

Department _____

Subject

Misc Hardware II

Name

SEGAL

Address _____

National® Brand

Computation Notebook

11³/₄" x 9¹/₄", 4 x 4 Quad., 75 Sheets

43-648



0 73333 43648 8



AVERY
DENNISON

Office Products
Chicopee, MA 01022

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110

115

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120

125

Thermistors on aluminum bench
Circuit for powering thermistors
Distance from end of angle to floor
Capacitance sensor spec web pages

130

Temperature effect on measured gap
Tapping on angle - effect on measured gap

133

134
135

Calculated YSI 44031 thermistor values
Calculated YSI 44036 thermistor values
MEDM displays of bench & a couple gas shed displays

140

one of gas shed

145

Bench strip tool readout - 1st one!

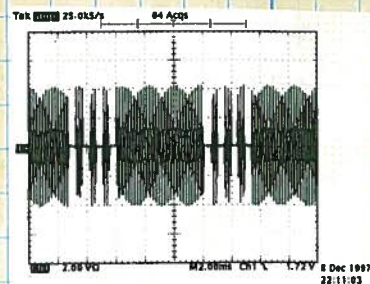
150

Sparky's Broadcast Signals

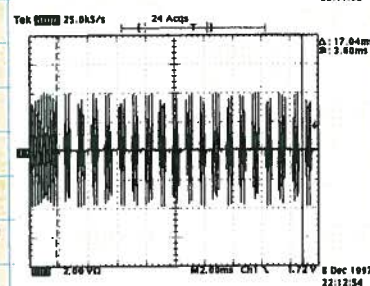
12/8/97

FET probe is used on 505754A to look at the antenna of the Transmitter.

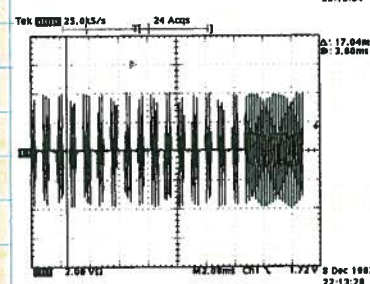
forward →



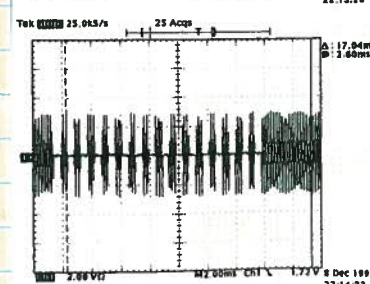
reverse ↗



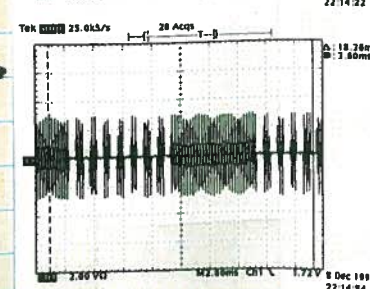
scrolled screen
to the right
from the above
picture



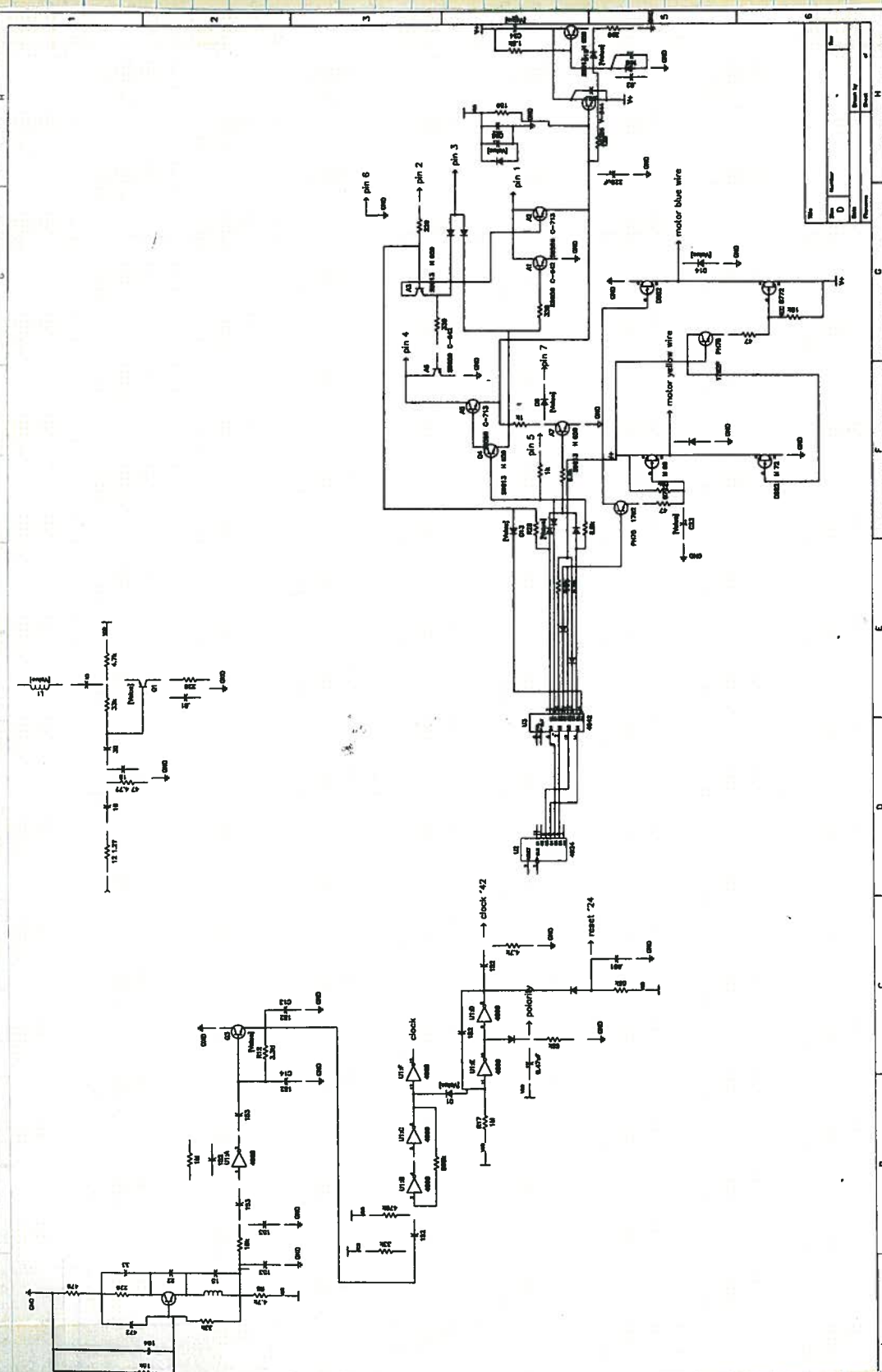
turn right →



turn left →



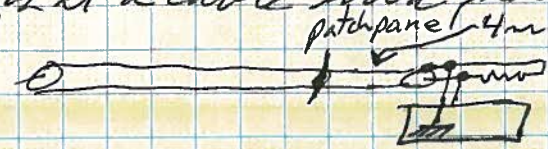
1/3/98 1ST Guess of Sparky's Circuit



Noise & Ground Loop from Hall A to Counting Room A 1/8/98

Checking for ground loop and noise on IEEE802.3 patch cables run from Hall A up to the Counting Room A.

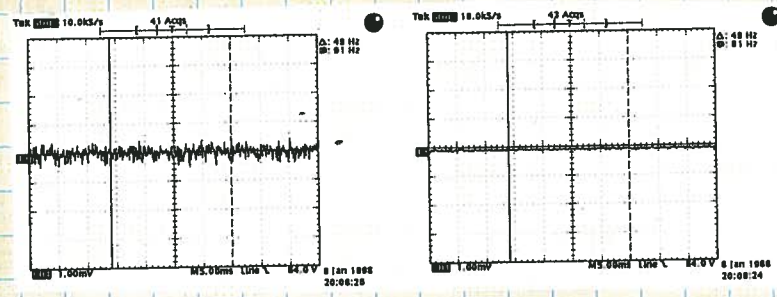
First, look at a cable with nothing attached to it in the hall.



Ch1 on 1MΩ
TDS754A 50Ω term on BNC "T"

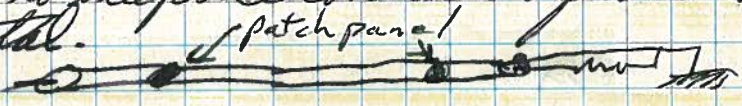
Trigger on Line
(for all the pictures)

sample mode

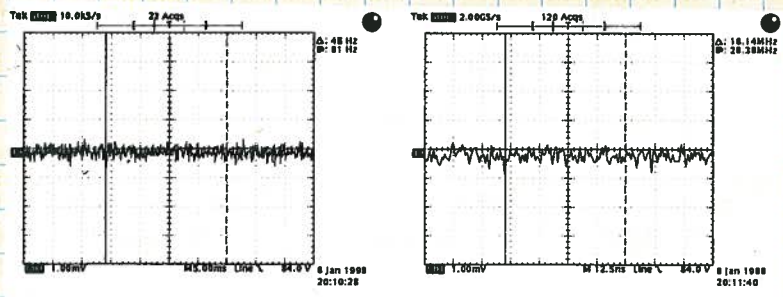


AVG set to 32

Attached a 4m piece of RG-58C/U to the end down in the hall. Tucked the end amongst some hanging cables, to keep the connector from contacting any local metal.

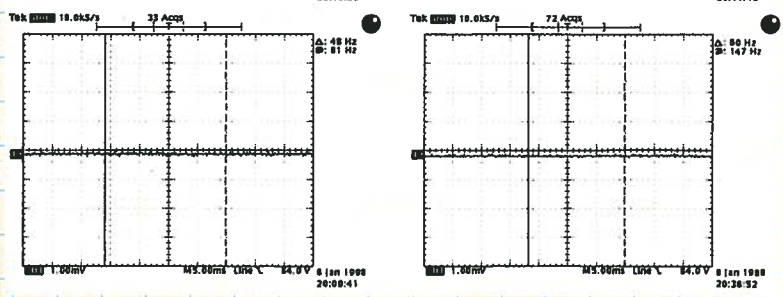


sample mode



sample mode
12.5ns/div

AVG set to 32

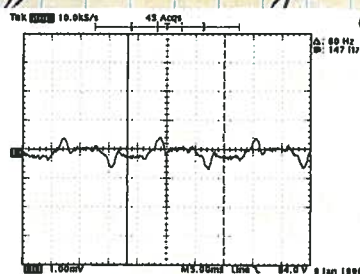
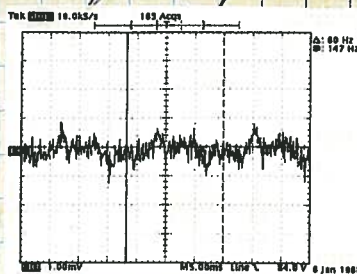


AVG set to 32
and terminator removed

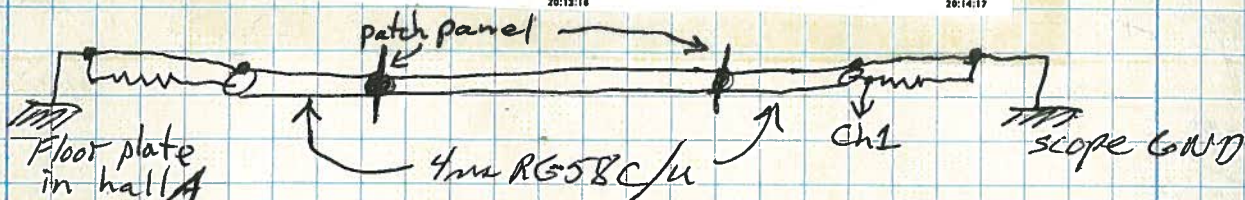
1MΩ to GND

50 Ω terminator and 4ms of RG-58C/U on end in the hall. The end with the terminator is laid on one of the steel floor plates for the bogies.

sample
mode

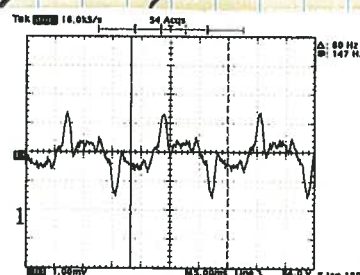
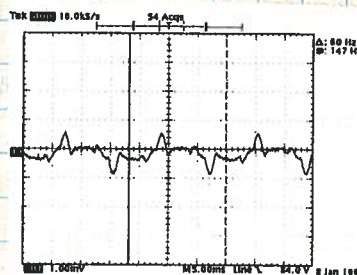


AVG set to 32



Later, when looking at the cables with the terminator at the scope removed, the terminator in the hall had been shifted and was no longer making contact with the floor plate. I set some paper on top of it to keep it pressed against the floor plate. I got the following:

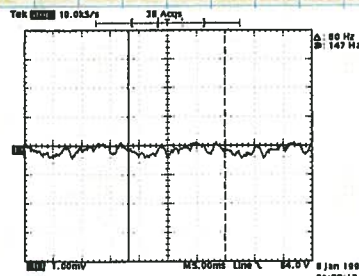
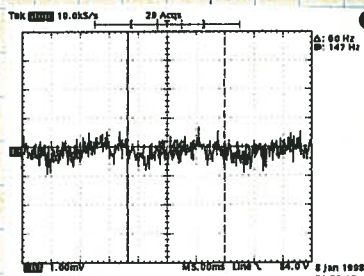
AVG set to 32



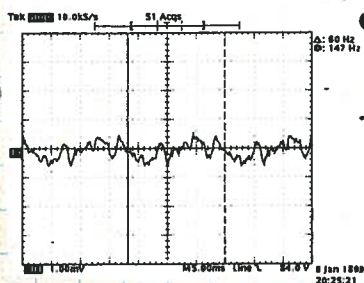
AVG set to 32
terminator removed
from BNC "T" at
scope

↓ with a cable tie
 Secured a 50 Ω terminator, on the end of 4m RG-58C/U cable off patch panel, to one of the mounting rails in the rack with the patch panels and Ethernet equipment.

sample
mode



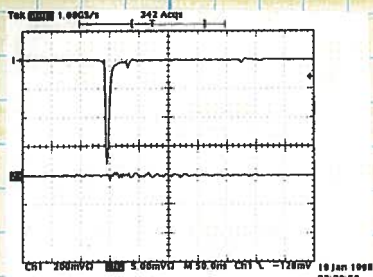
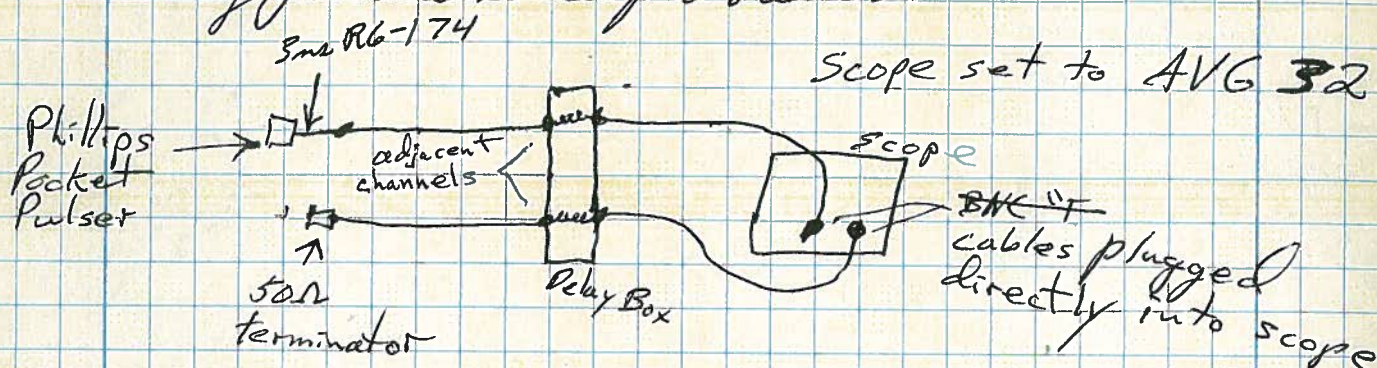
AVG set to 32



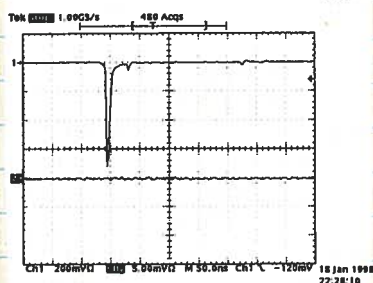
AVG set to 32
 terminator removed
 from BNC "T" at
 scope

Quick Look at Performance of Delay Box

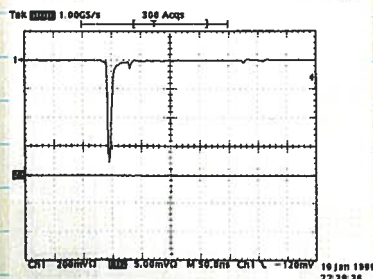
Boylan has assembled ~~some~~ modified some delay boxes. The inputs & outputs are LEAD receptacles mounted on the aluminum panel of the box. Without grounding tabs they have just a strip of copper on the back side of the panel, but the shields have a slot, $\frac{1}{2}$ " pigtail to this Cu sheet. The delays are RG-58 cable coiled inside the box. Having the shields tied together at the panels can generate some problems.



as illustrated above

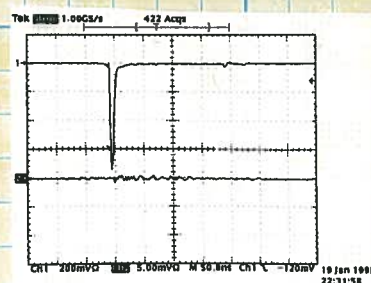


Cable disconnected from input of delay box for ch2

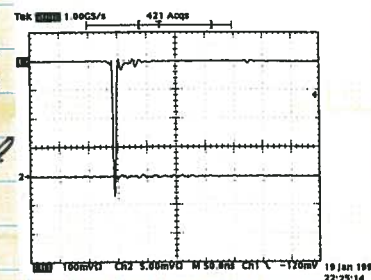


Cable disconnected from output of delay box for CH2

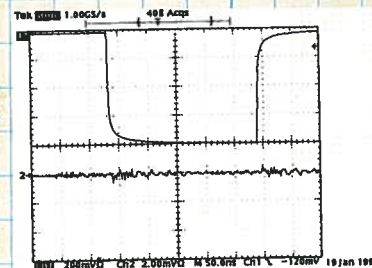
pocket pulser plugged directly into delay box with the 3rd cable.



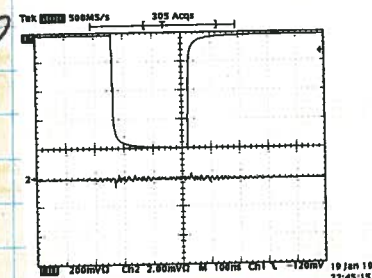
pocket pulser put back on the end of the longer cable. 50 Ω feedthru is put on the end of the cable with the pocket pulser.



Pocket pulser output is fed into a NIM discriminator. Output of discriminator is fed into delay box.

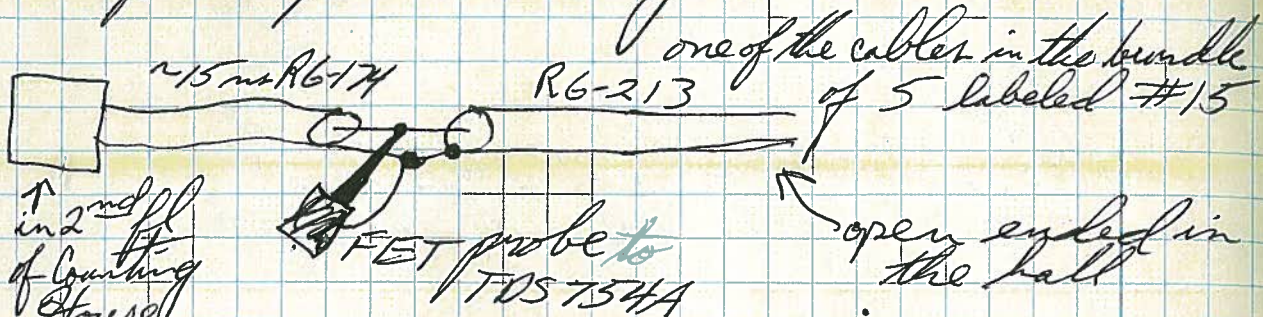


Same as above. Time scale changed.

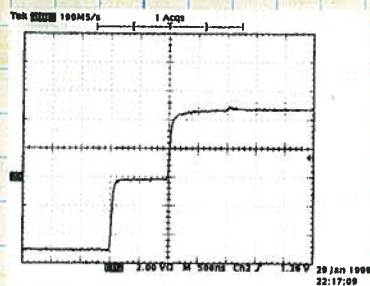


1/29/98 Length of Cable Pulled to 2nd Floor of Counting House
 Checking the length of the cable as it is pulled from the pilot area of the hall to the 2nd floor of the counting house.

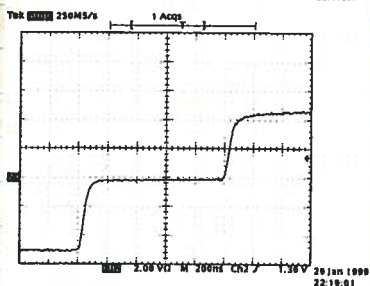
Model 19
 Wavetek
 or
 Phillips Pocket
 Pulser & 50Ω
 Feed thru



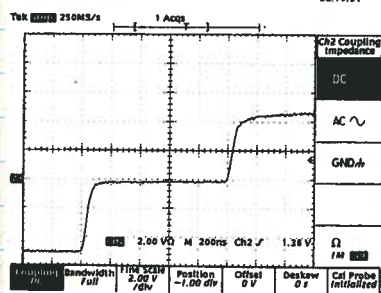
$v_{propagation} = 1.527 \text{ ns/ft}$ for cable on Hall A/B
 buy.



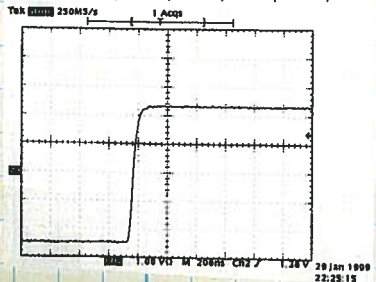
As illustrated above. Using
 wavetek.



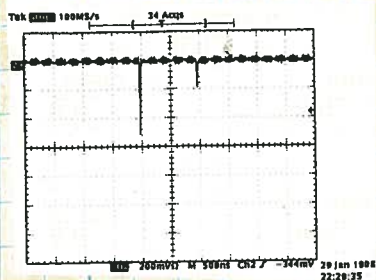
Expanded time scale



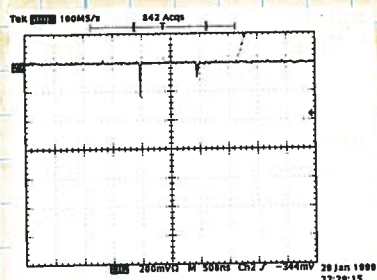
same as above



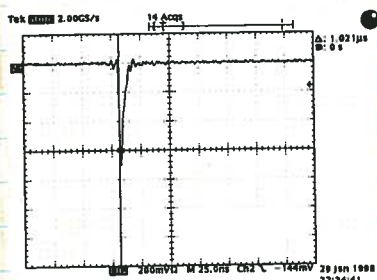
no R6-213 attached



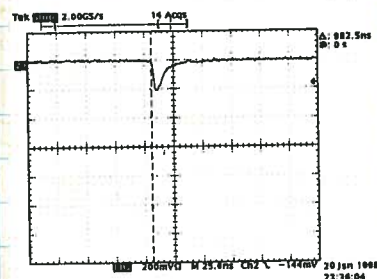
Using Pocket Pulser. Sporadic noise on the setup



The noise cuts in and out.



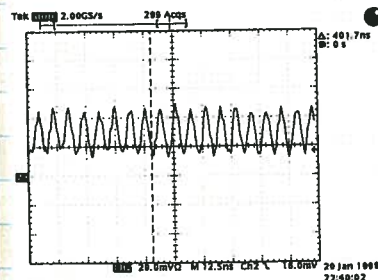
input pulse using pocket pulser and 50ohm feedthru.
2nd cursor is not in the correct position!



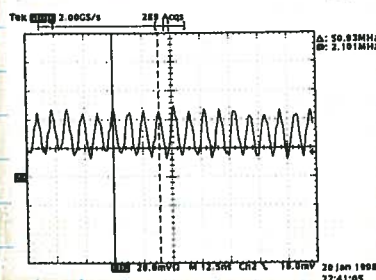
reflected pulse
2nd cursor is in the correct position!

$$\Rightarrow 983.5 \div (1.527 \cdot 2) = 322 \text{ ft}$$

using values from p. 15 of this book
gives 321 ft



noise on expanded time scale



frequency of noise
 $\approx 150 \text{ MHz}$

1/31
JS

Velocity of Propagation on RG-213 Check

fl quick look to see if velocity is different for this cable as compared to the cable previously bought for hall A

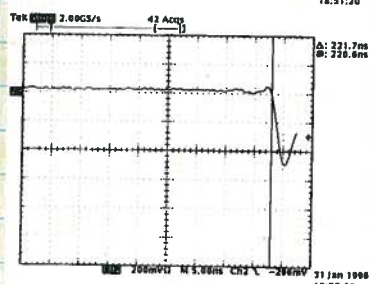
Same setup as page 12 of this book. Using pocket pulser and 50 Ω feed thru.

A scrap piece of cable is measured to be 72 ft $5\frac{1}{4}$ " long. Tape + cable were pulled with ~ 15 lbs of force and then allowed to relax. Tape pulled with ~ 5 lbs of force.



input pulse

2nd cursor is not positioned in this picture!

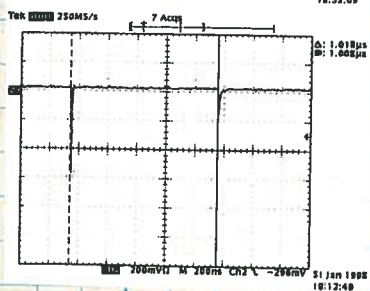


reflected pulse

now 2nd cursor is in correct position

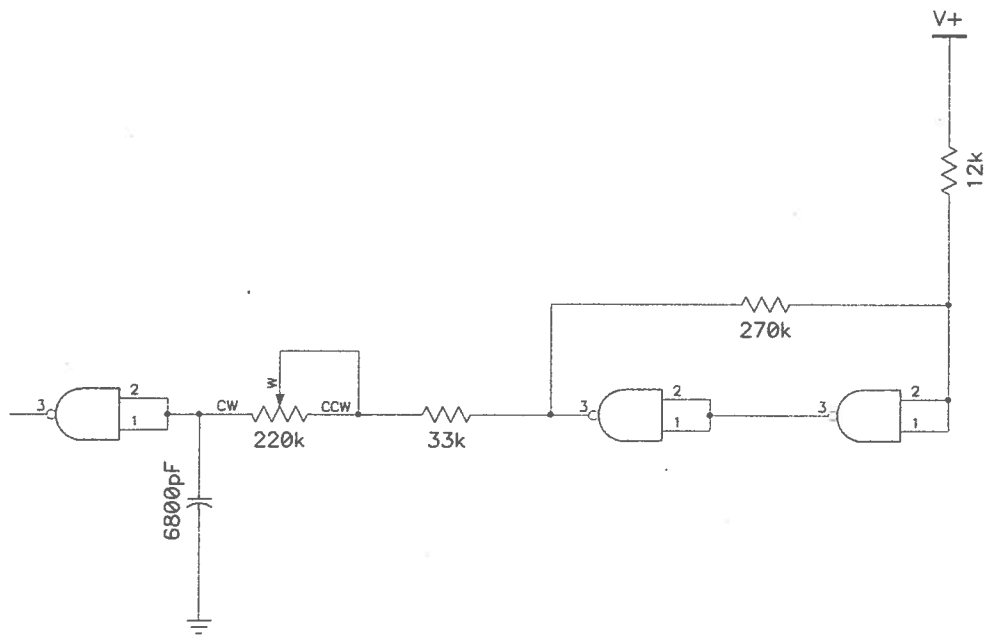
$$\Delta t = 221.7 \text{ ns}$$

$$\Rightarrow 0.653 \text{ ns} \\ 1.53 \text{ ns/ft}$$



cable from bundle #30

$$1016 \text{ ns} \div 2 \times 0.653 \Rightarrow 331.7 \text{ ft}$$



Title		
Size A	Number	Rev
Date	Drawn by	
Filename	Sheet	of

Panasonic WV-1410 Cameras

5/2

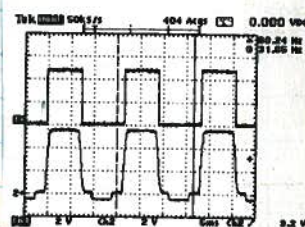
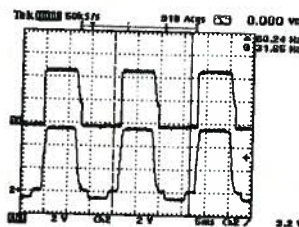
Checking one of the video cameras we were fixing in the hall. Ed. T. got a service manual for them.

The CMOS 4011 chip seems to have a problem. Channel 2 is pin 1 in all 8 pictures. After checking, I pulled the chip, put in a socket and seated a new chip.

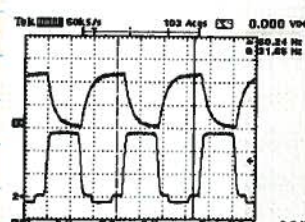
pin 3
pin 1



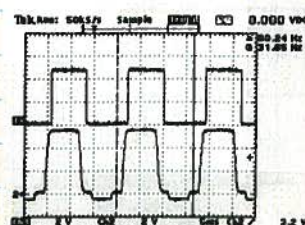
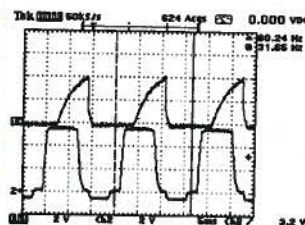
pin 4



pin 12



pin 11



16

shield Hut
Door

5/31/98 Check of Bogie Motor Current Draw

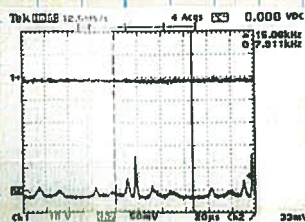
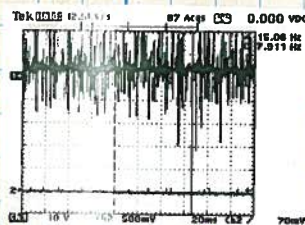
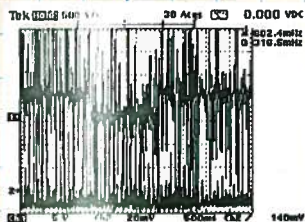
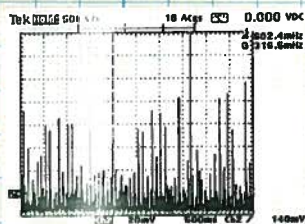
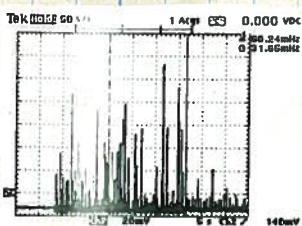
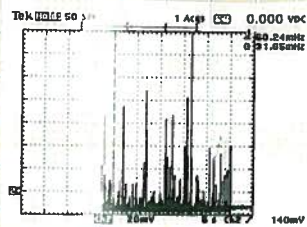
H.S.P. & Mark, Scott & I took a look at the current drawn by the right side door of the election hut.

The current clamp used (Fluke) was set to 100 mV/A.

The current was observed while the door was in motion.

Trying to find the reasons why the controller "stalls out" when the door closes.

Scope is TH5720 and read out with notebook PC.



Ch 1 is probe on switch input of controller.

The reason for "stalling" was not clear.

ECL Signal Propagation on 100' T in F

Setups a Phillips 7106 in a camera crate
to generate the ECL signal.
The pocket pulser is fed to Ch1 of 7106.

Using FET probes on TDS 754 A. Looking at the far end of the cable (where it's terminated)

230' of T in F
and it not terminated

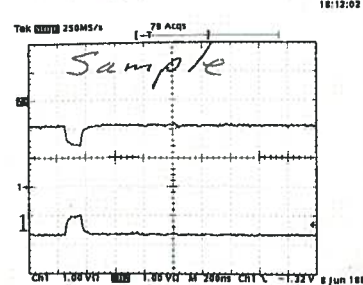
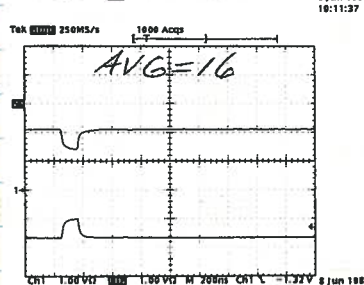
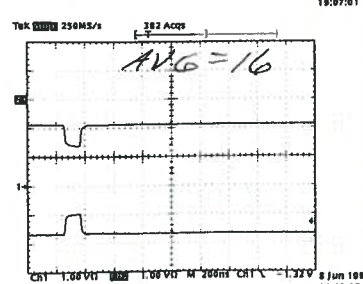
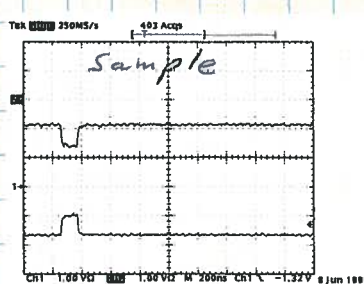
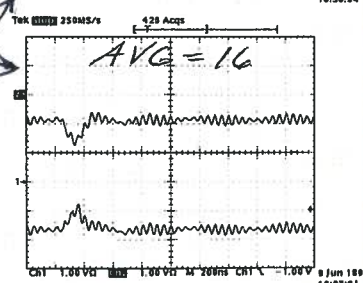
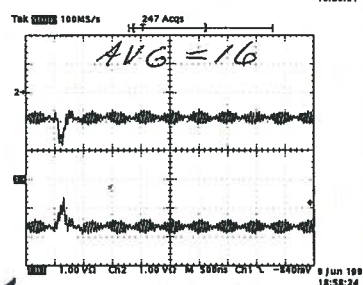
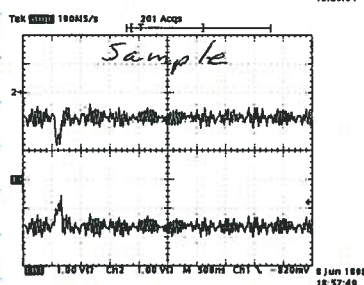
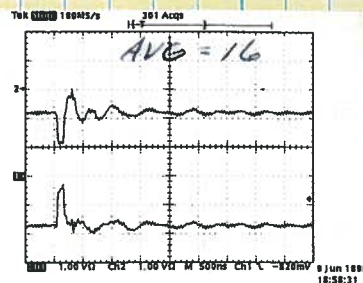
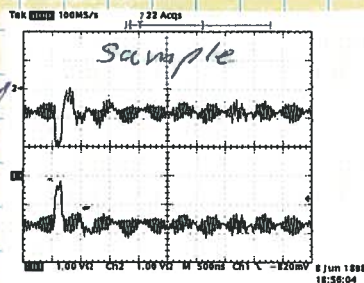
1st and 2nd pair of TnF have 110Ω terminating them.

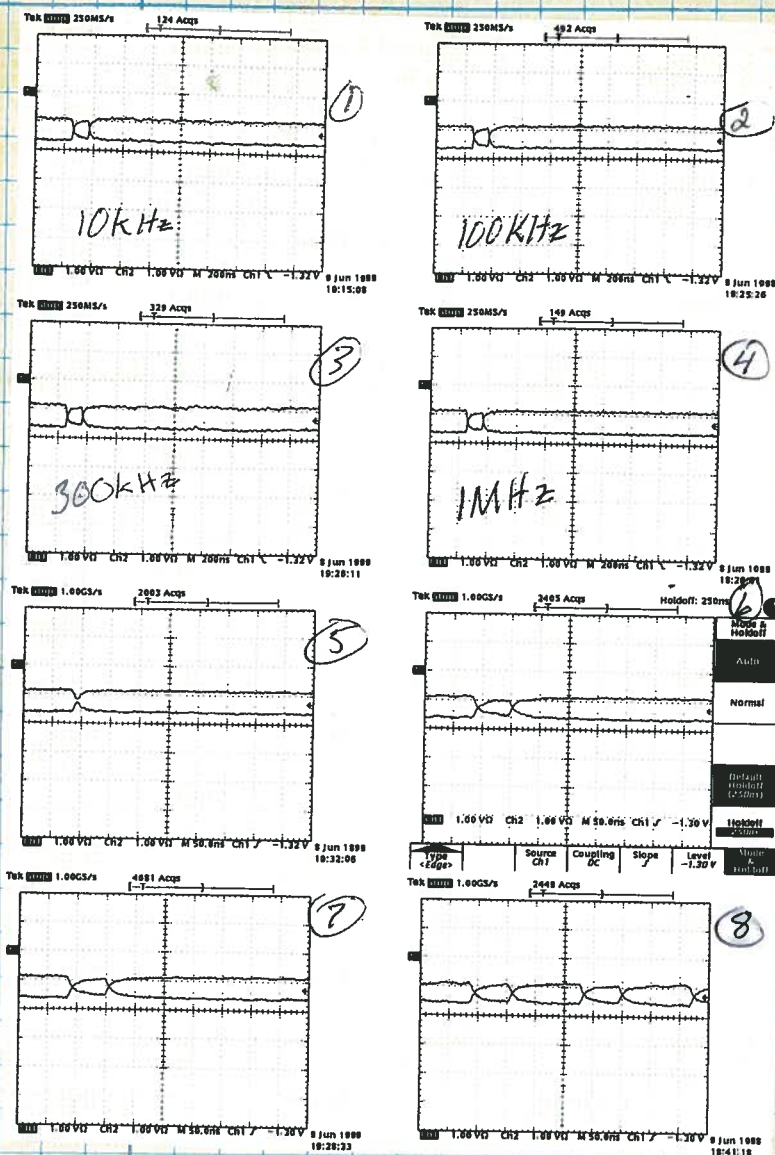
same photo, different time base

terminated in a power 4616

Cable terminated on an
unpowered L2477.
Used a ribbon "T"
to get the probes on the
lines.

~100' of T in F
~~terminated on an~~
~~unpowered helix~~
2277
terminated in a
powered 4616





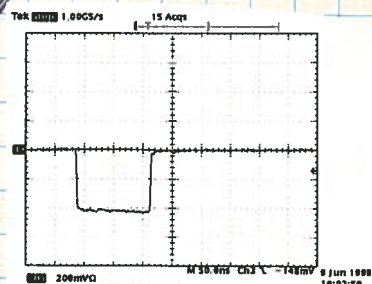
100' of T in F
Varying the pulse
repetition rates
① thru ④

⑤ shortening the output
pulse width to see where
the signals fail to cross.

⑥ + ⑦ had some trouble at
5 MHz or so. Found the
threshold set too low.
When I raised the threshold
I got nice stable pulses
all the way up to

⑥, ⑦ + ⑧ are terminated in an
unpowered 2277

While looking at the 30' cable I noticed Ron Gilman had
used the 4616 as a NTM fanout. One NTM in, 2 NTMs
out. This is not the way the 4616 works. The 2 "outputs"
are fed to the gates of 2249 and 2249W. Looking at one
of the gate signals



Oh, well.

Air Conditioning in Shielding Huts

6/21
JA

The Mitsubishi heat exchangers for cooling the huts have been failing. One is dead on the e^- arm. One is leaking on the hadron arm. They also come up in an idle mode after a power glitch.

On the 16 & 17 I cleared up the temperature readout sticks we had previously installed. Sticks on hadron had their power connections reversed. I replaced them.

Reset connections were made to VME 2210 relay cards. This should enable us to reset the AC after a power glitch.

EPICS database for hadron & e^- crates seem to have relay functions reversed. Not all relay channels are in database on hadron. Also, hadron ADC database is rounding values to the nearest volt. Not much help.

Jun 17, 1998

Full ADC display for e^- (hut door closed)

19:16:07

HRS ELECTRON -- DETECTOR PACKAGE															
HPE1313A:0 ADC															
+/- 16 Volts MAX															
Ch0	4.000	Ch16	-0.354	Ch32	-0.106	Ch48	1.536								
Ch1	0.015	Ch17	-0.295	Ch33	-0.190	Ch49	1.495								
Ch2	4.006	Ch18	-0.250	Ch34	-0.102	Ch50	1.552								
Ch3	-0.013	Ch19	-0.229	Ch35	-0.181	Ch51	1.568								
Ch4	-0.009	Ch20	-0.187	Ch36	-0.355	Ch52	1.532								
Ch5	7.889	Ch21	-0.196	Ch37	-0.164	Ch53	1.542								
Ch6	2.252	Ch22	-0.172	Ch38	-0.150	Ch54	1.552								
Ch7	0.738	Ch23	-0.186	Ch39	-0.159	Ch55	1.574								
Ch8	0.437	Ch24	-0.165	Ch40	-0.136	Ch56	1.515								
Ch9	0.291	Ch25	-0.168	Ch41	-0.155	Ch57	1.506								
Ch10	0.200	Ch26	-0.157	Ch42	1.566	Ch58	1.580								
Ch11	0.103	Ch27	-0.174	Ch43	0.906	Ch59	1.541								
Ch12	0.070	Ch28	-0.199	Ch44	1.552	Ch60	1.570								
Ch13	0.052	Ch29	-0.194	Ch45	1.565	Ch61	1.562								
Ch14	0.021	Ch30	-0.191	Ch46	0.935	Ch62	1.530								
Ch15	0.012	Ch31	-0.208	Ch47	1.546	Ch63	1.549								

Sensors are 5 mV/%K (change)

Jun 17, 1998

air intake temperature on hut unit read 73°F

18:31:17

1.548

1.529

1.562

1.570

1.541

1.578

1.506

1.515

1.575

1.552

(Hut doors
were still
open)

1.541

1.532

1.568

1.552

1.496

1.537

1.547

0.929

1.563

1.550

Jun 19, 1998

23:25:57

1.561

1.542

1.581

1.586

1.552

1.591

1.521

1.530

1.586

1.567

1.556

1.544

1.583

1.567

1.508

1.550

1.559

0.937

1.575

1.565

Jun 20, 1998

14:35:28

1.562

1.542

1.581

1.584

1.552

1.591

1.526

1.532

1.588

1.569

1.558

1.546

1.583

1.569

1.511

1.552

1.559

0.936

1.577

1.567

On monday 6/15, before the huts were opened, the e-amp showed

1.573

1.562

1.592

1.602

1.564

1.571

1.558

1.598

1.584

1.583

when the hut was opened
the intake air in the hut
was reading 89°F

1.617

1.537

1.545

1.609

1.581

7/31/98 Hadron Detector Stack Temperatures

Yesterday Rob V d Meer and I had to remove a PFC digital delay due to a few bad channels. I found the filter on the NIM fan tray to be clogged. There was no airflow. We removed the clogged filter.

Today I find both air conditioners are off. I don't know if they were off yesterday.

TS crate	~88°F across all the fronts
NIM (below TS)	79-85°F across the fronts
NIM (bottom of middle rack)	80-87°
walls	~80°F
NIM (middle of middle rack)	80-85
lower Camac	88-107
upper Camac	92-114
HV crate	82-87 across front
rear of TS	92-97
rear of NIM below TS	95-112
rear of upper Camac	91-95
rear of lower Camac	91-93
rear of upper NIM	112-118
rear of lower NIM	124-130
rear of HV	87-91

EPICS Readout of Hadron Arm Temperature Sticks 8/3

Javier reconfigured the AD readout on the Hadron Arm, so, now we can read the full voltages from the temperature chips.

With the hut doors open, right side AC unit running, filters removed from NE bins and filters replaced on the CAHFC and F Beams.

Aug 3, 1998

15:45:14

1.507

62

43

1.557

1.546

59

40

1.544

1.524

55

36

1.549

1.504

52

33

1.548

49

1.522

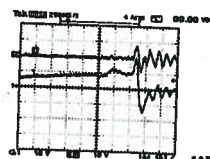
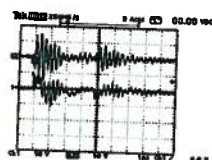
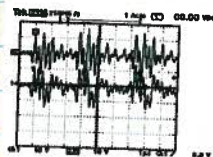
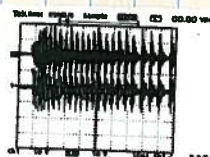
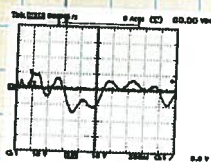
46

1.507

8/4/88 ADC Faults From FPP Door Switches ^(carbon)

The ADC seems to hang up occasionally when the doors are moved. ~~at present~~ This investigation was done a little while ago. If the ADC input exceeds $\pm 19V$ for a sufficient amount of time the ADC will throw the front end relays and connect all inputs to ground.

Some of the inputs from the contacts on the FPP doors are shown. Doors 2 & 3 seemed to be the worst. I used a TH5720 and a 10x probe.



Hall A Plan Crane Radio Transmitter Signals 8/6
TOS 754A with FET probes. Looking at test point 1

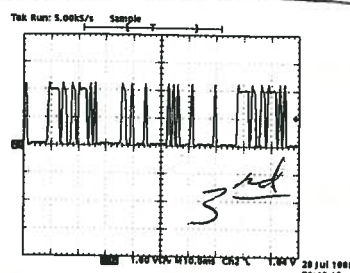
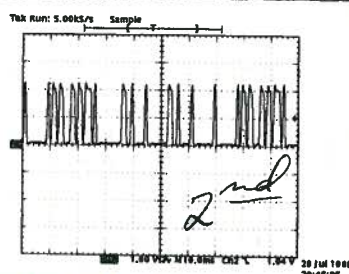
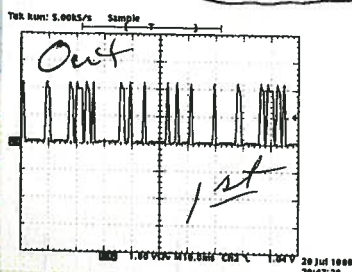
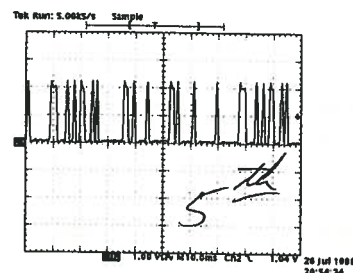
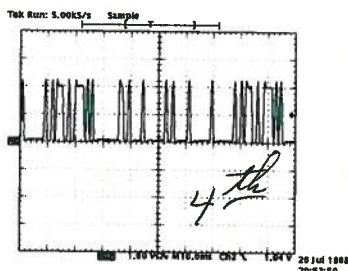
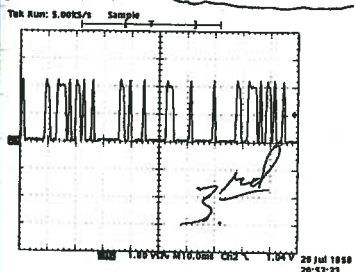
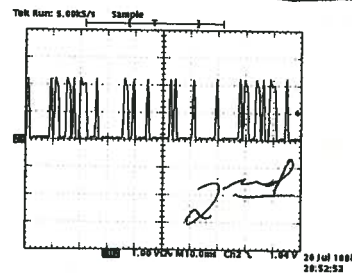
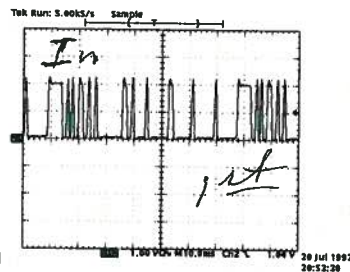
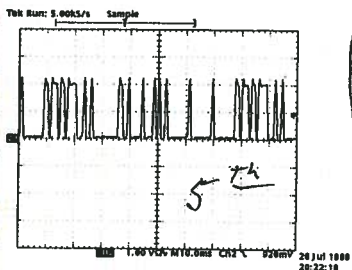
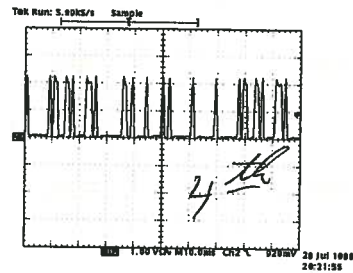
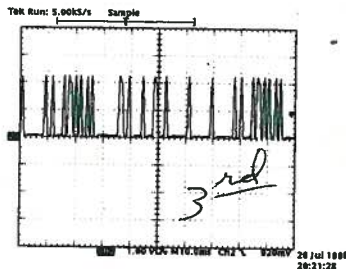
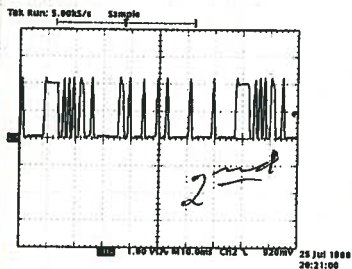
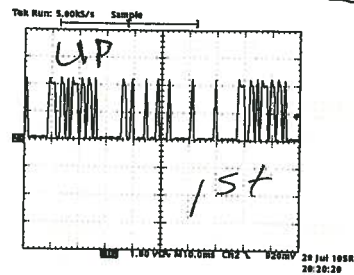
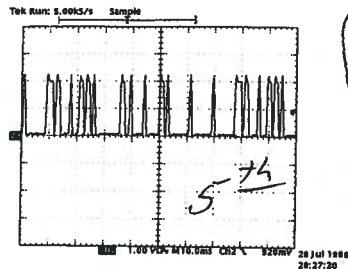
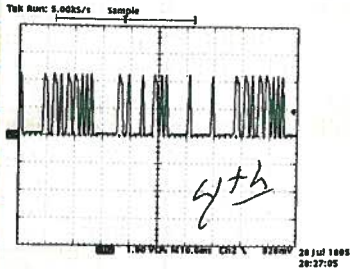
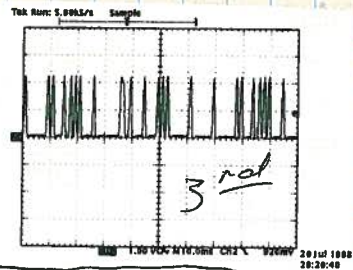
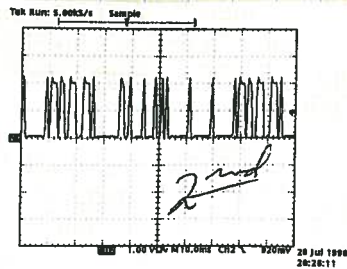
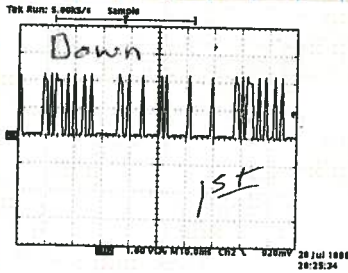
The crane was not working for me. Since the transmitter was the only part readily accessible to me I decided to chuck out its transmissions.

