

NSCL

2010

 **National® Brand**

COMPUTATION NOTEBOOK

Department NChem / Phys

Subject _____

Name _____

Address Wash. Univ.

43-648

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

Chemistry Storeroom



235

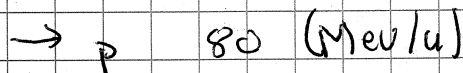
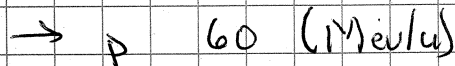
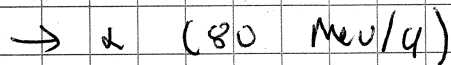
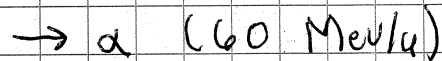
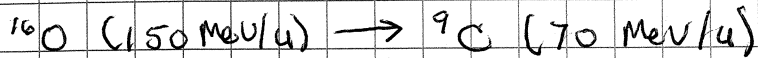
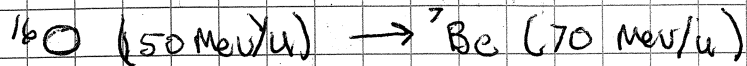
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Made in Canada

Will
Charly
5
506414

& Hi RA Data Base

<http://groups.nsc1.msu.edu/hi-ra>



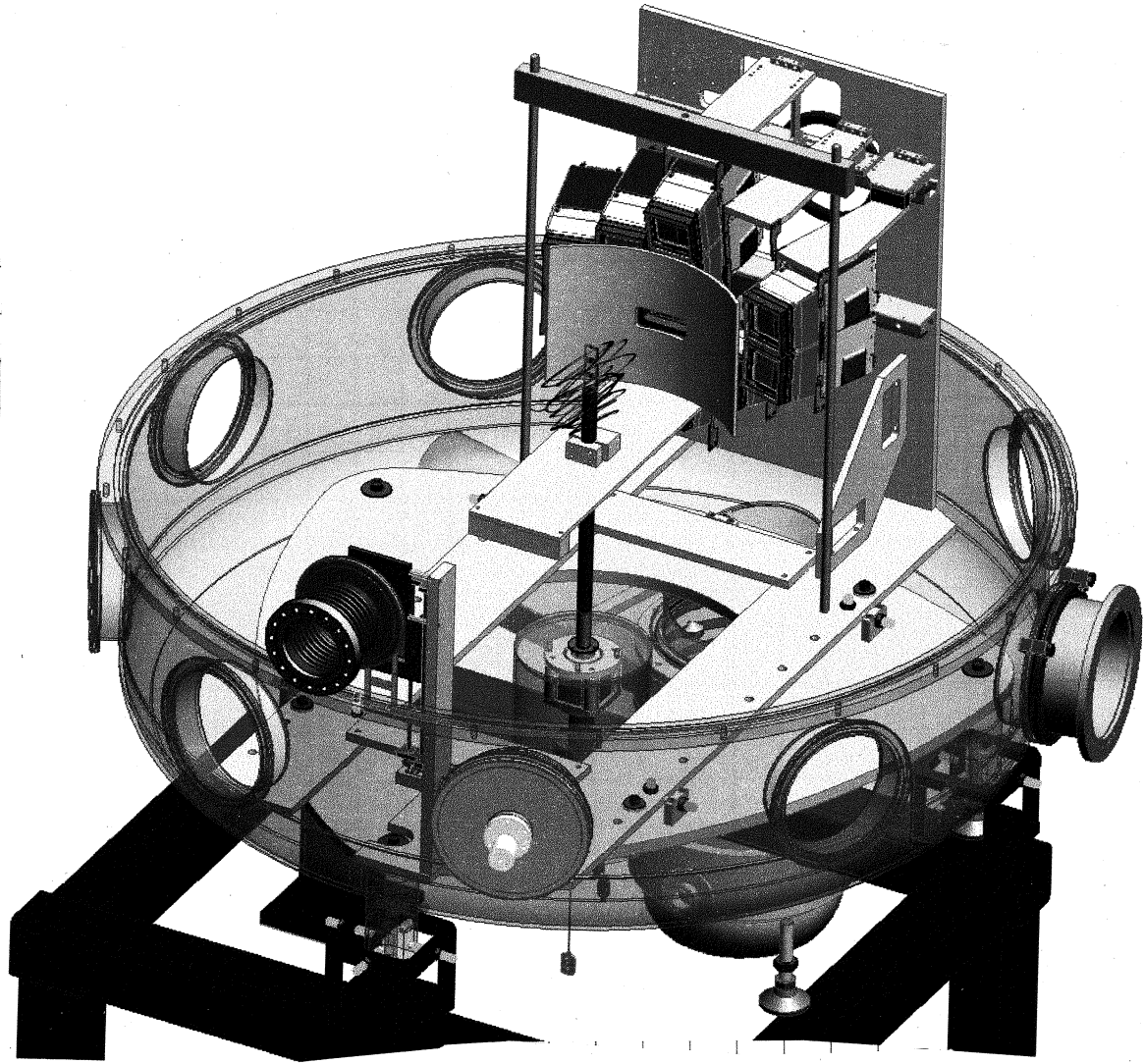
	E_k	Range Al	$E_{\text{loss}} (1500 \mu\text{m Si})$	$E_{\text{loss}} 1 \text{mm scint.}$
^9C	70	5.0 mm	101.5	36.1
^7Be	70	8.6	43.8	15.9
α	70	20 mm	10.7 MeV	
p			2.7 MeV	
^3He	697			3.9 MeV

AT

Deterated $44.2 \text{ mm} \times 66.5 \text{ mm} \times \sim 0.38 \text{ mm} \Rightarrow 2.729 \text{ g}$

R5600u PMT'S $\sim -1000 \text{ V}$, $\sim 1.3 \text{ mA}$ Ser set of 4

Corner	PMT base	R	Bias	Leakage	Peaks
TL	E	0	700	~ 0.95 $50-4$	$\sim 10 \text{ mV}$
TR	F	121K Ω			
BL	A	194			
BR	H	196			



tower	# tels	in plane angle	out-of-plane angles			
1	2	-15		-4		4
2	3	-7.5		-8	0	8
3	4	0	-13	-5		5
4	3	7.5		-8	0	8
5	2	15		-4		4

13

Telescope	Operating Voltage (V)	Silicon Inserted?
0 ✓		230 X
→ 1 ✓		350 X
2 ✓		280 X
3 ✓		365 X
4 ✓		270 X
5		280 X
6 ✓		380 X
7		280 X
8 ✓	The telescope you have at WashU	
9	Has a Silicon but not one with a record I have time to find	
10 ✓		180 X
11 ✓		350 X
12 ✓		410 X
13 ✓		350 X
14		280 X
15		200 X
16 ✓		180 X
17 ✓		300 X
18		220 X
19 ✓		280 X

micron

Telescopes all have mylar of $265 \mu\text{g}/\text{cm}^2$
 Zen De Srent.

HiRA punch through summary

Particle	65 micron dE Si (MeV)	1.5 mm E Si (MeV)	4 cm Csl (MeV)	Loss in Si (1.5 mm) (MeV)
p /	2.45	15.6	115.8	1.84
d	3.17	20.9	154.8	2.48
t	3.68	24.8	183.4	2.96
3He	8.72	54.9	411.1	6.53
4He	9.69	62.1	462.3	7.34
6He	11.21	74.0	548.3	8.72
8He	12.26	82.6	619.1	9.89

- Back

+ Front

chip board	DAC off	ZC2	CFD ref	T _{off}	E _{off}	F+ B-	OK
------------	---------	-----	---------	------------------	------------------	----------	----

thresh

and soldering
Fixed
fuse
as front (+)
ONLY
Back

22							
22	7	512	512	512	646	575	- ✓
17							-
23	-7	512	512	512	646	455	+ ✓
24	15	512	512	512	646	575	- ✓
→ 25	-22	512	512	512	646	455	+ ✓ see below
25	15	512	512	512	646	≠ 575	- ✓
24	-22	512	512	512	646	455	+ ✓
ok at lower thresholds also, but pedestal comes in							
27	15	512	512	512	646	575	- ✓
26	-15	512	512	512	646	455	+ ✓
31	15	512	512	517	646	575	- ✓
29	-19	512	512	512	646	455	+ ✓
30	15	512	512	512	646	575	- ✓
32	-15	512	512	512	646	455	+ ✓
33	15	512	512	512	646	575	- ✓
34	-15	512	512	512	646	455	+ ✓
35	15	512	512	512	646	575	- ✓
36	-13	<u>480</u>	<u>480</u>	<u>483</u>	646	455	+ ✓ fixed ✓
37	15	512	512	512	646	≠ 575	- ✓
38	-15	512	512	512	646	455	+ ✓
25	-17	512	512	512		565 450	+ ✓
17	-15	512	512	512		455	+ ✓

12/28

(also check times with 2 delays)

20	15	512	512	512	350	565	- ✓
28	-15	512	512	512	373	455	+ ch3 no time
28	20	512	512	512	350	565	- ch3 no time
20	-15	512	512	512	373	455	+ ✓
17							- double peaks
23							+ signals narrow on 2nd chip
39	15	default				565	- ✓
40	-15	default				455	+ ✓
40	15	480	480	485		565	- ✓
39	15	480	480	483		455	+ ✓
42	15	default				565	- ✓
41	-15	480	480	485		455	+ ✓
41	20	default				565	- ✓
41	20					455	+ ✓

needed higher thresh

Chipboard	Chipboard	Thresh	DAC off	ZCZ	CFD ref	Toff	Eoff	Ft B-	OK	
	43	15	512	512	512	350	565	-	Chip missing	
	44	-15	512	512	512	373	455	+	✓	
	44	15	512	512	512	350	565	-	✓	
Only Front →	43	-15	512	512	512	373	455	+	✓	
12/29	46	15	defaults			350	565	-	✓	
	48	-15	480	480	483	373	455	+	✓	
	48	15	defaults					-	✓	
	46	-15	defaults					+	✓	
	50	15	defaults			350	565	-	✓	
	51	-15	480	480	483	373	455	+	✓	
	51	15	defaults					-	✓	
	50	-15	defaults					+	✓	
	23		480	480	485			-	spectra not coming in + narrowing	
	17							+	double peaks + narrowing	
	52	15	defaults					-	✓	
	53	-15	defaults					+	✓	
	53	15	480	480	485	350	565	-	✓	
	52	-15	defaults			373	455	+	✓	
	17							-	double peaks on 17	
	23							+	spectra not coming in on 23	
12/30	45		defaults - tried making t offset, changing delay cables						-	E okay, no times
	34		defaults						+	✓
	54		defaults						-	✓
	45		defaults defaults							E okay, no times
	45		Jon fixed times, but not checked with Silicon/Source							Times OK checked on computer

