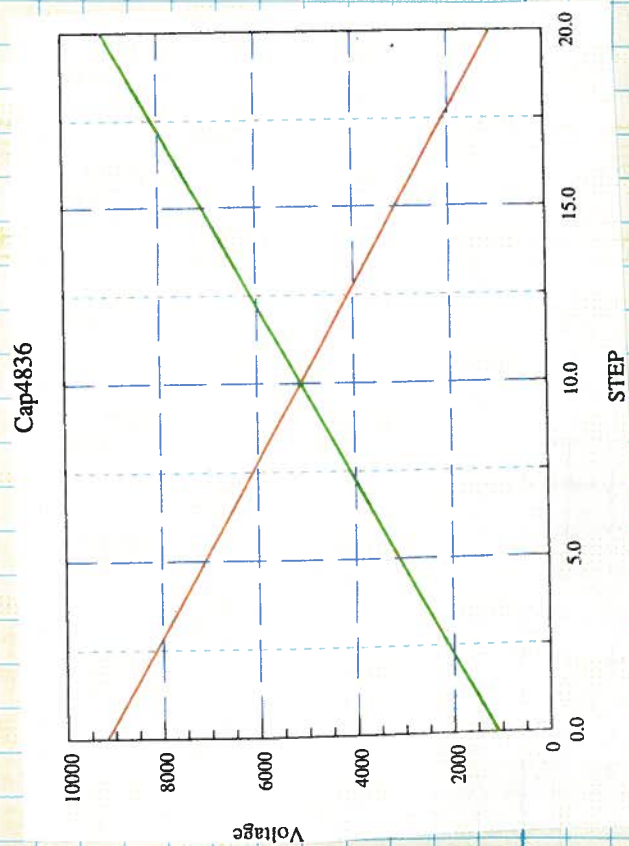
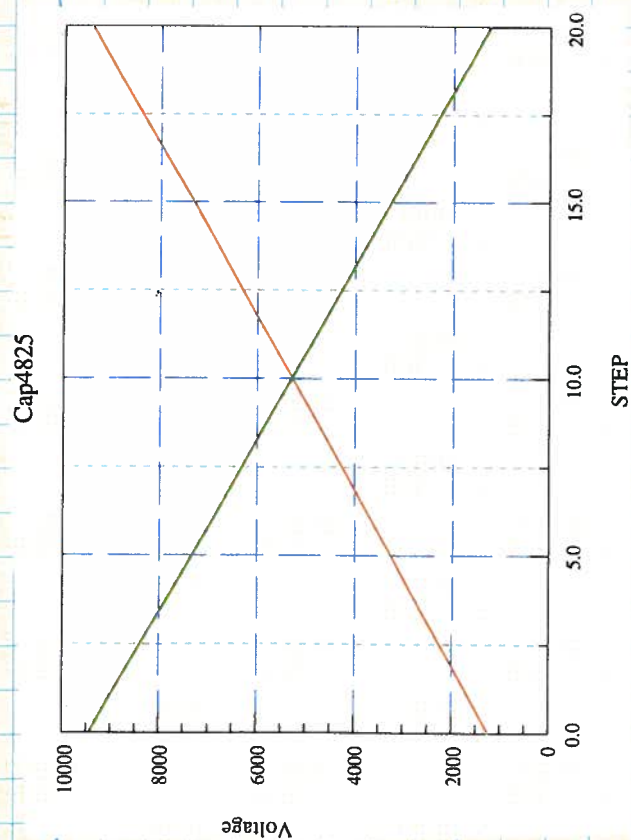
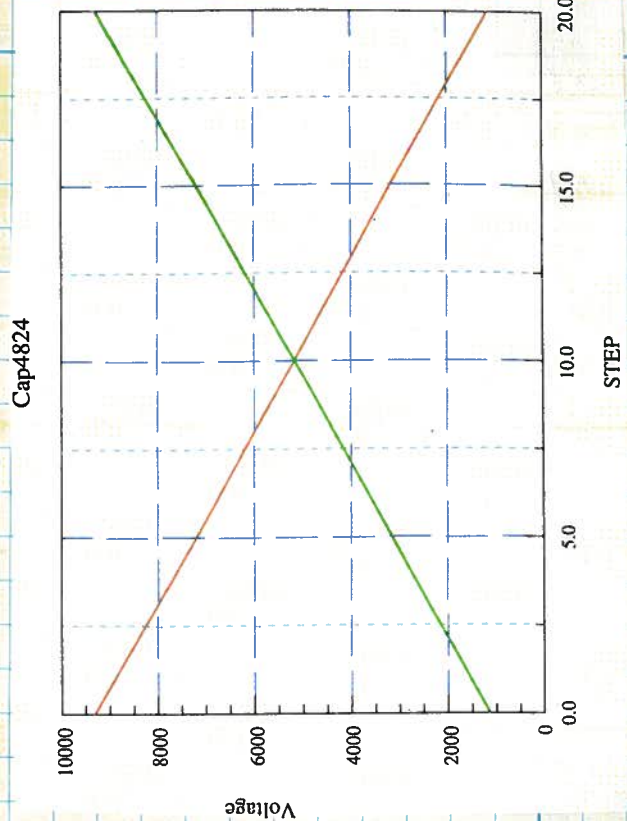
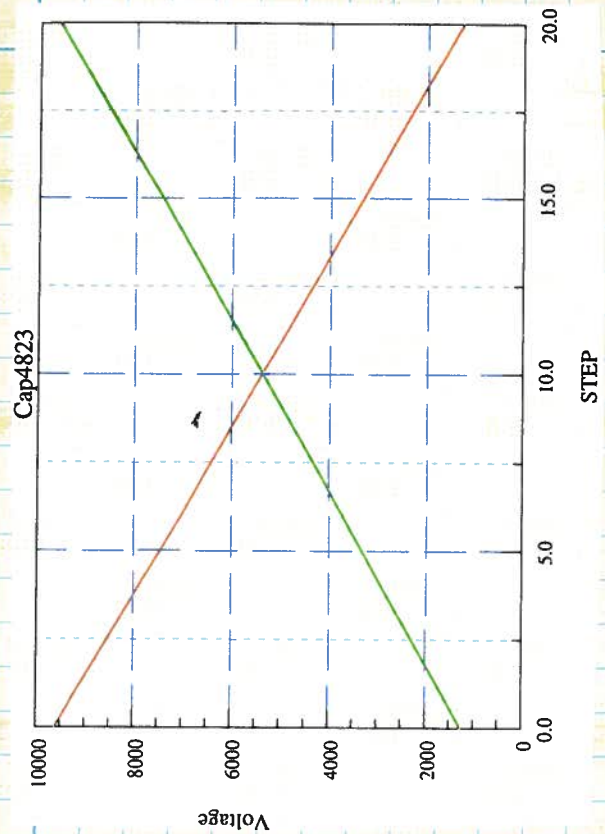
Conversion Data

1 ccm	= 1 mLm
1 ccm	= 0.001 Lpm
1000 ccm	= 1 Lpm
1 Lpm	= 2.118 scfh
1 Lpm	= 0.0353 scfhm
1 scfh	= 0.472 Lpm
1 scfh	= 472 ccm

Q_a = Actual flow rate
Q_i = Indicated flow rate
sg_c = Specific gravity of the calibration gas
sg_a = Specific gravity of the gas actually flowing

So, I see ~7 PSI @ ~9.83 scfh of air
which $\Rightarrow$ ~24 PSI @ 30 scfh
But, the pressure drop I observe is not all that linear,
and may be more (non-linear) at a higher flow.
Anyway, we should only see ~2 PSI for the RICH.

Calibration Check of Capacitive Gap Sensors
I need 4 sensors to use to monitor
the dipole to carriage gap on the right arm.



Spec for the second Capacitec System



P.O. Box 819,87 Fitchburg Rd., Ayer, MA 01432 U.S.A.
(978) 772-6033

PROBE MODEL: *HPB-375A-A-12-5-B-D*
PROBE S/N: *5291*
SENSOR TO GUARD RESISTANCE: >20 Megohms
SENSOR TO GROUND RESISTANCE: >20 Megohms
GUARD TO GROUND RESISTANCE: >20 Megohms
SENSOR TO GUARD CAPACITANCE:
FINAL INSPECTION: *163 pf*



P.O. Box 819,87 Fitchburg Rd., Ayer, MA 01432 U.S.A.
(978) 772-6033

PROBE MODEL: *HPB-375A-A-12-5-B-D*
PROBE S/N: *5292*
SENSOR TO GUARD RESISTANCE: >20 Megohms
SENSOR TO GROUND RESISTANCE: >20 Megohms
GUARD TO GROUND RESISTANCE: >20 Megohms
SENSOR TO GUARD CAPACITANCE:
FINAL INSPECTION: *167 pf*



P.O. Box 819,87 Fitchburg Rd., Ayer, MA 01432 U.S.A.
(978) 772-6033

PROBE MODEL: *HPB-375A-A-12-5-B-D*
PROBE S/N: *5293*
SENSOR TO GUARD RESISTANCE: >20 Megohms
SENSOR TO GROUND RESISTANCE: >20 Megohms
GUARD TO GROUND RESISTANCE: >20 Megohms
SENSOR TO GUARD CAPACITANCE:
FINAL INSPECTION: *164 pf*

Capacitec Calibration Data Sheet

Amp PTH: 800 (100-81) (100-81)		Channel: 800A / Johnson Lab	
Probe S/N: 100-375-501		Job: 100-375-501	
Standard: CEM 302		Date: Thu, Oct 4, 2001 @ 11:00 AM	
Link S/N: 000-100		Standard: 10, 100, 10k	
Check/Note: 800 (100-81) (100-81)		Technician: Mike Wilson / <i>163</i>	

Channel 1		Cal. Points (mV)	Output (VDC)	Front Panel Meter	Nominal (VDC)
Nominal Adjustment Points		0.3250	0.3250	0.3250	0.3250
OFFSET	0.3250	0.6500	0.6500	0.6500	0.6500
GAIN	1.6250	0.9750	0.9750	0.9750	0.9750
BREAK 1	2.3000	1.3000	1.3000	1.3000	1.3000
LINE 1	2.6250	1.6250	1.6250	1.6250	1.6250
BREAK 2	3.9500	3.9500	3.9500	3.9500	3.9500
LINE 2	4.2750	4.2750	4.2750	4.2750	4.2750
Drive		2.6000	2.6000	2.6000	2.6000
Voltage P-P		2.9250	2.9250	2.9250	2.9250
IHL Selection		3.2500	3.2500	3.2500	3.2500
Lab Temperature		3.5750	3.5750	3.5750	3.5750
Lab Humidity		3.9000	3.9000	3.9000	3.9000
Notes		4.2250	4.2250	4.2250	4.2250
		4.5500	4.5500	4.5500	4.5500
		4.8750	4.8750	4.8750	4.8750
		5.2000	5.2000	5.2000	5.2000
		5.5250	5.5250	5.5250	5.5250
		5.8500	5.8500	5.8500	5.8500
		6.1750	6.1750	6.1750	6.1750
		6.5000	6.5000	6.5000	6.5000

STANDARDS TRACABLE TO NIST

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Tel: 978-772-6033 Fax: 978-772-6036

Capacitec Calibration Data Sheet

Amp PTH: 800 (100-81) (100-81)		Channel: 800A / Johnson Lab	
Probe S/N: 100-375-502		Job: 100-375-502	
Standard: CEM 302		Date: Thu, Oct 4, 2001 @ 11:02 AM	
Link S/N: 000-100		Standard: 10, 100, 10k	
Check/Note: 800 (100-81) (100-81)		Technician: Mike Wilson / <i>164</i>	

Channel 2		Cal. Points (mV)	Output (VDC)	Front Panel Meter	Nominal (VDC)
Nominal Adjustment Points		0.3250	0.3250	0.3250	0.3250
OFFSET	0.3250	0.6500	0.6500	0.6500	0.6500
GAIN	1.6250	0.9750	0.9750	0.9750	0.9750
BREAK 1	2.3000	1.3000	1.3000	1.3000	1.3000
LINE 1	2.6250	1.6250	1.6250	1.6250	1.6250
BREAK 2	3.9500	3.9500	3.9500	3.9500	3.9500
LINE 2	4.2750	4.2750	4.2750	4.2750	4.2750
Drive		2.6000	2.6000	2.6000	2.6000
Voltage P-P		2.9250	2.9250	2.9250	2.9250
IHL Selection		3.2500	3.2500	3.2500	3.2500
Lab Temperature		3.5750	3.5750	3.5750	3.5750
Lab Humidity		3.9000	3.9000	3.9000	3.9000
Notes		4.2250	4.2250	4.2250	4.2250
		4.5500	4.5500	4.5500	4.5500
		4.8750	4.8750	4.8750	4.8750
		5.2000	5.2000	5.2000	5.2000
		5.5250	5.5250	5.5250	5.5250
		5.8500	5.8500	5.8500	5.8500
		6.1750	6.1750	6.1750	6.1750
		6.5000	6.5000	6.5000	6.5000

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Capacitec Calibration Data Sheet

Amp PTH: 800 (100-81) (100-81)		Channel: 800A / Johnson Lab	
Probe S/N: 100-375-503		Job: 100-375-503	
Standard: CEM 302		Date: Thu, Oct 4, 2001 @ 11:03 AM	
Link S/N: 000-100		Standard: 10, 100, 10k	
Check/Note: 800 (100-81) (100-81)		Technician: Mike Wilson / <i>164</i>	

Channel 3		Cal. Points (mV)	Output (VDC)	Front Panel Meter	Nominal (VDC)
Nominal Adjustment Points		0.3250	0.3250	0.3250	0.3250
OFFSET	0.3250	0.6500	0.6500	0.6500	0.6500
GAIN	1.6250	0.9750	0.9750	0.9750	0.9750
BREAK 1	2.3000	1.3000	1.3000	1.3000	1.3000
LINE 1	2.6250	1.6250	1.6250	1.6250	1.6250
BREAK 2	3.9500	3.9500	3.9500	3.9500	3.9500
LINE 2	4.2750	4.2750	4.2750	4.2750	4.2750
Drive		2.6000	2.6000	2.6000	2.6000
Voltage P-P		2.9250	2.9250	2.9250	2.9250
IHL Selection		3.2500	3.2500	3.2500	3.2500
Lab Temperature		3.5750	3.5750	3.5750	3.5750
Lab Humidity		3.9000	3.9000	3.9000	3.9000
Notes		4.2250	4.2250	4.2250	4.2250
		4.5500	4.5500	4.5500	4.5500
		4.8750	4.8750	4.8750	4.8750
		5.2000	5.2000	5.2000	5.2000
		5.5250	5.5250	5.5250	5.5250
		5.8500	5.8500	5.8500	5.8500
		6.1750	6.1750	6.1750	6.1750
		6.5000	6.5000	6.5000	6.5000

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P.O. Box 819,87 Fitchburg Rd., Ayer, MA 01432 U.S.A.
(978) 772-6033

PROBE MODEL: *HPB-375A-A-L2-5-B-D*
PROBE S/N: *5294*
SENSOR TO GUARD RESISTANCE: >20 Megohms
SENSOR TO GROUND RESISTANCE: >20 Megohms
GUARD TO GROUND RESISTANCE: >20 Megohms
SENSOR TO GUARD CAPACITANCE:
FINAL INSPECTION: *170pf*



P.O. Box 819,87 Fitchburg Rd., Ayer, MA 01432 U.S.A.
(978) 772-6033

PROBE MODEL: *HPB-375A-A-L2-5-B-D*
PROBE S/N: *5295*
SENSOR TO GUARD RESISTANCE: >20 Megohms
SENSOR TO GROUND RESISTANCE: >20 Megohms
GUARD TO GROUND RESISTANCE: >20 Megohms
SENSOR TO GUARD CAPACITANCE:
FINAL INSPECTION: *172pf*



P.O. Box 819,87 Fitchburg Rd., Ayer, MA 01432 U.S.A.
(978) 772-6033

PROBE MODEL: *HPB-375A-A-L2-5-B-D*
PROBE S/N: *5296*
SENSOR TO GUARD RESISTANCE: >20 Megohms
SENSOR TO GROUND RESISTANCE: >20 Megohms
GUARD TO GROUND RESISTANCE: >20 Megohms
SENSOR TO GUARD CAPACITANCE:
FINAL INSPECTION: *168pf*



