

 National® Brand

COMPUTATION NOTEBOOK

Department Famiano

Subject 05049

Name ~~XXXXXXXXXX~~

Address _____

43-648

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

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0 73333 43648 8

Radiform Inc. • Coppell, TX 75019

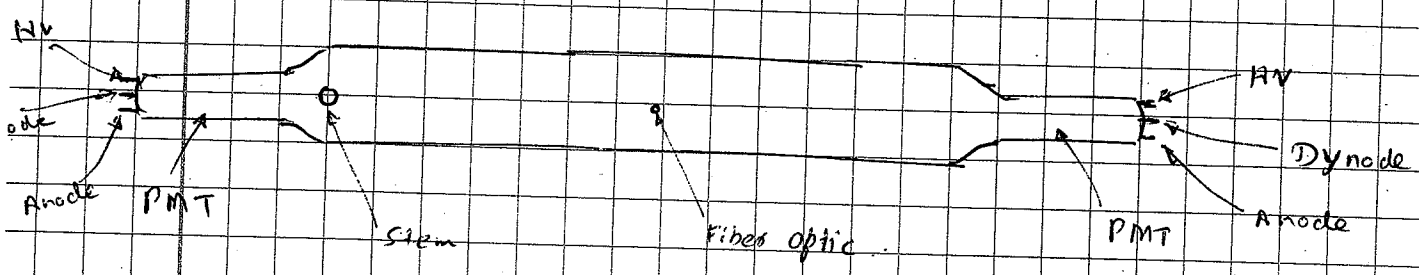
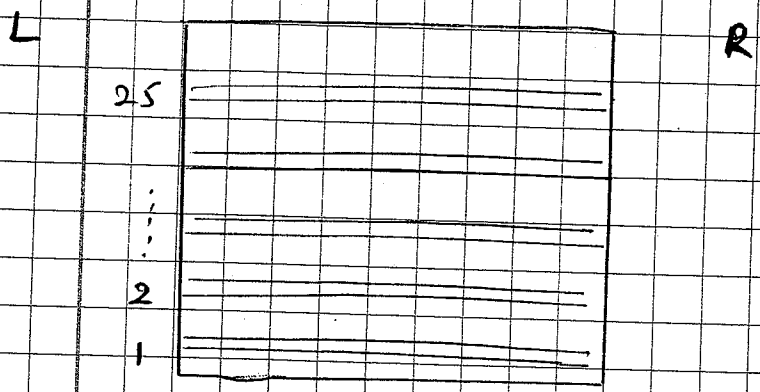
Made in Canada

2/19/2007

Inspection of N-Walls

FAX: 517-353-5967

Wall A (Front Side)



Bubbles	Cracks in tube	Corrosion in stem	Paper	#	Bubbles	Cracks	Corrosion
No Small	NO	NO	✓	21	NO	NO	NO
Yes (center)	NO	Yes	✓	22	NO	NO	NO
Yes Left	NO	Yes (Little)	✓	23	NO	NO	NO
Yes L, R	NO	Yes	✓	24	NO	NO	NO
Yes L, Small	NO	NO	✓	25	Yes	NO	Yes
Yes L	NO	Yes	✓				
Yes L	NO	NO	✓				
Yes L	NO	NO	✓				
Yes L Small	NO	NO	✓				
NO	NO	NO	✓				
Yes (center)	NO	NO	✓				
Yes (left)	NO	NO	✓				
Yes L, R	NO	Yes	✓				
NO	NO	NO	✓				
NO	NO	NO	✓				
NO	NO	NO	✓				
Yes (Left)	NO	Yes	✓				
NO	NO	NO	✓				

Big

rg Cables

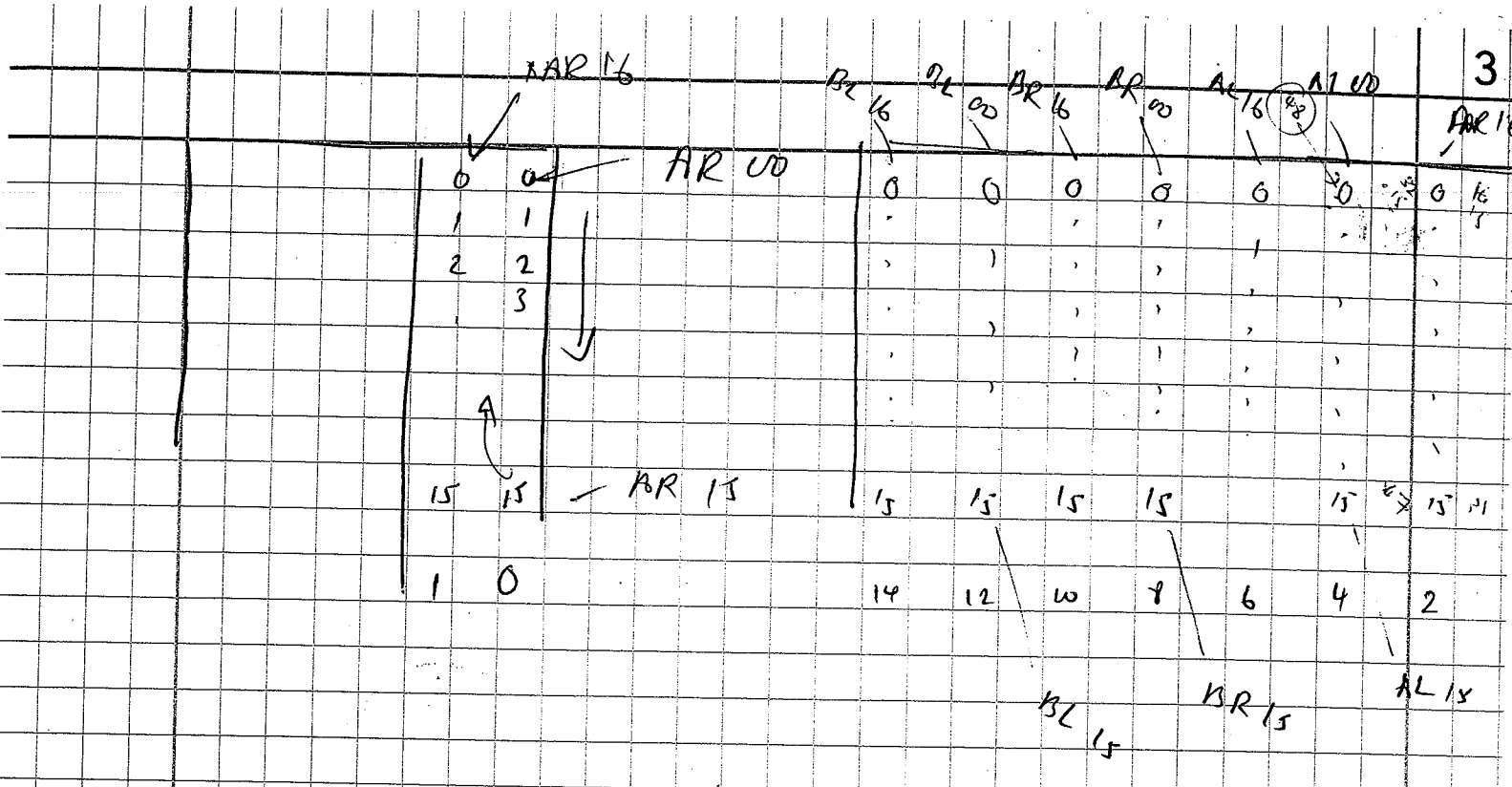
A-R

Brenna's cell
937-739
2010

✓
✓

ms

ms



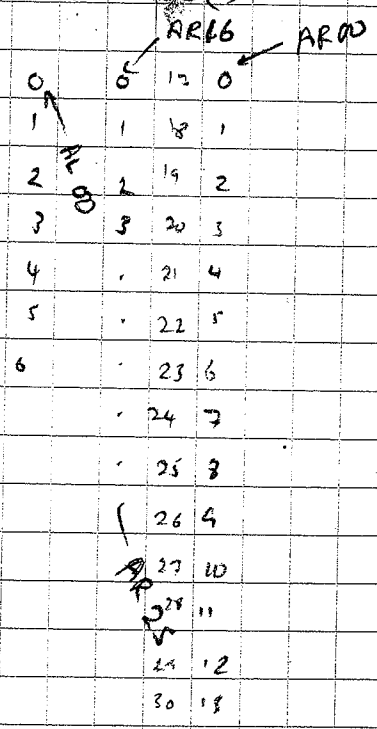
5/10/07 Equipment

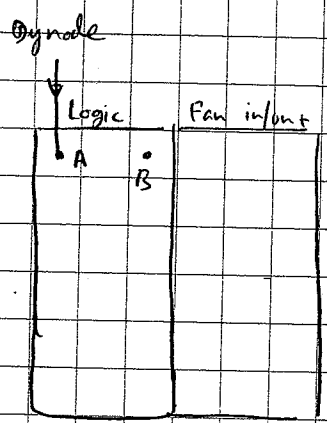
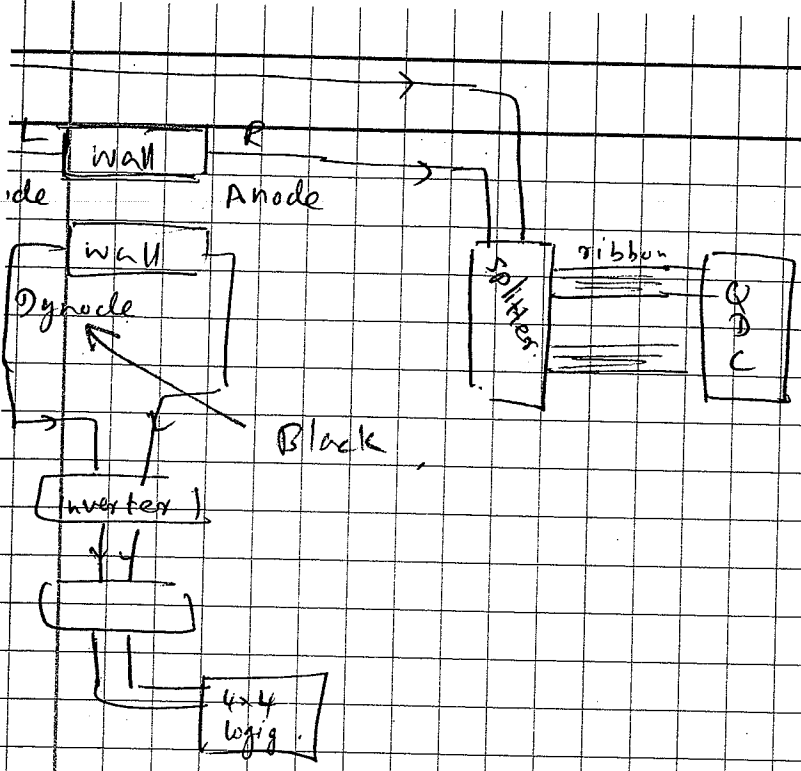
Netgem FS 108

C.A.E.N V 862 - 32 Channel - Individual gate QDC.

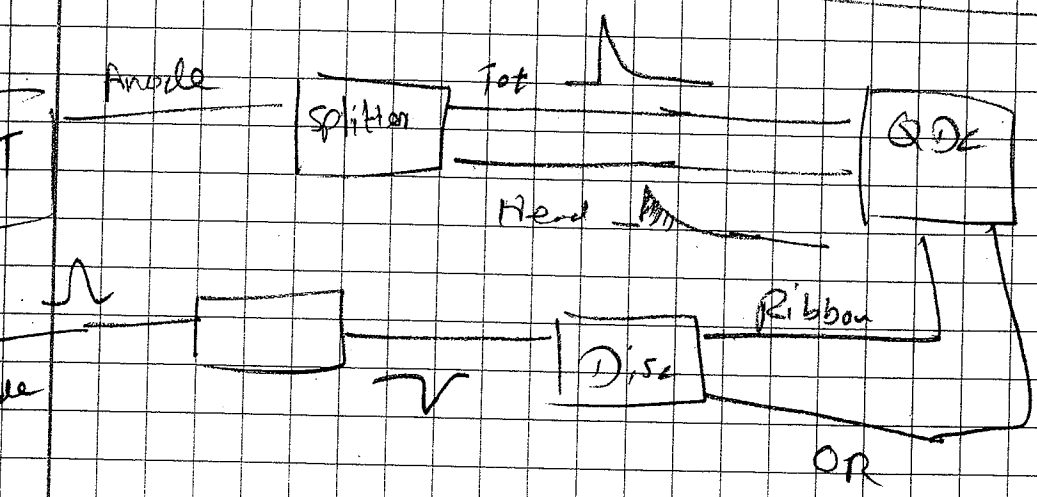
C.A.E.N V 262 - I/O Registers.

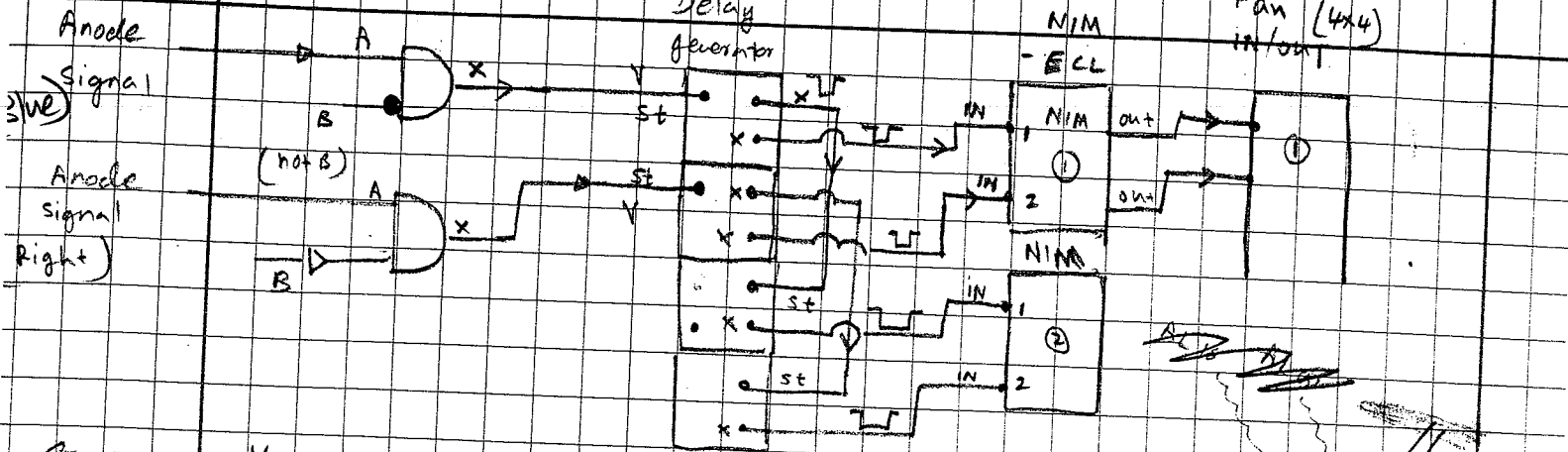
(10) (9) (8) (7) (6) (5) (4) (3) (2) (1)



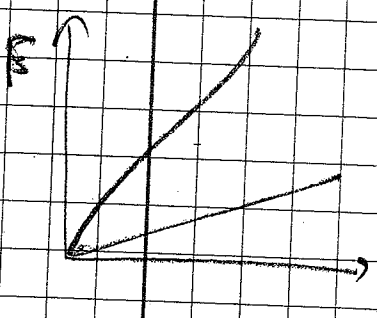
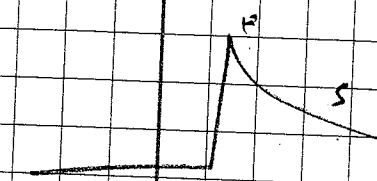


2/2207





Caen -
 V 282
 V 812
 V 862



BL00 BL13 BR24 ALIG AR

240	224	208	192	176	160	144	128	112	96	80	64	48	32	16	0
261	245	229	213	197	181	165	149	133	117	101	85	69	53	37	21
242	226	210	194	178	162	146	130	114	98	82	66	50	34	18	2
243	227	211	195	179	163	147	131	115	99	83	67	51	35	19	3
204	188	172	156	140	124	108	92	76	60	44	28	12	0	0	0
205	189	173	157	141	125	109	93	77	61	45	29	13	0	0	0
206	190	174	158	142	126	110	94	78	62	46	30	14	0	0	0
207	191	175	159	143	127	111	95	79	63	47	31	15	0	0	0
208	192	176	160	144	128	112	96	80	64	48	32	16	0	0	0
209	193	177	161	145	129	113	97	81	65	49	33	17	0	0	0
210	194	178	162	146	130	114	98	82	66	50	34	18	0	0	0
211	195	179	163	147	131	115	99	83	67	51	35	19	0	0	0
212	196	180	164	148	132	116	100	84	68	52	36	20	0	0	0
213	197	181	165	149	133	117	101	85	69	53	37	21	0	0	0
214	198	182	166	150	134	118	102	86	70	54	38	22	0	0	0
215	199	183	167	151	135	119	103	87	71	55	39	23	0	0	0
216	200	184	168	152	136	120	104	88	72	56	40	24	0	0	0
217	201	185	169	153	137	121	105	89	73	57	41	25	0	0	0
218	202	186	170	154	138	122	106	90	74	58	42	26	0	0	0
219	203	187	171	155	139	123	107	91	75	59	43	27	0	0	0
220	204	188	172	156	140	124	108	92	76	60	44	28	0	0	0
221	205	189	173	157	141	125	109	93	77	61	45	29	0	0	0
222	206	190	174	158	142	126	110	94	78	62	46	30	0	0	0
223	207	191	175	159	143	127	111	95	79	63	47	31	0	0	0

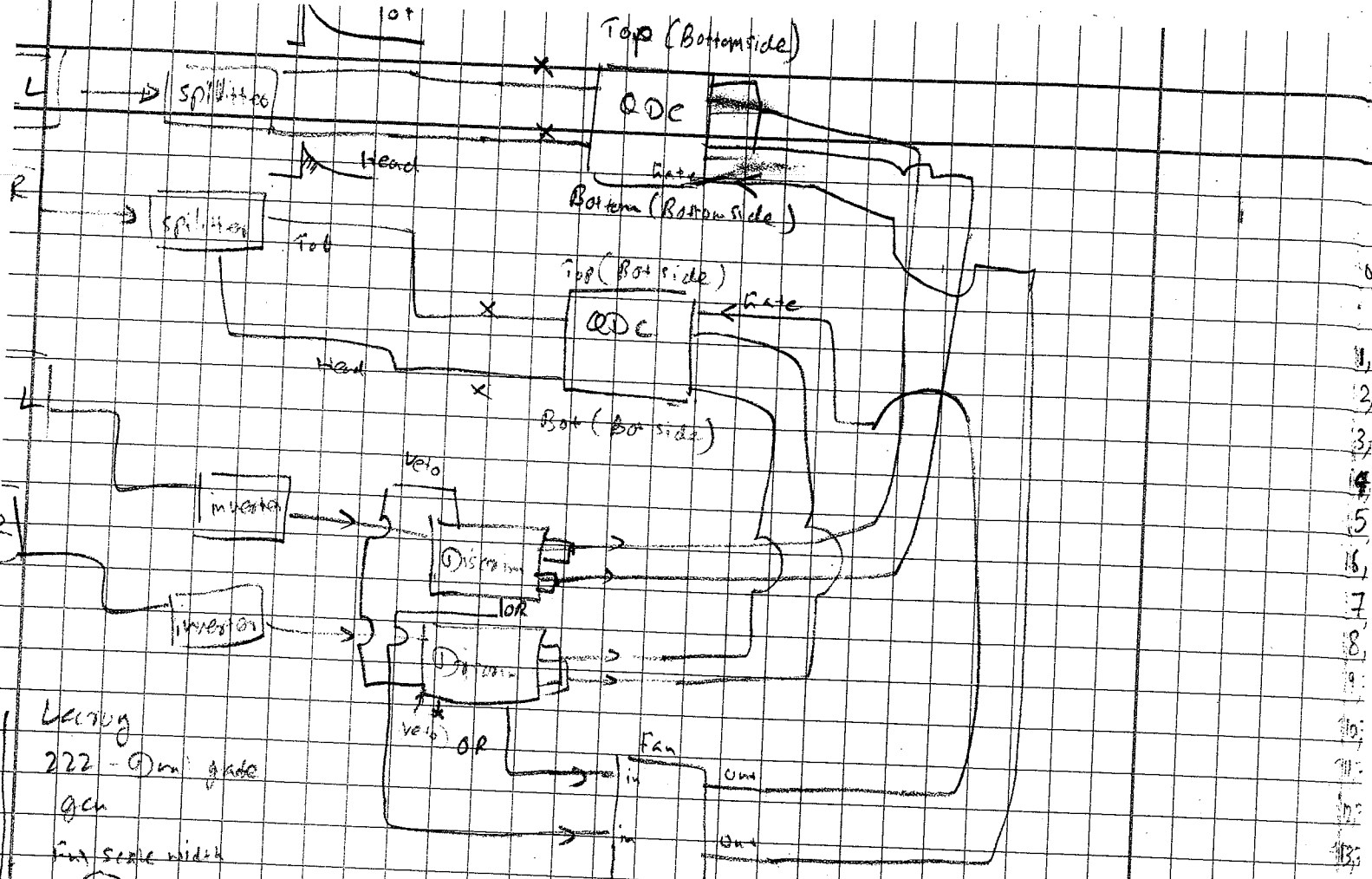
BL24

BL12

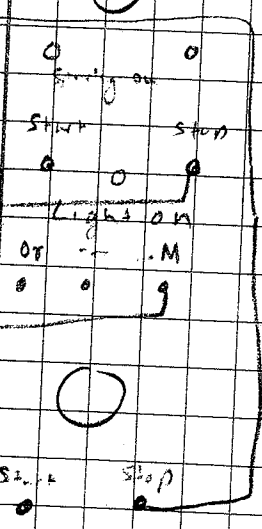
not connected

BR00

AR 15



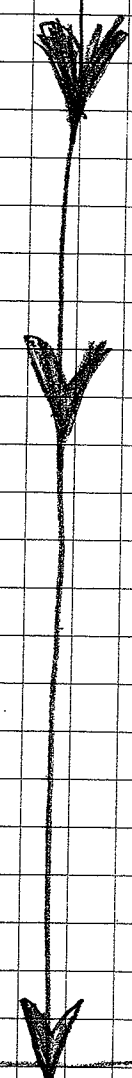
Lacing
 222 - 0mm grade
 gen
 fan scale width



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6/15/07 Testing of anodes & dynodes

Wall Channel no.	Anode Number		Dynode numbers		Voltage	Comments
	Left	Right	Left	Right		
0,64	A00	64 0	64	0	-2000V	splitter L is inverted L is
1,65	A01	65 1	65	1	-2000V	
2,66	A02	66 2	66	2		
3,67	A03	67 3	67	3		
4,68	A04	68 4	68	4		
5,69	A05	69 5	69	5		
6,70	A06	70 6	70	6		
7,71	A07	71 7	71	7		
8,72	A08	72 8	72	8		
9,73	A09	73 9	73	9		
10,74	A10	74 10	74	10		
11,75	A11	75 11	75	11		
12,76	A12	76 12	76	12		
13,77	A13	77 13	77	13		
14,78	A14	78 14	78	14		
15,79	A15	79 15	79	15		
16,80	A16	96 32	96	32		
17,81	A17	97 33	97	33		
18,82	A18	98 34	98	34		
19,83	A19	99 35	99	35		
20,84	A20	100 36	100	36		
21,85	A21	101 37	101	37		
22,86	A22	102 38	102	38		
23,87	A23	103 39	103	39		
24,88	A24	104 40	104	40		



32 206
 goes to
 head

Call anode	Anode number		Dynode number		Voltage -200V	Comments
	left	right	left	right		
00	✓	✓	162 ✓	165 ✓	↓	
01	✓	✓	163 ✓	166 ✓		
02	✓	X	164 ✓	167 X 2+y		BRO1 is noisy no signal
03	✓	✓	165 ✓	168 ✓		
04	✓	✓	166 ✓	169 ✓		
05	✓	✓	167 ✓	170 ✓		
06	✓	✓	168 ✓	171 ✓		
07	✓	✓	169 ✓	172 ✓		
08	✓	✓	170 ✓	173 ✓		no signal good
09	✓	✓	171 ✓	174 ✓		no signal good
10	✓	✓	172 ✓	175 ✓		
11	✓	✓	173 ✓	176 ✓		
12	✓	✓	174 ✓	177 ✓		
13	✓	✓	192 ✓	178 ✓		
14	✓	✓	193 ✓	179 ✓		
15	✓	✓	194 ✓	180 ✓		
16	X	✓	195 X	181 ✓		no signal
17	✓	✓	196 ✓	182 ✓		
18	✓	✓	197 ✓	183 ✓		
19	✓	✓	198 ✓	184 ✓		
20	✓	✓	199 ✓	185 ✓		
21	✓	✓	200 ✓	186 ✓		
22	X	✓	201 ✓	187 X		no signal
23	✓	✓	202 ✓	188 ✓		
24	✓	✓	203 ✓	189 ✓		

not yet connected

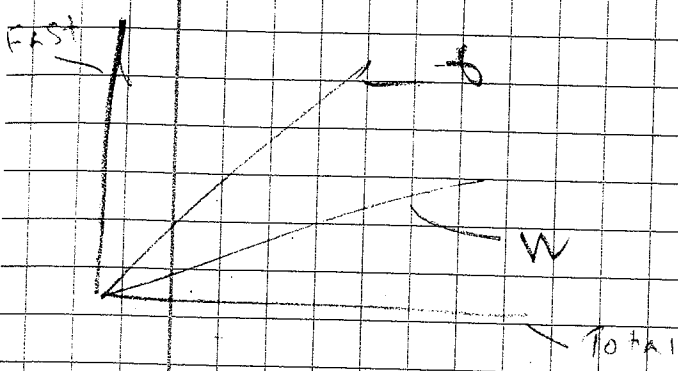
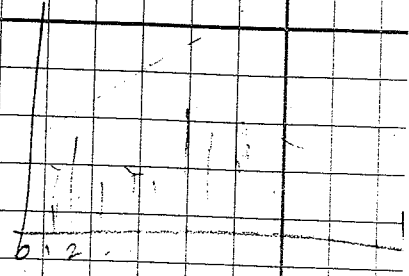
224

223

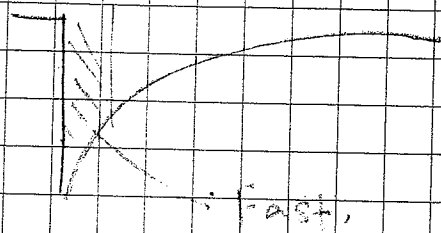
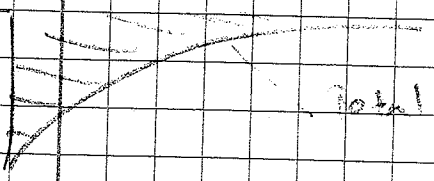
gas to open discriminator

gas gospec - " " Spectral

inside current we have input files



Type this
in keon - standard - all



gui - spectral - create

fast adc = adc 9

Total gate

Start adc = adc - 12

W S - good

Same at proton - gamma spec

Fast - gate

The ~~total~~ The master

300 WS - original

300 - WE found good

emacs NEUTRON - read.cpp

spider 14; SRC > X NEUTRON-read

Exp 01002 cfd - gui ← go cfd

124/2007

Testing Tubes with Spectra

HV = 2200 V

11/12/2007

Check n-g disc on walls with ^{252}Cf source
 $50\ \mu\text{Ci}$ source

no Voltage for each det set to -2000V

Run 11 = ^{252}Cf on wall A L O - V

Run 12 - Neutron run

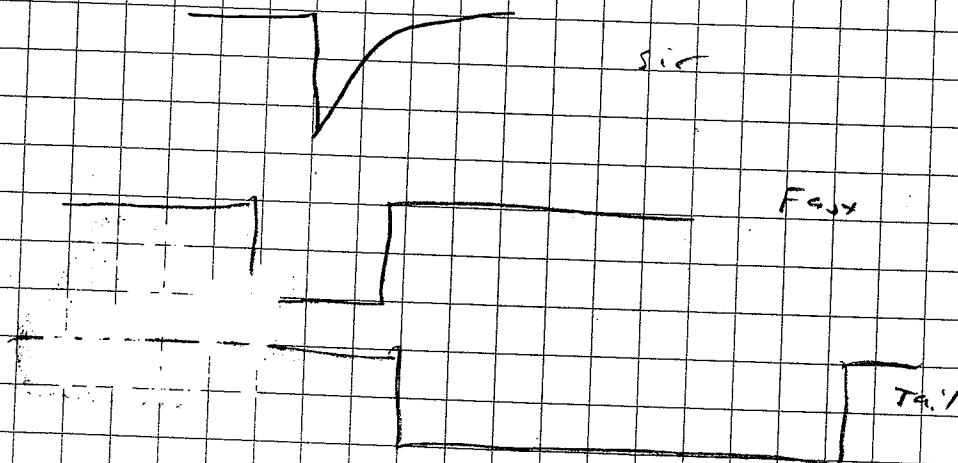
QDC 9 = Fast

QDC 12 = ~~Slow~~ Tail

Fast gate = 50 ns

Slow = 300 ns

Fast precedes signal by $\sim 10\ \text{ns}$



- Tubes ALO-8 seen fine - good n-g

- Tubes AL 8-15 have a problem \rightarrow probably electronic

Run 13 = background

Run 14 = ^{252}Cf wall A OIC L+A

Diode cables on AL 8-15 seem bad,
 wrong type probably



Possible Problem tubes

- Wall A → ~~Sta~~ Tube 6 OK

- Wall A → tube 7 Maybe

- Wall A R14

2.2008

23

Neade Neutron Wall B-R was missing anode cables 15-23
I have labeled them in blue
Cables 15-22 are the same blue cables as the other anode cables and are most likely the same length.
Cable 23 is a different black cable
R658 Type 50 Ω BNC connector
It is longer I think but I did not measure it. It needs to be measured

3.2008

Neade Connecting Diode Cables to Inverter.