CsI(TL)

the bias, collect e⁻, Inverting PA ⇒ the output

Disc. the input ; Shaper - noninverting



GA are 60 mV/MeV (Si) ~ 3 mV/MeV for protons in CsI

	Input	Output	Gain
Max	300 MeV	~ 900 mV	3
Max	330 MeV	~ 1000 mV	3
Max	70 MeV	~ 210 mV	3

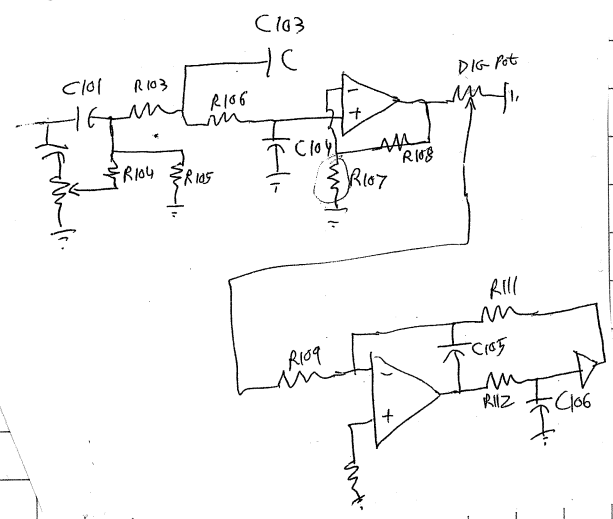
MSU Shaper CS1

- R106 1K
- R107 ~~120K~~ → 820Ω
- R108 8.2K
- R111 27K → 10K
- R112 3.3K

New 12/09

8.2K / 1.2K

- C101 472
- C103 10PF
- C104 470PF
- C105 27PF
- C106 27PF



Dec 19th noise investigation

8.79

RUN 15 all tie (Front) at 0.35V

788

- 513

5100

3.36

2388

$\frac{3360 \text{ KeV}}{2388 \text{ ch}} = 1.41$

{ ch 7 - front 240V } 33 ~~ch~~ ch 50A PP 500 mV
 { ch 13 } 46 1000 mV
 { ch 7 } 50 200 mV
 { ch 13 } 300 mV

7424

5100

2324

Microphatics problem

Potential sources

cables

mylar soil

IS run + 290 on back

ch 7

200 mV

ch 13

100 mV

H:RA

Tel

V

μA

0

290 V

1.27 μA

1.8M

*

*

*

*

*

*

5.8M

1.8M

*

4 Jan 2010

MB1

Blue tape Motherboard box

slot	Chipboard	Tel	slot	Chipboard	Tel
∅	1		9	* 43	F [3]
B	2	20	10	—	∅
F	3	* 39	11	44	B [2]
∅	4	—	12	* 46	F
B	5	* 40	13	—	∅
F	6	* 41	14	48	B
∅	7	—	15	* 50	F [1]
B	8	42	16	—	∅

MB3

White tape Motherboard box

Slot	Chipboard	Tel	Slot	Chipboard	Tel
1	—		9	26	[12]
2	22	[14]	10	—	
3	37		11	* 31	[11]
4	—		12	29	
5	24	[13]	13	—	
6	25		14	30	[10]
7	—		15	32	
8	27	[12]	16	—	

MB2

Green tape Motherboard box

Slot	chipboard	Tel	slot	chipboard	Tel
1	—		9	38	[7]
2	33	[9]	10	—	
3	34		11	52	[6]
4	—		12	53	
5	35	[8]	13	—	
* 6	36		14	—	
7	—		15	—	
8	51	[7]	16	—	

Biasing Si detectors - Problem Telescopes.

5 Jan 2010

Telescope	MB	slots	Bias (V)	Leakage (μA)
11	3	11, 12	25	1.92
10	3	14, 15	25	2.04
7	2	8, 9	25	2.04
6	2	11, 12	25	2.1
4	1	5, 6	25	2.04
3	1	8, 9	25	2.08
2	1	11, 12	25	1.98
1	1	14, 15	25	1.68

Possible work around:

Cut last 2 wires on cable in MB box (grounds)

→ Tried with Telescope 10 (MB3) and

leakage current seems to behave correctly ⇒ 1.72 μA
@ 395 V

Bias up one si in each MB box to test Readout w/3 MB

Tel	MB	slots	Bias (V)	Leakage (μA)
5	1	2, 3	350	1.70
9	2	2, 3	310	1.10
10	3	14, 15	395	1.70 1.70 1.72

Now Fired up MB3 only:

Tel	slots	Bias (V)	Leakage (μA)
10	14, 15	395	1.76
11	11, 12	310	1.10
12	8, 9	420	1.96
13	5, 6	300	2.46
14	2, 3	410	1.76

5 Jan 2010

MB3

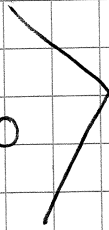
	<u>Chip board</u>	<u>channel</u>	<u>T#</u>	<u>F/B</u>	
	3	16	17	B	Missing
	3	0	17	B	"
	7	0	19	B	"
turn off ←	7	11	19	B	super noisy (triggers)
	7	16	19	B	missing
	9	0	3	B	"
	9	8	3	B	sporadic noise
	9	16	3	B	missing
	10	16	3	F	(missing)
	10	0	3	F	(and noisy)
	8	0	19	F	missing/wavy
*	8	1	19	F	super noisy (wavy)
	8	16	19	F	missing
	4	31	17	F	missing
	2	0	13	F	missing

6 Jan 2010

Cs.I power

Box Channel name

1	PA1	PA6
2	PA0	PA5
3		PA CSIO
4		PA7



changed channel names
to Box 1...4

L → R

11 TDC BBBB

12 TDC EEEE

14 ADC FFFF

15 ADC CCCC

17 TDC AAAA

18 QDC 8888

20 registrar 4444

RUN 47

CsI pulser calib 0.2 first step to 8.2 V in 17 steps of 0.50V

gains set at 100.

Bia Problem Si

det # 6 Front end channel missing

det # 4 Back thresholds

12

Run 50²² Th 4,11 Back Thresholds increased ~~to 200~~

Run 51 Th + Cosmic in Trigger

Run 52 Th + cosmic overnight run (Sat night)

10 Jan
SUN

Run 54 Th + ~~series~~ CsI in trig.

Adjusted thresh on tel 6,7 and CsI tdc.

Also fixed Tel 6 cable

TL # 5 in well set-up tripped at ~7pm
It will not now hold ~~to~~ 350 at near normal ρ

V _{CS}	100 V	1.08 μ A
	150 V	2.0 1.96
	175 V	2.52

Nominal 350 V 2.32 μ A
was doing this \nearrow for
last few days

air	50 V	0.62	Sun night	Cooling ON, CsI off
	100 V	1.08		

~~8:30 am~~

8:30 am

Mon Jan 11

air	50V	0.46
	100V	0.84

Si tests M evening

wa	msu	v	lc		
#1	T9	350	2.02	} nominal	Tower slot 15
#5	T7	450	1.51		Tower slot 3