Calibration Data Sheet

Any PTH SW (1100-81, 1100-812)		Customer: <i>BUA / Johnson Lab</i>	
Probe SW (1100-812)		Lab: <i>01-2111</i>	
Reference Cable: <i>EC-324</i>		Date: <i>Thu, Oct 4, 2001 @ 11:46 AM</i>	
Batch SW: <i>0000-1001</i>		Standard: <i>50, 100, 150</i>	
Check/Issue SW: <i>1100C40-1009</i>		Technician: <i>Mike Wilson /</i>	

Channel 4		Cal. Points (mm)	Output (VDC)	Front Panel Meter	Nominal (VDC)
Offset	0.3250	0.3250	0.3250	0.3250	0.3250
Gain	1.6250	0.6500	0.6500	0.6500	0.6500
BREAK 1	0.2760	0.9750	0.9750	0.9750	0.9750
LN 1	0.2000	1.3000	1.3000	1.3000	1.3000
BREAK 2	0.2760	1.6250	1.6250	1.6250	1.6250
LN 2	0.2000	1.9500	1.9500	1.9500	1.9500
Drive	5.00 @ TP1	2.2750	2.2750	2.2750	2.2750
Voltage p-p	5.00 @ TP1	2.6000	2.6000	2.6000	2.6000
Hi/Low Selection	LO @ W3	2.9250	2.9250	2.9250	2.9250
Lab Temperature	0.0 °C	3.2500	3.2500	3.2500	3.2500
Lab Humidity	0.0 %	3.5750	3.5750	3.5750	3.5750

Notes: *170pf*

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Calibration Data Sheet

Any PTH SW (1100-81, 1100-812)		Customer: <i>BUA / Johnson Lab</i>	
Probe SW (1100-812)		Lab: <i>01-2111</i>	
Reference Cable: <i>EC-324</i>		Date: <i>Thu, Oct 4, 2001 @ 11:50 PM</i>	
Batch SW: <i>0000-1001</i>		Standard: <i>50, 100, 150</i>	
Check/Issue SW: <i>1100C40-1009</i>		Technician: <i>Mike Wilson /</i>	

Channel 5		Cal. Points (mm)	Output (VDC)	Front Panel Meter	Nominal (VDC)
Offset	0.3250	0.3250	0.3250	0.3250	0.3250
Gain	1.6250	0.6500	0.6500	0.6500	0.6500
BREAK 1	0.2760	0.9750	0.9750	0.9750	0.9750
LN 1	0.2000	1.3000	1.3000	1.3000	1.3000
BREAK 2	0.2760	1.6250	1.6250	1.6250	1.6250
LN 2	0.2000	1.9500	1.9500	1.9500	1.9500
Drive	5.00 @ TP1	2.2750	2.2750	2.2750	2.2750
Voltage p-p	5.00 @ TP1	2.6000	2.6000	2.6000	2.6000
Hi/Low Selection	LO @ W3	2.9250	2.9250	2.9250	2.9250
Lab Temperature	0.0 °C	3.2500	3.2500	3.2500	3.2500
Lab Humidity	0.0 %	3.5750	3.5750	3.5750	3.5750

Notes: *172pf*

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Calibration Data Sheet

Any PTH SW (1100-81, 1100-812)		Customer: <i>BUA / Johnson Lab</i>	
Probe SW (1100-812)		Lab: <i>01-2111</i>	
Reference Cable: <i>EC-324</i>		Date: <i>Thu, Oct 4, 2001 @ 11:58 PM</i>	
Batch SW: <i>0000-1001</i>		Standard: <i>50, 100, 150</i>	
Check/Issue SW: <i>1100C40-1009</i>		Technician: <i>Mike Wilson /</i>	

Channel 6		Cal. Points (mm)	Output (VDC)	Front Panel Meter	Nominal (VDC)
Offset	0.3250	0.3250	0.3250	0.3250	0.3250
Gain	1.6250	0.6500	0.6500	0.6500	0.6500
BREAK 1	0.2760	0.9750	0.9750	0.9750	0.9750
LN 1	0.2000	1.3000	1.3000	1.3000	1.3000
BREAK 2	0.2760	1.6250	1.6250	1.6250	1.6250
LN 2	0.2000	1.9500	1.9500	1.9500	1.9500
Drive	5.00 @ TP1	2.2750	2.2750	2.2750	2.2750
Voltage p-p	5.00 @ TP1	2.6000	2.6000	2.6000	2.6000
Hi/Low Selection	LO @ W3	2.9250	2.9250	2.9250	2.9250
Lab Temperature	0.0 °C	3.2500	3.2500	3.2500	3.2500
Lab Humidity	0.0 %	3.5750	3.5750	3.5750	3.5750

Notes: *168pf*

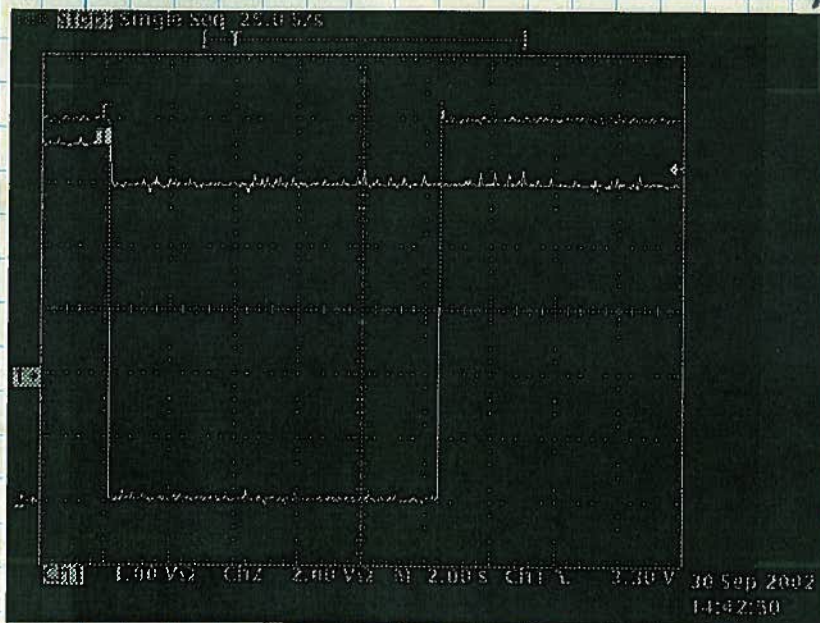
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10/7/02 Mark Products Helium Detector - Round 2

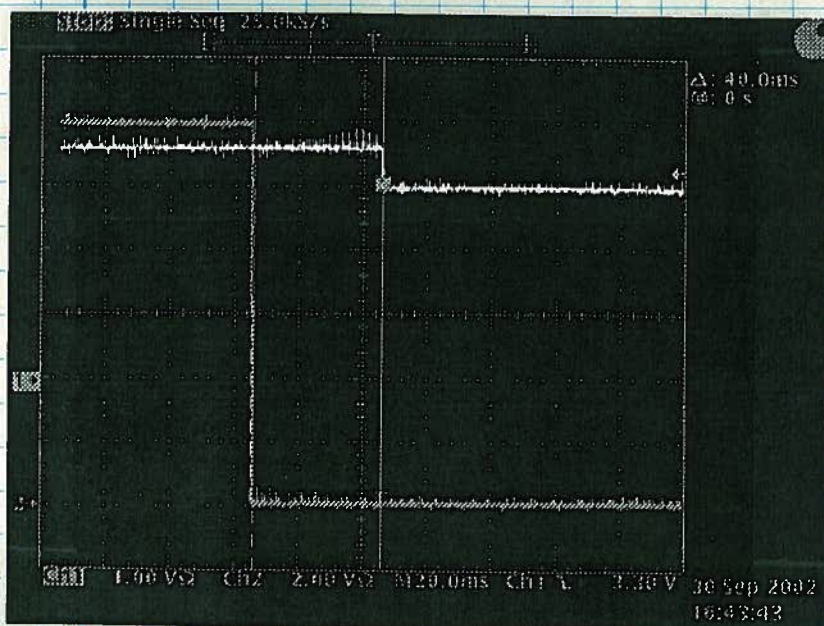
AS

I brought the detector out of the hall towards the end of this long down. If there is a power outage, it does not come up running in Batch mode. Actually, it doesn't start automatically anyway. But, that's another story. I lost half of it a little while ago. Tonight I went back to it to try and remember what I did here. While playing with the oscilloscope I finally figured out what the two scope pictures were of. I used 2 FET probes.



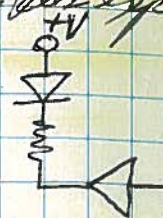
Ch 1 was on one of the leads for the "SURVEY" LED. Today I noticed it is a "high side" drive.

Ch 2 is the voltage on the "A" valve. See configuration on p. 63 of this volume.

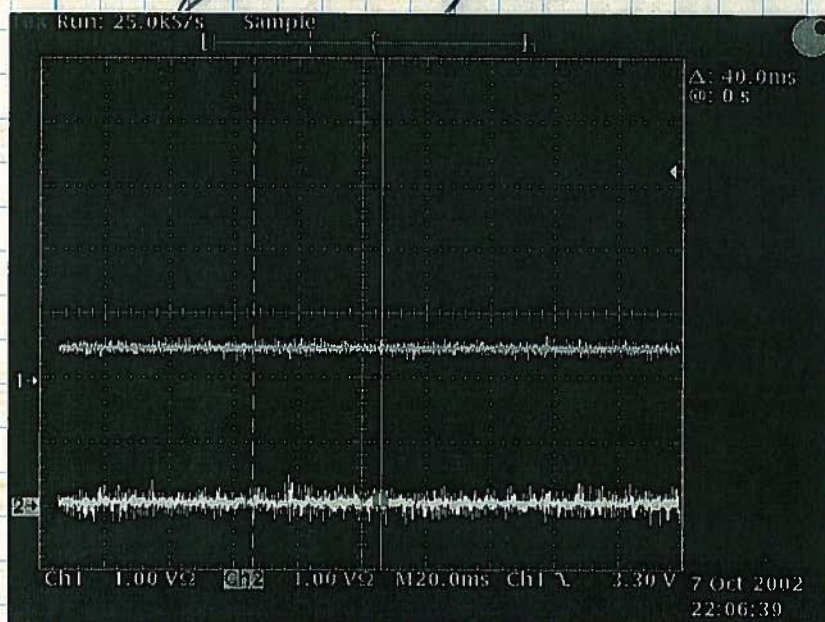


Changed time base to see which changed value first.

Tonight I found the "Survey" LED is driven by pin 6 of a 74LS05 on the processor board. ~~The expected~~ the pin is LOW when the LED is on. I clipped Ch 1 probe to pin 6.



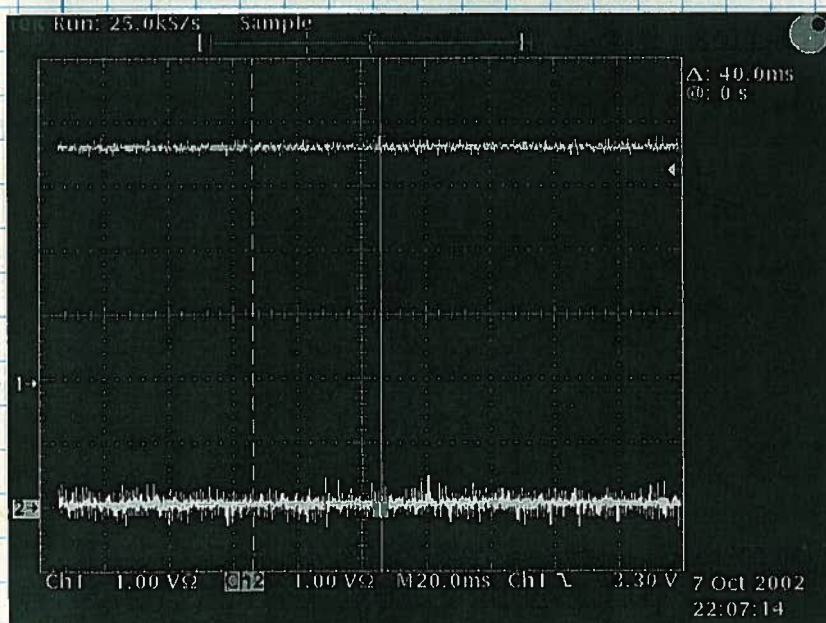
The base of the valve I was looking at is driven by the same signal I'm picking off for the 74LS123 I added. See pp. 64 of this volume. I clipped Ch 2 probe to the driving signal. Upstream of the 2k resistor on the transistor base and upstream of the 1k resistor to pin 2 of the 123.



When the unit is first turned on all the LEDs are ON for a short time.

"SURVEY" LED is on.

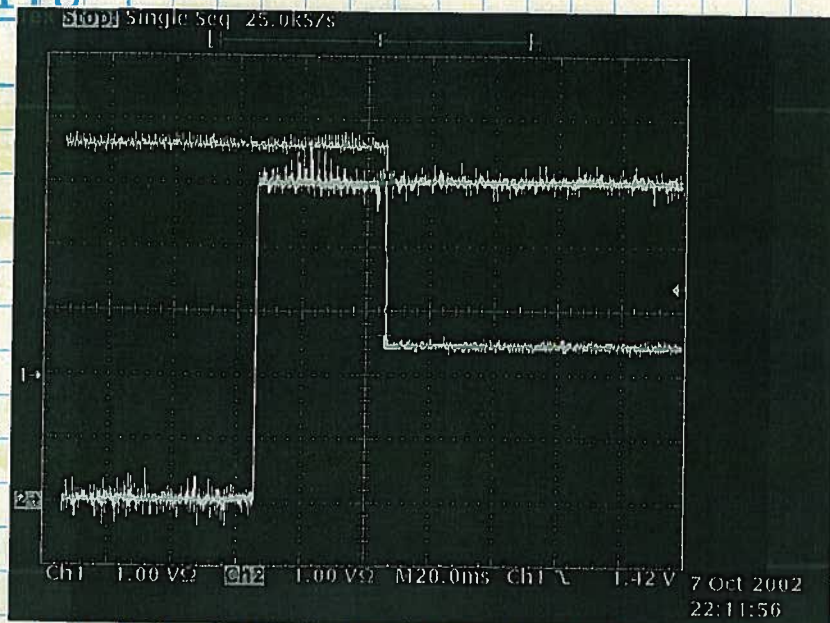
~~The~~ Valve "A" LED is off. (ITH LOW on base of transistor)



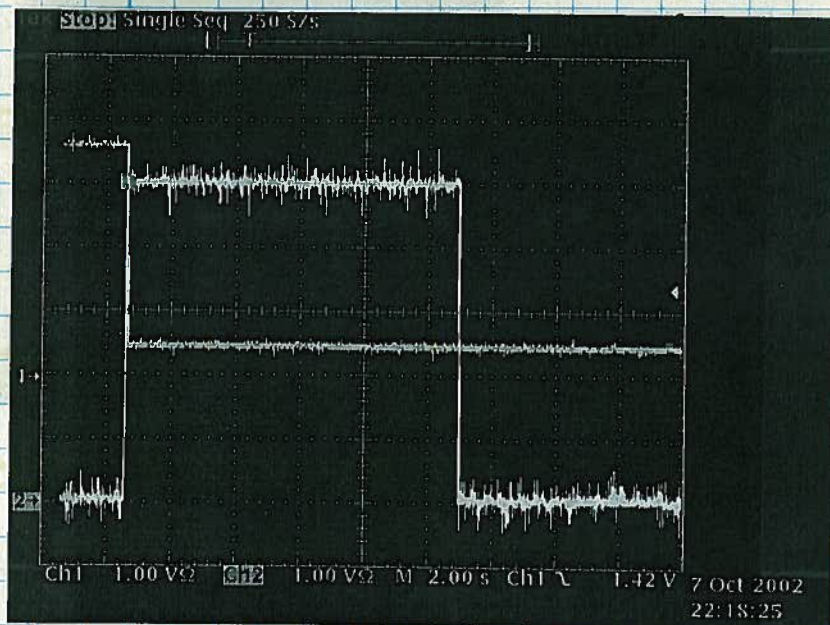
The LEDs all turn off and the 5 minute warmup begins.