- L All AL cables are zip tied under wall A to keep them off the ground.
- R AR cables are stored in box under wall A in back.
- L ~~Cables BL 8-15 are routed between the 2 walls and zip tied to the frame.~~
Cables BL are routed under wall A on the (A-L) side (side nearest wall B) and come up on the back side of (A-L). They are attached to the electrical crate.
- R Cables O-7 are routed under wall A on the (A-L) left side nearest wall B and then come up on the back side of A-L. They are quite long so they are coiled up and attached to the frame.
[under wall B from BR (left side) to BL (right) then
- Cables 8-15 and 16-23 are routed diagonally under wall B and attached to the electrical crate on the front left side. These are the only ones attached on the front.

BR 8-15 are looped because they are longer than 16-23 except 12 and 15.

Also: BR 19-23 were a little short so I put extensions on them, 19 + 20 are the same length 21 is only slightly longer and 22 and 23 are the same length but longer still.

Questions about set up? ~~scribble~~ ~~scribble~~

My number is (906) 235-0169

Maybe of important note:

cables BR 16-23 seem to be short, BR 19 is esp. short as well as BL 06 and BL 07
BR 12 and BR 15

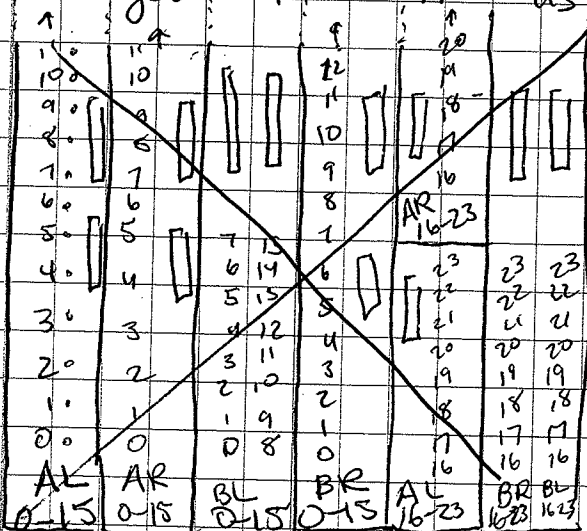
BR 0-7 seem very long

also I think BL 16-23 are shorter as well but I am not 100% sure.

BL03 was unlabeled and I labeled it in orange instead of the red like the others, so that is why it is different.

BL 23 is separate from the others and is short.

I have attached all the limo cables to the splitters. S.I. the first 3 splitters are ~~30~~ 25Ω and 100Ω the second three are 50Ω and 100Ω they are arranged the same as the inverter (basically).

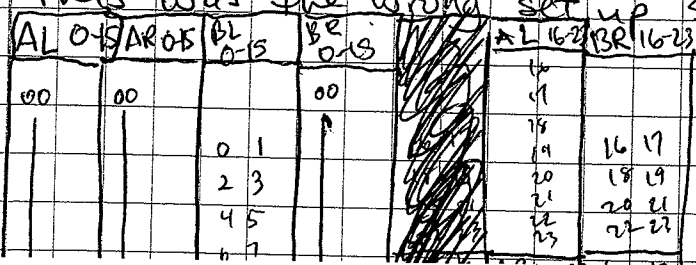


All cables are routed under wall B and up to the electric cart.

All cables should be 20 ns but some are (10+10) or (10+5+5) ns. or (10+8+2).

8.15.08 SMeade

this was the wrong set up so I redid it as follows



Ribbon Cables to Inverter

05 I put ribbon cables in the inverter. They are ~~were~~ inverted ribbon cables but they still work fine just don't follow the arrow markings. Also when I put the fifth one in from the right one of the prongs on the right side went through the board. I hope this does not affect the circuit, but if there are problems with it this may be why.

Neutron wall electronics Servo

Aug. 28
081

VME crate

<u>Slot</u>	<u>Module</u>	<u>Base add.</u>	<u>Desc.</u>		
6	V792 QDC	0x66660000	AL0-16	} TOT	
7	V862 I6QDC	0x77770000	AR0-16		
7	V862 I6QDC	0x77770000	AL0-16	} FAST	
			AR0-16		
12	V792 QDC	0xCCCC0000	BL0-16	} TOT	
			BR0-16		
13	V862 I6QDC	0xddd00000	BL0-16	} FAST	
			BR0-16		
15	V792 QDC	0xffff0000	AL 16-24	} TOT	CH 0-8
			AR 16-24		CH 8-15
			BL 16-24		CH 16-23
			BR 16-24		CH 24-31
16	V862 I6.QDC	0x10100000	AL 16-24	} FAST	
			AR 16-24		
			BL 16-24		
			BR 16-24		

CAMAC

<u>Slot</u>	<u>Module</u>	<u>Function</u>
10	32-ch disc	AL 0-15 Bank 1 AR 0-15 Bank 2
13	32 ch disc	BL 0-15 Bank 1 BR 0-15 Bank 2
20	16 ch disc	A/BL 16-23
23	16 ch disc	A/BR 16-23

1712

Test Signals in all tubes:

- Turn Von all tubes 10-2000
- Check anode signals

AR 13 = No Signal - Signal at tube \rightarrow possible bad cable \rightarrow blue cable
 \rightarrow Replace w/ AR 24

BL 04 = Ringing in Signal \rightarrow HV OK \rightarrow PMT Not Good \rightarrow lower V?

* BR 02 = No Signal \rightarrow No HV \rightarrow Moved to ch 24 \rightarrow OK!

BR 06 = Ringing - PMT Not Good \rightarrow lower V?

* BL 16 = No Signal - No HV Sig \rightarrow Not Connected \rightarrow OK!

* BL 22 = No Signal \rightarrow HV OK \rightarrow Tube OK \rightarrow Blue cable bad \rightarrow swapped

* BR 31 = No Signal \rightarrow HV Connection \rightarrow moved to 25 \rightarrow OK!!

Aug. 29
1326

Test Discriminator Channels

- Turn on Voltage → Make sure channel triggers

<u>Tube</u>	<u>Disc</u>	<u>HV channel</u>	<u>Note</u>
AL11	S120, ch 11	75	Very low rates

0828 Checking timing between Anode Signals and discriminator signals Sept. 03

Questionable channels

AL8	AP11 = delay 10ns
AL9	AP12 = delay 10ns
AL10	AR13 = delay 10ns
AL11	
AL12	DL015 ~ delay 45ns > 51ns
AL13	
AL14	
AL15	Stopped after DL

We need those 32 ch GDB's!!

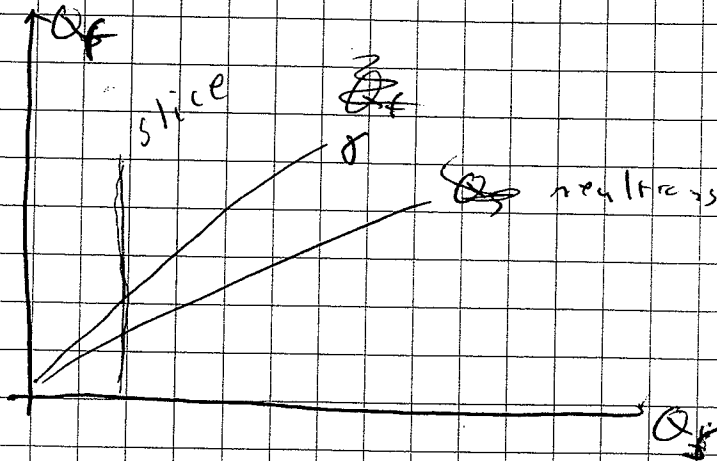
Splitter

AL-AR	100 Ω split is Bad!
	- replace w/ 25 Ω ?
AL	100 Ω looks Bad
BR	50 Ω ⇒ No signal
BR	100 Ω looks Bad

AL/BL	16-24	→ both look Bad
AR/BR	16-24	left is Bad
AR/BR	16-24	right is Bad

Procedure = using ^{252}Cf source

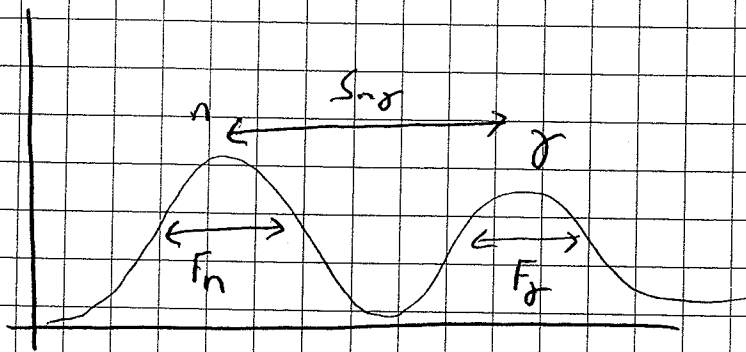
① Make Spectrum Q_f vs Q_{slow}



② Take a slice of Q_f at some constant Q_{slow}

slice channel: ~~272.5~~ 277.5 average 276.1 - 280.1 = Q_{slow}
slice thickness: ~~5~~ 5

③ Plot Q_f for slice



F_n : neutron FWHM

F_γ : γ FWHM

$S_{n\gamma}$: Separation between centroids

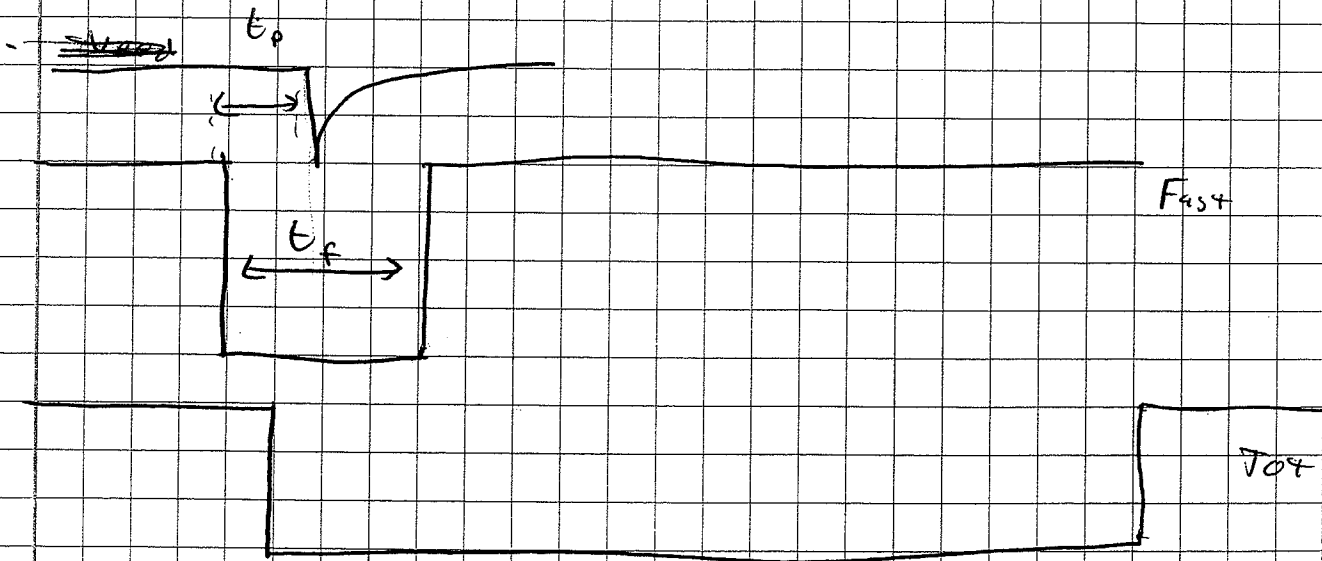
$$FOM = \left(\frac{F_n/2 + F_\gamma/2}{S_{n\gamma}} \right)^{-1} = \frac{2 S_{n\gamma}}{F_n + F_\gamma}$$

4. Larger FOM = better At least larger than 1

Calculate FOM

~~to~~

t_f (ns)	t_s (ns)	F_{WHM}	F_x	S_{sig}	
79.39	302 ns	8.48	5.81	18.97	
78.14	302	13.755	6.828	23.6	2.
76.85	302	14.44	6.099	24.25	2.
* 74.45	302	12.33	6.47	24.42	2.:
73.37	302	14.82	5.91	24.447	2..
72.30	302				
74.45	275	13.938	6.704	23.77	2.
74.45	325	15.215	6.977	23.772	2.1
74.45	350				



→ | ←

$\Delta t = 9.04 ns$

$t_f = 74.47 ns$

$t_s = 305.8 ns$

$t_p = 30 ns$

0 2008

23 Check channels on wall A

Notes: AL 14: something wrong w/ inverter

Wall A left 8-15 = replace dynode cable w/ 30 ns cable
current cables are 90 ns.

Wall A right 12 → check psd

Wall A right 6 → check timing

AR 7 → No signal
AR 8 → check

AR 10 → Nothing

AR 13 → Nothing

AR 14 → check timing

AR 15 → check timing

Examine AL 16-23 / BL 16-23 | looks like they all need work!

Problem channels

AL 0-13
AR 0-13

AL 14: Inverter broken

AL 8-15: Dynode cables too low

→ AR 3: recheck PSD

* AR 6: Gate on QOC (for)?

* AR 8: " " "

AR 10: No Fast Signal?

+ AR 13: No sigs?

* AR 14: Gate on QOC (for)?

* AR 15: " " "

→ seems OK. Could be better → Maybe check timing

* Set pedestal to -50 and everything looks OK, but I better do a Coulomb edge calibration to be sure we're not chopping anything off

AR 10: Bad inverter!
AL 14: Bad Inverter

+ Bad cables replaced

Bad ~~good~~ channels

AL	AR
14	10
13	

AL 0-13
AR 0-13 checked

⇒ AL 8 might have problems
→ look into
AL 13 odd → Not triggering fast
Arise Signal "James again with respect to gates
⇒ Inverter bad"

Bad Inverters
AL 13
AL 14
AR 10

AL 8 ⇒ Bad connection on splitter?
bad cable?

5

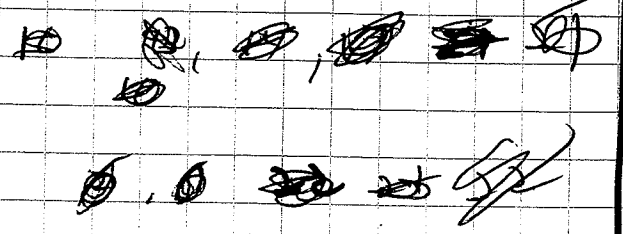
- Spectra look pretty crappy, could be splitter

=> All channels look good but we may want to adjust the splitter

* => maybe make it 25Ω and 25Ω => equal splitter

Bad Inverters

AL
AR
BL
BR



Examine BRO-15

*

BRO: No OR = Bad inverter
BE1 "
~~BR3~~

Switched inverter back

~~BR 0-6~~ → looks bad
~~BR 8-11~~ → looks bad

BR 0-11 Bad
12-15 OK

~~BR 02 - Broken Inverter~~

*

BR 05 Broken Inverter

BR 02 → No dynode signal
→ No anode
→ Bad inverter

→ wrong HV Channel
Channel 240

Jan 1, 2009

TEST AL 16-23
BL 16-23

No ORs on AL 17 - F***ing inverter!
BL 23 is a bit Flaky
m.

Check AL 16, 17, 18, 20, 21
BL 16, 17, 23

AL 16 looks funny
BR 20 ~~is~~
is odd

5.2008

Check OR on all channels

AL 8 looks a bit funny

BL 0-15 : Maybe channel splitter ratio to 1:1

* BL 15: No Spectra
BR 14 = Looks Funny

* AL 16: huge detection

* BL 18: No spectra

* BR 19: No sig

* BR 22 No spectra

* BR 20-23 all funny \Rightarrow maybe splitters

* BR 20 = Bad

BL 15: Inverter Broken: Used spare ~~BR~~ ch 15 on
Spare BenL

BL 18: Dazed Signal removed, replaced

\rightarrow BR 19: Bad splitter \odot very likely!

\rightarrow BR 22: Bad Splitter!

BR 20: Bad inverter! Moved to Spare Bank Slot 13

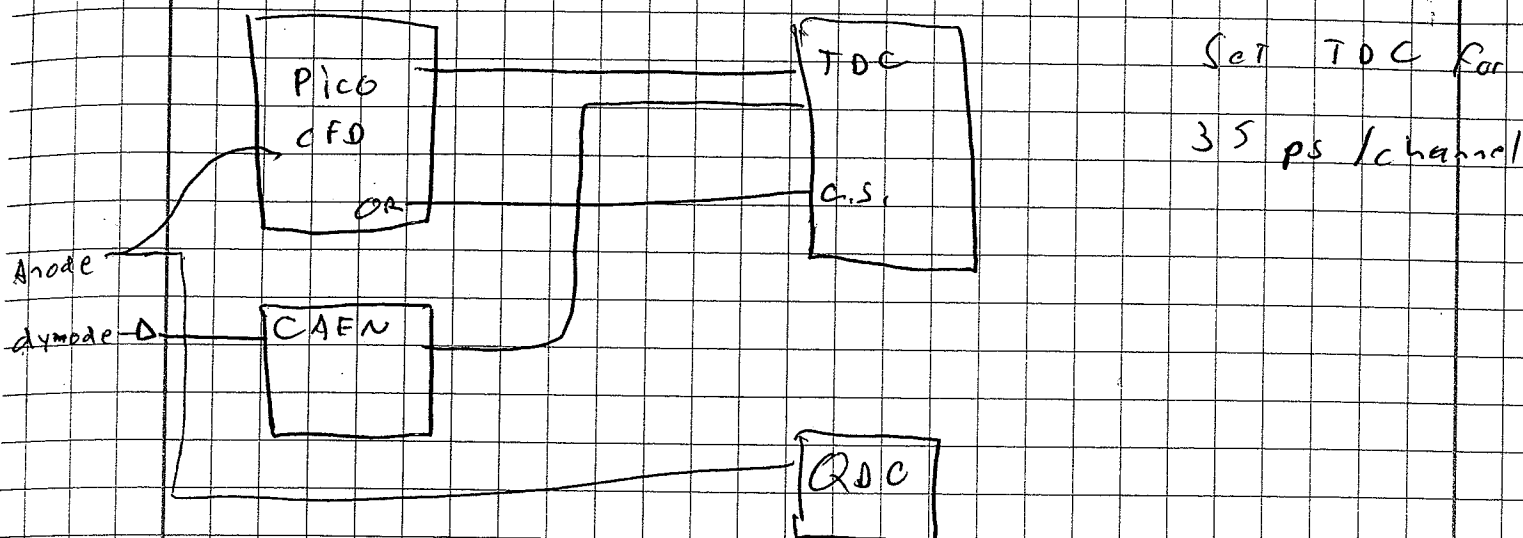
\rightarrow AL 16: ~~too~~ Everything LOOKS OK. Maybe check spectra

\rightarrow AL 8: Bad Splitter channel ~~is~~ Maybe OK
(crosscheck?)

\rightarrow ~~AL 16:~~

- All channels should be functional!

check jitter on CAEN CFD



Jitter on Pico is 4 channels

Jitter on CAEN w.r.t. Pico is $30.26 \text{ ch} = 1.05 \text{ ns}$

There seems to be some 620 ps bimodality in the CAEN which could be due to the dynode inverter \rightarrow reflection?

- Looking at the TDC vs QDC chart, this may be due to some pulse shape effect at low amps \rightarrow we notice it ~~at~~ on the Pico as well \Rightarrow its walk

- It's a threshold effect. Events near threshold will have this walk \rightarrow maybe the delays on the CAEN are off.

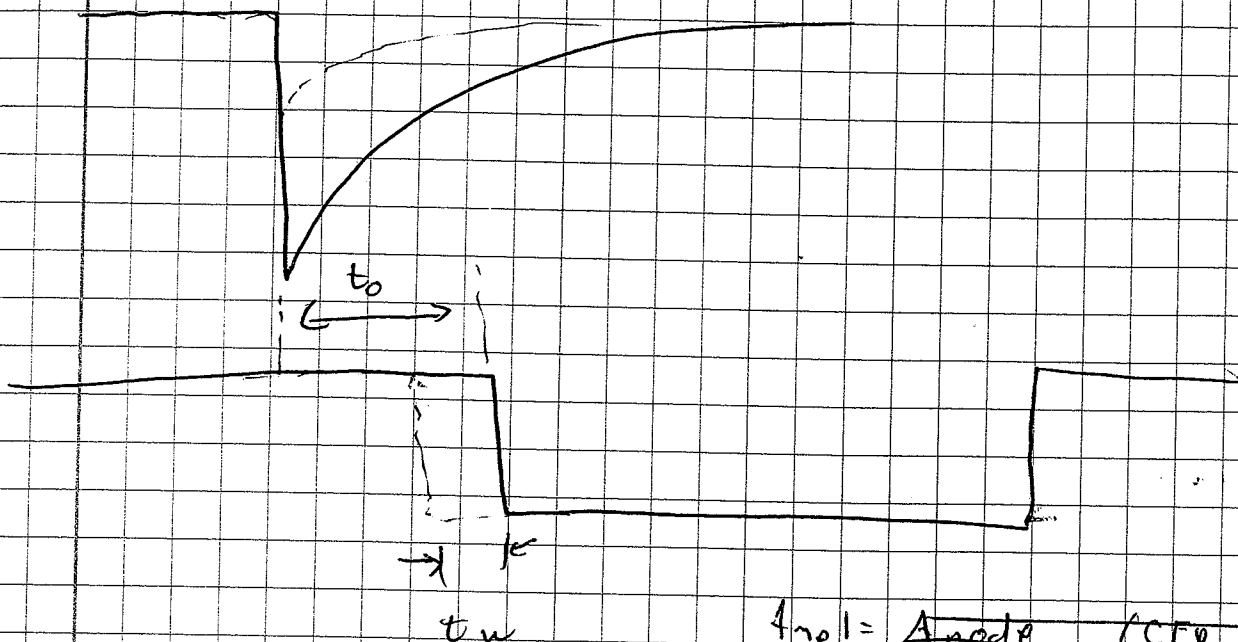
- lower thresh on CAEN \rightarrow resolution ~~decreases~~ goes to 812 ps. and shift to 412 ps

- Walk below channel 226 on QDC \Rightarrow what energy move is this?

CFD level = -5

\rightarrow but definitely no shift at high Amplitudes!