#1	T9	350	1.96	} actually running
#5	T7	400	1.32	

Preliminary test M evening

{ #1 1 missing on back strip #16
 { #5 1 " " " " " " 6

Tu 4m

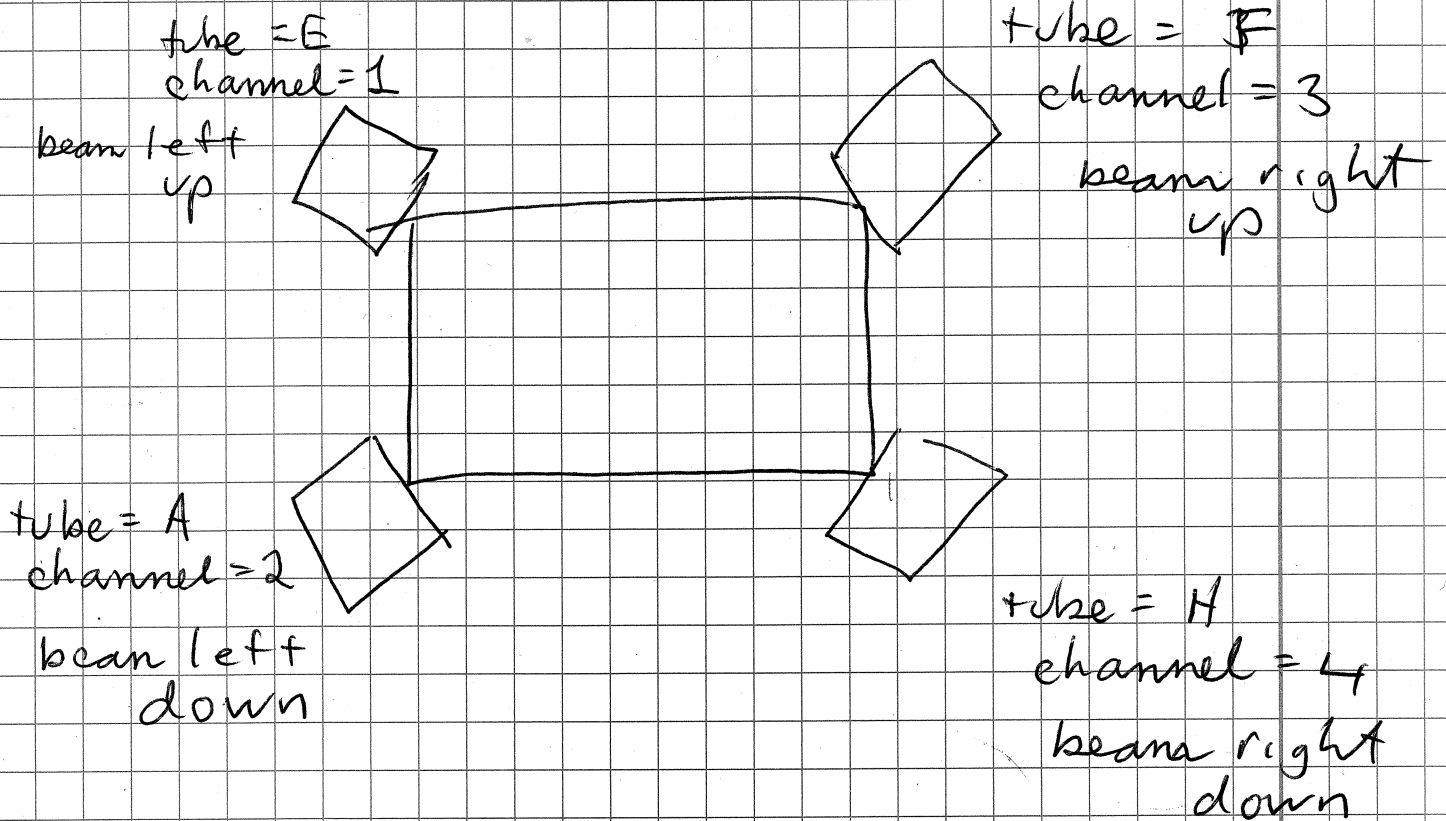
#1	T9	350	2.02	2.02
#5	T7	400	1.36	

Time test

using stretched 3 DRF
 delay 3 (150) + mm
 width 245

All times work except MB₃ slot 15

Active Target



Scalars

- 1 = Back OR MB1
- 2 = Front OR MB1
- 3 = Back OR MB2
- 4 = Front OR MB2
- 5 = Back OR MB3
- 6 = Front OR MB3
- 7 = Random pulser not Back "OR"
- 8 = Random pulser not Front "OR"
- 9 = Random pulser raw
- 10 = CSI "OR"
- 11 = Dirty Triggers
- 12 = Clear Triggers
- 13 = Random pulser not computer busy
- 14 = XFP
- 15 = Active target

Distances

1-12-18

Center detector $34 \frac{7}{16}$ " $\frac{1}{16}$ " from thin targets to front of HIRA package

$34 \frac{7}{16}$ - $.5$ " } Active target to Hira package

$33 \frac{1}{16}$

det #13 $34 \frac{15}{16}$ " Si to thin target

$34 \frac{7}{16}$ " Si to Active target

$\frac{3}{4}$ " from Hira front to Si

$35 \frac{1}{5}$ ~~90.2~~ ~~85.8~~ cm from thin target to Si for center two detectors

\uparrow wrong 4.33 cm

~~33.81~~ ~~85.88~~ cm from Active target to Si

~~34.44~~ $34 \frac{9}{16}$ " 88.7 cm from thin target to det 13

10 cm

$34 \frac{4}{16}$ " 87.5 from Active target to det 13

$\frac{13}{16}$ " thin to Active target 2.06 cm

35.5 thin to S_c center #4
 $35 + \frac{1}{8} - .5$
 $34 \frac{5}{8} = \cancel{34 \frac{5}{8}}$
 Active to S_c
 $\Delta =$
 ~~$35 \frac{1}{8} + \frac{1}{8} - \frac{1}{8}$~~

cm		
90.2	$35.5''$	thin to S_c Center #4
87.9	$34 \frac{5}{8}''$	active to S_c Center #4

$\Delta = 2.3 \text{ cm}$

	"	
88.7	34.93	thin to S_c Center #13
87.2	34.34	Active " " "

$\Delta = 1.5 \text{ cm} ?$

measured Active to thin
 $= \frac{13''}{16''} = 2.06 \text{ cm}$

21
if radius = 63 cm

~~from~~ thin to radius center = 27.2 cm
Active " " " = 24.9 cm

Run 58

1-12-10

Si Front + CSI trigger 10:30pm
²²⁸Th source.

Active target QDC

0 = Left up

1 = Left down

2 = right up

3 = right down

~~Active~~ k = total.

Active target TDC

0 = trigger → sum Active

1 = trigger → Front Si OR

Ended 58 9:40 1/13/10 time of run = 10:41:47.50
between 3-4 GB.

RUN 58 Summary

WashTel

threshold issues

bad chips

other

1 B

Ch 23, 25, 31 ok
all others too low

ch 16, 21; 0, 1, 5, 6 are
neighbors

offsets too low

1 F

ch 0-8, 16-24 too low

ch 0 doesn't look right

offset wrong?

2

B, F thresh ok

F ch 0 few cts, 14, 27 gain wrong

3

B ~~ok~~ most channels low
F ok thresh

ch 0 odd

4

B all ch. low
F ok

5

B ok
F ~half low

ch 6; 21, 22 are neighbors

6

B all low
F ~~ok~~ ok (small pedestals)

7

B all low
F all low, chip 0 worse

8

B all slightly low
F ok

ch. 24; 8, 9 are neighbors
ch 17 odd

9

B ok (small)
F ok (small)

10

B ok (small)
F ok

ch 0 odd

11

B all slightly low
F all ok

12

B all slightly low
F ok

ch 0 odd

13

B ok
F ~half low

~~ch 17 has intense "B" peak~~ ch 17 has intense "B" peak

14

B most low; 11, 13 high
~~F ch 11, 13 high thresh~~
F ok

ch 0; ch 16 neighbor?

All E offsets seem too low (pedestal \leftarrow 1000 ch, ^{some} even @ 0 ch ans)
But settings haven't changed.

Leakage Currents.

WLP MSU	Cell 1 T4	2 T6	3 T16	4 T11	5 T7	6 T10	7 T8	8 T0	9 T2	10 T3	11 T19	12 T12	13 T17	14 T13	CSI power
Volts	300	440	220	350	425	210	220	290	310	395	310	420	300	410	Yes
day/time	1.80 μ A	1.68 μ A	1.70	1.56	1.40	1.38	1.70	0.78	0.92	1.56	1.26	1.86	1.98	1.40	Yes
Jan 930															
15:00	1.80	1.68	1.74	1.58	1.42	1.40	1.72	0.78	0.94	1.56	1.28	1.90	2.02	1.42	Yes
19:30	1.52	1.36	1.26	1.16	1.08	1.22	1.44	0.58	0.76	1.36	1.00	1.40	1.74	1.22	Just on
Jan 8:00	1.96	1.68	1.70	1.56	1.42	1.38	1.70	0.78	0.92	1.56	1.32	1.40	1.98	1.40	
Jan 7:00	1.82	1.72	1.72	1.58	1.42	1.42	1.72	0.80	0.94	1.56	1.34	1.88	2.02	1.44	
Jan 1:00	1.84	1.74	1.76	1.60	1.42	1.44	1.74	0.80	0.94	1.58	1.36	1.88	2.04	1.44	
4:00	1.84	1.72	1.76	1.60	1.46	1.44	1.74	0.80	0.94	1.58	1.38	1.90	2.04	1.44	Yes
7:35	1.84	1.74	1.76	1.68	1.48	1.44	1.74	0.88	0.94	1.58	1.38	1.92	2.04	1.44	
8:30	1.84	1.74	1.76	1.60	1.48	1.44	1.74	0.80	0.94	1.58	1.38	1.94	2.04	1.44	Yes
10:40	1.84	1.74	1.76	1.60	1.50	1.44	1.74	0.80	0.94	1.58	1.40	1.96	2.04	1.44	Yes
12:55	1.84	1.74	1.76	1.60	1.50	1.44	1.74	0.80	0.94	1.58	1.40	1.96	2.04	1.44	Yes
2:16	1.84	1.74	1.76	1.60	1.52	1.44	1.74	0.80	0.94	1.58	1.42	1.98	2.04	1.44	Yes
4:46	1.84	1.74	1.76	1.60	1.52	1.44	1.74	0.80	0.94	1.58	1.44	2.00	2.04	1.46	Yes
6:45 pm	1.84	1.74	1.76	1.60	1.52	1.44	1.74	0.80	0.94	1.58	1.44	2.00	2.04	1.46	Yes
8:55 pm	1.84	1.74	1.76	1.60	1.52	1.44	1.74	0.80	0.94	1.58	1.44	2.04	2.04	1.46	Yes
11:00 pm	1.84	1.74	1.76	1.60	1.52	1.44	1.74	0.80	0.94	1.58	1.44	2.04	2.04	1.46	Yes
12:48 am	1.84	1.74	1.76	1.60	1.52	1.44	1.74	0.80	0.94	1.60	1.46	2.06	2.04	1.46	Yes
2:49 am	1.84	1.74	1.76	1.60	1.54	1.44	1.76	0.80	0.94	1.60	1.46	2.08	2.04	1.46	Yes
4:50 am	1.84	1.74	1.76	1.60	1.54	1.44	1.76	0.80	0.94	1.60	1.48	2.08	2.04	1.46	Yes
6:10 am	1.84	1.74	1.76	1.60	1.54	1.44	1.76	0.80	0.94	1.60	1.48	2.10	2.04	1.46	Yes
8:55 am	1.84	1.74	1.76	1.60	1.54	1.44	1.76	0.80	0.94	1.62	1.48	2.12	2.04	1.46	Yes
11:34 am	1.84	1.74	1.76	1.60	1.56	1.44	1.76	0.80	0.94	1.62	1.50	2.12	2.04	1.46	Yes
3:32 pm	1.84	1.74	1.76	1.60	1.56	1.44	1.76	0.80	0.94	1.62	1.52	2.14	2.04	1.46	Yes
5:23 pm	1.84	1.74	1.76	1.60	1.56	1.44	1.76	0.80	0.94	1.62	1.52	2.16	2.04	1.46	Yes
7:42 pm	1.84	1.74	1.76	1.60	1.56	1.44	1.76	0.80	0.94	1.62	1.52	2.18	2.04	1.46	Yes
9:55 pm	1.84	1.74	1.76	1.60	1.56	1.44	1.76	0.80	0.94	1.62	1.54	2.18	2.04	1.46	Yes
3:00 am	1.84	1.74	1.76	1.60	1.56	1.44	1.76	0.80	0.94	1.62	1.56	2.22	2.04	1.46	Yes
3:00 am	1.84	1.74	1.76	1.60	1.58	1.44	1.76	0.80	0.94	1.62	1.56	2.22	2.04	1.46	Yes
3:05 pm	1.84	1.74	1.76	1.60	1.58	1.44	1.76	0.80	0.94	1.62	1.58	2.26	2.04	1.46	Yes
6:00 pm	1.84	1.74	1.76	1.60	1.50	1.44	1.76	0.80	0.94	1.62	1.60	2.26	2.04	1.46	
9:45 pm	1.86	1.74	1.76	1.60	1.60	1.44	1.76	0.80	0.94	1.62	1.62	2.26	2.04	1.46	
4:00 am	1.86	1.74	1.76	1.60	1.60	1.46	1.76	0.80	0.94	1.62	1.66	2.30	2.04	1.46	
6:00 am	1.86	1.76	1.76	1.60	1.60	1.46	1.76	0.80	0.94	1.62	1.66	2.30	2.04	1.46	
1:45 am	1.86	1.76	1.76	1.60	1.62	1.46	1.76	0.80	0.94	1.62	1.66	2.32	2.04	1.46	Yes
6:04	1.86	1.76	1.76	1.60	1.64	1.46	1.76	0.80	0.94	1.62	1.68	2.34	2.04	1.46	Yes
7:10 pm	1.86	1.76	1.76	1.60	1.64	1.46	1.76	0.80	0.94	1.64	1.70	2.36	2.04	1.46	Yes