"SURVEY" LED is off

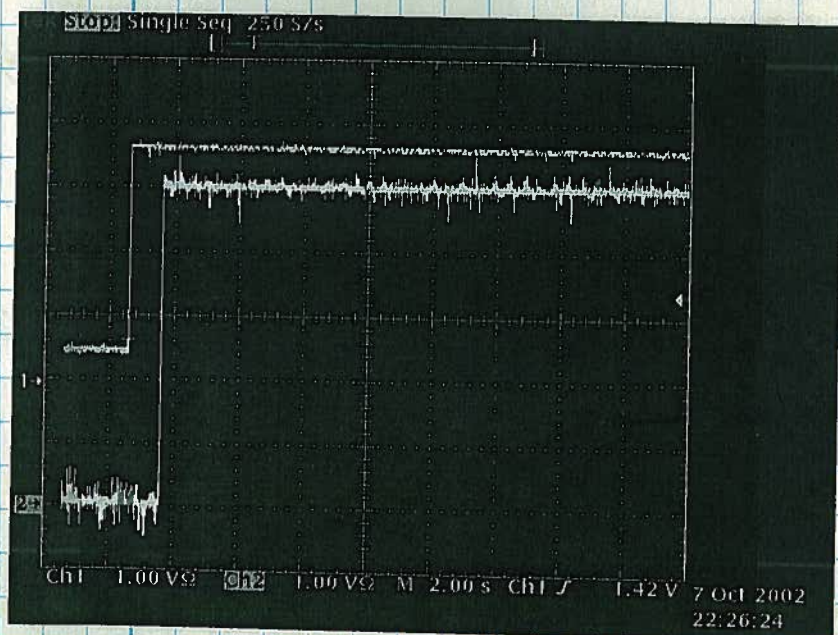
Valve "A" LED is still off



After the warmup period first the valve "A" is energized and then the "SURVEY" LED is ~~lit~~ lit.



On a slower time base we see the valve stays on for about 10 seconds.



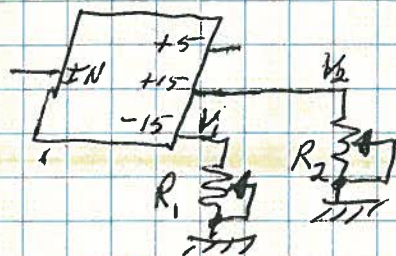
After the unit settles into "SURVEY" mode I push the BATCH/SURVEY button to put it in "BATCH" mode.

First the "Survey" LED goes off. Then valve "A" is energized.

Load Test of DFC25E 24T5/15

A simple load test of the Power-One
OC-DC voltage converter module looking
at the $\pm 15V$ outputs.

1/25/04
JA



R_1	R_2	V_1	V_2	V_{in}
45.1	43.0	-5.7	+5.5	28.3V (wall supply)
∞	∞	-16.9	+16.3	29.6
∞	86.9	-17.4	+6.8	24.0 (bench supply)

3/28/06 AMT 136 Liquid He Level Meter

I have been looking at the American Magnetics liquid helium level controller we use to read out the level probes in the magnets. I'm trying to develop a more direct method of debugging problems with the magnet controller. I have made some sketches of the circuits of interest and have taken the T457205+ to it to try to understand it better.

I will forego putting the sketches in here till I understand more.

the1.txt

1 ch1 is +I and ch2 is after the 5 ohm resistor. 5 ohm, 100 ohm, 100 ohm between +I and -I pins. Set to percentage the display reads 69.2. Remove ch2 probe and the display still shows 69.2. Remove ch1 and the display still shows 69.2. The FET probe from the TDS754 is still connected to R42. Remove FET probe, the display shows 71.2. Reconnecting ch1 and ch2 probes the display still shows 71.2.

2 ch2 probe is now on -I pin. Display fluctuates between 71.2 and 71.1.

3 ch2 probe is on R44 of circuit. where R44 and R40 join. Display shows 71.4.

4 ch2 probe is on R42 of circuit. where R42 and R41 join. Display shows 71.0.

5 ch2 probe is on pin 7 of 324. Display is 71.1.

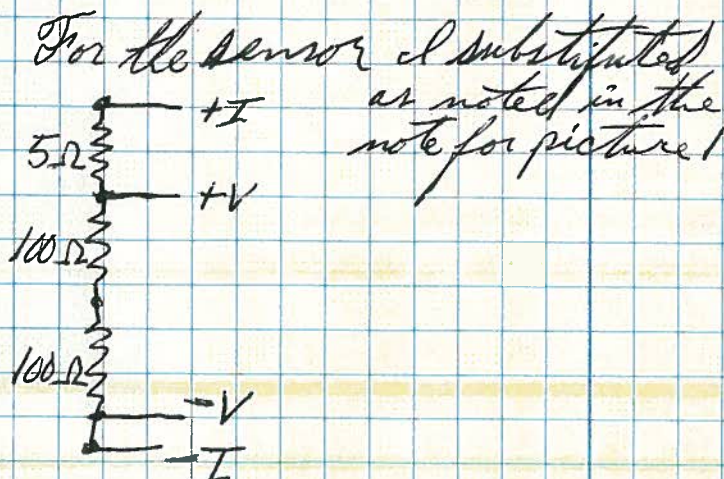
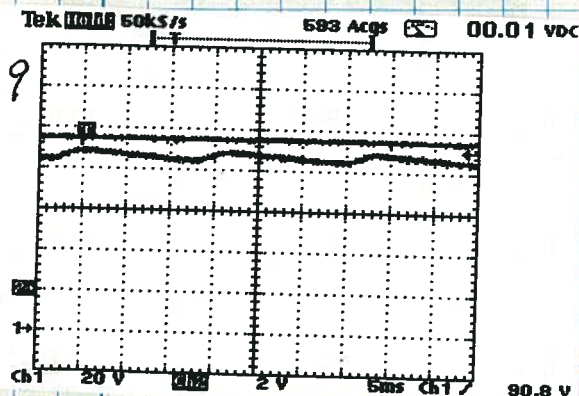
If I AC couple ch2 and look on the 50mV scale it looks DC.

6 ch2 probe on TP9. Display shows 71.1.

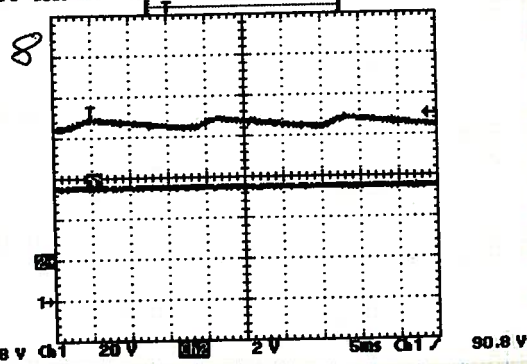
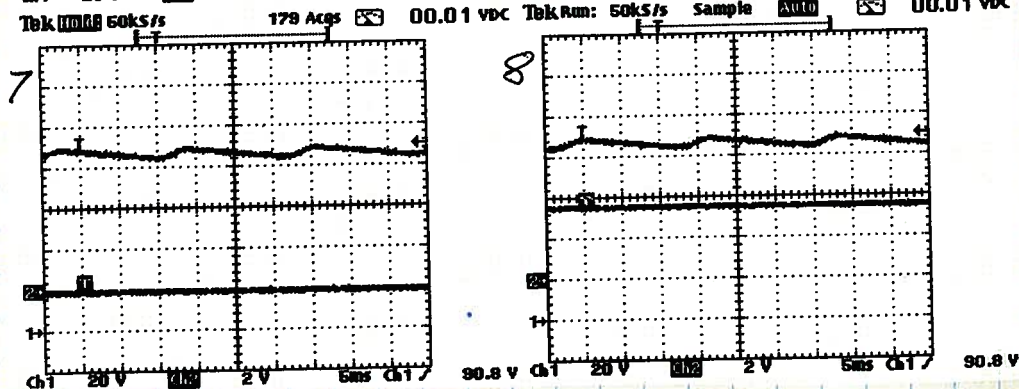
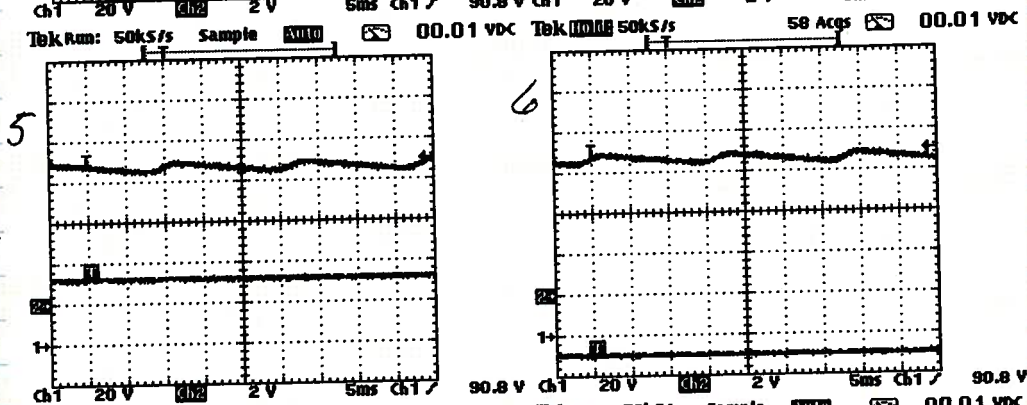
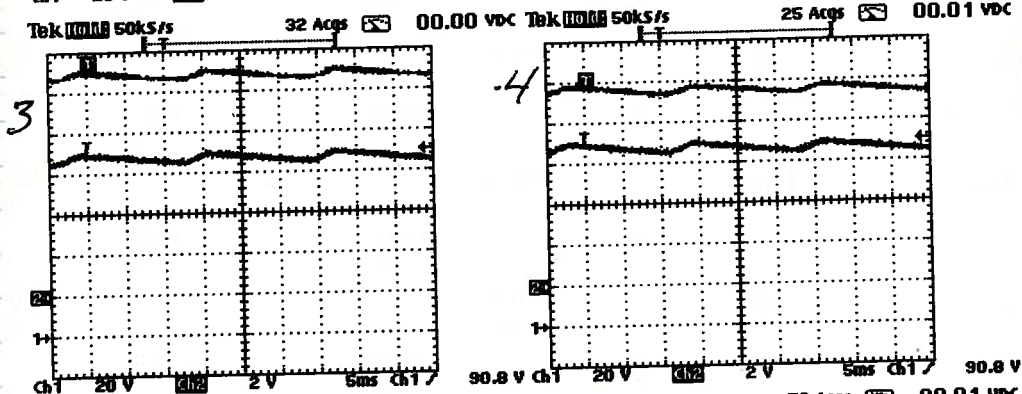
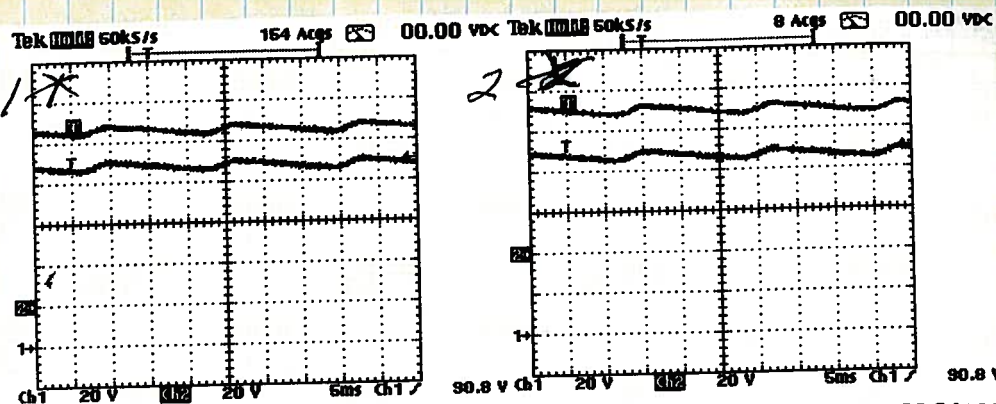
7 ch2 probe is on pin 2 of 324. Display is 71.1.

8 ch2 probe is on pin 8 of 324. AC coupling and looking on 50mV scale things look DC.

9 ch2 probe on pin 14 of 324. Display is 71.1.



ripple is 160 Hz



3/29

JS

Looking at the voltage on TP9 while varying the "sensor" resistance.

R	TP9	
Ω	Volts	
100	7.85 -2.30	-1.55 was "resting voltage" in ^{sample} update mode. I switched to update mode for this check.
200	3.06	
300	-3.82	
400	-4.58	
∞	-11.95	
500	-5.34	
600	-6.11	

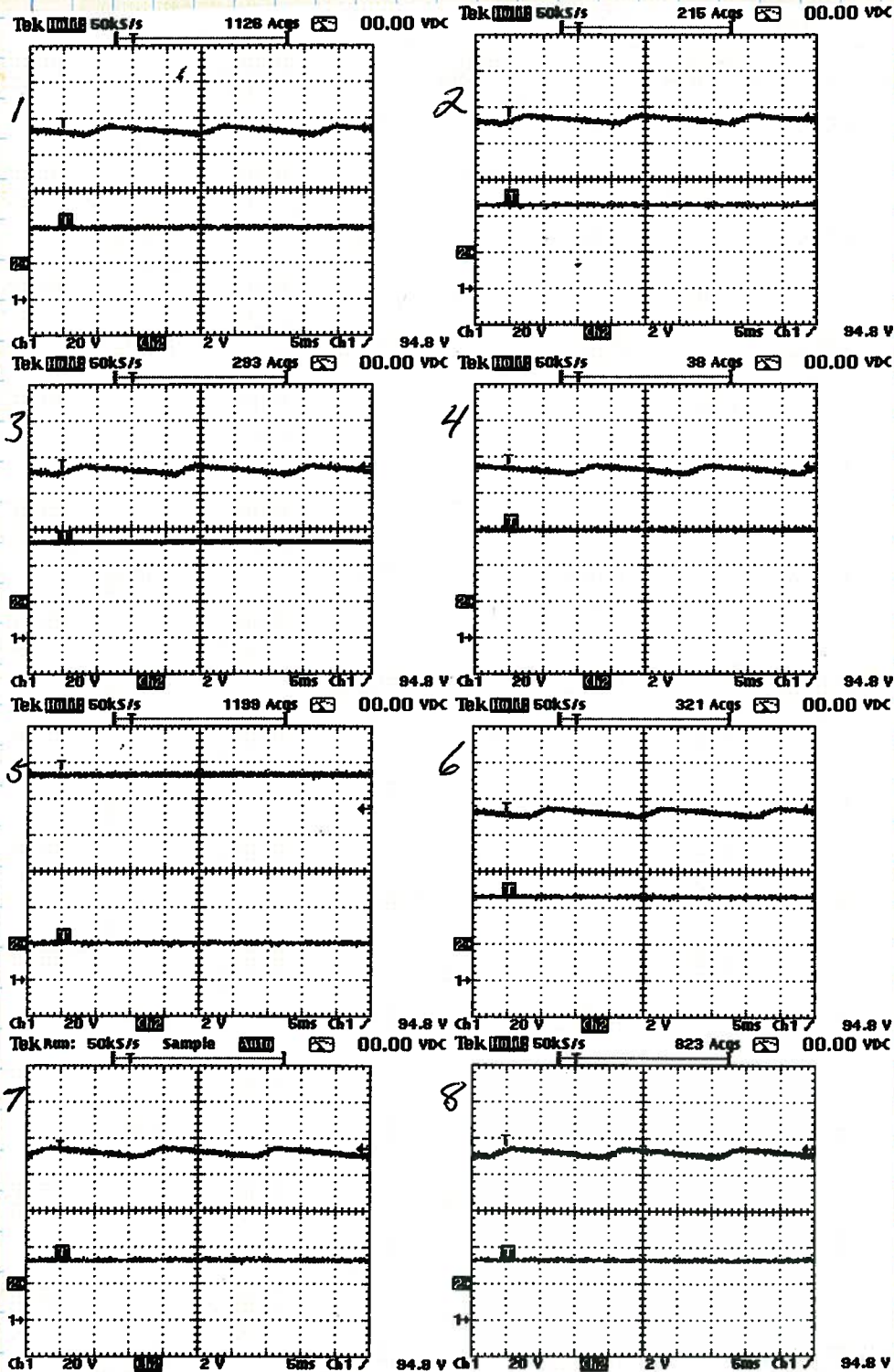
switching to ~~update~~ sample mode & checking the "resting" voltage at TP9.