Measure walk Far Pico CFD



$$A_{rel} = \frac{A_{node}}{\text{Disc level}} \quad (\text{CFD user dynoda})$$

<u>A_{rel}</u>	<u>t₀ Jitter</u>	<u>t₀</u>	<u>T_{rise}</u>
543	2ns	13.6ns	
548			
575	2ns	13.6	
600	~3.75	13.6	
650	~3.75-4	13.6	
675	~4	13.6	
700	~4	13.6	~80
725			~60

DN CAEN mod

<u>Anode</u>	<u>Time</u>	<u>t₀</u>	<u>t_w</u>	<u>Through Anode</u>
-39	2.25	37.2ms		
-32	2.25	150 39.2		150
-20	2.25	39.2		~80
-15		37.2 39.2	~2.25	~70
-10			~2.25	~50
-5			~4.25	~20

Anode vs. Dynode

<u>Anode nu</u>	<u>Dynode nu</u>	<u>A/I</u>
154	43	3.58
216	63.2	3.41
180	39.2	3.31
170	50	3.40
564	154	3.66
170	49.0	
166	48.1	
122	37.2	
129	40.1	
142	41	
364	103	
538	148	
167	50.1	
142	43.9	
139	42.9	
214	580	
124	36.1	
152	47.0	
150	41	
92.3	29.2	
160	47.1	
861	31.0	
36.9	12.8	
70.	22.0	
205	72.7	

532	154
480	140
435	122
428	124
677	196
412	118
577	162
113	32.3
137	40
149	47.3
114	32.6
177	50.4
157	49.6
92.9	28.4

1,0008 ^{60}Co calibration and ^{137}Cs calibration

Compton edges

^{60}Co edges at 0.96 MeV and 1.116 MeV

^{137}Cs at 0.477
AmBe at -

Test on AL 0-9 Ser HV = -2400

20C

Tube	^{60}Co Channel	^{137}Cs	x	b
0	874	466		
1	731	423		
2	1669 1610	884		
3	715 687	434		

20C

0	664	406 419
1	567	333
2	1318	802
3	484	298

Method : Find peak of ~~the~~ Compton continuum
Choose edge at 50% of peak

set $E = mx + b$

- Figure out E_n vs $M_{voltage}$
- Do this for all tubes at various voltages

Tube	QDC				IGQDC			
	60Co	137Cs	m	b	60Co	137Cs	m	b
0	874	466	0.001375	-0.16375	664	419	0.00229	-0.482424
1	731	423	0.001821	-0.293464	567	333	0.002397	-0.321346
2	1610	884	0.000773	-0.206091	1368	802	0.000991	-0.317915
3	687	434	0.002217	-0.485348	484	298	0.003016	-0.421806

2400 V
Calibration

Tube	QDC				IGQDC			
	60Co	137Cs	m	b	60Co	137Cs	m	b
0	454	273	0.003099	-0.369149	403	250	0.003667	-0.439667
1	420	260	0.003506	-0.434625	337	204	0.004218	-0.383481
2	917	464	0.001238	-0.097623	818	416	0.001396	-0.103537
3	471	299	0.003262	-0.498227	306	190	0.004836	-0.441879

2200 V
Calibration to 15 Me

¹³⁷Cs

0	273	250
1	260	204
2	464	416
3	299	190

⁶⁰Co

0	454	403
1	420	337
2	917	818
3	471	306

Tube

0	1	2	3
0	1	2	3

~~2000V~~
-2200V

QDC

QDC

0	1	2	3
0	1	2	3

Get Compton Edge For all tubes

-Set HW = -2200V

Tube	⁶⁰ Co CG/IB	¹³⁷ Cs CG/IB	ped	CG IB
0	480	422		
1	424	339		
2	946	830		
3	452	300		
4	666	490		
5	628	489		
6	396	360		
7	516	420		
8	341	442	304	358 check 1st plan!
7	619	489	309	1054 358 269
10	2201	360	1769	1054 836
11	290		272	213 264
12	324		283	381 292
13	558		465	318 259
14	582		443	310 232
15	355		280	220 163
16	1810		1490	828 712
17	585		461	328 256
18	663		589	361 320
19	363		357	335 218
20	423		312	280 176
21	472		348	294 212
22	473		405	241 231
23	434		346	268 267

Week 1

BL	-2200V Tube	60Co		137Cs		rad	
		CG	IG	CG	IG	CG	IG
0		668	348	374	222		
1		575	266	343	179		
2		336	206	199	149		
3		512	236	343	171		
4		324	154	507 179 251	124		
5		916	409	502	249		
6		1035	477	521	267		
7		630	305	346	192		
? 8		503	308	280	203		
9		478	265	309	165		
10		865	399	445	223		
11		386	233	245	174		
12		569	290	314	187		
13		466	230	261	151		
14		513	236	286	143		
15		1058	469	516	244		
16	487	476	467	278	287		
17	469	482	415	283	234		
18	1570	399	1239	836	654		
19		399	370	246	238		
20		692	572	340	288		
21		461	383	244	200		
22		1221	944	346	294		
23		490	370	248	186		

NV=-2200

60 Co

137 Cs

Pod

Tube	CG	IG	CG	IG	CG	IG
0	370	325	253	229		
1	655	504	384	296		
2	492	428	299	273		
3	344	225	286	182		
4	300	633 231	223	159		
5	841	630	473	355		
6	694	520	363	287		
7	514	403	308	233		
8	303	311	289	233		
9	488	405	300	226		
10	320	257	220	174		
11	455	414	257	245		
12	605	523	317	262		
13	1002	837	496	368		
14	364	295	210	168		
15	1005	827	491	380		
16	1122	909	312	287		
17	614	480	265	205		
18	545	431	318	296		
19	Bad	Splinter!	432	289		
20	365	309	225	167		
21	324	287	414 450	355		
22	1221	988	244	236		
23	417	319	410	336		

200
annual →

BR

HV = -2200

Tubo	^{60}Co		^{137}Cs		pod	
	CG	I G	CG	IG	CG	IG
0	431	375	263	230		
1	668	516	363	279		
2	1152	1009	582	514		
3	536	381	331	215		
4	387	292	247	180		
5	720	500	397	301		
6	527	471	282	260		
7	800	619	272	229		
8	424	401	232	232		
9	877	705	464	369		
10	541	409	300	231		
11	567	493	307	278		
12	245	222	206	188		
13	486	425	276	234		
14	631	497	check!			
15	413	318	231	181		
16	581	502	550	463		
17	338	279	347	258		
18	588	543	297	232		
19	790	603	485	418		
20	349	280	149	169		
21	1174	956	584	458		
22	365	285	228	169		
23	369	312	224	199		

check
200

check!

To do

- Clean cables
- Splitter on BR 19 needs to be repaired
- Find Th or PuBe source or High E source
- Find E at 2nd CF
- AL8 Splitter channel?
- Check spectra on low gain channels
- Change splitter for AL 0-15 to equal split
- Email Ashley
- Print Rad source check sheets

Re-test a few odd channels

~~AR3~~

Channel	Co-60		137Cs	
	GG	IG	GG	IG

AR3	373	249	289	183
AR4	345	249	228	160
AL16	1311	930	867	715
AL19	480	329	331	213
BL22	1228	967	615	284
AL6	396	352	300 205	197
AL8	339	289	244	210
AL11	307 374	254 280	240	224
BR7	804	380 391	603	313
BR12	583 236	227	237	207
BR16	125	959	959 576	493
BR17	584	469	359	257
AR16	573	326	212 484	296
AR17	349	308? 308?	644 276	275
AR21	863	451	644 691	357
AR22	476	387 422	448 237	357 235
AR23	807	414 678	628 414	346
AR19	583 720	419	628 581	267
AR18	595	320	418 542	295
AR20	365	240	282	179

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AR16	539	320 475	475 325	286
AR17	346	275	575 323	253
AR18	583	535	535 325	298
AR19	741	567	567 435	296
AR20	324	258	258 245	180
AR21	786	666	666 454	346
AR22	438	412	412 235	232
AR23	768	664	664 406	336
BL4	313	219	173	178

AL12
BR21
BR14

Recheck ASA

- AL11: No QDC signal - Splitter on top bank - splitter
- ~~AL2: low gain on IG QDC~~
- AL8: Bad cable? → cross talk in spl. area?
- BR19: Offset on IG QDC → splitter channel? (strict) - split
- ~~BR20: low Amps~~
- ~~BR22: No signal~~
- ~~AL16: No signal~~

~~BR19~~: Something wrong
~~Att~~

All fixed!

Jan 17, 20

Test LeCroy 3420 Disc

- Good PSD
- Very low jitter
- No apparent walk
- ORs ok
- Disc. very low

On AL1 Channel 1 = good, sd down to
 Jay Ch ~~200~~ 215

Quick	Source	cal		IG		
		137Cs	Rad	60Co	137Cs	POC
AL0	467	282	108	431	272	74
AL1	445	267	113	361	214	45

Can we bus the signals and still get good TOC (psd)

- Delay signal by 20 ns to TOC Comm stop

Strange 14 ns satellite pulse at 320 level → cross talk

$$10 \text{ ns stop delay} = 273.04 \text{ ch}$$

res = 0.4 ff

- Seems like it's OK to bus these.

2,2009 Pick up + send ~~LAST~~ detectors at IUCF

2

29

Det 1: 4 bad strips cf. Notes From Youngs (E xcel sheet)

Te 13: Det 1674-12 \downarrow made test
pin³ on EB

Te 14: Det 1140-18 EB 14 bad

Te 15: 1140-1a OK

Te 16: EFG
FR0, 3, 4, 5, 6, 14, 15

Te 17: 1742-4 EB 2, 11, 12, 14

004

- do
- Check w/ Sanderson on Chamber status
 - Reg on Cales
 - Students schedules
 - Get From de Souza
 - LASSA pinout
 - "Splitters"

Note: LASSA pins
in desicator is
Lab Middle
shelf back

- Yurkon
 - Targets
 - wire bands
- Place in ~~the~~ chamber
- Brief Youngs & Rogers on Teskey visit
- LASSA tests: Coupland
- Next wk: Chamber mechanics
- Pulsar, M.Y.
- Check delays on CAEN CFO.
- Jess PSD w/ Pico CFO. if poss. ble.

Defin Mini Ball Inspection

Jan. 14.

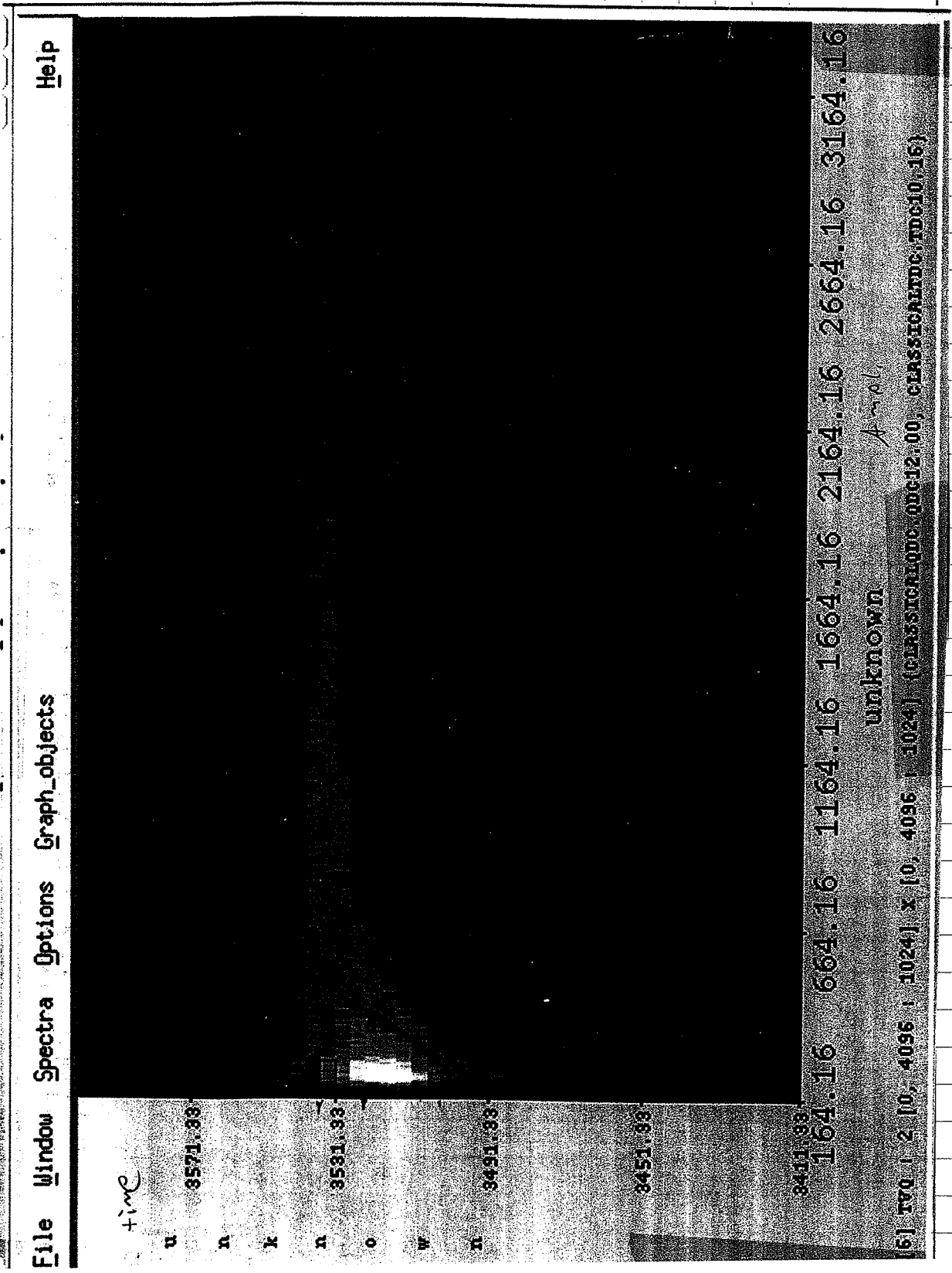
Rings 4- end

Things to inspect:

- Wrappings
- Sn Pb foil
- Pulse input
- Connections
- Foil
- Scintillator?
- Optical coupling
- Scintillator Mount

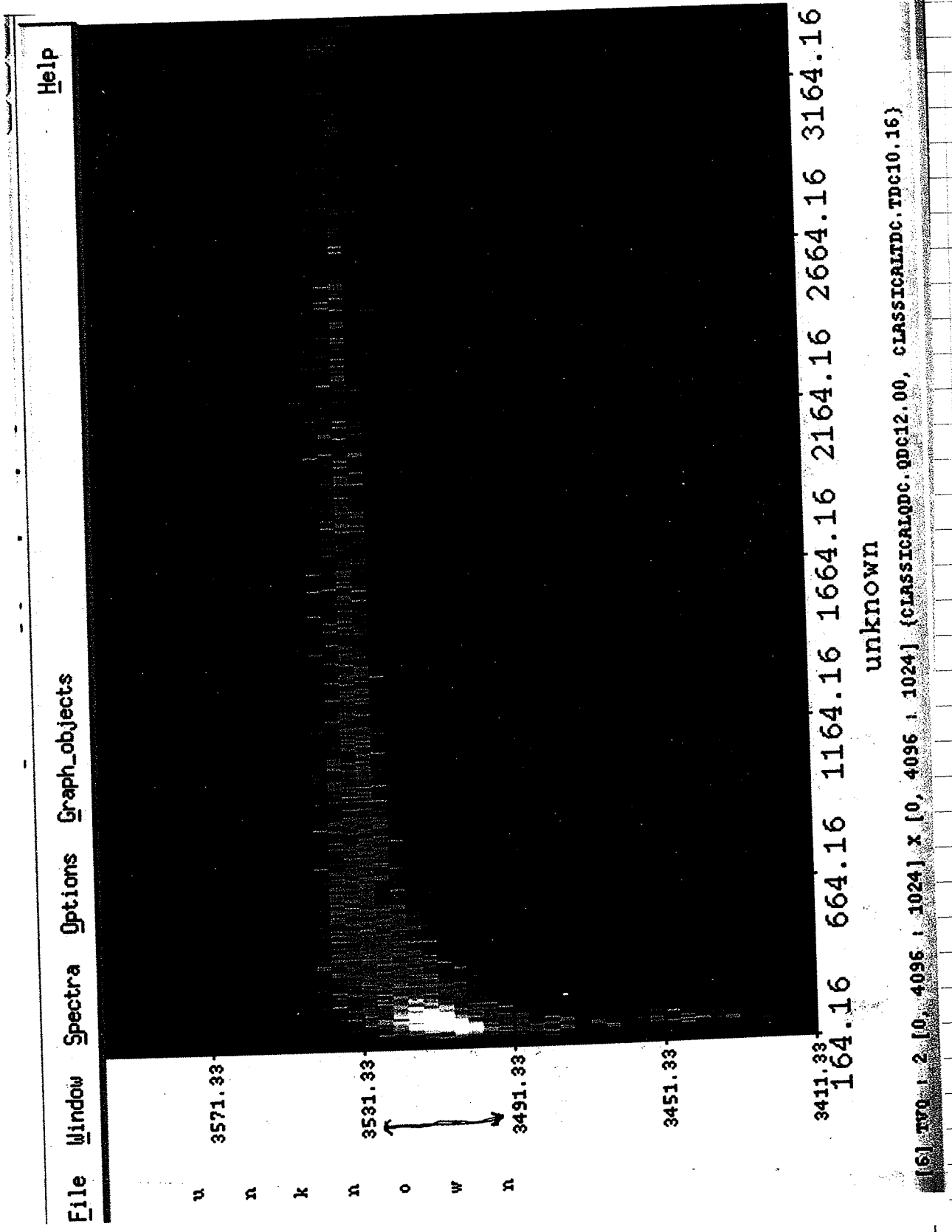
Amplitude effect on CAEN v812 CFD

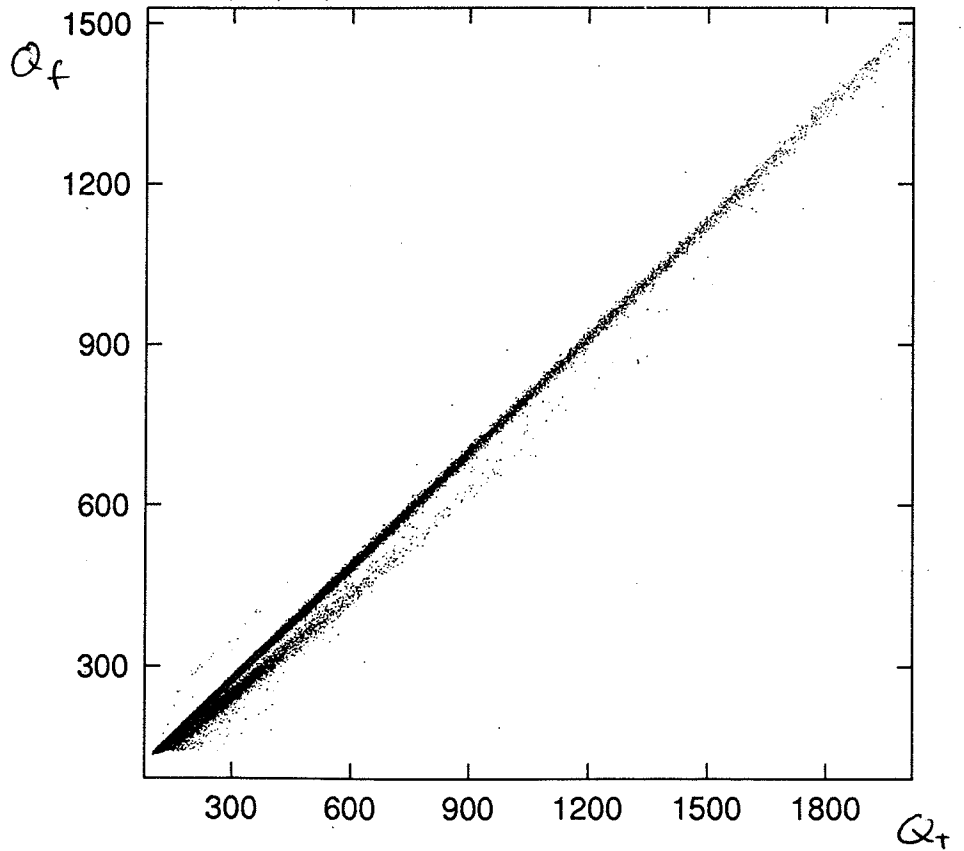
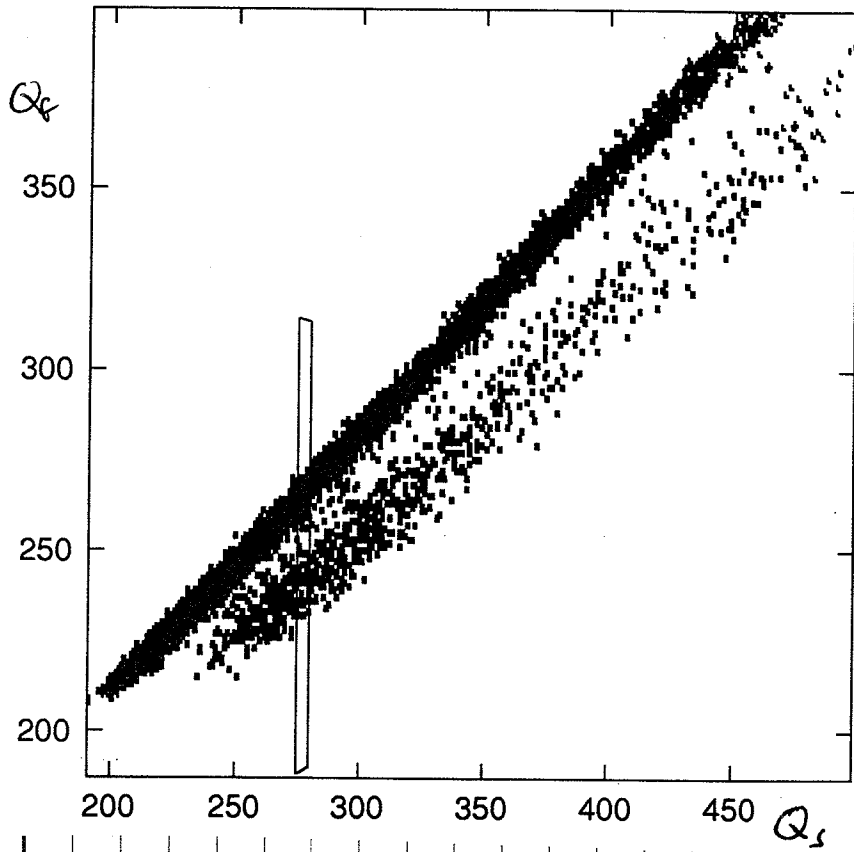
Below about ch #200, the timing shifts continuously, but the total FWHM is still about 600 ps max. If the thresh is lowered, the shift minimizes. This seems to correspond to near threshold events.
Lower thresh



This is not the same as the 6 ns jitter we saw with the V812 before repair.
Higher flash

Note: The 6 ns jitter was not observed.





Things to check:

- LoCroy 3420 CFO's: do these exist somewhere?
- timing on these. Maybe they're OK.

Jan. 23,

Installation of Miniball elements

- Replaced 6-1 with 6-17

Pumped chamber

at 6:18:51 chamber at 70 mTorr
 at 09:21 next morning, chamber at 957 mTorr

Jan 26, 20

Leak rate $\approx \frac{957 - 70}{14.5 \text{ hrs}} = 61.2 \text{ mTorr/hr} = 1.02 \text{ mTorr}$
 $= 0.017 \text{ mTorr/d}$
 $= 1.7 \times 10^{-5} \text{ Torr/sec}$

Connect Power to MiniBall

In order to ~~connect~~ accommodate π walls, we must remove

- 3 detectors from Ring 4
- 3 From ring 5
- 3 From ring 6

Jan 28,

Attached all MiniBall power cables

pumped to 70 mTorr at 6:18:34
 At 0900 $p = 838 \text{ mT}$ outgast leak rate = 61.36 mTorr/hr

1009 Rough down rest of chamber with ALL parts inside.

- All miniball except a few parts
- All Mini Ball cables
- ~~Not~~ TWO CLASS A telescopes
- NO cooling lines
- NO Programs.

h:
Time (min) Pressure (T)

0	760
1:29	460
1:54	400
13:35	9 9.30
15:00	6.03
31:00	0.213
34:30	0.164
41:20	0.117
44:00	0.107
49:40	0.092
52:10	0.088
1:07:00	0.070
1:16:30	0.062
1:23:25	0.058
1:29:30	0.055
1:43:10	0.049

009 Chamber Outgass after 14 hours

at 08:40 : P = 597 mT

at ~18:40 last night P = 0.49 mT

$$\text{Outgass: } \frac{597 - 49}{14 \text{ hr}} = 39.14 \text{ mT/hr}$$

To do:

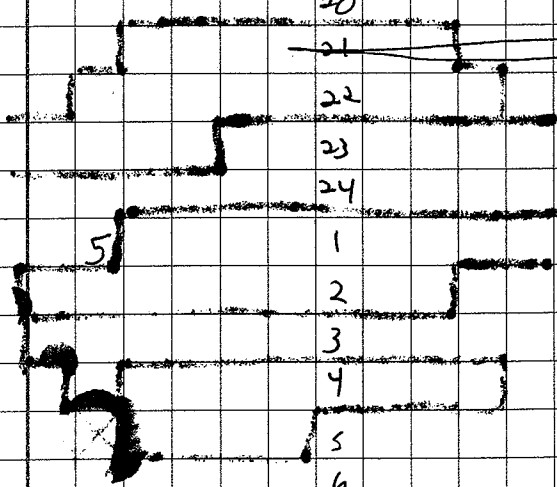
- order Camera
- Talk to Turkon about
 - Targets
 - Viewer
- CLASS A Frames
- Mini Ball Power Terminal Sevel
- Ring 4 = Mill other side
- Wolf

- Tape Light holes

- Seal N-wall

Mini Ball Power Crate Map

Ring	Type	Channel	Note	
4	1	0		
	2	1		
	3	2		
	4	3		
	5	4		
	6	5	unused	
	7	6	unused	
	8	7	unused	
	9	8 5		
	10	9 6		
	11	10 7		
	12	11 8		
	13	12 9		
	14	13 10		
	15	14 11		
	16	15	unused	
5	17	16	unused	
	18	17	unused	
	19	18	unused	
	20	19	unused	
	21	20	unused	
	22	21		
	23	22		
	24	23	← 147	
	5	1	24	
		2	25	
3		26		
4		27		
5		28		
6		29	unused (check)	
7		30	unused	
8		31	unused	
9		32		
10		33		
11	34			
12	35			
13	36			
14	37			
15	38			



Mini Ball

Power (Cont.)

Ring

~~channel~~ Tube

channel

Note

5

17

7

unused

18

7

unused

19

7

unused

20

7

unused

21

7

unused

22

7

unused

23

29

24

30

6

1

31

2

32

3

33

4

34

5

Unused

6

Unused

7

Unused

8

35

9

36

10

37

11

38

12

39

13

40

14

41

15

Unused

16

Unused

17

Unused

18

42

19

43

20

44

7

1.