too low

wrong?

rise "B" peak

0 ch ans)

new tel#

2 Front

high thresh
"

also moved Effset 455 to 460 on tel 2
→ lowered all thresh from ~~-20~~ to -1
lowered thresh -24 to -6
" " -24 to -1
2pm, 13 Jan

2 back

some

5

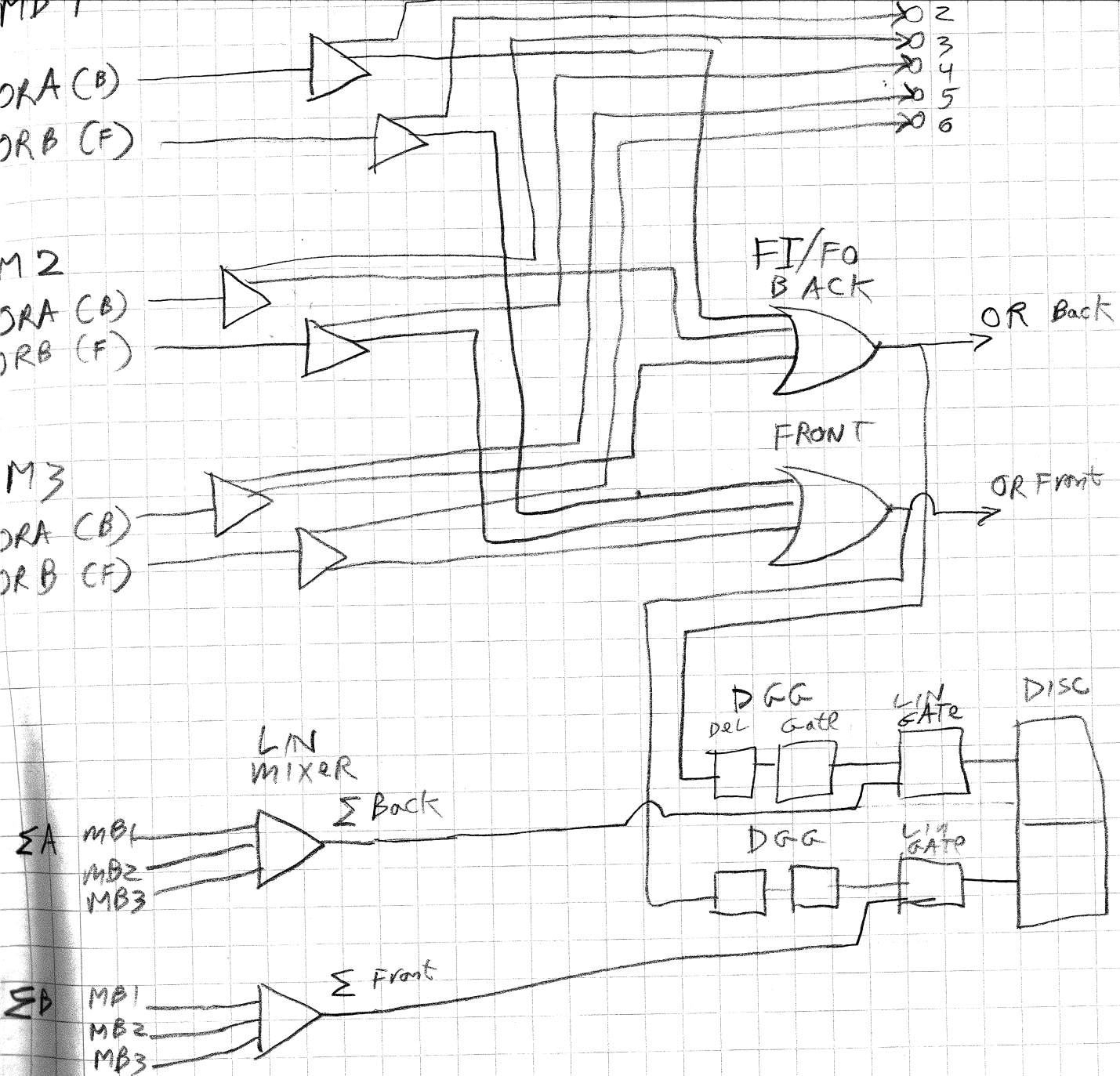
some

10

strip at 15 (chip 0, channel)

12

some

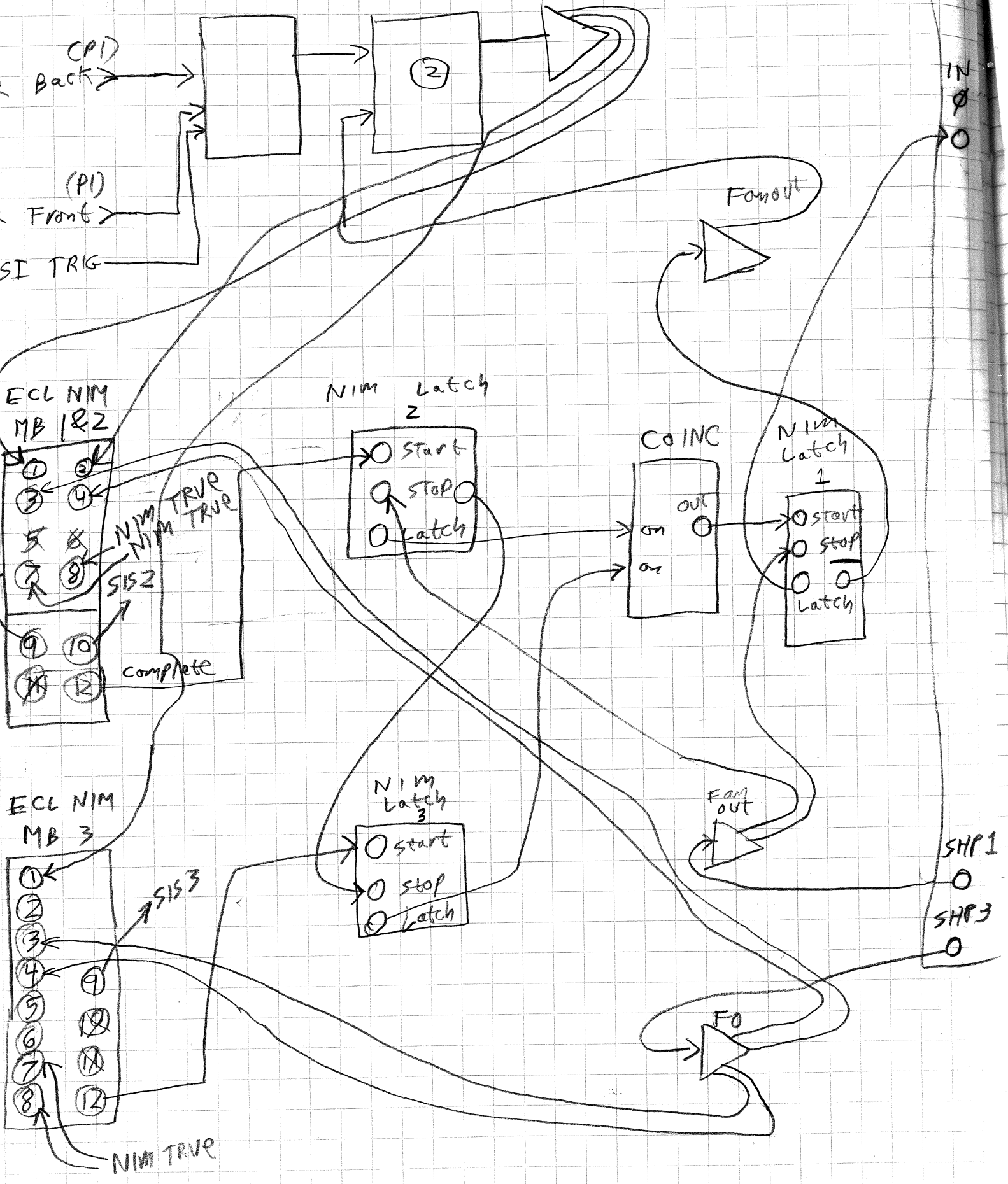


4-FOLD LOGIC

4 FOLD LOGIC

Fanout

VZ62



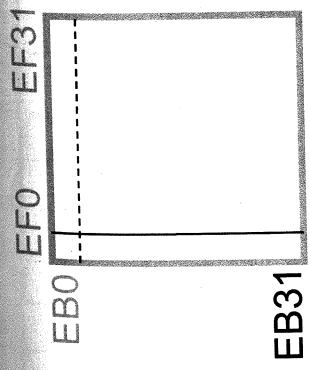
Tower 5

Tower 4

Tower 3

Tower 2

Tower 1



CB slot

T17 13
 3,4 MB3
 5,6
 U = 300 [V]
 I = 2.85 [μA]