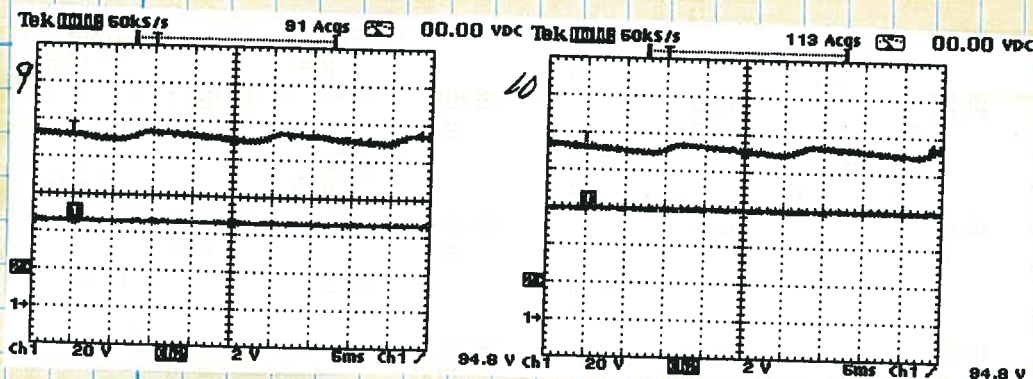
600	-1.60
500	-1.59
400	-1.58
300	-1.57
200	-1.56
100	-1.55

Update mode is constantly putting current through the sensor. Sample mode only applies current periodically.

3/30

Checking how the voltage applied to the sensor is handled. Probe on CH1 is connected to +I pin. Probe on CH2 from pin 7 of 324.





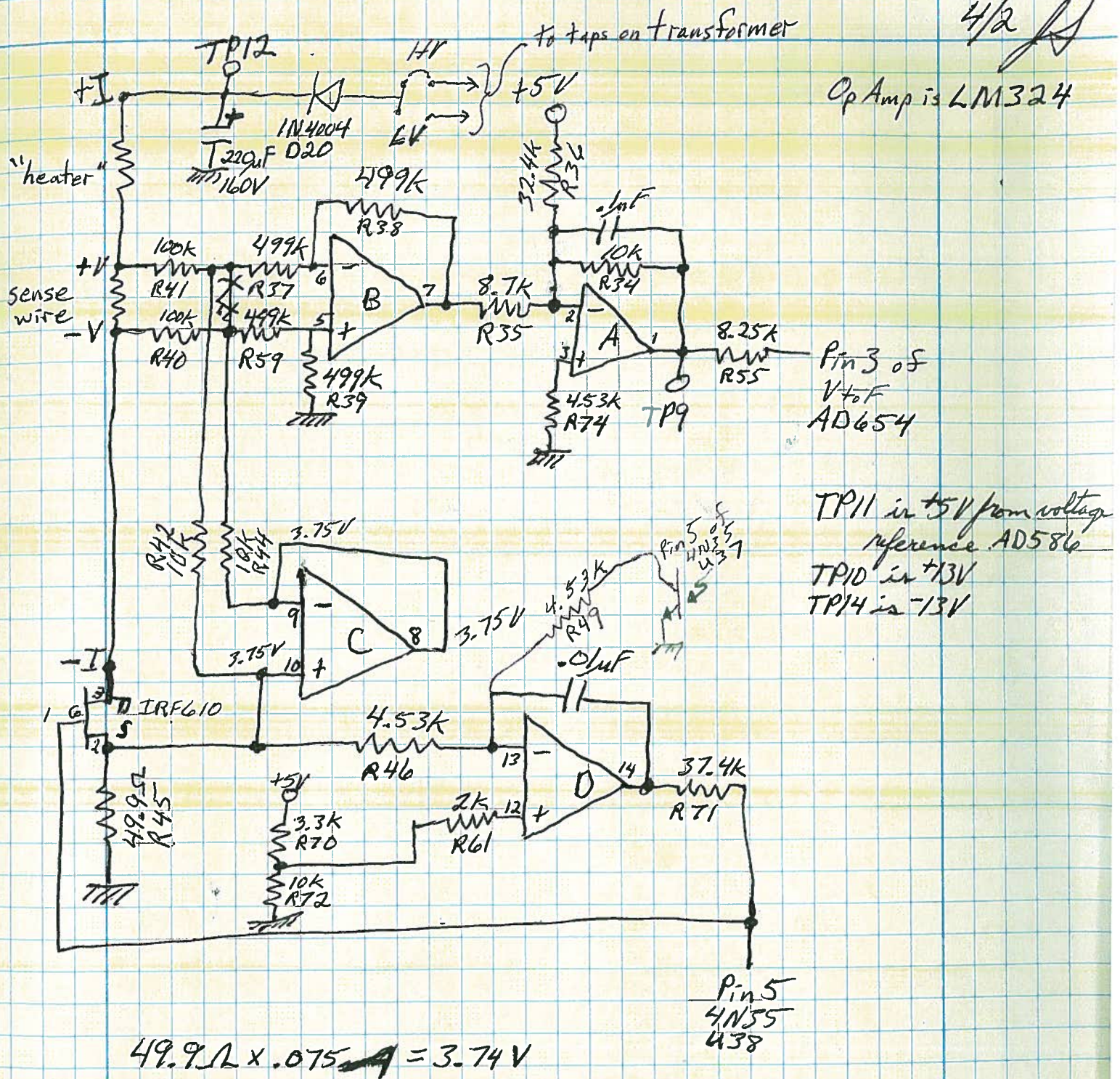
The2.txt

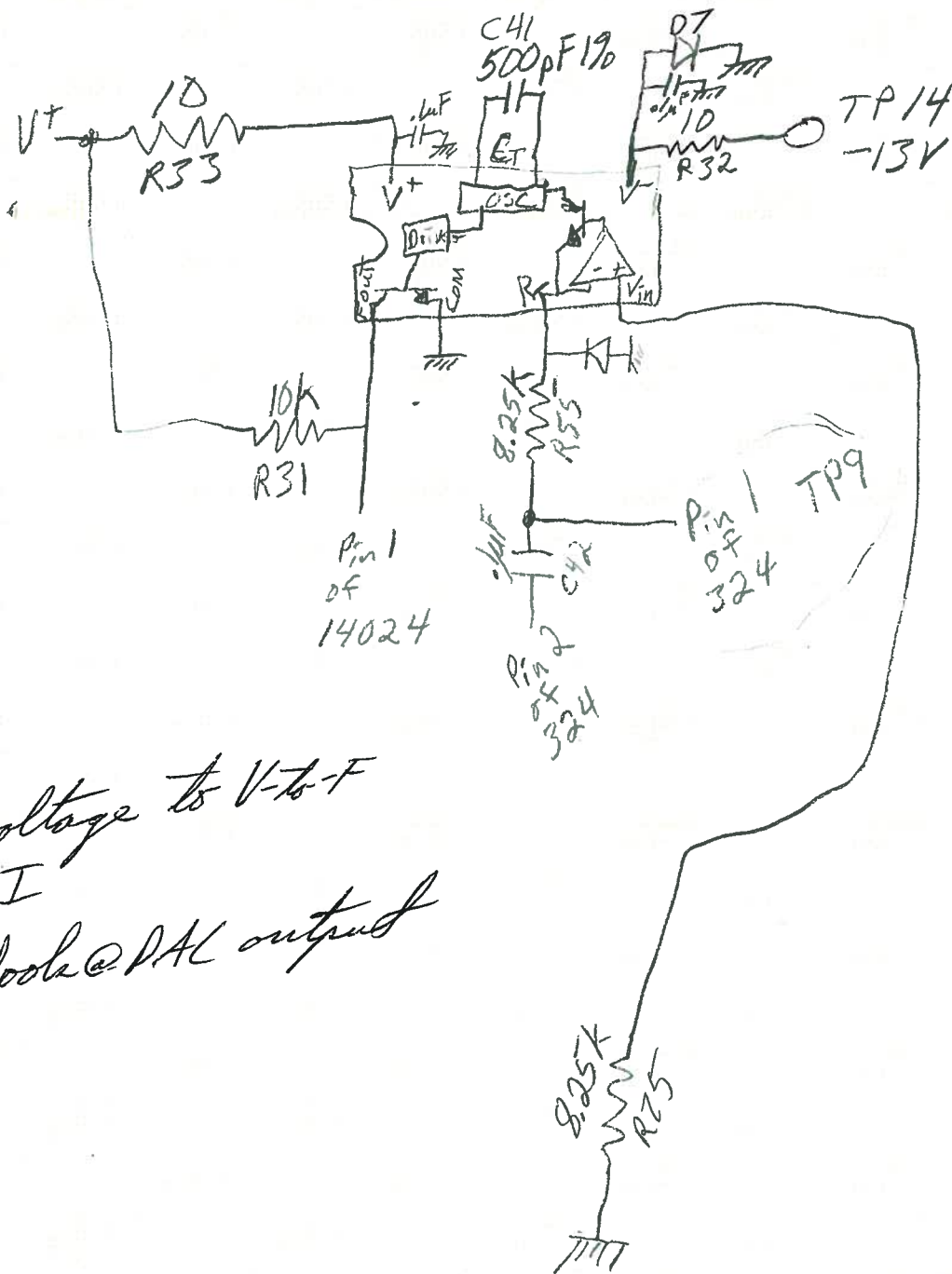
- 1 ch 2 probe is on pin 7 of 324.
300 ohms for "sensor".
- 2 400 ohms for "sensor".
- 3 500 ohms for "sensor".
- 4 600 ohms for "sensor".
13.5 percent on display. Length is set at 60 inches.
- 5 600 ohms for "sensor".
Change length to 20 inches. Display shows 606.0.
- 6 Set length to 40. Display is still 606.0.
400 ohms for "sensor". Display reads 5.3 inches.
- 7 200 ohms for "sensor". Display reads 22.6 inches.
- 8 Length set to 80 inches. Display reads 62.6 inches.
- 9 Sensor set to 400 ohms.
- 10 Sensor set to 600 ohms. Display reads 28.1 inches.

Voltage applied to sensor is constant. Current is controlled by the gate of the IRF610.

4/2

Op Amp is LM324





TP9 voltage to V-to-F
TP12 + I
look @ DAC output

6/26/66

Q2 He level meter has an oscillating output. It goes from ~82% to ~77% on the display.

A
4
JF

We pull the meter and put a scope probe on TP7. Attaching the probe ground to the chassis shows the chassis is not at gnd. Clip a lead to TP13 and the probe gnd. The signal is now stable.

Looking at the EPICS strip chart we see that at some point shortly after we started the He level reading began to behave normally.

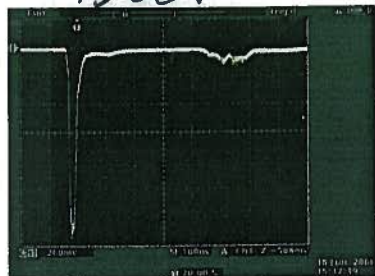
Removed probe from TP9 and put it on pin of AD654. Disconnected probe gnd. Meter continues to behave correctly. Connect scope probe gnd to chassis. Chassis is still not at gnd. So, not an intermittent gnd connection somewhere. Probably not.

6/27
A

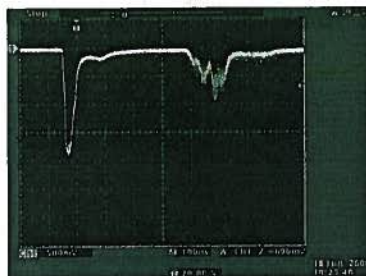
Pulsing S2 PMTs on Left Arm

This was done on 6/18.
 I took the avalanche pulser with the SMA
 fitting up on the Left Arm to look at the conditions
 of the PMTs on S2.
 I could not reach the top PMT on the right side (R1).

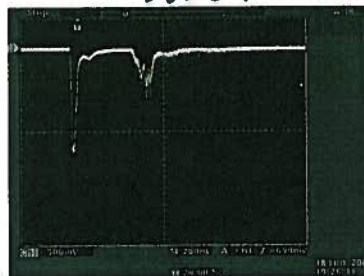
-1500V



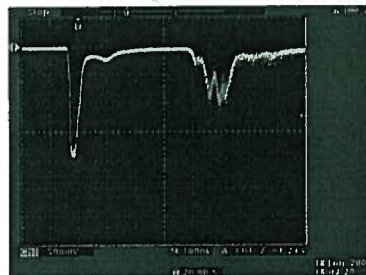
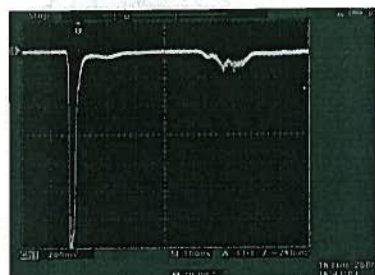
-1800V



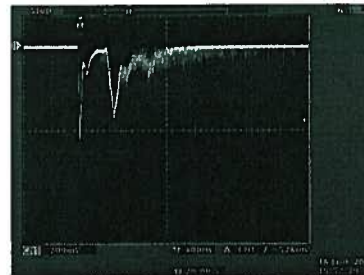
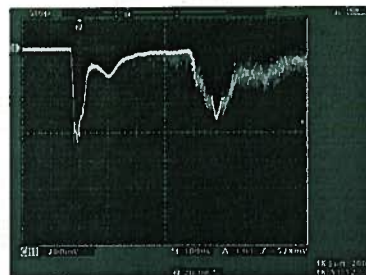
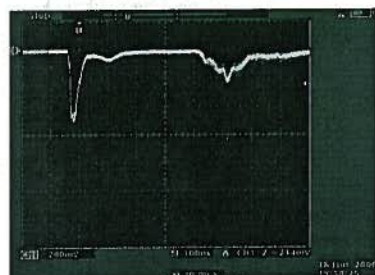
-1800V



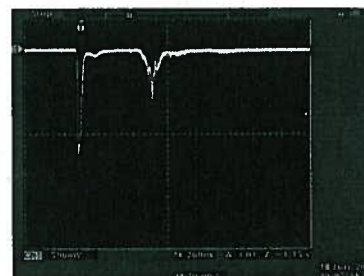
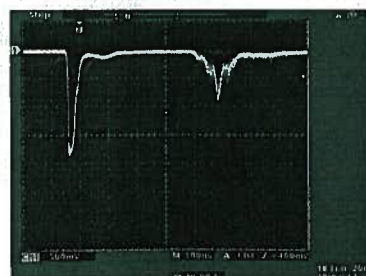
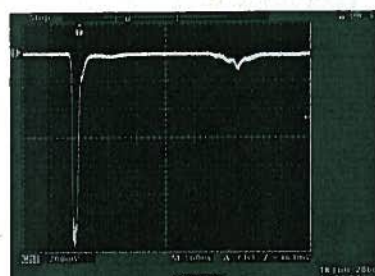
R6



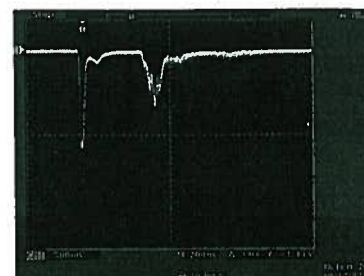
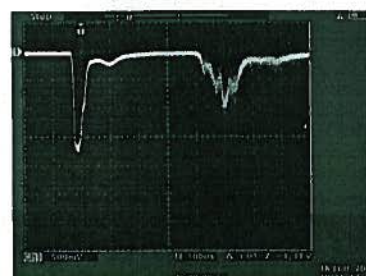
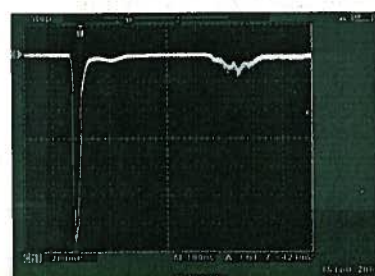
R5