45

2.

46

3.

47

4.

48

5.

49

6.

50

7.

51

8.

52

9.

53

10.

54

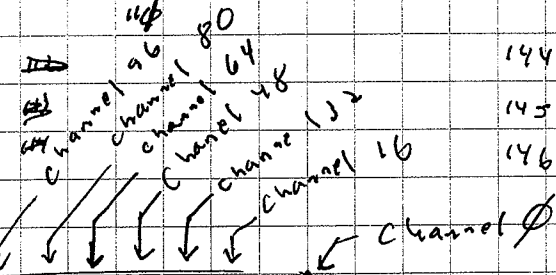
11.

55

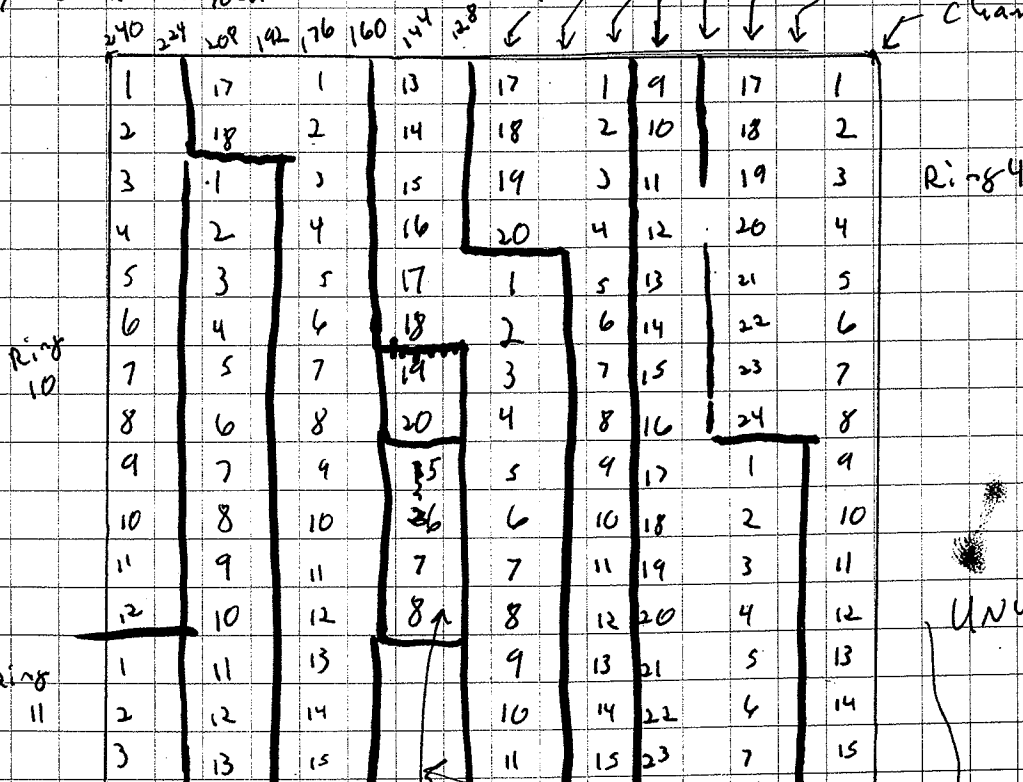
Ring	Tube	Channel	Note	
7	13	13	57	
	14	14	58	
	15	15	59	
	16	16	60	
	17	17	61	
	18	18	62	
	19	19	63	
	20	20	64	
	8	1	21	65
		2	22	66
3		23	67	
4		24	68	
5		25	69	
6		26	70	
7		27	71	
8		28	72	unused
9		29	73	unused
10		30	74	unused
11		31	75	
12		32	76	
13		33	77	
9	14	34	78	
	15	35	79	
	16	36	80	
	17	37	81	
	18	38	82	
	19	39	83	
	20	40	84	
	1	41	85	
	2	42	86	
	3	43	87	
	4	44	88	
	5	45	89	
	6	46	90	
7	47	91		
8	48	92		
9	49	93		
10	50	94		
11	51	95		
12	52	96		
13	53	97		

MiniBall Power (cont.)

Ring	Tube	Channel	Note
10	1	[Redacted]	Unused (camera)
	2	[Redacted]	96
	3	[Redacted]	97
	4	[Redacted]	98
	5	[Redacted]	99
	6	[Redacted]	100
	7	[Redacted]	101
	8	[Redacted]	102
	9	[Redacted]	103
	10	[Redacted]	104
	11	1	[Redacted]
11	2	[Redacted]	106
	3	[Redacted]	107
	4	[Redacted]	108
	5	[Redacted]	109
	6	[Redacted]	110
	7	[Redacted]	111
	8	[Redacted]	112



LeCroy Crate Layout



0:30 Pumped MiniBall down

Time	P
20:30	82 mTorr
09:01 (Next day)	843 mTorr

$$\text{Leak/outgas rate: } \frac{843-82}{12.5} = 60.88 \text{ mT/hr}$$

30:00 To do:

- Find MiniBall coding
- Get X-ray & Phase Images

Re-do HV channels

Test to be sure we're getting signals from MiniBall dots

Missing signals

Ring C: 1
 12 (bad cable?)
 Ring 8: 4: very low amplitude
 6: Missing
 10: Missing
 17: Missing
 18: Missing

27

* Card in ~~Slot~~ Slot 13 seems to only go to 705 V max
 * Card in Slot 15 also only goes to 705 V max

To do:

- Extend Scint Mount by 2.75'
- ~~Scintillator Quote R74004 + E57K~~
- Targets → Yurkon
- Camera Mount
 - Modify code
- Bend Plastic Scintillator
 - talk to Yurkon
- ~~Toy rod end R74004 PMT~~
- ~~Call Hamamatsu~~

Shutdown 16:55 = 40 mTorr
 08:38 = 484 mTorr = 444 Torr in 15:43 = 28.25 Torr/h

Rerouted MiniBall power (see pg 48) Modified.

MiniBall = Ring 5 #16 ⇒ Replaced in chamber signal with cable #17 since #16 looked broken

Test MiniBall

- test 1: signals from detectors, dark current

Ring 4

#10 = No signal at flange = recheck at flange: Maybe not plugged
~~#11 = No signal at flange~~
 #24: No signal ⇒ No HV = changed HV channel

Ring 5

#9 = No sig at flange = HV? try again

Ring 6

#1: No sig at flange
 #3: No sig at flange
~~#10: No sig~~
~~#11: No sig~~
~~#12: No sig~~
 Bad cable?
 veto

Ring 7

All OK

Ring 8

#6: Missing

#10 ~~Missing~~ (Target?) = Target! = re rotated: TX again
No Sig At Floor

Ring 9

All OK

Ring 10

~~#8 No Sig~~

~~#10 No Sig~~

#10 No Sig At Floor: Re route voltage, Try again

Ring 11

#3 No Sig

~~#5 No Sig~~

#5-8: No Sig = Wrong HV: Try again

Recheck

Ring 4: 10! Still bad *
24! OK

Ring 5: 9 : OK

Ring 6: 1: OK

3: Bad *

Ring 8: 9: No Sig *

Ring 10: 10 = OK

Ring 11: 3 = bad (No Sig) *

Pump down

Time

A (mTorr)

21:01
07:42

120
1450 mTorr

142.75 mTorr/hr

Repaired channels

= All good except 4:10

Test Splitters

11:1-8

Fast = all OK

slow:

Tail:

Log:

10:5-12

F:

S:

T:

L:

~~10:12: F: No input sig~~

~~9:14: No input~~

4:17: No input sig

4:24: No input \Rightarrow Broken

4:9: No ~~FAS~~ input (also

4:10: No input \Rightarrow Bad

10:12 \Rightarrow Find correct HV channel

9:14 \Rightarrow Find correct HV channel

4:24 \Rightarrow No input

4:17 \Rightarrow Really low gain

4:10 \Rightarrow Find correct HV channel

Recheck splitters 12 & 3: Maybe bad T+S sigs. \neq OK

S: 9 \Rightarrow Maybe Bad T sigs

4:2 \Rightarrow Maybe Bad S signal

Logic

4:15 tools odd = OK
4:18 = No sorry OK
4:10 = No logic sign OK
10:14 = No in air sign

Pump down

time P

1905 75 mTorr
0738 ~~288~~ 864 mTorr

Outgas rate = 69 mTorr/hr

24, 2009

Pump down

Time : 19:33
Pressure = 83 mTorr

07:39
1100 mTorr

$\frac{\Delta P}{\Delta t} = \frac{84.05 \text{ mTorr}}{hr}$

6 5, 2009

Assemble LTSS4 Silicon

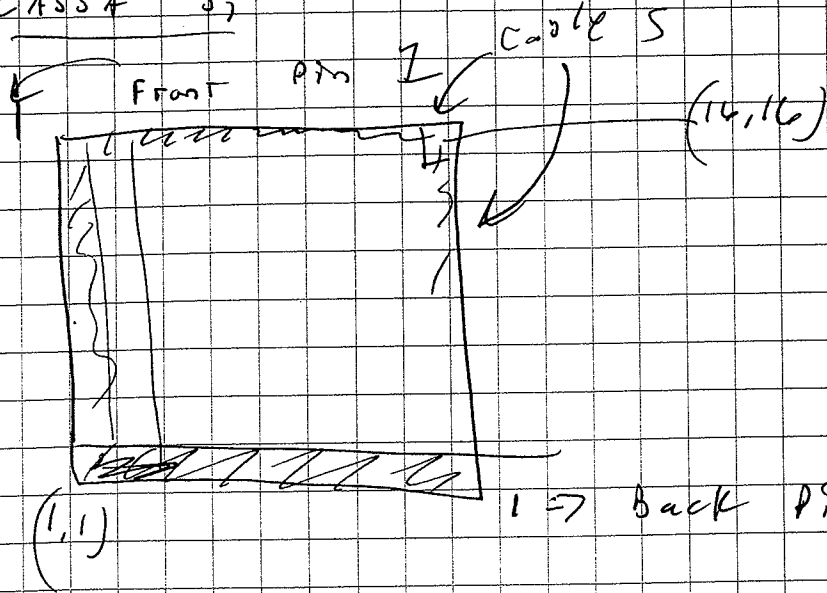
Telescope
7

Si
1133-20

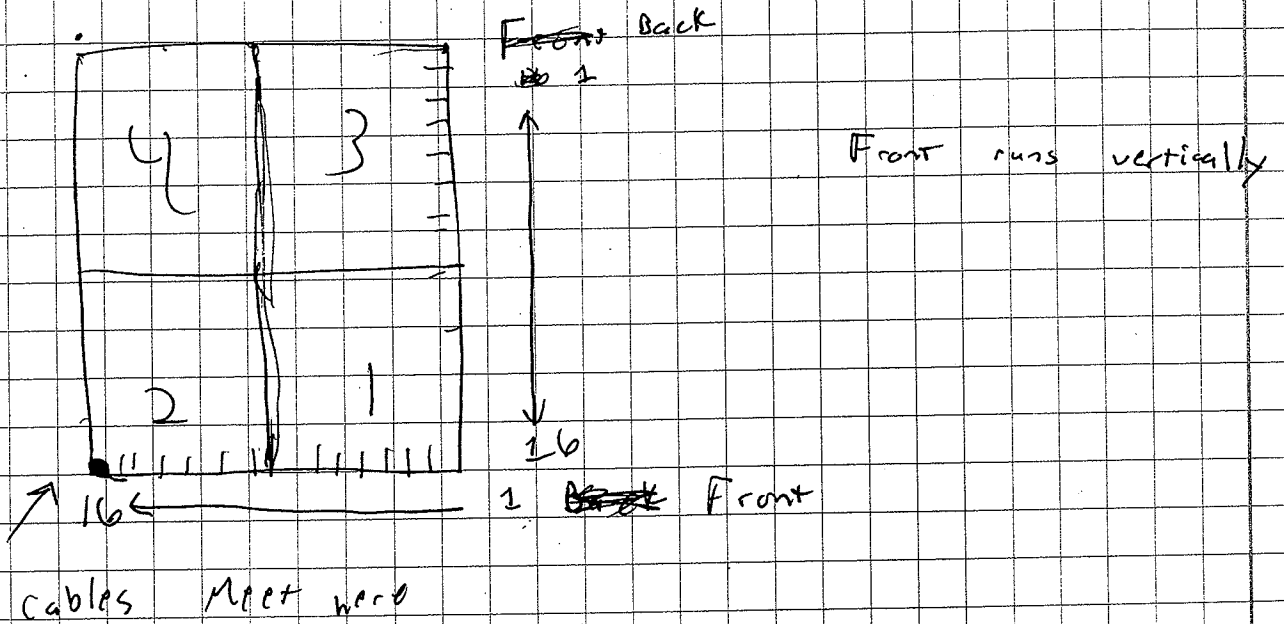
More
Practice

Run : Missing CoI signs +
~~Bad~~ Bad Si

LASSA S₂



LASSA S₁ + CSIP ordertation



6,009 Mount Si licars

Telescope	Si	Note
7	1133-20	
5	1140-19	
2	1140-21	Replaced CSE part between 2+1
3(a)	1674-12	
8	1194-17	
4	1140-18	

6,009 To do:

- Miko Shows x-legs
- 40 LEMO Feeds
- Alt 16 if CSE in-chamber cannot
- Cooling
- Adapt Signal cables for CASSA
- LEMO Feed through
- Ribbon Cable Joiners

Recheck Mini DAW tubes

- 4:9 = Low gain as before
- 4:10 = No Sig - disconnected inside chamber
- ~~4:11 = No Sig~~
- 4:14 = No Sig
- 5:16 = verify cable routing
- 6:1 = No Sig - disconnected inside
- ~~6:2 = No Sig~~
- ~~6:9 = No Sig~~
- ~~6:10 = Check routing~~

Down-down rest

Feb. 9, 20

T (m:s)	A (J)
0	760
17:32	2.76
21:05	1.09
24:45	0.484
26:25	0.364
28:35	0.272
30:00	0.229
31:00	0.204
32:30	0.180
34:00	0.161
34:58	0.151
38:07	4.4×10^{-4}
48:13	2.0×10^{-4}
1:00:35	1.3×10^{-4}
1:10:25	1.0×10^{-4}
1:14:25	9.3×10^{-5}
1:23:35	7.7×10^{-5}
1:44:25	5.4×10^{-5}
2:04:00	4.1×10^{-5}
2:12:00	3.8×10^{-5}
2:27:25	3.2×10^{-5}
2:33:25	3.0×10^{-5}
2:44:12	2.8×10^{-5}
2:54:25	2.6×10^{-5}
3:10:35	2.3×10^{-5}
3:21:45	2.1×10^{-5}
3:52:45	1.9×10^{-5}
4:00:00	1.8×10^{-5}

Turn on Turbo at: 36:15

11008 Wiring at MiniBall

- Gates
- Signals
- F
- S
- T

To do

- recheck Gates
- F
- F common
- slow
- Tail
- Shield cable joiners
- Find and use 16a → ribbon
- get 3 more C.G. ADCs
- Make channel Map.
- Replace 7th dist
- Find.
- Source check

MiniBall Discriminator CAMAC Crate

<u>Slot</u>	<u>Channels</u>	<u>Note</u>
7	4:1-3	
9	4:4-24, 5:1-3	
11	5:4-24, 6:1-4	
13	6:8-20, 7:1-6	
15	7:7-20, 8:1-2	
17	8:3-18, 9:1	
19	9:2-14, 10:2-4	May Need to replace
21	10:5-12, 11:1-8	

Mini Ball VME Crate Configuration as of today

Slot	Module	Channels	Note
------	--------	----------	------

2	IG QOC	4:1-3 F	
3	CG QOC	4:1-3 S	
4	CG QOC	4:1-3 T	

4:5-14,
4:15-24, 5:1-3

7	IG QOC	4:5-14, 5:1-3 } F 5:4-14, 6:1-4 } S 6:8-20, 7:1-6 } T	
8	CG QOC		
9	IG QOC		

12	IG QOC	6:8-20, 7:1-6 } F 5:4-14, 6:1-4 } S 7:7-10, 8:1-2 } T 8:3-18, 9:1	
13	CG QOC		
14	CG QOC		

(Don't have yet)

17	IG QOC	8:1-18, 9:1 } F 9:2-14, 10:2-12 } S 11:1-8 } T	
18	CG QOC		
19	CG QOC		

Don't have yet

Don't have yet

Spl# Cable Config Map

<u>Cable Channel</u>	<u>Fast channel</u>	<u>Slow</u>	<u>Tail</u>
1	1	8	1
2	2	8	2
3	3	6	3
4	4	5	4
5	5	4	5
6	6	3	6
7	7	2	7
8	8	1	8
9	9	16	9
10	10	15	10
11	11	14	11
12	12	13	12
13	13	12	13
14	14	11	14
15	15	10	15
16	16	9	16

Mini Ball Map

Ring	Channel	QOC Channel	Fast Slot - ch	slow slot - ch	tail slot - ch
------	---------	-------------	----------------	----------------	----------------

4

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24

Unused

unused

unused

8

7

6

5

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

Unused

unused

unused

5

- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24

6

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20

7

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

7

15

16

17

18

19

20

8

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

9

1

2

3

4

5

6

7

8

9

10

11

12

13

14

10

1

		F S T	Fast Slot	Slow Slot	tail slot
		QOC channels			
10	5	1 8 1			
	6	2 7 2	17	18	19
	7	3 6 3			
	8	4 5 4			
	9	5 4 5			
	10	6 3 6			
	11	7 2 7			
	12	8 1 8			
11	1	9 16 9			
	2	10 15 10			
	3	11 14 11			
	4	12 13 12			
	5	13 12 13			
	6	14 11 14			
	7	15 10 15			
	8	16 9 16			

b. 12, 2008 Mini Ball Spectrum ^{228}Th Source

Run 0

R7 TG only
HV = -1100V

Plotting F vs. S
F vs. T
F vs. uncorrelated

13, 2008 Untert chamber. \Rightarrow Mini Ball ~~Source~~ Background Run

Run 4

R7 TG
HV = 1100 V

To do:

- repair Mini Ball tubes
- Make individual widths for LeCroy
 - Make Mask for LeCroy
 - See Phillips get more
- Test All neutron channels on Mon
 - Compton Cal.
- Change jumpers on LeCroy disas!
- Check LeCroy delays

VME crate = crate 1

Slot	Module	Purpose	ADDR
3	GGQDC	AL 0-15, BL 0-15	0x33330000
5	IGQDC		0x55550000
10	GGQDC	AR 0-15, BR 0-15	0xaaaa0000
12	IGQDC		0xcccc0000
16	CGQDC	AL 16-23, AR 16-23	0x10100000
18	IGQDC		BL 16-23, BR 16-23

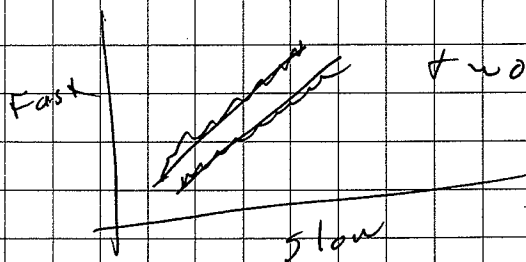
CAMAC Branch = 0
Crate = 1

Slot	Purpose
3	AL 0-15 ✓
5	AR 0-15 ✓
7	BL 0-15 ✓
9	BR 0-15 - May Not work ✓
11	AL 16-23 BL 16-23
15	AR 16-23 BR 16-23 - May Not work

Set pulse width somewhere between 3 and 4
- Maybe 4

Quick test for wall 0-15

- Note Some channels have "double band" structure likely due to jitter in Fast Signal.
- May have to replace dist.
- Examples as AL 9 and AL 15



switching discs didn't help.
Is it a word pulse signal?

⇒ lowering PMT voltage helped but it looks like 9

Run 6 ²⁵²CF neutron test on wall AL 0-15
 Source placed near AL I
 ⇒ Good PID
 Iped for CG QDC = -50

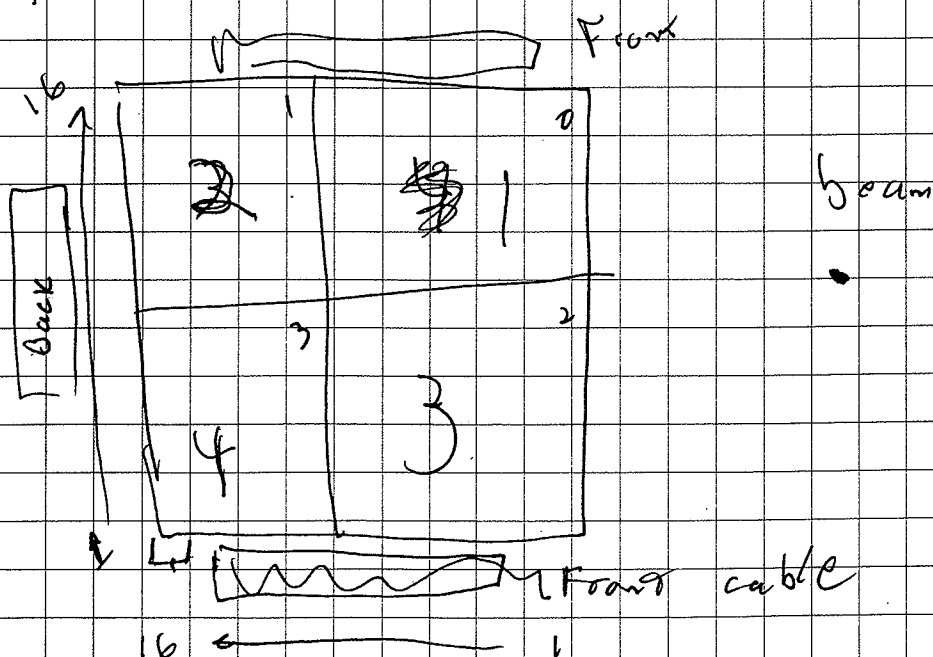
Run 7 Same as 6 but Iped for
 All QDC's at -50

6/16/2009 Examining Mini-Ball Faulty Signals

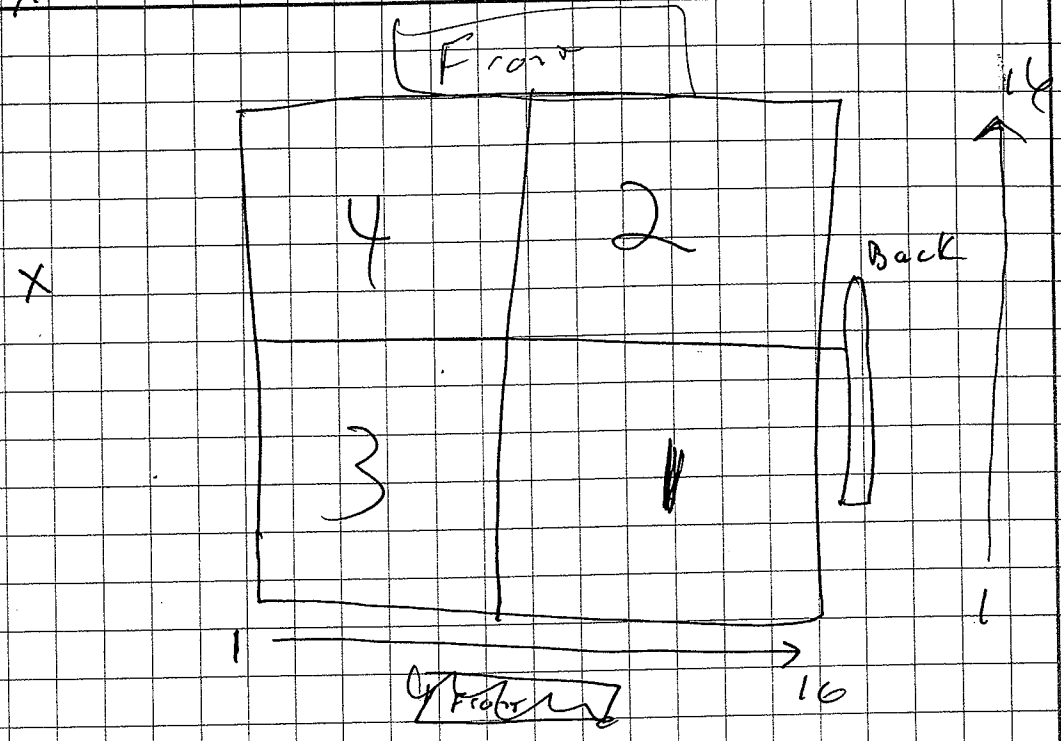
4:20 = Connection looked ok = will retry
 4:24 = Connection looked ok = will retry = replaced.
 - this one is chemically bad ⇒ replace tube
 6:11 = looked ok = retry
 10:12 = looks ok = retry

Place LASS + Detectors in Chamber

AS Viewed From back



Beam's eye view



Table

From downstream

Tel # 8
 S# = 1194-17
 -66V
 1.21 mA

Tel 1

1140-21
 -85V
 6.52 mA
 Tel 4

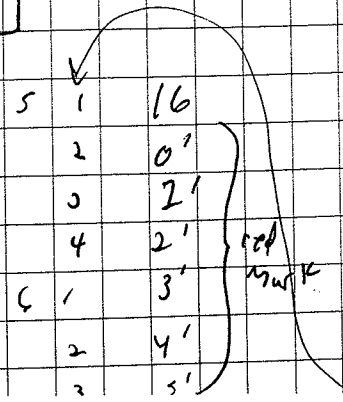
Tel 1742M
 S# -55V
 0.21 mA
 Tel 6

Tel 2
 S# = 1140-18
 -60V, 5.29 mA

1140-19
 -65V
 3.45 mA
 Tel 5

Tel 3
 3
 1674-12

Tel	Ch	Step
2	φ	0
	2	1
	3	2
	4	3
2	1	4
	2	5
	3	6
	4	7
3	1	8
	2	9
	3	10
	4	11
4	1	12
	2	13
	3	14
	4	15
5	1	16



To do:

- LASS & Cooling
- Determine Pre-amp Gain
 - Alternates
 - Full range
- MiniBall Light Pulser
- VME in S2
- Preamp
 - begin set up of LASSA = Power Cables etc.
- Ribbon → IEMU
- C to QDC

Placed V1190 JOC in Neutron VME system

- Slot 8 Base addr = 0x88880000

For Tomorrow & Fr

- Co-60 on MiniBall
 - F
 - B
 - T

- Assemble Preamps
 - Pre-amp cooling
 - insert at least two preamps
 - Signals from LASSA
 - n-walls
 - Camera