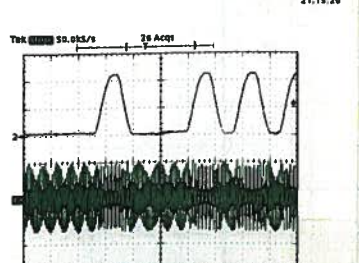
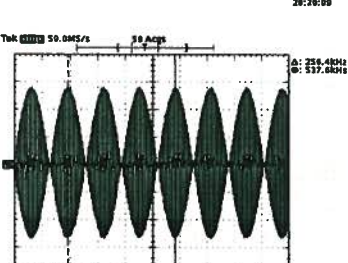
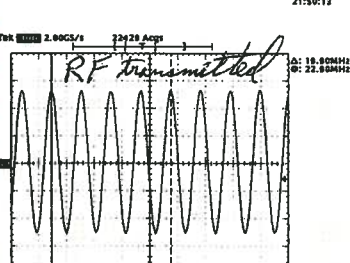
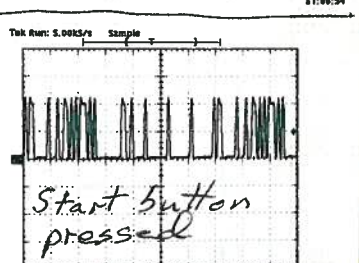
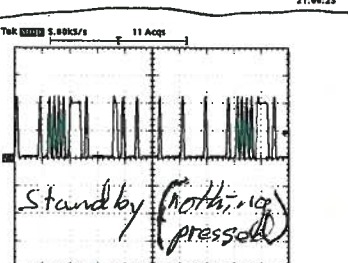
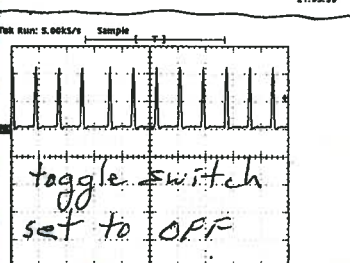
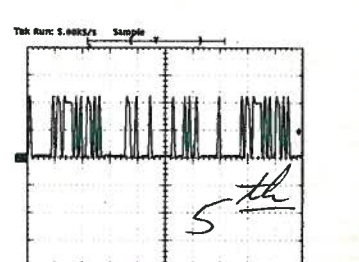
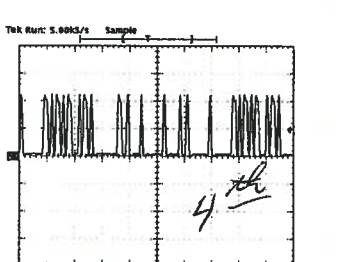
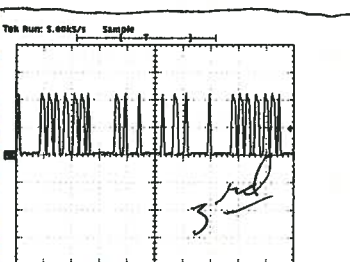
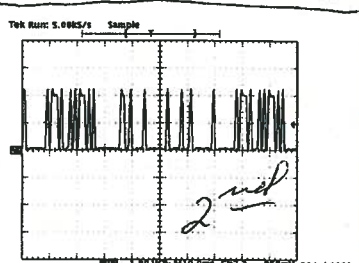
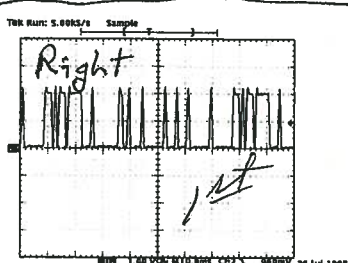
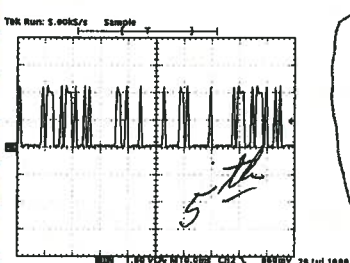
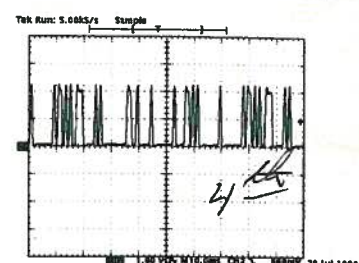
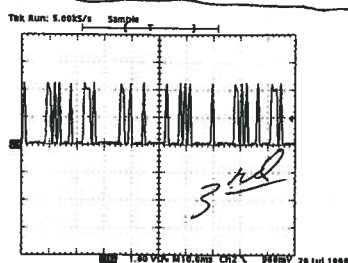
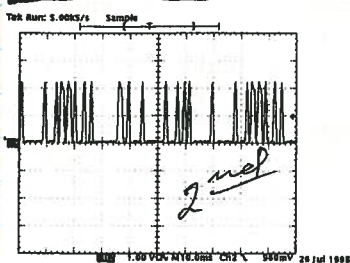
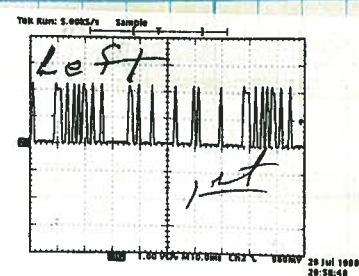
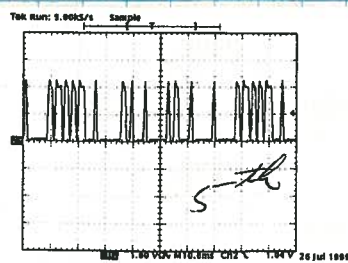
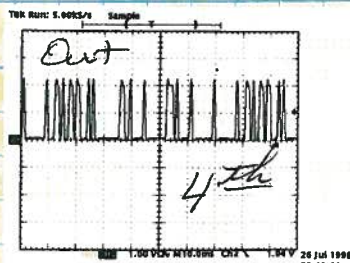
Each function was operated one at a time, i.e. not right and up together.

While there does seem to be a change in the RF output when the test point has a change of state the difference in time scales was too great for me to be able to tell what the change in the RF output actually is.

On the 31st Manny Alvarez went up and found an overload fault on the receiver/crane controller.

The crane has since only given me a little trouble on the 4th. It stalled on me twice. I had no trouble with it on the 5th.





8/9 Anomalous Gas $\bar{C}$ PMT Pulses on Hadron Arm

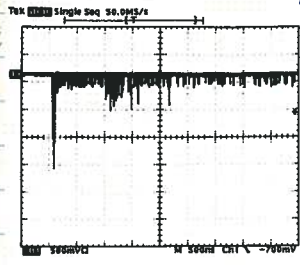
Earlier I looked at some signals from S1, S2 and the gas $\bar{C}$ counter on the Hadron Arm.

PMT voltages are

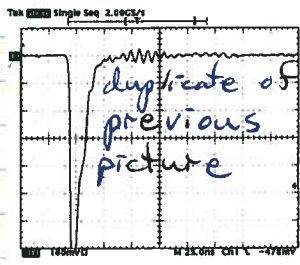
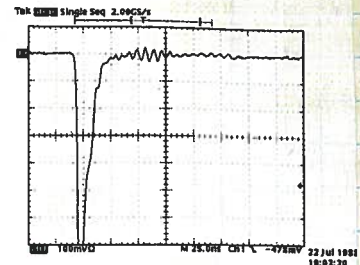
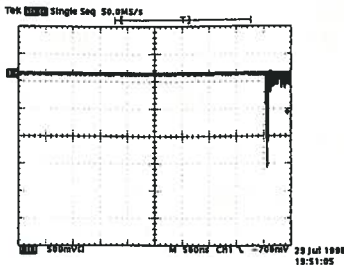
gas #9	2380
#7	2550
#5	2850
#3	2650

In my notes I see, also, 3 is @ 1815
4 is @ 2225, in reference
to the scintillator voltages. But, I am not
sure if these are S1 or S2

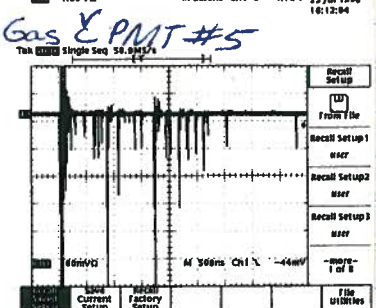
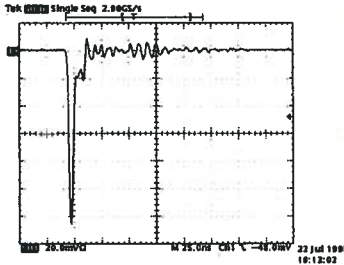
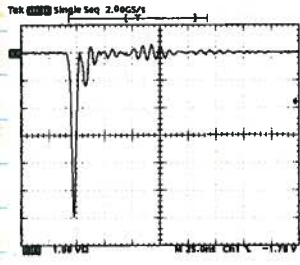
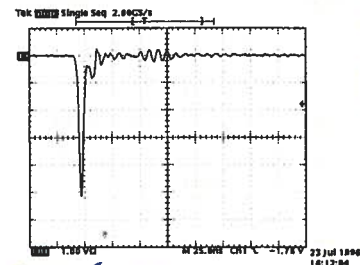
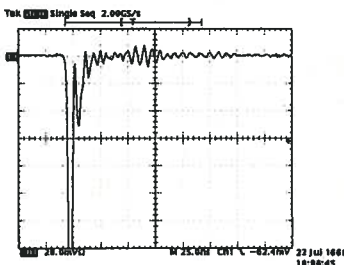
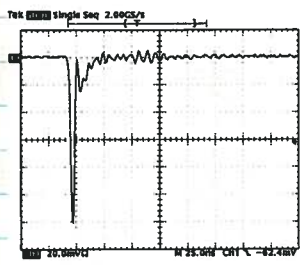
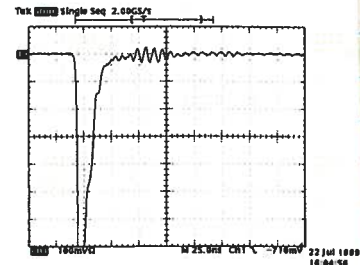
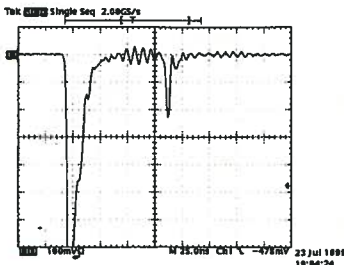
same picture, shifted horizontally



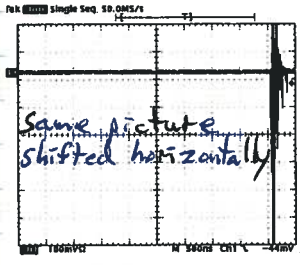
gas
c
PMT
#9



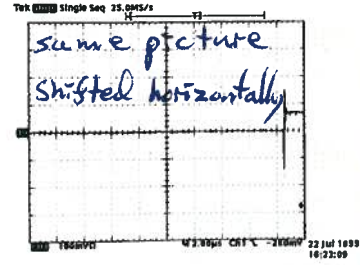
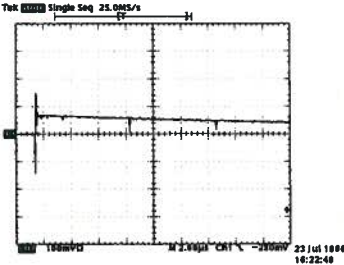
duplicate of
previous
picture



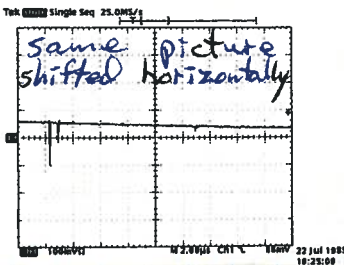
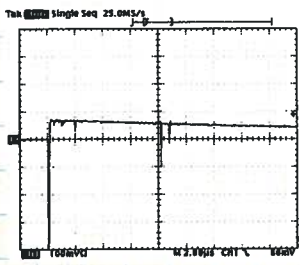
Gas & PMT #5



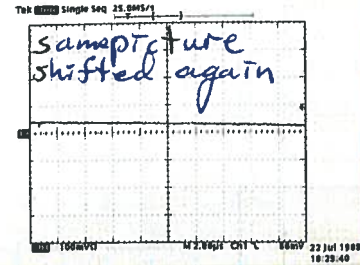
same picture
shifted horizontally



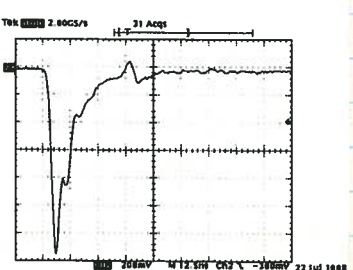
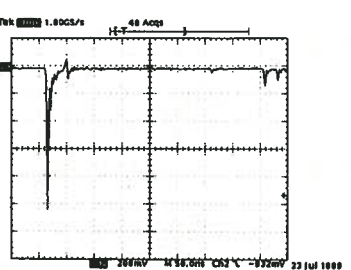
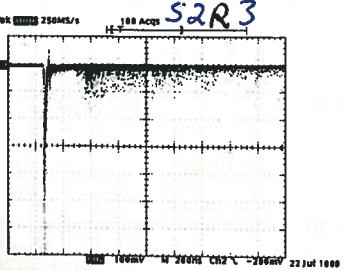
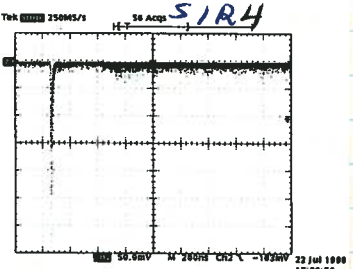
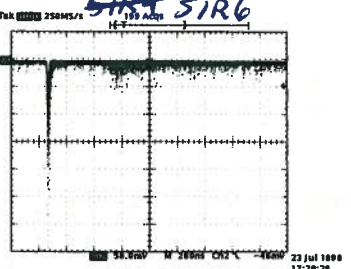
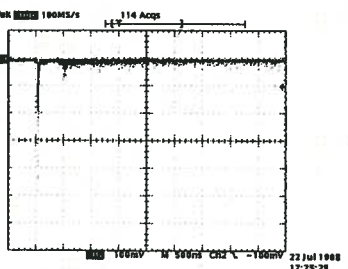
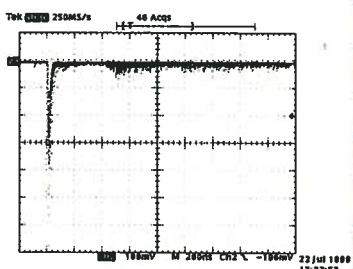
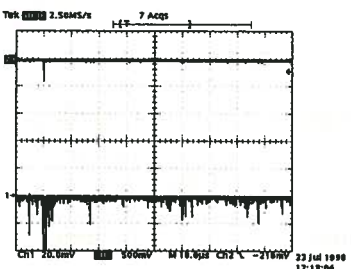
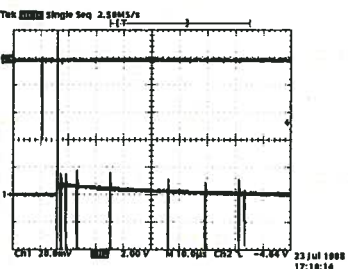
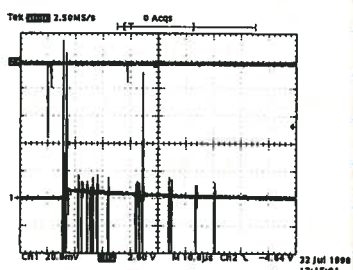
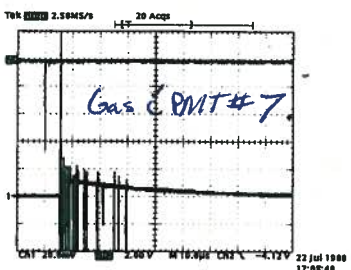
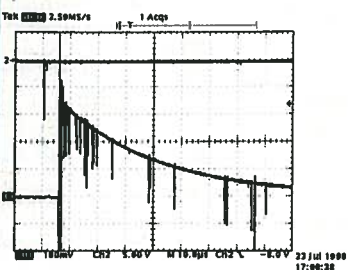
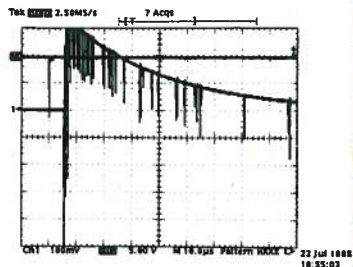
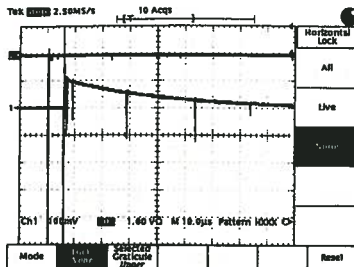
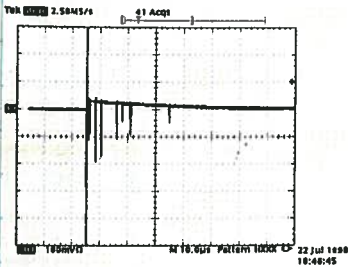
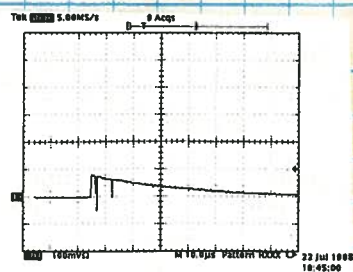
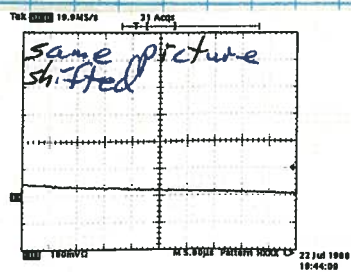
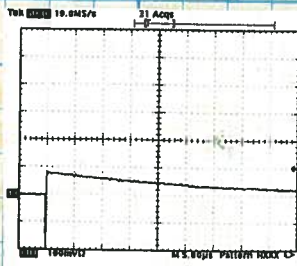
same picture
shifted horizontally

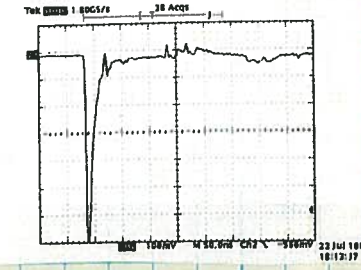
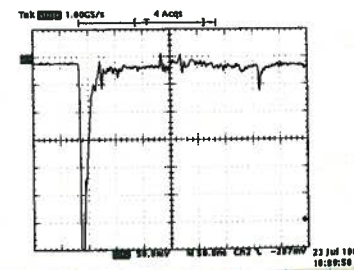
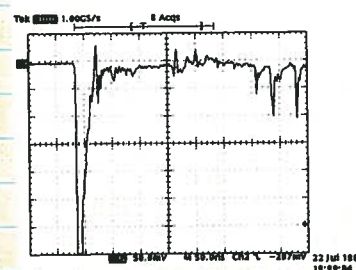
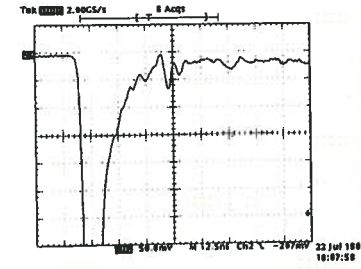
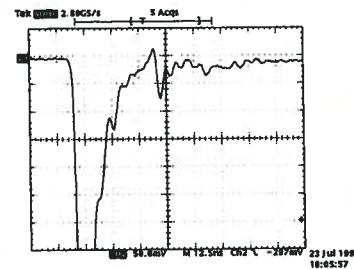
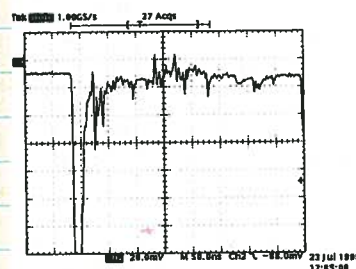
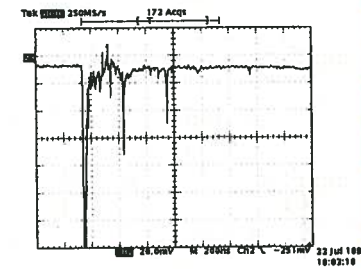
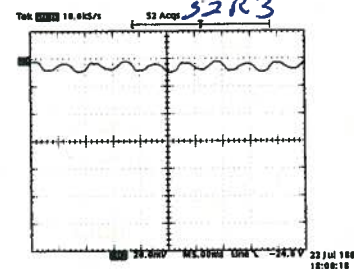
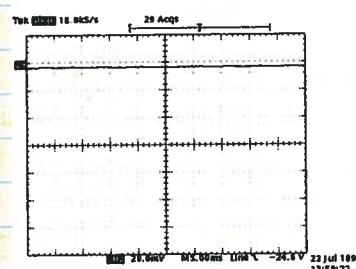
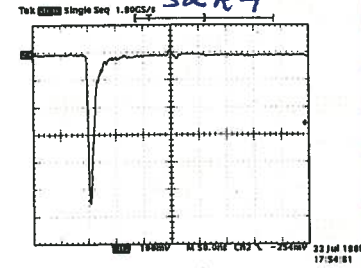
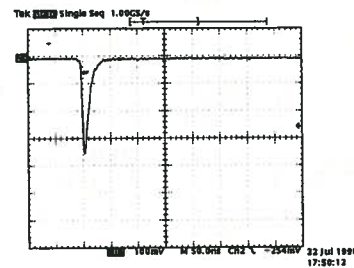
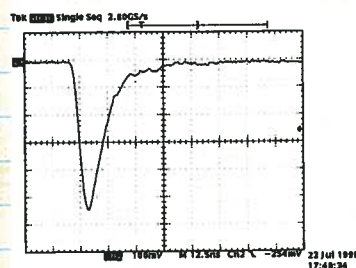
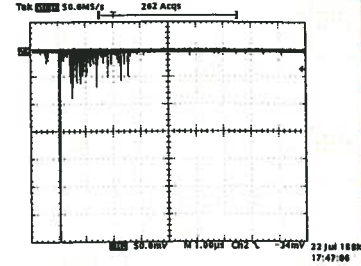
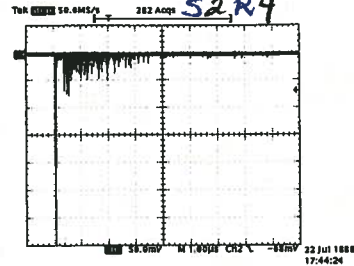
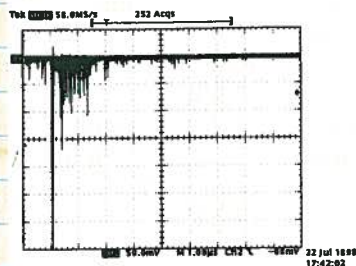
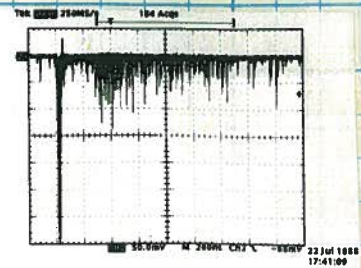
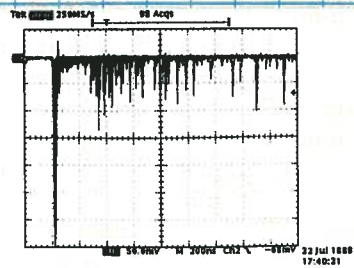
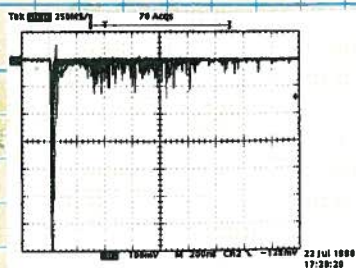


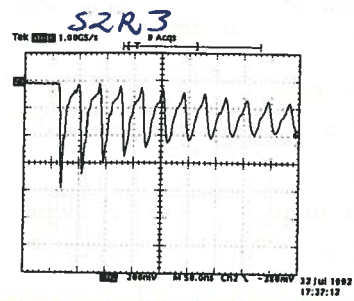
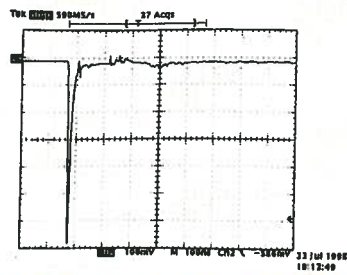
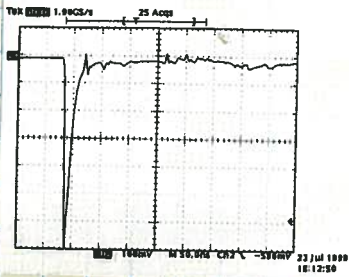
same picture
shifted horizontally



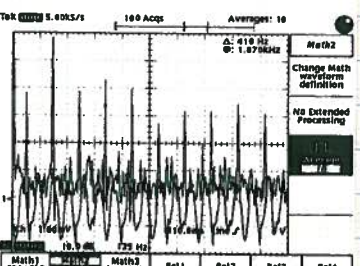
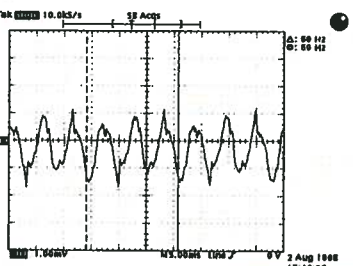
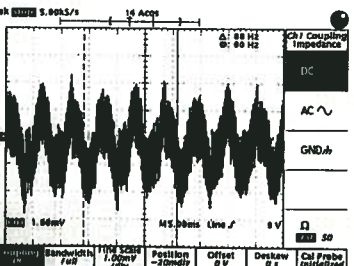
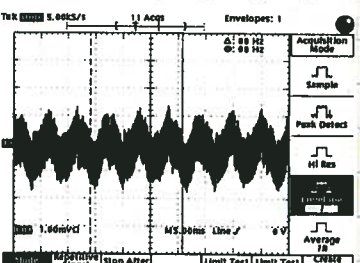
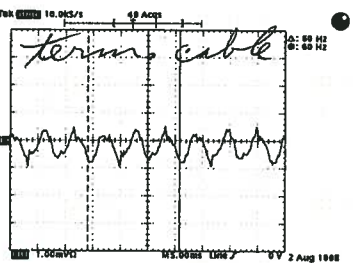
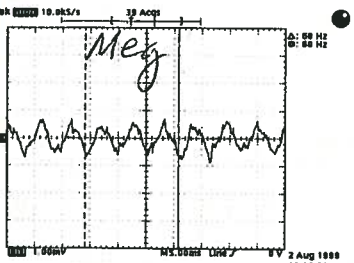
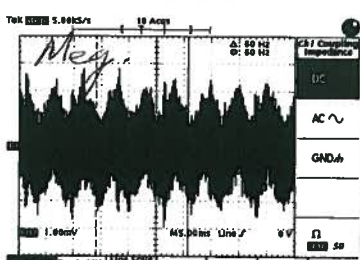
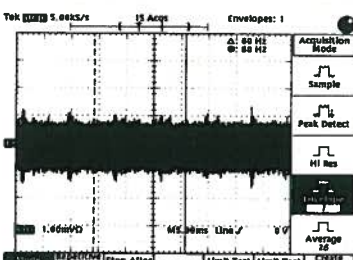
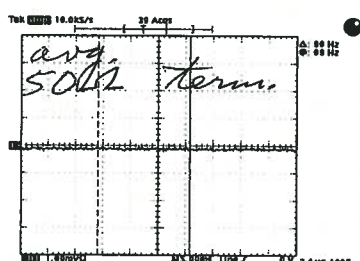
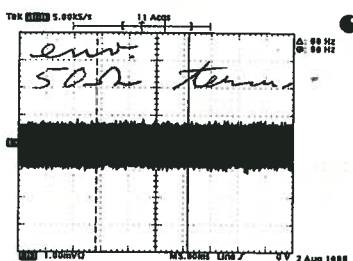
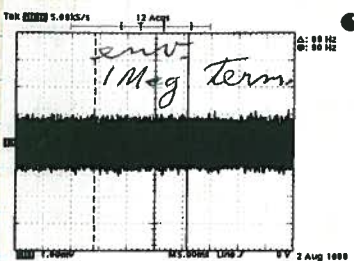
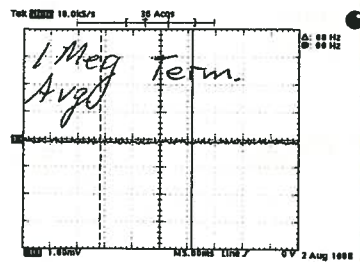
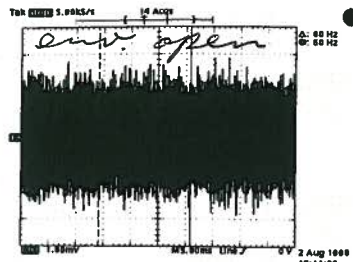
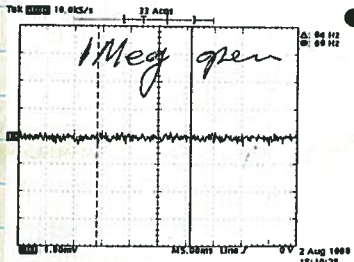
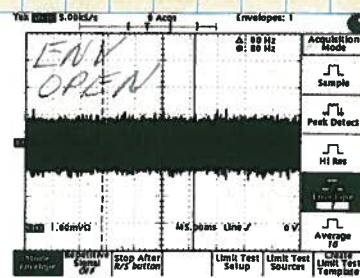
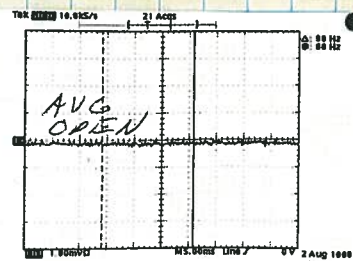
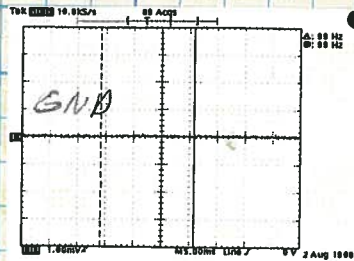
same picture
shifted again



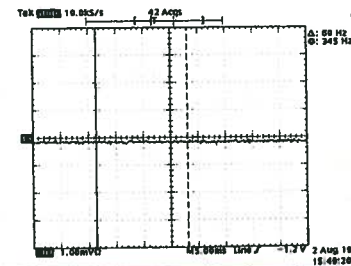
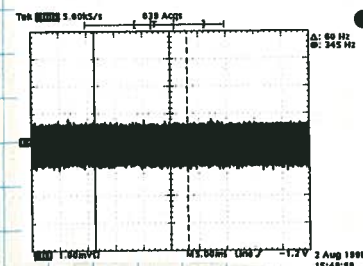
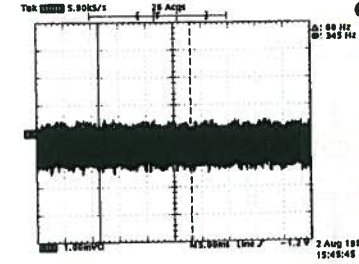
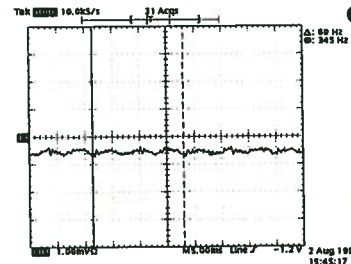
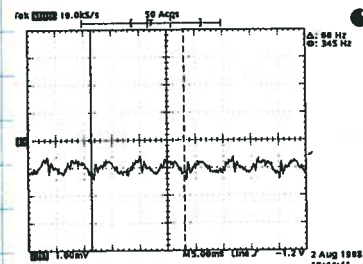
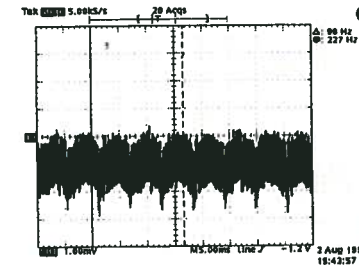
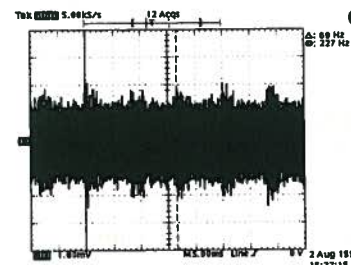
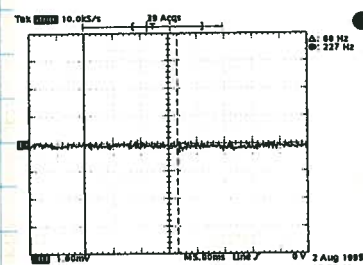
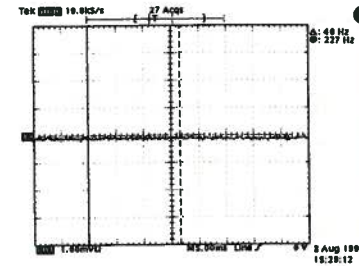
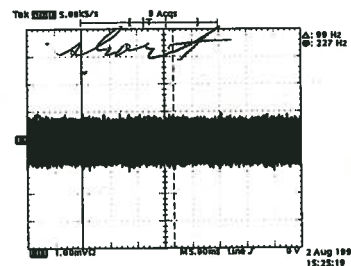
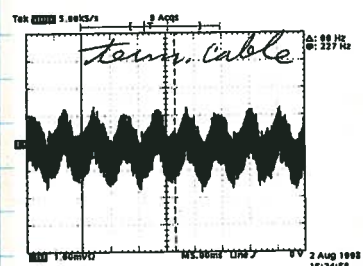
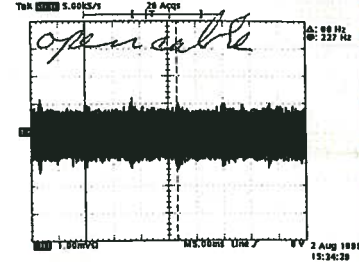
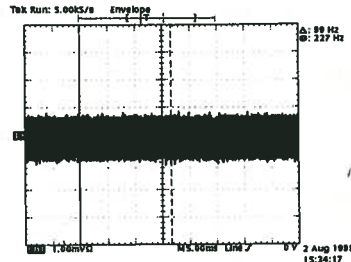
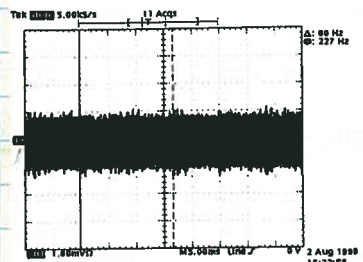
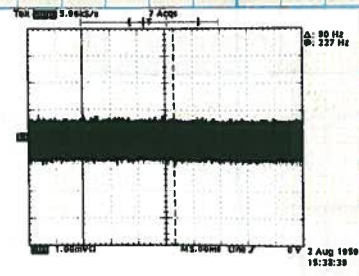
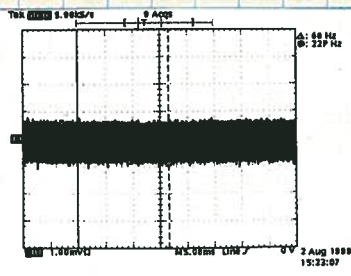
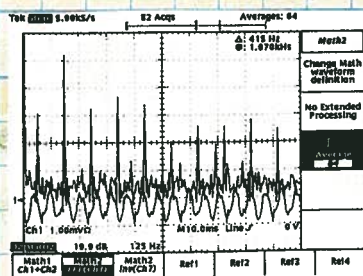




8/9/98

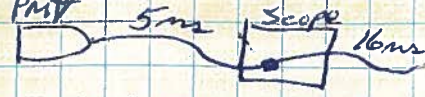


FFT of term. cable

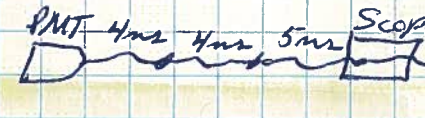


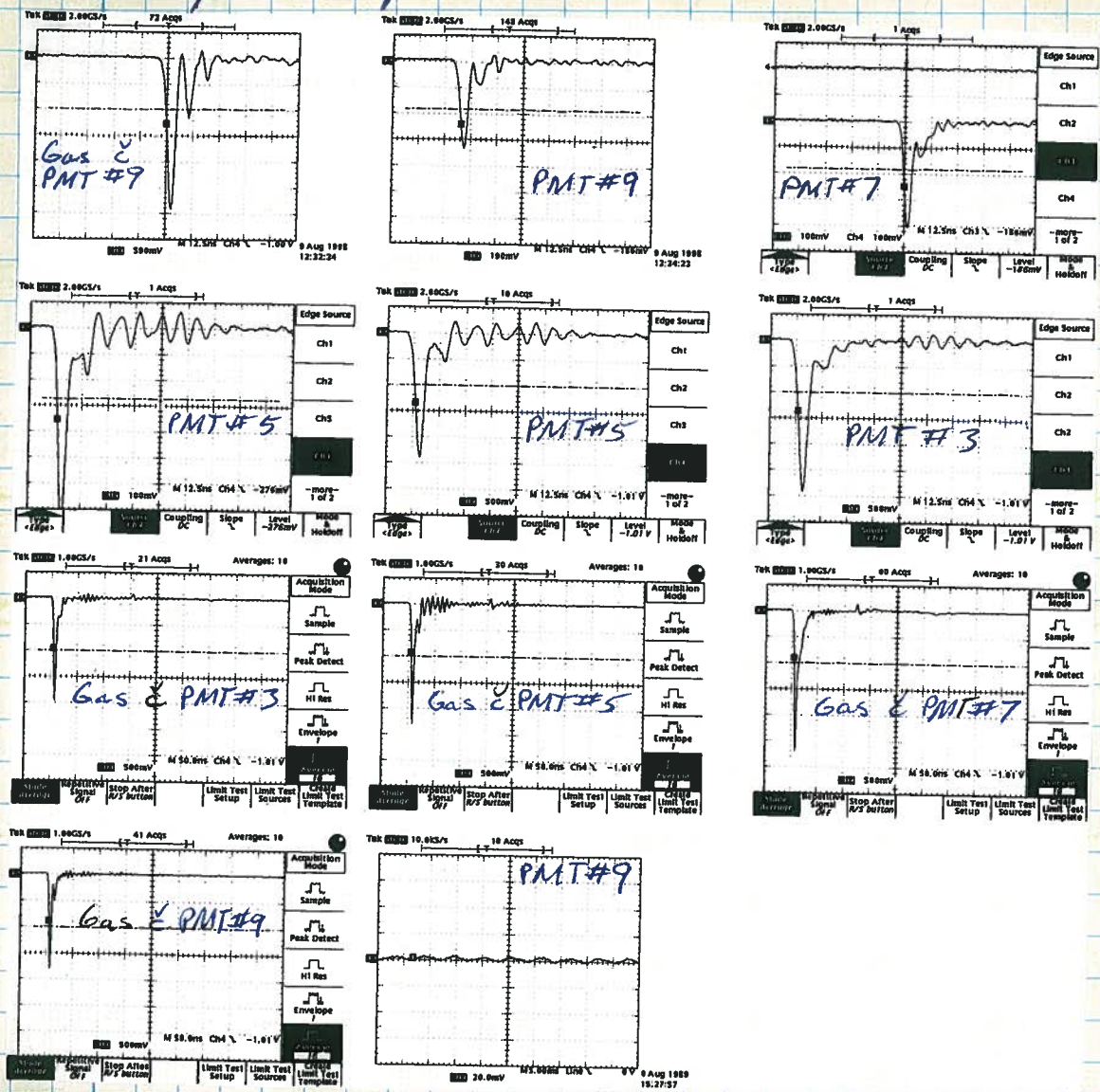
8/9/98 Electron Arm Gas C PMT signals

Looking for pulses similar to those on p. 29830

Ch4 has  To 2nd level platform

Ch3 has a bluge of 4ms cables.

After 3rd picture Ch 4 is  Scope 16ms 371



HV settings
PMT# 2600
2477
2521
2452
2470
2551
2442
2586
2531
2610
for e arm

I did not see any pulses with large overshoots.
 Going back to the Hadron Arm I did not see
 any of these pulses there, either.

Detector Heat Temperatures

8/14

Establishing normal operating values
for the outputs of some of the temperature
cards or crates in the detector hut.

The printouts are from the epicr displays.

Aug 9, 1998

AC off doors open

12:11:16

HRS ELECTRON -- DETECTOR PACKAGE

HPE1313A:0 ADC

+/- 16 Volts MAX

Ch0	3.998	Ch16	-0.353	Ch32	-0.194	Ch48	1.543
Ch1	3	Ch17	-0.294	Ch33	-0.195	Ch49	1.501
Ch2	3.994	Ch18	-0.257	Ch34	-0.188	Ch50	1.551
Ch3	-1	Ch19	-0.228	Ch35	-0.184	Ch51	1.561
Ch4	0.018	Ch20	-0.186	Ch36	-0.353	Ch52	1.536
Ch5	8.209	Ch21	-0.195	Ch37	-0.173	Ch53	1.529
Ch6	4.061	Ch22	-0.170	Ch38	-0.159	Ch54	1.544
Ch7	1.302	Ch23	-0.184	Ch39	-0.167	Ch55	1.569
Ch8	0.771	Ch24	-0.163	Ch40	-0.143	Ch56	1.507
Ch9	0.501	Ch25	-0.169	Ch41	-0.161	Ch57	1.513
Ch10	0.317	Ch26	-0.159	Ch42	1.571	Ch58	1.552
Ch11	0.161	Ch27	-0.175	Ch43	0.914	Ch59	1.524
Ch12	0.105	Ch28	-0.198	Ch44	1.576	Ch60	1.542
Ch13	0.072	Ch29	-0.199	Ch45	1.564	Ch61	1.562
Ch14	0.030	Ch30	-0.200	Ch46	0.932	Ch62	1.531
Ch15	0.018	Ch31	-0.220	Ch47	1.551	Ch63	1.546

Aug 11, 1998

AC off doors open

14:22:03

1.559	1.540
1.539	1.530
1.567	1.570
1.562	1.560
1.538	1.508
1.573	1.548
1.522	1.560
1.516	0.938
1.568	1.573
1.553	1.586

Aug 11, 1998

AC off doors open

14:29:41

HRS ELECTRON -- DETECTOR PACKAGE

HPE1313A:0 ADC

+/- 16 Volts MAX

Ch0	3.992	Ch16	-0.358	Ch32	-0.188	Ch48	1.550
Ch1	-1	Ch17	-0.298	Ch33	-0.194	Ch49	1.508
Ch2	3.948	Ch18	-0.249	Ch34	-0.184	Ch50	1.560
Ch3	-1	Ch19	-0.230	Ch35	-0.182	Ch51	1.570
Ch4	0.003	Ch20	-0.187	Ch36	-0.358	Ch52	1.529
Ch5	6.680	Ch21	-0.197	Ch37	-0.168	Ch53	1.541
Ch6	2.372	Ch22	-0.174	Ch38	-0.155	Ch54	1.554
Ch7	0.767	Ch23	-0.184	Ch39	-0.165	Ch55	1.568
Ch8	0.459	Ch24	-0.162	Ch40	-0.142	Ch56	1.518
Ch9	0.306	Ch25	-0.169	Ch41	-0.159	Ch57	1.521
Ch10	0.209	Ch26	-0.158	Ch42	1.583	Ch58	1.575
Ch11	0.110	Ch27	-0.176	Ch43	0.917	Ch59	1.539
Ch12	0.074	Ch28	-0.200	Ch44	1.587	Ch60	1.563
Ch13	0.054	Ch29	-0.199	Ch45	1.574	Ch61	1.569
Ch14	0.024	Ch30	-0.198	Ch46	0.934	Ch62	1.540
Ch15	0.013	Ch31	-0.215	Ch47	1.562	Ch63	1.559

Aug 12, 1998

doors closed AC off power off (1 of UME on)

08:27:31

1.517	1.489
1.521	1.500
1.524	1.515
1.521	1.506
1.500	1.501
1.520	1.525
1.501	1.521
1.476	0.899
1.522	1.518
1.507	1.512

Aug 12, 1998

doors open AC on

16:48:27

1.545	1.536
1.533	1.537
1.555	1.564
1.542	1.553
1.525	1.508
1.554	
1.517	1.548
1.510	1.557
1.569	0.932
1.548	1.567
	1.581

Aug 12, 1998

doors closed AC on

20:16:50

1.522	1.535
1.533	1.538
1.547	1.564
1.545	1.553
1.526	1.506
1.548	
1.520	1.548
1.512	1.559
1.569	0.935
1.547	1.570
	1.583

Aug 13, 1998

doors closed

13:25:06

1.529

1.542

1.555

1.553

1.532

1.555

1.528

1.517

1.574

1.552

1.544

1.547

1.574

1.560

1.517

1.556

1.565

0.939

1.576

1.587

Aug 12, 1998

doors open AC on

16:48:52

1.51

1.55

1.53

1.51

1.56

1.55

1.55

1.55

1.52

1.51

Aug 12, 1998

doors closed AC on

20:17:08

1.50	1.55
1.54	1.54
1.52	1.54
1.50	1.54
	1.52
	1.50

Aug 13, 1998

doors closed AC on

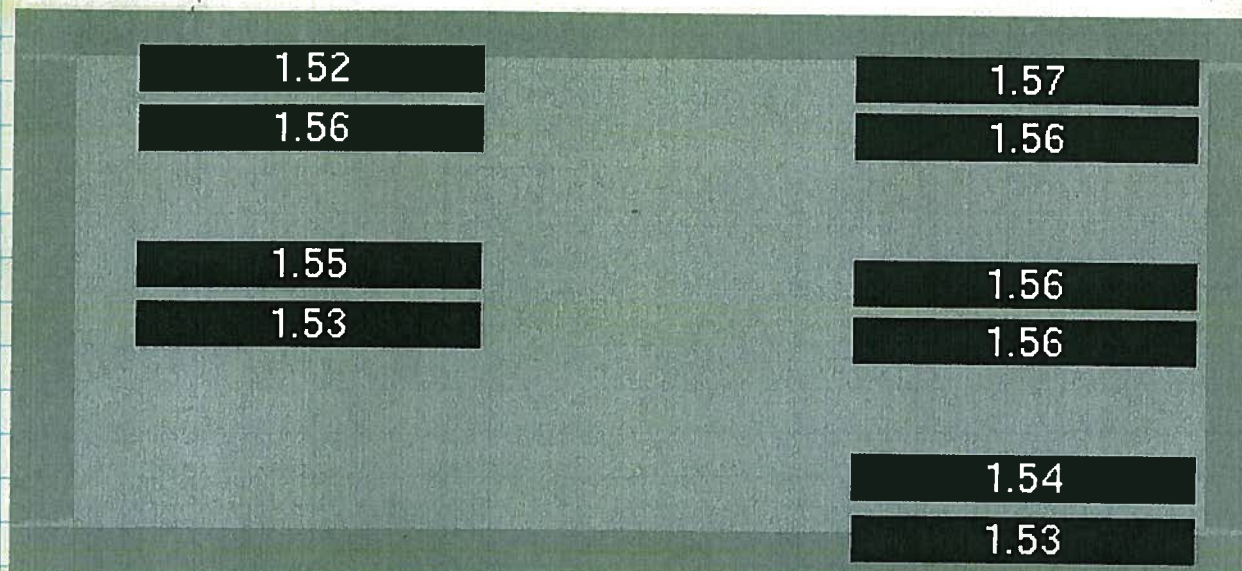
13:25:22

1.49	1.54
1.53	1.54
1.52	1.53
1.50	1.53
	1.51
	1.50

On Saturday 8/15 the VDC's ^(on Hadron) were giving crap data.
 When they occurred the front unit on the left was off.
 Today when I check the temperature of fluid 2.

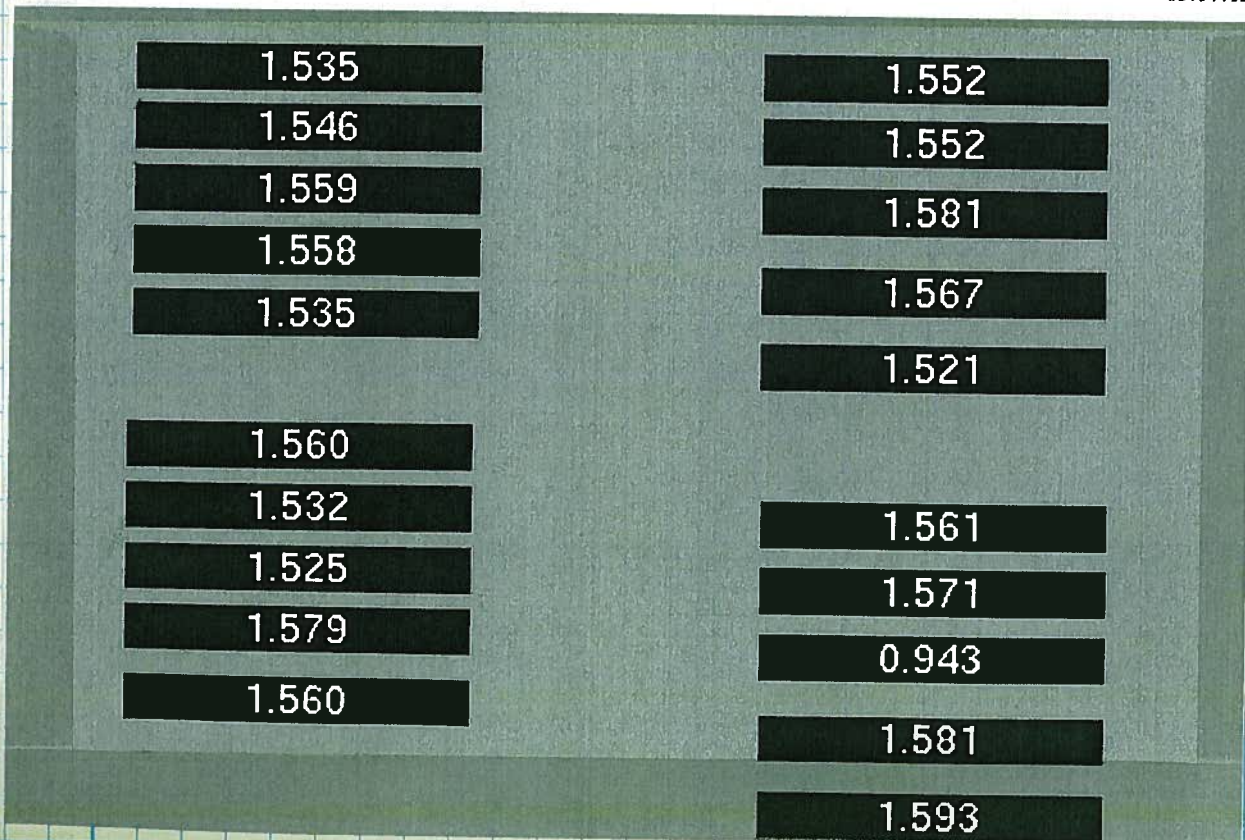
Aug 17, 1998

15:17:43



Aug 17, 1998

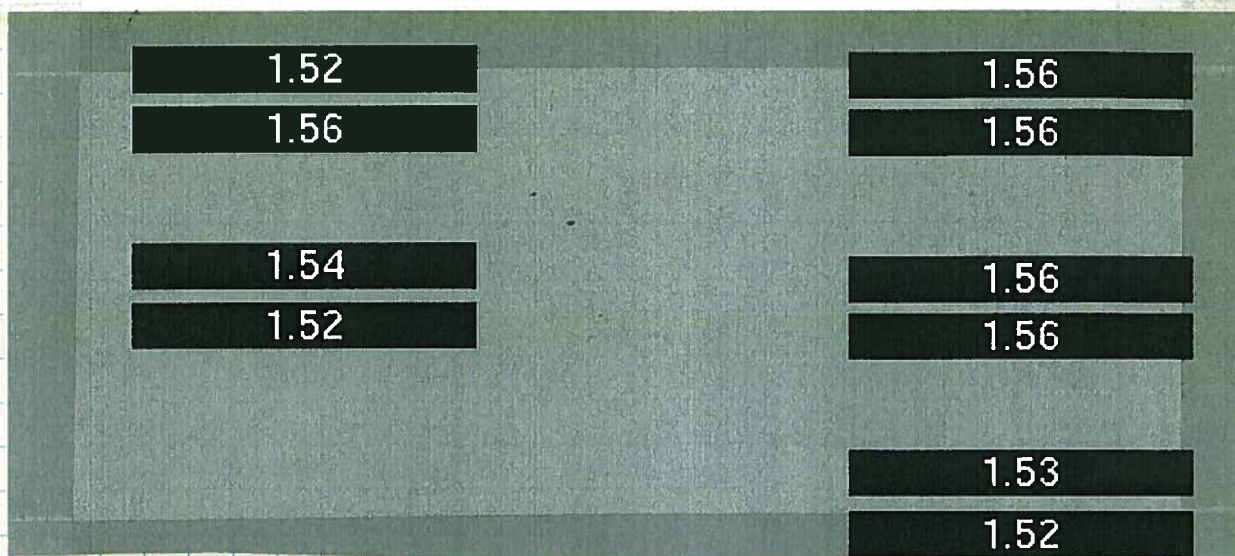
15:17:12



I tried remotely resetting the HVAC units on the Hadron Arm and waiting for see if the temperature would come down.