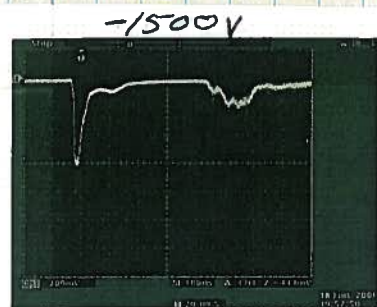
R4



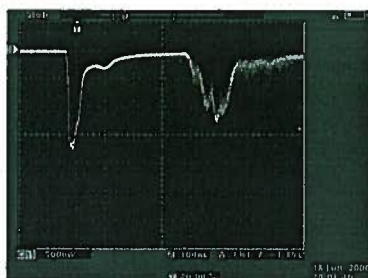
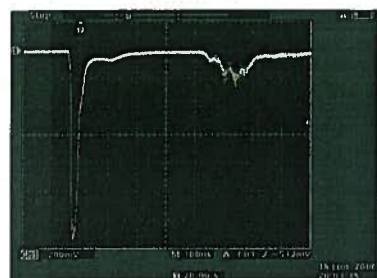
R3



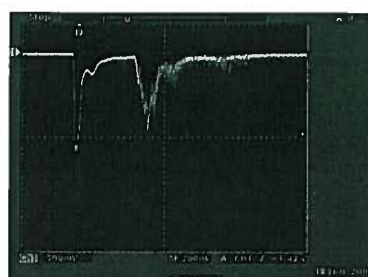
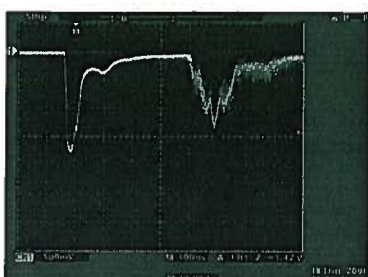
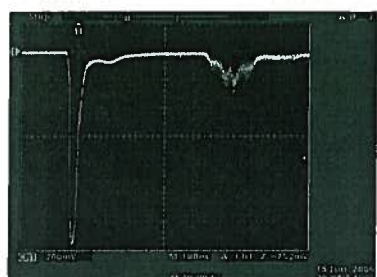
R2



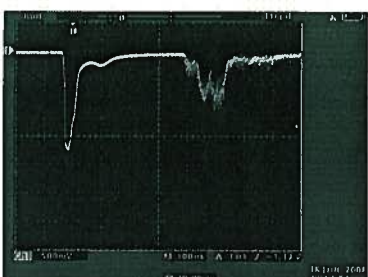
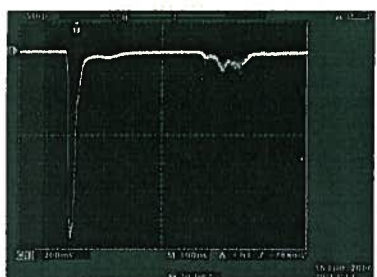
L6



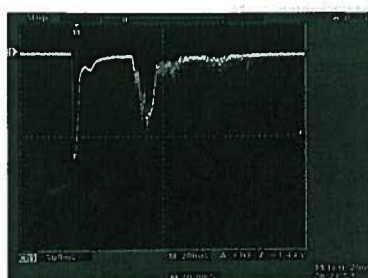
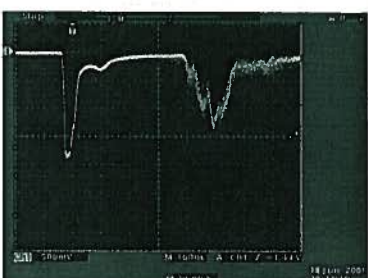
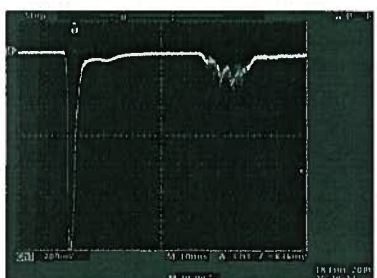
L5



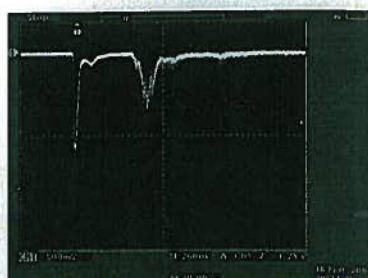
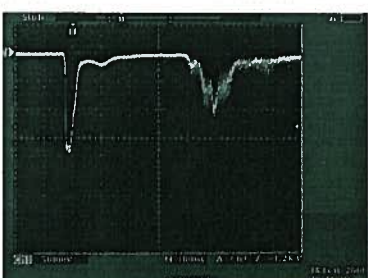
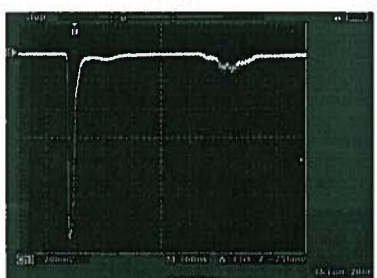
L4



L3



L2

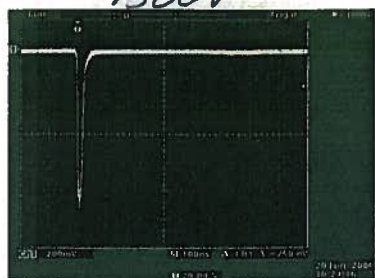


L1

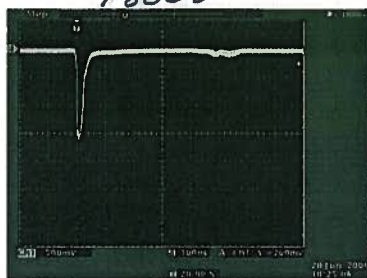
6/27
RJ

Pulsing 52 PMTs in Physics Storage (done on 6/20)

-1500V

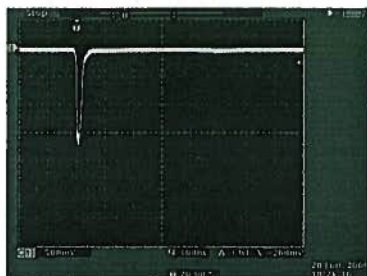
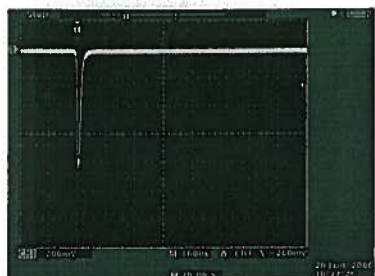


-1800V

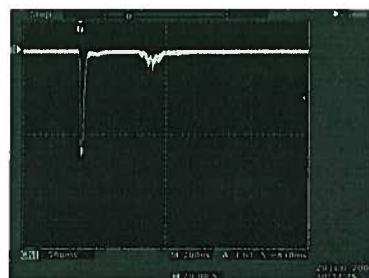
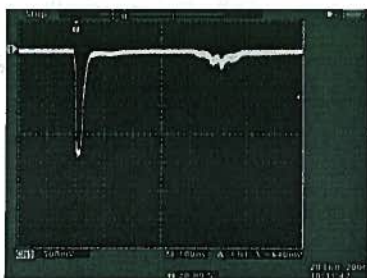
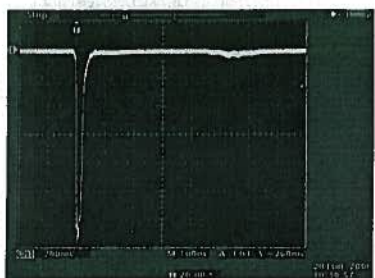


-1800V

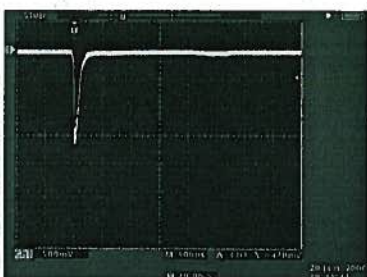
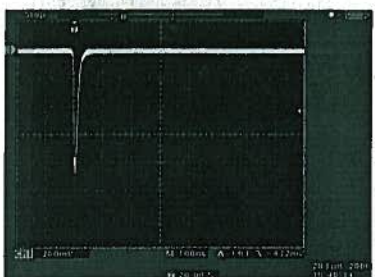
R1



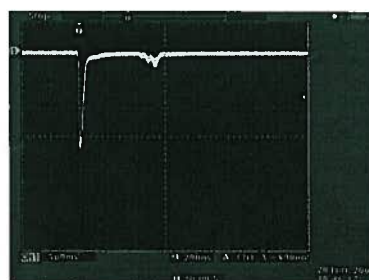
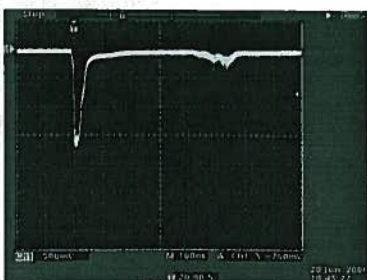
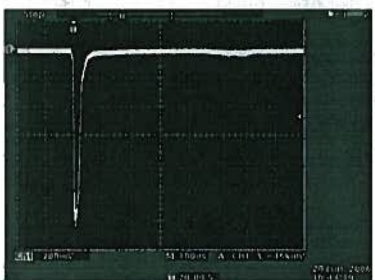
R2



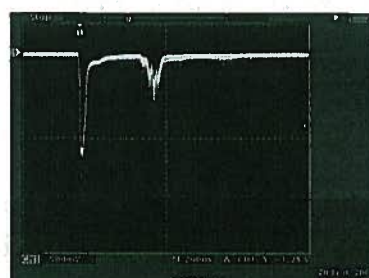
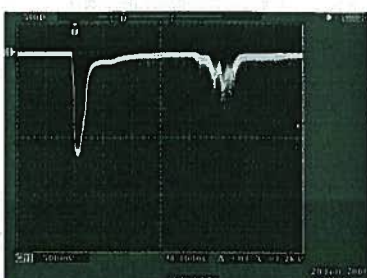
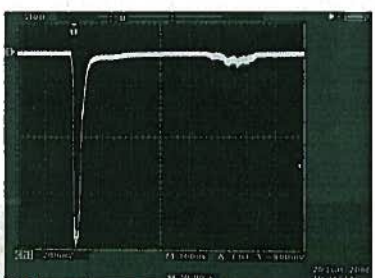
R3



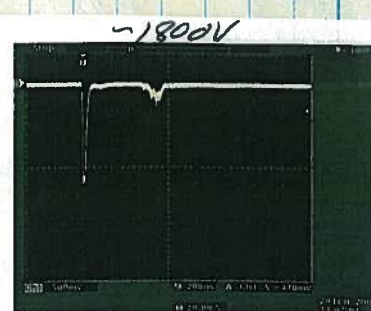
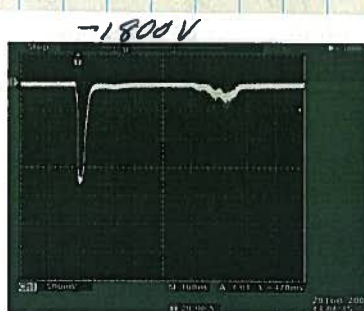
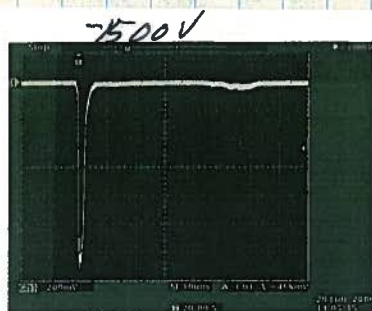
R4



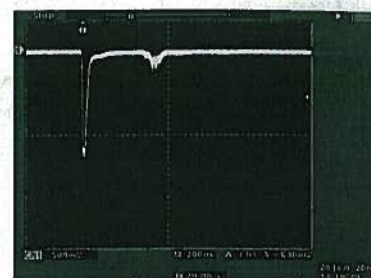
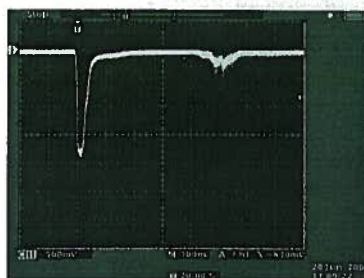
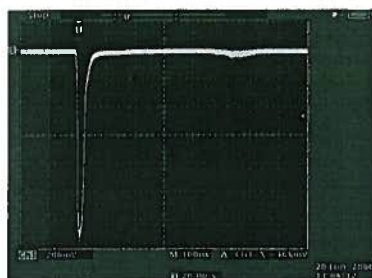
R5



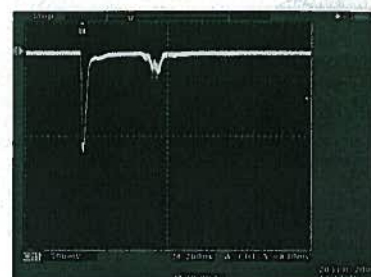
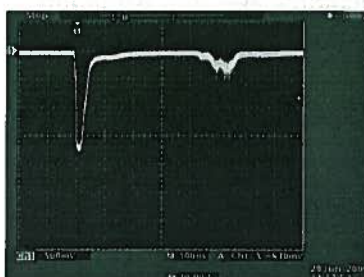
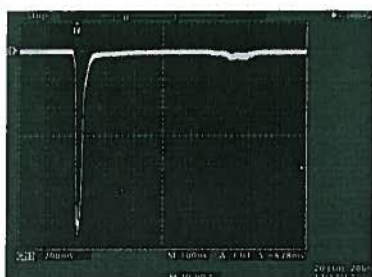
R6



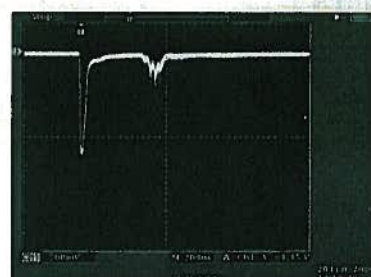
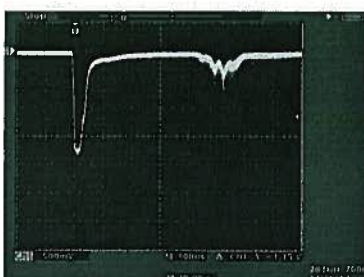
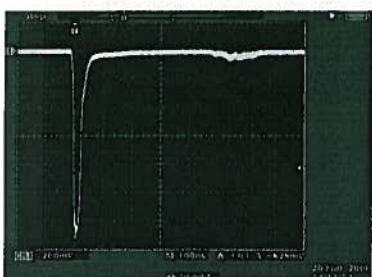
L1



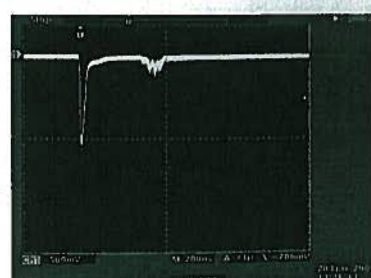
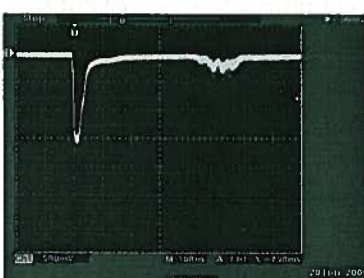
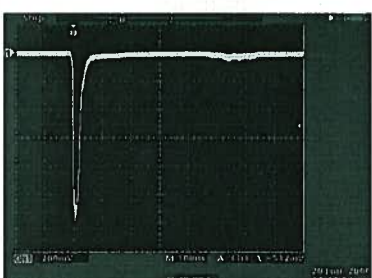
L2