T13 14
 1,2 MB3
 2,3
 U = 410 [V]
 I = 1.28 [μA]

T3 10
 9,10 MB3
 14,15
 U = 395 [V]
 I = 1.61 [μA]

T19 11
 7,8 MB3
 11,12
 U = 310 [V]
 I = 1.14 [μA]

T12 12
 5,6 MB3
 8,9
 U = 420 [V]
 I = 2.15 [μA]

T10 6
 7,8 MB2
 11,12
 U = 210 [V]
 I = 1.46 [μA]

T8 7
 5,6 MB2
 8,9
 U = 220 [V]
 I ≈ 1.8 [μA]



T0 8
 3,4 MB2
 5,6
 U = 290 [V]
 I = 1.24 [μA]

T2 9
 1,2 MB2
 2,3
 U = 310 [V]
 I = 1.03 [μA]

T16 3
 5,6 MB1
 8,9
 U = 220 [V]
 I = 1.67 [μA]

T11 4
 3,4 MB1
 5,6
 U = 350 [V]
 I = 1.71 [μA]

T7 5
 1,2 MB1
 2,3
 U = 450 [V]
 I = 1.51 [μA]

T4 1
 9,10 MB1
 14,15
 U = 300 [V]
 I = 2.12 [μA]

T6 2
 7,8 MB1
 11,12
 U = 440 [V]
 I = 2.76 [μA]

E Front

Power Tower 3

Power Tower 2

Si Bias Power Tower 0

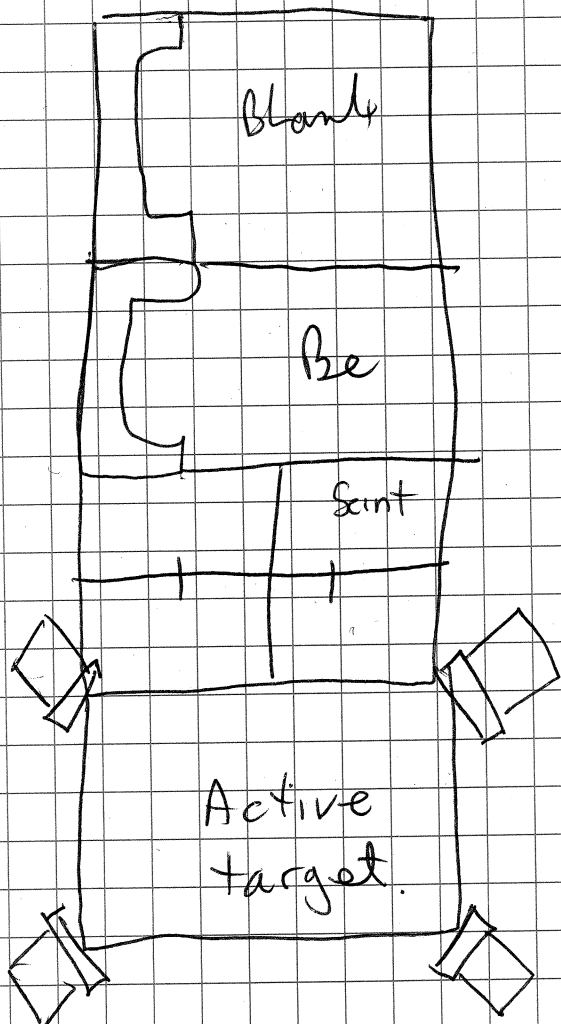
Entrance Blocker

55 mm
35 mm

horizontal
vertical

1/2" Cu

gap to thin target = 21 mm.



thin target to det B Si holes.

$$90.9 \text{ cm} - 2 = 88.9$$

Active target to det B Si hole

$$87.1 \text{ cm}$$

Blocker hole

3 cm horizontal

RUN 71 at timed source RUN ran for 1 hr

h 1/17/10

RUN 71 Source run starts ~ 7:50 am ended 10:30

Pedestals huge rate
Thresholds renzied on many tels

NOISE . . .

Problem the Camera Stange needs to be grounded.

RUN 73 α source run with Stange grounds
MSU5. setup

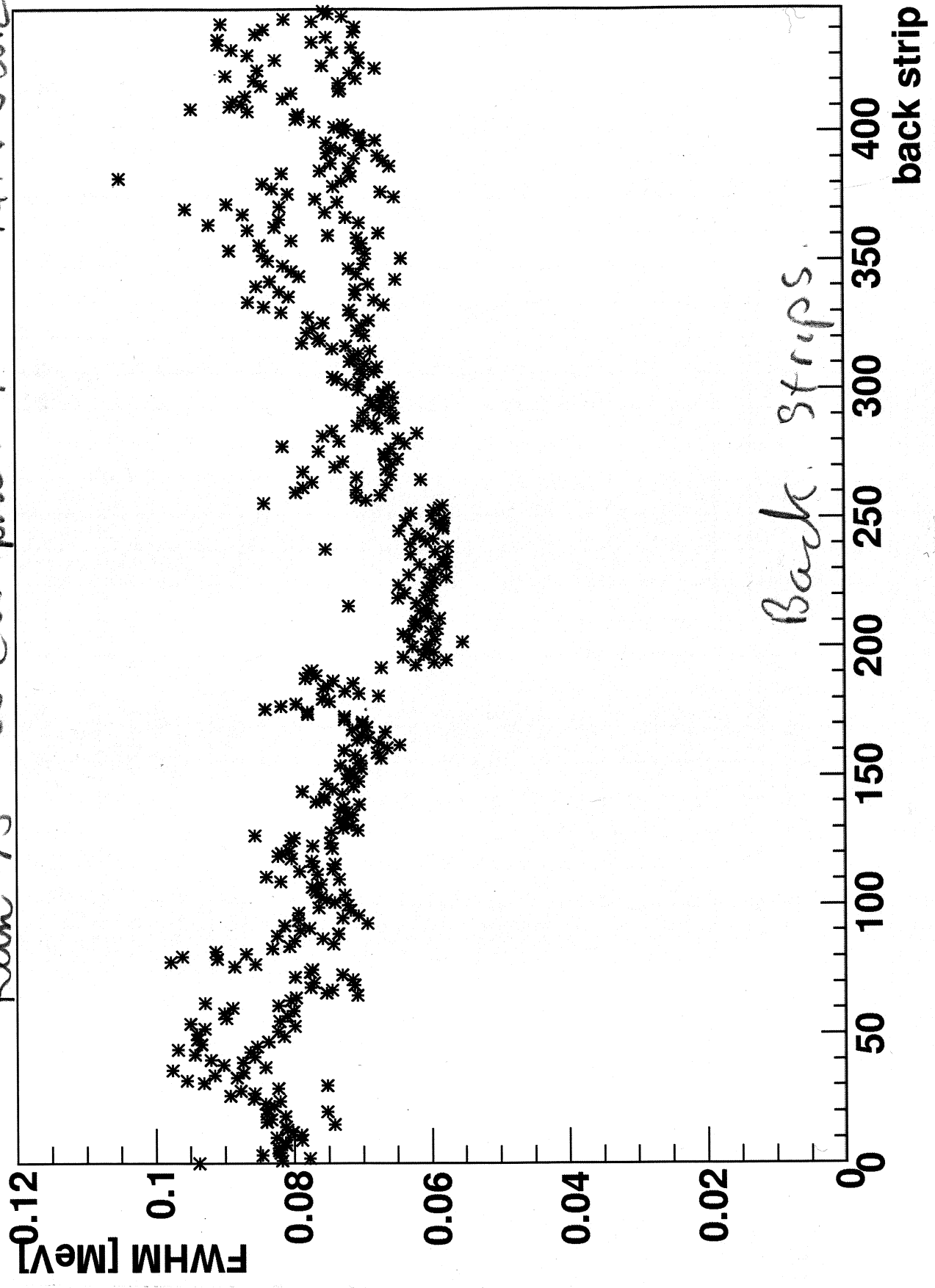
in Si pulser calibration non-linearities