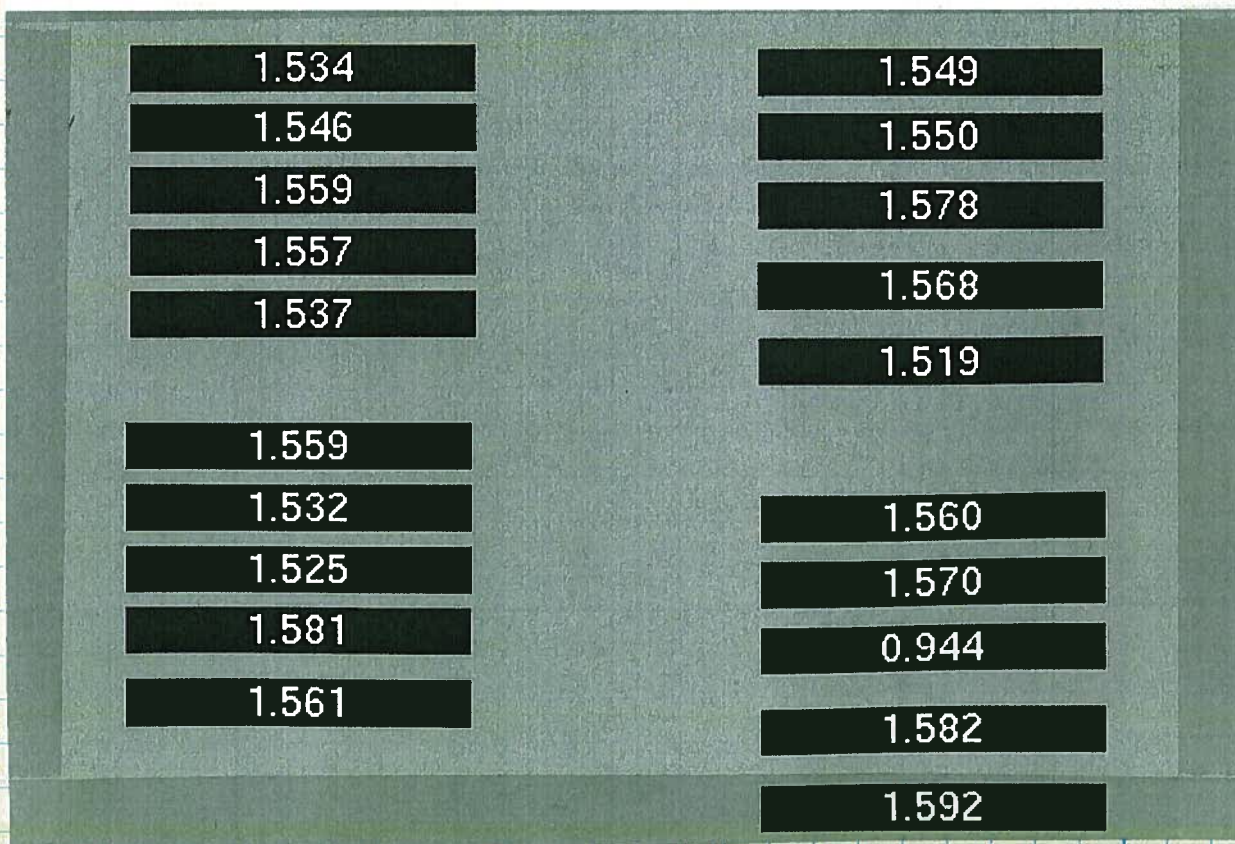
Aug 17, 1998

16:58:06



Aug 17, 1998

16:58:29



There was a scheduled access at 4AM to install some carbon blocks on top of the VDCs. I came in to look at the air conditioning.
 These are the temperatures prior to opening the hut doors.

Aug 18, 1998

04:34:45

1.53	1.57
1.57	1.56
1.55	1.56
1.54	1.56
	1.54
	1.53

Aug 18, 1998

04:35:54

1.534	1.550
1.545	1.552
1.560	1.579
1.558	1.566
1.535	1.521
1.560	1.561
1.533	1.571
1.523	0.943
1.581	1.582
1.558	1.595

Aug 18, 1998

05:02:57

1.51	<i>With the hut doors open.</i>	1.57
1.55		1.55
1.53	<i>VDC fans were blowing against each other. I turned the ones at the back around so all fans blow in the same direction.</i>	1.56
1.51		1.56
		1.53
		1.52

Aug 18, 1998

05:25:50

1.51	<i>Hut doors closed again</i>	1.56
1.55		1.55
1.53		1.55
1.51		1.55
		1.52
		1.52

Aug 18, 1998

05:36:08

1.52	<i>Hut doors still closed. Temp. not increasing above these values</i>	1.57
1.55		1.56
1.54		1.56
1.52		1.56
		1.53
		1.53

At the 1:30 Hall A meeting Charles P. mentioned something about the temps in the huts. I went to the Counting Room to look.
 Temperatures in the huts when I got to the CR.
 Called in MRI to work on the HVAC units.

Aug 18, 1998

13:58:23

1.52	1.57
1.56	1.56
1.55	1.56
1.53	1.56
	1.54
	1.53

Aug 18, 1998

13:58:30

1.534	1.553
1.546	1.553
1.560	1.582
1.559	1.568
1.536	1.521
1.561	1.561
1.533	1.572
1.526	0.941
1.581	1.581
1.561	1.593

I closed the door on the electron arm just a little past 5 PM. So, they've been closed for 2 hrs. The refrigerant was apparently a little low. MRI charged it up. The unit in the left (Mitsubishi) was blowing cold air on one ~~side~~ ^{end} & room temp air at the other end.

Aug 18, 1998

18:18:04

1.517	1.534
1.525	1.535
1.545	1.563
1.543	1.551
1.525	1.504
1.547	1.544
1.513	1.555
1.506	0.929
1.566	1.567
1.541	1.582

Looking in the logbooks, Charles and I found no mention of trouble with the VDC readout anytime after 4 AM this morning.

The doors on the huts have been closed for about a day.

Aug 19, 1998

14:31:22

1.52	1.57
1.56	1.56
1.55	1.56
1.53	1.56
	1.54
	1.53

Aug 19, 1998

14:31:16

1.512	1.527
1.525	1.528
1.539	1.556
1.538	1.545
1.521	1.497
1.543	1.539
1.508	1.550
1.502	0.930
1.562	1.563
1.539	1.577

Checking in on the running experimental find
 The electronic log states a brief problem on run 2702
 (log entry 648)

Aug 20, 1998

13:24:10

the
same
values
at
8:30 PM

1.52	1.57
1.56	1.56
1.55	1.56
1.53	1.56
	1.54
	1.53

Aug 20, 1998

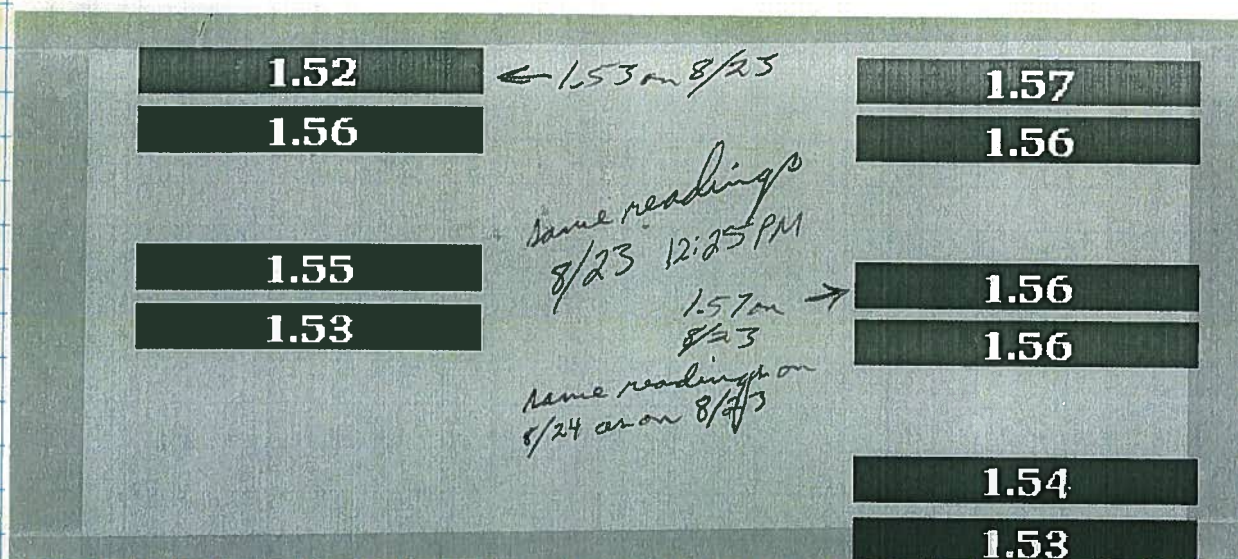
13:24:16

everything
within a
couple of
mV @
8:30 PM

1.511	1.524
1.518	1.527
1.537	1.554
1.536	1.542
1.519	1.496
1.538	
1.505	1.537
1.498	1.548
1.560	0.932
1.533	1.559
	1.572

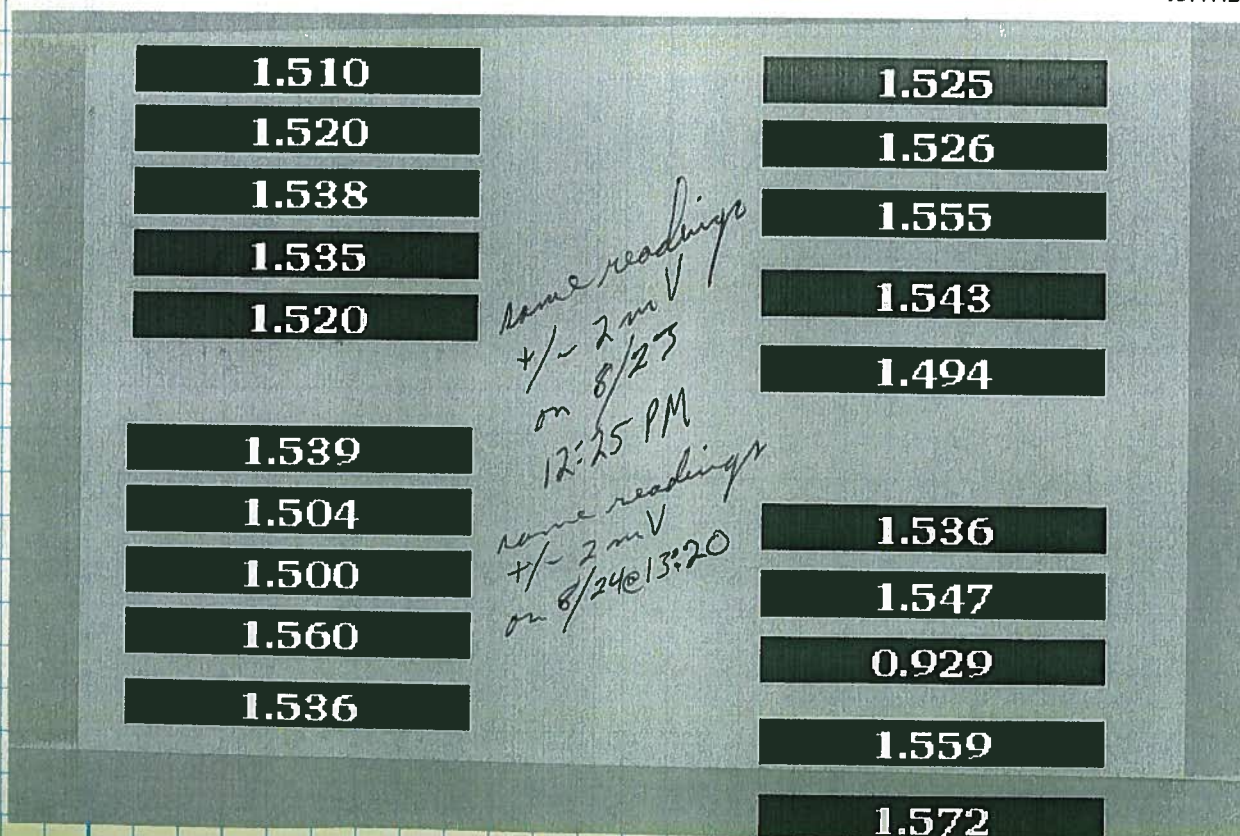
Aug 21, 1998

15:47:39



Aug 21, 1998

15:47:21



Humidity Sensor for Aerogel Diffusion Box 1/2/99
 We installed a Honeywell HICAL
 humidity sensor inside the aerogel diffusion
 box.

Model: IH-3602A
 Wafer: thunder2

Channel: 29
 MRP: thunder2

File: 98080113

(-) common or ground-----o o----- +5V precision supply
 E+ signal/output-----o o-----Thermistor
 case-----o o-----Thermistor
 tab-----x

BOTTOM VIEW
 PIN CONNECT

HICAL Sensing Products

Honeywell Inc.

9C Founders Blvd.

El Paso TX 79906

Calculated values at 5V:

Vout @0%=0.891 @75.3%=3.105

Linear output for 2% RH accy @25C:

Zero offset = 0.891 V

Slope = 29.408 mV / %RH

$RH = (V_{out} - 0.891) / 0.0294$

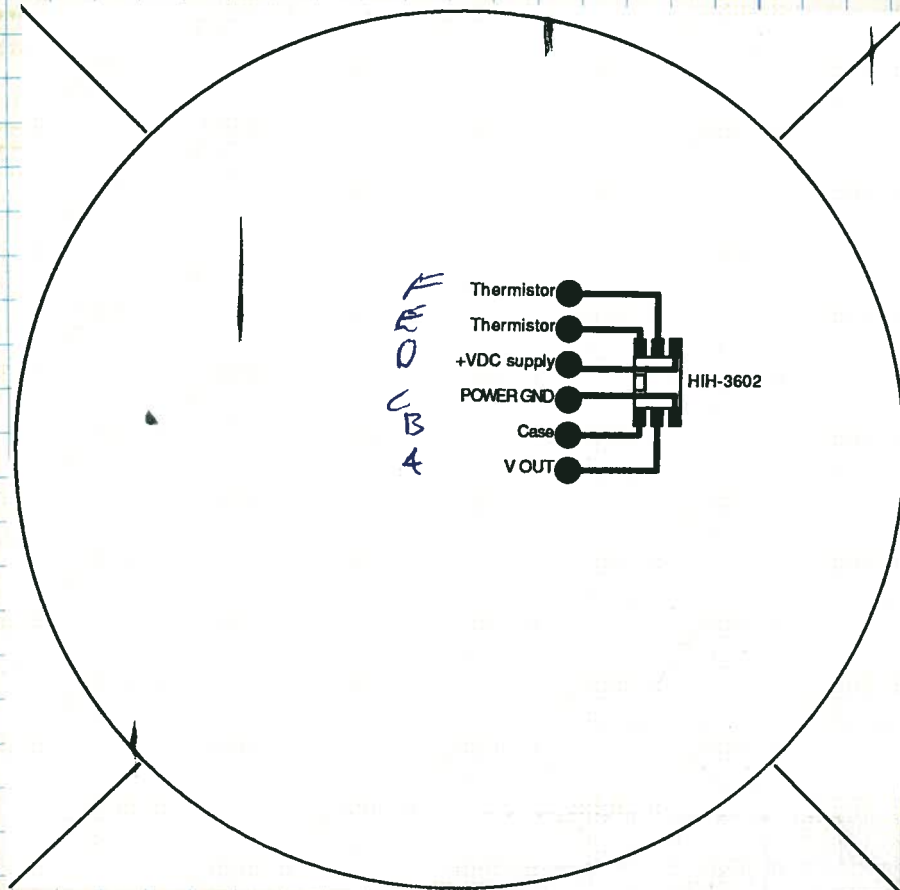
Ratiometric response for 0 to 100%RH:

$V_{out} = V_{supply} * (0.1782 \text{ to } 0.7663)$

This is the layout of the board it is mounted on. Letters are
 the pins of an 8-pin paramatone connector (Trim-Trio) the
 pads are jumpered to.

2/21/99

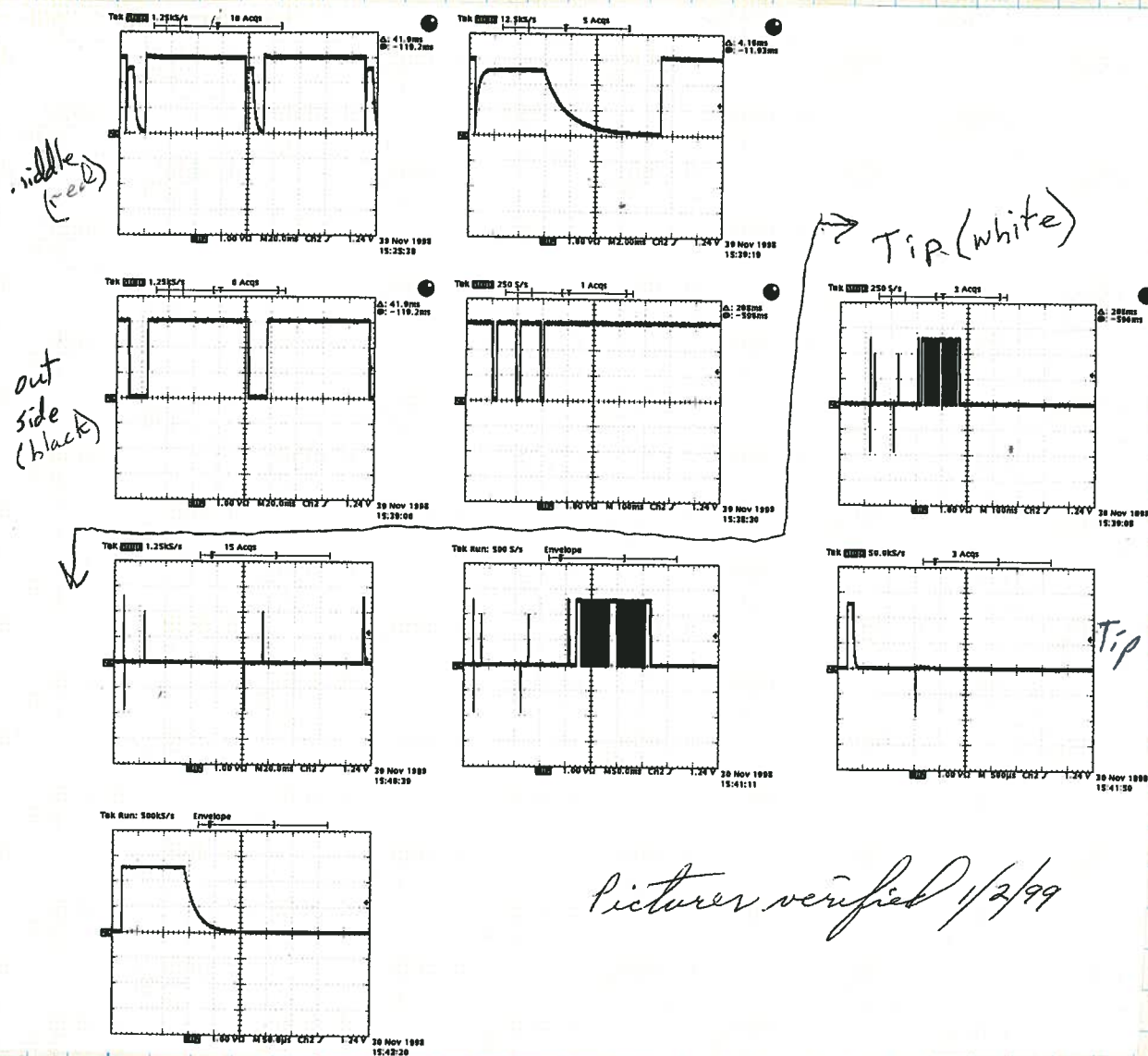
I had to put a MAX4162
 as a unity gain follower
 on VOUT in order to
 drive the H8 digitalizer.
 See p. 64 this volume.



1/2/99 HOB0 H8 Datalogger External Input

Waveforms recorded previously on the external input connector for the Onset Computer Corp. HOB0 H8 datalogger. There was no load on the external input.

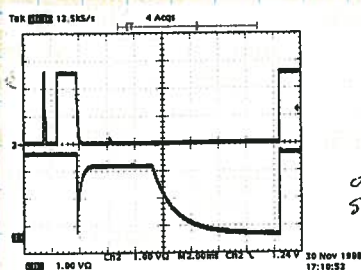
Note: these pictures were taken over month ago.



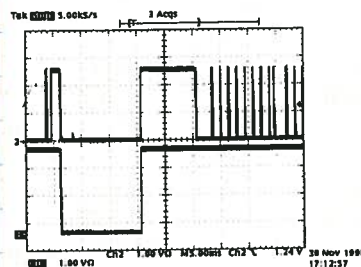
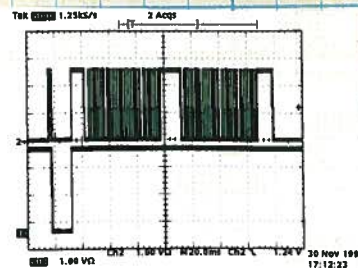
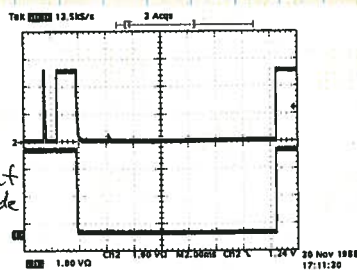
Pictures verified 1/2/99

The above pictures are with temperature, humidity & external channels enabled. Colors are the colors on the 2.5mm stereo cable from Onset.

Tip
middle



out
side



Pictures verified 1/2/99

The above pictures are with only the external channel enabled

Pictures were taken with FET probes on the TDS754A scope

Spec sheet is on p. 64

2/17/99 Crowcon Sensor He Sensitivity

JA

Tried to check the helium sensitivity of the Crowcon flammable gas sensors we use in Hall A.

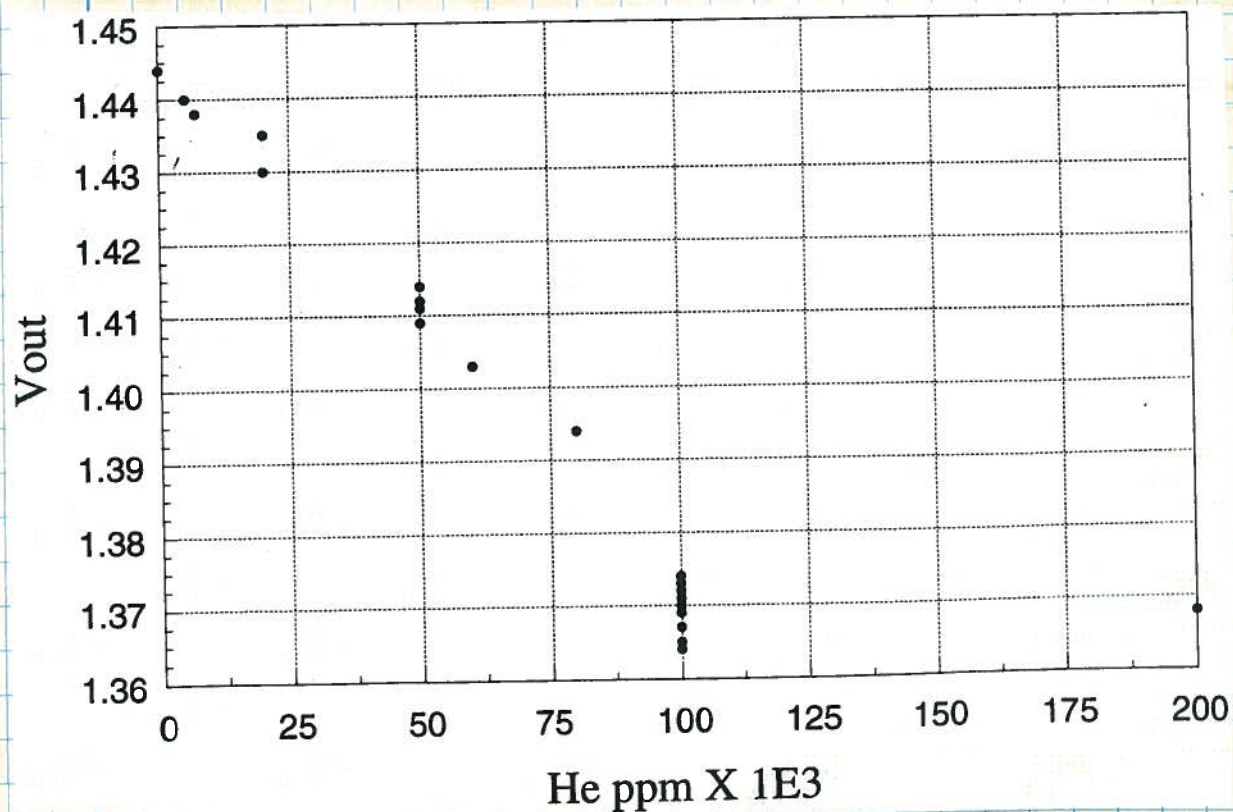
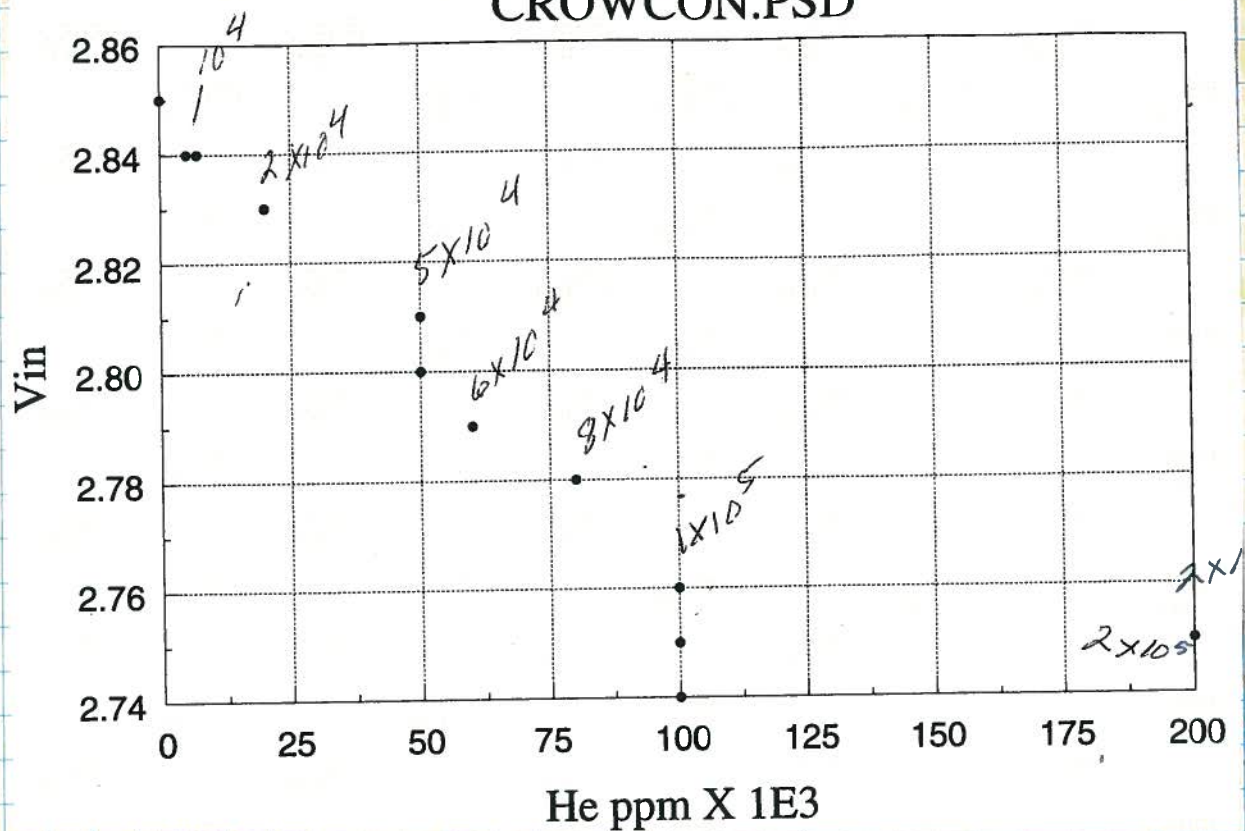
When the magnets went the Gasmaster goes off. This has happened at least 4 times that I am aware of.

This work was done at the end of January.

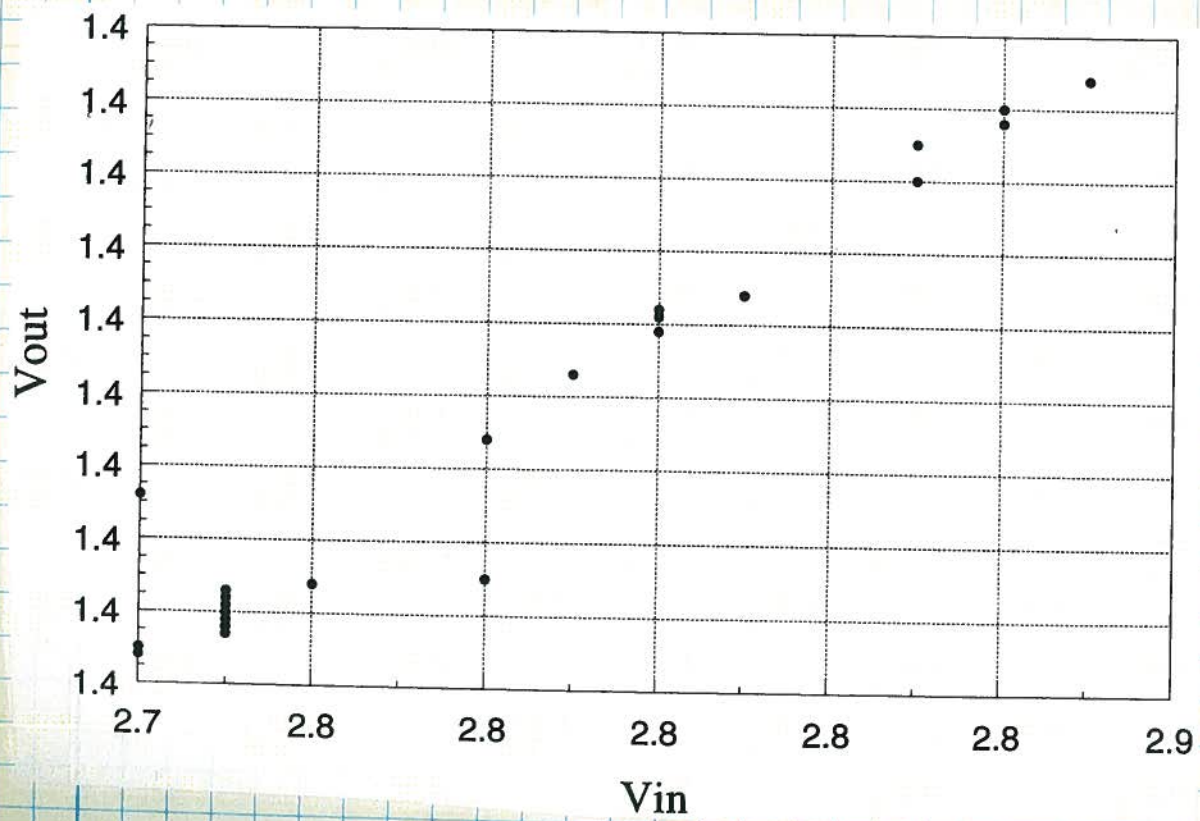
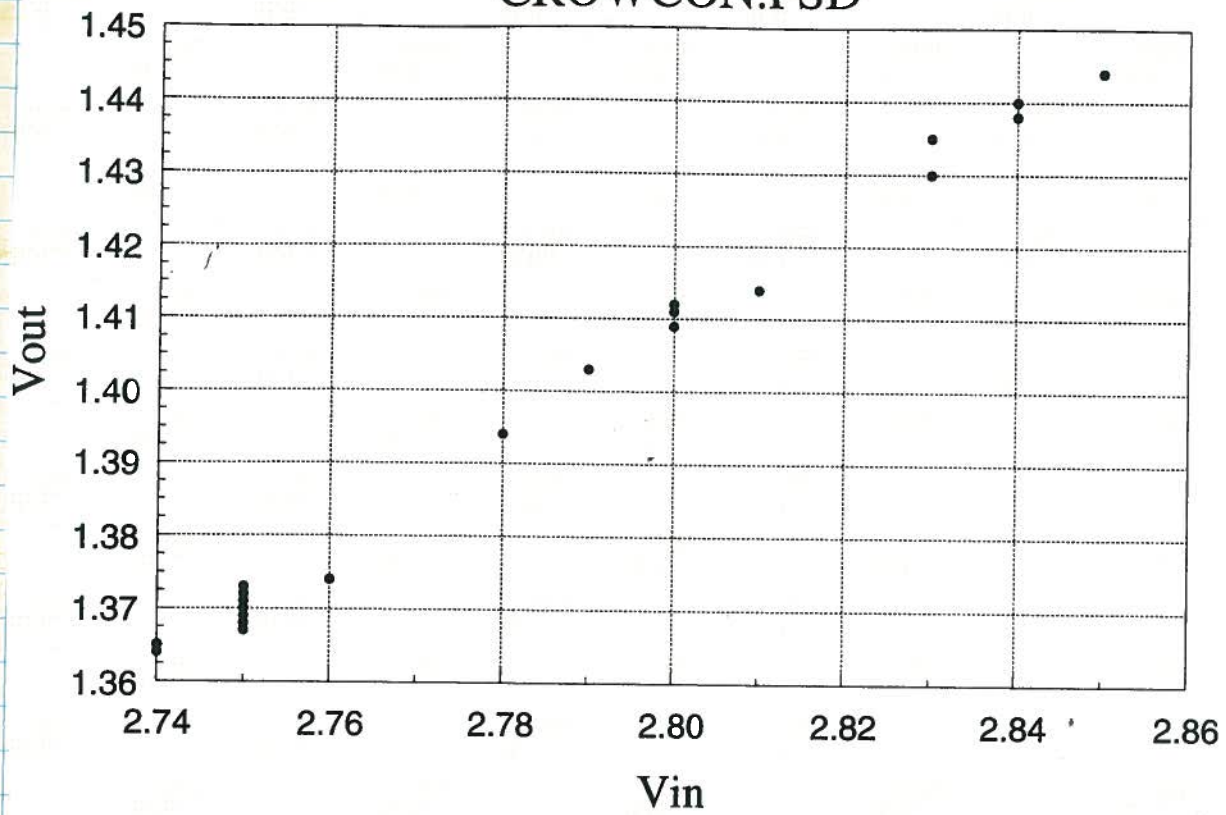
I now find I've already written this up on page 82-84 of Lab Techniques III.

Oh, well. I include the plots for posterity.

CROWCON.PSD



CROWCON.PSD



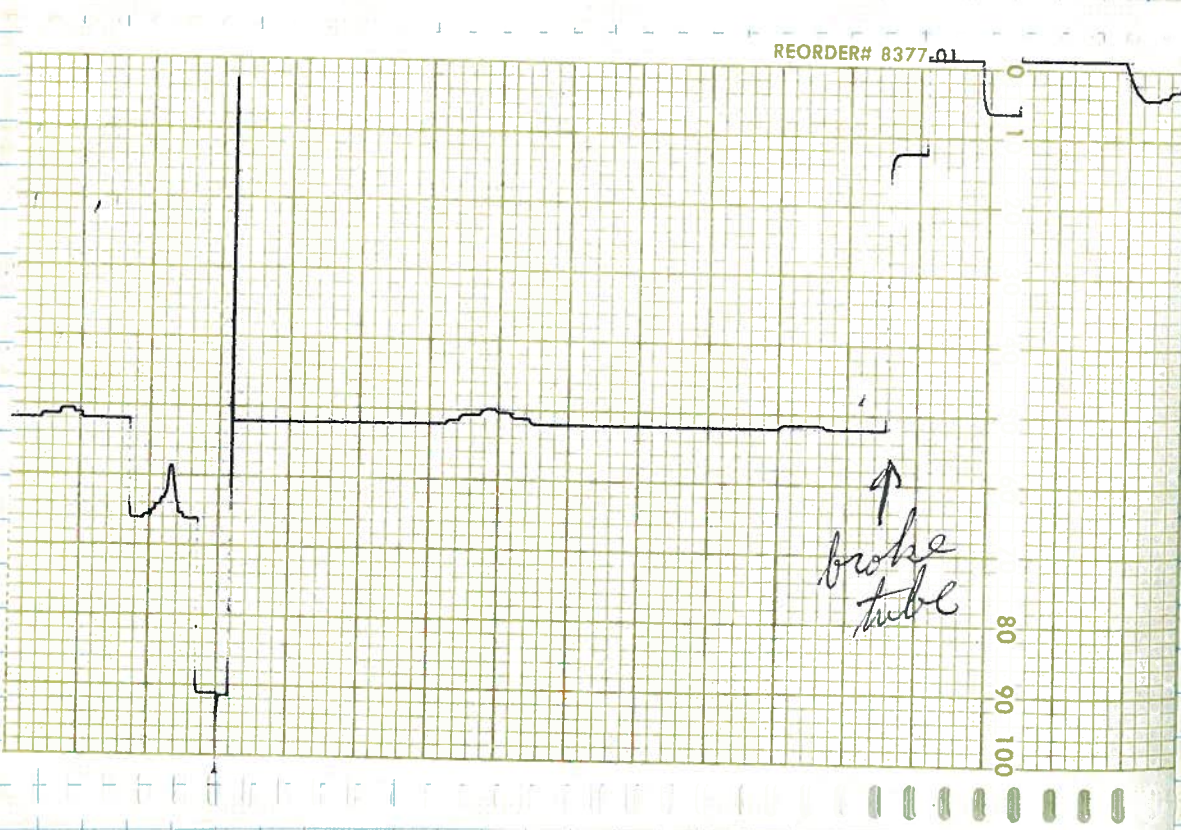
Breaking an 8575 Harder Vacuum 7/17

Last Tuesday, after the Hall meeting, Ed Tolt's put one of the 8575's (series number 31827, see p. 74 of Lab Techniques III) inside a small vacuum can. We had a Balzers leak detector setup on the can.

We pulled about a 10^{-5} vacuum on the can and then broke the PMT by hitting the side of the can with a hammer. The leak detector went off scale.

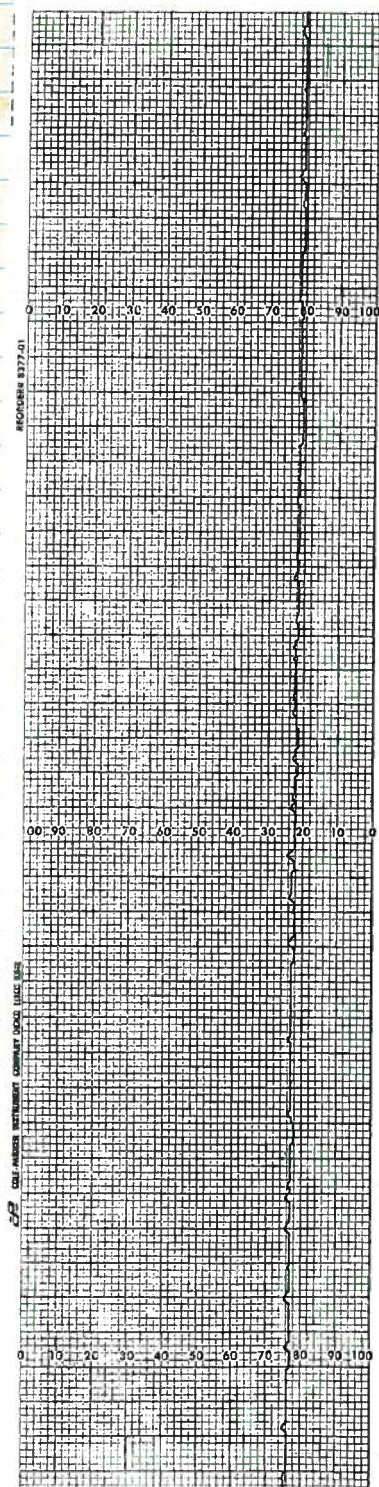
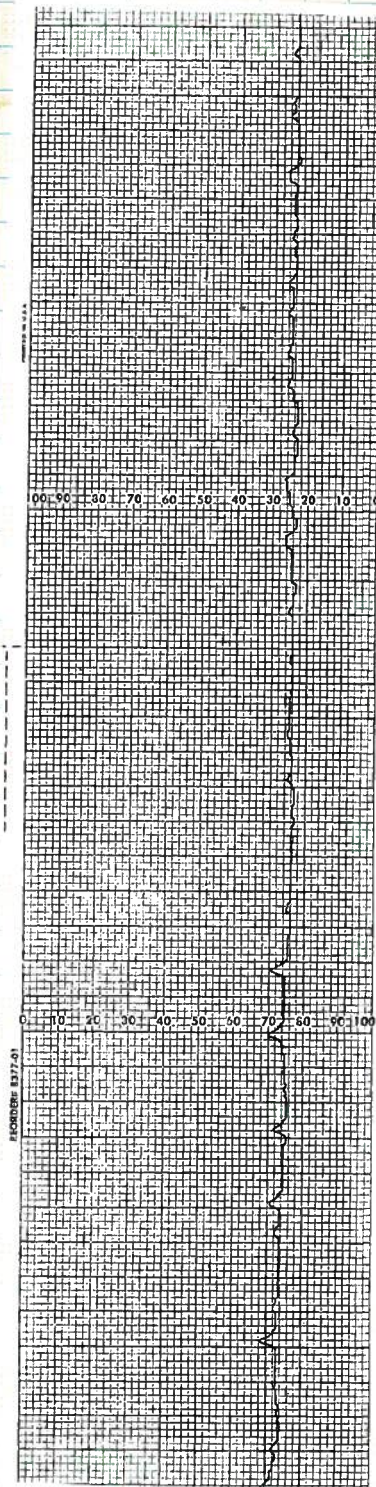
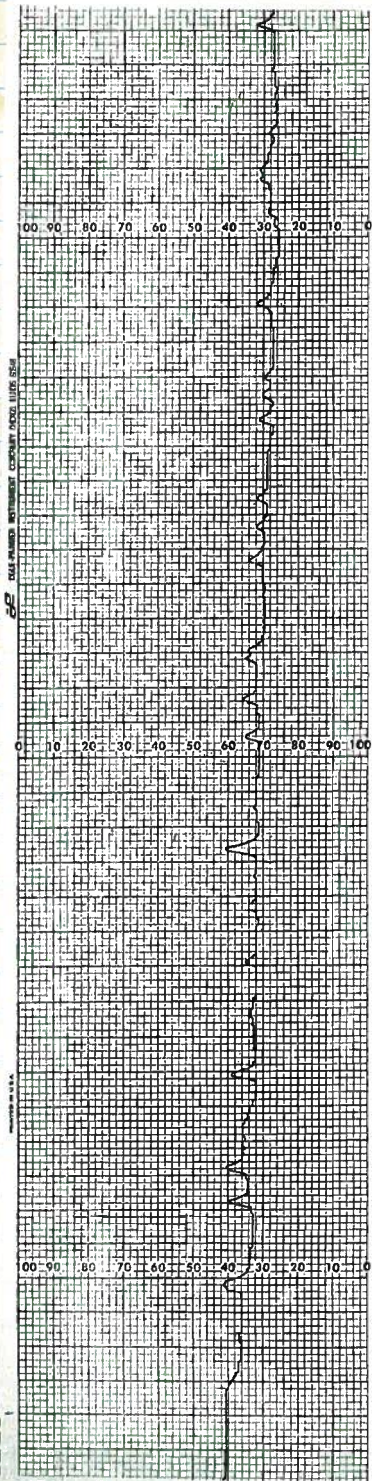
So, we could not conclude that it was helium in the tube. All we can say is there was a fair amount of some gas inside the tube.

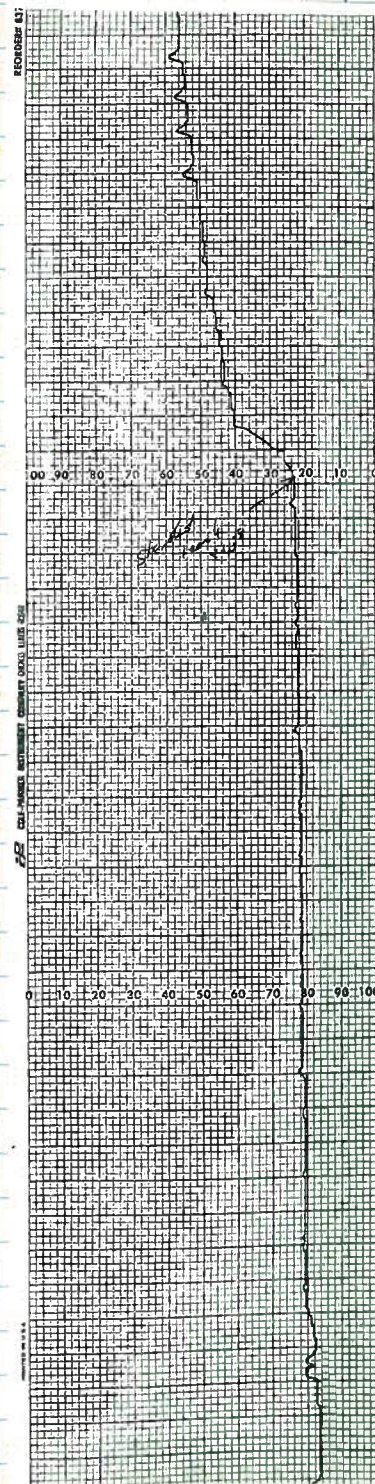
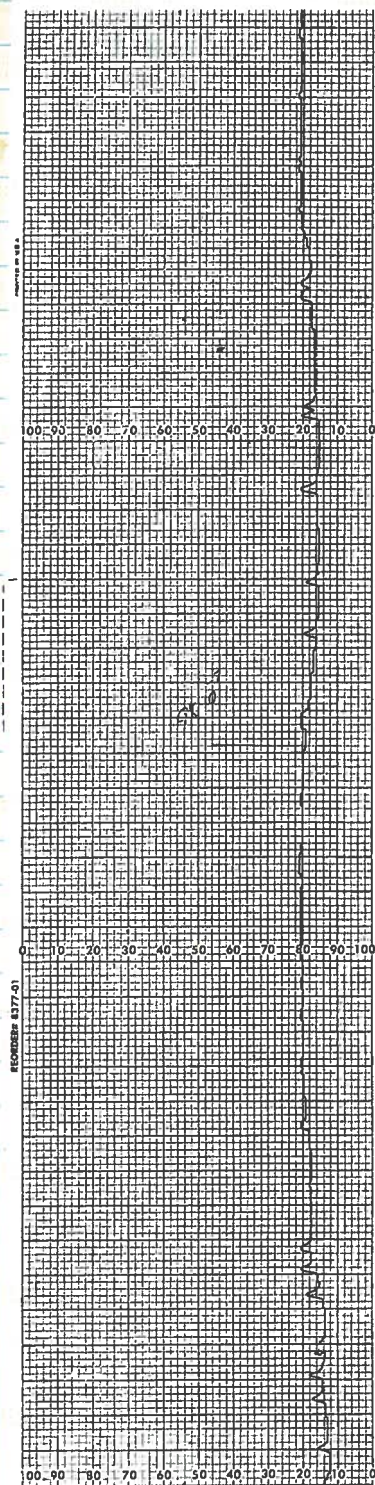
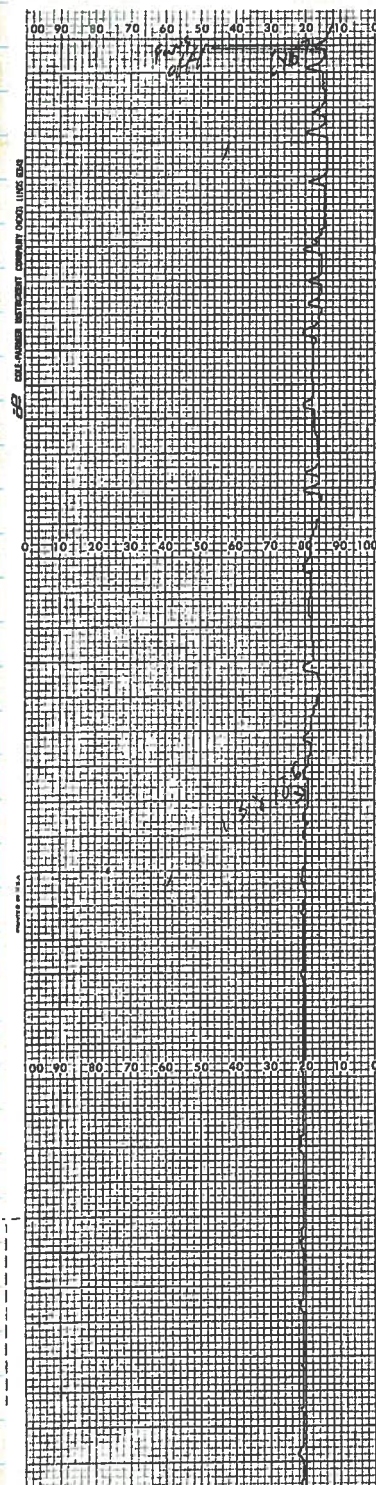
Below is the plot from the Balzers of that. Since we couldn't conclude anything significant I did not record the scale settings on the chart recorder or from the Balzers leak detector.