COC Mini Ball Mapping to QDC's

Slot CH Ring

Tube

Function (F, S, T)

Type

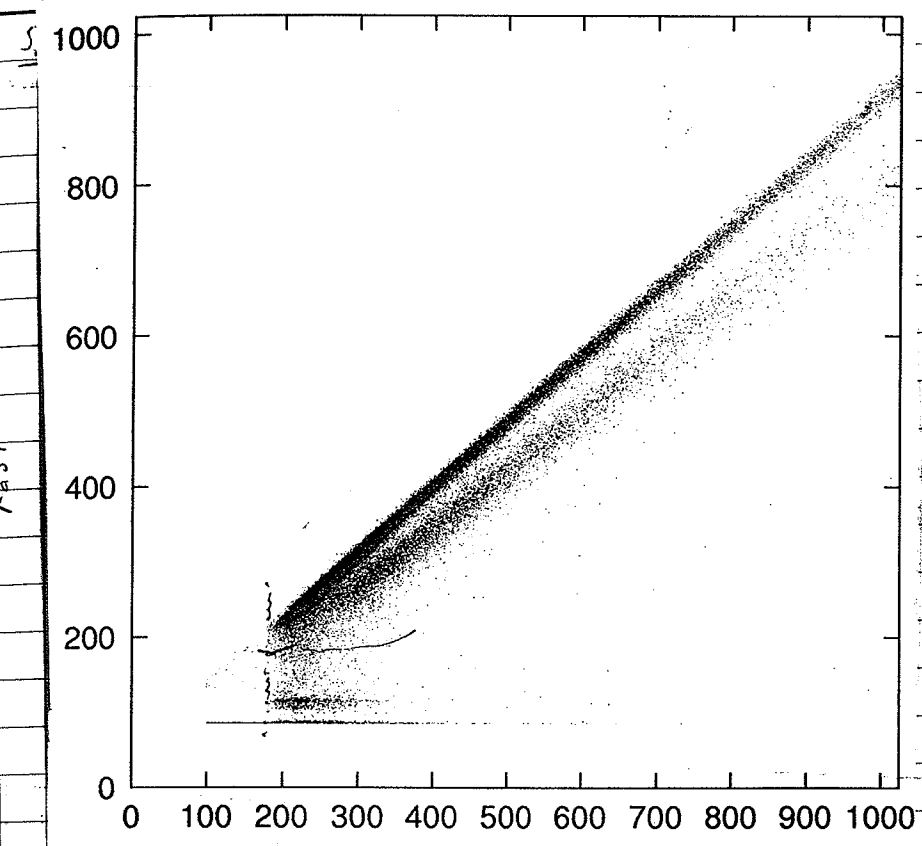
Power Channel	Slot	Channel	Ring	Tube	Function	Type	Slot	Channel	Ring	Tube	Function	Type	Slot	Channel	Ring	Tube	Function	Type	
0	2	0	4	1	F	IG	3	0	0	4	S	CG	4	4	0	4	1	T	CG
1	1	1	1	2	2		1	1	1	1			1	1	1	1	2		
2	2	2	2	3	3		2	2	2	2			2	2	2	2	3		
3	3	3	3				3	3	3				3	3	3				
4	4	4	4				4	4	4				4	4	4				
5	5	5	5				5	5	5				5	5	5				
6	6	6	6	4	3		6	6	6	4	3		6	6	6				
7	7	7	7	4	2		7	7	7	4	2		7	7	7				
8	8	8	8	4	1		8	8	8	4	1		8	8	8				
9	9	9	9				9	9	9				9	9	9				
10	10	10	10				10	10	10				10	10	10				
11	11	11	11				11	11	11				11	11	11				
12	12	12	12				12	12	12				12	12	12				
13	13	13	13				13	13	13				13	13	13				
14	14	14	14				14	14	14				14	14	14				
15	15	15	15				15	15	15				15	15	15				
16	3	16	16	4	4		16	16	16	4	4		16	16	16	4	4		
17	4	17	17	5	5		17	17	17	5	5		17	17	17	5	5		
18	5	18	18	9	9		18	18	18	9	9		18	18	18	9	9		
19	6	19	19	10	10		19	19	19	10	10		19	19	19	10	10		
20	7	20	20	11	11		20	20	20	11	11		20	20	20	11	11		
21	8	21	21	12	12		21	21	21	12	12		21	21	21	12	12		
22	9	22	22	13	13		22	22	22	13	13		22	22	22	13	13		
23	10	23	23	14	14		23	23	23	14	14		23	23	23	14	14		
24	11	24	24	15	15		24	24	24	15	15		24	24	24	15	15		
25	12	25	25	16	16		25	25	25	16	16		25	25	25	16	16		
26	13	26	26	17	17		26	26	26	17	17		26	26	26	17	17		
27	14	27	27	18	18		27	27	27	18	18		27	27	27	18	18		
28	15	28	28	19	19		28	28	28	19	19		28	28	28	19	19		
29	16	29	29	20	20		29	29	29	20	20		29	29	29	20	20		
30	17	30	30	21	21		30	30	30	21	21		30	30	30	21	21		
31	18	31	31	22	22		31	31	31	22	22		31	31	31	22	22		

Power Channel	Slot	Channel	Ring	Tube	Function	Type	Slot	Channel	Ring	Tube	Function	Type	Slot	Channel	Ring	Tube	Function	Type	
19	7	0	5	4	F	IG	8	0	5	14	S	CG	9	0	5	4	T	CG	
20	1	1	1	5	13		1	1	1	5	13		1	1	1	5	13		
21	2	2	2	9	9		2	2	2	9	9		2	2	2	9	9		
22	3	3	3	10	10		3	3	3	10	10		3	3	3	10	10		
23	4	4	4	11	11		4	4	4	11	11		4	4	4	11	11		
24	5	5	5	12	12		5	5	5	12	12		5	5	5	12	12		
25	6	6	6	13	13		6	6	6	13	13		6	6	6	13	13		
26	7	7	7	14	14		7	7	7	14	14		7	7	7	14	14		
27	8	8	8	15	15		8	8	8	15	15		8	8	8	15	15		
28	9	9	9	16	16		9	9	9	16	16		9	9	9	16	16		
29	10	10	10	17	17		10	10	10	17	17		10	10	10	17	17		
30	11	11	11	18	18		11	11	11	18	18		11	11	11	18	18		
31	12	12	12	19	19		12	12	12	19	19		12	12	12	19	19		
32	13	13	13	20	20		13	13	13	20	20		13	13	13	20	20		
33	14	14	14	21	21		14	14	14	21	21		14	14	14	21	21		
34	15	15	15	22	22		15	15	15	22	22		15	15	15	22	22		
35	16	16	16	23	23		16	16	16	23	23		16	16	16	23	23		
36	17	17	17	24	24		17	17	17	24	24		17	17	17	24	24		
37	18	18	18	25	25		18	18	18	25	25		18	18	18	25	25		
38	19	19	19	26	26		19	19	19	26	26		19	19	19	26	26		
39	20	20	20	27	27		20	20	20	27	27		20	20	20	27	27		
40	21	21	21	28	28		21	21	21	28	28		21	21	21	28	28		
41	22	22	22	29	29		22	22	22	29	29		22	22	22	29	29		
42	23	23	23	30	30		23	23	23	30	30		23	23	23	30	30		
43	24	24	24	31	31		24	24	24	31	31		24	24	24	31	31		
44	25	25	25	32	32		25	25	25	32	32		25	25	25	32	32		
45	26	26	26	33	33		26	26	26	33	33		26	26	26	33	33		
46	27	27	27	34	34		27	27	27	34	34		27	27	27	34	34		
47	28	28	28	35	35		28	28	28	35	35		28	28	28	35	35		
48	29	29	29	36	36		29	29	29	36	36		29	29	29	36	36		
49	30	30	30	37	37		30	30	30	37	37		30	30	30	37	37		

1107 CB Ring Tube Function Type

Slot	Channel	Ring	Tube	Function	Type	Slot	Channel	Ring	Tube	Function	Type
51	12	0	7	7F	CG	13	0	7	14	7T	CG
52	1	1	8	9		1	1	7	13	8	
53	2	2	10	11		2	2	7	12	9	
54	3	3	7	10		3	3	7	11	10	
55	4	4	7	9		4	4	7	10	11	
56	5	5	7	8		5	5	7	9	12	
57	6	6	7	7		6	6	7	8	13	
58	7	7	7	6		7	7	7	7	14	
59	8	8	7	5		8	8	7	6	15	
60	9	9	7	4		9	9	7	5	16	
61	10	10	7	3		10	10	7	4	17	
62	11	11	7	2		11	11	7	3	18	
63	12	12	7	1		12	12	7	2	19	
64	13	13	7	0		13	13	7	1	20	
65	14	14	8	1		14	14	7	16	1	
66	15	15	2	2		15	15	7	15	2	
67	16	16	3	3		16	16	8	11	3	
68	17	17	4	4		17	17	8	9	4	
69	18	18	5	5		18	18	8	8	5	
70	19	19	6	6		19	19	8	7	6	
71	20	20	7	7		20	20	8	6	7	
72	21	21	8	8		21	21	8	5	8	
73	22	22	8	9		22	22	4	8	9	
74	23	23	8	10		23	23	8	3	11	
75	24	24	9	11		24	24	9	1	12	
76	25	25	13	12		25	25	8	18	13	
77	26	26	14	13		26	26	8	17	14	
78	27	27	15	14		27	27	8	16	15	
79	28	28	16	15		28	28	8	15	16	
80	29	29	17	16		29	29	8	14	17	
81	30	30	18	17		30	30	8	13	18	
82	31	31	9	1		31	31	8	12	1	

Slot	Channel	Ring	Tube	Function	Type	Slot	Channel	Ring	Tube	Function	Type
83	17	0	9	2F	IG	18	0	9	9	2T	CG
84	1	1	3	3		1	1	9	8	3	
85	2	2	9	4		2	2	9	7	4	
86	3	3	5	5		3	3	9	6	5	
87	4	4	6	6		4	4	9	5	6	
88	5	5	7	7		5	5	9	4	7	
89	6	6	8	8		6	6	9	3	8	
90	7	7	9	9		7	7	9	2	9	
91	8	8	10	10		8	8	10	4	10	
92	9	9	11	11		9	9	10	3	11	
93	10	10	12	12		10	10	10	2	12	
94	11	11	13	13		11	11	9	14	13	
95	12	12	14	14		12	12	9	13	14	
96	13	13	10	2		13	13	9	12	2	
97	14	14	3	3		14	14	9	11	3	
98	15	15	4	4		15	15	9	10	4	
99	16	16	5	5		16	16	10	12	5	
100	17	17	6	6		17	17	10	11	6	
101	18	18	7	7		18	18	10	10	7	
102	19	19	8	8		19	19	10	9	8	
103	20	20	9	9		20	20	10	8	9	
104	21	21	10	10		21	21	10	7	10	
105	22	22	11	11		22	22	10	6	11	
106	23	23	12	12		23	23	10	5	12	
107	24	24	11	1		24	24	11	8	1	
108	25	25	2	2		25	25	11	7	2	
109	26	26	3	3		26	26	11	6	3	
110	27	27	4	4		27	27	11	5	4	
111	28	28	5	5		28	28	11	4	5	
114	29	29	6	6		29	29	11	3	6	
145	30	30	7	7		30	30	11	2	7	
146	31	31	8	8		31	31	11	1	8	



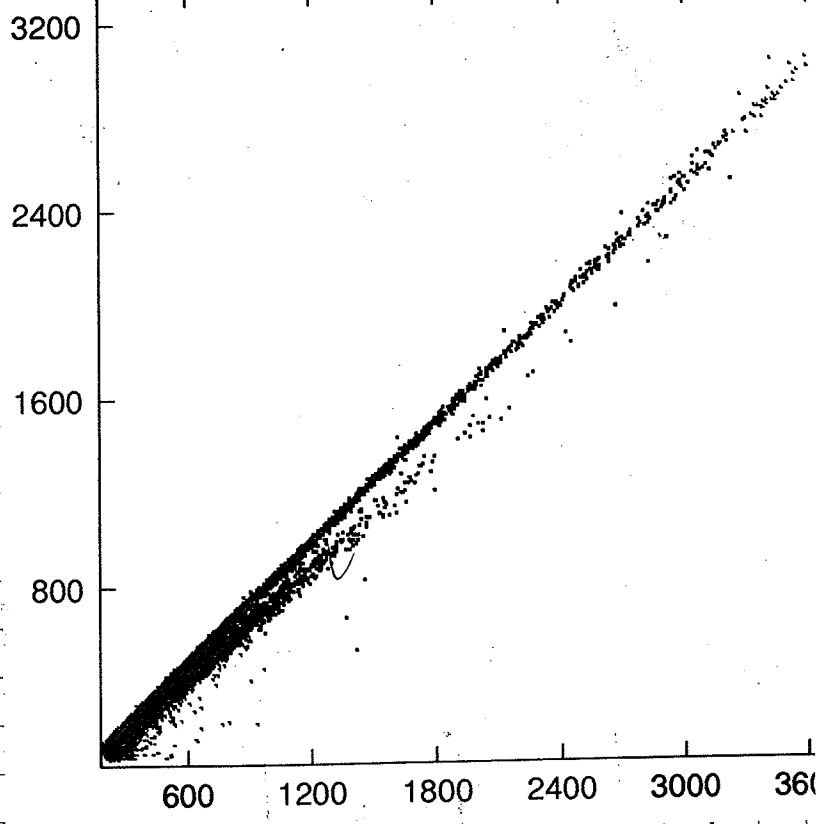
Function
T

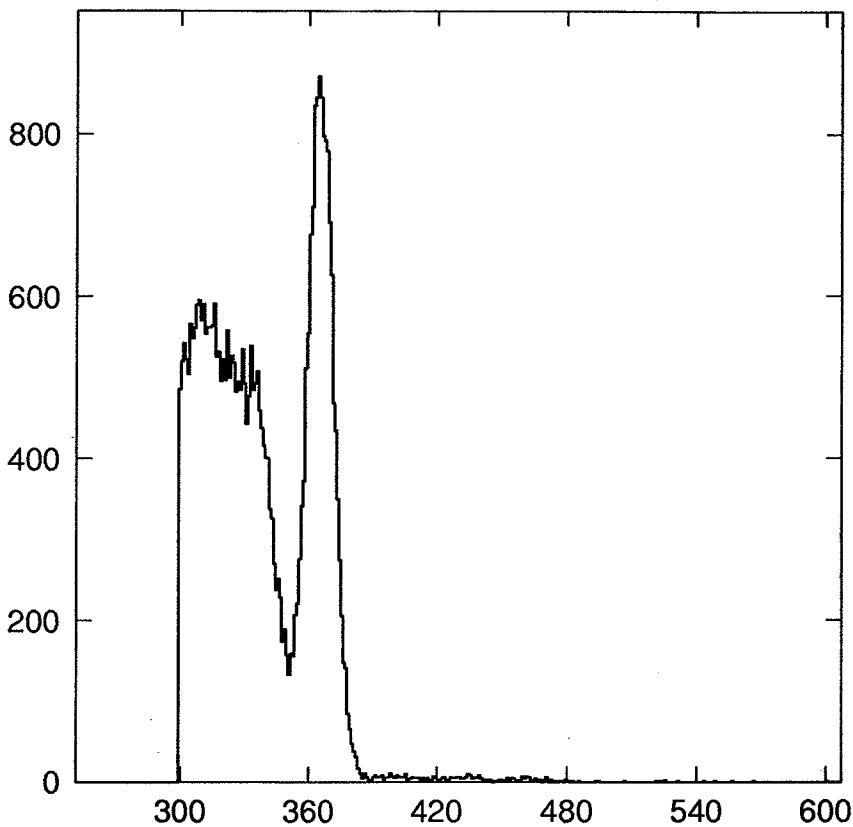
Neutron wall
Sample PSD Spectra

← Run 6
Tube 0 Left
- Note Scale

Tube 7 Left
Run 6
- low res Spectra

- Tot
- Feb. 18 To do
- Check pedestals on rods
 - Phosors
 - All on
 - All off
 - ✓ - LACray
 - Mask
 - Spect IP
 - V1190
 - ✓ - Minibed map
 - Neutron map
 - Talk to Dave S. about Dune build
 - ✓ - Finish last minibed debug
 - Minibed & tests → Fri
 - N-wall gain → Sat
 - Foil Franks for LAsd. = deSouza *
 - Check & source





Mini Ball
 Slow spectrum
 Ring 4 tube 22

^{137}Cs

Not too bad

HV = -1100 v

↑ Full energy
 Compton

Feb. 18, 2009 Begin checks w/ ^{60}Co source
 - Start w slow channels first.

slots	Odd looking ADC channels	
	16, 17 = low gain?	R4T14 R4T13
	20 \Rightarrow Fewers	R4T10
	22 \Rightarrow Fewers	R4T5
	25 \Rightarrow OK, but low gain	R5T2
	26 \Rightarrow OK, but low gain	R5T1
	27 \Rightarrow No sig	R4T24 \Rightarrow Some plug wires!
	30 \Rightarrow No sig	R4T15

R4 T13 = Crummy looking Spectrum Set HV to -1200
 R4 T14 = Low gain \Rightarrow lousy looking Set HV = -1250
 R4 T5 = Bad looking \Rightarrow HV = -1300

R4 T13 = Probably OK
 R4 T14 = Probably OK
 R4 T5 = OK \Rightarrow Voltage re-routed

Check

R4 T5 \Rightarrow Probably just low gain
 10 \Rightarrow Repaired OK \Rightarrow low gain
 13 \Rightarrow Probably OK \Rightarrow Just low gain
 14 \Rightarrow " " " "
 21 \Rightarrow No signal at Flame

* \Rightarrow So For Ring 4, we need to worry about T21
 \Rightarrow No sig at Flame

* \Rightarrow Fast signal has really low amplitude
 \Rightarrow gating?

Fast Signal

Check

* Ch 16 R4 T4
 19 R4 T90 = OK low gain
 23 R4 T14 Bad splitter! \Rightarrow No Fast sig
 25 R4 T21 \Rightarrow No sig

Tail

check

⊙ All OK except of course R4 T21

Examine Slots 7, 8, 9

Slot 8 = Slow

check ch 8	R6 T4	Really low gain
16	R6 T8	OK
11	R6 T1	NO Signal at Flange
28	R7 T2	Faulty Connection
29	R7 T1	
30	R6 T20	
31	R6 T19	

* R6 T1 NO Signal at Flange

Examine Slots 12, 13, 14

Slot 13

check	4	=> low gain?	R7 T10	OK
	6	R7 T8 => low gain	Bad splitter	
	15	R7 T15	=> low gain	
	20	Bad splitter		
	21	=> low gain?	R8 T4	OK

* { R7 T8 => Bad splitter!
 R7 T15 => Maybe Bad splitter

* Fast ch 29 => Bad QDC channel

Channels to recheck

R4 T14 = Bad splitter!
 R4 T21 = No Sig at Flange
 R6 T1 = No Sig at Flange
 R7 T8 = Bad splitter
 R7 T15 = Maybe Bad splitter
 R8 T17 = Bad QDC channel? = Replace Fast QDC! OK
 R10 T2 => No Sig at Flange
 R12 T2 => Bad splitter

Schedule For Tomorrow

- 0800 = vent
- 0830 = raise lid
- 0830 = Assemble two preamps for LASSA in coding
- 0900 = put preamps in chamber
- 0930 = wire pre-amps
- 1000 = close lid
- 1000 = check noise level w + w/o bias

Replace MiniBall Qdc
in Slot 12 and return
Ch 27 OK

Feb. 19, 2009 check MiniBall elements in Slot 17-19

Slot 18 = slow

Note: when readout
starts, the
Phillips go
offline! Fix

RIC T12 \Rightarrow No Signal at Flag

To do

- 6 - travel plans for WESTL
- 5 - Test ECL Bussing on N-walls
 - Look for same counts
 - Compare time spectra
 - Slopes
 - Counts
 - Double peaks
- 7 - N-wall thresh
- 1 - recheck N-wall calibrations.
- 2 - Double Bands on N-wall P10 (p & 83)
 - MiniBall double check
- 3 - N-wall Pedestals
- 4 - Spectel V1190
 - N-wall gain
 - Fail Froms For LASSA
- LASSA pre-amp assembly
- Last check S.S

To do

- ~~MEMO~~ - ribbon for
LASSA + LSE
- 2
- Travel plans for WESTL
- Test Bussing ECL
signals on N-walls
 - Efficiency
 - Timing = look for
- N-wall thresh hold
- recheck signal

Feb. 21, 2009 Compton Edge check using ⁶⁰Co Source + ¹³⁷Cs
Channels

Wall A ~~Fast~~
Tube

⁶⁰Co
~~Left~~

¹³⁷Cs
~~Right~~

HV = 24
width = 4

	<u>Fast</u>	<u>Tot</u>	Fast	<u>Fast</u>	<u>Tot</u>
0	812	862		449	443
1	672	776		360	433
2	1772	2039		901	1041
* 3	776 648	812 682		379	419
4	2089 1143	1268		616	728
5	1064	1118		561	573
6	720	845		458	529
7	977	1091		549	557
8	684	694		385	366
9	1010	1103		460	566
(50% 200) 10	1948	2084		1848	2077
11	504	569		302	323
12	1404	1289		559	556
13	1052	1290		477	629
14	795	1264		278	656
15	643 597	693		348	397

Wall AR

Tube	60°C		105°C	
	Fast	Total	Fast	Total
0	668	703	405	400
1	1184	1882	599	664
2	987	1028	496	497
3	414	530	297	291 355
4	482	557	292 697	327
5	1437	1649	670	780
6	1283	1443	684	723
7	862	926	450	487
8	580	589	351	327
9	264	815	428	454
10	475	522	301	320
11	725	774	426	413
12	1044	1161	516	557
13	1841	2099	879	977
14	596	703	325	355
15	1712	1984	803	874

WALL B left

Tube	Co		Cs	
	Fast	Tot	Fast	Tot
0	938	1010	519	544
1	539	941	194	539
2	323	549	159	308
* 3	566	375	358	402
4	458	529	326	364
5	1359	1533	652	751
6	27 1447	1848	803	952
7	631	1126	247	612
8	642	1060	240	543
9	640	816	351	485 466
10	1411	1587	672	810
11	377	752	185	463
12	903	1011	475	554
13	719	852	271	456
14	690	828	358	510
* 15	→ 1047	1726 1470	831	853
16				

Check neuron A10

- AL6 looks funny
 - Fast Sig is double band
 - Maybe crosslog!
- AR8 looks a bit funny
 - sort of double banded
 - Actually → Many in that @ DC Bank look funny → Maybe 3 other → xlog!
 - double - check BR0-15
 - could be CFO
 - changed NIM term → helped a little but didn't eliminate it
 - Maybe bad GOG?
 - Bad ECL cable?

BL2 ⇒ Maybe huge offset!
 (perhaps large positive offset in total sig)

Feb 22

To do:

- redo Compton Cal w/ new Ipad.
- Capacitor packs
 - BR20 disc. sig
- Mini-Ball Ayler
 - Incorporate BR20, BR14 into signals
- Camera
 - Replace Leaky Floor

→ Replaced caps in N-wall solenoids
 - recheck tubes

Feb 23, 2

AL0-15

- AL11 is weird

AR 0-15

- AR11 → looks like no TOT signal - total sig look funny

BR 0-15

- BR14 → very low cts

- BR11 → large FOT pedestal → maybe gone fixed

BR10 → No Fast and large pedestal on TOT

AR 16-23 / BR 16-23

→ AR20 → No TOT

→ BR20 → different disc

P10 Spectra

Well	Side	Sample	P10 Tube	Mon	P10 channel	E (MeV)	
A	R		0	713	500	673	670
			1	591 627	688	760	724
			3	647	687	571	488
			6	502 458	362	524	483
			8	352	688	512	
			12	548			
			13	570			
			15	542			
			4	565			

The problem w/ the double lines seemed to go away. Actually it probably got absorbed into the resolution of the spectra.

Quick Compton Edge check

AR Tube	60 Co		E	E
	F	T		
0	687	893	607	
1	1189	1613	541	
2	1006	1186		
3	516	886		
4	958	723		
5	1390	1788		
6	1411	1400	1607	
7	941	1157		

reset IABD's on IGQDC

- Must recalibrate

check n-wall PID Thresh Examples

AR	Channel (For)	Move	
0	520	0.698	
1	624	0.443	
2	496	475	
3	647	1.40	⇒ probably a gain issue
4	463	0.808	

recalibration of tubes 03 on AR

Tube	⁶⁰ Co		¹³⁷ Cs	
	F	I	F	I
0	692		404	
1	1229		628	
2	980		519	
3	442		293	
4				

Electron Wall pedestal run

set HV on all tubes to 2400V

Set all delays

- recheck PID

- AL 10 ⇒ Not too bad, but could be better

- BL = strange offsets on a lot of tubes

- probably must set Iped on IGQDC
(~~increase~~ more neg)

{ - BR ⇒ May make Iped more neg

Tube 5 + 9 look bad ⇒ smeared out

BR 14 ⇒ Not a lot of counts

BR21 → Not too bad → could be better

BL 16-23 all look awful!

AR 16-23 → Maybe increase IPD0 on QDC Fast

AL 16-23 all look bad No Aid

* AR / ~~BR~~ 16-24 all look good

[* AR 22 looks bad
AR 23 looks bad

AL 16-23 all good

BR20 → Missing as it should be

BR21 → Missing

BR16 → strange offset

Check

AR 22-23 - Maybe delay

DR 18 = low Fast offset

BR 21 → Missing. QDC channel May be missing

~~BL 16-17~~ missing

BL 17-19

✓ AL 0-15 all OK

AR 0-15

BR 0-15

- Tube 5 - Fuzzy (see pg 6a)

- Tube 6 - Offset in Total (May need more) OK

- Tube 7 - Offset still

- Tube 9 - Fuzzy (see pg 6a)

- Tube 14 → low offset.

BL 0-15

- Tube 3 - Strange offset in total

AL 16-23 BL 16-23

~~AL 17-18~~ ~~BL 17-18~~

BL 17, 18 - Fast is Missin
BL 19 → Missin only add

AR 16-23 BR 16-20

AR 22, 23 = Really ragged ⇒ Check CFO delays
BR 18 → Offset in Fast
BR 21 Missin

* we have to capacitively couple the splitters!