compressive at high energies for Front
expansive " " " for Back

α Calibration Front

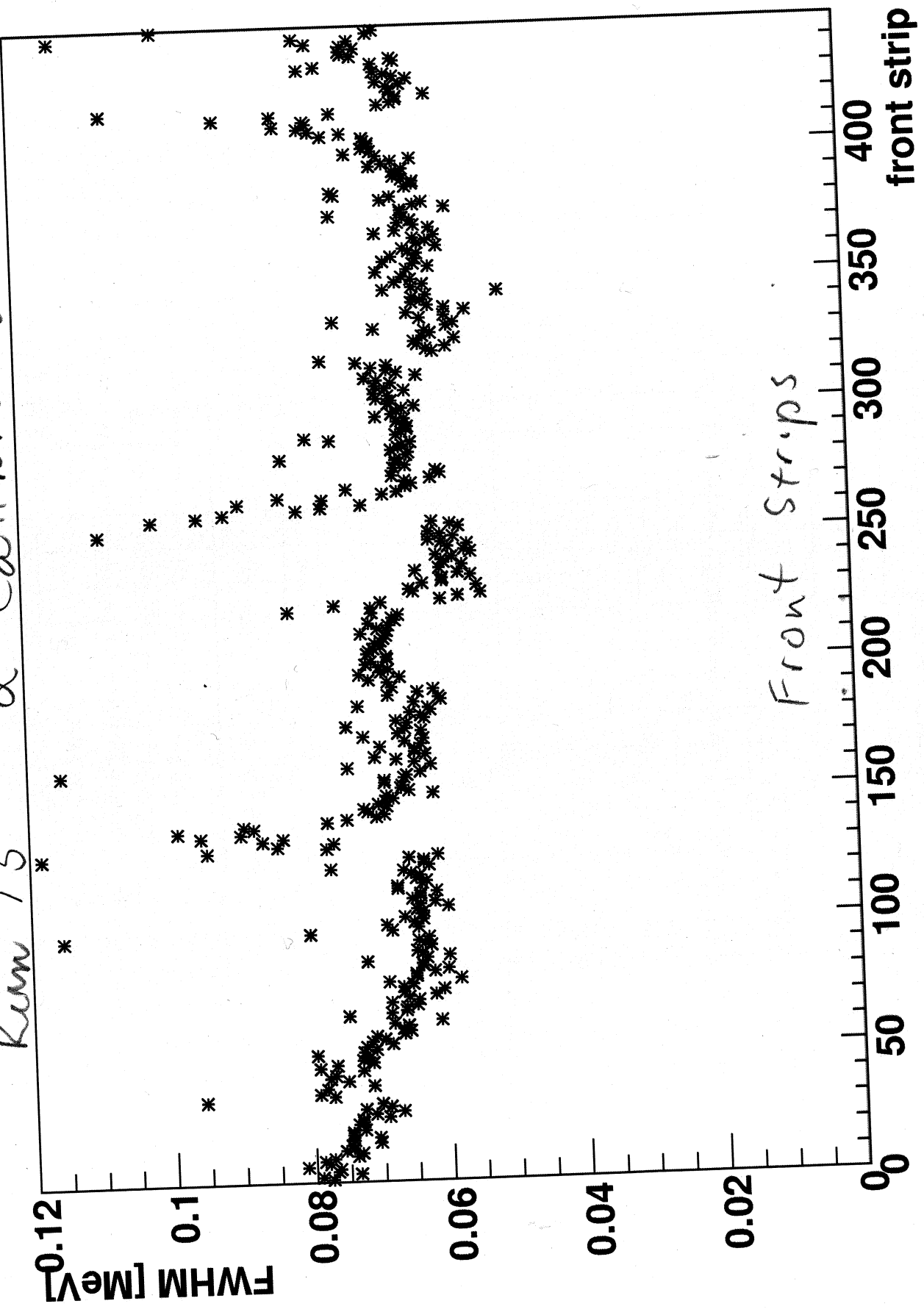
0-31	bad	
1-31	bad fit	
7-28	bad	
8-0	bad fit	(double peaks)
9-31	bad	
12-0	bad fit	(double peaks)
13-0		

Run 73 α calibration 14th Jan.



Back Strips.

Run 73 α calibration 14th Jan.



Noise summary for evening of Jan 15.

Several hrs spent ~~on~~ searching for noise on
Si

Backs were greatly improved but not
fronts.

Improvements made by doing everything wrong

i.e. grounding Perani ~~gag~~ gage to
chamber.

Plan proceed to get other items running
and return to this problem later.

Jan 15

RUN 78 Start 4:20
Be on Be, Triple com.

CsI gains = 100

RUN 79 Start 4:45
Be + Be

CsI gains = 175

P, dt, ^3He , ^4He lines all seen

Stop 6:40

extra (unmatched Si-CsI) features seen but
a) primarily in CsI around beam AND

b) $M_{\text{CsI}} \approx 1$

RUN 80 Be on Be same as above
Start 6:57

moved to EFP linear delay to line up with gate
run stopped collecting at $\approx 7:30$

Data acq. will not acquire.

Run 81 Be + Be

lower TDC thresholds for XFP + CsI
in Active TDC.

Run 82 Be + Be, Set

Waiting on Secondary Beam Development

~ 10AM ~

PLAN Run 90 all Weekend.

RUN 83

60 MeV p's see p's in all CsI 1-2 ch wires
no other usable calibration pts

RUN 84

60 MeV d's Started 11:08
stopped 12:00 midnight of 1/15-16

d's, ³He, t, d in many detectors

In the most outside detectors d's and d's might
be obtainable

RUN 85

started 12:44 AM

stopped 12:47 AM

67 MeV α on Be - checking times

RUN 86 Trash

RUN 87

α C + Be

started 1:23 AM

stopped 3:29 AM

Run 88

same

started 3:29 AM

stopped 5:34 AM

Run 89

Same

started 5:34 AM

stopped 7:32 AM

Run 90

Same

started 7:32 AM

stopped 8:23 AM

Stop to check S2 vault

Some alarm?

Alarm was a computer
in S3 not S2.

computer in S800

Run 91

same

started 8:33 am

stopped 10:40 am

Run 92

same

started 10:40 am

stopped 12:40 am

Calibration beams

"60"		BP	E	after Be
H		1.1419	60.10 MeV	57.90
d			15.38	12.60
t			6.89	2.37
α			15.57	9.69
^3He			27.26	22.76

Before Be Target

"60"	^4He	2.2675	60.00	58.32
	^3He		103.3	101.32
	p		218.6	216.2
	d		59.3	58.0
	t		26.88	25.69 25.69
"60"	^4He	2.2675		

"80"	H	1.3254	80.0	78.09
	d		20.66	18.51
	t		9.27	6.29
	α		20.92	16.75
	^3He		36.74	33.22

"80"	He	2.6319	80.46 80.0	78.64
	^3He		137.66 136.9	135.1
	p		286.8 285.3	282.5
	d		79.48 79.02	77.81
	t		36.25 36.04	35.02

Some time spent on ~~re-~~ documenting Cyclic settings & curves

Run 93 start 12:45 pm
end 2:46 pm ${}^9\text{C} + \text{Be}$

Run 94 start 2:46 pm
end 4:46 pm same

Run 95 start 4:46 pm
end 6:47 pm same

Run 96 start 6:47 pm
end 8:46 pm ${}^9\text{C} \text{ on } \text{Be}$

Run 97 start 8:46 pm
end 10:47 pm ${}^9\text{C} \text{ on } \text{Be}$

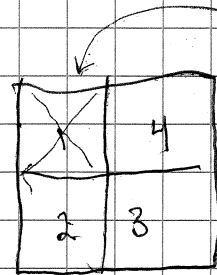
~~Run 98~~ start: 10:47 pm ${}^9\text{C} \text{ on } \text{Be}$
end: 12:47 am no changes

** Run 99 start: 12:48 am ${}^9\text{C} \text{ on } \text{Be}$
end: 2:48 am no changes

Run 100 START: 2:49 am
END: 4:50 am same

Run 101 START: 4:50 am
STOP: 6:50 am same

6:10 am noticed
no data from Tele10 CSI-0 vs Tele Ebmax
problem?



~~In Run 100 (previous run) we had data out. (from ~~meter~~ meter) immediately~~

spectol (offline check)

Run 98
beginning of
buffer @ 2300
signal gone

run 101 —
no signal
(Tele10 CSI-0
vs Eb S:)

checked with disc/shaper
control & signal switches
and both disc & shaper
missing on Tele10 CSI-0 front
∴ must be P.A.

⊗ Run 98 ~ Midnight audi ratmeter
 made horrible loud & high pitched
 noises periodically.
 CST-OR bounced around
 from ~ 300 Hz to ~ 2500 Hz.
 Lasted on & off ~ 2 minutes.
 Operator made NO adjustments
 while it happened.

Seems fine now.

⊗⊗ ~1:20 AM Operators lost communication with A1900 ~~and~~
~~to see if~~ trigger rate was unchanged so the beam
 was stopped from ~1:25 to 1:28 ~~to reset the~~
 equipment, Beam came back w/o issue with CST-OR
 triggering at 300-350

Run 102

START = 6:50 am
 STOP = 8:55 am

same

Run 103

START = 8:55 am
 stop = 9:35

Same ^9C or ^9Be

CST-OR ~ 300 cps

Went into cave! Chiller still 16°

MB boxes below room T, but warmer than before
 beam. Perhaps because \downarrow air \rightarrow V to MB's.

Run 104

Start = 9:34 am
 Stop = 11:34 am

Run 105

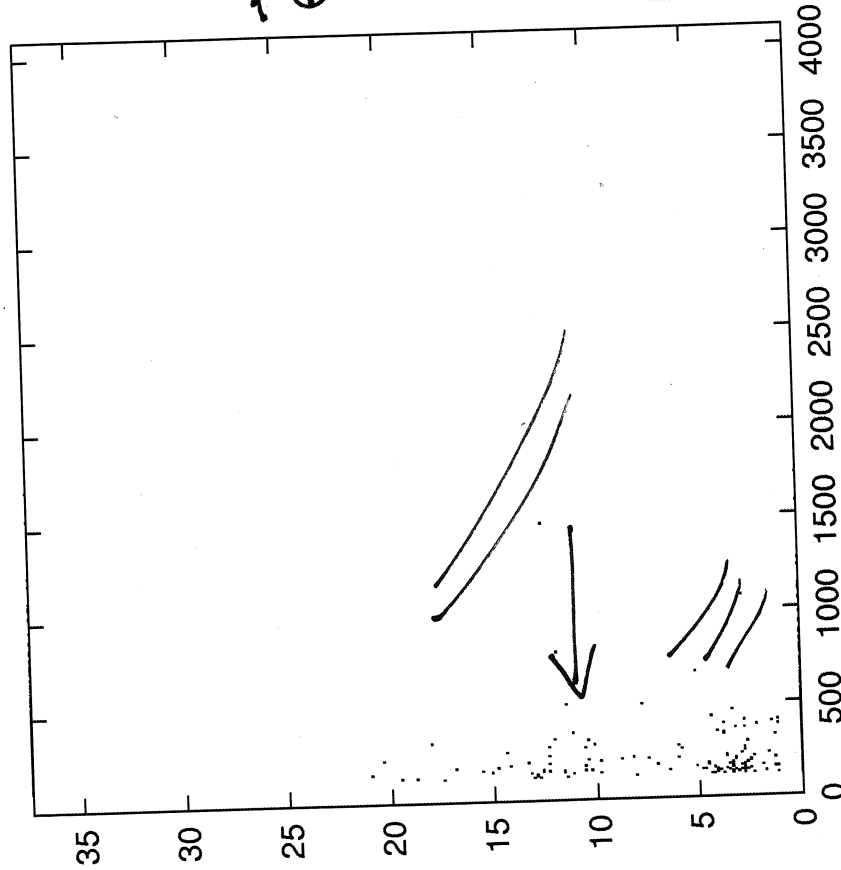
Start = 11:34 am
 Stop = 13:32 am

same

GE-OR 376 cps

XFP 1.7×10^5

[5] TELE10.EB.EMAX_VS_CSI.00



Run 98
cut buffer
~ 23000

(before
signal ok
after
24000 ~
no signal).