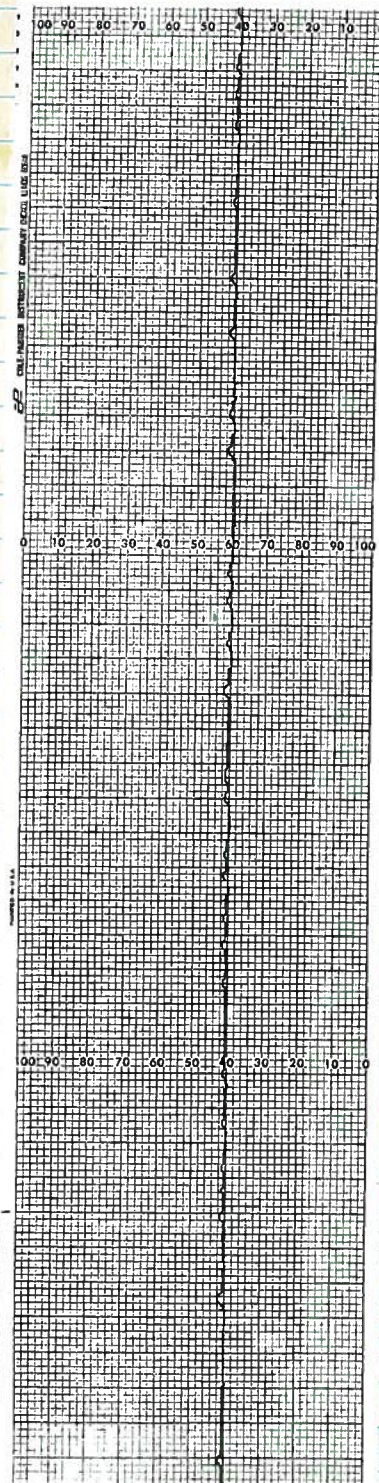
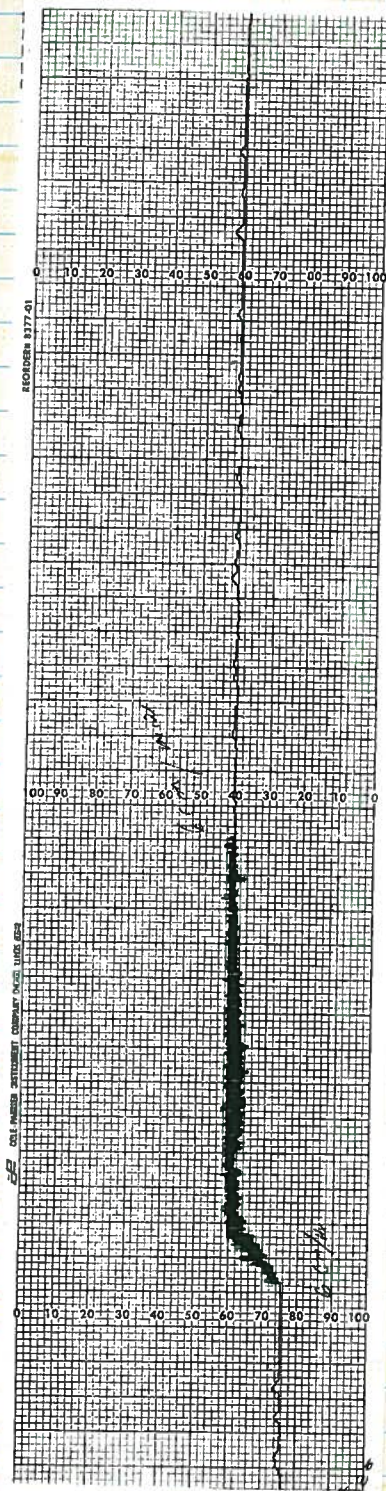
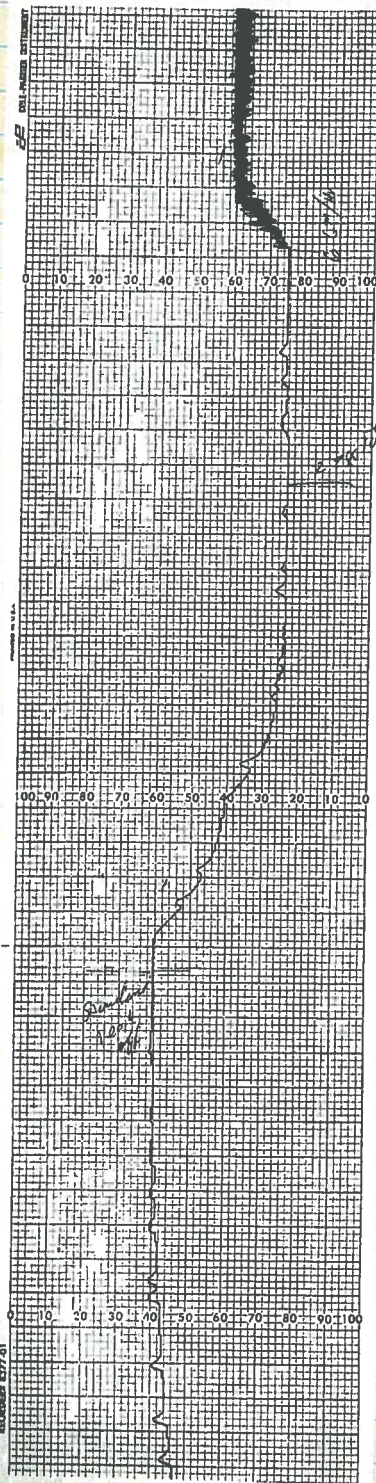


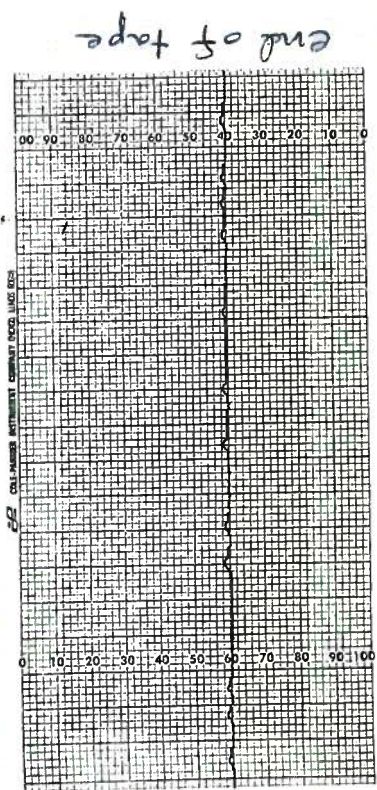
2/17 Helium Level in Hall A

JA Yesterday Ed Folts measured the helium level in Hall A.









2/21 Once Computer HOBO H8 Data Logger spec

**HOBO®
H8 Family
User's Manual**

Read this manual before using the HOBO H8 family of products. The HOBO H8 family of products is designed for use with the Onset Computer Corporation's BoxCar Pro for Windows software and PC cable for Windows. All rights reserved. © 1997 Onset Computer Corporation. Onset, HOBO, StoreView, Tolt, and ToltView are trademarks of Onset Computer Corporation. The CE mark identifies this product as complying with all pertinent requirements of the European Union (EU).

1. One HOBO H8 logger (part HOBO-001-02, HOBO-002-02, or HOBO-004-02)
2. Mounting Accessories: Hook and loop tape, Double-sided tape

Inside this package:
The HOBO H8 Family loggers are shipped with:
1. One HOBO H8 logger (part HOBO-001-02, HOBO-002-02, or HOBO-004-02)
2. Mounting Accessories: Hook and loop tape, Double-sided tape

Thank you for buying a HOBO data logger. With proper care it will give you years of accurate and reliable measurements.

This manual covers the HOBO H8 family of products. All members share a common feature set, store 7944 time-stamped measurements and are compatible with the HOBO Shuttle allowing for convenient retrieval of field data. The measurements available on each model are:

Model	Part Number	Temp	RH	Light	External (Temp or Volt)
HOBO Temp	HOBO-001-02	✓	✓	✓	✓
HOBO Temp/External	HOBO-002-02	✓	✓	✓	✓
HOBO RH/Temp	HOBO-003-02	✓	✓	✓	✓
HOBO RH/Temp/Light/External	HOBO-004-02	✓	✓	✓	✓

Common Specifications

Operating range (logger): -4°F to +158°F (-20°C to +70°C).
0 - 95% RH non-condensing.
Time accuracy: approx. ±1 minute per week (±100 ppm at 68°F or 20°C), full dependence shown in Plot A.
Measurement capacity: 7944 measurements total, stored in non-volatile memory.
Size: 2.4" x 1.9" x 0.8".
Weight: approximately 1 oz.
Battery, CR 2032 (lithium) user-replaceable.
Battery life (continuous use): 1 year.
Storage temperature: -40°F to +167°F (-40°C to +75°C).

Measurement Specifications

Temperature - Each HOBO H8 logger has an internal temperature sensor on a 4 inch wire which is mounted on the circuit board inside the snap lid case. Typically, the sensor is left inside the case and measures ambient air temperature over the operating range of the logger: -4°F to +158°F (-20°C to +70°C) with a time constant of about 15 minutes in still air. The internal sensor can be placed outside the case when a shorter time constant is needed (less than one minute in air and about 2 seconds in water). The temperature sensor is capable of measuring temperature from -40°F to +248°F (-40°C to +120°C) when extended from the case (see using the sensor outside the box for more information). The HOBO's temperature resolution and maximum error are shown in Plot B. This error includes the measurement uncertainty due to the sensor resolution.

Relative Humidity - The HOBO's user-replaceable relative humidity sensor is temperature compensated, and the logger's relative humidity accuracy is ±5% over the entire -41°F to +122°F (-5°C to +50°C) operating range of the sensor. The relative humidity sensor's operating RH range is 25% to 95% at 77°F (25°C) and for intervals of 10 seconds or longer. Full dependence shown in Plot C. NOTE: The HOBO's RH sensor will be damaged by condensation. It must not be exposed to fog, mist or other condensing conditions.

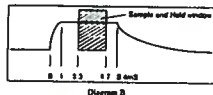
Light Intensity - The HOBO's light intensity sensor approximates the sensitivity of the human eye. The sensor's response versus light wavelength is shown in Plot D (black line), along with the eye response (grey line). The nominal range is 2 to 600 lumens/m², with an accuracy of ±20% of reading, ±2 lumens/m². The sensor's angular response is roughly cosine dependent, with 0° being directly above the sensor.

External Input for Temperature Measurement - The HOBO H8 loggers with an external input can accommodate an external temperature cable (Onset part number TMC8-H) which measures temperature over the range -40°F to +248°F (-40°C to +120°C). See Plot B above for accuracy and resolution.

External Input for Voltage Measurement - The external port can alternatively accommodate a voltage input cable (Onset part number CABLE-2.5-Stereo) which allows a single voltage input to be recorded. This input reads 0 to 2.5 DC volts, with a ±0.1 µA maximum leakage between measurements and a ±0.4 µA during sensor measurements (5.4 ms each). The accuracy is ±10mV ±0.5% of reading. The input line should not be exposed to signals below 0 volts or above 2.5 volts. The external sensor's zero volt input is not the same as the serial port's ground connection. Connecting the zero volt connection to ground may damage the logger. The 2.5 volt output power line is active during sensor measurements. External sensors should draw no more than 2 mA when powered.

Switched 2.5V Output - This signal can be used to power a sensor directly (like the HOBO's external temperature sensor) or it can also be used to trigger an external circuit. The switched 2.5V input blinks on for about 5.4 ms every time a measurement is made of any channel. A logger with four channels enabled will cause four blinks after each measurement interval expires. The external channel is the last of the blinks whether one, two, three or four channels are enabled. The four enabled channels example is shown in Diagram A.

Details of the blink - The input is sampled at a specific point in each blink in Diagram B. The start of the sample window is 2.3 ms after the beginning of the blink, and ends 2.4 ms later.



Continued on next page

Continued from other side

Connecting the communications cable and launching

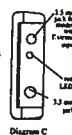
Starter Kit, which includes the appropriate interface cable and software, is required to operate your logger. Connect the interface cable into the 3.5 mm jack on the logger and into a working serial port of your computer. Install and start the logger's software. Select Launch... under Logger on the menu bar and a launch dialog box will be provided. For a complete explanation on installing the software and launching your logger, please refer to the software manual.

Operation Indicator

The HOBO data loggers have a red LED light that blinks while it's logging. The LED blinks brightly at every measurement, and weakly every two seconds if the interval between measurements is longer than two seconds. The blinking LED is most visible when viewed straight on, as shown in Diagram C.

Mounting options

Included with your HOBO H8 data logger are three options for mounting it on location: a magnet, hook and loop tape, and double-sided tape. These can be stuck on the back of your HOBO. When using the magnet, note that it works best on flat surfaces.

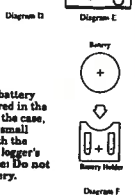
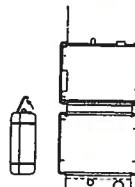


Readout

Reconnect the HOBO data logger to the interface cable, start BoxCar Pro, select Readout under Logger on the menu bar and the data will be displayed in a graphical or tabular form. For a complete explanation on Reading out your logger, please refer to the BoxCar Pro software manual.

Using the sensor outside the box

In normal operation, the HOBO's internal temperature sensor should be left inside the case. To use the sensor outside the case, open the snap-lid case as shown in Diagram D and remove the circuit board. Unwind the four inch sensor wire from the circuit board and place the board back into the case. When closing the case, make sure the sensor is aligned in the small notch in the case as shown in Diagram E and press the snap-lid closed. Be careful, the sensor is fragile and easily damaged!

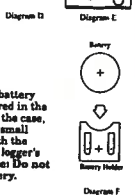


Keep it dry

Your HOBO data logger can be permanently damaged by corrosion if it gets wet. Protect it from rain or condensation. Should it get wet, remove the battery immediately and dry the board completely with a hair dryer before reinstalling the battery. The RH sensor is damaged by any exposure to condensation, and if it gets wet, it will need to be replaced (Onset part number HUM-UPS-506).

Charging the battery

We recommend changing the HOBO's battery when its level is less than 30% (battery level displayed on the host computer during Launch and Readout). Data stored in the HOBO will not be lost when removing the battery. To change the battery, open the case, lift the circuit board and remove the battery by carefully pushing it out with a small screwdriver or other small, blunt instrument. Be sure to install the battery with the printed side away from the HOBO's circuit board as shown in Diagram F. The logger's red LED will blink a number of times after the battery has been installed. Note: Do not cut open, incinerate, heat above 185°F (85°C) or recharge lithium battery. Dispose per local regulations.



Service and Support

HOBO® products are easy to use and reliable. In the unlikely event that you have a problem with the hardware or software, please read the following.

Who do I contact?

Contact the company that you bought the loggers from: Onset Computer Corporation or an Onset Authorized Dealer.

Before calling, you can evaluate and often solve your problem if you try the following:

1. Read this manual and the ReadMe file on the disk. It may only take a few moments to get the answers you need.
2. Write down the events that led to the problem. Have you changed anything in your computer recently? Are you doing anything differently?

When contacting Onset Computer Corporation, please indicate that you need Technical Support for HOBO® products.

Be prepared to:

1. Provide the product number which is found on the bottom of the logger, the software version and serial number if present on the diskette.
2. Provide details on the hardware and software configuration of your computer including: manufacturer, model number, peripherals, and version of operating system.
3. Completely describe the problem or question. The more information you provide, the faster and more accurately we will be able to respond.

NOTE: Onset allows one technical support contact for each software license.

Onset Technical Support

Onset Computer Corporation
PO Box 3450
Pocasset, MA 02569-3450
Phone: (508) 759-9500
Fax: (508) 759-9100
e-mail: loggerhelp@onsetcomp.com

Warranty

The HOBO® products are warranted to be free from defects in material and workmanship for a period of one year from the date of original purchase. During the warranty period Onset will, at its option, either repair or replace products that prove to be defective. This warranty is void if the Onset products have been damaged by customer error or negligence or if there has been an unauthorized modification.

Returning Products to Onset

Direct all warranty claims to place of purchase. Before returning a failed unit, you must obtain a Return Merchandise Authorization (RMA) number from Onset. You must provide proof that you purchased the Onset product(s) directly from Onset (purchase order number or Onset invoice number). Onset will issue an RMA number that is valid for 30 days. You must ship the product(s), properly packaged against further damage, to Onset (at your expense) with the RMA number marked clearly on the outside of the package. Onset is not responsible for any package that is returned without a valid RMA number or for the loss of the package by any shipping company. Loggers must be clean and free of any toxins before they are sent back to Onset or they may be returned to you.

Repair Policy

Products that are returned after the warranty period or that are damaged by the customer as specified in the warranty provisions can be returned to Onset with a valid RMA number for evaluation.

Please contact Onset for more information and prices on:

ASAP Repair Policy

Onset will expedite the repair of a returned product.

Data-back™ Service

HOBO® data loggers store data in nonvolatile EEPROM memory. Onset will, if possible, recover your data to a disk.

Tune Up™ Service

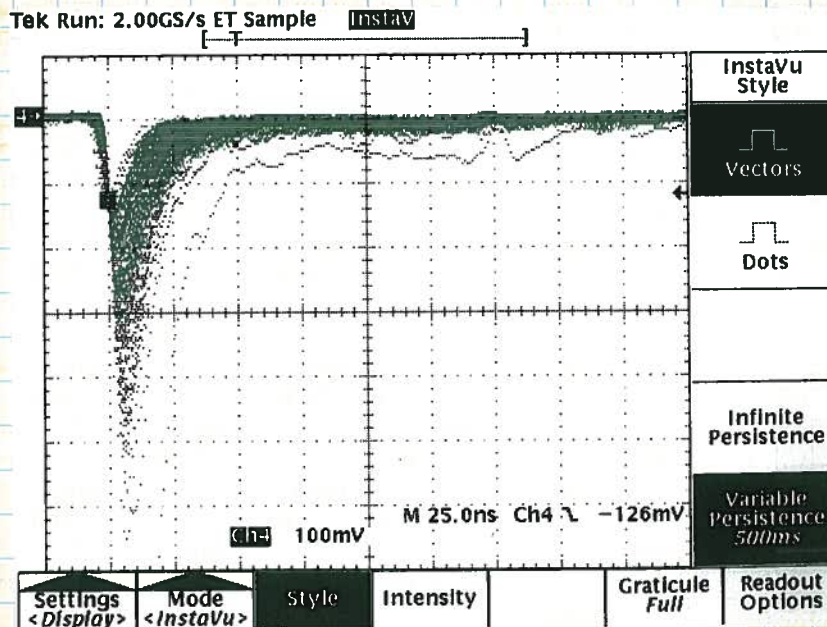
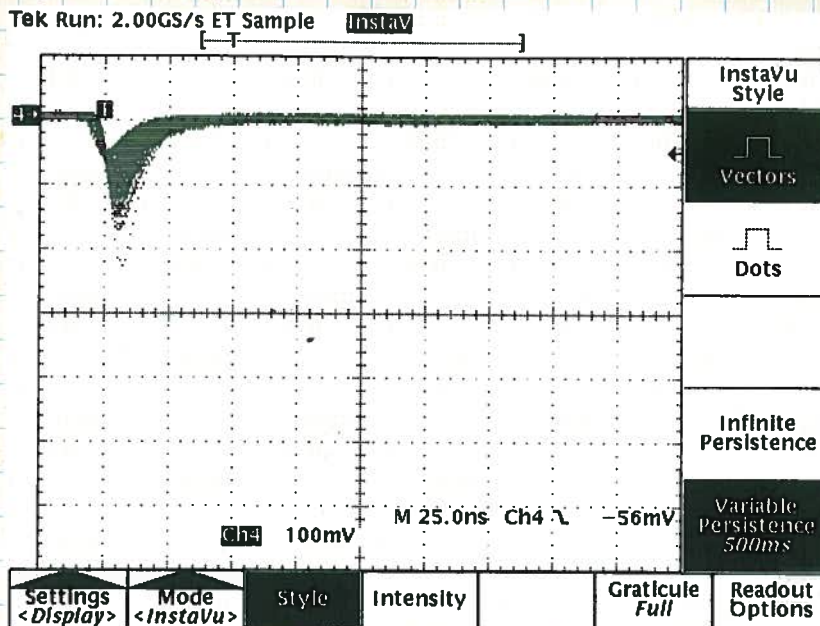
Onset will examine, retest, and recalibrate any HOBO® data logger.

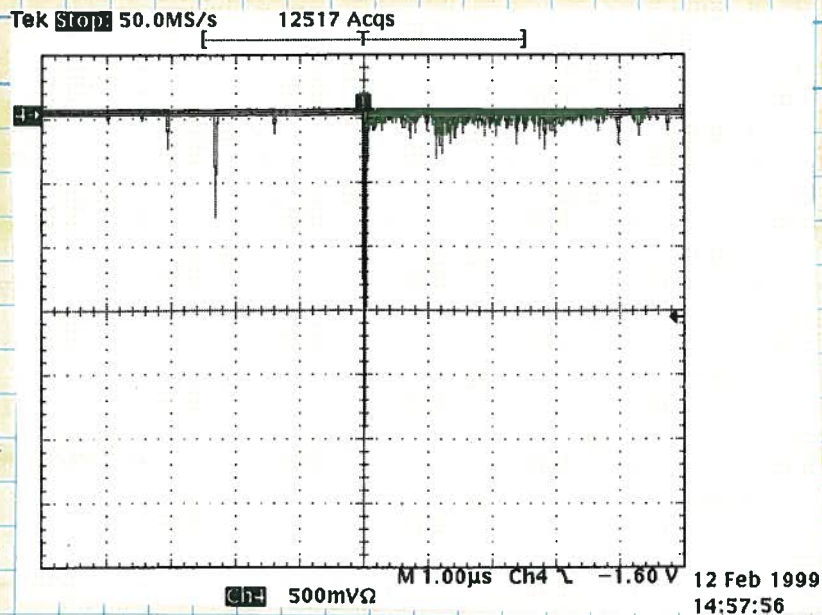
Added a MAX4462 to output of humidity sensor for zero-gal diffusion box (p. 51 this volume). Done as a unity gain follower.

2/24
JS

On 2/12 I replaced the 8575 on
ES2R5.

Below are before & after pics of Ru^{106} source on
the scintillator.

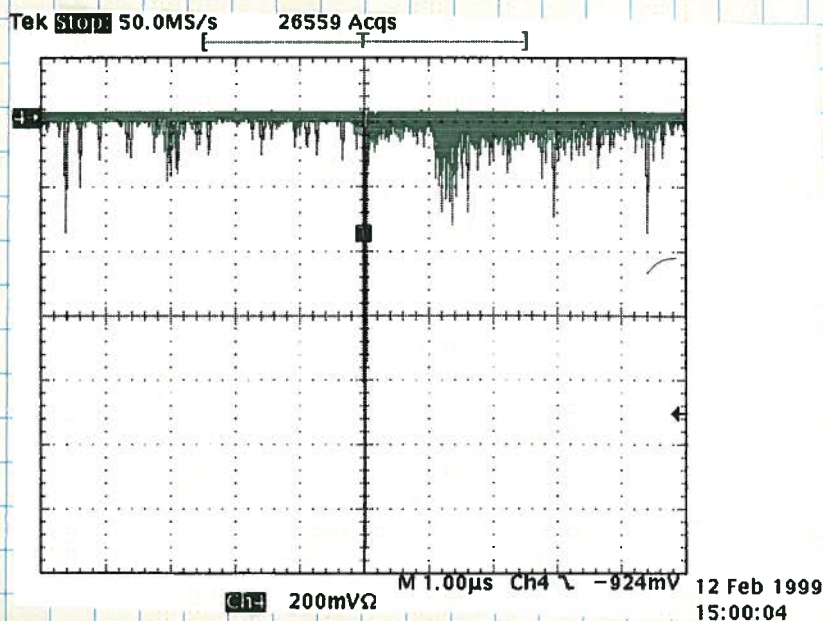
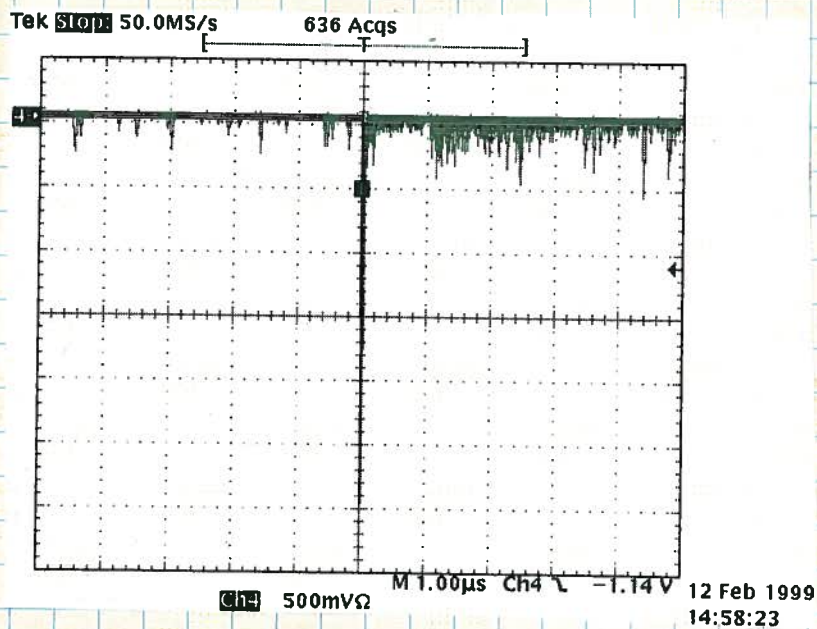




There are pics of
Ru¹⁰⁶ on 53
which was on
the floor under
the e-arm.

First & last
PMTs on one
side.

a quick look
to see if there
is anything



2/24

I hooked up the Emco HV and 3227 grounded bare amp to the $\frac{1}{2}$ " straw tube in the Gas Shed.

For monitoring the gas mix out of the flow controllers.

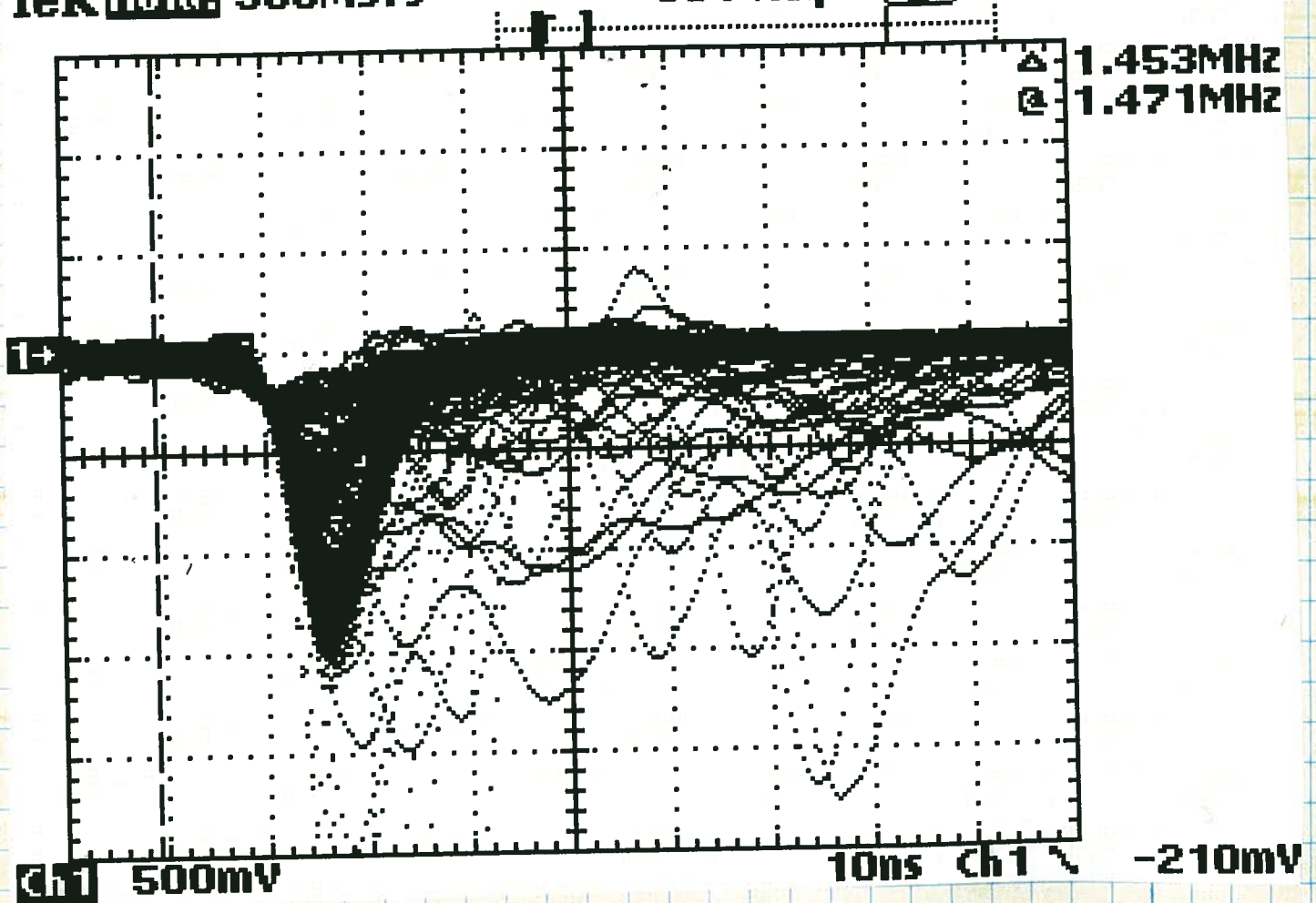
10 μ Ci ^{55}Fe on pinhole of tube. 3.21V on control of Emco HV. $\Rightarrow$ ~ 1690 V on anode. (5V = 2500V)

Tek **HOLD** 500MS/s

534 Acqs



00.01 VDC

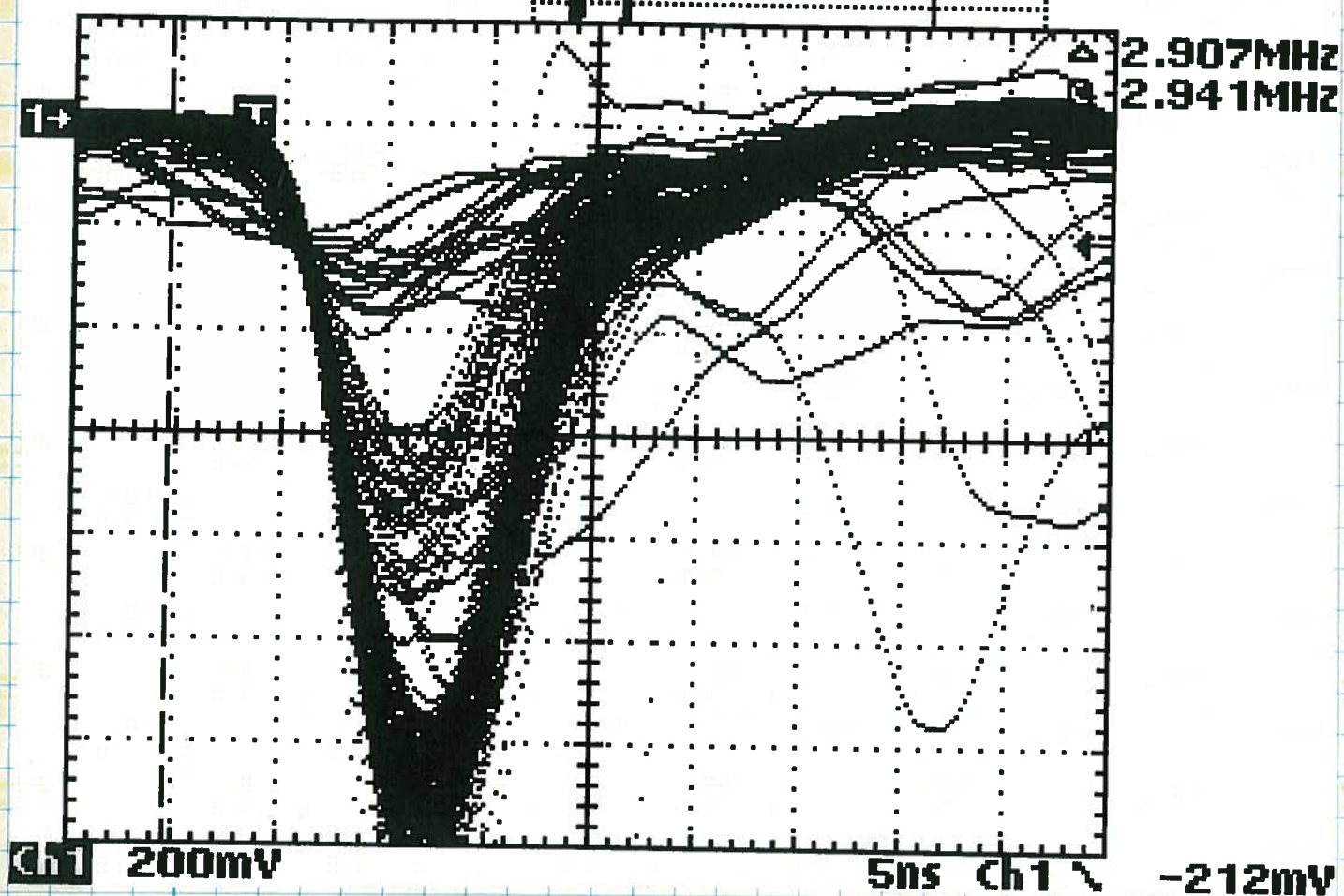


Tek **HOLD** 500MS/s

224 Acqs



00.00 VDC

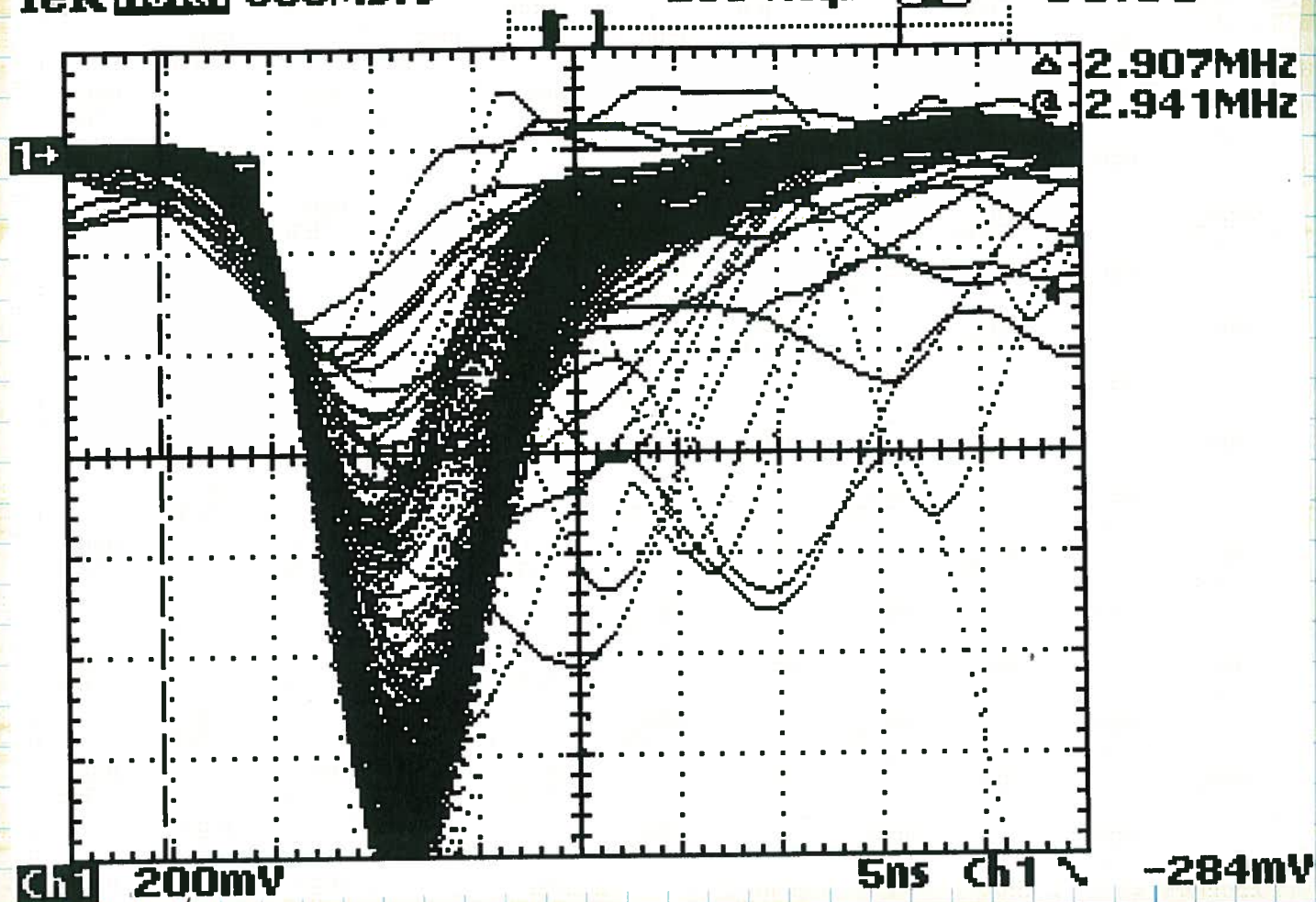


Tek Hold 500MS/s

258 Acqs



00.00 VDC

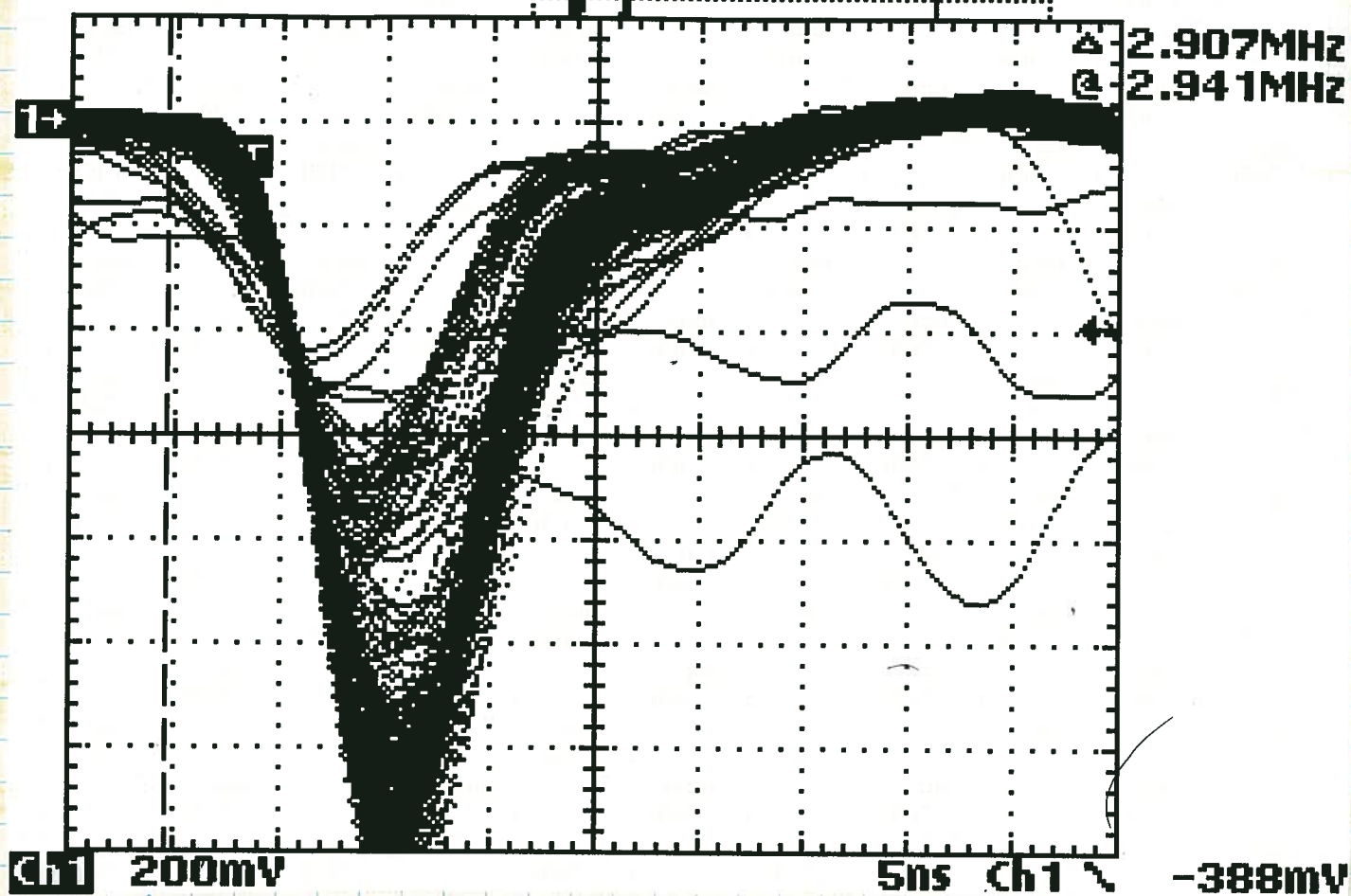


Tek **Hold** 500MS/s

210 Acqs



00.01 VDC

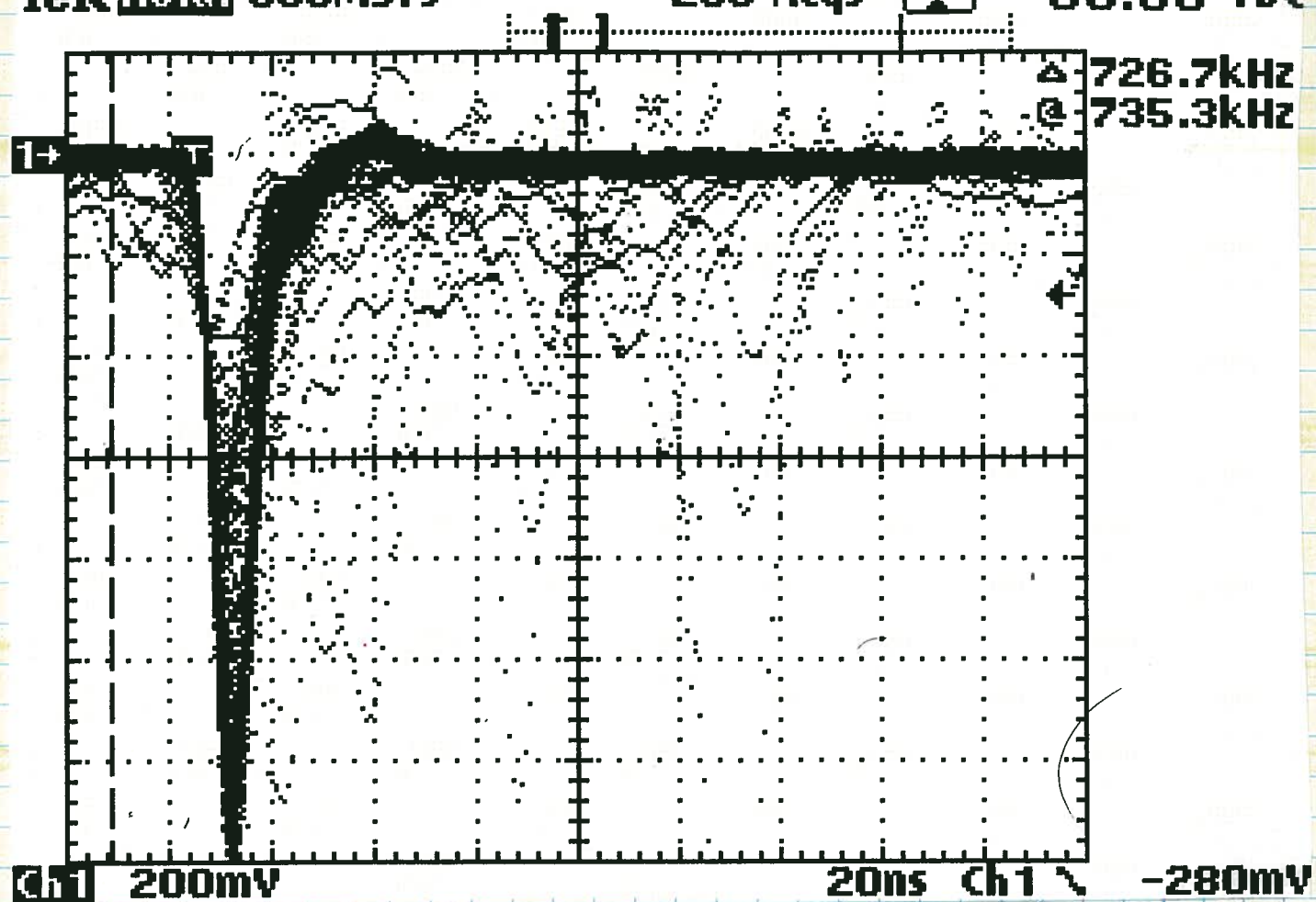


Tek **HOLD** 500MS/s

298 Acqs



00.00 VDC

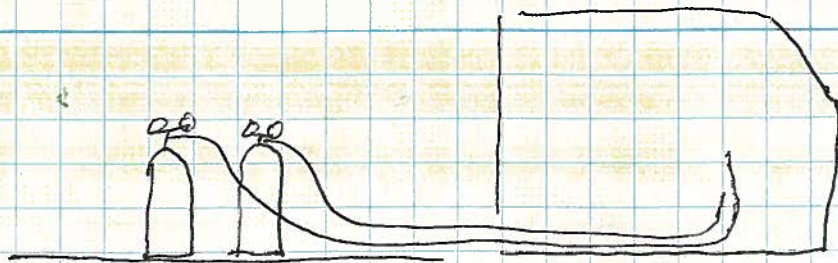


Detector Heat Sealing on Hadron Arm
 I put 2 nitrogen cylinders upon the service platform.

HVAC is off

Door closed 8:02 21.0

time	O ₂	
8:03	21.0	
:04	21.0	gas on on both cyl. low press @ ± 60 PSI on both
:06	21.0	
:07	20.0	90 PSI on one cyl
:11	20.0	
14	20.7	
15	20.6	
18	20.7	
22	20.5	
27	20.4	
30	20.4	90 PSI down to ⁶⁰ 70 PSI
33	20.4	90 PSI $\approx \emptyset$ when valved off I see ~ 24 PSI in bottle
36	20.4	
39	20.5	
42	20.5	
45	20.5	
48	20.6	
51	20.6	
54	20.5	
57	20.6	
59	20.6	60 PSI cyl down to 50 PSI
9:02	20.6	
03	20.6	60 PSI $\approx \emptyset$ when valved off I see $\sim \emptyset$ PSI in bottle
04	20.6	
06	20.7	
09	20.8	
12	20.8	
16	20.8	
19	20.9	
24	20.9	
31	20.9	
32	21.0	start to open doors after this
38	21.0	doors open
40	21.0	ready compared to 8:04



Initially, I set both regulators to 60 PSI. One could be set higher, which I did shortly after starting. O_2 reading made with a personal O_2 monitor sitting on the 1st electronics platform. The display is viewed by a small CCD camera. Camera monitor was outside the hut.

3/6/99 Check of S1 & S2 on Hadron arm

I find the HV crate is set to HV OFF
Set HV ON

Card 1 = left 0-5 are S1 6-11 are S2
Card 2 = right 0-5 are S1 6-11 are S2

Card 1 as found	set to	Card 2 as found	set to
1790		1790	
1875		1850	
1780		1840	3R
1840		1875	4R
1770		1920	5R
1990		2260	51/6R
1770		1870	
1960		1820	
1850		1800	3R
1970		1700	4R
1860		2070	5R
1920		2030	52/6R

I did not change any voltages.

Ru₁₀₆ on H51/6R

Cosmics for H51/5R (could not read disk)

cosmics for H51/4R

cosmics for H51/3R

cosmics for H51/2R (scope floppy drive broke!)

1R also shows similar afterpulsing

H52/6R shows MUCH worse afterpulsing than 51/1R. More of it and a larger amplitude on average

H52/5R is similar to 6R

4R has much less afterpulsing, though still ~100%

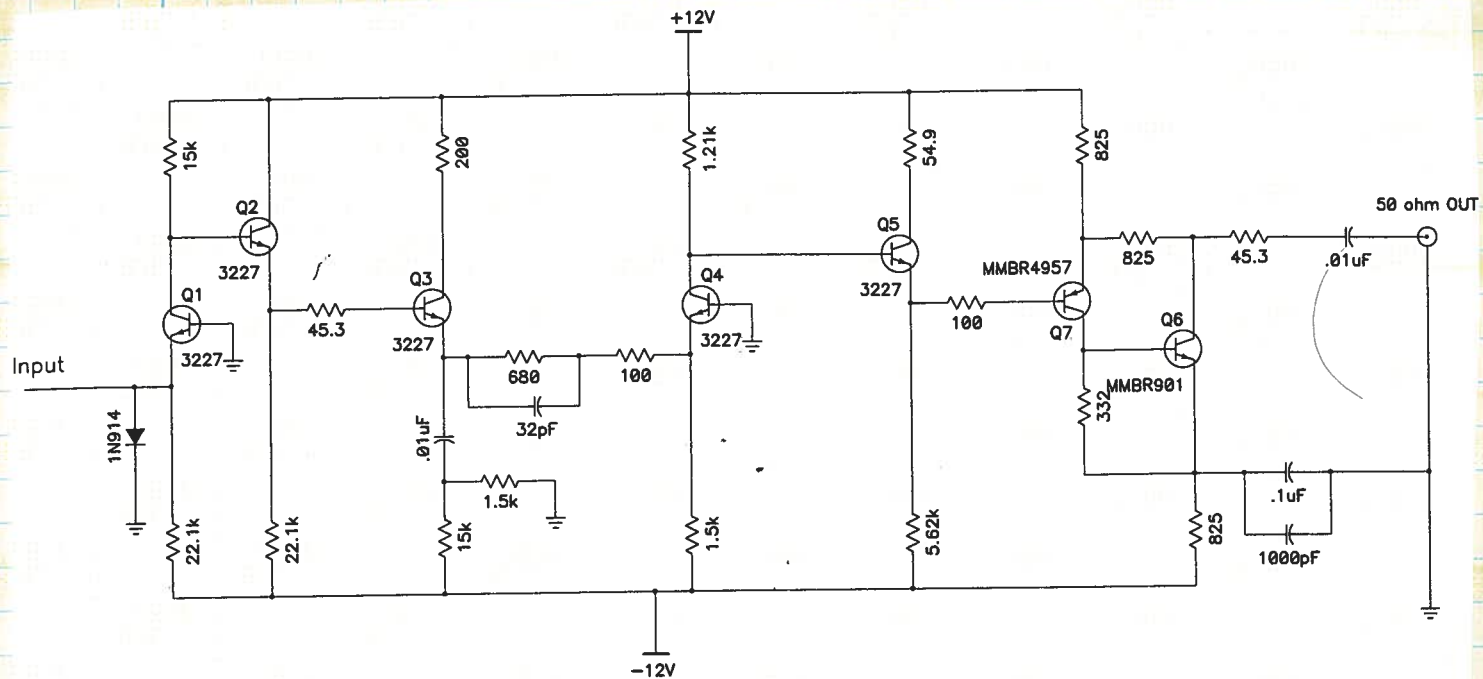
3R is somewhere between 4R & 5R

2R has a lot of low amplitude afterpulsing. In gain of tube low, as determined by ADC plots from HE-3

1R has lots of afterpulsing, also. Seems generally larger in amplitude than 2R (both pulse & afterpulsing seem larger)

Turned HV OFF

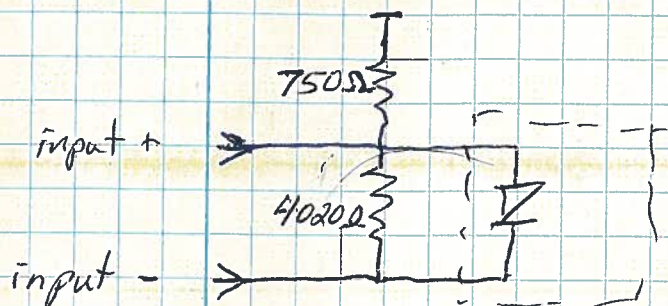
3227 Amp For Gas Mix Monitor



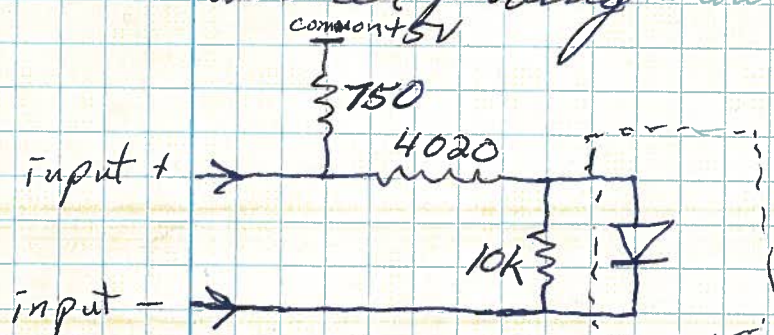
3/26 VMIC 1182 inputs

Looking at the inputs of the VMIC 1182 input module I see

supposedly this is setup for a 5V input



Upon closer inspection I find some vias to 10k resistors on the bottom side of the board. Further probing shows



This is consistent with the company schematic, although 750 is 4.7k and 4020 is 1k on the schematic.

I cut out all the 750Ω on the board. James Proffitt said he also did this on all the boards he used in the magnet controls.

Hadron S2 PMT Replacement

3/31/99

Checking #52/6R + 5R Dave and I found both of the tubes go into regenerative feedback when turned up to 2700V.

J.S.
D.M.