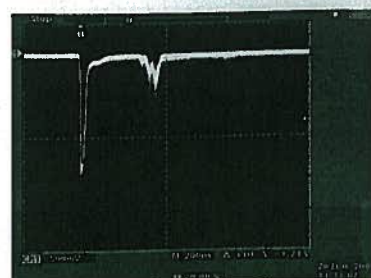
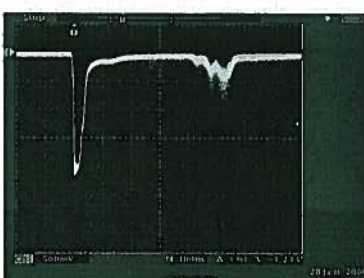
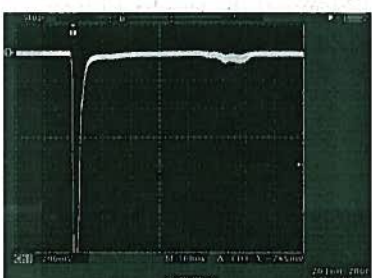
L3



L4



L5

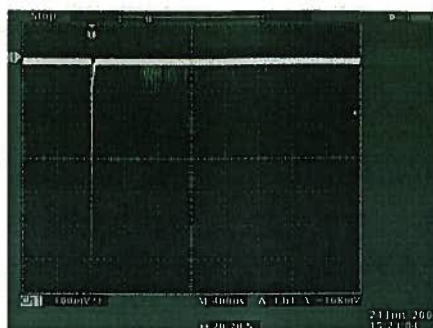
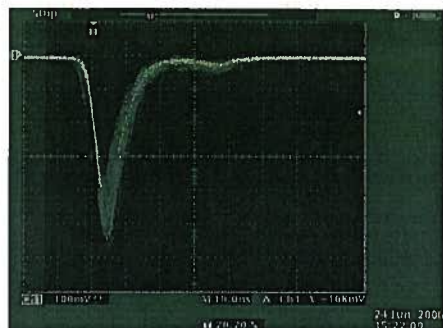


L6

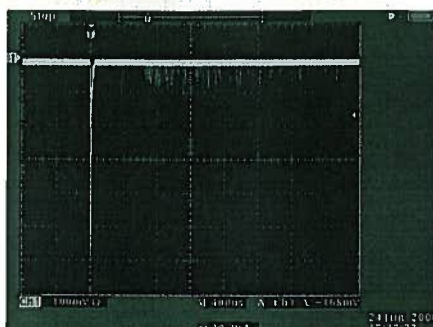
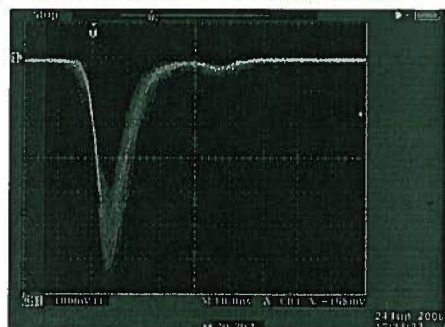
~~6/27~~
~~SS~~

Pulsing PMTs on Gas Cerenkov for Left Arm (done 6/24)

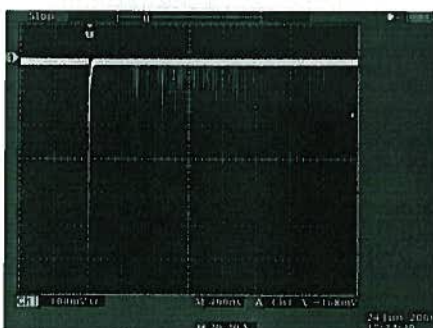
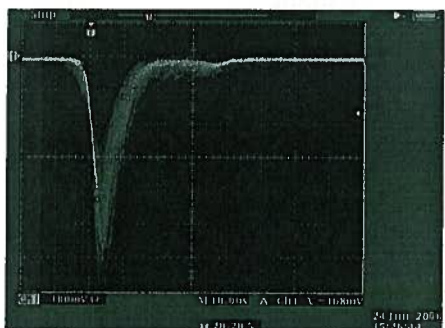
I connected the avalanche pulser (L.T. II p. 102)



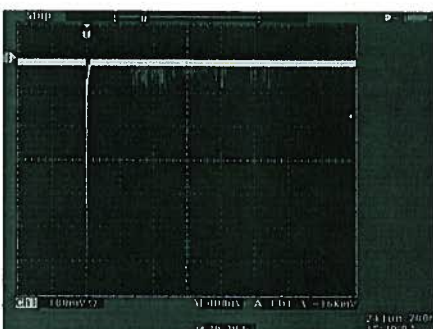
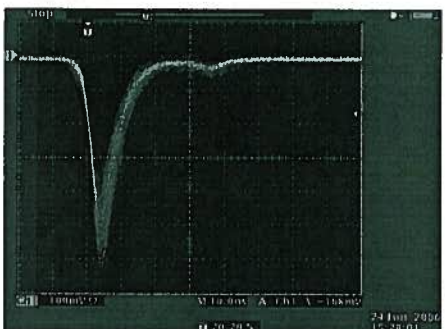
2
-1600V
-91mA



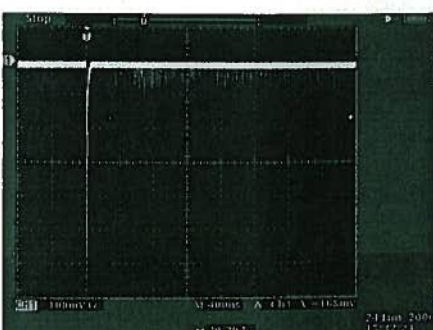
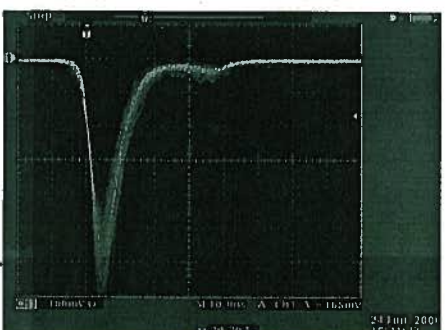
4
-1400V
-80mA



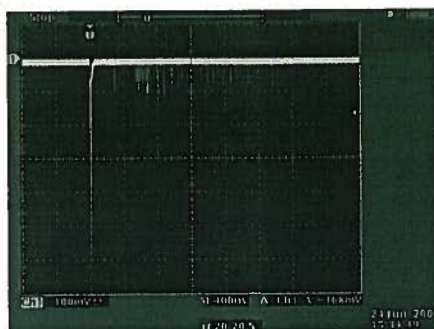
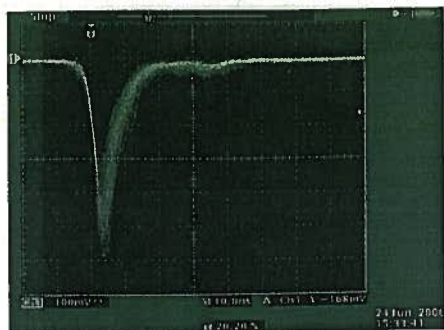
6
-1900V
-1.09mA



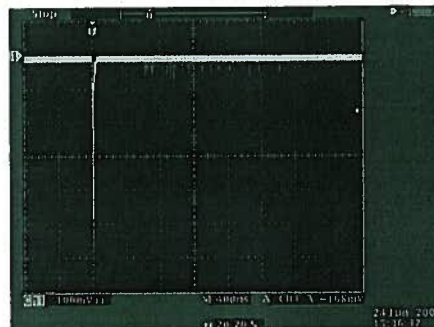
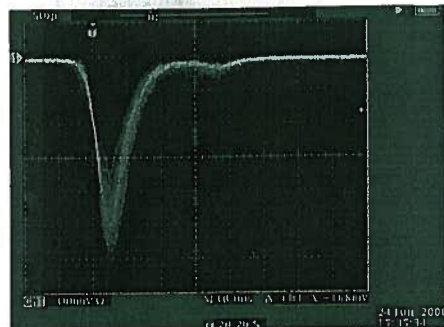
8
-1600V
-91mA



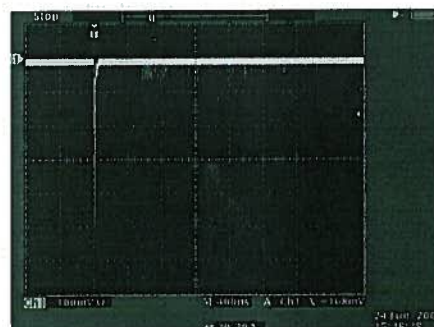
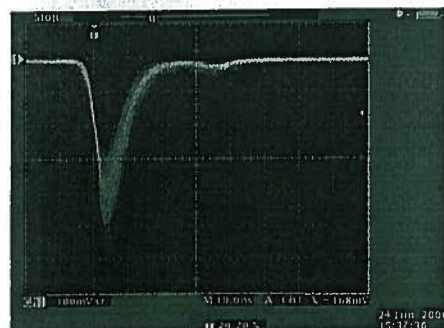
10
-1600V
-91mA



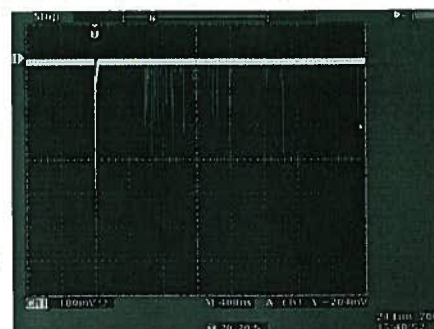
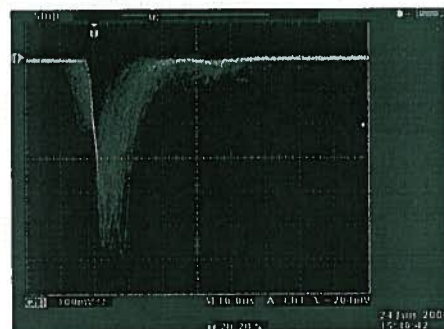
9
-1800V
1.03mA



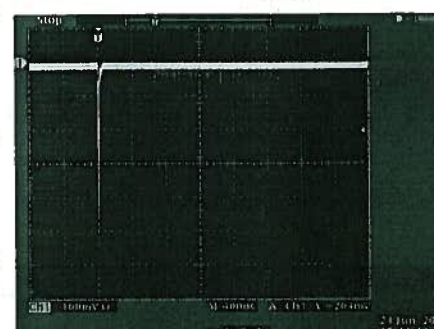
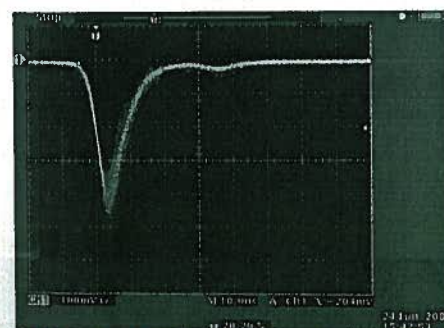
7
-1500V
.86mA



5
-1600V
.91mA



3
-1700V
.97mA



1
-1300V
.75mA

Liquid N₂ Probe First Look

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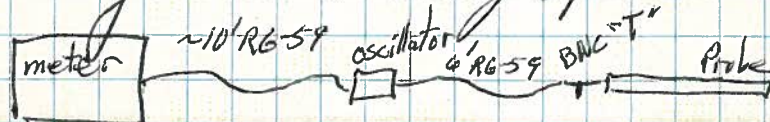
Looking at the liquid nitrogen probes for the hall. It looks like the probe is a variable capacitance for an oscillator circuit. The oscillator is in a housing that is supposed to connect to the oscillator with 6 feet of RG-59.

I have an old, used, bad probe. I have a new style, used ~~probe~~ oscillator in a box. I have a new style unused oscillator in a Pomona box.

I used a meter, that had a red tag on it. We did not know what the red tag was for.

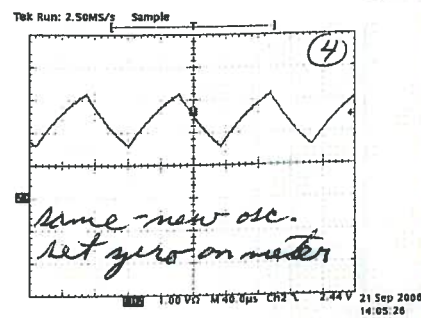
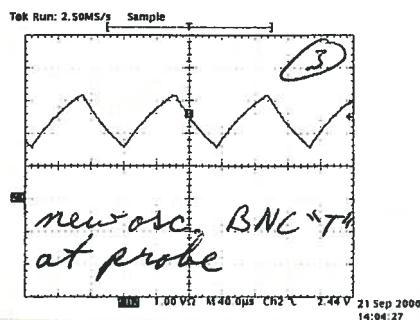
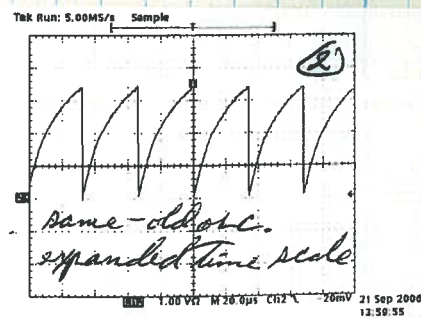
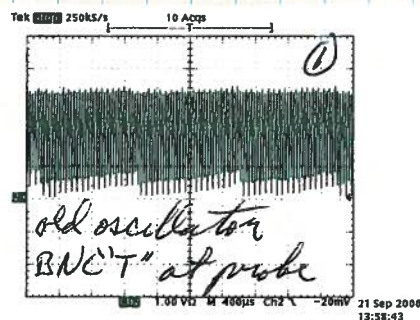
The same 6' RG-59 cable was used on the two new style oscillators to connect to the probes. The old style oscillator has the 6' RG-59 wired directly to it.

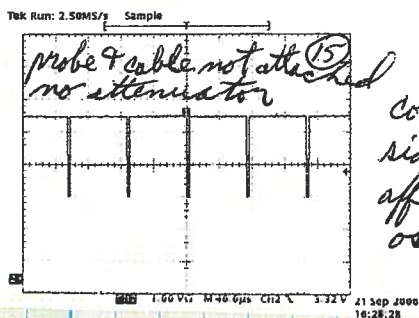
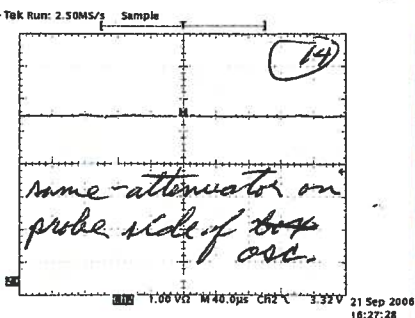
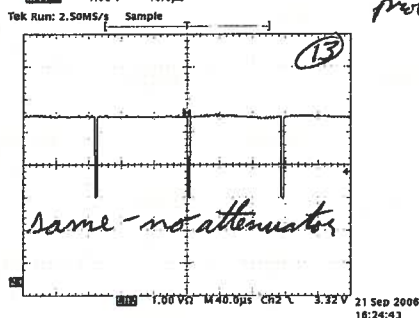
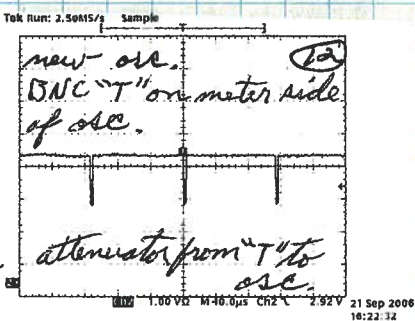
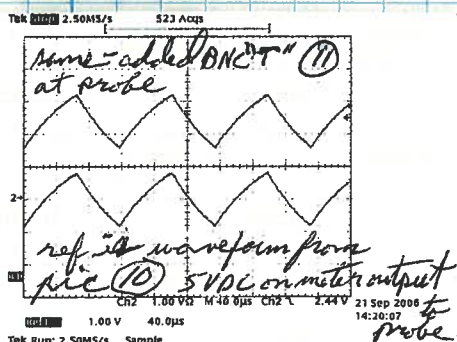
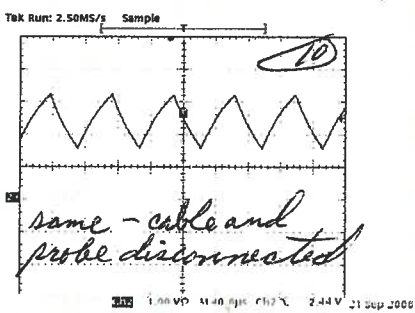
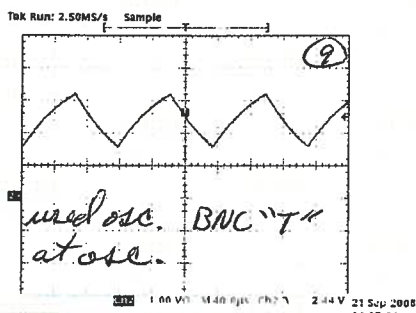
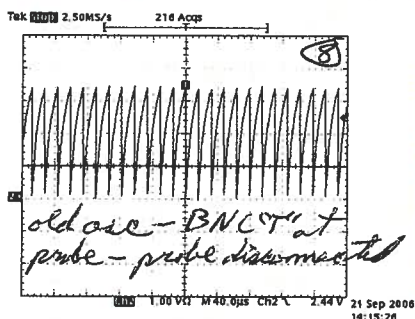
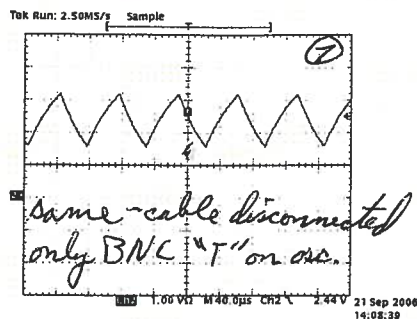
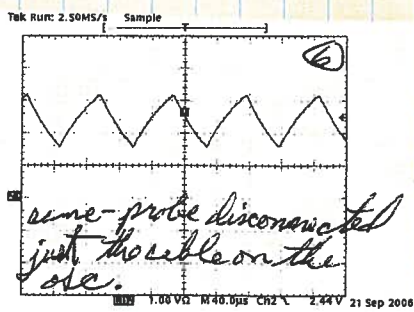
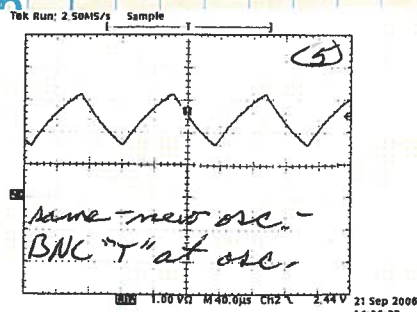
Looking at the old style oscillator