Total buffer
39322

Aster run 105 at 13:40 on Sun, went into cave to hook up T-sensors.

All 3 read between 0.20 and 0.23 V presume this means 20 \rightarrow 23 $^{\circ}$ C.

Retune of segment ϕ , just before primary target.

Run 106 Started 14:43
stop 16:44

increase in beam intensity about 20%, CSI-OR \sim 390.

Run 107

start = 16:44
stop = 18:13

normal data run same as before.

Run stopped as we lost beam.

Power supply died on SUSY line. Ok.

Run 108

start 6:17 pm
end: 8:16 pm

$^{\circ}$ C on Be data

Run 109

start: 8:16 pm
end: 10:16 pm

~~XXXXXXXXXX~~

(Beam intensity dropped \sim 8%)

DO NOT trust elog for run time!

Run 110

start: 10: ERROR
end:

"dscop server" error message.

- ① Communication between servers seems to be broken.
- ② "eventlog may not have finished normally" Continuing w/ post run actions
- ③ Doing soft REBOOT of spdag19.

sudo reboot // then started

Sunday

17

~~Monday~~

18 January 2010

Run 111

start: 10:39 pm
end: 10:57 pm 9C

No beam for first 30 seconds.

Run 112

start: 10:57 pm
stop: 10:59 pm 9C

*Restarting the S: Control Software

→ LOADING MS05.setup
not MS04.setup.

B/c did not do that after
reboot of SPDag19.

Jorge, Jenny, ZB, Meredith
present.

SCRAP Runs #110-112

Run 113

start: 11:03 pm
stop: 11:43 pm ✓ 9C

Run 114

start: 11:43 pm
end: 01:11 am ✓ 9C

Summary

SPdag 19 died at end of Run 109.

Files for Run 109 is in directory.
Run 110 is junk

Runs 111-112 are suspect bk

SUNDAY EVENING

b/c Si Control Software was not restarted after crash.

Runs 113 & on are fine.

MONDAY 18 JANUARY 2010

~~TRW~~

~~to~~ Lost beam ~ 1:11 AM.

Run 115 start 2:05 stop 4:10

The CSI-ScE₀ map for **Tel 1 CSI 3** looks like some additional lines showed up.

Could be CSI gain shifted (or unstable)

Still ~ $\frac{340}{5}$ CSI-0

Run 116 start 4:11 am stop: 6:09 am

Note on the comment above: The duplicate lines persist, i.e. if it is a gain shift, it is on and off.

On the other hand, it could be cross talk (partial CSI's). However if this were the case, it is strange that only this tel shows clear secondary lines. Still favor unstable gain explanation.

Further note: It looks like the above problem in Tel 1 CSI 3 is the Si. The Back maps have the duplicate lines but the Front does not.

Duplicate lines, mentioned above also ~~was~~ seen in Telescope-1, CSI 0. Note that these were not appeared from Run # 115, rather from the beginning of the expt. Run # 82 shows these duplicate lines!

Run 117

start : 6:09 am
stop : 8:03 am

same as before.
9c on Be data.

Run 118

start : 8:04 am
stop : 10:03 am

same as before.

Run 119

start : 10:03 am
stop : 12:03 pm

: normal data run

Run 120

start : 12:04 pm
stop : 13:03 pm

Calibration

Run 121

¹H at 80 MeV
Seep's everywhere.

start : 1:43 pm
stop : 1:58 pm

Run 122

⁴He at 80 MeV

started : 2:25 pm
stopped : 3:17 pm

The momentum slice is 1% for these calibration beams.

Run 123

⁴He at 80 MeV

start : 3:20 pm
stop : 4:20 pm

Momentum slice now at 1/2%

Run 124

Be on Be

start : 5:53 pm
stop : 7:52 pm

900 CsI OR → 1500 CsI OR

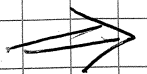
Live time 70%

Run 125

⁷Be on Be

Start : 7:52 pm
Stop : 9:52 pm

1800 CsI OR



Voltage EFP ⁷Be 1450 ⁹C 1350 V

		BP	V	(db/dr) scmt E _{LOSS}	E _{LOSS} / m sc
⁷ Be	at 64 MeV	2.1012	10.80	...	16.5
⁶ Li	51.70 MeV	"	9.59		11.4 MeV

Run 126 ⁷Be on Be
1600 CSI or
Start: 9:52 pm
Stop: 11:54 pm

Run 127 Same as previous
Start: 11:54 pm
Stop: 01:57 AM

19 Jan 2010

Run 128 Same as previous
Start: 01:57 AM
Stop:
paused: 02:46 AM

~~Paused run ~~stop~~ because ~~stop~~ operators lost and needed to reboot~~
Stopped: 2:54 AM

Control system error - operators had to reboot and return
to stopped run and returned key to operators during return

Run 129 still ⁷Be on Be
CSI or N/SSO
Start: 3:17 AM
Stop: 3:34 AM

→ More detail: lost VME crate and magnets started ramping down. Operators rebooted, restarted control programs + returned.

Run 129: started OK, then buffers stopped coming in (spectel/scalers not updating)
stopped run, but then could not start new one (readout
done readout/restarted, but no buffers in new run frozen)

tried soft reboot of spdag19 (see bottom of p 41)

- Restarted Motherboard control (CHIP) and loaded MSUS.
- Restarted CSI shp/disc and loaded e08001_csi.shp/disc
- Restarted readout

→ looks OK (buffers coming in)

- Re-attached spectel
- Restarted scalar display

Run 130 still Be on Be
Start: 3:58 AM
Stop: 5:58 AM

Jan 2010

Run 131

^7Be on Be target

start: 5:58 AM
stop: 7:50 am

Run 132

^7Be on Be target

start: 7:51 am
stop: 9:42 am

normal data run.

Run 133

^7Be on Be target

start: 9:43 am
stop: 10:42 am

Run 134

^7Be on Be target

CSI OR \approx 1500

start: 10:43 am
stop: 12:39 pm

RUN 135

^7Be on Be target

start: 12:39 pm
stop: 14:40

Run 136

^7Be on Be target

start: 14:40
stop: 15:12

LOST BEAM, K500 WAS RAMPING DOWN.

Run 137

START: 15:43
STOP: 16:04

^7Be on ^9Be TARGET.
STOPPED RUN FOR BEAM CHANGE

Run 138

START: 17:14
STOP: 19:13

^9C ON ^9Be TARGET
NO ATTENUATION.

Run 139

Start: 19:13
Stop: 21:13

^9C on ^9Be Target

Run 140

Start: 21:13
End: 23:10

^9C on ^9Be

Run 141

Start: 23:10
End: 1:10

^9C on ^9Be

Run 142

Start: 1:10

^9C on ^9Be

End: 2:40 am

Run stopped because of the problem with the retard readout. (buffers stopped coming)

- rebooting spdaq, 19 - DONE
- loading MSU5.setup file in fi control software

Run 143

START: 2:46 am
STOP: 4:46 am

^9C on ^9Be

Run 144

START: 4:46 am
STOP:

^9C on ^9Be

HiRA punch through summary

Particle	65 micron dE Si (MeV)	1.5 mm E Si (MeV)	4 cm Csl (MeV)	Loss in Si (1.5 mm) (MeV)
p	2.45	15.6	115.8	1.84
d	3.17	20.9	154.8	2.48
t	3.68	24.8	183.4	2.96
3He	8.72	54.9	411.1	6.53
4He	9.69	62.1	462.3	7.34
6He	11.21	74.0	548.3	8.72
8He	12.36	83.6	619.1	9.89

Your experimental account information:

account name: e08001

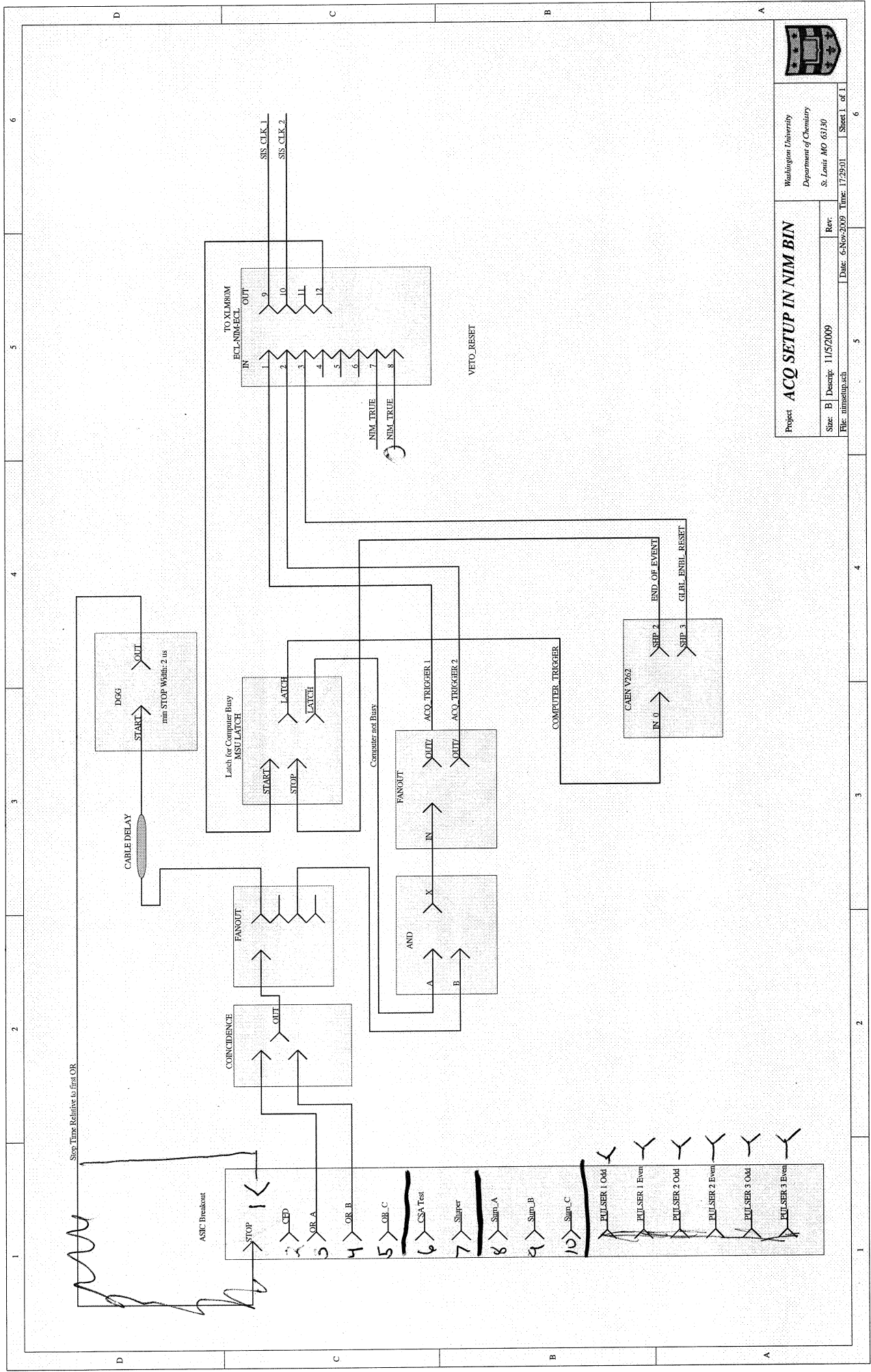
account pass: b4Xl&o7Cl

Go Green 1

Ser #	Chip 1 Ser.	Chip 2 Ser.	Back (neg)	Front (pos)	Peaks	Leakage	Location
2-001	none	none					
2-002	6	7					
2-003	66	5		Chip 1 replaced OK			
2-004	--	--		Already at Oak Ridge			
2-005	11	18					
2-006	15	16					
2-007	19	25					
2-008	2	3					
2-009	26	27					
2-010	33	34					
2-011	28	30					
2-012	14	32					
2-013	40	42		CFDref=505 hi thresh chans 2,8,9			
2-014	44	45		CFDref=508			
2-015	48	50		CFDref=509 hi thresh chans 2,6,8			
2-016	35	36					
2-017	80	57		First chip 2 bad channels-changed	double		
2-018	65	64		DAC offset 509 ZC2 off 480			
2-019	87	88					
2-020	81	82				5 nA 400 V	
2-021	84	85		token problems ?		5 nA 400 V	
2-022	73	76 OK				5 nA 400 V	
2-023	87	88		OK		9 nA 400 V	
2-024	93	95 OK		ok		5 nA 400 V	
2-025	98	99 OK		7 high thresholds (dbl peak with low thresh)		4 nA 400 V	
2-026	102	103 -POL 480/480/480		OK		5 nA 400 V	
2-027	67	68 OK		480/480/480 for + pol		3 nA 400 V	
2-028	69	71		Chan 3 time range different		1 nA 400 V	
2-029	100	101		OK		1 nA 400 V	
2-030	108	109 OK				1 nA 400 V	
2-031	90	91 OK 512/512/517		+ pol 490/480/490		3 nA 400 V	
2-032	104	107		OK		4 nA 400 V	
2-033	110	111 OK					
2-034	115	118		OK			
2-035	123	124 OK		+pol 480/480/483		1 nA 350 V	
2-036	121	122		OK 480/480/483			
2-037	138	139 OK		pulser OK		1 nA 350 V	
2-038	125	126		OK			
2-039	140	141		pulser OK			
2-040	154	156		+pol 480/480/480			
2-041	145	146		+pol 480/480/485			
2-042	160	166		2nd chip bad discs-changed			
2-043	134	136		-pol 480/482/480 chan 17 bad; +pol 480/480/481			
2-044	127 129?			+pol 480/478/480			
2-045	158	159		ser shift problems			
2-046	130	133		+pol 480/480/483			
2-047	142	143		-pol ch 16 dead; +pol reject events			
2-048	151	152		-pol several chans dead; +pol OK			
2-049	148	149		serial shift problems			
2-050	171	172		+pol 480/480/480			
2-051	174	175		+pol 480/480/480			
2-052	165	29		Ch 2 lower gain, worse on +; +pol 480/475/480			
2-053	168	169		+pol, ch 8 10% lower gain			
2-054	29	167		Ser shift reg problems			
2-055							

Ser #	Chip 1 Ser.	Chip 2 Ser.	Back (neg)	Front (pos)	Peaks	Leakage	Location
2-001	none	none					
2-002	6	7					
2-003	66	5		Chip 1 replaced OK			
2-004	--	--		Already at Oak Ridge			
2-005	11	18					
2-006	15	16					
2-007	19	25					
2-008	2	3					
2-009	26	27					
2-010	33	34					
2-011	28	30					
2-012	14	32					
2-013	40	42		CFDref=505 hi thresh chans 2,8,9			
2-014	44	45		CFDref=508			
2-015	48	50		CFDref=509 hi thresh chans 2,6,8			
2-016	35	36					
2-017	80	57		First chip 2 bad channels-changed	double		
2-018	65	64		DAC offset 509 ZC2 off 480			
2-019	87	88					
2-020	81	82				5 nA 400 V	
2-021	84	85		token problems ?		5 nA 400 V	
2-022	73	76 OK				5 nA 400 V	
2-023	87	88		OK		9 nA 400 V	
2-024	93	95 OK		ok		5 nA 400 V	
2-025	98	99 OK		7 high thresholds (dbl peak with low thresh)		4 nA 400 V	
2-026	102	103 -POL 480/480/480		OK		5 nA 400 V	
2-027	67	68 OK		480/480/480 for + pol		3 nA 400 V	
2-028	69	71		Chan 3 time range different		1 nA 400 V	
2-029	100	101		OK		1 nA 400 V	
2-030	108	109 OK				1 nA 400 V	
2-031	90	91 OK 512/512/517		+ pol 490/480/490		3 nA 400 V	
2-032	104	107		OK		4 nA 400 V	
2-033	110	111 OK					
2-034	115	118		OK			
2-035	123	124 OK		+pol 480/480/483		1 nA 350 V	
2-036	121	122		OK 480/480/483			
2-037	138	139 OK		pulser OK		1 nA 350 V	
2-038	125	126		OK			
2-039	140	141		pulser OK			
2-040	154	156		+pol 480/480/480			
2-041	145	146		+pol 480/480/485			
2-042	160	166		2nd chip bad discs-changed			
2-043	134	136		-pol 480/482/480 chan 17 bad; +pol 480/480/481			
2-044	127 129?			+pol 480/478/480			
2-045	158	159		ser shift problems			
2-046	130	133		+pol 480/480/483			
2-047	142	143		-pol ch 16 dead; +pol reject events			
2-048	151	152		-pol several chans dead; +pol OK			
2-049	148	149		serial shift problems			
2-050	171	172		+pol 480/480/480			
2-051	174	175		+pol 480/480/480			
2-052	165	29		Ch 2 lower gain, worse on +; +pol 480/475/480			
2-053	168	169		+pol, ch 8 10% lower gain			
2-054	29	167		Ser shift reg problems			
2-055							

Snp 2 ~ 35 μ s
 Snp 1 ~ 300 ns (not used)
 Snp 3 ~ 1.5 μ s earlier than Snp 1



corner	PMT/base	bias	leakage	Peak height
Top L	A (121)	700V	~0.99 mA	~20 mV
Top R	B (142)	↓		~5 mV
Bottom L	C (138)			~7-8 mV
B R	D (110)			~3-5 mV
<hr/>				
TL	E (145)	↓		~10 mV - 12 mV
TR	F (124)			~10 mV ~5-8 mV
BL	G (118)			~15 mV
BR	H (108)			~15-20 mV
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	R	bias	I	Peaks	I (each)	Previous
TL	∅	700		~10 mV	.25	~10 mV
TR	1.2 MΩ	↓		~12 mV	.17	~12 mV
BL	A	↓		~2 mV	.17	~20 mV
BR	H	↓		~2 mV	.17	~18 mV

TL	E	∅	700		No change	.25
TR	F	294 kΩ	↓		1.5 mA	.22
BL	A	1.2 MΩ	↓		—	.17
BR	H	1.2 MΩ	↓		—	.17

TL	E	∅		~10 mV	.25	} Next: ↑ ~130 kΩ OK (maybe ↑ a bit) ↓ ~200 kΩ
TR	F	121 kΩ		~2 mA / 10 mV	.25	
BL	A	294 kΩ		~10 mV	.22	
BR	H	1.2 MΩ		No change	.17	

<u>Corner</u>	<u>PMT/Base</u>	<u>Resistor</u>	<u>Bias</u>	<u>Leakage</u>	<u>Peaks</u>
TL	E	ϕ	700	$\left(\begin{array}{c} 0.95 \\ \text{mA} \end{array} \right)$	$\approx 10 \text{ mV}$
TR	F	121 k Ω	\downarrow		$\sim 10 \text{ mV}$
BL	A	294 k Ω			$\sim 10 \text{ mV}$
BR	H	196 196 k Ω			$\sim 10 \text{ mV}$

OK gains