We will replace all of the PMTs on S2/R.

We put the 5r90 source on 4R and saved a file to disk. We will set HV to a value to give about the same response on the new tubes.

Serial numbers of the tubes were/are

PMT	Tube removed	New Tube
6R	C063440	T51487
5R	F074695	T51488
4R	U31777	T51486
3R	T20981	T51484
2R	U34635	T51489
1R	T20206	T51842

6R	U31770	T51851
4R	F0 42767	T51858
3R	Z040967	T51845
2R	U31898	T51857
1R	U31773	T51853

- missing magnetic shield

6/7/99 Det Hut Seal Test (Det Hut)
 JS Hadron
 ~2:33 PM opened the N₂ cylinders
 ~2:36 opened a little more
 ~2:37 1/2 opened a little more
 O₂ levels remain steady
 ~2:40 either empty - all empty
 ~2:54 start opening doors
 ~2:58 doors fully opened - yellow markers
 2:58~3:4 program terminated
 my watch 3:00:03 } at the
 computer 4:00:51 } same
 time

chan 0 rear of stack
 chan 1 next to VDC
 chan 2 behind 2nd level racks
 chan 3 top of Pb-glass

Rusty helped me put foam blocks under the hut doors. This was to complete the sealing of the front of the hut. We could not get our arms in far enough to make the seal along the inside of the doors. We did what we felt was the best job considering the circumstances. I wasn't too pleased with the job I did on my side.

I put 4 oxygen sensors in the hut.
One was at the rear of the detector stack, by the patch panels.

One was next to the VDC, cable tied to conduit coming down from the main breaker panel.

One was behind the equipment racks on the 2nd level. Cable tied to the cable raceway (vertical) between the first and second racks.

The fourth sensor was mounted to the top of the Pb-glass frame. Cable tied to the upper rigging hole.

Pion
Rejector

Shielded twisted pair was brought from each sensor out onto the service platform. A 100 ohm metal film 1% resistor was soldered across the ends of the wires.

4 AMP-01 is configured with a gain of $\frac{20 \cdot 10k\Omega}{2k\Omega} = 100$ were used to buffer the sensor signals into the 8 bit ADC of mine which is controlled through the parallel port of a PC. ADC is 8 channel multiplexed input.

Hadron

7/6/99 Re-Test of ~~Electron~~ Detector Hut Sealing

Ready to go.

Same setup as on p. 78.

Set PC clock to time on my pager.

"Swept" hut for people. No one under box beam.

Turned off HVAC units.

Started program.

Shut door. Left door shut at 11:36 PM

Opened gar at 11:37

Gar bottles empty at 11:41

Started opening doors at 11:54

Doors to normal open position at 11:57

For this run I'd also done a better job of the seal under the doors. Did the right side door while it was closed. Set up the left side & then closed the door on the foam blocks.

Hut is neglecting blocked corners (rear & front) and filling (box beam & detectors),

$$24.67' \times 11.58' \times 26.90' = 7684 \text{ ft}^3$$

if each cylinder has 305 ft^3 of N_2 $\times 4 = 1220 \text{ ft}^3$

$$\frac{1220}{7684} = .159$$

$$\text{for air } \frac{\text{O}_2}{\text{Total}} = .21 \quad \text{O}_2 = .21 \cdot \text{Total}$$

$$\text{add } x \text{ of } \text{N}_2 \text{ get } \text{O}_2 = (.21 \text{ Total}) \cdot (1 - x)$$

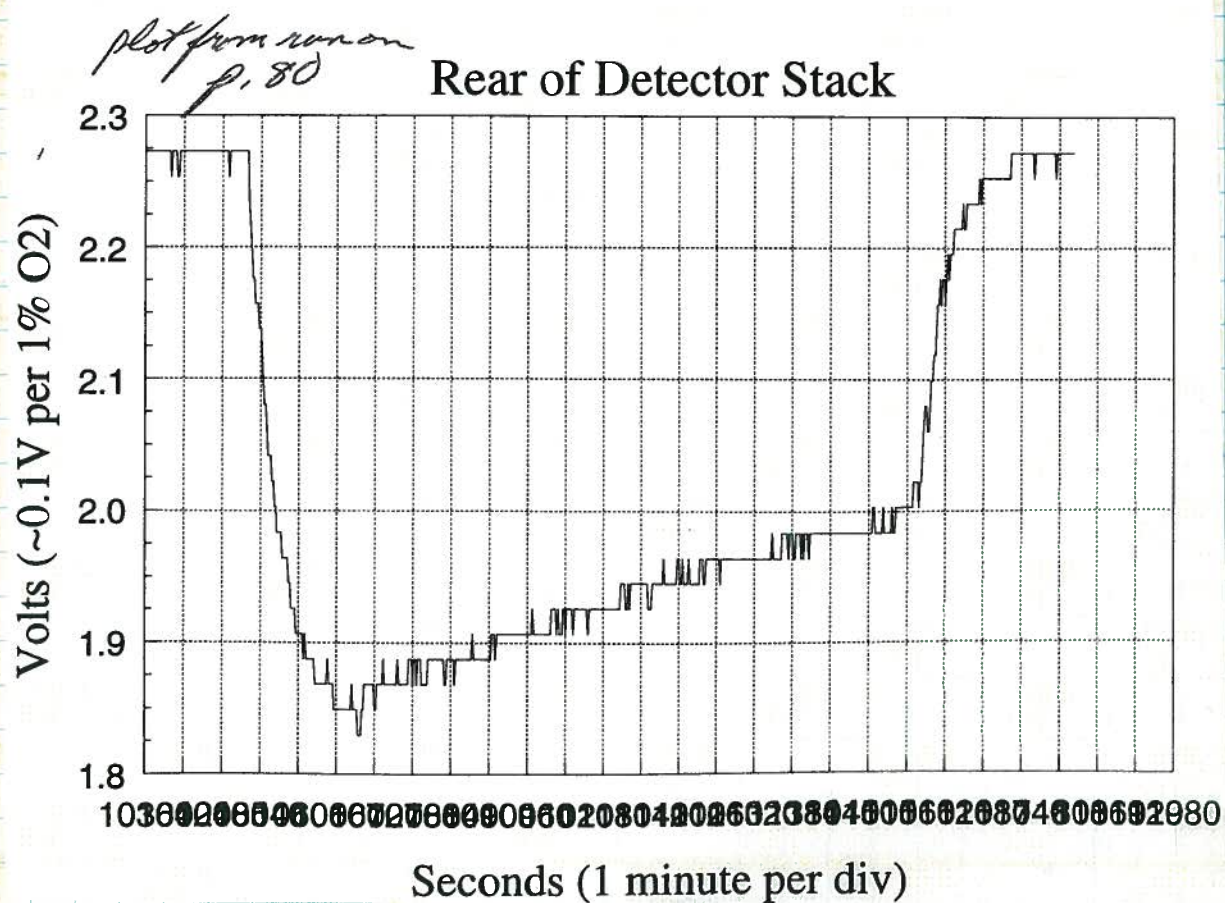
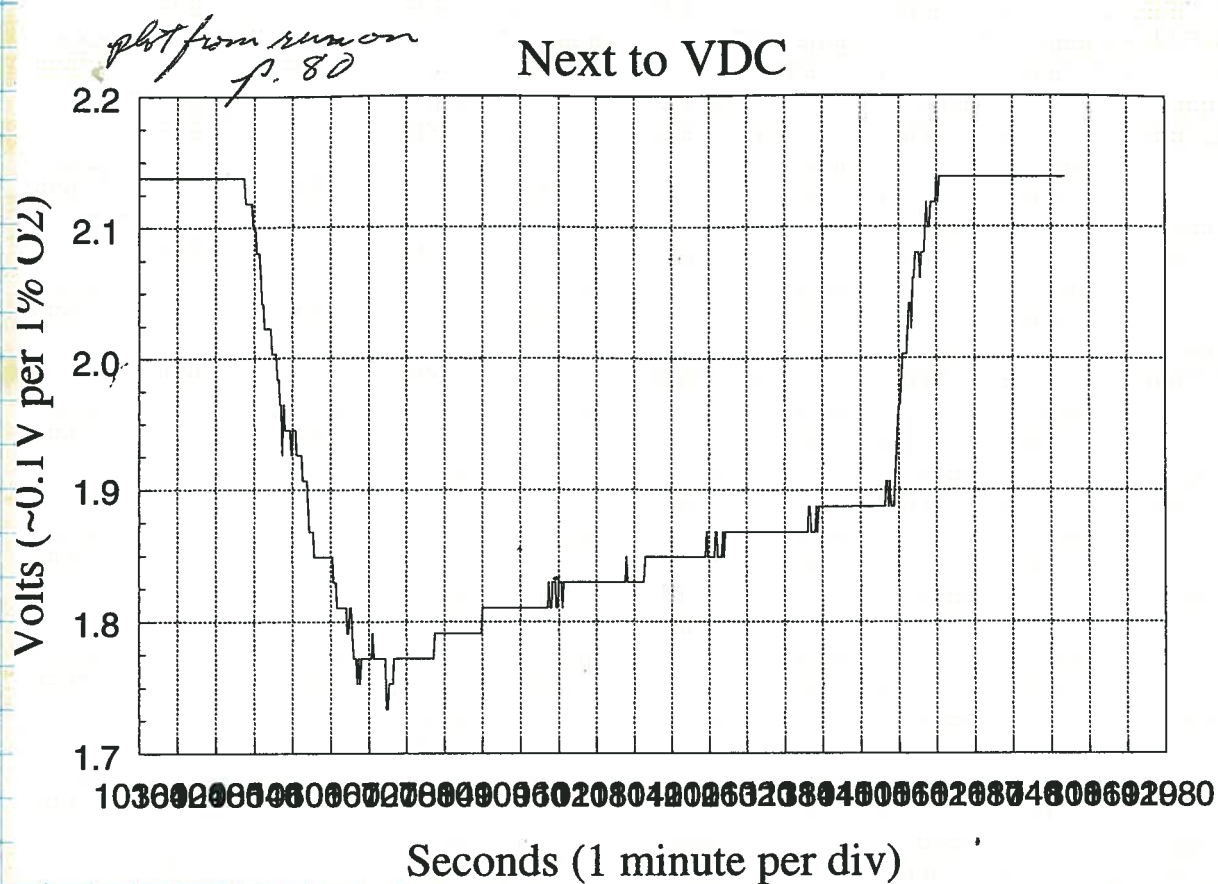
$$\frac{\text{O}_2}{\text{Total Wt}} = \frac{(1-x)}{1} \cdot .21$$

$$1 - .159 = .841$$

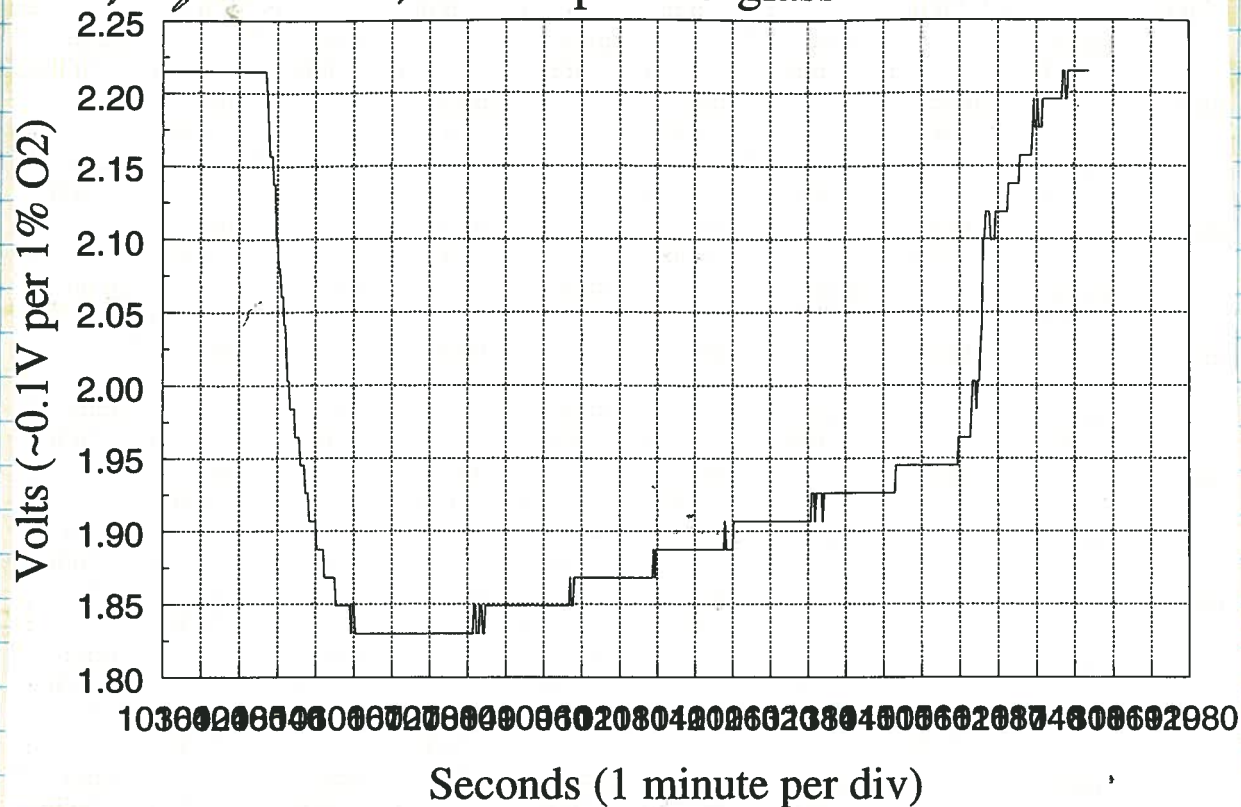
$$.841 \cdot .21 = .177$$

$$.21 - .177 = .033$$

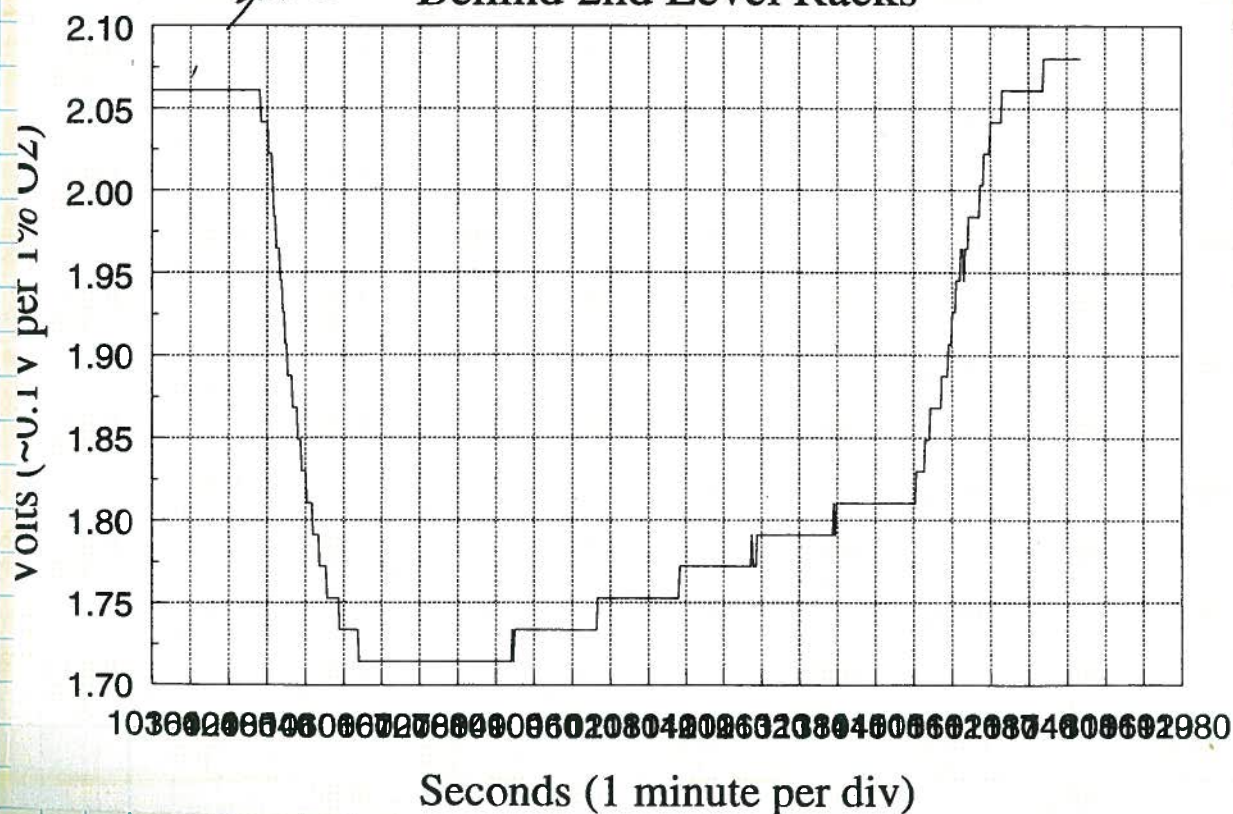
So, $\text{O}_2\%$ should have dropped by at least 3.3%

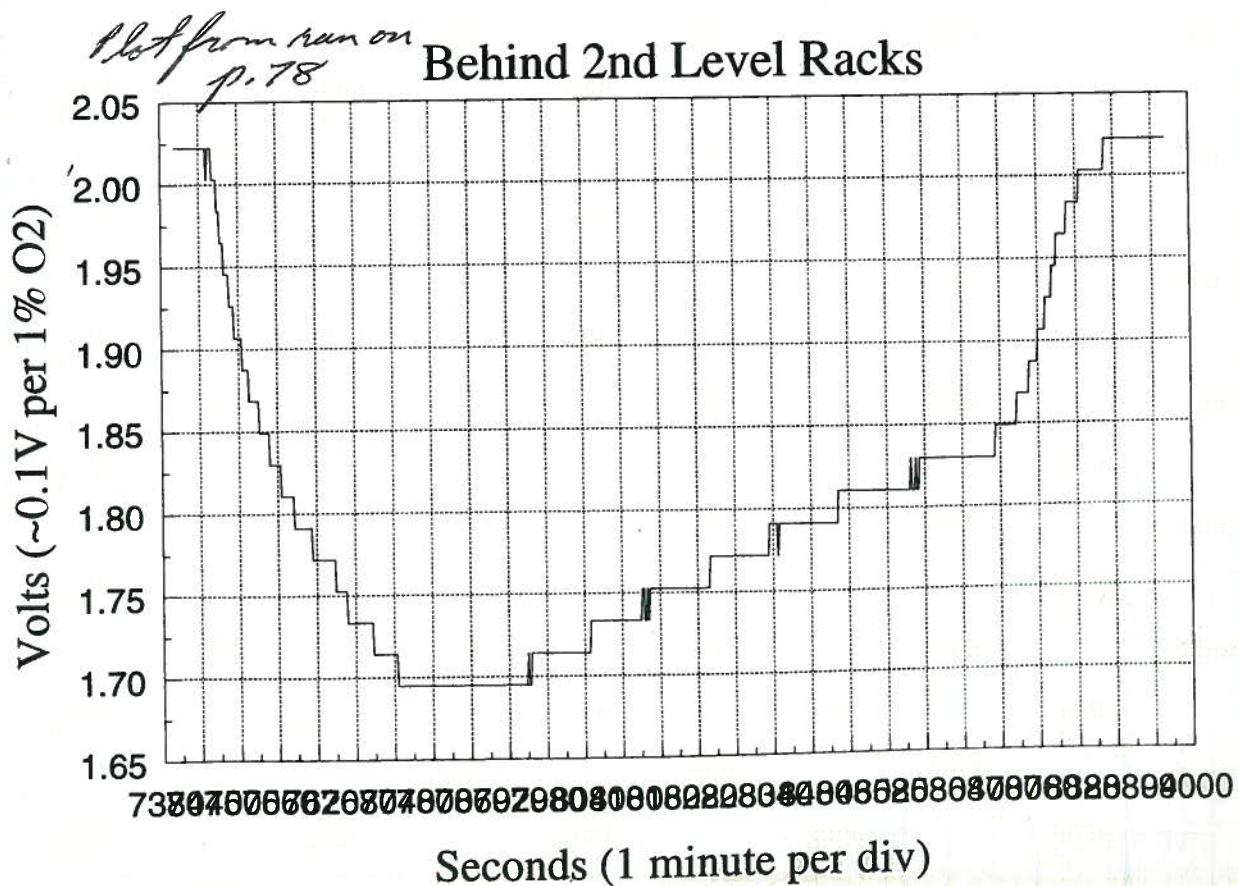
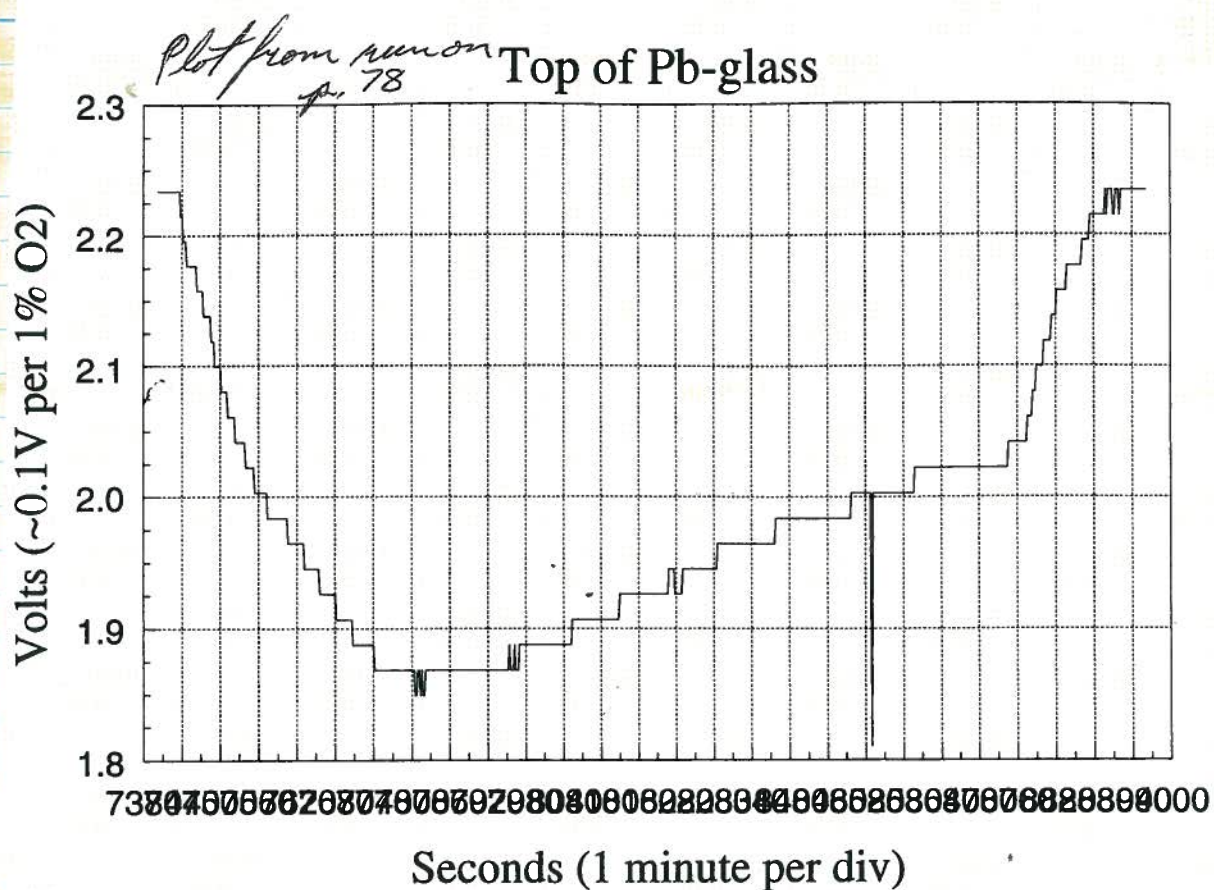


plot from run on p. 80 Top of Pb-glass



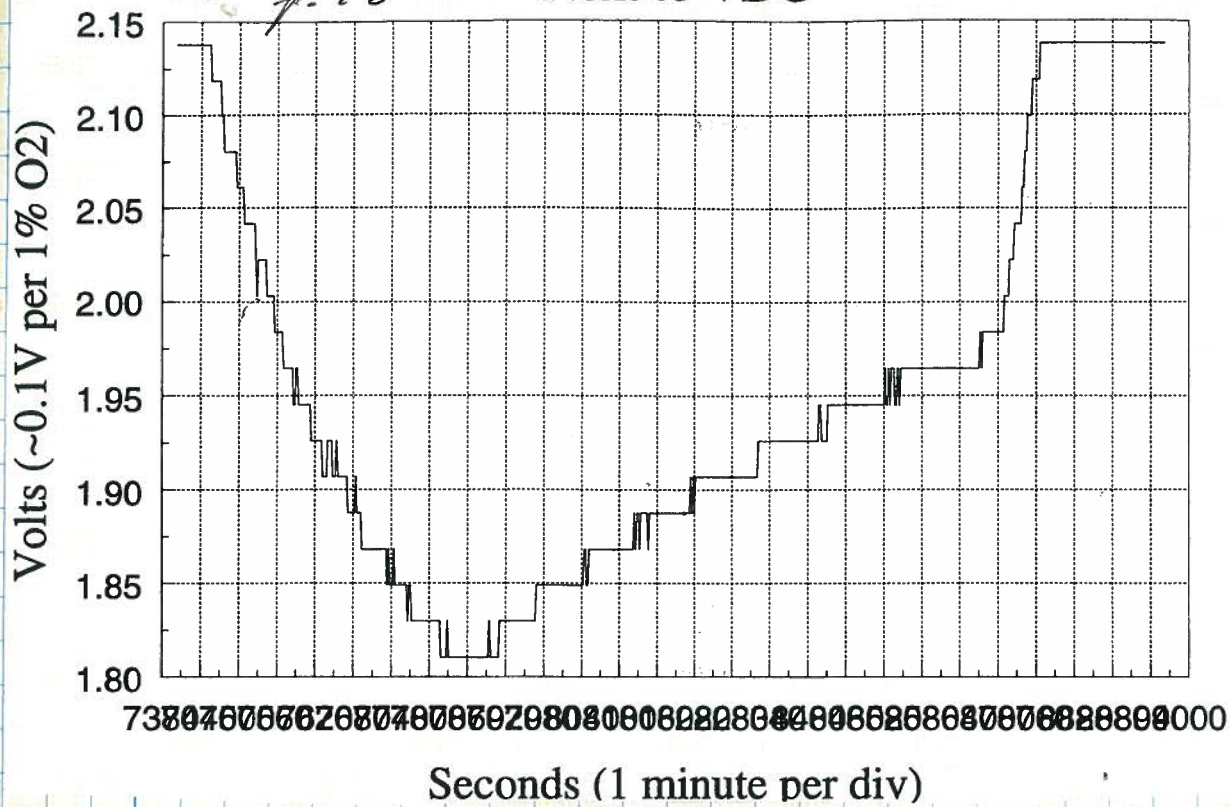
plot from run on p. 80 Behind 2nd Level Racks



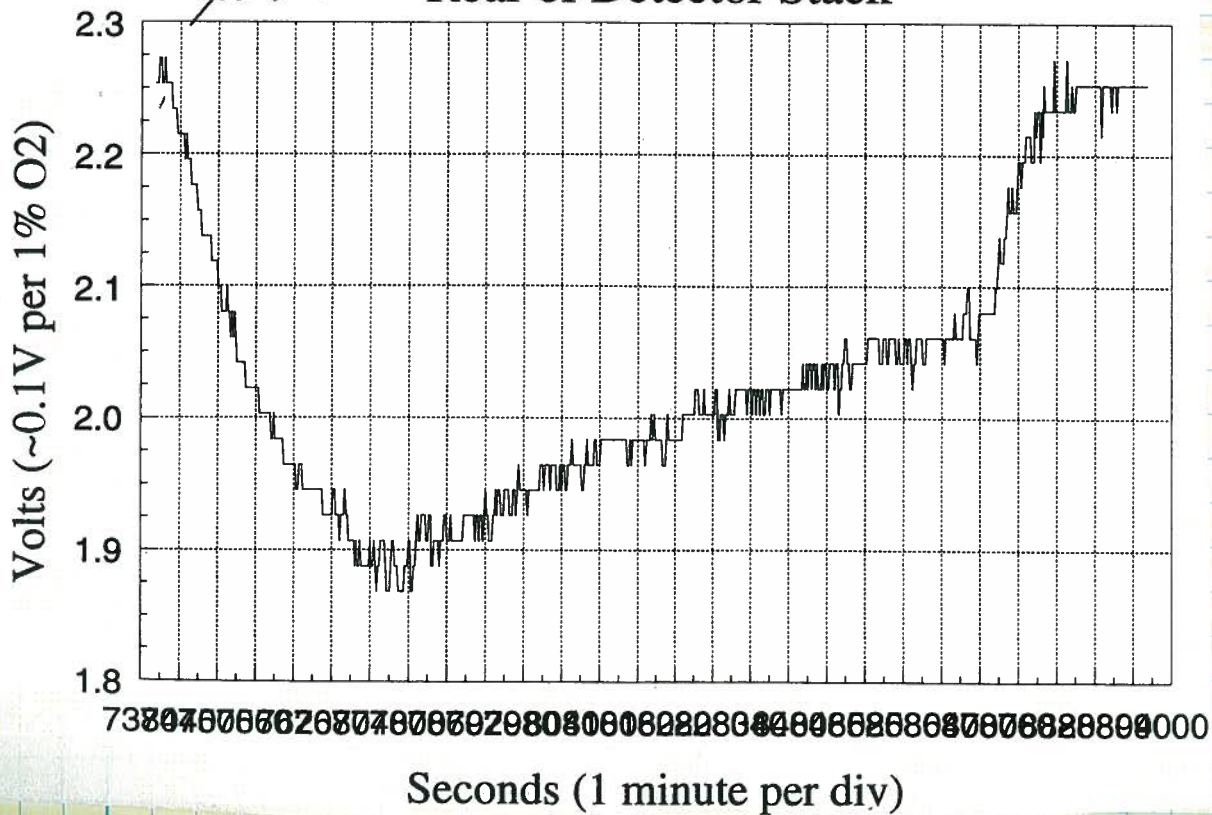


*plot from run on
p. 78*

Next to VDC

*plot from run on
p. 78*

Rear of Detector Stack

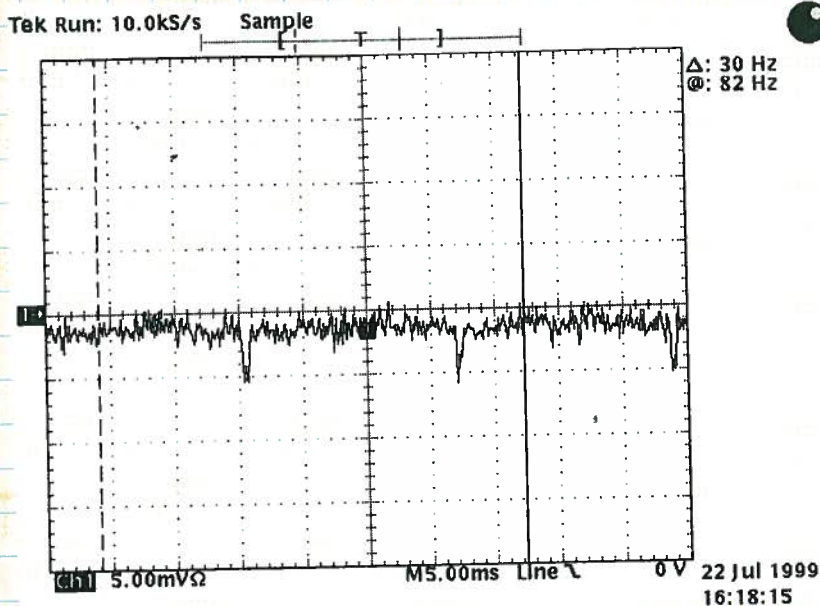


Noise on Phillips 740

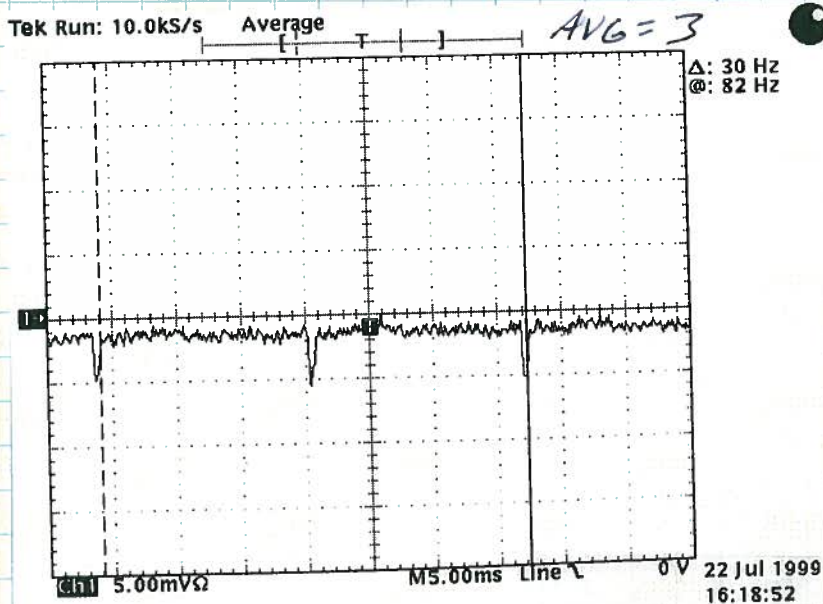
7/23

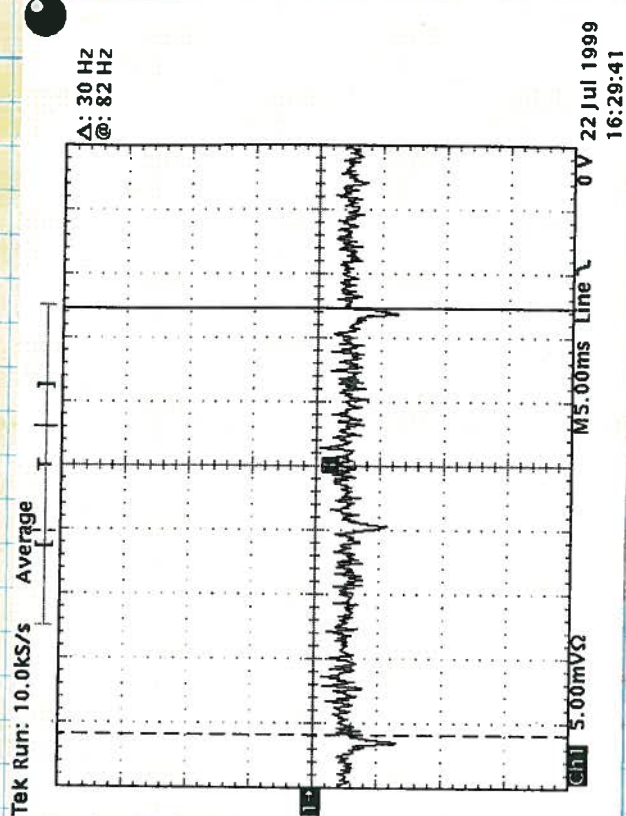
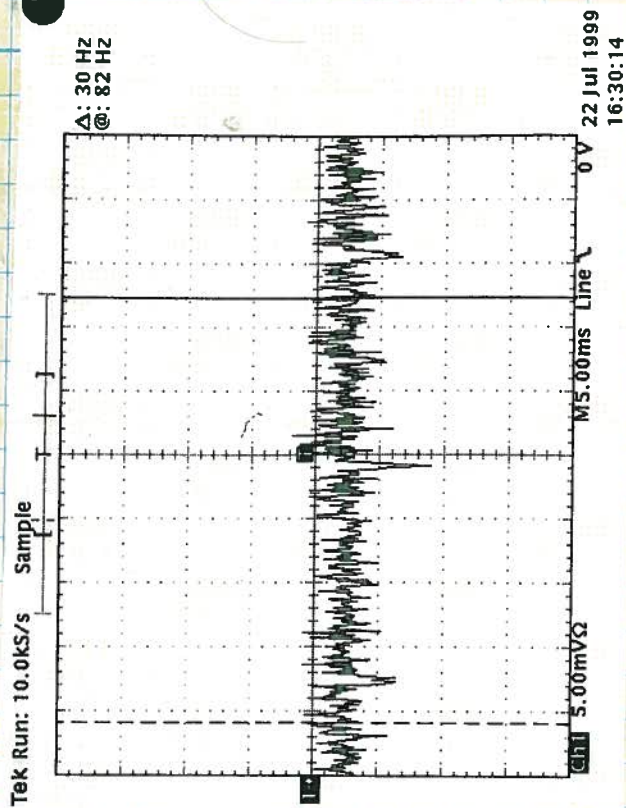
Trying to determine if the Phillips 740 is linear fan-in/out has too much noise to use in the Real Compton setup. Telcoy & Phillips both bid on the PR for \$4,000 worth of the modules. Eugene C. made some comment to the effect that the Phillips module had notable 60Hz noise.

output of one 740 channel



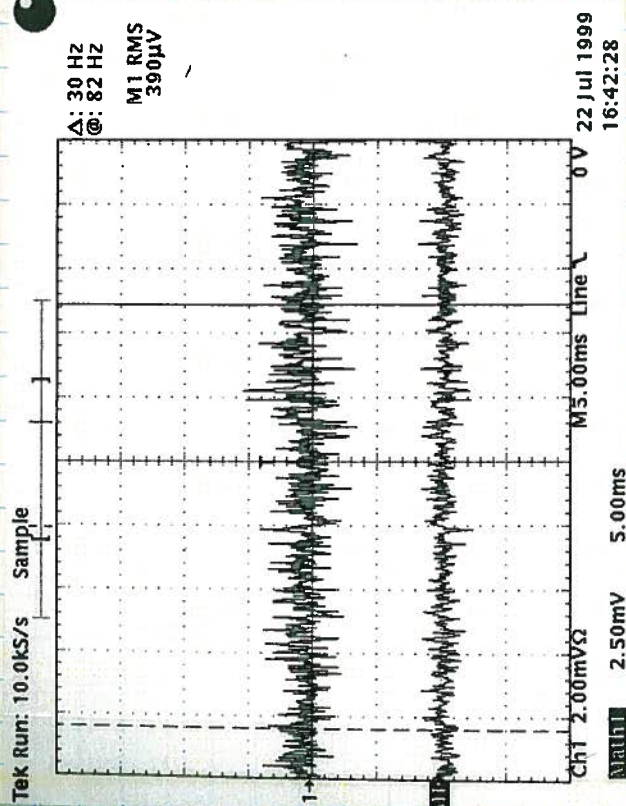
same as above.
AVG = 3



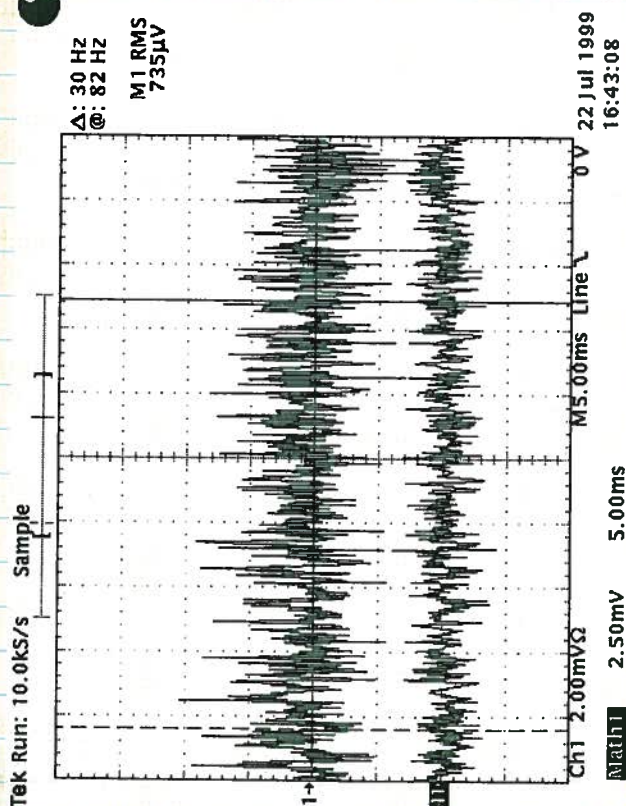


1st 3 channel outputs fed into 4th channel. 4th output displayed.

One channel

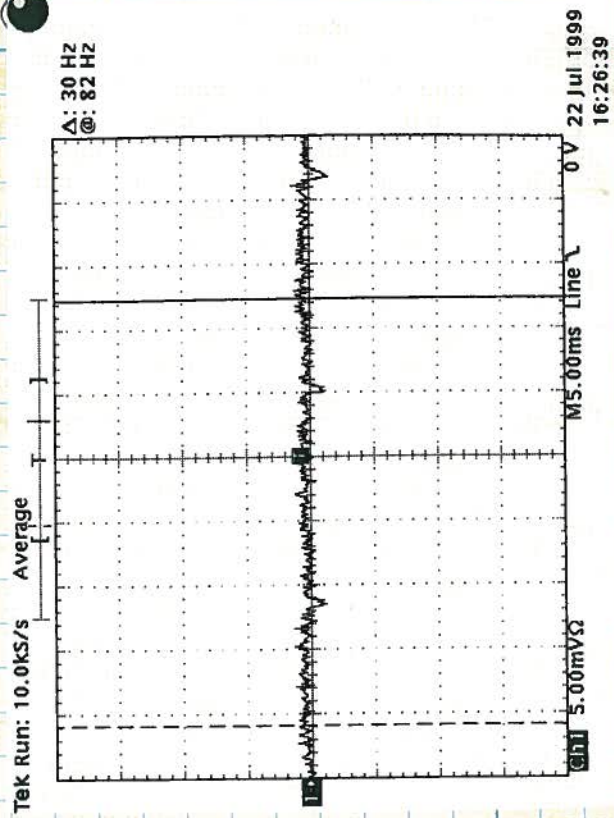
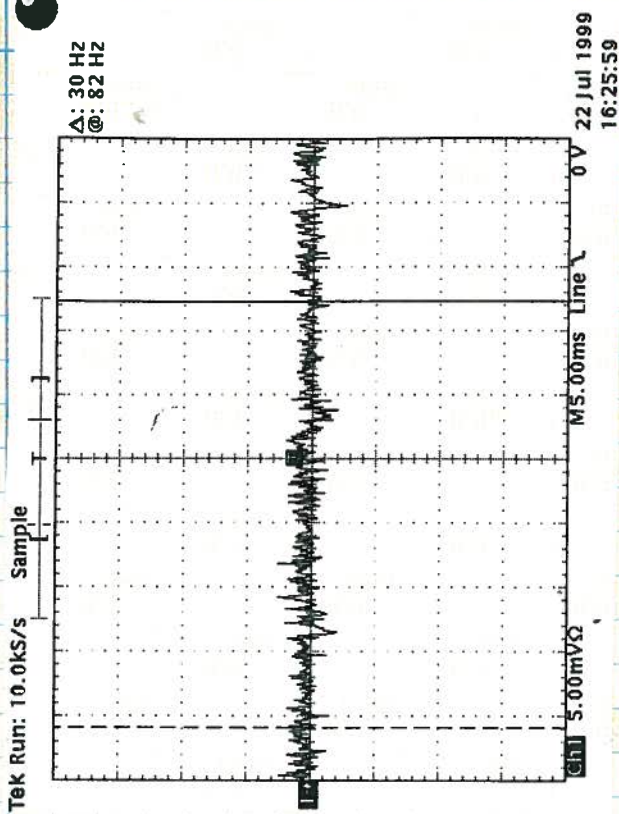
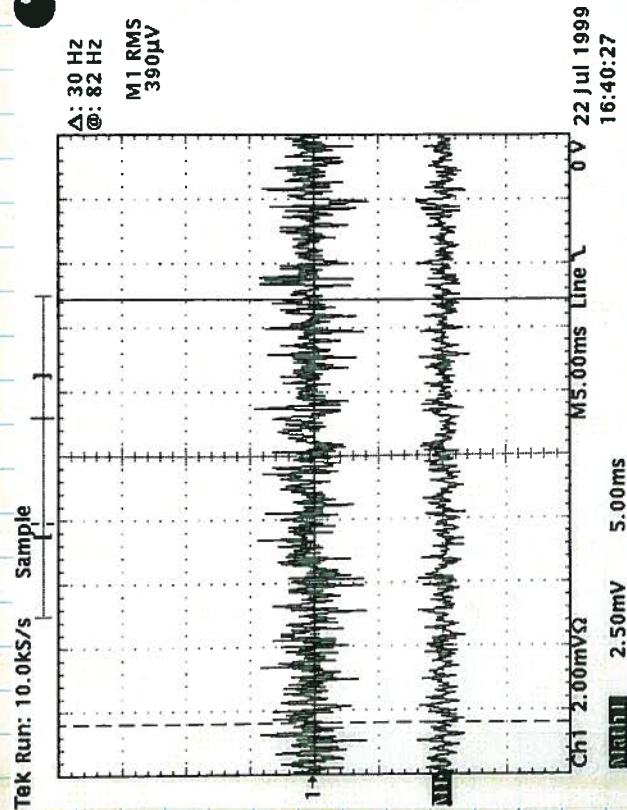
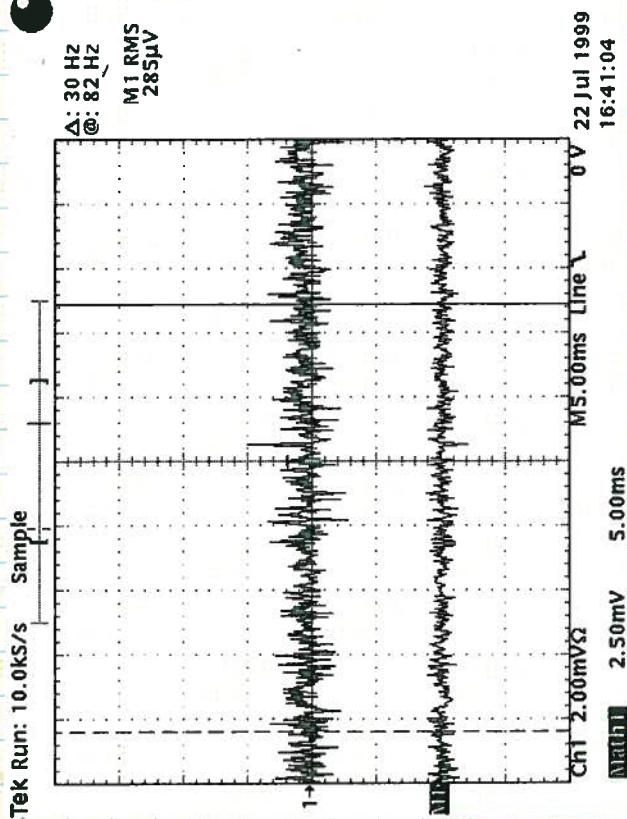


1st 3 inputs to 4th inputs. 4th output to scope.