Just getting the pictures into the logbook. I did not make a note, but, I believe I used the TDS754 and an FET probe to look at the signals on the BNC "T".

3/22/07





connection on meter
side of osc. do not
affect reading or
oscillations

It seems the oscillator is a separate circuit. ~~But~~ Fed 5VDC from the meter to power it. The circuit is an oscillator whose f is set by the capacitance on it, including the probe. Hence each setup needs to be calibrated for zero and 100%.

The oscillator is probably AC coupled to the 5VDC line on both the meter side and the oscillator side of the RG-59 cable. The DC connection is to provide power.

Cracking open a "dead" oscillator a DIP chip is evident.

1/24 AC Currents on Left Detector Stack

I went up on the left arm with a Fluke 77 III and a Fluke 15200's AC clamp. The clamp put out either 100 mV/A or 10 mV/A.

I split open an extension cord so I could get the clamp around each of the conductors individually. I unplugged the unit under test and plugged it into the extension cord. The extension cord was then plugged into the outlet the unit is normally plugged into.

item	100 mV/Amp		
	line	neutral	ground
next to staircase → Rack 1 top NIM Fan	.104V	.104	.000
top NIM Fan + Bin	.230	.230	.000
Trigger Supervisor	.401	.402	.001
2nd rack lower camac	.766	.765	.001
upper camac	.525	.526	.001
upper NIM bin	.236	.236	.001
lower NIM bin	.200	.200	.000
3rd rack controls VME	.192	.192	.001

at the junction box at the rear of the detector stack I measured the current on the orange cables. I put the clamp around them where they go into the flex tray, outside the box.

color code		
inside box		
ground	.232	(100 mV/Amp)
red	.173	(.171)
black	.313	
blue	.068	
white	.173	(.173)

10 mV/Amp

checking to make sure I had the correct wire

inside the box

I got 245 VAC on the orange ground inside the box
 I got .035 on the ground going to the panel in the front
 I got .108 V .041 on the green wire of the black cables coming into the box

I got .008 holding the closed probe next to the cables in the tray

1/25/07 Quartz Fiber Transmission

Checking the transmission through the quartz fibers from the Helium-3 (polarized) experiment. The fibers go from the lab area to the target cell.

Quick check with the Fluke FOS & FOM and a Fluke 77 III. Checking with the (FOS) source and Meter (FOM) set for 850nm.

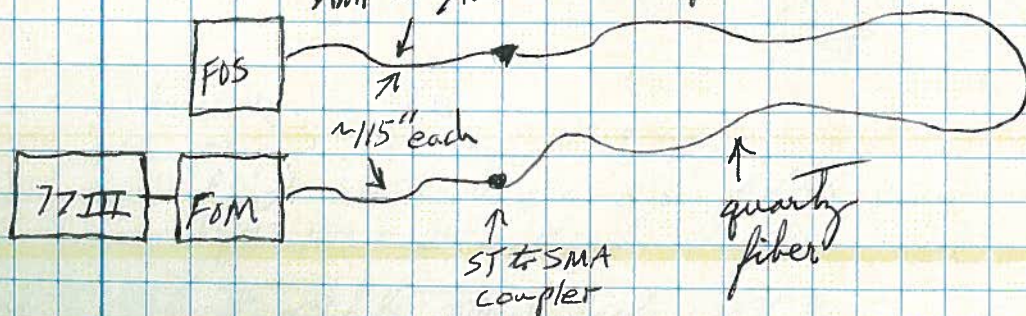
Fiber	mV	
F6	with Fiber	#to Fiber
F6	45.5	
F4	47.5	
F5 (Bad)	61 climbing	← says (Bad) on the label
F3	47.1	
F7	47.1	
F2	46.1	
F8	one end is crapped up. Can't get a connect on it.	
F1	46.7	

Checking them again

	850nm	1300nm
F3	46.4	45.6
F4	47.5	46.5
F6	46.0	46.8
F7	48.0	45.6
F2	48.0	45.0
F1	48.7	45.9

on F3 with the FOS & FOM at 1300nm there does not seem to be any appreciable transmission at all. Oh! it helps to have the cable on the FOS connected to the 1300nm source. I will try the cables with the 1300nm. See above.

AMP 62.5/125 E92128 type OFNR



I took a Tek 3054 scope to the circuit while it was in place on the valve actuator. My notes are

pic 1 is V_{in} Ch 1 is pin 4 Ch 2 is pin 11
 pic 2 is V_{in} after going up before
 pic 3 is V_{in} after going down
 pic 4 is V_{in} after going up
 pic 5 is V_{in} after going down

pic 6 Ch 1 is pin 1 Ch 2 is pin 3 V_{in} after going up
 pic 7 is same but at stop

pic 8 is Ch 1 is pin 1 Ch 2 is pin 6 V_{in} after going down
 pic 9 is Ch 1 is pin 1 Ch 2 is pin 2 V_{in} after going up
 pic 10 is Ch 1 is pin 1 Ch 2 is pin 3 V_{in} after going up

Looking at the discriminator I find I need a ΔV_{in} of 20-30mV to start motion in the direction it was previously moving in.

I need a ΔV_{in} of ~ 150 mV to start motion in the direction opposite the previous motion.

The 7905 regulator is 5.09V at pin V_{SS} of TCA965.

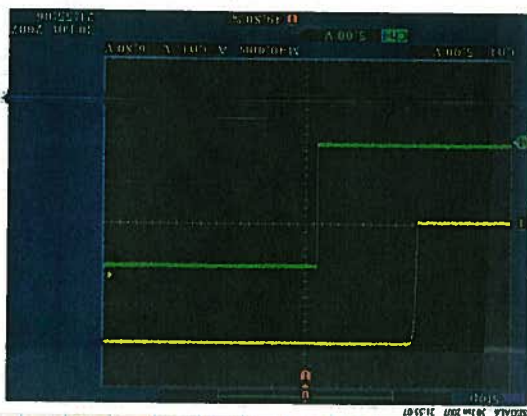
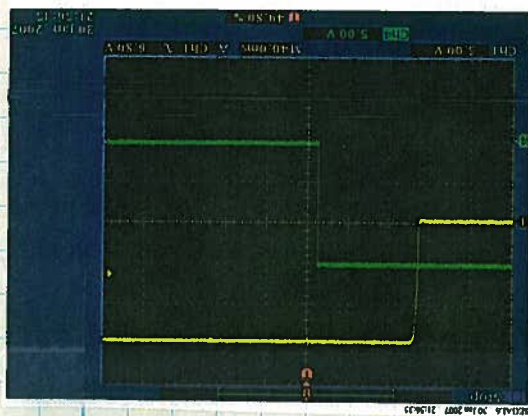
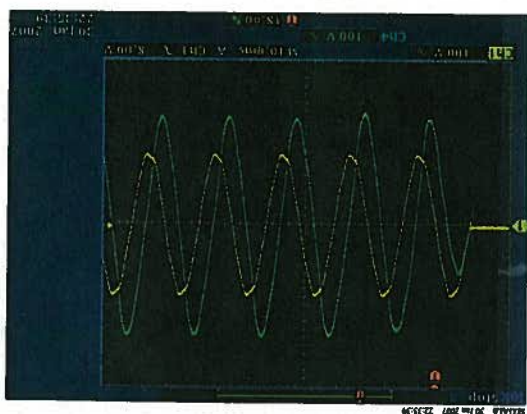
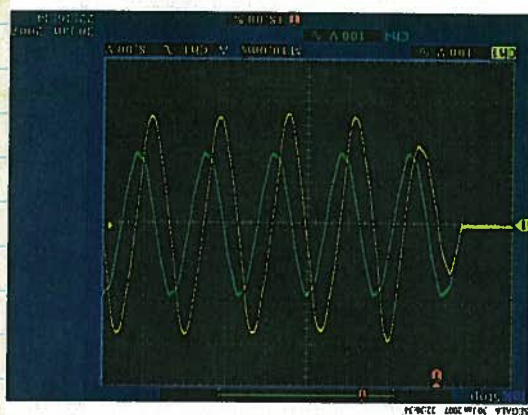
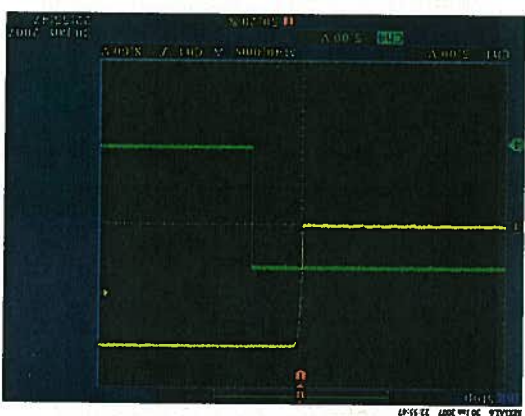
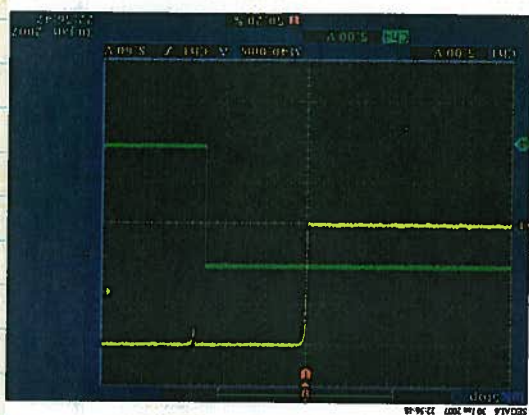
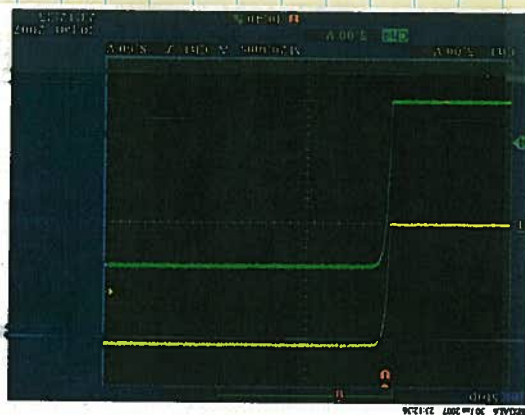
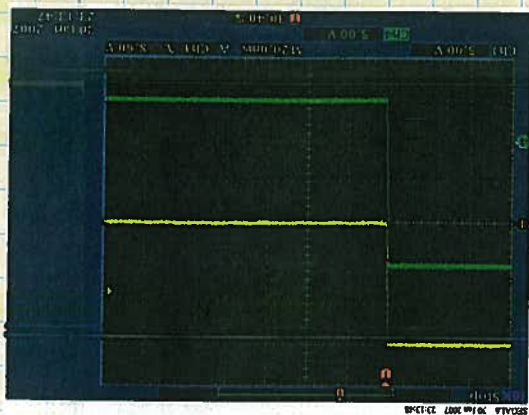
Pin 9 of TCA965 is 5.01V

pic 11 is Ch 1 purple to motor Ch 2 is brown to motor V_{in} up
 pic 12 is V_{in} down

pic 13 is Ch 1 pin 1 Ch 2 pin 3 V_{in} after down } same even when
 pic 14 is V_{in} after up } reversing direction

Not consistent. When going down I get both of the delays at various times. Going up seemed pretty consistent. Delay due to glitches ???

pics 15 & 16 are Ch 1 pin 1 of '93 Ch 2 pin 13 of TCA just to show the function of the nodes



Trying to see what we can replace a bad "follow-up" pot with.

First we run the valve to the hard stop on the open position. The voltage regulator is already adjusted to give 10.0V out on the wiper. At this point the 317 output is only a tiny bit over 10.0V. The valve is driven down about 10 mm. The offset pot is adjusted to give 2.074V on the wiper. Power is turned off and the yellow wire from the follow-up pot is disconnected. The yellow wire to the wiper is found to be 804Ω . The offset pot (B) was found to be $\sim 4 \Omega$.

The pot (follow-up) uses 80% of its electrical travel. The pot supposedly has 350° of travel, so a replacement pot needs at least 264° of travel. ~~to give~~ In 264° of travel the resistance must change by at least 800Ω .

3/2/07 Looking at Right Q2 Overheating

Mark & Heidi

The right Q2 has been tripping on a "over temperature" fault. This occurs when we cycle the magnet to saturation. Mark & Heidi have looked at the thyristors with a thermal camera and taped the video. In the past the LCW piping has been redone to try and improve the flow.

We will try to get a handle on the root cause of the overheating.

At one point we checked some of the LCW flows using an ultrasonic flowmeter. We have to blow compressed air into the lines. Mark already had a method for doing this. We checked the flow on the delivery hose connected to each of the 3 flags in a quack power supply. The hoses are $\frac{3}{8}$ " hoses.

Looking at Right Q2.

Rear hose flow is ~ 6.6 ft/sec

Middle hose flow is ~ 7.0 ft/sec

Front hose flow is ~ 6.7 ft/sec

Looking at Right Q3

Rear hose flow is ~ 6.9 ft/sec

Middle hose flow is ~ 7.3 ft/sec

Front hose flow is ~ 7.5 ft/sec

Looking at Left Q2

Flow is ~ 7.4 ft/sec (I failed to note which hose)

We throttled the flow back till ~ 6.7 ft/sec

Ramp Left Q2 to 1000 A

flag temperatures are 80-81-80 (front to back)

81-84-82

turned the fans on top of supply OFF

82-86-90

ramped up to 1500 A

84-92-97

87-94-101

89-95-102

turned water flow back up to ~ 7.7 ft/sec

88-95-102

89-96-103

Temperature does not seem to be dropping much.
S.L.T. Th. power supply down

On 3/1/07 we went back to the Left Q2.

We put a brass coupling in the return line hose of the middle thyristor.

We clamped a Cole Parmer Digi-Sense thermocouple to the brass union.

With the power supply off we see 82.2°F on the thermocouple.