Signals to examine

- BR 20 = disc
- ~~AL 11~~ - looks OK now
- BR 14 = low cts - Bad invert!
- ~~AL 16 missin~~
- ~~AL 17-19 missin~~ = Dynode Signal is awful! OK
- AL 20 both look bad - No Total sig - Maybe @ AC

Recheck

- ~~AL 16-23, BL 16-23~~
- AL 20 → No Total ⇒ probably CG @ AC

- ~~AR 16-23, BR 16-20~~
- AR 20 also looks bad! Maybe Bad!
- ~~BR 21 !!~~

AR 0-15

~~AR 11 → No Fast Tot~~

AL 0-15

~~AL 11 also bad → No Tot~~

BL 0-15

~~BL 11 looks Bad!~~

BR 0-15

~~BR 14~~

BR 14 → Bad Dynode

AR 16-23 BR 16-23

BR 20 = wrong disc

why all this Bad!

Feb 24, 2009 To do:

- Fix broken Pre-amp Box
- Bean Dump
 - bricks?
 - water?
- TOC
 - Mult events
 - test delay + Calibration
- Family Cape

- CoI Boards
- Minimal Pulser (Fri)
- Camera
- Source check

Feb 25, 2009

Looked at Q's for the first time

$$E = 8.778 \text{ MeV}$$

$$A = 117 \text{ mV}$$

low gain?

TOC Bus tests on N-walls

Look for

- integrated CTS in Fast channel
- Integrated CTS in TOC
- TOC Shift.

Run 9TOC only

- No Fast CTS of course
- 1 min run
- Centroid =
- CTS =

Run 10

Used wrong cable = sorry

Run 11TOC only

- No Fast CTS
- 1 min run
- centroid = 278.69452
- CTS = ~~3164~~ 8036
- FWHM = 1.65

Run 12TOC only

- No TOC
- 1 min run
- Integrations.

Channels	CTS	FWHM	Cost
0-494 0-494	6672	171.13	295.17
1000-2000 1529 472-1639	1253	250.98	829.79
1595-2713	270	264.53	2030.13
2649-4061	190	1087.87	3412.19
0-4095	8264	1311.86	500.21

Run 13 TOC and QDC bussed (How w'd like to run if possible)

TOC

- centroid = 287.12
- FWHM 1.73
- CTS 8878

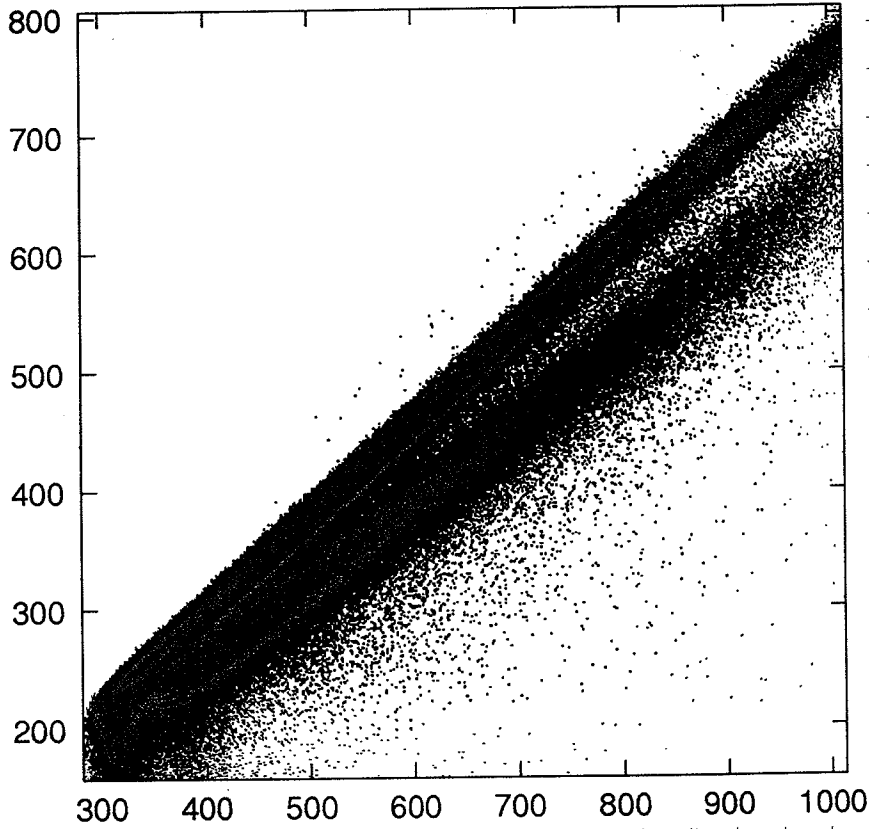
QDC

Channels	CTS	FWHM	Cost
0-494	7146	175.44	297.569
472-1639	1397	256.31	825.51
1596-2713	274	232.29	2068.19
2649-4091	218	1106.67	3476.76
0-4095	8878	1455.38	510.38

So far, except for the 0.9ns shift (which is probably OK) everything looks reasonable.

Check neutron 0101

Don't have a source!



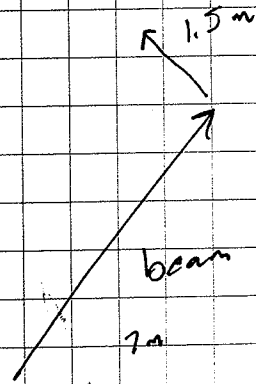
Neutron ASD

Feb 26, 2009

~~to do~~

To do:

- ✓ 4 - re-inforce MiniBall → JEMO → Ribbon
- ✓ - talk to Dallas → Sn targets
- ✓ 5 - talk to Sanderson → use laser for targets
- ✓ 5 - MiniBall cables
- 6 - Maxwell & cal of pedestals - Network
- 7 - LASSA Foil Frames
- 8 - Maxwell wiring
- ✓ - WUSTL travel
- ✓ 1 - MiniBakoo
- ✓ 2 - FA electronics
- ✓ - Talk to Josie → water Jues
- 3 - install rack electronics
 - ✓ a - LASSA
 - ✓ b - CSE
 - ✓ c - FA
- Max Mac n-walls
- Order camera
- connect Power to MiniBall



Chamber Pump

Time (H:MM:SS)	P (Torr)
0	260
0:10:35	20.3
0:14:00	6.26
0:17:00	2.55
0:21:00	0.881
0:23:30	0.533
0:26:30	0.337
0:28:10	0.282
0:31:25	0.210
0:34:00	0.181
0:36:45	0.161
0:38:30	0.152
0:39:40	
0:41:40	6.8×10^{-4}
0:55:30	2.9×10^{-4}
1:03:30	2.3×10^{-4}
1:15:10	1.9×10^{-4}
1:32:25	1.4×10^{-4}
1:41:10	1.3×10^{-4}
1:47:15	1.2×10^{-4}
2:04:00	1.0×10^{-4}
2:14:30	9.4×10^{-5}
2:26:30	8.6×10^{-5}
2:43:40	7.6×10^{-5}

Turned on Turbo at 0:39:05

March 3, 2008

To do:

- Interlock check
- Get AmBe source
- Si MQD
- Wash U travel
- Dark adapt N. Flange
- Make new ribbon cables (shielded)
- LASS cables adapted
- Frame
- Insulate Dot 3 Back cable

March 5, 2008

To do:

- Insulate Accone assembly better
- Coat cables

March 6, 2008

Electronics testing

- Recheck 2F
 - No apparent pulses input
 - probably NO U on frame
- 4F = Look like low gain
 - maybe preamp gain
- Slot 6, ch 3 & 4 \Rightarrow little triggered, not too good

Check outputs on preamps

- 2B = really low gain
- 3F = NO pulses
- ~~Slot 6~~

* 2A dot cable may be a bit flaky

Status

LASSA

- ✓ 8 - test readout - Sat
 - pulser
 - on chip
 - all chips
- 9 - Test resolution - Sun
 - alpha test
- ✓ 1 - Assemble electronics rack - Sat
- ✓ 2 - Connect readout - Sat

MindBall

- ✓ 3 - Reconnect - Sat
- 7 - Check Bad/Missing DPs - Sat
- Alpha source test - Sun

Neutron wall

- ~~recheck~~
- ✓ 4 - insert bus cables - Sat
- ✓ 6 - recheck all sigs for missing signals - Sat
 - or bad cables.
 - ROC by hand - Sat
 - TOC.
- ~~Gain~~ Neutron test - Sat
- 11 - Gain Match
- 12 - Map TOC
- 13 - Check TOC for all channels

Misc

- Flange Mapping
- Scalers
- Check self-timing for all wall tubes
 - Multiplicity \neq counts.
 - Route through FA FLFO
- Leak check isolation Flange & cooling

Forward array

- ✓ 5 - Connect signals & timing - Sat
- 10 - Readout check - Sun
 - α source

March 7, 2009

Nechoch AV-wall a humbly

- ✓ ↓ - BR18 = Only pods
- * - BR152 Only pods = diode sig grounded when received
- ✓ ↓ - BR20 - Few cts ⇒ No diodes?
- ↓ - BR21 = No sig - Damn QOC!
- * - AR3 = Maybe sig offset, but probably OK
- * - BR0 = No sig! = Fixed

- ✓ - BR19
- ✓ - BR20

⇒ Diode signals are Not plugged in well!

⇒ we need one more IG QOC
⇒ urgent!

⇒ BR20 ⇒ redo!

To do

- Get cable for LASSA3 seems flaky → re-ground
- AV-wall BR20 Diode inverter needs redoiz
- IG QOC For Slot 20 is Bad,
- ASIC: SI II CD. might be flaky ⇒ merger may be touching case

- Examine Lass A & Q

Ⓢ Lass A & Q is Functioning w/pulsers
- seems robust.

To do:

- Find & debug Missing channels
- Bias data
- & tests
- offsets
- Missing chips & channels.

Examine Bad channels

Pulsar test

- Power 0 slot 5 chip 0

<u>Power</u>	<u>slot</u>	<u>chip</u>	<u>chan</u>	<u>Note</u>	<u>Tel</u>	<u>Steps</u>
0	5	0	0, 1	No Noise, good resolution	1F	14, 15
0	5	1	15	Great res. low gain	2F	0
0	11	0	15	No sig	3F	0
0	11	1	15	No sig	4F	0
0	12	0	10	No noise (Bad step?)	3B	5
0	12	0	15	No noise low gain (Bad step?)	3B	0
0	12	1	13-15	No noise, low gain (Bad step?)	4B	0-2

Chan 15

22874

51
5
11
6
12

0
0
1
0
0 maybe 1
0
1

~~→ 7F = Program wrong~~

~~→ 7B = Program wrong~~

✓ → 3F = Program wrong

✓ → 2F

✓ → 5F

✓ → 3B

→ 3B

✓ → 4B

✓ = 5B

Arch 9/2009

22874 & source rest.

* Run 23

→ 22874 & source rest

Dot 1 Front only

Resolution + gain

2 MeV → 3969 channels = 1984.5 chs/MeV = 0.5 keV/ch

FWHM → ~146.8 → 167.8 chs ≈ 157.3 keV ≈ 75 keV → not too bad

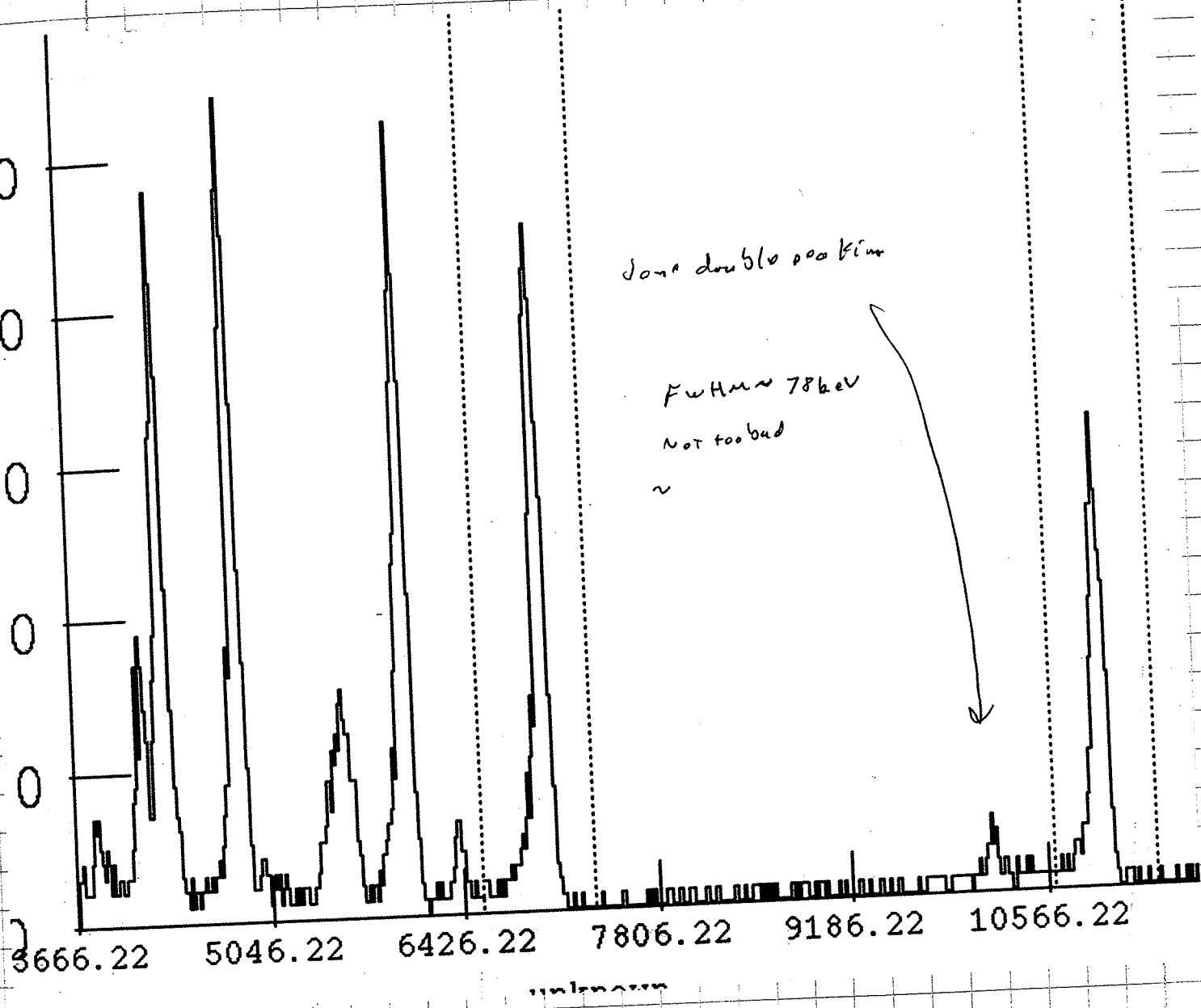
⇒ Some double peaking

Dynamic range = 8.1 MeV

we need to attenuate by ~10!

I thought our gain was lower!

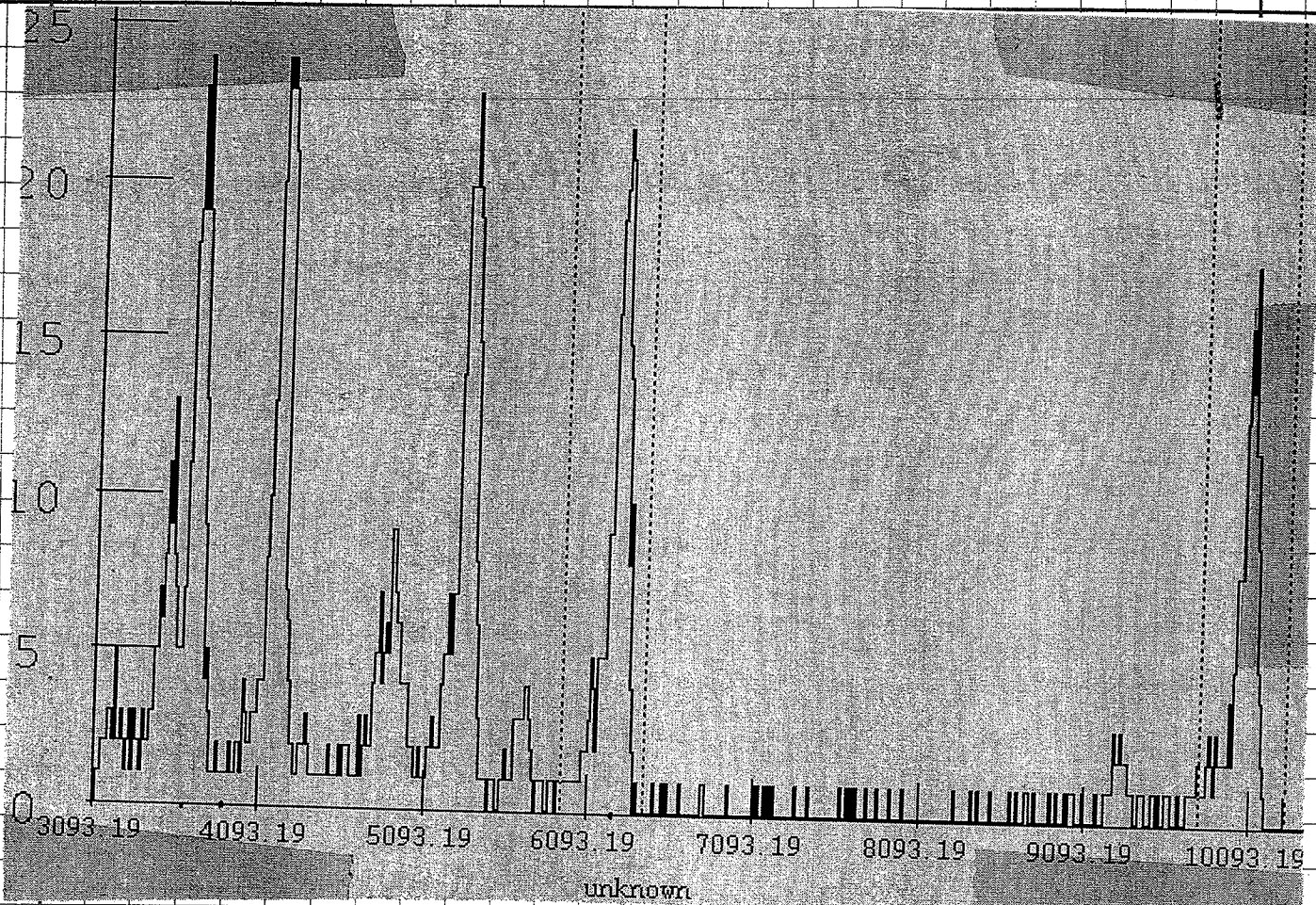
Run 24 28th spectrum channel 5 only! + backs *
 Run 25 28th spectrum front channel 5 only. NO backs! *



Run 25

Gain = 1904.55 ch/MeV
 Range = 8.6 MeV
 Res = 70.5 keV

Run 5



* IDEA: Attenuate EF but Not EB
That way we can run with two different gains!

To do:

- Check IOL4 map \rightarrow high power + connector?
- IOL5 isn't connected to power?

Changed Chip boards to low gain setting

March 10

Recalibrate w/ α source

2 MeV =

Dynamic Range =

8.788 MeV = Channel 4711.819 FWHM = 32.76

6.778 MeV = Ch 3497.97 FWHM = 42.70

604 ch/MeV = 1.65 keV/ch

FWHM \approx 67.32 keV

Dynamic range = 27 MeV

Pulse equivalent @ 785 MeV \Rightarrow

4.5845V

6.778 MeV \Rightarrow

3.525V

How low can we trigger?

\Rightarrow Lowest value ~~is 0.17 V~~ Thresh = -9.

Value = 0.17 V

\Rightarrow At this gain, this corresponds to an energy of 0.423 MeV

E	Pulse	
8.785	4.5845	$\Rightarrow E = mV + b$
6.778	3.525	$m = 1.8943$
		$b = 0.1006$

Proton Peak is
CASSA = 147.4 MeV

\Rightarrow What ~~is~~ can we see with what ~~is~~?

Lowest Energy

Si Energy (MeV)

Alpha

Max Energy we can see in S.

^4He

~~7.818~~
33.02

~~2.814~~
1.223

157 MeV

^7Li

66.62

2.467

69.3 MeV

228TH source test on Tel 1 all ch's

Spectral Analysis For all scopes
 - one chip at a time for now

- missing strips

Chip 0 = 0, 1 → S15, ch 0 = 0, 1
 Chip 2 = S16

	Star	Chip	Missing	
10 det	✓ 5	0	01	Pulsar OK (known missing)
?	6	0	18	Pulsar OK (Carlo?) Bad det!
2 det	✓ 5	1	15	→ Pulsar also gone OK
?	6	1	13-15	Pulsar OK 14 is confirmed 15 = Bad person
3 det	11	0	9	- Pulsar OK
beam	11	1	11	⇒ Pulsar also missing!
✓	12	0	3	⇒ Pulsar OK confirmed
✓	12	1	15	Pulsar OK Confirmed
*	12	0	land 2	have low gain ⇒ wrong program?
?	11	0	15	but pulsar OK! ⇒ looks like High Pulsar OK

Tel 5 Not connected
 - Needs jumper!

* Run 28
 - Telescopes 1-4 & tests
 - Front and Back

8 channels to look at:

SI	chip	chan		
6	1	15	Connector	replace 13-15 (mod)
11	1	11		replace 11
12	0	1, 2, 3	⇒ swap request	replace 0-3

Cables

11	0	9	= Maybe wrong connector at det
11	0	15	= seems OK!

To do

- Jumpers for last chip board

Mark!

Tot 3F Not connected?

- No current in bias ;
- No noise reduction on bias
- Not much noise

Missing channels

SI	chip	chan	
5	0	0, 1	confirmed
6	0	10	new!
5	1	15	Confirmed
6	1	8,	
		13,	
		14	
		15	

We can suffer 1 missing channel per side, but the 4 on start chip 1 are bad.

To do

Tel 3 Not connected : 3 F
 Tel 4 No power connected
 Tel 5 No power connected.

Broken cable seems to be required but we still are Missing power on 3 signal

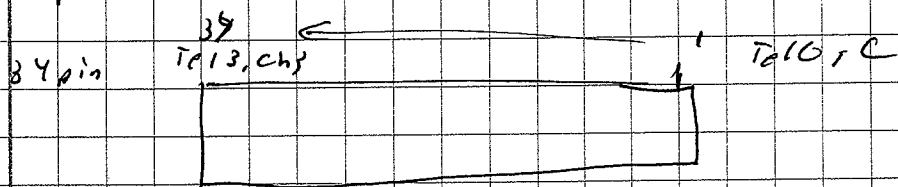
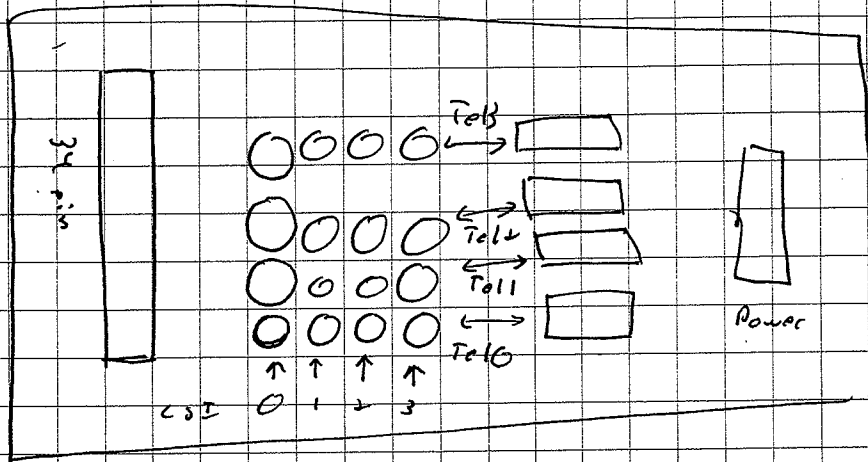
Missing channels

<u>S1</u>	<u>chip</u>	<u>chans</u>	<u>Tel</u>	<u>Func</u>
5	0	0 + 1	1	F
6	0	10	1	B
5	1	15	2	F
* 6	1	8, 13-15	2	B
12	0	3	3	B
11	1	4	4	F
12	1	15	4	B

To do

- source test of language and without

CSD Bar layout

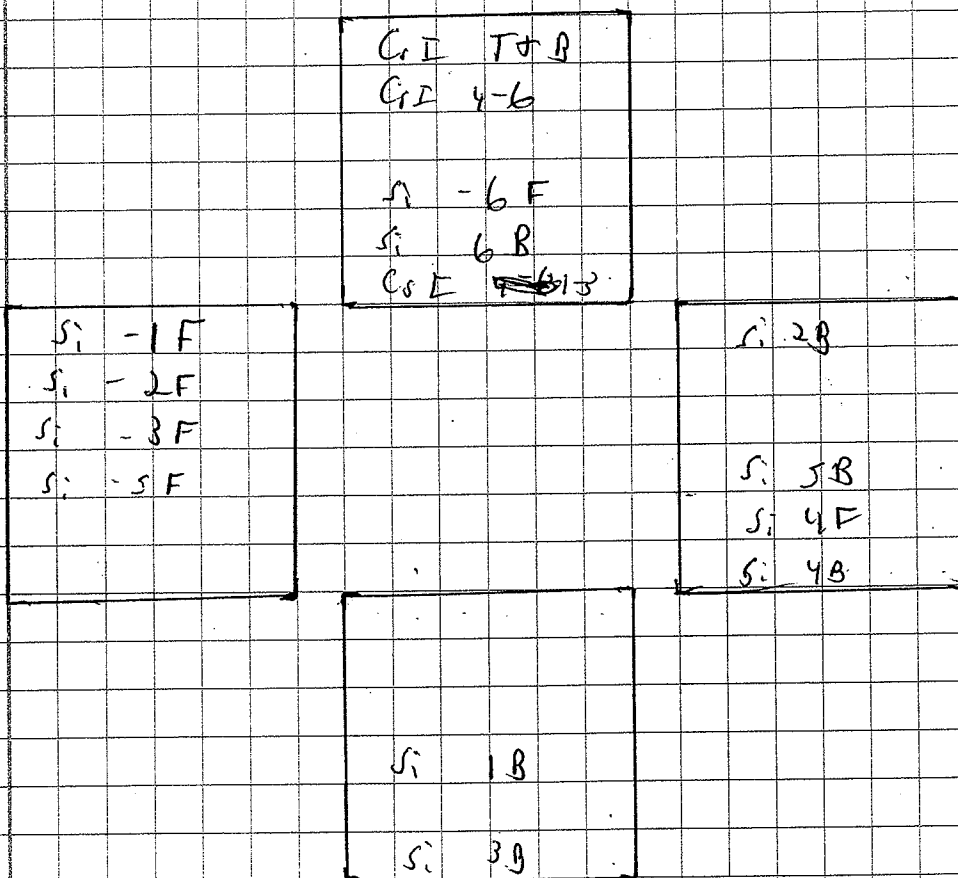


<u>PIN</u>	<u>Tel</u>	<u>CSD</u>
1	0	0
3		1
5		2
7		3
9	1	0
11		1
13		2
15		3
17	2	0
19		1
21		2
23		3
25	3	0
27		1
29		2
31		3
33		

March 13, 2007

Dunn
Telescope G only & source ~~and~~To do:

- Jumpers on CB-15
- Ribbon cables for CsE
 - Flange to NiNU Bin → Screw parts
- CsI pulser
- Si/CsI Flange



Checking CSI - over at 9 time

- Pulses OK on #4
 #5
 #6
 #7
 #2

- Bias on #4 ⇒ Shows PD noise
 #5 ⇒ " "
 #6 ⇒ " "
 #1
 #2

Note: Mapping seems off from what M.Y. suggests.