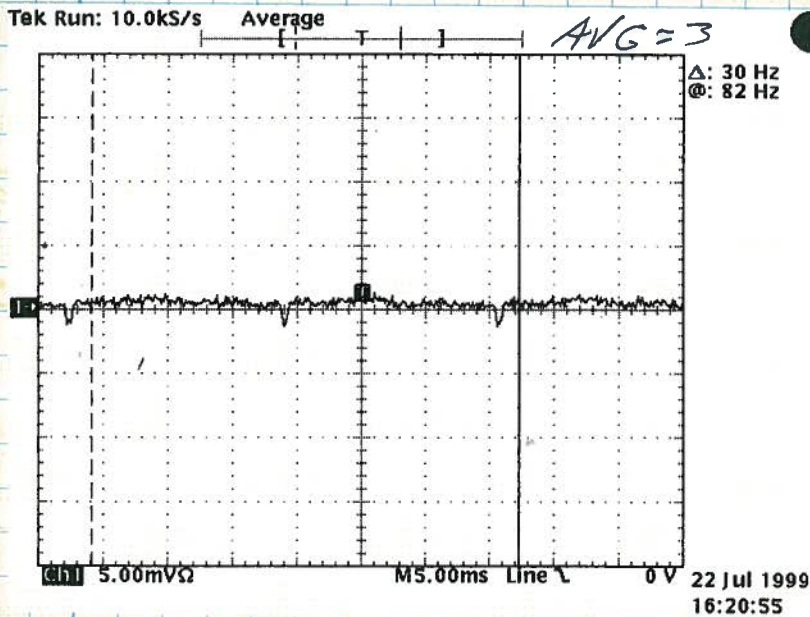
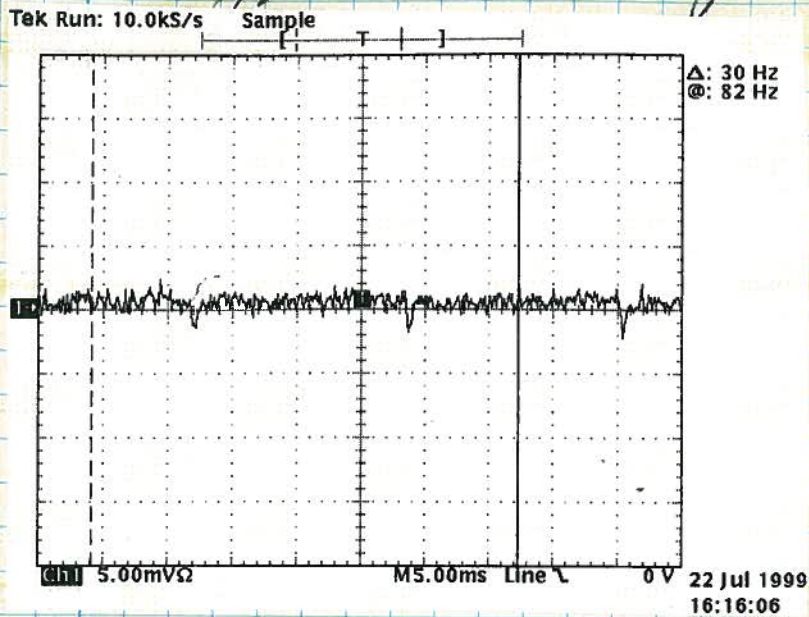


LeCroy fan-in/out. Same config. as p. 86

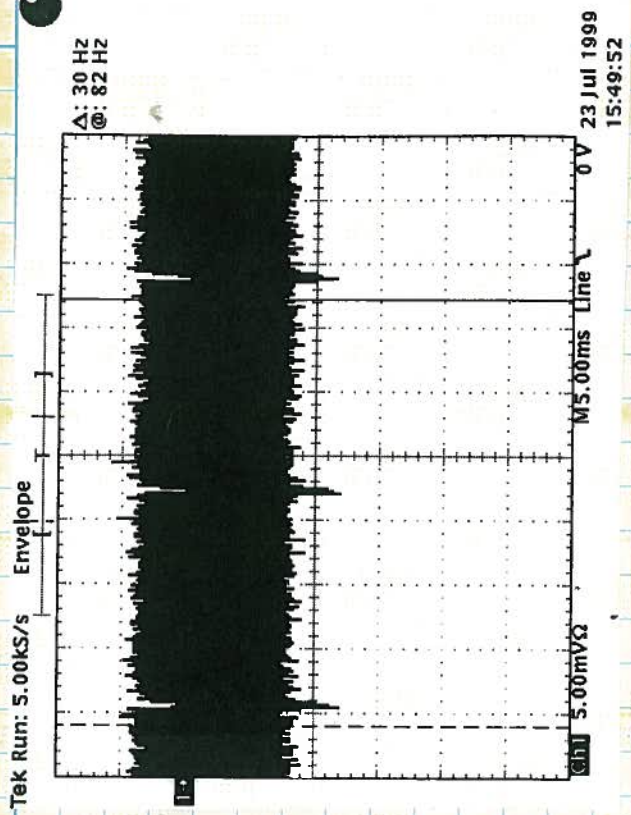
87



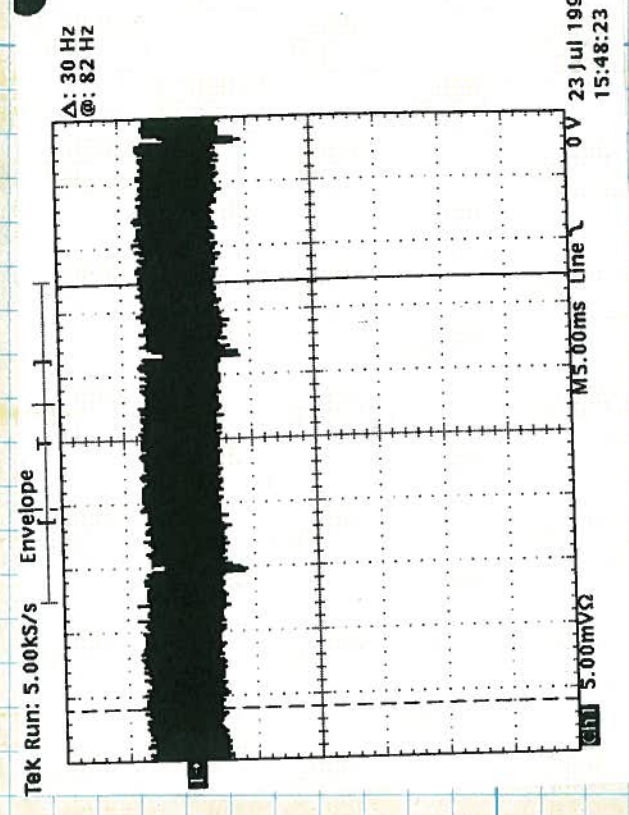
Telray fan-in/out. Config. is same as on p. 85



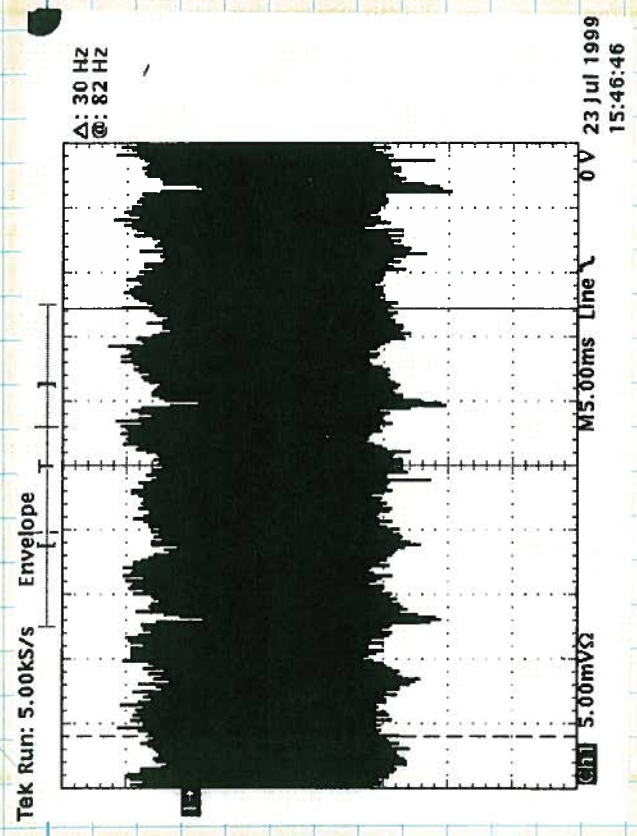
1 Chan of Phillips



1 Chan of Telcross



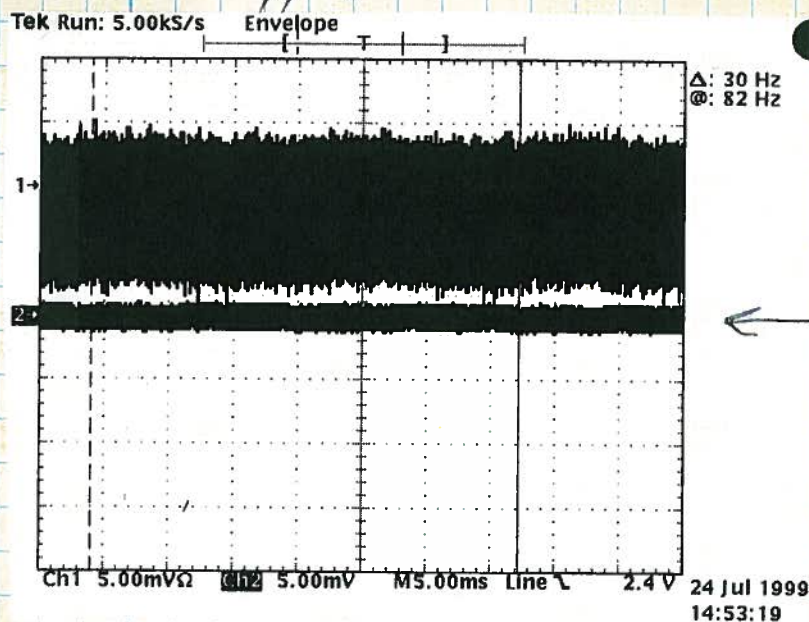
1st 3 of Phillips into 4th chan.



8/6
A

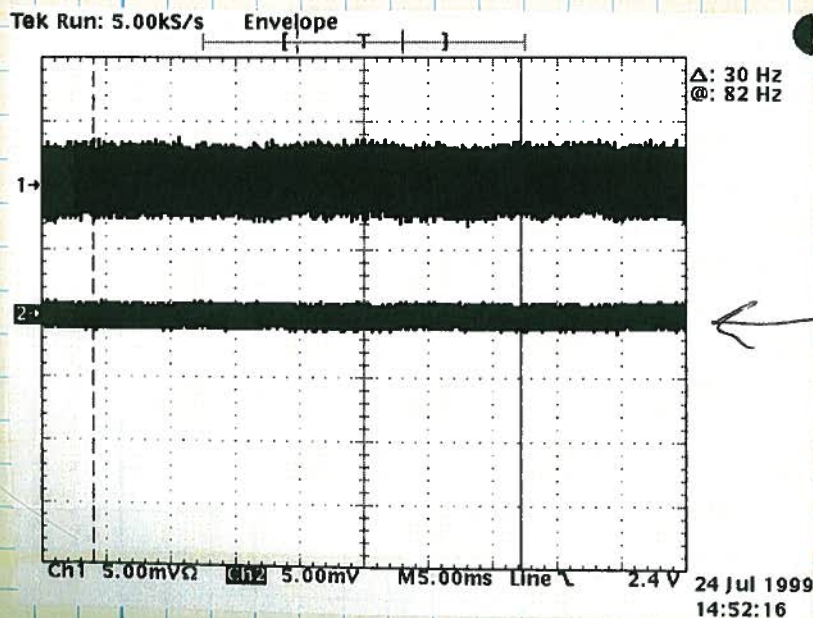
I went back the next day to look into the modules and try to find where the 60 Hz was coming from. The 60 Hz peak didn't seem to grow substantially by feeding 3 outputs into the 4th channel.

I noticed when I opened or closed windows on the PC next to the setup the 60 Hz changed character a little. This was after I hooked up the output of the HV amp for the proportional tube to CH2 of the scope. I also saw 60 Hz on that, I was fooling around on the PC while I was thinking. Turning the PC and monitor off the 60 Hz went away.



Phillips output of one channel

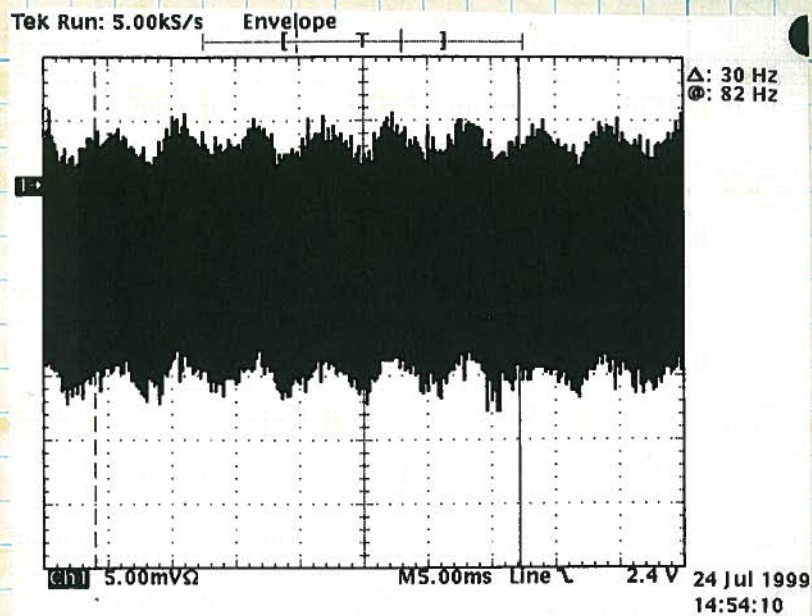
← HV amp output



LeCroy output of one channel

← HV amp output

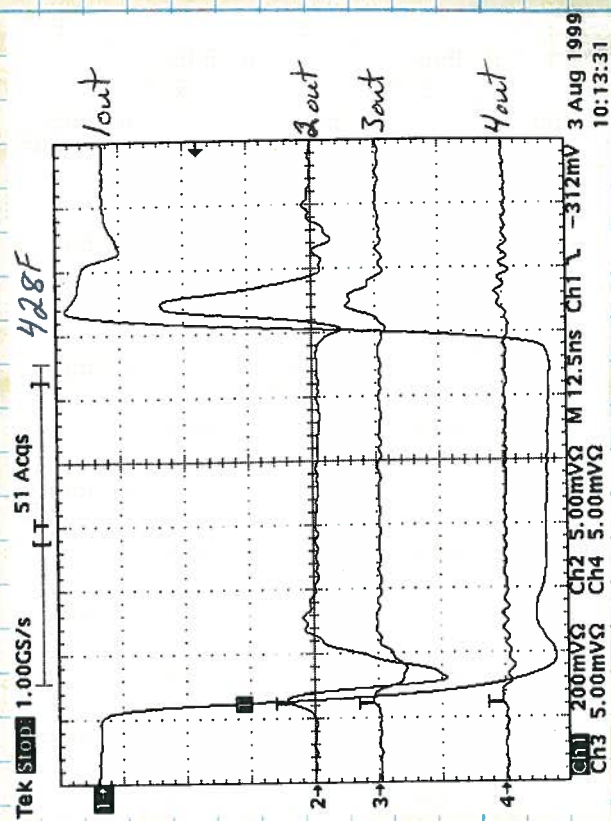
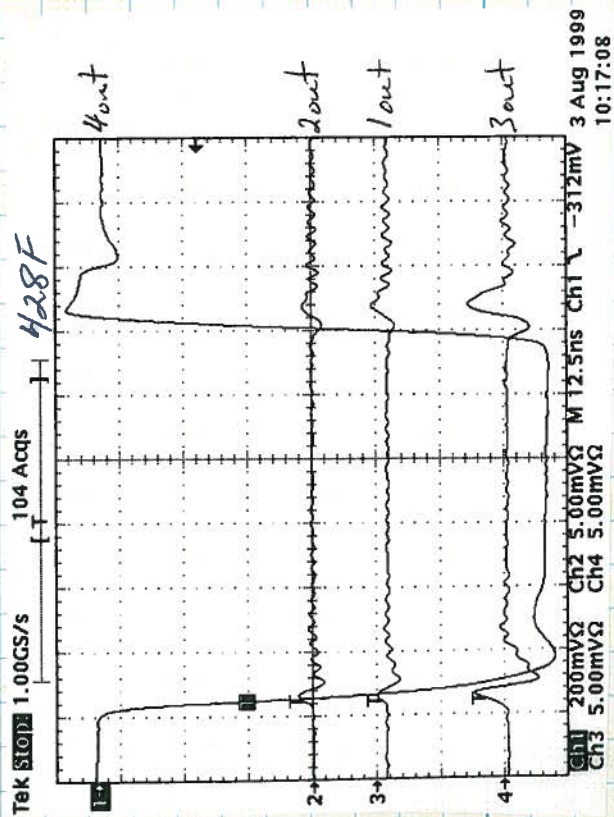
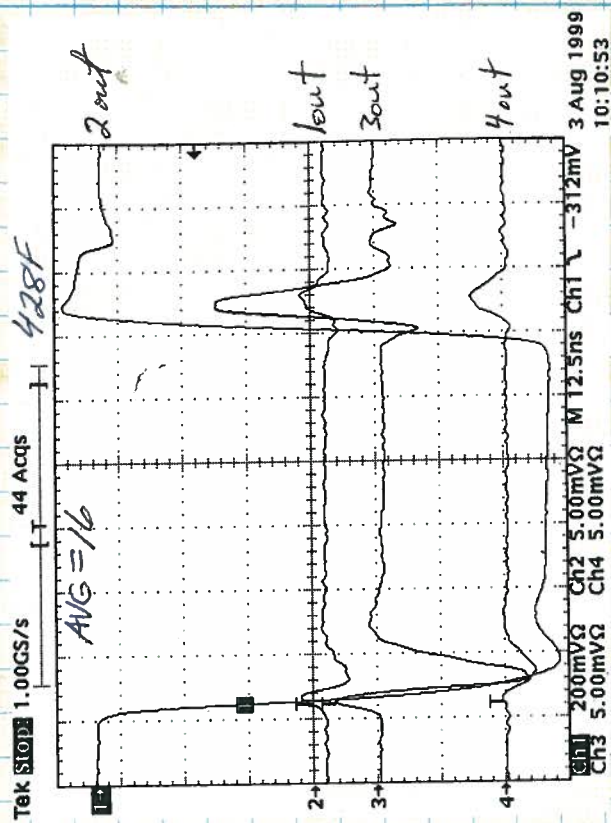
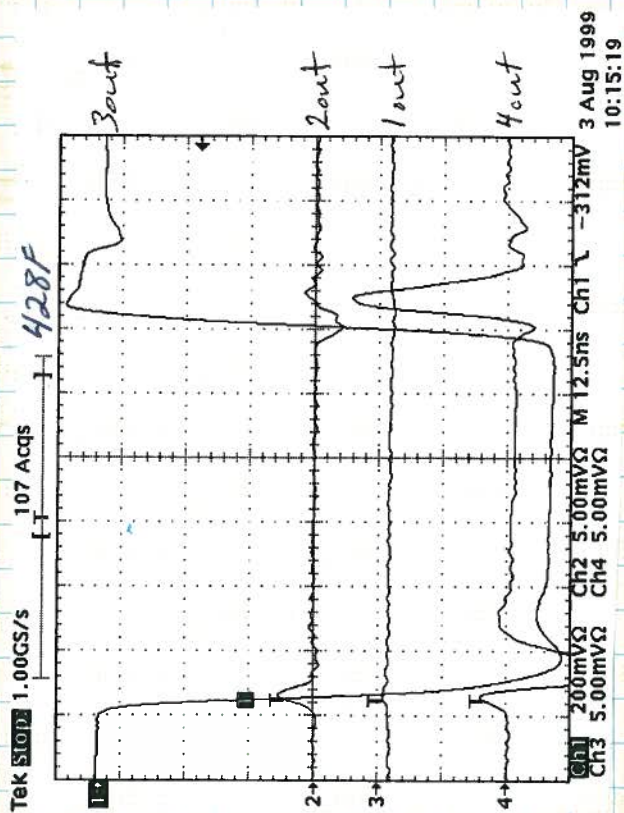
1st three of
Phillips into
the 4th

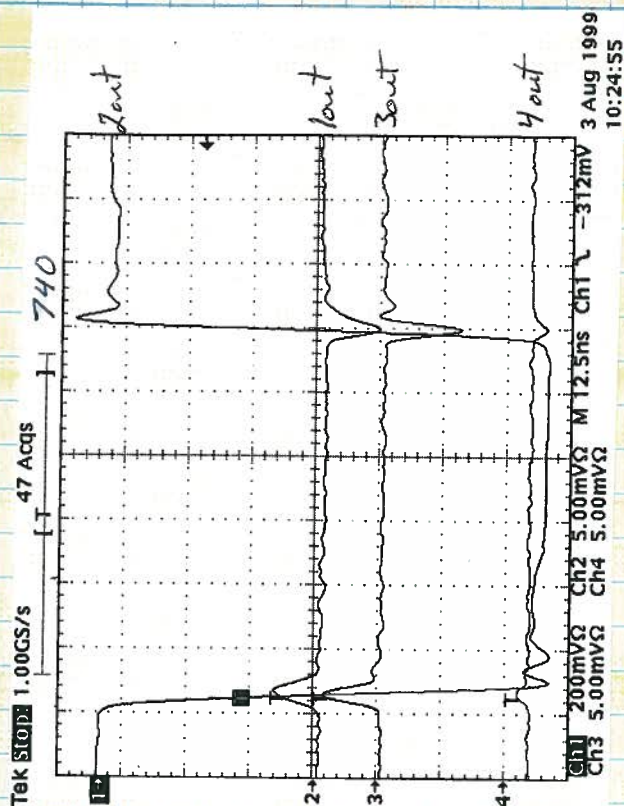
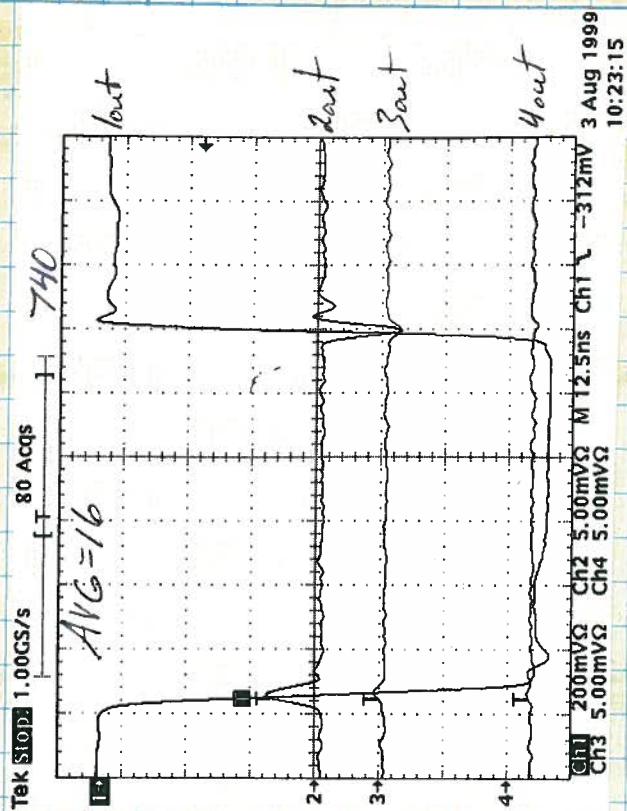
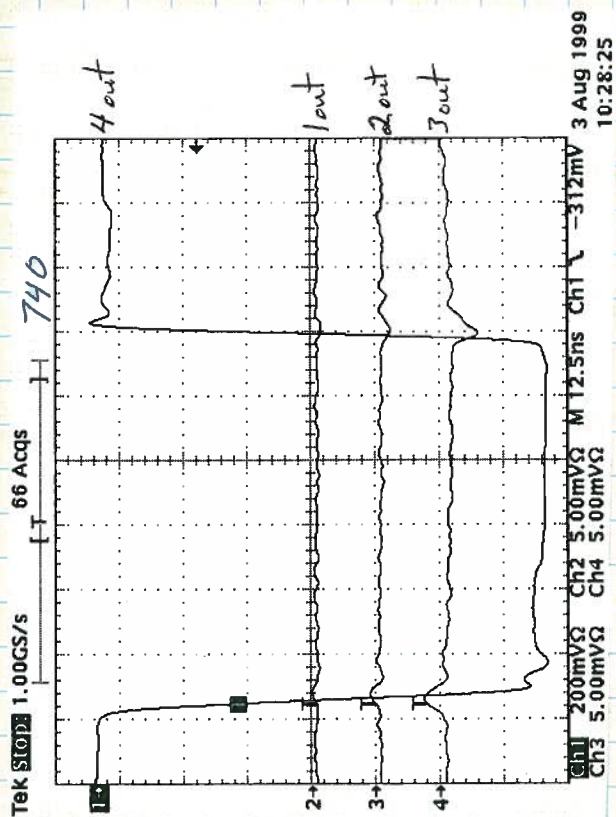
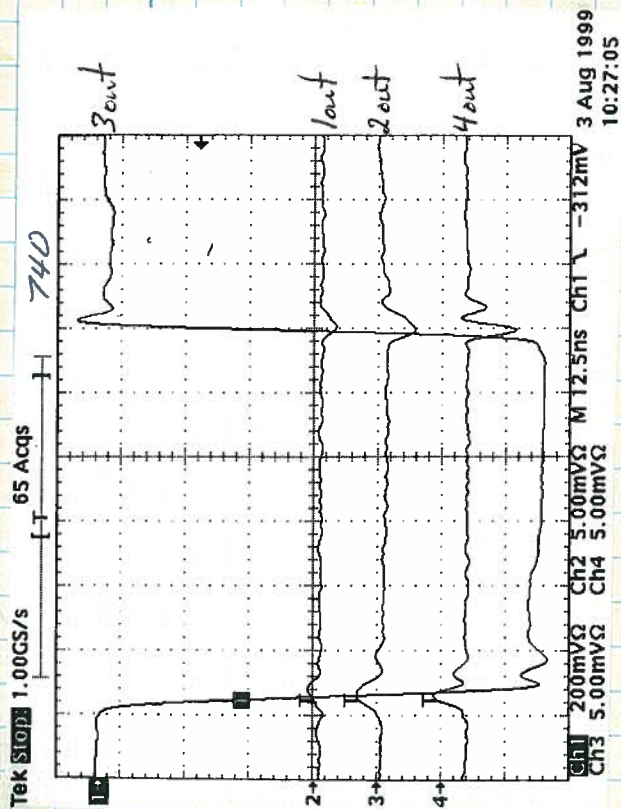


8/6
A

Looking at the cross talk from channel to channel off the Phillips 740 and TelCroy 428F.

I ran the output from an HP1313 pulser into one of the channel inputs of the fan-in/out. I initially played around a little then eventually ran an output from all four channels of the module into a scope channel.





11/20/99
JD

I've installed the mounts for on the aluminum BPM bench in front of the target chamber.

Half the thermistors for temperature monitoring have been installed.

I did a crude calibration of ΔV for the capacitive sensors.



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

PROBE MODEL: *HPB-375A-A-12-5-M-D*
 PROBE S/N: *4823*
 SENSOR TO GUARD RESISTANCE: >20 Megohms
 SENSOR TO GROUND RESISTANCE: >20 Megohms
 GUARD TO GROUND RESISTANCE: >20 Megohms
 SENSOR TO GUARD CAPACITANCE: *170 pf*
 FINAL INSPECTION:

QC
002



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

PROBE MODEL: *HPB-375A-A-12-5-M-D*
 PROBE S/N: *4824*
 SENSOR TO GUARD RESISTANCE: >20 Megohms
 SENSOR TO GROUND RESISTANCE: >20 Megohms
 GUARD TO GROUND RESISTANCE: >20 Megohms
 SENSOR TO GUARD CAPACITANCE: *180 pf*
 FINAL INSPECTION:

QC
002



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

PROBE MODEL: *HPB-375A-A-12-5-M-D*
 PROBE S/N: *4825*
 SENSOR TO GUARD RESISTANCE: >20 Megohms
 SENSOR TO GROUND RESISTANCE: >20 Megohms
 GUARD TO GROUND RESISTANCE: >20 Megohms
 SENSOR TO GUARD CAPACITANCE: *181 pf*
 FINAL INSPECTION:

QC
002



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

PROBE MODEL: *HPB-325A-A-L2-5-B-D*
 PROBE S/N: *4836*
 SENSOR TO GUARD RESISTANCE: >20 Megohms
 SENSOR TO GROUND RESISTANCE: >20 Megohms
 GUARD TO GROUND RESISTANCE: >20 Megohms
 SENSOR TO GUARD CAPACITANCE:
 FINAL INSPECTION: *161 pf*

QC
002



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

PROBE MODEL: *HPB-325A-A-L2-5-B-D*
 PROBE S/N: *4837*
 SENSOR TO GUARD RESISTANCE: >20 Megohms
 SENSOR TO GROUND RESISTANCE: >20 Megohms
 GUARD TO GROUND RESISTANCE: >20 Megohms
 SENSOR TO GUARD CAPACITANCE:
 FINAL INSPECTION: *177 pf*

QC
002



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

PROBE MODEL: *HPB-325A-A-L2-5-B-D*
 PROBE S/N: *4838*
 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*

QC
002



Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4732
Probe S/N	HPB-375-4823
Extension Cable	EC-2399
Rack S/N	4008-301
Clock/Meter S/N	4100C-1607

Customer	SURA/ Jefferson Lab
Job #	60-26714/ 70-26715
Date	Wed, Sep 29, 1999 @ 10:38 AM
Standards	57, 30, 123
Technician	Mike Welton /

Channel 1 Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive		
Voltage p-p	6.00	@ E9
Hi/Lo Selection	HI	@ S8

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Nominal (VDC)
0.0125	0.482	0.500
0.0250	0.993	1.000
0.0375	1.503	1.500
0.0500	2.010	2.000
0.0625	2.511	2.500
0.0750	3.009	3.000
0.0875	3.507	3.500
0.1000	4.000	4.000
0.1125	4.496	4.500
0.1250	4.997	5.000
0.1375	5.506	5.500
0.1500	6.007	6.000
0.1625	6.503	6.500
0.1750	6.990	7.000
0.1875	7.489	7.500
0.2000	8.001	8.000
0.2125	8.520	8.500
0.2250	9.025	9.000
0.2375	9.518	9.500
0.2500	9.989	10.000



87 Fitchburg Road
Ayer, MA 01432
978-772-6033
Fax 978-772-6036

Capacitec

Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4749
Probe S/N	HPB-375-4824
Extension Cable	EC-2400
Rack S/N	4008-301
Clock/Meter S/N	4100C-1607

Customer	SURA/ Jefferson Lab
Job #	60-26714/ 70-26715
Date	Wed, Sep 29, 1999 @ 11:14 AM
Standards	57, 30, 123
Technician	Mike Welton / <i>[Signature]</i>

Channel 2

Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p @

Hi/Lo Selection HI @

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Nominal (VDC)
0.0125	0.478	0.500
0.0250	0.996	1.000
0.0375	1.506	1.500
0.0500	2.013	2.000
0.0625	2.512	2.500
0.0750	3.012	3.000
0.0875	3.507	3.500
0.1000	4.000	4.000
0.1125	4.492	4.500
0.1250	5.000	5.000
0.1375	5.507	5.500
0.1500	6.011	6.000
0.1625	6.505	6.500
0.1750	6.995	7.000
0.1875	7.490	7.500
0.2000	8.006	8.000
0.2125	8.522	8.500
0.2250	9.031	9.000
0.2375	9.518	9.500
0.2500	9.991	10.000

Capacitec
 87 Fitchburg Road
 Ayer, MA 01432
 978-772-6033
 Fax 978-772-6036



Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4727
Probe S/N	HPB-375-4825
Extension Cable	EC-2401
Rack S/N	4008-301
Clock/Meter S/N	4100C-1607

Customer	SURA/ Jefferson Lab
Job#	60-26714/ 70-26715
Date	Wed, Sep 29, 1999 @ 12:04 PM
Standards	57, 30, 123
Technician	Mike Welton /

Channel 3 Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p	6.00	@	E9
Hi/Lo Selection	HI	@	S8

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Nominal (VDC)
0.0125	0.492	0.500
0.0250	1.003	1.000
0.0375	1.510	1.500
0.0500	2.017	2.000
0.0625	2.515	2.500
0.0750	3.012	3.000
0.0875	3.511	3.500
0.1000	4.003	4.000
0.1125	4.497	4.500
0.1250	5.002	5.000
0.1375	5.507	5.500
0.1500	6.011	6.000
0.1625	6.504	6.500
0.1750	6.993	7.000
0.1875	7.487	7.500
0.2000	8.002	8.000
0.2125	8.515	8.500
0.2250	9.025	9.000
0.2375	9.515	9.500
0.2500	9.991	10.000



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Calibration Data Sheet

Amp P/N; S/N	410-SC; 410-1539
Probe S/N	HPB-375-4836
Extension Cable	EC-2437
Rack S/N	N/A
Clock/Meter S/N	N/A

Customer	SURA/ Jefferson Lab
Job #	60-26790
Date	Wed, Oct 20, 1999 @ 12:02 PM
Standards	57, 30, 123, 107
Technician	Mike Welton /

Channel 1

Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0500	0
GAIN	0.2000	0
BREAK 1	N/A	
LIN 1	N/A	
BREAK 2	N/A	
LIN 2	N/A	

Drive Voltage p-p @

Hi/Lo Selection HI @

Notes

PROBE CAL/ DATA FOR REFERENCE ONLY

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Nominal (VDC)
0.0125	0.439	0.500
0.0250	0.959	1.000
0.0375	1.480	1.500
0.0500	2.000	2.000
0.0625	2.523	2.500
0.0750	3.046	3.000
0.0875	3.570	3.500
0.1000	4.092	4.000
0.1125	4.611	4.500
0.1250	5.125	5.000
0.1375	5.634	5.500
0.1500	6.134	6.000
0.1625	6.622	6.500
0.1750	7.098	7.000
0.1875	7.560	7.500
0.2000	8.008	8.000
0.2125	8.440	8.500
0.2250	8.855	9.000
0.2375	9.253	9.500
0.2500	9.635	10.000

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Calibration Data Sheet

Amp P/N; S/N	410-SC; 410-1539
Probe S/N	HPB-375-4837
Extension Cable	EC-2439
Rack S/N	N/A
Clock/Meter S/N	N/A

Customer	SURA / Jefferson Lab
Job #	60-26790
Date	Wed, Oct 20, 1999 @ 11:50 AM
Standards	57, 30, 123, 107
Technician	Mike Welton /

Channel 1 Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0500	0
GAIN	0.2000	0
BREAK 1	N/A	
LIN 1	N/A	
BREAK 2	N/A	
LIN 2	N/A	

Drive Voltage p-p	6.00	@	E9
Hi/Lo Selection	HI	@	S8

Notes

PROBE CAL/ DATA FOR REFERENCE ONLY

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Nominal (VDC)
0.0125	0.582	0.500
0.0250	0.988	1.000
0.0375	1.495	1.500
0.0500	2.006	2.000
0.0625	2.521	2.500
0.0750	3.036	3.000
0.0875	3.554	3.500
0.1000	4.071	4.000
0.1125	4.588	4.500
0.1250	5.104	5.000
0.1375	5.611	5.500
0.1500	6.113	6.000
0.1625	6.607	6.500
0.1750	7.090	7.000
0.1875	7.560	7.500
0.2000	8.019	8.000
0.2125	8.462	8.500
0.2250	8.889	9.000
0.2375	9.301	9.500
0.2500	9.694	10.000



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Amp P/N; S/N	410-SC; 410-1539
Probe S/N	HPB-375-4838
Extension Cable	EC-2438
Rack S/N	N/A
Clock/Meter S/N	N/A

Customer	SURA/ Jefferson Lab
Job #	60-26790
Date	Wed, Oct 20, 1999 @ 12:06 PM
Standards	57, 30, 123, 107
Technician	Mike Welton / 

	(In.)	Dial
OFFSET	0.0500	0
GAIN	0.2000	0
BREAK 1	N/A	
LIN 1	N/A	
BREAK 2	N/A	
LIN 2	N/A	

Drive Voltage p-p @
Hi/Low Selection HI @

PROBE CAL/ DATA FOR REFERENCE ONLY

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Nominal (VDC)
0.0125	0.465	0.500
0.0250	0.971	1.000
0.0375	1.481	1.500
0.0500	1.992	2.000
0.0625	2.508	2.500
0.0750	3.023	3.000
0.0875	3.541	3.500
0.1000	4.056	4.000
0.1125	4.572	4.500
0.1250	5.080	5.000
0.1375	5.585	5.500
0.1500	6.080	6.000
0.1625	6.568	6.500
0.1750	7.041	7.000
0.1875	7.503	7.500
0.2000	7.950	8.000
0.2125	8.382	8.500
0.2250	8.796	9.000
0.2375	9.195	9.500
0.2500	9.575	10.000

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Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4748
Probe S/N	HPC-375-4338-LAB
Extension Cable	N/A
Rack S/N	4008-1627
Clock/Meter S/N	4100CM3-1596

Customer	SURA/ Jefferson Lab
Job #	60-26810
Date	Wed, Oct 27, 1999 @ 8:25 AM
Standards	57, 30, 123
Technician	Mike Welton / <i>MD</i>

Channel 1 Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p	6.00	@	E9
Hi/Lo Selection	HI	@	S8

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Front Panel Meter	Nominal (VDC)
0.0125	0.498	0.497	0.500
-0.0250	1.003	1.002	1.000
0.0375	1.505	1.504	1.500
0.0500	2.006	2.004	2.000
0.0625	2.508	2.506	2.500
0.0750	3.009	3.006	3.000
0.0875	3.507	3.504	3.500
0.1000	4.003	4.000	4.000
0.1125	4.499	4.496	4.500
0.1250	5.002	4.998	5.000
0.1375	5.508	5.503	5.500
0.1500	6.009	6.004	6.000
0.1625	6.503	6.497	6.500
0.1750	6.989	6.983	7.000
0.1875	7.489	7.481	7.500
0.2000	8.004	7.996	8.000
0.2125	8.519	8.511	8.500
0.2250	9.029	9.019	9.000
0.2375	9.524	9.513	9.500
0.2500	9.997	9.987	10.000

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Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4716
Probe S/N	HPC-375-4338-LAB
Extension Cable	N/A
Rack S/N	4008-1627
Clock/Meter S/N	4100CM3-1596

Customer	SURA/ Jefferson Lab
Job#	60-26810
Date	Wed, Oct 27, 1999 @ 8:50 AM
Standards	57, 30, 123
Technician	Mike Welton / <i>[Signature]</i>

Channel 2 Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p	6.00	@	E9
Hi/Lo Selection	HI	@	S8

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Front Panel Meter	Nominal (VDC)
0.0125	0.500	0.500	0.500
0.0250	1.005	1.004	1.000
0.0375	1.505	1.506	1.500
0.0500	2.006	2.006	2.000
0.0625	2.508	2.507	2.500
0.0750	3.009	3.009	3.000
0.0875	3.508	3.508	3.500
0.1000	4.004	4.004	4.000
0.1125	4.499	4.498	4.500
0.1250	5.001	5.002	5.000
0.1375	5.508	5.509	5.500
0.1500	6.009	6.008	6.000
0.1625	6.504	6.503	6.500
0.1750	6.995	6.994	7.000
0.1875	7.491	7.490	7.500
0.2000	8.002	8.001	8.000
0.2125	8.515	8.515	8.500
0.2250	9.020	9.019	9.000
0.2375	9.514	9.510	9.500
0.2500	9.987	9.980	10.000

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Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4747
Probe S/N	HPC-375-4338-LAB
Extension Cable	N/A
Rack S/N	4008-1627
Clock/Meter S/N	4100CM3-1596

Customer	SURA/ Jefferson Lab
Job#	60-26810
Date	Wed, Oct 27, 1999 @ 8:57 AM
Standards	57, 30, 123
Technician	Mike Welton /

Channel 3 Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p	6.00	@	E9
Hi/Lo Selection	HI	@	S8

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Front Panel Meter	Nominal (VDC)
0.0125	0.498	0.498	0.500
0.0250	1.002	1.002	1.000
0.0375	1.503	1.503	1.500
0.0500	2.001	2.002	2.000
0.0625	2.504	2.504	2.500
0.0750	3.004	3.004	3.000
0.0875	3.502	3.502	3.500
0.1000	3.997	3.998	4.000
0.1125	4.493	4.491	4.500
0.1250	4.999	4.998	5.000
0.1375	5.506	5.505	5.500
0.1500	6.004	6.005	6.000
0.1625	6.496	6.496	6.500
0.1750	6.981	6.982	7.000
0.1875	7.484	7.482	7.500
0.2000	7.997	7.995	8.000
0.2125	8.511	8.500	8.500
0.2250	9.016	9.015	9.000
0.2375	9.504	9.502	9.500
0.2500	9.978	9.979	10.000

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Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4686
Probe S/N	HPC-375-4338-LAB
Extension Cable	N/A
Rack S/N	4008-1627
Clock/Meter, S/N	4100CM3-1596

Customer	SURA/ Jefferson Lab
Job #	60-26810
Date	Wed, Oct 27, 1999 @ 9:14 AM
Standards	57, 30, 123
Technician	Mike Welton / <i>[Signature]</i>

Channel 4

Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p @

Hi/Lo Selection HI @

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Front Panel Meter	Nominal (VDC)
0.0125	0.495	0.495	0.500
0.0250	0.999	0.999	1.000
0.0375	1.502	1.502	1.500
0.0500	2.003	2.002	2.000
0.0625	2.505	2.504	2.500
0.0750	3.004	3.005	3.000
0.0875	3.502	3.502	3.500
0.1000	3.999	3.999	4.000
0.1125	4.496	4.495	4.500
0.1250	5.000	5.000	5.000
0.1375	5.508	5.508	5.500
0.1500	6.009	6.009	6.000
0.1625	6.503	6.504	6.500
0.1750	6.992	6.991	7.000
0.1875	7.490	7.489	7.500
0.2000	7.999	7.998	8.000
0.2125	8.512	8.510	8.500
0.2250	9.015	9.015	9.000
0.2375	9.508	9.508	9.500
0.2500	9.981	9.978	10.000

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Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4689
Probe S/N	HPC-375-4338-LAB
Extension Cable	N/A
Rack S/N	4008-1627
Clock/Meter S/N	4100CM3-1596

Customer	SURA/ Jefferson Lab
Job#	60-26810
Date	Wed, Oct 27, 1999 @ 9:20 AM
Standards	57, 30, 123
Technician	Mike Welton / <i>[Signature]</i>

Channel 5 Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p	6.00	@	E9
Hi/Lo Selection	HI	@	S8

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Front Panel Meter	Nominal (VDC)
0.0125	0.488	0.488	0.500
0.0250	0.997	0.997	1.000
0.0375	1.502	1.501	1.500
0.0500	2.004	2.004	2.000
0.0625	2.507	2.507	2.500
0.0750	3.008	3.008	3.000
0.0875	3.506	3.505	3.500
0.1000	4.000	4.001	4.000
0.1125	4.494	4.494	4.500
0.1250	4.997	4.997	5.000
0.1375	5.505	5.505	5.500
0.1500	6.007	6.006	6.000
0.1625	6.504	6.504	6.500
0.1750	6.994	6.993	7.000
0.1875	7.491	7.493	7.500
0.2000	8.002	8.001	8.000
0.2125	8.516	8.513	8.500
0.2250	9.021	9.019	9.000
0.2375	9.514	9.510	9.500
0.2500	9.981	9.980	10.000

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Calibration Data Sheet

Amp P/N; S/N	4100-SL; 4100-4678
Probe S/N	HPC-375-4338-LAB
Extension Cable	N/A
Rack S/N	4008-1627
Clock/Meter S/N	4100CM3-1596

Customer	SURA / Jefferson Lab
Job #	60-26810
Date	Wed, Oct 27, 1999 @ 9:32 AM
Standards	57, 30, 123
Technician	Mike Welton /

Channel 6

Nominal Adjustment Points

	(In.)	Dial
OFFSET	0.0250	0
GAIN	0.1000	0
BREAK 1	.1250	
LIN 1	.1625	
BREAK 2	.2000	
LIN 2	.2500	

Drive Voltage p-p @

Hi/Lo Selection HI @

Notes

STANDARDS TRACABLE TO N.I.S.T.

Cal. Points (In.)	Output (VDC)	Front Panel Meter	Nominal (VDC)
0.0125	0.496	0.496	0.500
0.0250	1.000	1.000	1.000
0.0375	1.501	1.501	1.500
0.0500	2.002	2.001	2.000
0.0625	2.503	2.503	2.500
0.0750	3.004	3.003	3.000
0.0875	3.502	3.502	3.500
0.1000	3.998	3.999	4.000
0.1125	4.494	4.494	4.500
0.1250	4.999	4.998	5.000
0.1375	5.507	5.507	5.500
0.1500	6.007	6.008	6.000
0.1625	6.502	6.502	6.500
0.1750	6.990	6.990	7.000
0.1875	7.487	7.487	7.500
0.2000	8.000	8.000	8.000
0.2125	8.514	8.500	8.500
0.2250	9.019	9.017	9.000
0.2375	9.507	9.506	9.500
0.2500	9.981	9.977	10.000

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skier assembly MB250401J-52 1/2

motor is Slo-Syn type M062-LS-550

if assembly is Q1 J
Q1 $\Rightarrow$ 1mm/rev (10 turns/cm)

1.8° motor in 1/2 step mode (400 steps/rev)

motor is 1.8°/step

NF90 does 1/2 stepping 400 steps/rev
400 steps/1mm

sensor output is currently 4.589V
100 steps gives 4.185
100 3.788
100 3.382
100 2.976

	Volts	dist. between sensors	
	4.589	.211"	4.589
	2.977	.172"	-2.976
400 steps	1.612	.039" $\approx$ 1mm	1.613

~~not~~ half stepping

400 steps = 1mm

move stepper back 800 steps 7.922V .2855°
again 800 steps 11.238 .342°

starting at this point

steps	DMM Volts	Front Panel Volts	
0	10.679		display not on - turned it on ".362" from support to support
0	10.626	10.617	
0	10.626.347	10.615	
100	10.279.367	10.269	
100	9.912.387	9.904	
100	9.525.397	9.517	
100	9.128.404	9.121	
100	8.724.402	8.718	
100	8.322.420	8.316	
100	7.902.412	7.897	
100	7.490.400	7.845	
100	7.090.384	7.086	
100	6.706.393	6.702	
100	6.313.400	6.309	
100	5.913.394	5.910	
100	5.519.398	5.516	
100	5.121.401	5.119	
100	4.720.398	4.718	
100	4.322.386	4.320	
100	3.936.384	3.934	
100	3.552.394	3.550	
100	3.158.396	3.156	
100	2.762	2.761	
-2000	10.621	10.610	

EC-2438 coax
chan 4
375-4836 head

DMM up by 52 mV if switch display to
another channel

400 steps/mm 100 = .25 mm = 250 μ m

Steps	OMM Volts	Front Panel Volts
0	10.993.356	10.984
100	10.637.389	10.629
100	10.258.397	10.250
100	9.861.003	9.853
0	9.858.408	9.851
100	9.450.415	9.443
100	9.035.422	9.029
100	8.613.434	8.608
100	8.179.436	8.175
100	7.743.427	7.739
100	7.316.408	7.313
100	6.908.410	6.905
100	6.498.411	6.495
100	6.087.410	6.085
100	5.677.408	5.675
100	5.269.418	5.267
100	4.851.408	4.849
100	4.443.396	4.441
100	4.047.392	4.046
100	3.655.403	3.654
100	3.252.400	3.251
100	2.852	2.851
-2000	10.985	10.975

.329" between supports

EC-2439 coax
chan 5
375-4837 head

11.239V on fluke 8060A meter
 11.229V on front panel display

steps	DMM Volts	Front Panel Volts	
100	10.879	10.870	.383
100	10.496	10.489	.405
100	10.091	10.084	.413
100	9.678	9.672	.422
100	9.256	9.250	.427
100	8.829	8.824	.444
100	8.385	8.381	.442
100	7.943	7.940	.438
100	7.505	7.502	.418
100	7.087	7.085	.418
100	6.669	6.667	.414
100	6.255	6.253	.414
100	5.841	5.839	.413
100	5.428	5.427	.423
100	5.005	5.004	.416
100	4.589	4.588	.405
100	4.184	4.183	.397
100	3.787	3.786	.406
100	3.381	3.380	.406
100	2.975	2.974	
-2000	11.239	11.229	

EC-2437 coax
 chan 6
 375-4838 head

steps	DMW Volts	From Panel Volts
0	10.628	10.618
100	10.169	10.161
100	9.686	9.678
100	9.212	9.205
100	8.720	8.714
100	8.234	8.229
100	7.757	7.752
100	7.302	7.298
100	6.861	6.856
100	6.430	6.427
100	6.010	6.007
100	5.693	5.591
100	5.165	5.163
100	4.745	4.743
100	4.333	4.331
100	3.937	3.935
100	3.530	3.528
100	3.124	3.123
100	2.723	2.722
100	2.323	2.322
100	1.912	1.911
-2000	10.623	10.612

EC-2399 coax
chan 3
375-4823 head

steps	Drum Volts		Front Panel Volts
0	11.495		11.481
100	11.114		11.101
100	10.721		10.710
100	10.323		10.313
100	9.917		9.907
100	9.492		9.484
100	9.060		9.053
100	8.623		8.616
100	8.189		8.182
100	7.743		7.738
100	7.309		7.304
100	6.895		6.891
100	6.493		6.490
100	6.080		6.077
100	5.669		6.665
100	5.256	.413	5.253
100	4.848	.408	4.845
100	4.437	.411	4.435
100	4.036	.401	4.034
100	3.640	.396	3.638
100	3.248	.392	3.246
100	2.845	.403	2.843
-2100	11.470		11.456

EC-2401 coax
chan 1
375-4824 head

steps	DMM Volts	Front Panel Volts
	11.261	11.249
100	10.796	10.784
100	10.325	10.316
100	9.862	9.852
100	9.382	9.374
100	8.900	8.894
100	8.421	8.418
100	7.959	7.954
100	7.490	7.485
100	7.046	7.042
100	6.622	6.618
100	6.208	6.204
100	5.784	5.782
100	5.361	5.358
100	4.948	4.946
100	4.542	4.539
100	4.137 .405	4.136
100	3.737 .400	3.735
100	3.341 .396	3.340
100	2.947 .394	2.946
100	2.542 .405	2.541
-2000	11.250	11.237

EC-2400 core
chan 2
375-4825 head

Hd 4836.txt

Save Data
Save Parameter
Save Confidence Band
Save Predict Band

Straight Line: $y=a*x+b$
xPos: 1
yPos: 2
wPos: 0
vWF: 0.000000000000000E+0000

a:= -0.396716883
b:= 10.6824069
Sum Sqrs: 0.00882609004

Covariance Matrix
cvm[1,1] := 0.00129870130
cvm[2,1] := -0.0129870130
cvm[2,2] := 0.177489177
Goodness of Fit Statistics ...
— C O D: 0.999927174
— Corrl: 0.999963586
— M S C: 9.33696553

Parameter Statistics
95.00% Confidence Intervals
Parameter b: 10.6824069
StdDev: 0.00908015610
— Uninvariant ...
LOW: 10.6634019
HIGH: 10.7014119
Supproting Plane:
LOW: 10.6583081
HIGH: 10.7065058
Parameter a: -0.396716883
StdDev: 0.000776715575
— Uninvariant ...
LOW: -0.398342567
HIGH: -0.395091199
Supproting Plane:
LOW: -0.398778297
HIGH: -0.394655470

(c) Poly Software International

Hd 4837.txt

Save Data
Save Parameter
Save Confidence Band
Save Predict Band

Straight Line: $y=a*x+b$
xPos: 1
yPos: 2
wPos: 0
vWF: 0.000000000000000E+0000

a:= -0.412170130
b:= 11.0561775
Sum Sqrs: 0.0179549511

Covariance Matrix
cvm[1,1] := 0.00129870130
cvm[2,1] := -0.0129870130
cvm[2,2] := 0.177489177
Goodness of Fit Statistics ...
— C O D: 0.999862760
— Corrl: 0.999931378
— M S C: 8.70330279

Parameter Statistics
95.00% Confidence Intervals
Parameter b: 11.0561775
StdDev: 0.0129509388
— Uninvariant ...
LOW: 11.0290709
HIGH: 11.0832841
Supproting Plane:
LOW: 11.0218055
HIGH: 11.0905495
Parameter a: -0.412170130
StdDev: 0.00110782191
— Uninvariant ...
LOW: -0.414488828
HIGH: -0.409851432
Supproting Plane:
LOW: -0.415110304
HIGH: -0.409229956

(c) Poly Software International

Hd4838.txt

Save Data
Save Parameter
Save Confidence Band
Save Predict Band

Straight Line: $y=a*x+b$

xPos: 1
yPos: 2
wPos: 0
vWF: 0.000000000000000E+0000

a:= -0.419731579
b:= 10.9006000
Sum Sqrs: 0.0155086368

Covariance Matrix

cvm[1,1] := 0.00150375940
cvm[2,1] := -0.0142857143
cvm[2,2] := 0.185714286

Goodness of Fit Statistics ...

— C O D: 0.999867642
— Corrl: 0.999933819
— M S C: 8.72999786

Parameter Statistics

95.00% Confidence Intervals

Parameter b: 10.9006000

StdDev: 0.0126494958

— Uninvariant ...

LOW: 10.8740244

HIGH: 10.9271756

Supproting Plane:

LOW: 10.8668727

HIGH: 10.9343273

Parameter a: -0.419731579

StdDev: 0.00113825545

— Uninvariant ...

LOW: -0.422122965

HIGH: -0.417340193

Supproting Plane:

LOW: -0.422766501

HIGH: -0.416696657

(c) Poly Software International

1-d2823.txt

Save Data
Save Parameter
Save Confidence Band
Save Predict Band

Straight Line: $y=a*x+b$

xPos: 1
yPos: 2
wPos: 0
vWF: 0.000000000000000E+0000

a:= -0.434045455
b:= 10.4592165
Sum Sqrs: 0.183956219

Covariance Matrix

cvm[1,1] := 0.00129870130
cvm[2,1] := -0.0129870130
cvm[2,2] := 0.177489177

Goodness of Fit Statistics ...

— C O D: 0.998733507
— Corrl: 0.999366553
— M S C: 6.48102708

Parameter Statistics

95.00% Confidence Intervals

Parameter b: 10.4592165

StdDev: 0.0414539935

— Uninvariant ...

LOW: 10.3724522

HIGH: 10.5459807

Supproting Plane:

LOW: 10.3491970

HIGH: 10.5692359

Parameter a: -0.434045455

StdDev: 0.00354597014

— Uninvariant ...