Ramp Left Q2 up to 1500A

Using the non-contact probe I see $\sim 73^{\circ}\text{F}$ on the thermocouple.

At 1500A the thermocouple reads 83.6°F

IR probe shows flags are $83-89-94^{\circ}\text{F}$

After 2 minutes the thermocouple is 83.3°F
flags are $87-95-102^{\circ}\text{F}$

Infrared non-contact probe is a
Raytek PM Plus
model RAYRPM30L3U

after 2 more minutes (4 min total) TC is 83.4°F
flags are $90-97-104$

Ramp the supply down to 0A

after ~ 5 minutes the TC reads 82.0°F

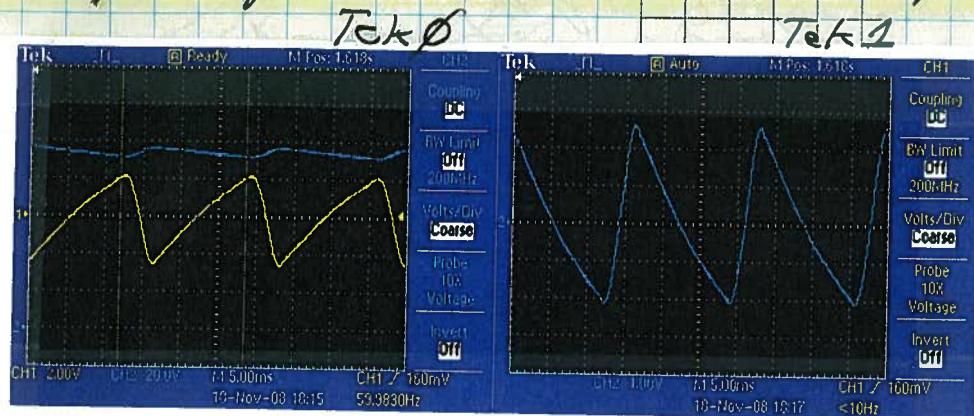
We put all the toys away.

It looks like there is plenty of water flow to the flags on the power supplies. It seems the design of the flags does not let much heat get transferred to the LCW. The water only makes a short loop through the flag.

11/19/68 Checking Some AMT 136 LHe Level Meters

We had some problems with the liquid level in the RQ2. While looking with a scope at the meter it seemed as if the output had a 60Hz oscillation on it.

What the channels were hooked up to is not, in the end, of value to know. There are the two scope pictures I saved while poking around.



We replaced the meter and labeled it "bad".

Looking at the meters today I see the problem is there are two isolated grounds on the circuit. One for the analog ^{HV} side and one for the digital LV side.

TP13 is the AGND for the analog HV section

TP18 is the GND for the digital LV section

Use TP13 as ground reference for everything up to TP9.

Use TP18 as the ground reference for Vout

Keeping this in mind we can continue.

Looking at AMT 136 S/N 98-0130-2

Using resistor box as the sensor.

100 Ω on the box

Ch1 is buffered voltage output 0-10V

Shield it at TP18 GND

Ch2 is VtoF input on pin 3

Shield it at TP13 AGND

first pic. Tek 2

Tek 3 is Ch 2 at TP9

Tek 4 is Ch 2 on pin 7 of LM324

and dead short for a probe (100.0 display)

Tek 5 is same with open for the probe (606.0 display)

Tek 6 is S/N 01-0823-1

Ch1 is buffered Vout

Ch2 is VtoF pin 3

100 Ω for probe

Tek 7 is Ch 2 on pin 1 of LM324

Tek 8 is Ch 2 on pin 7 of LM324

Tek 9 is 50 Ω for probe

Tek 10 is direct short for probe (100.0 disp)

?? → Tek 11 is open (606.0) for display

Tek 12 is 100 Ω again (56.9% on display)

it started out ~57.2% on the disp.

Varying the resistance rapidly, by tapping the banana plugs, does not make the microprocessor have a problem.

Tek 13 is S/N 01-0823-7 Ch1 is Vout Ch2 is TP9

50 Ω for probe

Tek 14 is 100 Ω for probe

Tek 15 is open

Tek 16 is also open

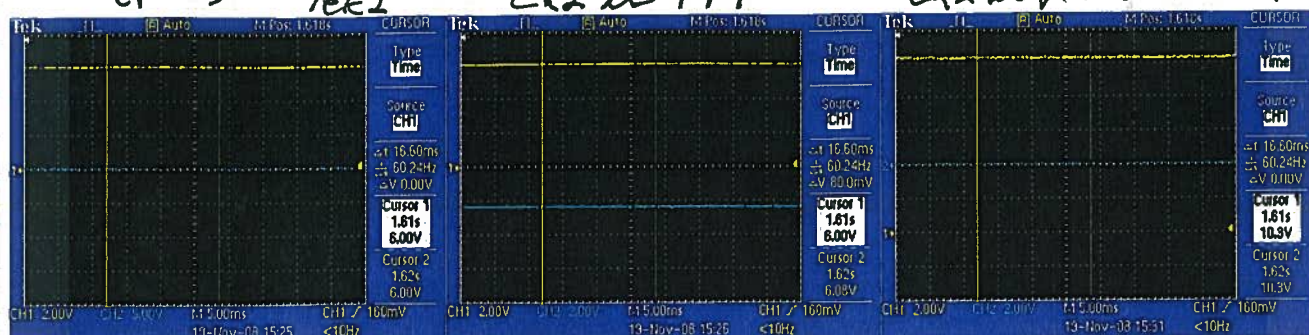
Tek 17 is short

probe length
was set to
20.0"

S/N 98-0130-2
 Ch1 in Vout shield@TP8
 Ch2 Vt&F input shield@TP13
 (pin 5) Tek2

Ch2 in TP9

Probe is a short
 Ch2 in pin 7 of LM324

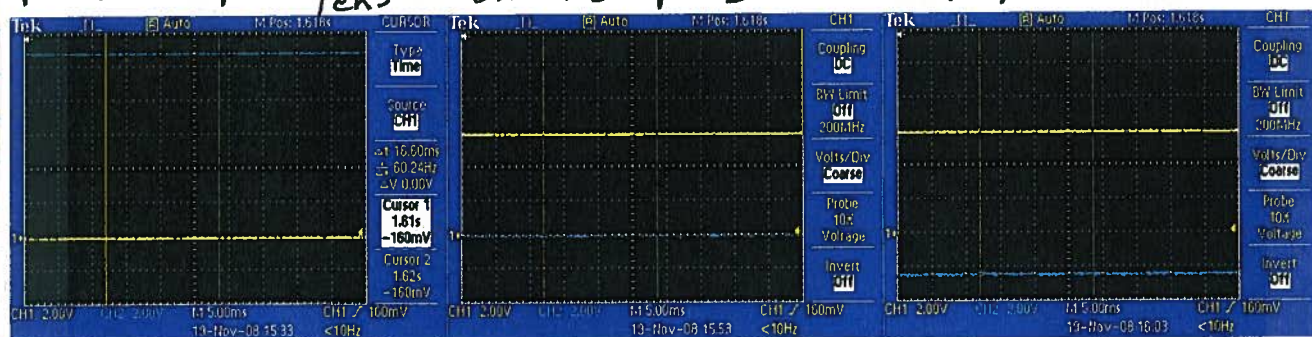


100Ω for probe

Ch2 in pin 7
 Probe is open Tek5

S/N 01-0823-1
 100Ω for probe
 Ch2 Vt&F pin 3

(TP9)
 Ch2 pin1 of LM324

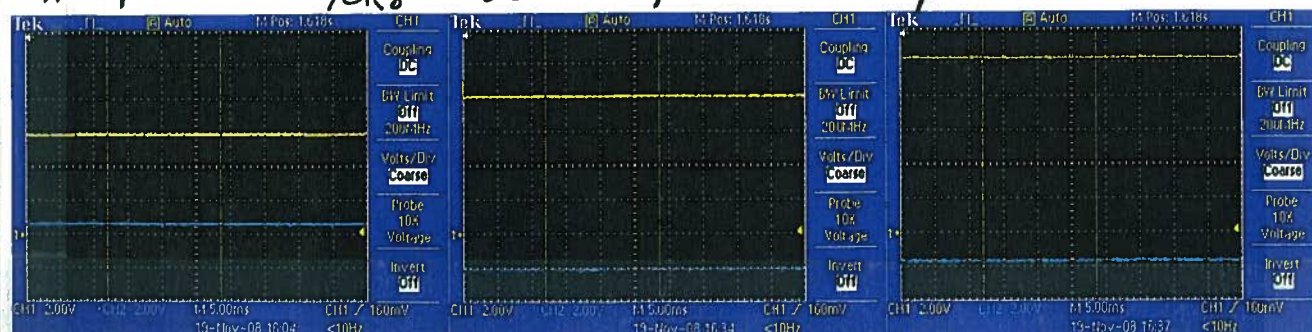


Ch2 pin7

Tek8

Same
 50Ω for probe

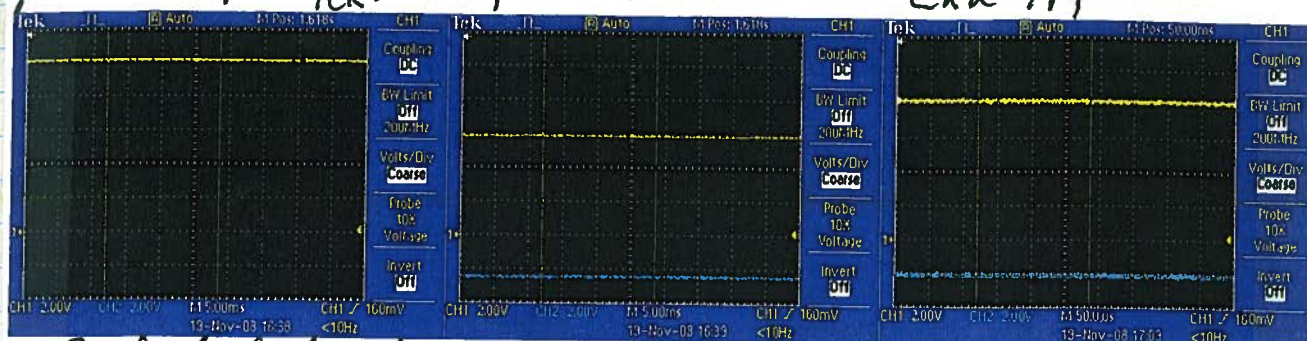
same
 probe is a short



same
probe is open Tek11

same
probe is 100 Ω

S/N 01-0823-7
50 Ω for probe
Ch2 TP9

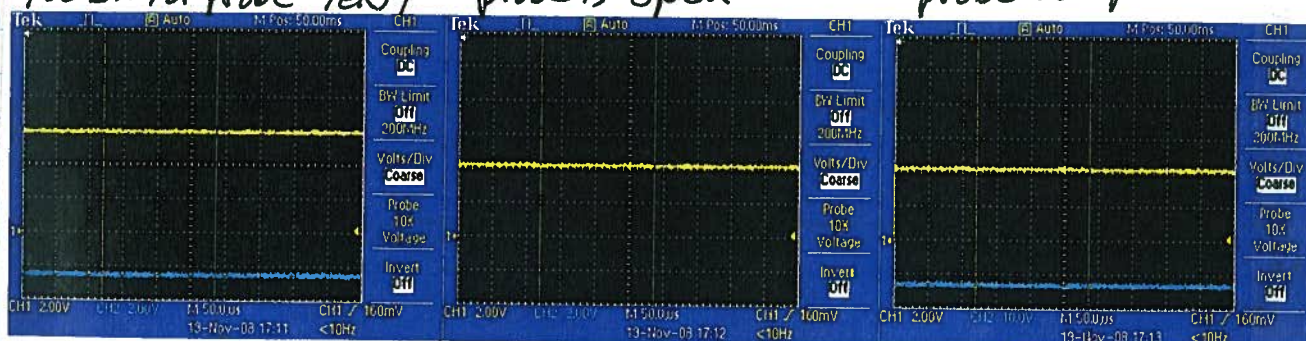


?? I think I made
an error when I
took this picture

same
100 Ω for probe Tek14

same
probe is open

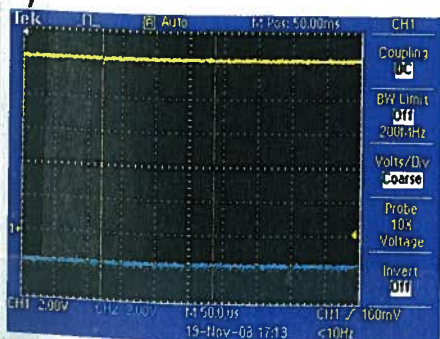
same
probe is open



↖ scale change ↗

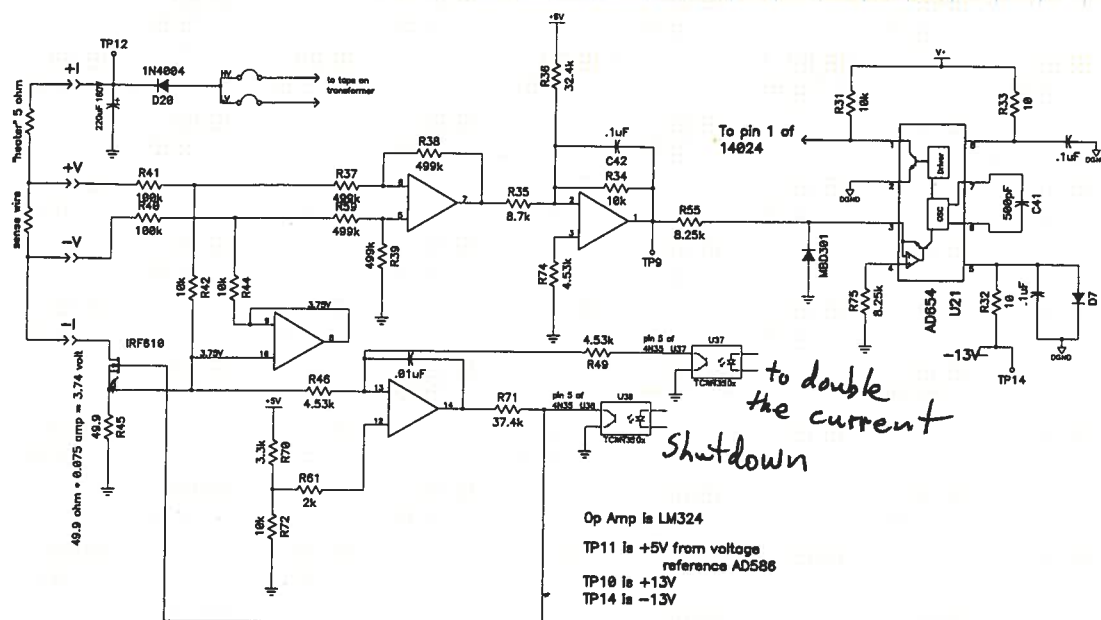
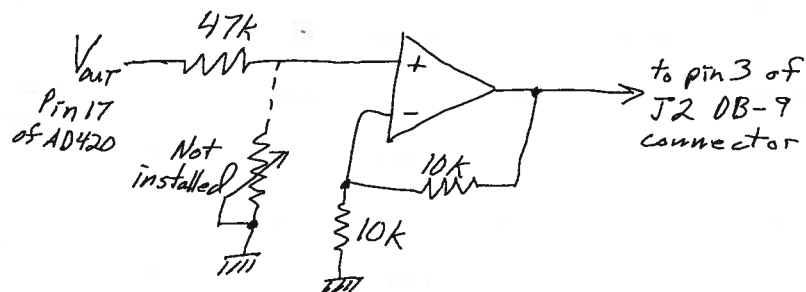
What is up with these?

same
probe is short



Clearly we need a
better check-out
procedure.

Schematic of AMI 136 Drive Circuit

Output Circuit for Models 13x + 18x
AMI Level Meters12/2/05
JSfor voltage divider $V_o = V_i \frac{R}{R+47k}$

$$.5V = 5V \frac{R}{R+47k}$$

$$.5R + \frac{47k}{2} = 5R$$

$$4.5R = \frac{47k}{2}$$

$$R = 5.22k\Omega$$

to get a 0-1VDC output