Ribbon Signs for 4-2-3

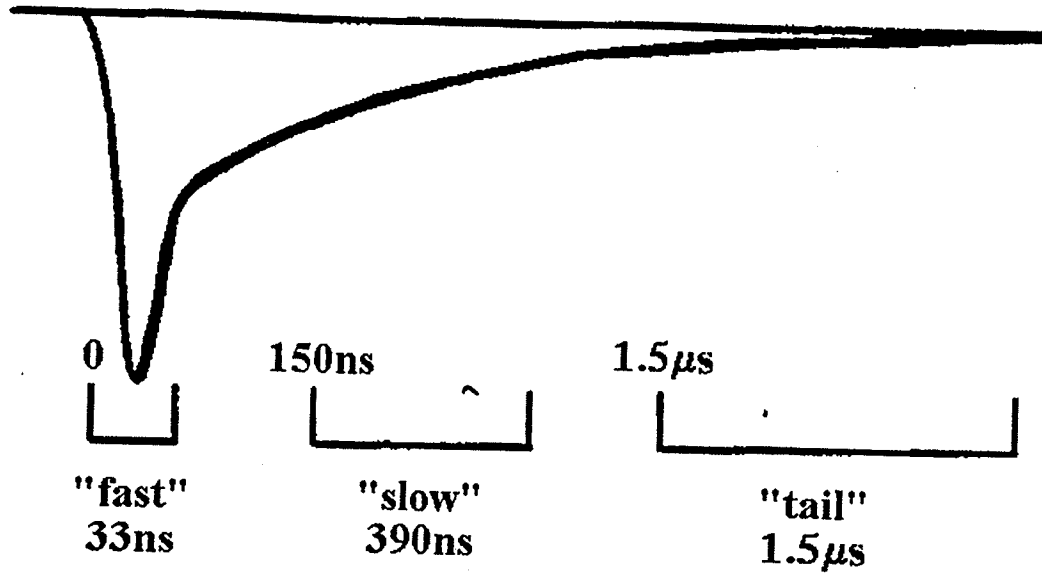
Pin	
1	Tel 1 0
3	1
5	2
7	3
9	Tel 2 0
11	1
13	2
15	3
17	Tel 3 0
19	1
21	2
23	3
25	
27	
29	
31	
33	

Ribbon signals for 4-6

Pin	
1	Tel 6 0
3	1
5	2
7	3
9	Tel 5 0
11	1
13	2
15	3
17	Tel 4 0
19	1
21	2
23	3

which CSI is it? 1-4 or 4-1?

Photomultiplier Tube Signal

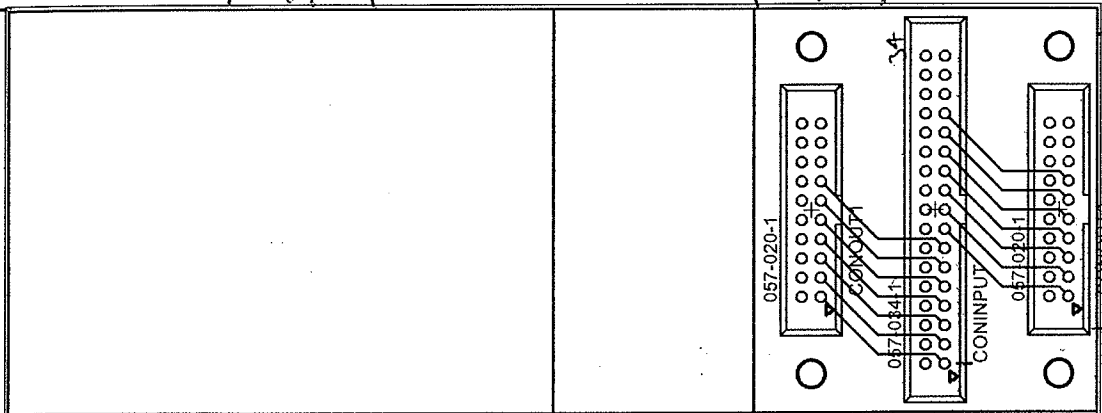


	Det #	Vbias (V)	Current (uA)	Tel	Bad Front Strips	Bad Back Strips	Bad Front Strips
dE	1161-4	-19	0.71	1			
E	1674-9	-50	0.70	1	All Fine	3, 5, 14, 15	All Fine
dE	1161-1	-19	0.19	2			
E	1140-21	-85	1.52	2	All Fine	All Fine	All Fine
dE	1661-10	-24	0.42	3 (9)			
E	1674-12	-60	0.96	3 (9)	All Fine	3	All Fine
dE	1652-7	-19	0.31	4			
E	1140-18	-60	5.29	4	12	14, 15	3
dE	1652-5	-19	0.48	5			
E	1140-19	-65	3.25	5	All Fine	All Fine	All Fine
dE	1652-4	-19	0.70	6			
E	1133-20	-66	7.49	6			
dE	1747-6	-19	0.93	7			
E	1742-4	-55	0.92	7	All Fine	2,11,12,14	All Fine
dE	1661-2	-21	0.98	8			
E	1194-17	-66	1.31	8	0,1	10	14,15
CsI		30	0.11	All			

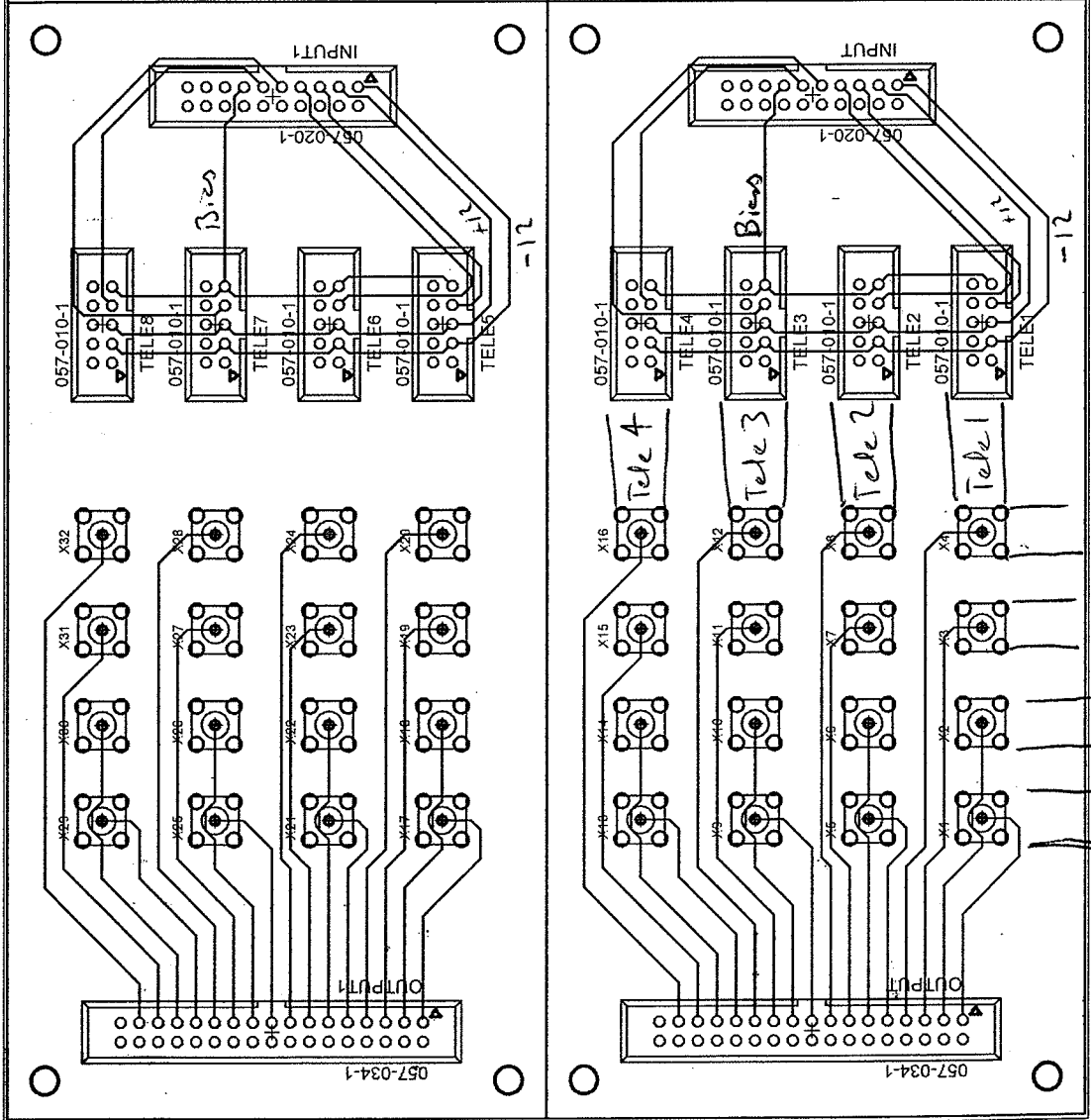
10 Pin
 Pin 3 ~~Signal~~
 5 -12
 7 +12
 9 Test
 Bias
 rest = GND

20 Pin
 Pin 1 ~~Signal~~
 3 -12
 5 +12
 7 Test 1
 9 Test 2
 11 Test 3
 13 Test 4
 Bias
 even = GND
 15, 17, 19 open

34 Pin
 Pin 1 ~~Signal~~
 3 -12
 5 +12
 7 Test 1
 9 Test 2
 11 Test 3
 13 Test 4
 Bias
 -12
 +12
 Test 5
 Test 6



Pin 25 ~~Signal~~
 27 Test 8
 Bias
 even = GND



CsI 1
 CsI 2
 CsI 3
 CsI 4

2/25/16

CSZ test,

⇒ CSZ ch 1 seems to have very large gain ⇒ check
→ maybe a room offset scale

To do:

- ~~check~~ check CSZ gain
5 mV/MeV w/ pulser
- check remaining 12 CSZ's.

Talk to D. Sanders

- Beam Alignment w/ Qroads?
- Dump alignment
- Double check FA polling sequence
- Pulser
- EPICS
- Patch panel
- Scalers
- Collimator
- Timing for N-wall calibration - AP?, Scint?
- Gain matrix FA

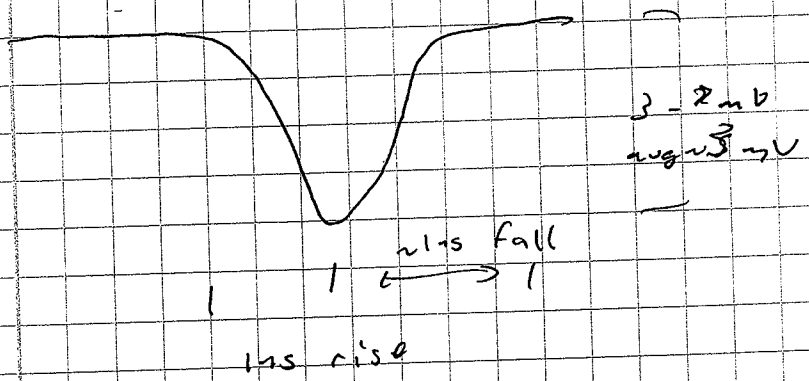
Test Forward Array

HV Supply: -800 to -1000 V
 Address: 35.8.35.124

Forward Array on channels 1-16.

- PMT
- ~~5 = No Sig~~
 - ~~6 = No Sig~~
 - ~~7 = No Sig~~
 - ~~11 = No Sig~~
 - ~~15 = No Sig~~ - ~~100 HV~~ HV Chan 14
 - ~~1 = no or low sig~~
 - ~~7 = "~~
 - ~~12 = "~~

Signal



TOC time $24 \text{ ns} = 250.45 - 179.26 \Rightarrow 3.53 \text{ ch/ns}$
 $= 0.283 \text{ ns/ch}$
 $\Rightarrow \text{Fullscale} = 1.16 \mu\text{s}$

Change range to 0x44

Qm TDC in compos step mode? with highest resolution?

- Intrinsic resolution = 1 channel only

$$20 \text{ ns delay} = 580.59 \text{ ch}$$

$$\Rightarrow 34 \text{ ps/ch}$$

$$\text{Full scale} = 140.6 \text{ ns}$$

$$\text{FWHM} = \frac{1}{\sqrt{2}} \cdot 20 \text{ ns} = 14.14 \text{ ns} = 7.43 \text{ ch} = 10.1 \text{ ch}$$

~~$$20 \text{ ns} = 700 \text{ ps}$$~~

* - Run Compos Start w/ 80 ns ECL delay.
redo

$$32.20 \text{ ps/ch}$$

$$\Rightarrow \text{FWHM} \sim \frac{32.20}{\sqrt{2}} = 22.8 \text{ ps}$$

~~$$32.20 \text{ ps} = 359 \text{ ps}$$~~

$$\text{Full scale} \sim$$

* Run 44 FA Self Timing and 12th Source tests

$$\text{FWHM of ch 1 with all dots} = 11.5 \text{ ch} = 371 \text{ ps}$$

To do

Change Miraball C1MAC disc. crate

Pin diode to TDC = gate w/ or!

Pulsar on Ring 5 jumps around a lot!

- check input power

- Ring 8 might jump a lot too

- Map Nucleon disc

	Ring	Tube	Note
	5	3	low gain or slow = maybe OK tail looks low too
	5	5-7 12 15 16-21	missing ⇒ removed <u>OK</u> low gain low gain removed ⇒ OK
	6	4-6 14-16	<u>removed</u> <u>removed</u>
Pulsar	7	Probably Pulsar doesn't work → check later	
	8	5 9 18	Missing OK (all target target Missing sig Does Not exist! (double check)
	9	Pulsar sig looks funny looks like all ch's coming in, but Mostly near pad. No good pulsar peak ⇒ recheck 1 Tail } 6 Tail } Missing or low 8 tail } → check this! 10 tail }	
Pulsar	10	0 3T 11	Compq Missing Missing.
Pulsar	11	Pulsar signal is crazy - All sigs OK.	

- Try pulser on 9 again?

- 5 F15

- 5 S15 → ugly signal

- 5 T15

} 5-15 probably tube

7 F13 = No sig → Splice?

8 F 2-4 looks Bad → ~~Splice~~ Splice?

~~9 F 15~~

10-11 all Missing = Tube

11 F looks OK, so probably just by 6

Missing tubes

5-15

10-11

Missing Channels

7 F 13

8 F 2-4

Run 45

MiniBall pulser test Ring 5

March 19, 2009

Recheck all Neuron wall seeds

~~AL 0-15~~

~~BL 0-15~~

AL 0-8 OK

BL 0-8 OK

AR 0-8 OK

BR 0-8 OK

AL 8-15 OK

AR 8-15 OK

BL 8-15 OK

BR 8-15 OK

AL 16-23 OK

AR 16-23 OK

BL 16-23 OK

BR 16-23 => BR 21 Missing -> Maybe QDC

Examine pedestals

- Maybe set ipod or CG QDCs

B/AL 0-15 = OK

B/AR 0-15 = Maybe come down abit ~100 days

AL 16-23

BL 16-23

AR 16-23

BR 16-23

Maybe a bit

N-wall

TOC Map

TOC Channel

~~32-47~~

~~54-71~~ 96-103

64-79

~~102-109~~ 112-119

48-63

~~72-87~~ 104-111

80-95

120-125

Tubes

AL0-15

AL16-23

AR0-15

AR16-23

BL0-15

BL16-23

BR0-15

BR16-23

TOC calibration

$S_{ns} \Rightarrow 10.23$ ch/us $\Rightarrow 0.0968$ ns/ch

Self-time: FWHM = 1.8 ch $\Rightarrow 180$ ps.

\Rightarrow Neutron wall TOC #94 looks a bit odd \Rightarrow Bad ECL cable problem



\Rightarrow Maybe Noisy Neighbors

BR14 = Strange dynode shape
 \Rightarrow Needs low thresh word

AL16-23 seems to have somewhat lower resolution w/50 ps
 \Rightarrow check delays =

BR20 looks bad \Rightarrow lower thresh = changed \rightarrow OK

Run 46

Neutron wall Pedestal Run

HV = ~~2000~~ 2200VPedestals For CG QDCs

<u>Tube</u>	<u>Wall A L</u>	<u>Wall A R</u>	<u>Wall B L</u>	<u>Wall B R</u>
0	161	260	162	497
1	213	346	213	177
2	183	260	182	604
3	252	605	252	302
4	218	328	218	388
5	216	433	217	432
6	248	254	248	120
7	176	348	175	186
8	177	348	178	341
9	225	480	227	84
10	217	330	217	713
11	212	227	213	244
12	184	295	184	247
13	245	299	245	439
14	289	162	289	436
15	257	292	257	294
16	182	196	182	201
17	212	178	212	230
18	206	167	205	234
19	268	233	268	274
20	201	266	201	239
21	195	232	195	216
22	238	228	238	179
23	249	215	249	197

Pedestals For Dig CROCS

<u>Date</u>	<u>Wall A L</u>	<u>Wall A R</u>	<u>Wall B L</u>	<u>Wall B R</u>
0	87	75	82	64
1	43	46	61	44
2	50	57	115	67
3	100	62	61	58
4	55	26	82	49
5	108	65	96	56
6	102	44	50	47
7	81	48	31	83
8	81	76	72	73
9	82	46	35	29
10	59	39	68	62 78
11	61	66	86	62
12	71	50	78	61
13	45	38	36	70
14	45	24	39	59
15	106	29	65	55
16	83	57	49	76
17	72	23	67	74
18	50	50	38	63
19	88	45	50	85
20	78	22	45	108
21	42	81	67	70
22	65	65	43	74
23	65	27	76	45

March 24, 2008

Debug MiniBGL

Game Plan

1. Fix Missing tubes
2. Fix Missing channels
3. Attempt to Fix pulser
4. Examine ~~the~~ Disc./CAMAC noise

1. Fix Missing Tubes

Tubes 5:15
10:11

5:15 = connected to all signals
- wrong cable \rightarrow should be OK now

10:11 = Seems OK, just low gain, may replace

2. Fix Missing channels

7F13 : No sig
8F2-Y
} covered jacks 73

Other channels to check

R7 F 0 R7 50
R7 53 all
R7 57
R7 F9 R7 59
} recheck sig \rightarrow

R7 9 5B
9 59

check gains on STF

To do: redo spreadsheet for MiniBall maps

- Neutron wall position Cal.
- MiniBall gain maps
- Granix & Noise on MiniBall

Check
Ring 7

F: ~~6, 7, 8, 13, 18~~ } must be solved
S: ~~1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18~~
T: ~~1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18~~

Ring 8
Fast: 3
Slow: 3, 11, 12, 13, 16, 17
Tail: 3

} has really low gain
- check slow

Recheck all channels, fastest timing 1x more w/over.

Ring 5

Fast: 0, 2, 12
Slow: 3
Tail: 8

Ring 6 S: 18

Ring 7 Fast: ~~9, 10~~ 3, 9, 13, 14, 16, 18 } check all
Slow: 0, 7, 9, 14
Tail:

Ring 8: F: 0, 3,
S: 3, 11, 12, 13, 17
T: 3

Ring 9: F: ~~0~~ = check all
S: check all patterns
T: 0, 5, 12

Ring 10: Fast = all
Slow: all

Tail: 5

Ring 11 Fast: 3

S: 3

T: 3

Look at S₁₋₅

Ring 5 F: All good

S: 1-3 have low amp + strange shape
 T

Ring 5 F 1-3: No data, but sig ok

Ring 6: 3 ~~slow~~ slow: No sig. Bad spinner
 18 slow Low gain isal

Ring 7 F: 3, 9 - 13, 16, 18
 S: 7

Ring 8 F: check gates

Ring 9 F: 0 | High gain
 S: 0
 All: 12 = Just center high gain

Ring 10: F S
 S S

Goals For today

1. Source spectra w/ all 5 channels - w/ and w/o Iron core
2. Test attenuators → find
 - Set offsets
 - Find dynamic range
 - Pedestal run
3. Set CrI gains
 - puber.
 - 0.5 mV/Mpc

or tests

Tel 2 =	-60 V	I = 1.18 mA	
Tel 2 =	-55 V	4.97 mA	
Tel 3 =	-55 V	6.29 mA	
Tel 4 =	-60 V	2.28 mA	(check this #)
Tel 5 =	-60 V	2.77 mA	
Tel 6 =	-50 V	0.66 mA	

Run 47 2287m Source on all powered pedestals No RHTs.

Run 4

Run 48 = Samples Run 47 but iron gauge off

Run 4

⇒ Slot 15 chip 0 is missing!

Possible low gain → chip

SI	chip	ch
11	0	4
12	0	1
12	0	2
14	0	4
14	1	0

Spectra look OK
 - double peaking on Fronts as expected
 → Was't worry for Now

Slot 15 ch12 I was turned off => recal

49 = All chins running, ion gauge off

50 = Same as Run 49, but ion gauge on

51 Pedestal run - Forced read IG on

52 Pedestal run w/ ion gauge off

Insert Attenuators

Missing channels w/ attenuators

Slot	ch12	ch		
5	0	1, 2, 3	X	3
	1	14, 15	X	
6	0	10		
	1	6, 8, 18, 14, 15	6	6
11	0	9		
	1	5	X	
12	0	2, 15	X	
	1	14, 15	X	
14	2	17	X	
15	0	1, 2	X	

* = Preamp For S/G, ch12, ch16 is bad

= 228th Source on all scopes IG = off = Att.

y Forced read => Pedestal run

T₀ do

no pair preamp

6, 4, 6
15, 1, 0

Optional =

11, 0, 4
12, 0, 1
12, 0, 2
14, 0, 4
14, 1, 0

-C_sI Att_n

C_sI gain

Full scale range =

Pesticide

C_sI ~~range~~ Full

Preamp at 5mV/100V

A

146.51mV

0.732 V

d

195.8

0.979 V

t

231.8

1.16 V

¹⁴Hg

521.9

2.61 V

0

585.9

2.93 V

Pulser gain is 0.5mV/100V

→ Adjust pulser so output at preamp is 2.93V

⇒ then Shaper gain should be low enough so that

Full scale on Shaper is ~4V

$G \approx 1.35$

Dynamic range in Si w/ ADCs

Ex. Slot II ch 1 ch 4

E chan FWHM (cs)

6.778 3795.96 29.64 =
8.780 4618.84 30.46 = 69.8 keV

cal = 2.29 keV / ch cm

~~Dynamic range~~ =

Calibration

$$m = 3.29 \times 10^{-3} \text{ MeV/cm}$$

$$b = -1.797 \text{ MeV}$$

Dynamic range ch 16384 \Rightarrow 35.72 MeV

Just above ${}^4\text{He}$ punch through

Trigger logic preliminaries

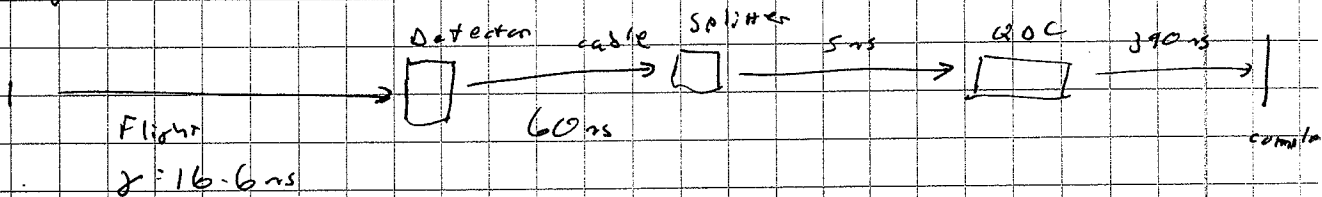
- Primary trigger
 - Start + Multiplicity
 - Multiplicity may be zero
- Time differences
 - Neutron TOF
 - Fastest is photons \rightarrow
 - Slowest is \sim 1 MeV neutrons : \sim 1.38 cm/ns
- Assume FA & MiniBall signals occur at same time
- Make gate with those
- Use this gate to Gate N-walls
- Use this to Gate CST
- Use this to Trigger Si
- Use NOT of this to Fast clear Si
- Use this to gate MiniBall
- Use to Gate FA.

To do

- Find More NSB9 Shapers
 - Verify Software Map \Rightarrow Out
 - Gasmeider CsI
 - ✓ - Fire Laser
 - Epics channels
 - Faraday Cup
 - Test AB
 -
 - Software
 - Epics
 - e-log
 - ✓ - Different Summing times
 - Pulsar control
- Gate CsI off SD
 - Pulse CsI + Si
 - Look at Gate
 - Find Quad GAG ~~works~~
 - Fast Clear Cables
 - Timing Sig to N-walls
 - F.C. to N-walls

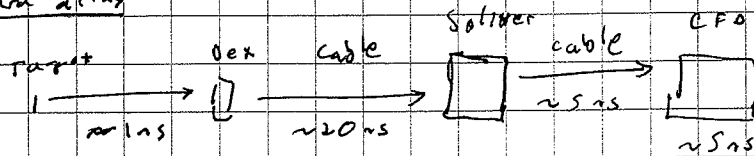
Neutron Timing (min)

Jargon

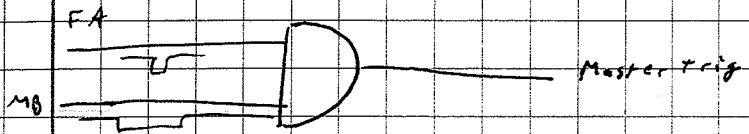


From event to Neutron ~~data~~ QDC = 81.6 ns

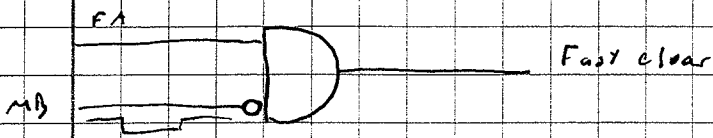
Forward array



Forward array cannot gate Neutrons. we must use fast clear.