LOW: -0.441467255

HIGH: -0.426623654

Supproting Plane:

LOW: -0.443456506

HIGH: -0.424634403

(c) Poly Software International

Hd 2824.txt

Save Data
 Save Parameter
 Save Confidence Band
 Save Predict Band

Straight Line: $y=a*x+b$
 xPos: 1
 yPos: 2
 wPos: 0
 vWF: 0.000000000000000E+0000

a:= -0.416562959
 b:= 11.5299565
 Sum Sqrs: 0.0283683196

Covariance Matrix
 cvm[1,1] := 0.00112930548
 cvm[2,1] := -0.0118577075
 cvm[2,2] := 0.169960474
 Goodness of Fit Statistics ...
 — C O D: 0.999815412
 — Corrl: 0.999907702
 — M S C: 8.41556581

Parameter Statistics
 — 95.00% Confidence Intervals
 Parameter b: 11.5299565
 StdDev: 0.0155265789
 — Uninvariant ...
 LOW: 11.4975686
 HIGH: 11.5623444
 Supproting Plane:
 LOW: 11.4889192
 HIGH: 11.5709939
 Parameter a: -0.416562959
 StdDev: 0.00126563223
 — Uninvariant ...
 LOW: -0.419203021
 HIGH: -0.413922896
 Supproting Plane:
 LOW: -0.419908074
 HIGH: -0.413217843

Hd 4825.txt

Save Data
 Save Parameter
 Save Confidence Band
 Save Predict Band

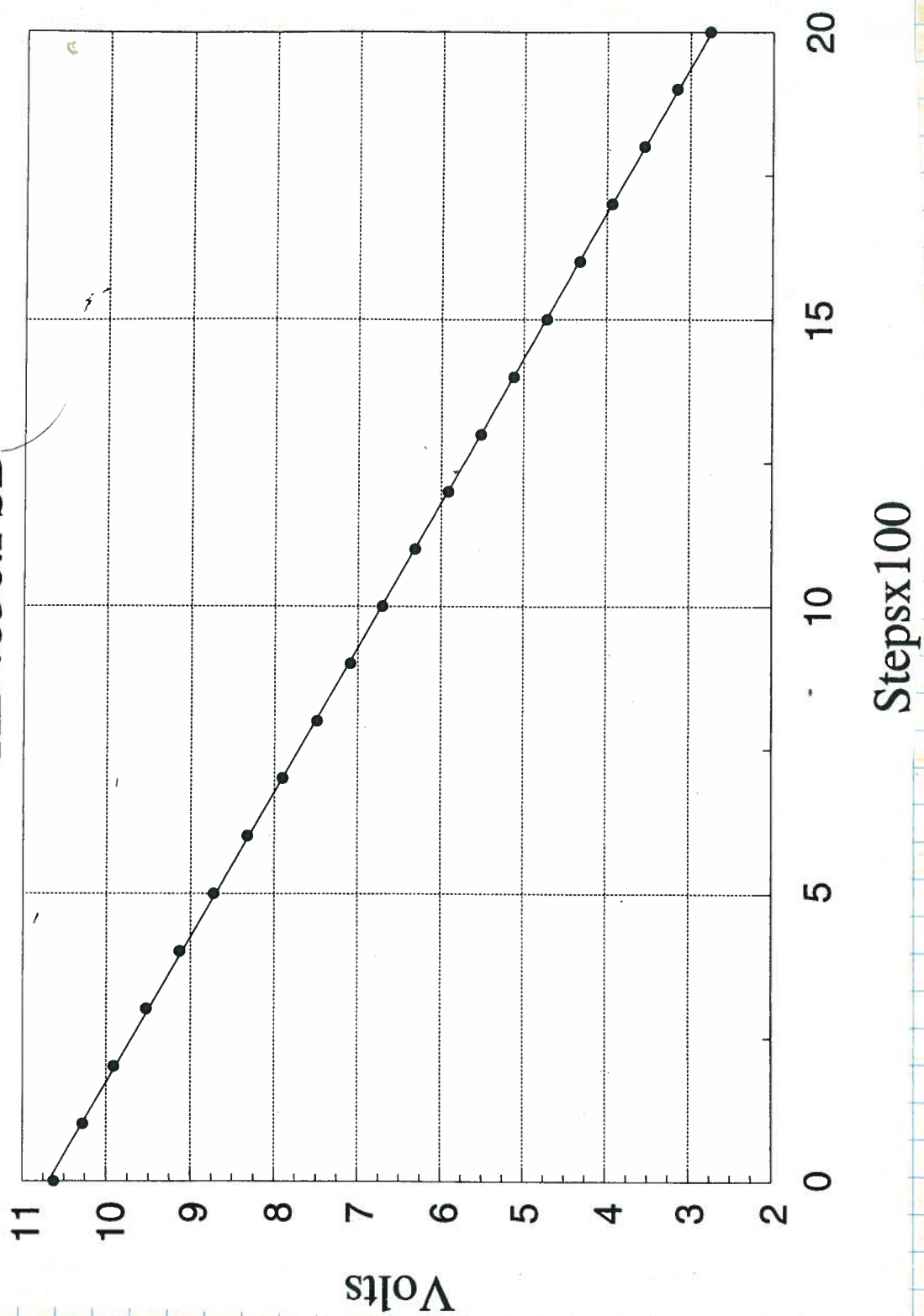
Straight Line: $y=a*x+b$
 xPos: 1
 yPos: 2
 wPos: 0
 vWF: 0.000000000000000E+0000

a:= -0.436085714
 b:= 11.1043810
 Sum Sqrs: 0.193529581

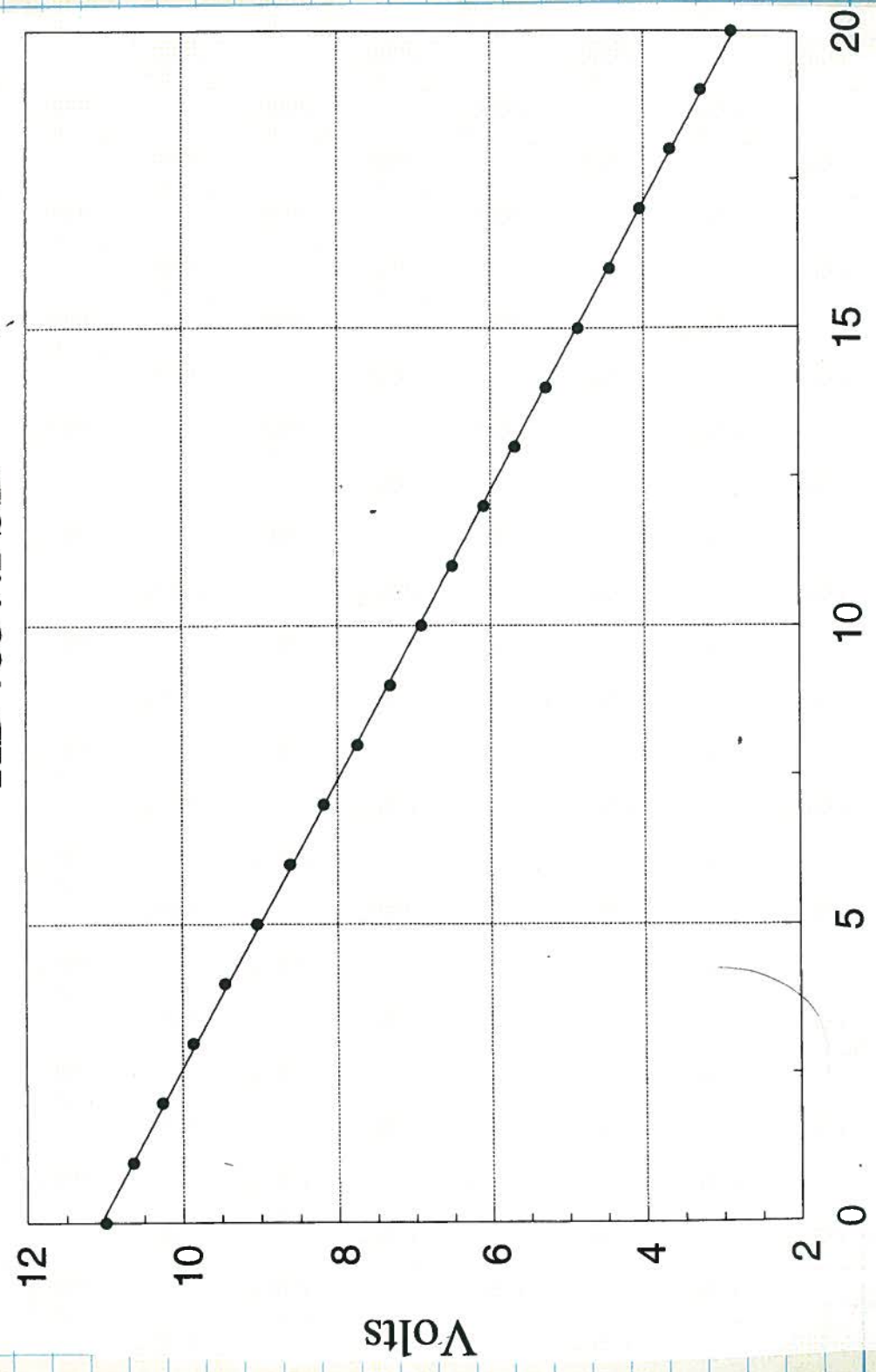
Covariance Matrix
 cvm[1,1] := 0.00129870130
 cvm[2,1] := -0.0129870130
 cvm[2,2] := 0.177489177
 Goodness of Fit Statistics ...
 — C O D: 0.998680105
 — Corrl: 0.999339835
 — M S C: 6.43972707

Parameter Statistics
 — 95.00% Confidence Intervals
 Parameter b: 11.1043810
 StdDev: 0.0425189779
 — Uninvariant ...
 LOW: 11.0153877
 HIGH: 11.1933742
 Supproting Plane:
 LOW: 10.9915350
 HIGH: 11.2172269
 Parameter a: -0.436085714
 StdDev: 0.00363706879
 — Uninvariant ...
 LOW: -0.443698187
 HIGH: -0.428473242
 Supproting Plane:
 LOW: -0.445738543
 HIGH: -0.426432885

HD4836.PSD

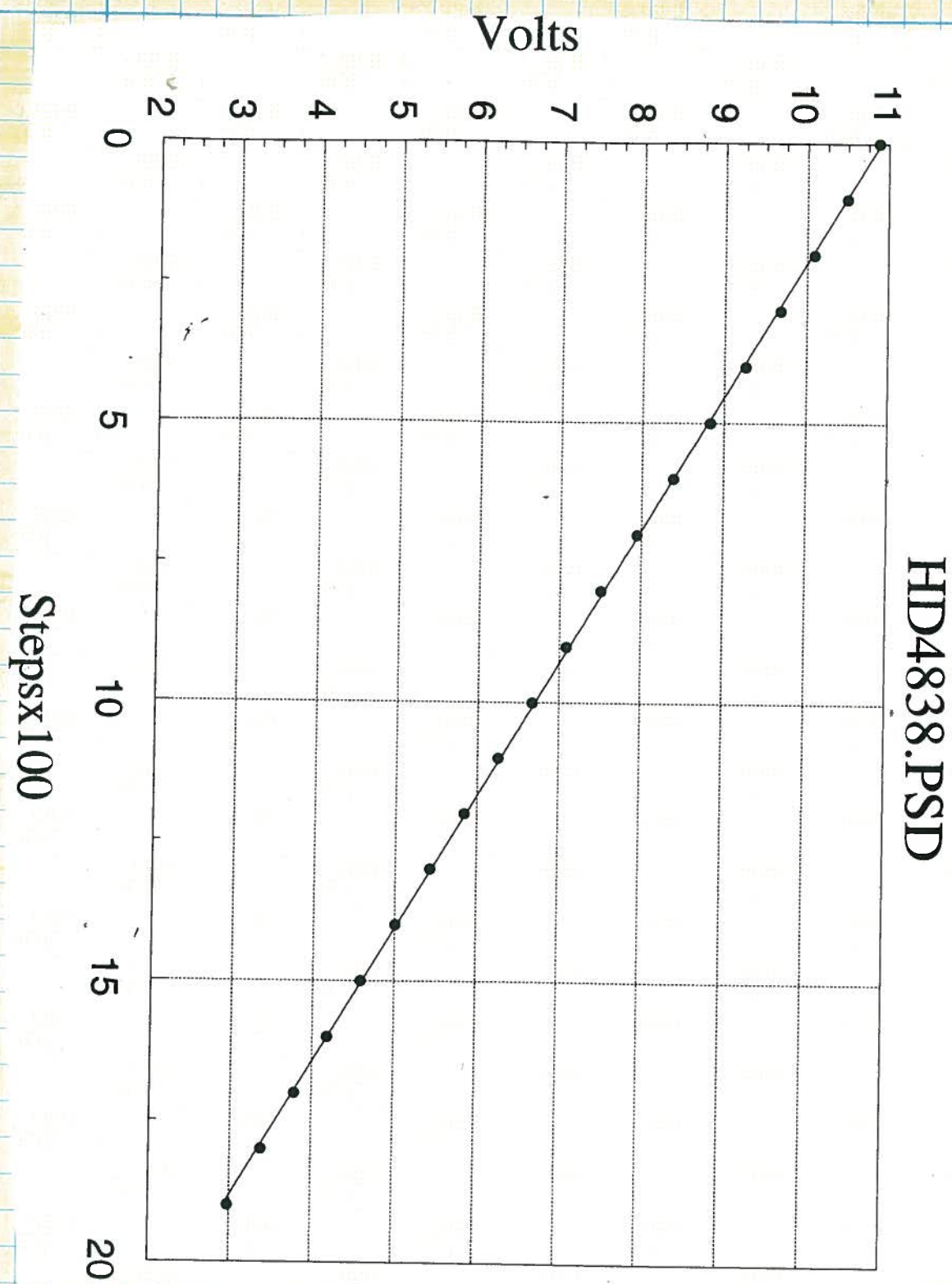


HD4837.PSD

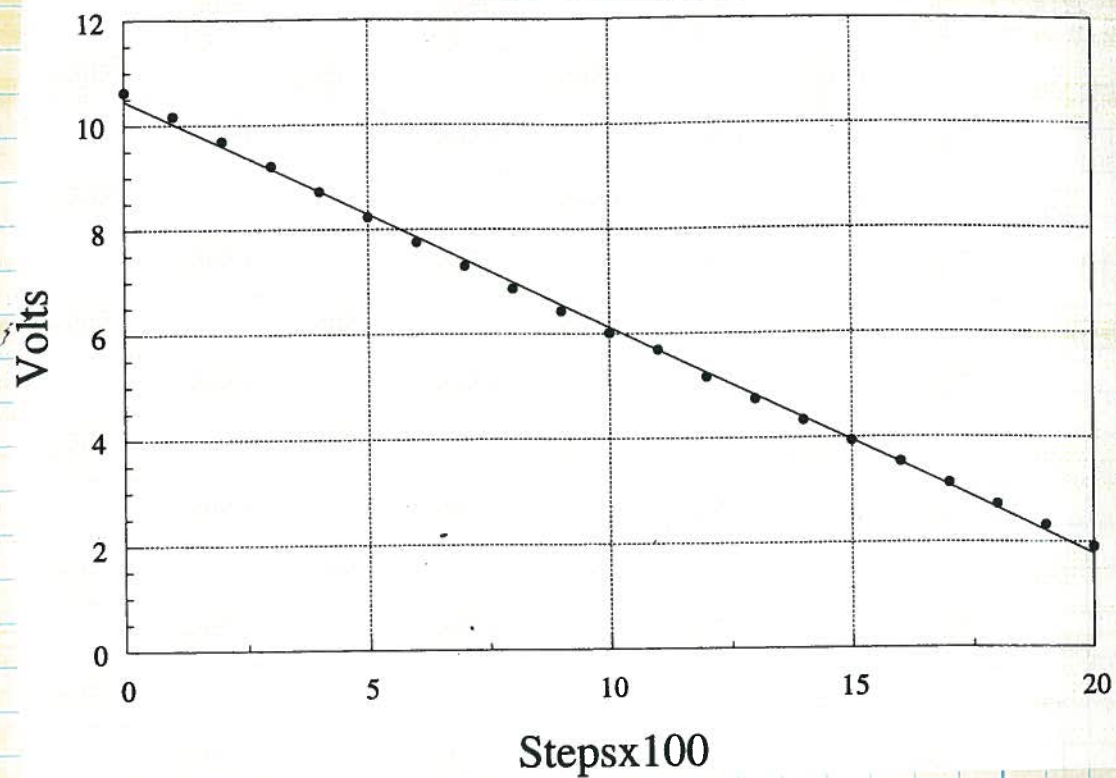


Steps x 100

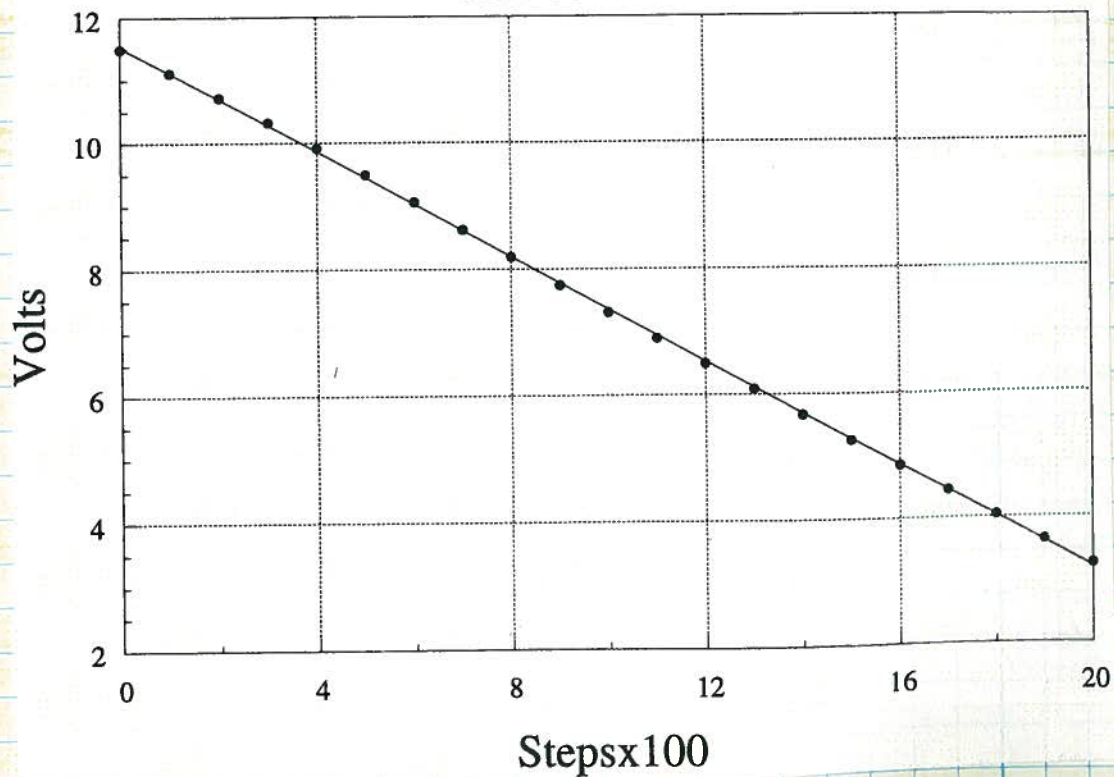
Volts



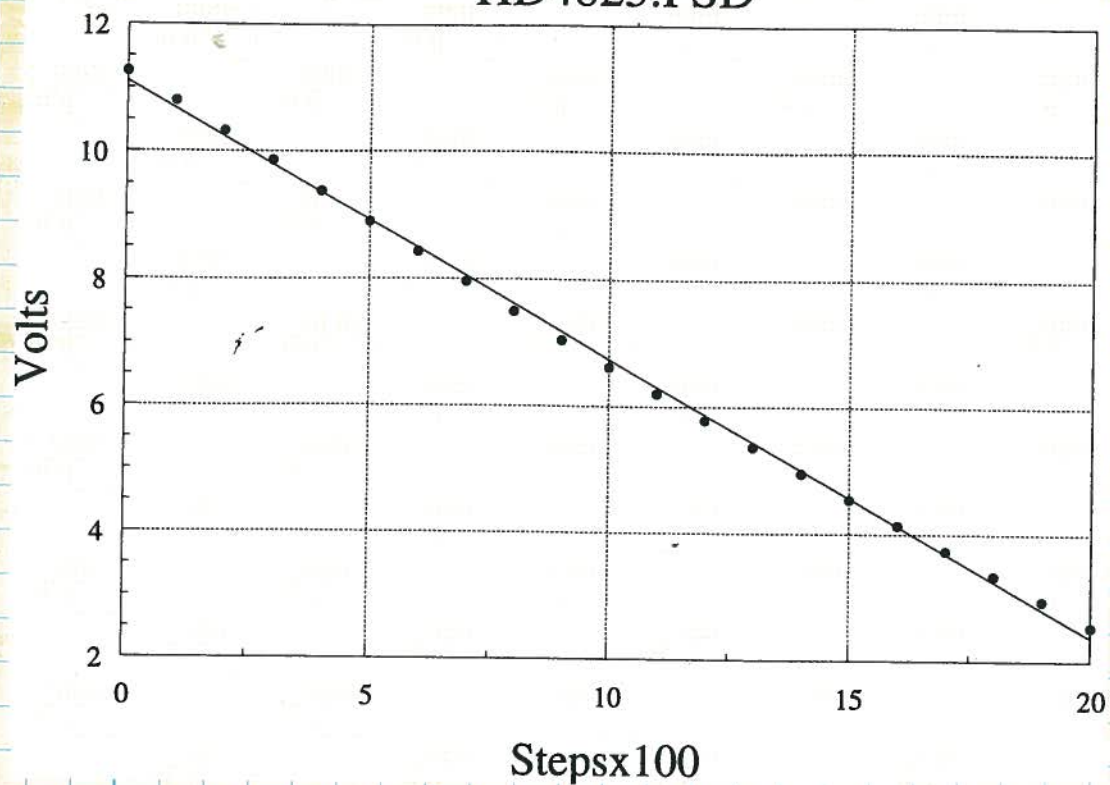
HD4823.PSD



HD4824.PSD



HD4825.PSD



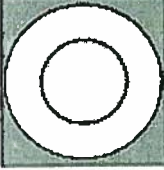
as of 12/3/99 the probe are set as
 target
 ← 4823 (chan 3)

4824 (chan 1) → ○ ← 4825 (chan 2 of capacitor amplifiers)

↑ beam looking down
 on the hall

4836 (chan 4) → ○ ← 4837 (chan 5)

↑ 4838 (chan 6)

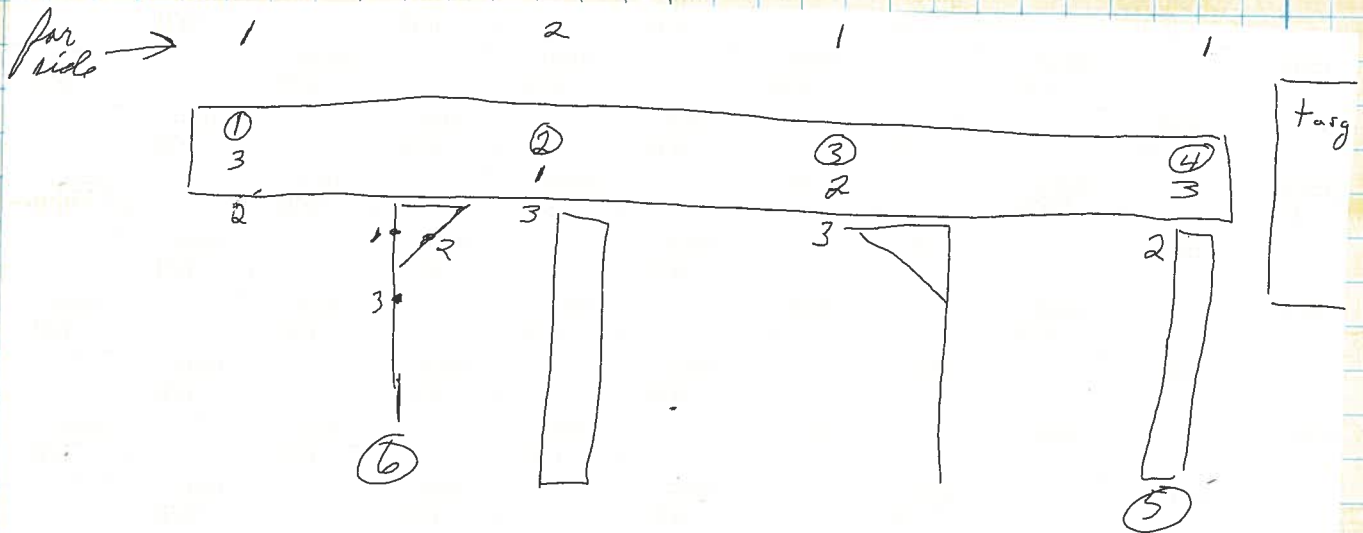
STYLES	HPB-40	HPB-75	HPB-150	HPB-375	HPB-500
					
Sensor OD	0.040 (1.016)	0.075 (1.905)	0.150 (3.810)	0.375 (9.525)	0.500 (12.70)
Guard OD	0.156 (3.962)	0.197 (5.00)	0.315 (8.00)	0.670 (17.02)	0.920 (23.37)
Linear Range	0.020 (0.508)	0.050 (1.270)	0.100 (2.540)	0.250 (6.458)	0.325 (8.255)
Encased Range	0.015 (0.381)	0.037 (0.940)	0.075 (1.905)	0.187 (4.750)	0.244 (6.20)

- Range specified in inches (millimeters)
- Encased range implies a probe face flush mounted to an earth grounded surface (Consult Factory)
- For thinner gap sensors ask for information on Capacitec's HPS Series of flat sensors 0.0098" (0.25mm) thick typical

NOTES:

1. The guard element is driven with an electronic voltage 2 to 20 Volts P - P maximum and must not be grounded.
2. -D dip coatings also prevent the driver, sensor and guard elements from being accidentally earth grounded or shorted. (not available on "V" and "S" series probes)
3. Range values tested with 5 ft. (1.524 meters) of Capacitec L2 cable.
4. Range and signal to noise ratio will be degraded by longer cable lengths.
5. A 20 point archived calibration record of voltage output versus nominal displacement is provided standard with every probe.
6. Sensor must be calibrated with final length of cable for stated results.
7. All components are electronically isolated from each other by greater than 20 megohms of leakage resistance (at room temperature) for best operation with the instrumentation.

Location of the thermistors on the beam.
 (5) & (6) are do not have thermistors yet. They are wired into ch 32 and up of the HP1313A ADC.



6 done 3, 1, 2

5 done 1, 2, 3

beamline VME has

ballast 12

HP1313

VME VME 2210 (relays)

VME VME 1182

write on 17 → 24 of 2210

1-16 of 1182 are TAP-EBC
READ

1-16 of 2210 in TAP-EBC
WRITE

A row in GND & ganged

1-8 of 1313 are CC S1-8

9-16 of 1313 are CT S1-8

The capacitive sensor targets are aluminum angles mounted on the underside of the aluminum bench.

The angle at the end away from the target stops $1.57''$ off the floor. The base of the sensor stand is $0.250''$ thick. The sensor is $.093''$ thick.

$$\begin{array}{r} 1.500 \\ - .250 \\ \hline 1.250 \\ - .093 \\ \hline 1.157'' \text{ gap} \end{array}$$

The angle at the end at the target chamber stops $1\frac{3}{8}''$ off the floor.

$$\begin{array}{r} 1.375 \\ - .250 \\ \hline 1.125 \\ - .093 \\ \hline 1.032'' \text{ gap} \end{array}$$

Sensors go from $.362''$ to $.197''$

$.165''$ for $2.5 \rightarrow 5V$ output
So center of range should be $.080''$ from the target.

$$\begin{array}{r} 1.157 \\ - .080 \\ \hline 1.077'' \text{ of shims} \end{array}$$

$$\begin{array}{r} 1.032 \\ - .080 \\ \hline .952'' \text{ of shims} \end{array}$$



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PROBE FORMAT

HPX	-XXX	X	-X	-XX	-XX	-XX
Probe Type	Sensor Diameter	Probe Length* (example 1 only)	Operating Temperature	Cable Type	Cable Length	Connector Type
C: Cylindrical B: Button T: Threaded R: Rectangular S: Flat D: Dual Flat	"In Thousandths" (.0254)	A: 0.500" (12.7) B: 0.625" (15.9) C: 0.750" (19.1) D: 0.875" (22.2) E: 1.000" (25.4) F: 1.250" (31.7) G: 1.500" (38.1) H: 1.750" (44.5) I: 2.000" (50.8)	A: 32 to 300°F (0 to 150°C) E: -100 to 400°F (-73 to 205°C) V: -100 to 1600°F (-73 to 871°C) S: -100 to 1832°F (-73 to 1000°C)	L2: .093 (2.4) L3: .063 (1.6) I2: .125 (3.2) N: .125 (3.2) ND: .165 (4.2) T: .063 (1.6)	In feet (about 0.3m)	M: 10-32 Microdot Male B: BNC Male FX: MCX Female MX: MCX Male
		Probe Thickness (example 2 only)				
		A: .093" (2.36) B: .065" (1.65) C: .125" (3.17) D: .025" (0.64)				

Standard sizes in bold

Please consult factory for availability of probe selection

CABLE SPECIFICATIONS

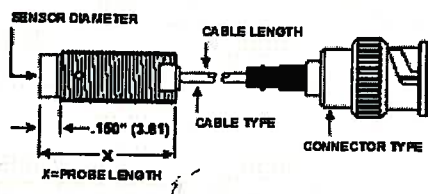
Cable Temperature Range for "A" & "E" Probes, -65°F to 446°F (-54°C to 230°C)

Type L2 OD .093" (2.4)

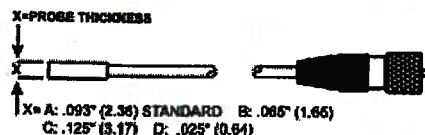
Teflon

~ 30 pF/ft (90/m)

example (1):
HPT-150X-A-L2-5-B



example (2):
HPB-75X-E-L3-5-M



SPECIFICATION & PROBE NOTES

Dimensions: All dimensions are shown as typical only. Please contact the factory for exact dimensions.

Maximum Range: Same as the diameter of the sensor element. (Minimum range is touch or 0.1% of full scale.)

LINEAR Range: Two thirds (0.67) times the sensor diameter typical.

Probe Interchangeability: $\pm 10\%$ of full scale maximum change, $\pm 2\%$ typical.

Probe Material Composition: A and E, stainless 303; V, Inconel 600, other materials available.

Calibrations: There are 21 numbered, standard calibrations available, please consult factory and specify when ordering.

Range:

- Standard listed ranges are ratios from 0-10.000VDC analog output, but each probe may be calibrated with several range versus sensitivity calibrations. Calibration/sensitivity from 0.001VDC/0.001" (0.0254mm) to 10.000VDC/0.001" (0.0254mm) are available.
- Range is defined as from touch to full scale reading, $\pm 50\%$ of range = ± 10.000 VDC calibration optional.

Grounding: "-D" dip coatings are available to prevent the electronically driven sensor/guard elements from being accidentally earth grounded and shorted.

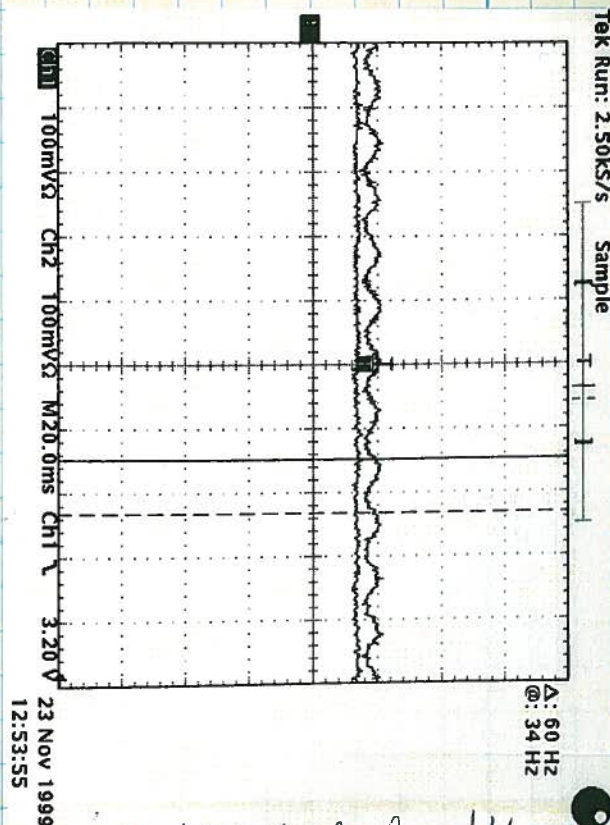
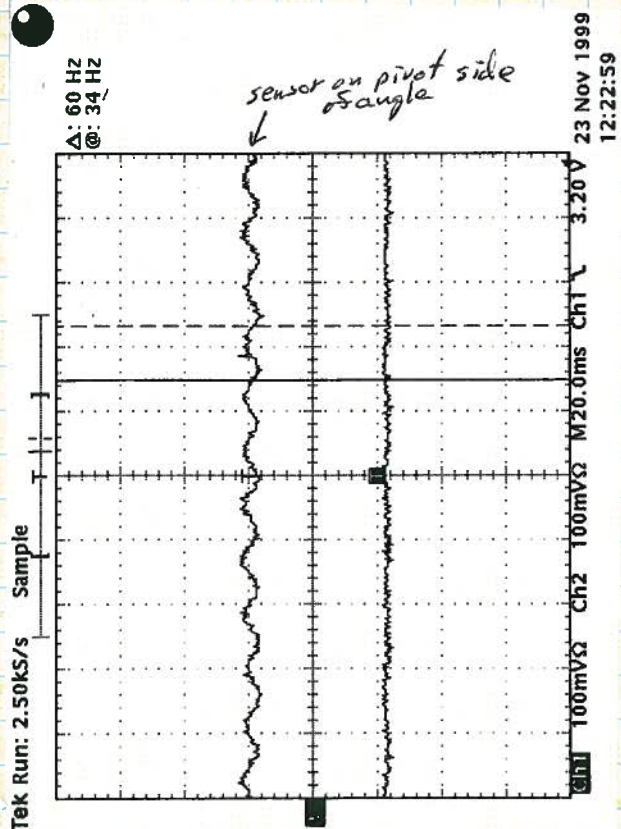
Extension Cables: Many extension cables are available depending upon connector types. Consult factory for proper part numbers. example: EC-D-L2-5 is a standard 5 foot extension cable with female BNC to male BNC connectors.

11/23

I hooked up the three sensors by the pivot (S end of the aluminum bend). Head 4823, 4824 & 4825. Used the channels and cooper from p114-116. Looked at the outputs of 2 channels using the Tek 754A and FET probes (only had 2 probes handy). Had about 4+V offset on Ch1 & Ch2 of scope. I looked at all three channels, 2 channels would bounce around when I tapped the aluminum angle. ~~3rd~~ One channel remained pretty steady. When I would heat the angle with a heat gun the one channel would drop in voltage. The other two would remain about the same.

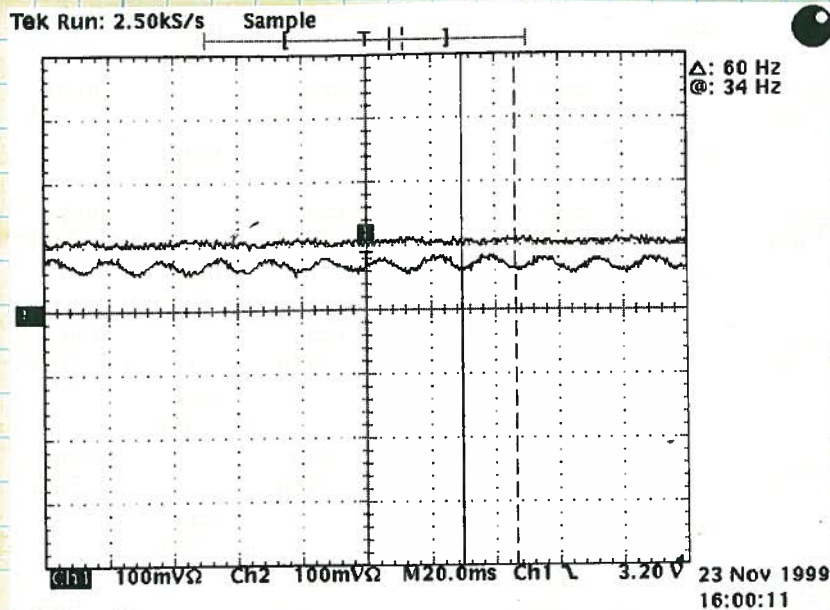
after heating with the heat gun ↓

after cooling for awhile ↓



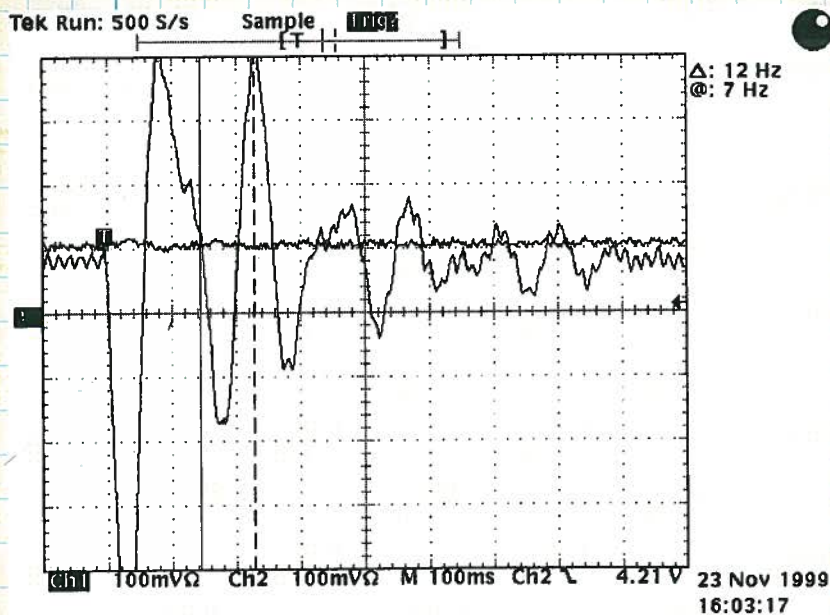
arrgghh! upside down!!

Trying to see what tapping on the angle does. Tap towards the pivot.



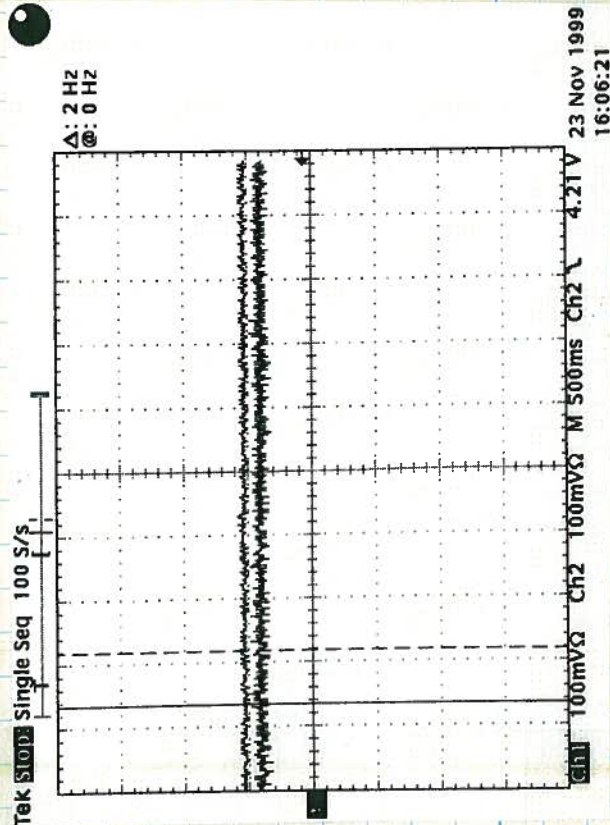
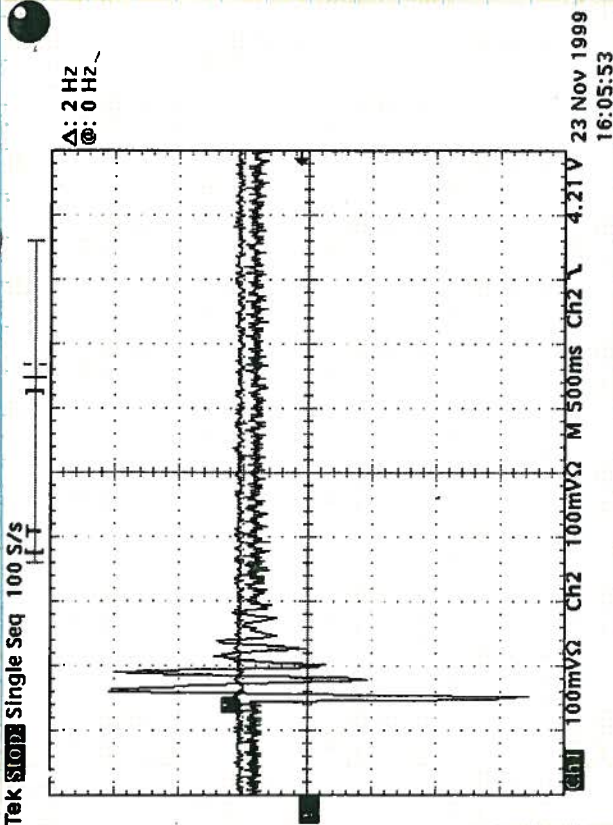
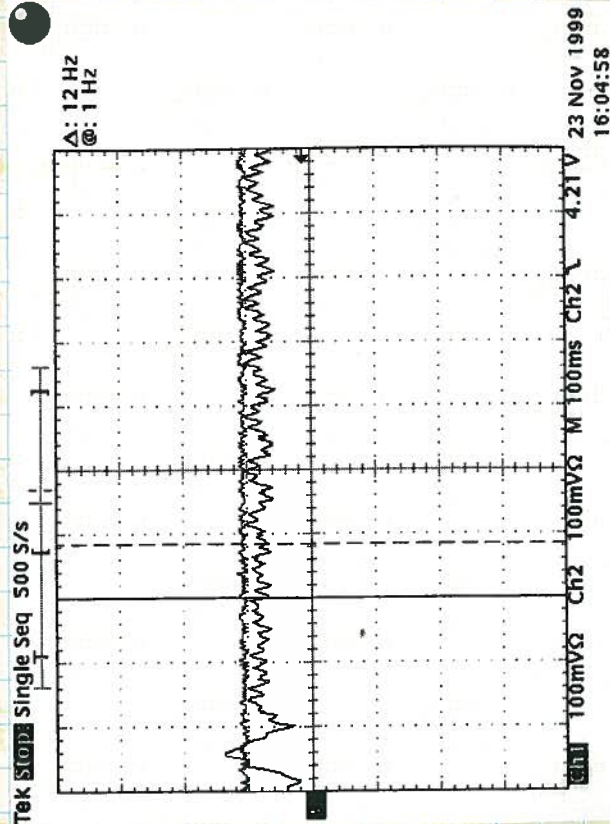
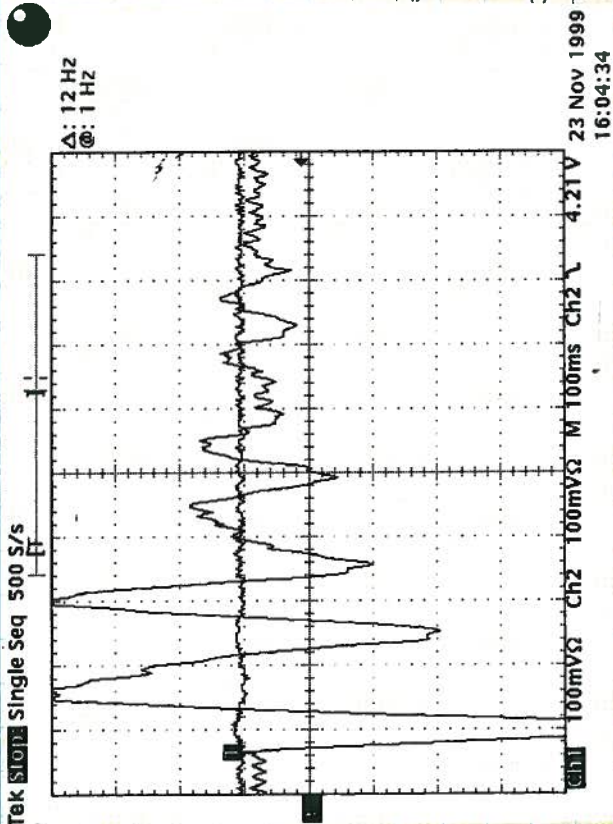
Before tap.

*(compare with p. 131)
(??? is something up?)
(still had some cooling
to do ??)*

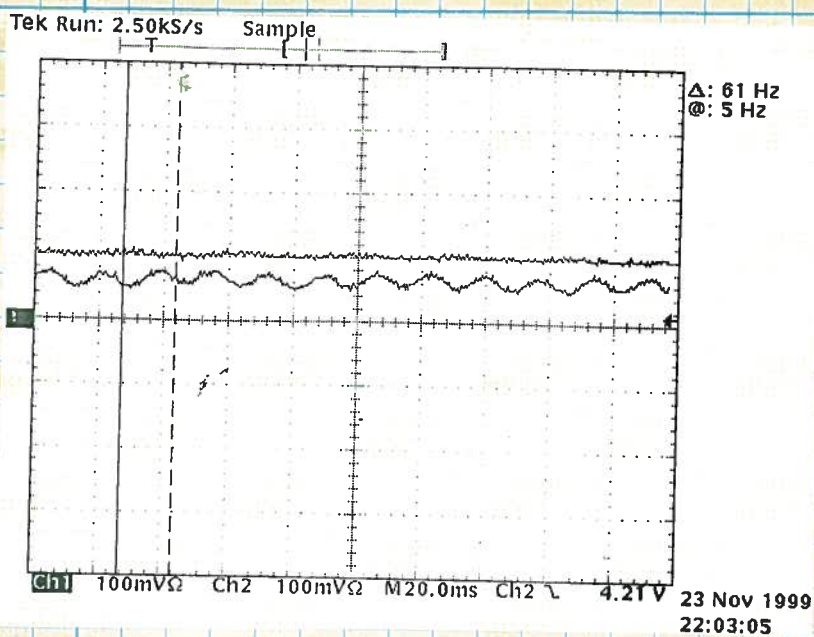


Looking for how long it takes to damp out.

These are of the same trace. I shifted horizontally. Tapped the same as on the facing page (p. 132)



same as the upper photos, except different horizontal scale.



*checking to see if
the situation is
stable.*

11/29/99

I have wired the Capacitor sensors and Hallbut
4 of the thermistors to the HP2134 ADC.

Ch16	4.941	Ch32	5.37	Ch48	5.398
Ch17	3.726	Ch33	5.39	Ch49	5.397
Ch18	3.606	Ch34	5.38	Ch50	5.434
Ch19	3.735	Ch35	5.41	Ch51	5.429
Ch20	5.429	Ch36	4.941	Ch52	5.344
Ch21	4.300	Ch37	5.413	Ch53	5.414
11801		Ch38	5.430	Ch54	5.416
		Ch39	5.430	Ch55	5.400
		Ch40	5.428	Ch56	3.452
		Ch41	5.419	Ch57	2.187
		Ch42	5.422	Ch58	1.421
		Ch43	5.420	Ch59	0.884
		Ch44	5.440	Ch60	0.576
		Ch45	5.404	Ch61	0.373
		Ch46	5.394	Ch62	0.227
		Ch47	5.409	Ch63	0.168

11/29/99



Ch16	4.938	Ch32	5.35	Ch48	5.396
Ch17	3.893	Ch33	5.37	Ch49	5.379
Ch18	3.749	Ch34	5.36	Ch50	5.415
Ch19	3.632	Ch35	5.40	Ch51	5.427
Ch20	5.405	Ch36	4.938	Ch52	5.325
Ch21	4.195	Ch37	5.404	Ch53	5.330
11758		Ch38	5.423	Ch54	5.404
		Ch39	5.425	Ch55	5.390
		Ch40	5.422	Ch56	3.448
		Ch41	5.408	Ch57	2.188
		Ch42	5.412	Ch58	1.417
		Ch43	5.410	Ch59	0.882
		Ch44	5.432	Ch60	0.575
		Ch45	5.399	Ch61	0.378
		Ch46	5.381	Ch62	0.229
		Ch47	5.385	Ch63	0.169



Ch16	4.887	Ch32	5.31	Ch48	5.332
Ch17	3.878	Ch33	5.33	Ch49	5.347
Ch18	3.705	Ch34	5.33	Ch50	5.344
Ch19	3.620	Ch35	5.37	Ch51	5.347
Ch20	5.379	Ch36	4.890	Ch52	5.313
Ch21	4.145	Ch37	5.374	Ch53	5.359
		Ch38	5.388	Ch54	5.366
		Ch39	5.390	Ch55	5.345
		Ch40	5.390	Ch56	3.408
		Ch41	5.364	Ch57	2.160
		Ch42	5.369	Ch58	1.402
		Ch43	5.369	Ch59	0.876
		Ch44	5.403	Ch60	0.568
		Ch45	5.387	Ch61	0.375
		Ch46	5.338	Ch62	0.225
		Ch47	5.331	Ch63	0.167

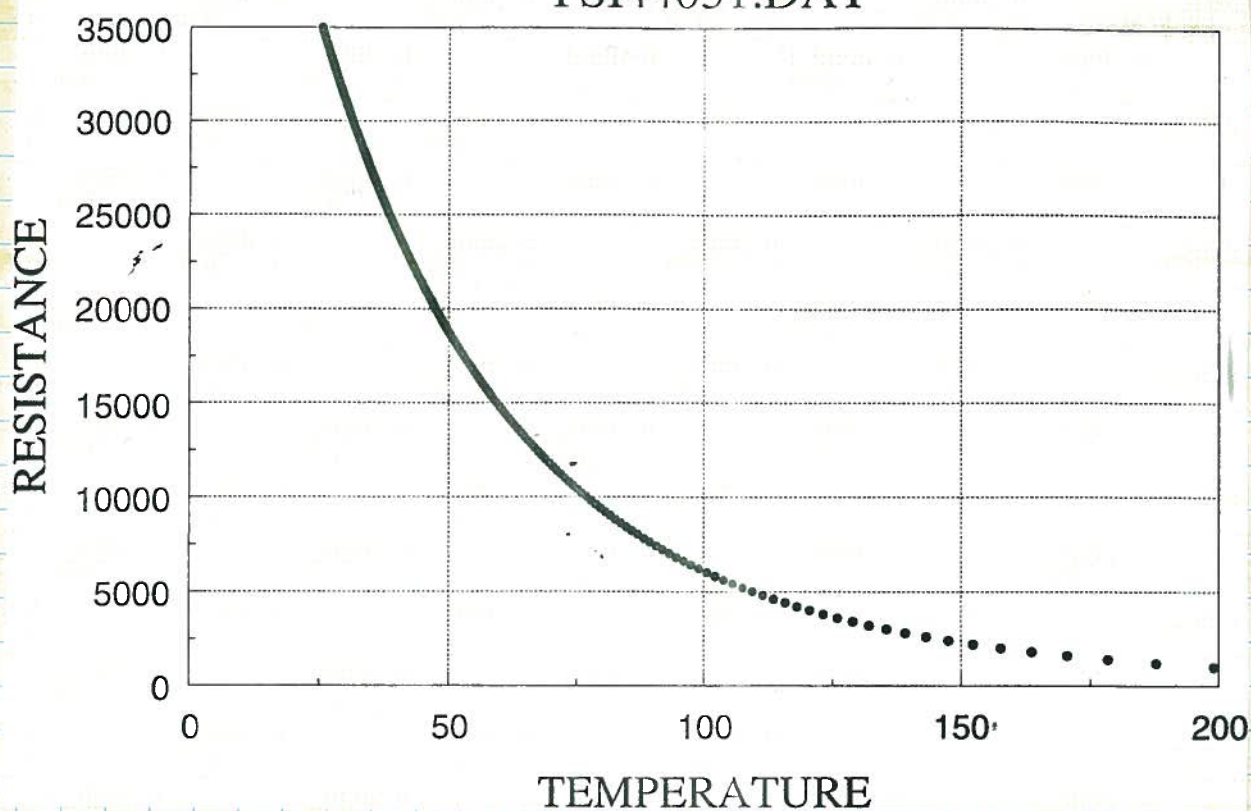
11617
11683

Ch16	4.898	Ch32	5.20	Ch48	5.317
Ch17	3.877	Ch33	5.30	Ch49	5.355
Ch18	3.735	Ch34	5.29	Ch50	5.365
Ch19	3.641	Ch35	5.33	Ch51	5.379
Ch20	5.365	Ch36	4.898	Ch52	5.314
Ch21	4.128	Ch37	5.338	Ch53	5.368
		Ch38	5.344	Ch54	5.372
		Ch39	5.344	Ch55	5.334
		Ch40	5.315	Ch56	3.337
		Ch41	5.333	Ch57	2.143
		Ch42	5.339	Ch58	1.388
		Ch43	5.335	Ch59	0.898
		Ch44	5.396	Ch60	0.566
		Ch45	5.32	Ch61	0.371
		Ch46	5.33	Ch62	0.232
		Ch47		Ch63	0.170

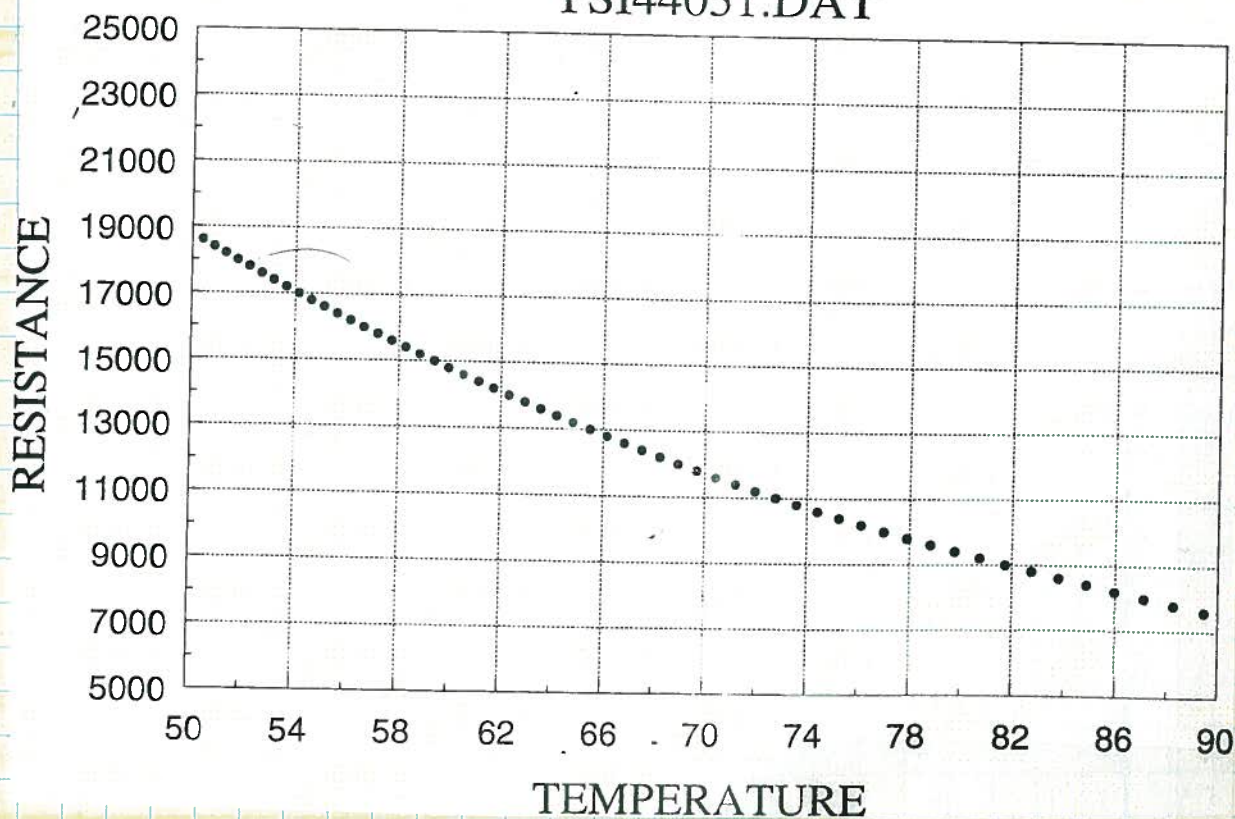
[illegible]

Calculated Thermistor Values
Data for plots taken from YSI catalog. (0°C, 40°C & 100°C)

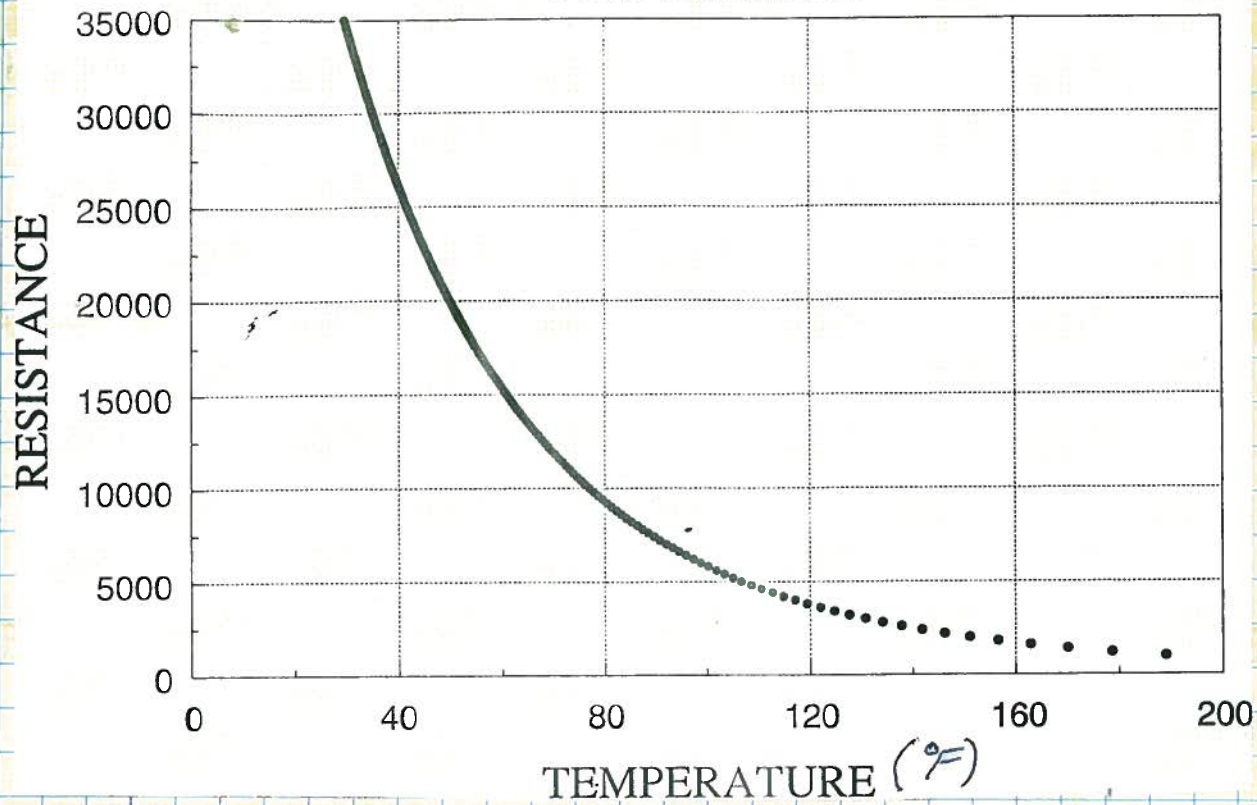
YSI44031.DAT



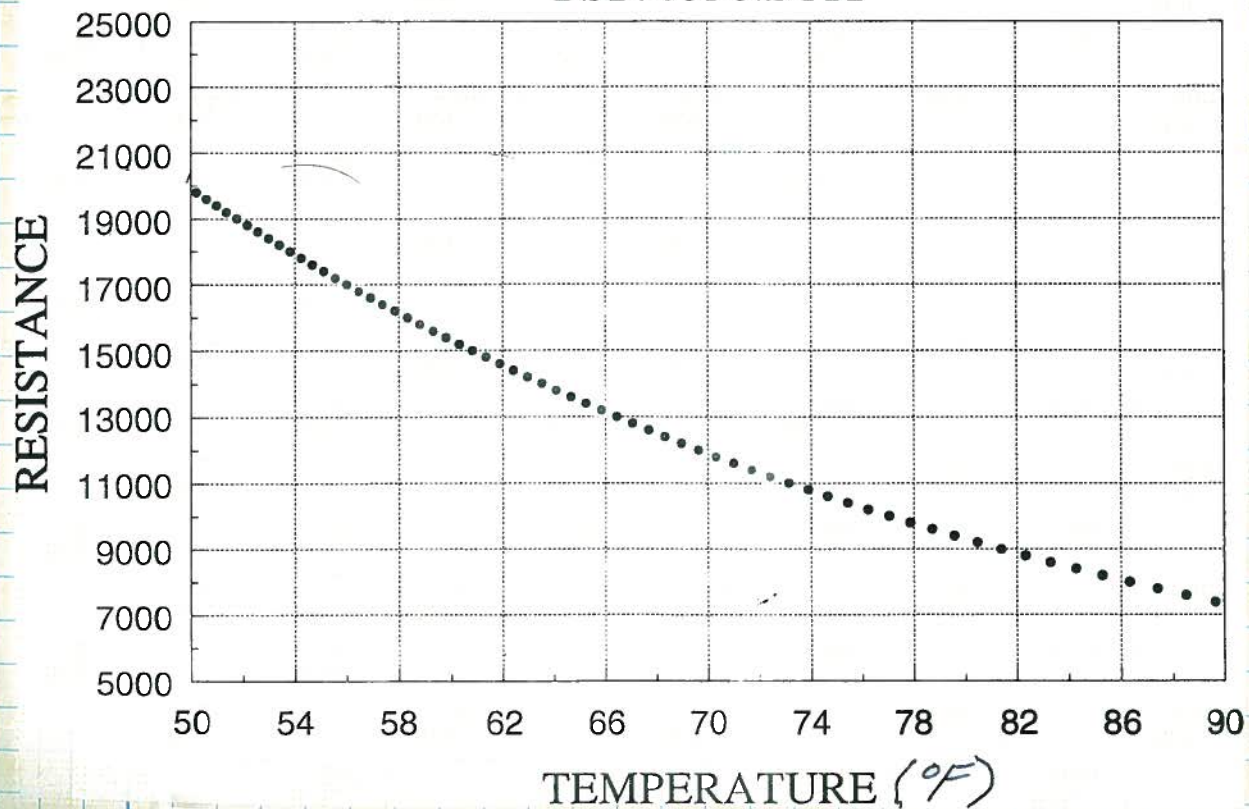
YSI44031.DAT

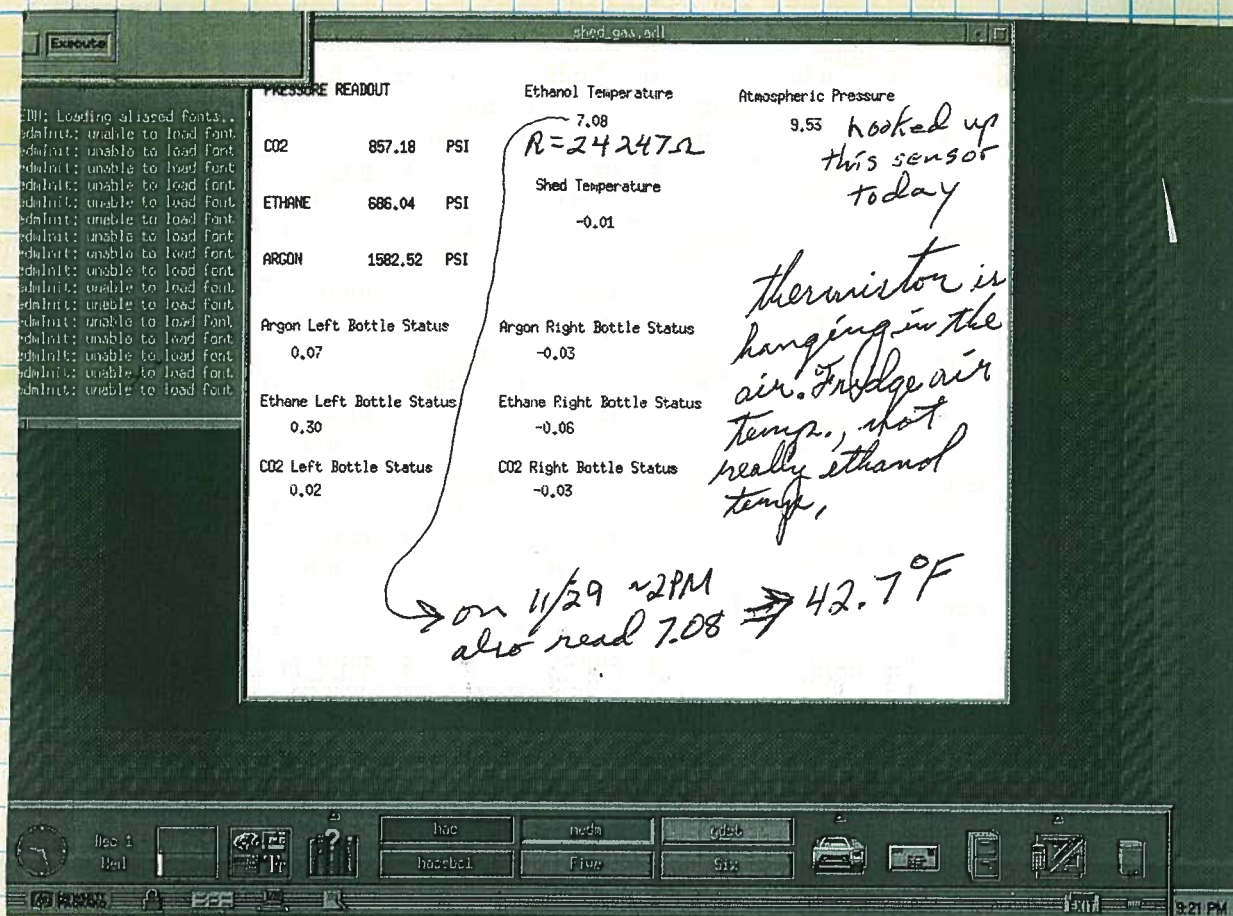


YSI44036.DAT



YSI44036.DAT





Ch 36 seems bad in the APC. Moved, but thermistor into Ch 60. This was ~1hr after I changed channels. See the next page.

827.1	2940	955.6	1440	11418	1240
208.2	2940	685.6	9440	12374	0420
154.2	1940	085.6	9440	849.6	6140
915.5	0940	955.6	1440	557.55	8140
320.0	6940	033.6	8440	5.882	0440
955.1	8540	245.6	0440	4.916	9140
941.2	1540	085.6	1440		
928.8	3940	165.6	0440		
845.6	5940	555.6	6340		
127.6	1940	5.555.6	0340		
555.6	2940	155.6	0440		
105.6	2940	310.6	9540		
165.6	1940	55.6	0440		
525.6	0940	02.6	1440		
515.6	6140	05.6	0440		
525.6	8140	02.6	2240		

Dec 1, 1999

13:53:29

Beamline Controls VME

HPE1313A:0 ADC

+/- 16 Volts MAX

2 PM

Ch16	4.925	Ch32	5.27	Ch48	5.292
Ch17	3.867	Ch33	5.29	Ch49	5.306
Ch18	3.705	Ch34	5.29	Ch50	5.364
Ch19	3.597	Ch35	5.32	Ch51	5.407
Ch20	5.360	Ch36	4.925	Ch52	5.307
Ch21	4.119	Ch37	5.336	Ch53	5.369
	10441	Ch38	5.347	Ch54	5.391
		Ch39	5.350	Ch55	5.308
		Ch40	5.351	Ch56	3.384
		Ch41	5.320	Ch57	2.149
		Ch42	5.330	Ch58	1.395
		Ch43	5.328	Ch59	0.870
		Ch44	5.405	Ch60	0.564
		Ch45	5.389	Ch61	0.372
		Ch46	5.324	Ch62	0.223
		Ch47	5.324	Ch63	0.166

Dec 1, 1999

20:10:46

Beamline Controls VME

HPE1313A:0 ADC

+/- 16 Volts MAX

8 PM
smaller gapsmaller gap $\Delta = 10 \text{ mV}$ before moving
Ch36 to Ch60
increased
temperature

Ch16	4.896	Ch32	5.26	Ch48	5.297
Ch17	3.870	Ch33	5.28	Ch49	5.314
Ch18	3.729	Ch34	5.27	Ch50	5.351
Ch19	3.650	Ch35	5.31	Ch51	5.373
Ch20	5.350	Ch36	4.896	Ch52	5.298
Ch21	4.109	Ch37	5.314	Ch53	5.361
		Ch38	5.327	Ch54	5.374
		Ch39	5.328	Ch55	5.315
		Ch40	5.327	Ch56	3.340
		Ch41	5.307	Ch57	2.135
		Ch42	5.314	Ch58	1.384
		Ch43	5.312	Ch59	0.888
		Ch44	5.389	Ch60	0.565
		Ch45	5.379	Ch61	0.370
		Ch46	5.323	Ch62	0.229
		Ch47	5.321	Ch63	0.168

Dec 1, 1999

20:14:51

Beamline Controls VME

HPE1313A:0 ADC

+/- 16 Volts MAX

8PM

Ch16	4.897	Ch32	5.26	Ch48	5.299
Ch17	3.884	Ch33	5.28	Ch49	5.316
Ch18	3.729	Ch34	5.27	Ch50	5.351
Ch19	3.645	Ch35	5.31	Ch51	5.372
Ch20	5.350	Ch36	4.897	Ch52	5.297
Ch21	4.122	Ch37	5.313	Ch53	5.361
		Ch38	5.329	Ch54	5.374
		Ch39	5.330	Ch55	5.318
		Ch40	5.329	Ch56	3.346
		Ch41	5.309	Ch57	2.140
		Ch42	5.316	Ch58	1.382
		Ch43	5.313	Ch59	0.896
		Ch44	5.388	Ch60	5.295
		Ch45	5.378	Ch61	3.452
		Ch46	5.324	Ch62	2.167
		Ch47	5.322	Ch63	1.435

After moving
Ch 36 to Ch 60

increased
gap

12/2 $\Delta = 11mV$
11:30 AM

increased
gap, $\Delta = 28mV$

11697
decreased
temperature

Ch16	4.995	Ch32	5.34	Ch48	5.359
Ch17	3.877	Ch33	5.35	Ch49	5.385
Ch18	3.741	Ch34	5.35	Ch50	5.422
Ch19	3.634	Ch35	5.39	Ch51	5.435
Ch20	5.388	Ch36	4.936	Ch52	5.335
Ch21	4.104	Ch37	5.331	Ch53	5.403
		Ch38	5.413	Ch54	5.399
		Ch39	5.415	Ch55	5.389
		Ch40	5.413	Ch56	3.418
		Ch41	5.401	Ch57	2.172
		Ch42	5.405	Ch58	1.394
		Ch43	5.403	Ch59	0.942
		Ch44	5.432	Ch60	5.371
		Ch45	5.401	Ch61	3.519
		Ch46	5.382	Ch62	2.163
		Ch47	5.397	Ch63	1.447



Dec 2, 1999

20:32:07

Beamline Controls VME

HPE1313A:0 ADC

+/- 16 Volts MAX

Ch16	4.922	Ch32	5.33	Ch48	5.353
Ch17	3.777	Ch33	5.35	Ch49	5.362
Ch18	3.606	Ch34	5.35	Ch50	5.392
Ch19	3.625	Ch35	5.38	Ch51	5.401
Ch20	5.361	Ch36	4.922	Ch52	5.330
Ch21	4.168	Ch37	5.382	Ch53	5.383
		Ch38	5.401	Ch54	5.381
		Ch39	5.403	Ch55	5.373
		Ch40	5.402	Ch56	3.337
		Ch41	5.388	Ch57	2.152
		Ch42	5.395	Ch58	1.400
		Ch43	5.393	Ch59	0.876
		Ch44	5.423	Ch60	5.363
		Ch45	5.395	Ch61	3.479
		Ch46	5.373	Ch62	2.223
		Ch47	5.370	Ch63	1.448

Dec 2, 1999

21:04:39

Beamline Controls VME

HPE1313A:0 ADC

+/- 16 Volts MAX

Ch16	4.879	Ch32	5.30	Ch48	5.309
Ch17	3.625	Ch33	5.32	Ch49	5.318
Ch18	3.428	Ch34	5.32	Ch50	5.342
Ch19	3.587	Ch35	5.36	Ch51	5.359
Ch20	5.334	Ch36	4.879	Ch52	5.314
Ch21	4.083	Ch37	5.367	Ch53	5.363
		Ch38	5.379	Ch54	5.364
		Ch39	5.383	Ch55	5.320
		Ch40	5.384	Ch56	3.310
		Ch41	5.360	Ch57	2.128
		Ch42	5.369	Ch58	1.379
		Ch43	5.369	Ch59	0.880
		Ch44	5.407	Ch60	5.344
		Ch45	5.386	Ch61	3.473
		Ch46	5.344	Ch62	2.200
		Ch47	5.324	Ch63	1.431

Dec 2, 1999

21:07:35

Beamline Controls VME

HPE1313A:0 ADC

+/- 16 Volts MAX

Ch16	4.876	Ch32	5.30	Ch48	5.306
Ch17	3.628	Ch33	5.32	Ch49	5.313
Ch18	3.428	Ch34	5.32	Ch50	5.335
Ch19	3.602	Ch35	5.35	Ch51	5.356
Ch20	5.332	Ch36	4.876	Ch52	5.314
Ch21	4.092	Ch37	5.364	Ch53	5.361
		Ch38	5.377	Ch54	5.363
		Ch39	5.381	Ch55	5.320
		Ch40	5.382	Ch56	3.333
		Ch41	5.357	Ch57	2.134
		Ch42	5.365	Ch58	1.379
		Ch43	5.365	Ch59	0.885
		Ch44	5.403	Ch60	5.342
		Ch45	5.384	Ch61	3.479
		Ch46	5.340	Ch62	2.186
		Ch47	5.318	Ch63	1.447

shed_temp.adl

Ethanol Temperature Atmospheric Pressure
7.19 9.51

Shed Temperature

-0.01

12/2 ~11:30AM

Dec 2, 1999

20:32:43

PRESSURE READOUT Ethanol Temperature Atmospheric Pressure

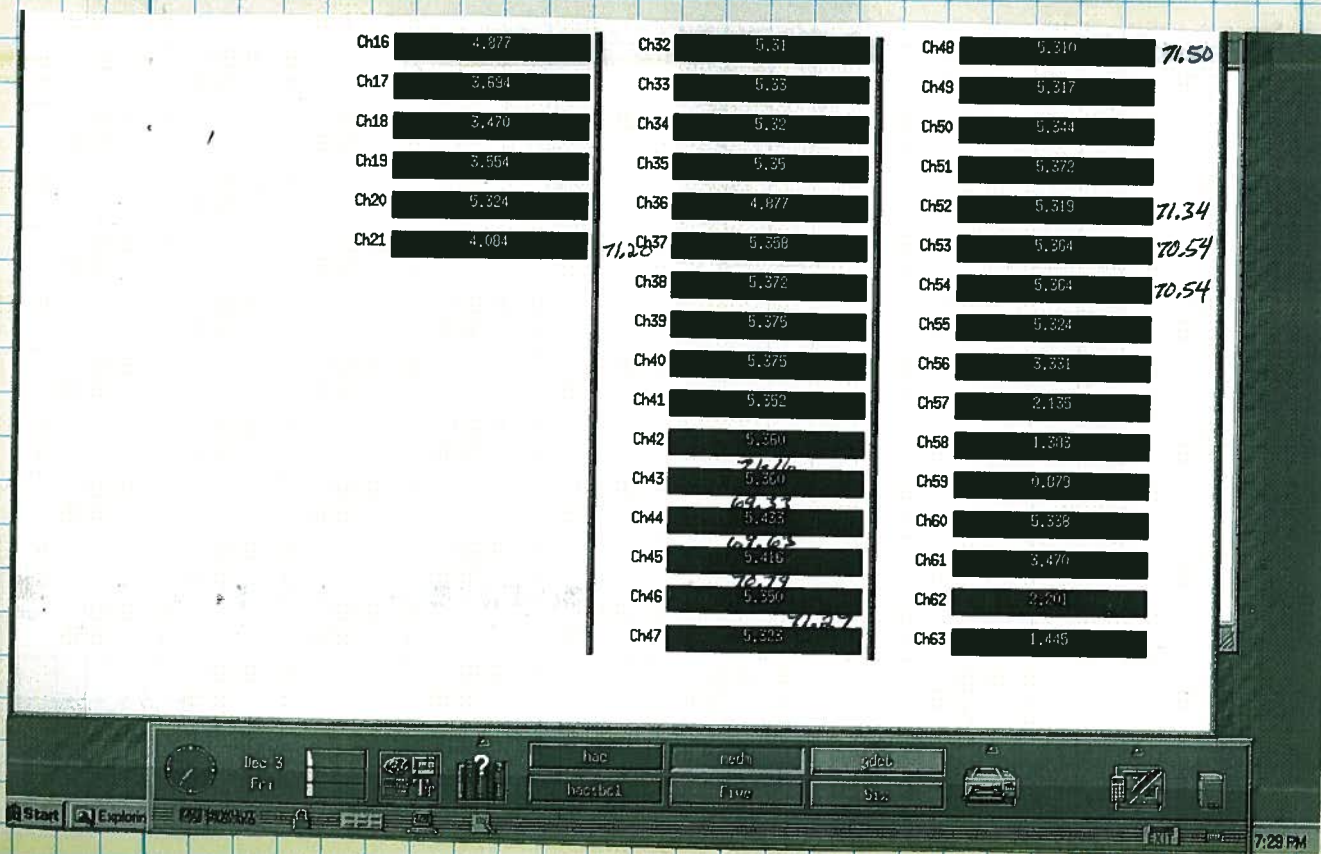
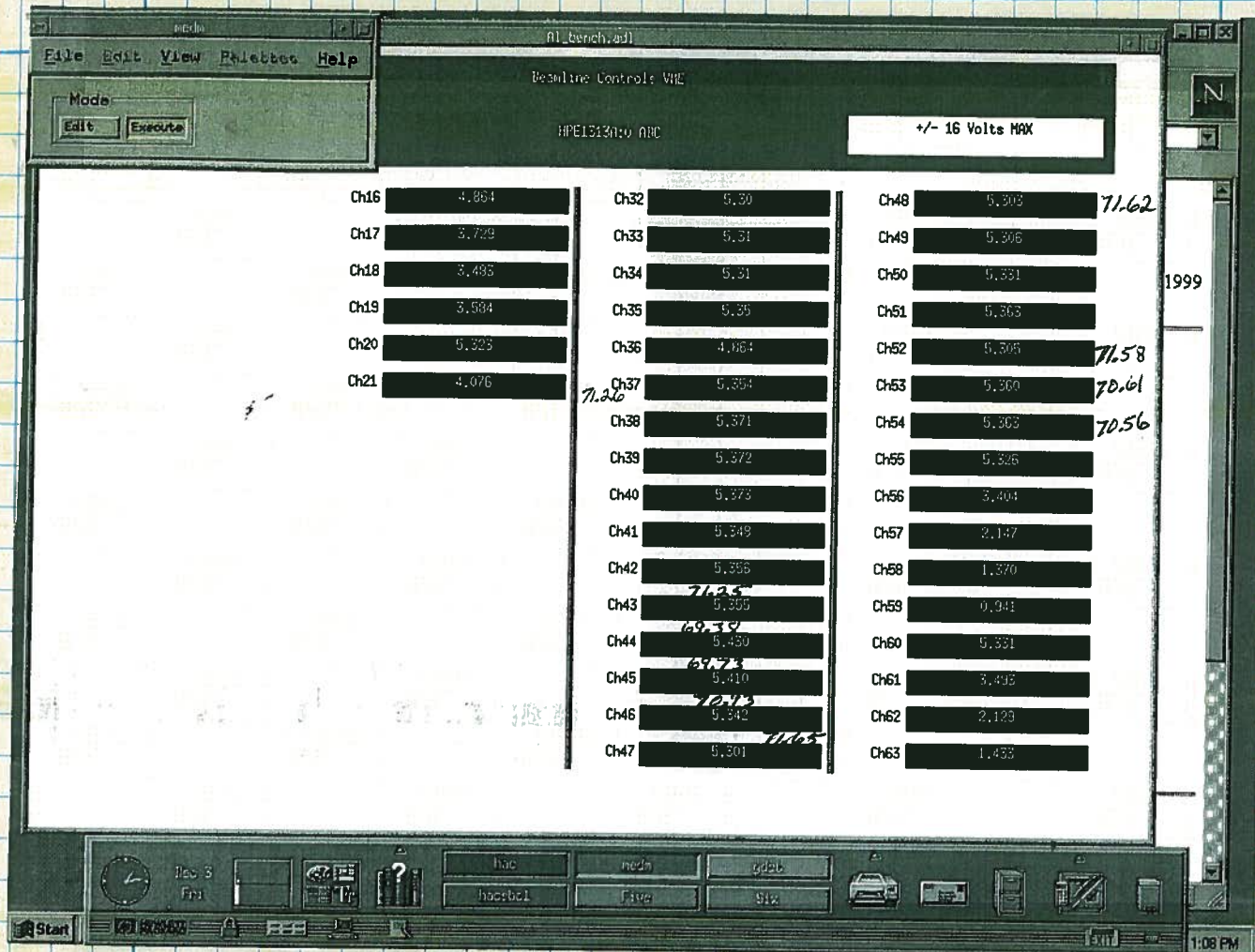
CO2 909.67 PSI 7.19 25587.2 9.51

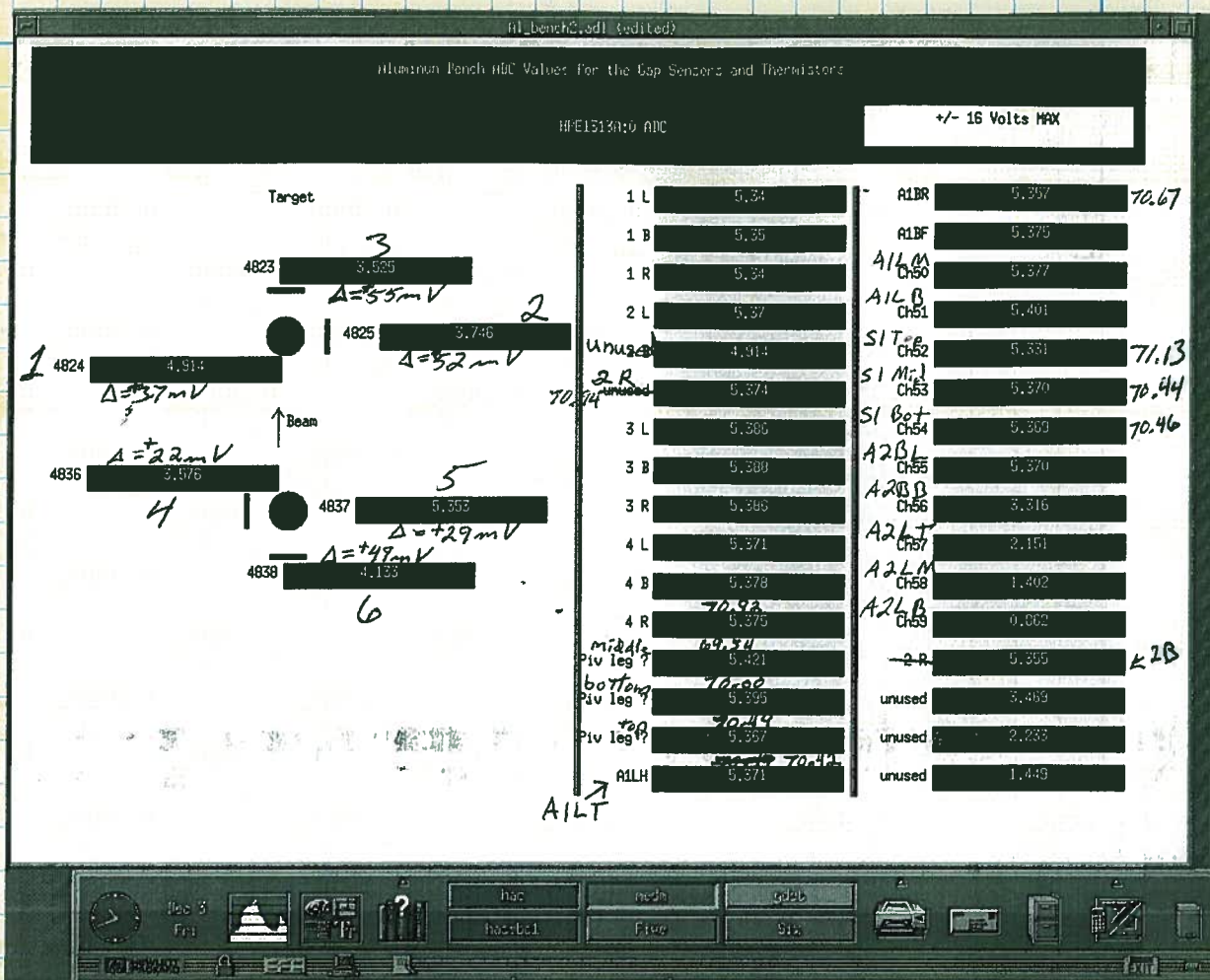
⇒ 40.74°F

ETHANE 743.41 PSI Shed Temperature

-0.01

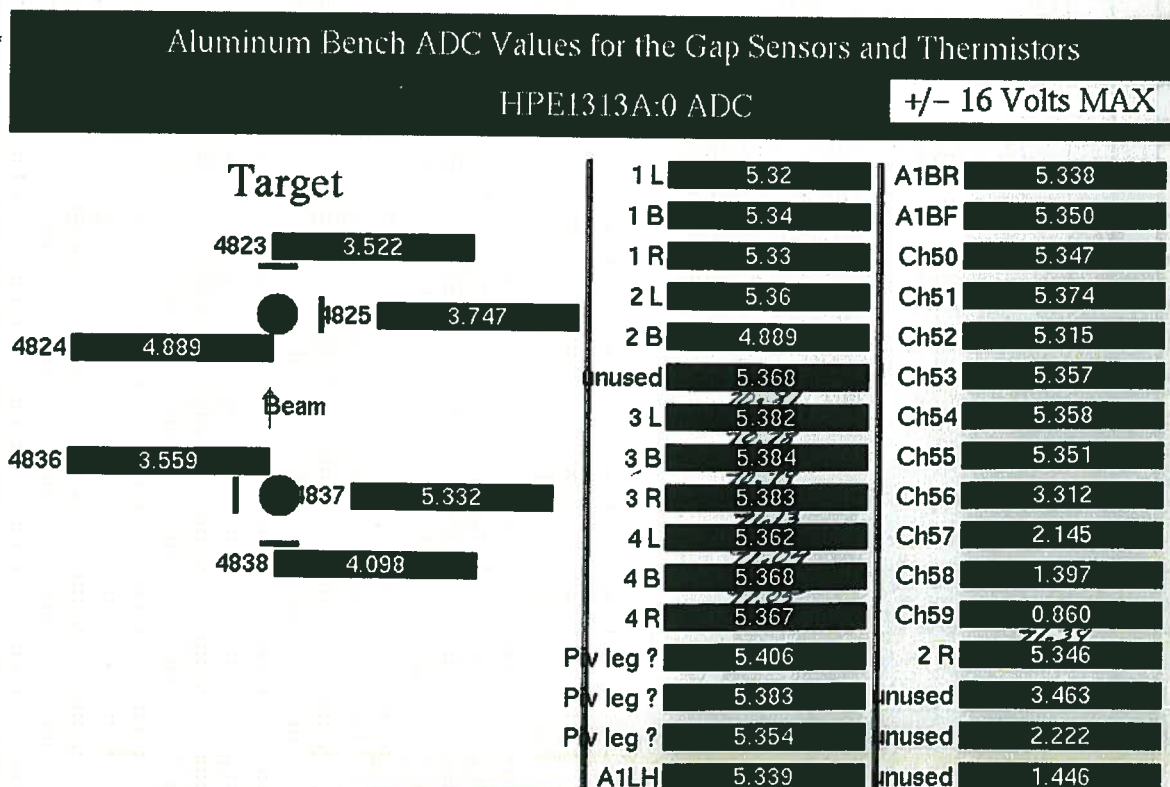
ARGON 985.11 PSI





Dec 4, 1999

12:09:37



Dec 4, 1999

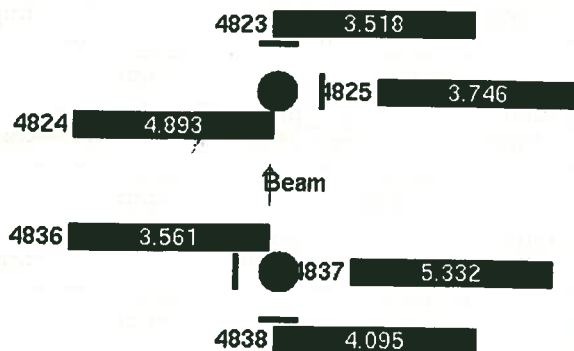
12:10:04

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

HPE1313A:0 ADC

+/- 16 Volts MAX

Target



1 L	5.32	A1 BR	5.336
1 B	5.34	A1 BF	5.349
1 R	5.33	A1 LM	5.347
2 L	5.36	A1 LB	5.374
unused	4.893	S1 Top	5.315
2 R	5.367	S1 Mid	5.358
3 L	5.382	S1 Bot	5.358
3 B	5.383	A2 BL	5.351
3 R	5.382	A2 BB	3.394
4 L	5.362	A2 LT	2.154
4 B	5.369	A2 LM	1.384
4 R	5.367	A2 LB	0.916
S2 Mid	5.407	2 B	5.345
S2 Bot	5.383	unused	3.490
S2 Top	5.353	unused	2.168
A1 LH	5.337	unused	1.449

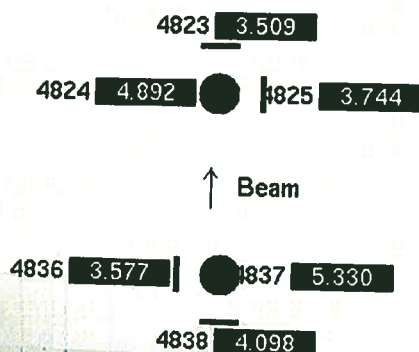
Dec 4, 1999

12:32:14

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L	5.32	2 L	5.36	3 L	5.382	4 L	5.362
1 B	5.34	2 B	5.346	3 B	5.383	4 B	5.368
1 R	5.33	2 R	5.367	3 R	5.382	4 R	5.368
A1 BR	5.336	S1 Top	5.317	A2 BL	5.351	S2 Top	5.353
A1 BF	5.346	S1 Mid	5.357	A2 BB	3.326	S2 Mid	5.407
A1 LT	5.333	S1 Bot	5.358	A2 LT	2.146	S2 Bot	5.383
A1 LM	5.344			A2 LM	1.395		
A1 LB	5.373			A2 LB	0.870		

Target



unused 4.892

unused 3.475

unused 2.221

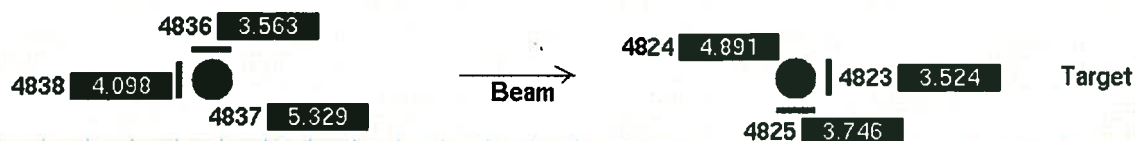
unused 1.448

Dec 4, 1999

12:41:35

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L	5.32	2 L	5.36	3 L	5.381	4 L	5.361		
1 B	5.34	2 B	5.344	3 B	5.382	4 B	5.368		
1 R	5.33	2 R	5.367	3 R	5.382	4 R	5.366		
	A1 BR	5.334	S1 Top	5.308	A2 BL	5.350	S2 Top	5.353	
unused	4.890	A1 BF	5.347	S1 Mid	5.357	A2 BB	3.372	S2 Mid	5.406
	A1 LT	5.334	S1 Bot	5.359	A2 LT	2.149	S2 Bot	5.383	
unused	3.494	A1 LM	5.346		A2 LM	1.383			
unused	2.163	A1 LB	5.373		A2 LB	0.918			
unused	1.441								

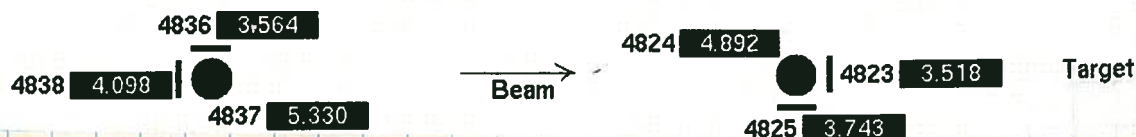


Dec 4, 1999

12:41:56

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L	5.32	2 L	5.36	3 L	5.382	4 L	5.362
1 B	5.34	2 B	5.344	3 B	5.382	4 B	5.368
1 R	5.33	2 R	5.367	3 R	5.382	4 R	5.367
A1 BR	5.333	S1 Top	5.312	A2 BL	5.350	S2 Top	5.353
A1 BF	5.345	S1 Mid	5.358	A2 BB	3.316	S2 Mid	5.407
A1 LT	5.334	S1 Bot	5.358	A2 LT	2.142	S2 Bot	5.383
A1 LM	5.348			A2 LM	1.391		
A1 LB	5.374			A2 LB	0.880		



Dec 4, 1999

13:14:44

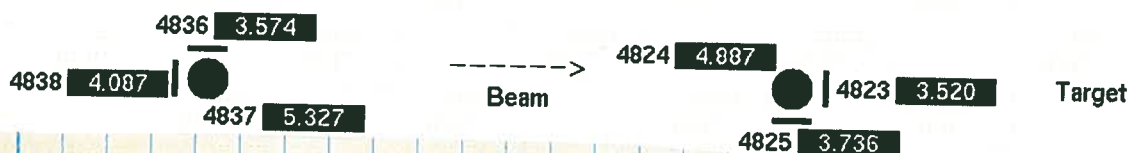
Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.32	2 L 5.36	3 L 5.380	
1 B 5.34	2 B 5.345	3 B 5.382	4 L 5.361
1 R 5.33	2 R 5.365	3 R 5.382	4 B 5.368
			4 R 5.367
A1 BR 5.333	S1 Top 5.315	A2 BL 5.349	S2 Top 5.353
A1 BF 5.342	S1 Mid 5.358	A2 BB 3.357	S2 Mid 5.406
A1 LT 5.329	S1 Bot 5.358	A2 LT 2.150	S2 Bot 5.383
A1 LM 5.344		A2 LM 1.389	
A1 LB 5.372		A2 LB 0.889	

YSI 44036 Thermistor

YSI 44031 Thermistor

Capacitive Gap Sensor

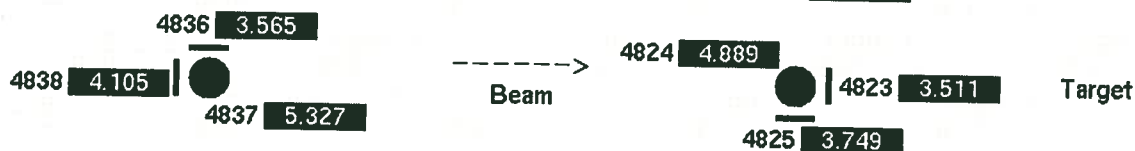


Dec 4, 1999

15:53:59

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.32	2 L 5.36	3 L 5.377 70.89	
1 B 5.34	2 B 5.341 71.47	3 B 5.379 70.86	4 L 5.358 71.20
1 R 5.33	2 R 5.363 71.12	3 R 5.379 70.86	4 B 5.365 71.08
			4 R 5.363 71.12
A1 BR 5.333 71.09	S1 Top 5.312 71.46	A2 BL 5.347 70.84	S2 Top 5.350 70.79
A1 BF 5.345 70.88	S1 Mid 5.355 71.25	A2 BB 3.392	S2 Mid 5.403 70.47
A1 LT 5.338 71.00	S1 Bot 5.357 70.67	A2 LT 2.152	S2 Bot 5.381 70.24
A1 LM 5.344 70.90		A2 LM 1.383	
A1 LB 5.370 70.44		A2 LB 0.918	



YSI 44036 Thermistor

YSI 44031 Thermistor

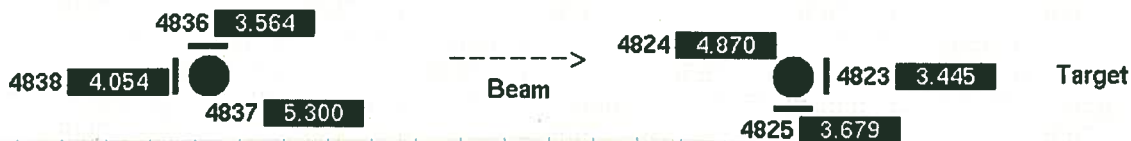
Capacitive Gap Sensor

Dec 4, 1999

21:02:43

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.30 72.14	2 L 5.35	3 L 5.371 70.99	4 L 5.345 71.41
1 B 5.32	2 B 5.340 71.49	3 B 5.374 70.94	4 B 5.353 71.28
1 R 5.32	2 R 5.360 71.16	3 R 5.374 70.94	4 R 5.354 71.26
A1 BR 5.306 72.04 71.57	S1 Top 5.310 71.50	A2 BL 5.315 71.41	S2 Top 5.333 71.09
A1 BF 5.312 71.84 71.46	S1 Mid 5.353 71.28	A2 BB 3.271	S2 Mid 5.397 70.57
A1 LT 5.313 71.93 71.44	S1 Bot 5.353 70.74	A2 LT 2.123	S2 Bot 5.378 70.30
A1 LM 5.329 71.67 71.16		A2 LM 1.385	
A1 LB 5.353 71.28 70.74		A2 LB 0.847	

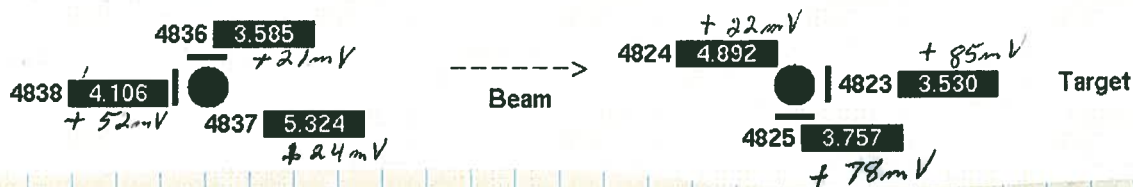


Dec 4, 1999

22:17:39

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

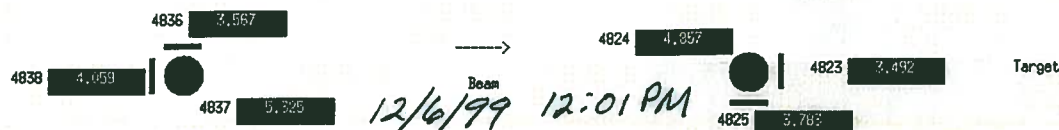
1 L 5.31 71.97	2 L 5.35 71.33	3 L 5.365 71.08	4 L 5.344 71.42
1 B 5.32 71.81	2 B 5.334 71.59	3 B 5.367 71.05	4 B 5.350 71.33
1 R 5.32 71.81	2 R 5.353 71.28	3 R 5.365 71.08	4 R 5.349 71.34
A1 BR 5.332 71.11	S1 Top 5.305 71.58	A2 BL 5.343 70.91	S2 Top 5.335 71.05
A1 BF 5.349 70.81	S1 Mid 5.345 71.41	A2 BB 3.287	S2 Mid 5.394 70.61
A1 LT 5.337 71.02	S1 Bot 5.347 70.84	A2 LT 2.135	S2 Bot 5.376 70.33
A1 LM 5.346 70.86		A2 LM 1.394	
A1 LB 5.370 70.44		A2 LB 0.855	

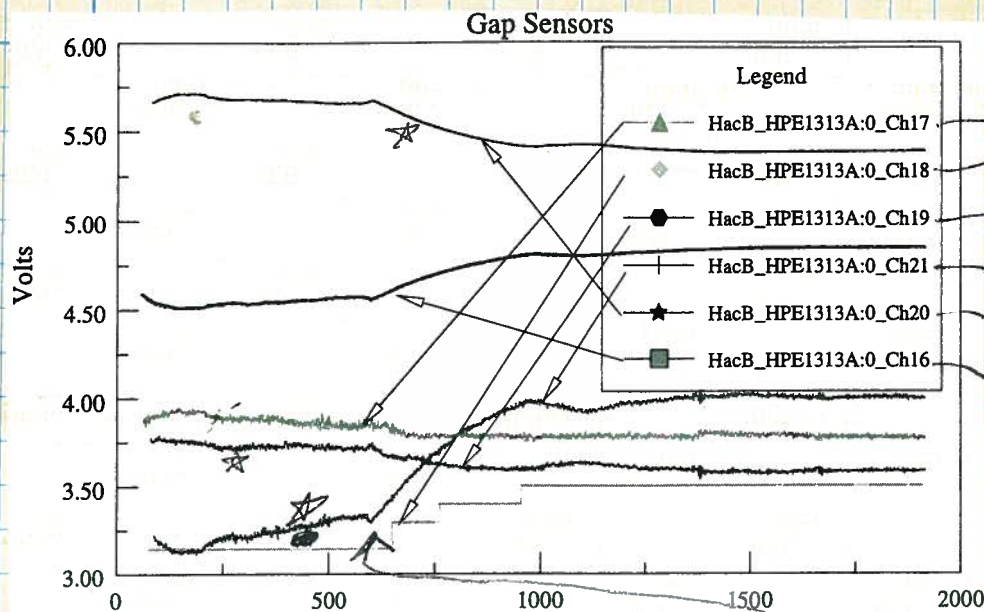


hl_bench4.adl

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.318	2 L 5.351	3 L 5.390	4 L 5.358
1 B 5.329	2 B 5.335	3 B 5.387	4 B 5.364
1 R 5.320	2 R 5.355	3 R 5.395	4 R 5.365
A1 BR 5.325	S1 Top 5.310	A2 BL 5.349	S2 Top 5.350
A1 BF 5.334	S1 Mid 5.355	A2 BB 3.417	S2 Mid 5.404
A1 LT 5.336	S1 Bot 5.395	A2 LT 2.156	S2 Bot 5.379
A1 LM 5.339		A2 LM 1.380	
A1 LB 5.358		A2 LB 0.933	





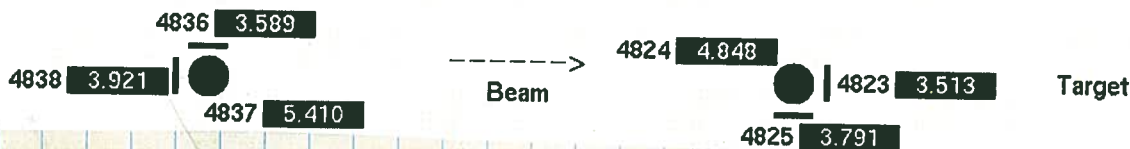
Time 12/6/99
(Starts at ~16:01) (Each Point is 5 Seconds)

Dec 6, 1999

22:47:50

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.315	2 L 5.410	3 L 5.452	4 L 5.374
1 B 5.333	2 B 5.374	3 B 5.442	4 B 5.379
1 R 5.319	2 R 5.410	3 R 5.450	4 R 5.377
A1 BR 5.347	S1 Top 5.306	A2 BL 5.371	S2 Top 5.360
A1 BF 5.360	S1 Mid 5.358	A2 BB 3.411	S2 Mid 5.405
A1 LT 5.352	S1 Bot 5.360	A2 LT 2.161	S2 Bot 5.381
A1 LM 5.367		A2 LM 1.385	
A1 LB 5.393		A2 LB 0.938	



Dec 6, 1999

22:50:25

Aluminum Bench ADC Values for the Gap Sensors and Thermistors

1 L 5.315	2 L 5.410	3 L 5.453	4 L 5.375
1 B 5.333	2 B 5.376	3 B 5.442	4 B 5.381
1 R 5.321	2 R 5.411	3 R 5.450	4 R 5.379
A1 BR 5.350	S1 Top 5.310	A2 BL 5.371	S2 Top 5.361
A1 BF 5.363	S1 Mid 5.359	A2 BB 3.307	S2 Mid 5.406
A1 LT 5.352	S1 Bot 5.362	A2 LT 2.148	S2 Bot 5.382
A1 LM 5.368		A2 LM 1.403	
A1 LB 5.394		A2 LB 0.855	