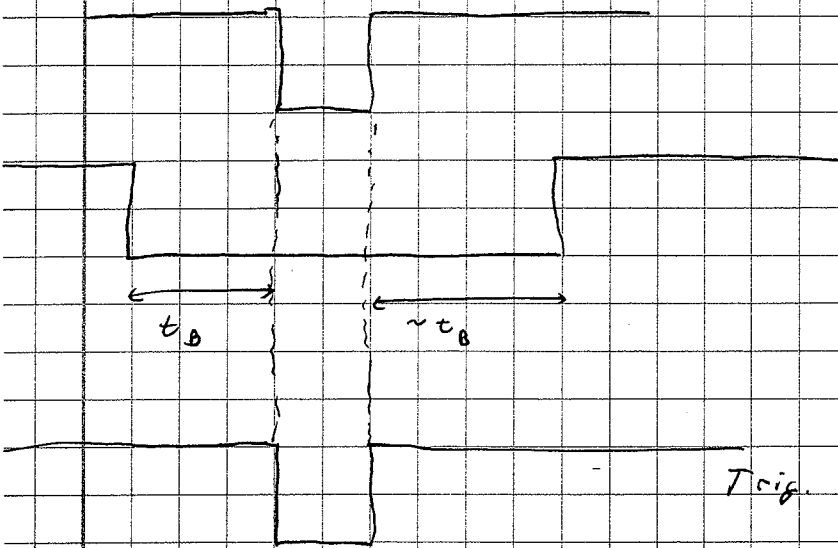


FA = Forward array trig
 MB = MiniBall Multiplicity trig



- Check Fast clear window

Timing



t_0 = time buffer
 used to compensate
 for jitter in FA
 and time differences
 in individual MB elements
 $t_0 \approx 100 \text{ ns}$

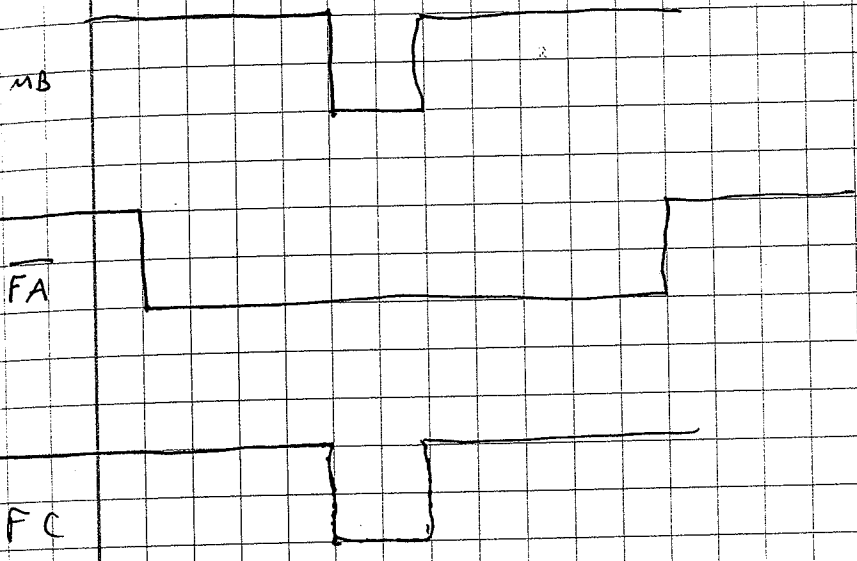
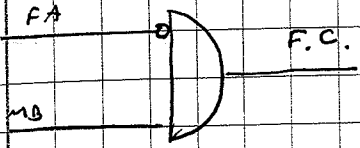
Trig

- ✓ What if we don't have a MiniBall trig but a Forward array?
 - use Fast clear?
 - No trigger?
- ✓ How much should we delay the Master trig?
 - $\sim 6 \mu\text{s}$ after MiniBall/Neutron/FA case
 - probably $\sim 6 \mu\text{s}$ after MB read.
- ✓ What is time jitter in FA/MB?
 - time diff between FA/MB?
- ✓ What is time jitter in MB Multiplicity?
 - time between individual MB elements.

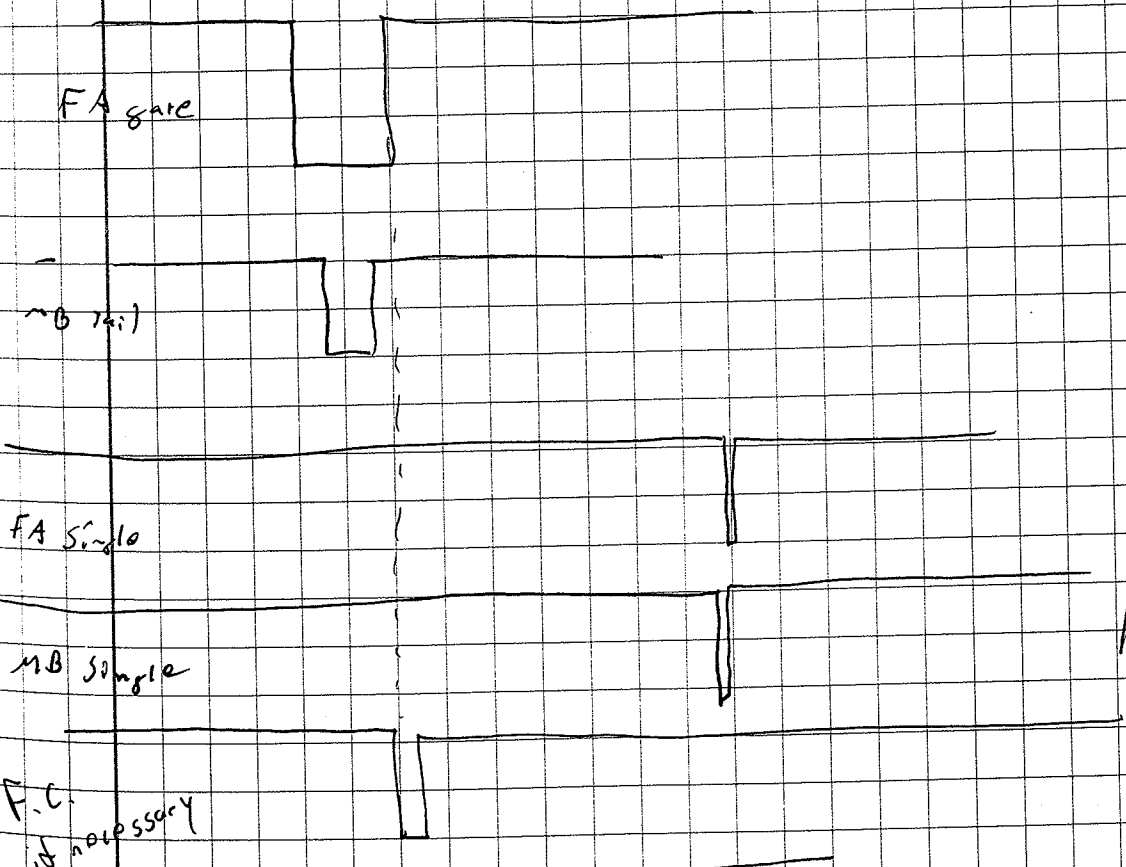
- 1 How much should we delay Fast clear?
 - within Fast clear window of all elements.

- How to trigger Si
 - Trigger MB read w/ prompt Trig.
 - Thru Trigger XM read w/ master trig

we also want



Gates & Triggers



also Master Trigger

Diagram of Trigger

MB Trig should be \Rightarrow Obviously not P_{Si}
- Si + MB + FA trig

01: CSE chan 1 preamp signal looks really weird

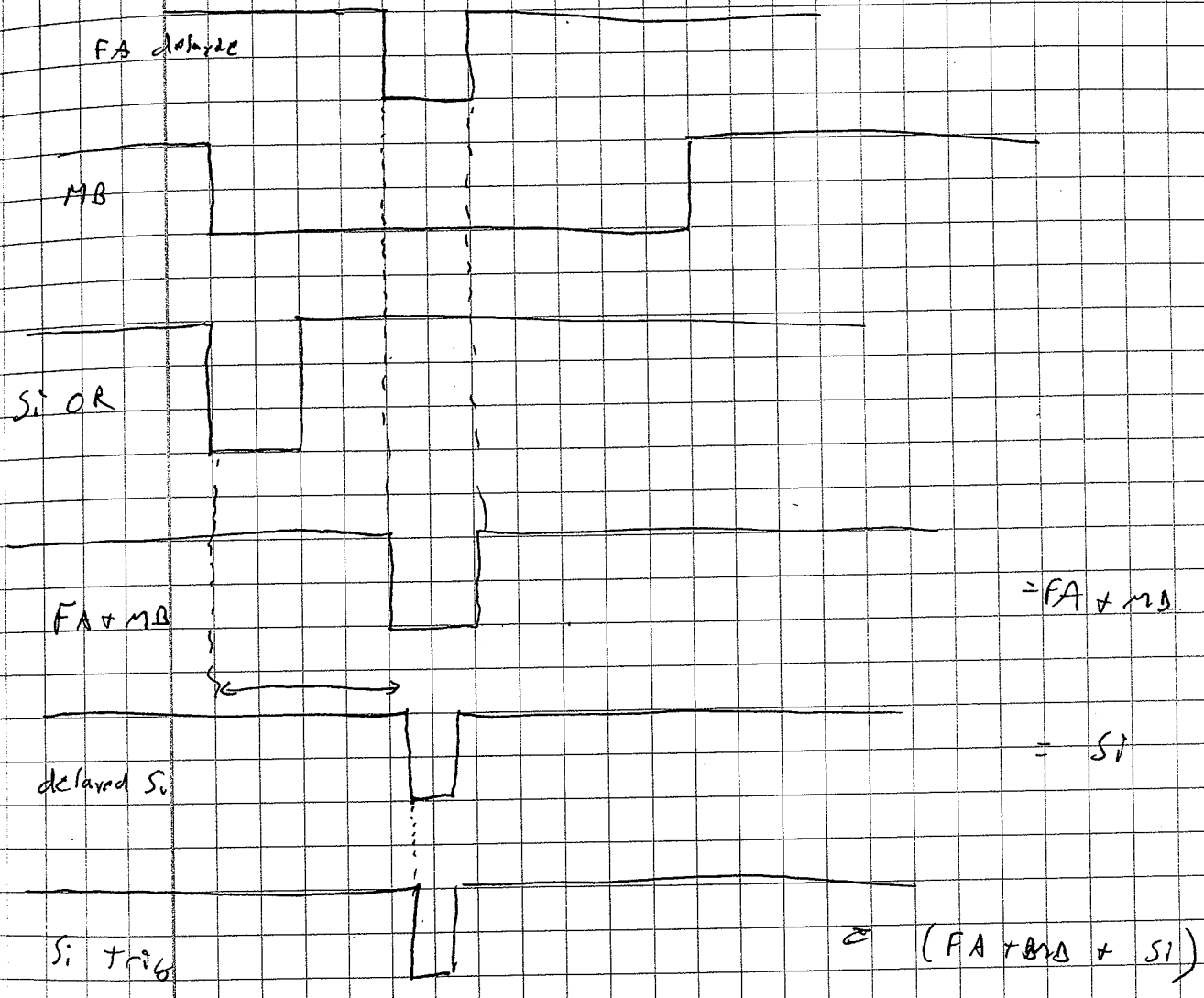
- Strange shape
- large gain
- very non-linear
- γ -source looks OK \Rightarrow May examine later
 - examine pulses?
 - replace preamp?

009 Note on Readout order

- Si last
- CSE second to last
-
- Will prompt trigger be OK for Si?
 - trigger Si ~~from~~ MB on prompt and Si OR
- Check Si Trigger timing
 - Can we trigger OR w/ prompt?
 - Use prompt and Si OR.

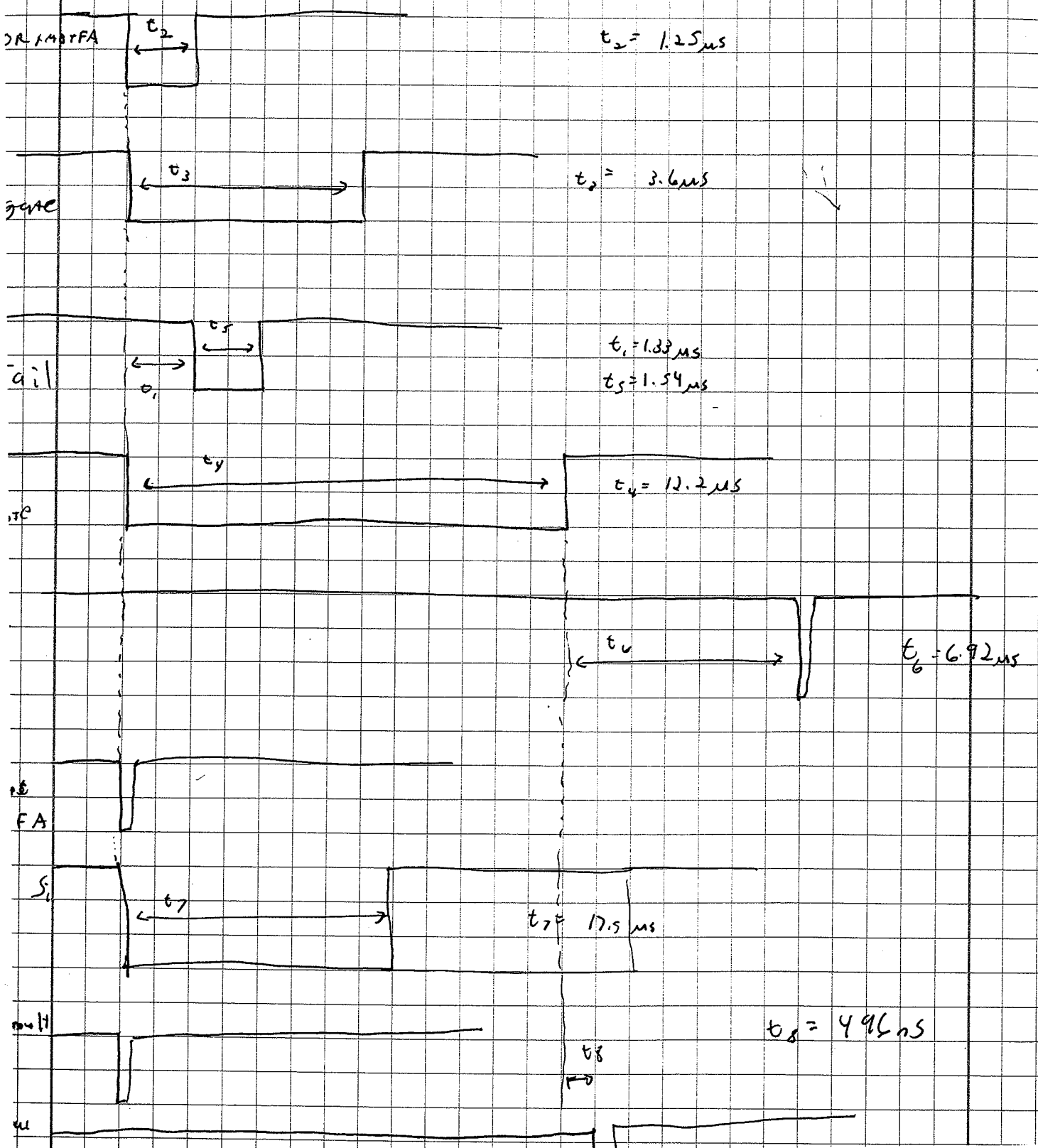
Si Trig

- Trigger Si w/ Si OR and prompt master.



- Routed Fast clear to N-walls
- Routed Forward array trigger to N-wall
 - put into vll90 chan 0
 - put N-wall OR into vll90 chan 0

Gates + timing



Control Bus Signals on VME

~~Set~~ ~~For~~

- Removed Termination of Bussed Signals except Last
- Set all Boards for Internal busy Section 3.6.2 in manual

- Crate 2:

Crate	Slot #	Device	Status/Term?	Int. busy
2	11	V775	Terminate	Y
	13	V785	Not term	Y
	14	V1120	Not term	N
	21	V785	Not term	Y
	2	V862	No	Y
0	3	V792	No	Y
	4	V792	No	Y
	6	V862	No	Y
	8	V792	No	Y
	9	V792	No	Y
	11	V862	No	Y
	13	V792	No	Y
	14	V792	No	Y
	16	V862	No	Y
	18	V792	No	Y
	19	V792	No	Y

(cont. on next page)

To do

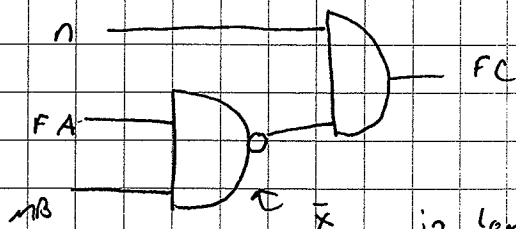
- Remove leak checker
- Clean vault
- restack dump
- Filter water
- Install LED.
- Set fast clear window
- Check w/ Ron about int. busy
- Yurkon target info
- Redo bus cable for minimal

Neutron wall termination

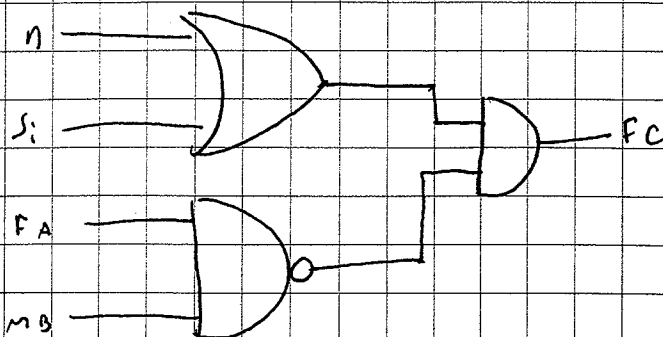
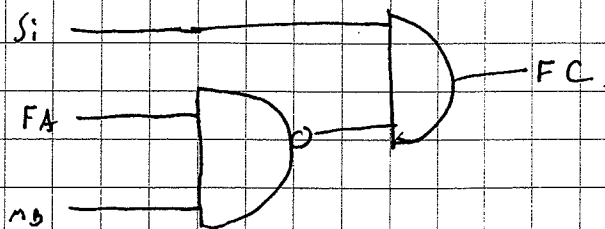
Gate	Slot	Mod	Term?	Int busy?
1	3	V792	Y	Y
	5	V862	N	Y
	8	V1196	Y N	N
	10	V792	N	Y
	12	V862	N	Y
	16	V792	N	Y
	18	V862	N	Y

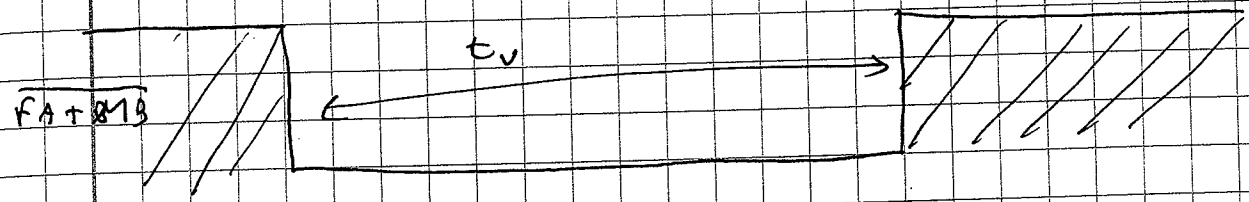
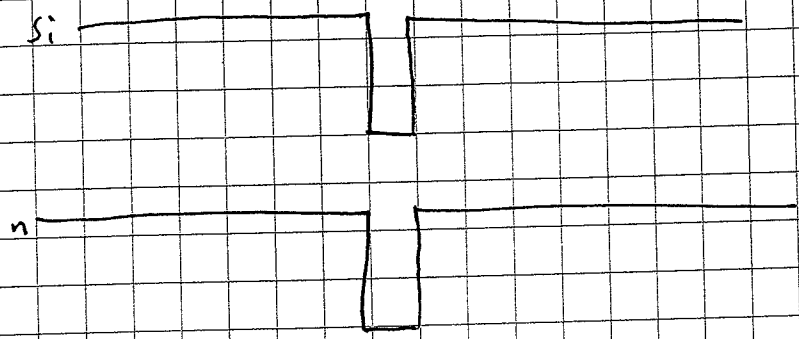
Trigger logic

- what if we have neutrons but no $(FA+MB)$?
 - we must generate a Fast Clear for $n + \overline{(FA+MB)}$
- what if we have S_i but no $(FA+MB)$?
 - we must also generate a Fast clear for $S_i + \overline{(FA+MB)}$

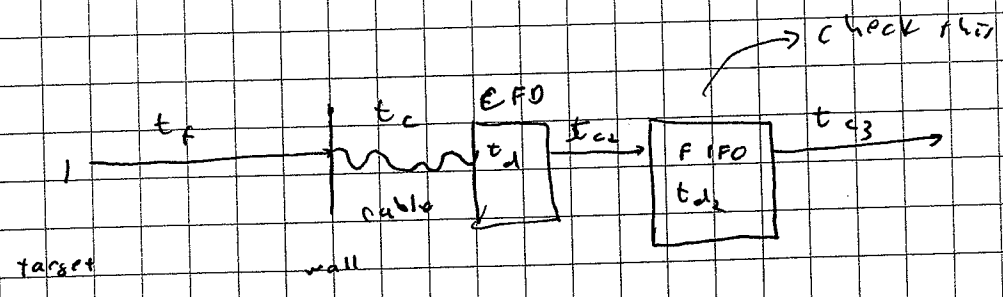


in Logic Mod \Rightarrow Make sure it's wide enough
(or narrow enough to fit in n-OR)





t_v must be wide enough to accommodate various neutron flight times.



$1.3 \mu s \geq t_f \geq 16 ns$ $t_c \approx 40 ns$ $t_d \approx 10 ns$
 $t_{c2} \approx 5 ns$
 $t_{d2} \approx 6 ns$
 $t_{c3} = 60 ns$

Minimum time to neutron OR at racks

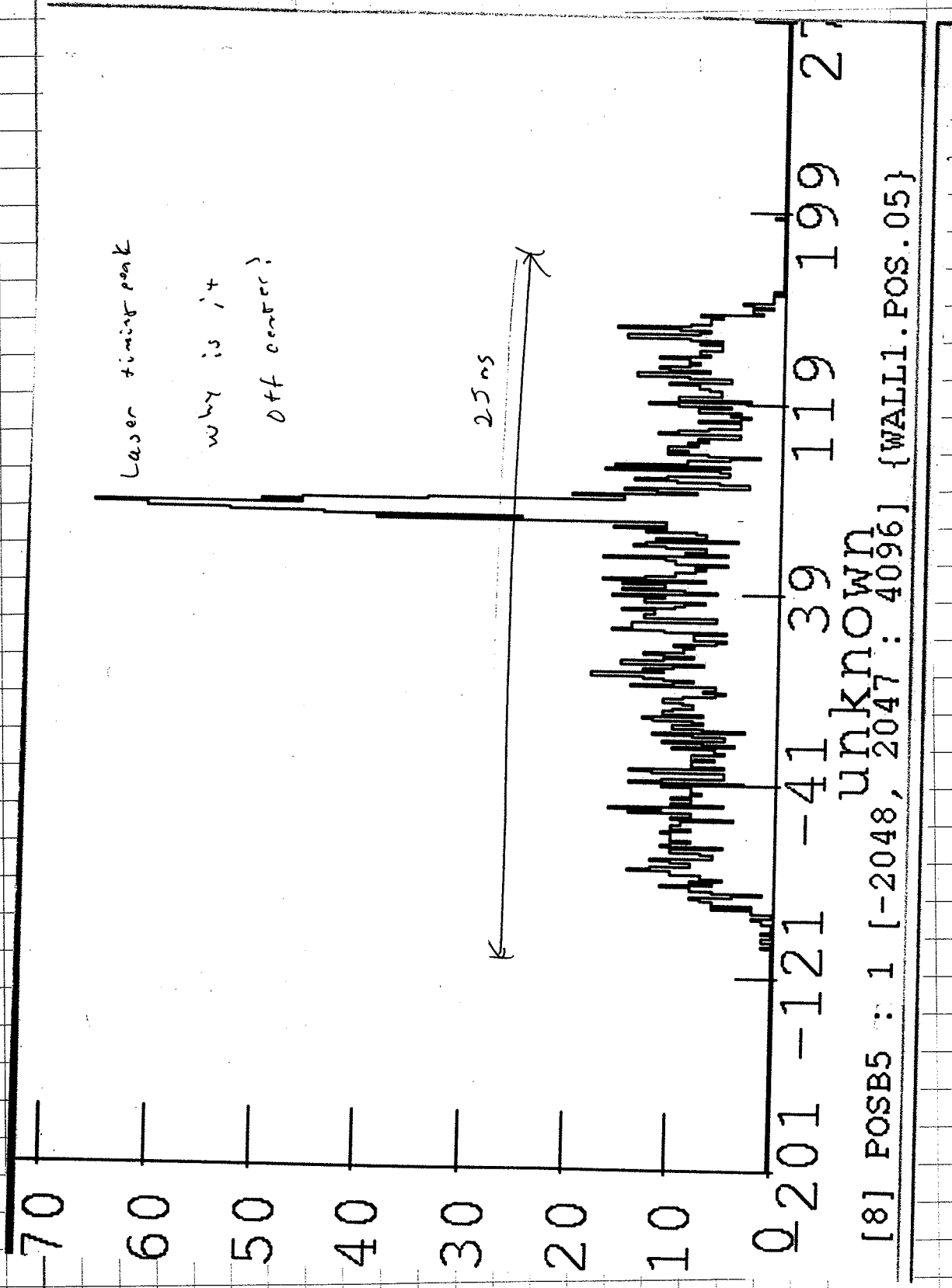
$t_f + t_c + t_d + t_{c2} + t_{d2} + t_{c3} = 137 ns$

Experiment Laser positioning

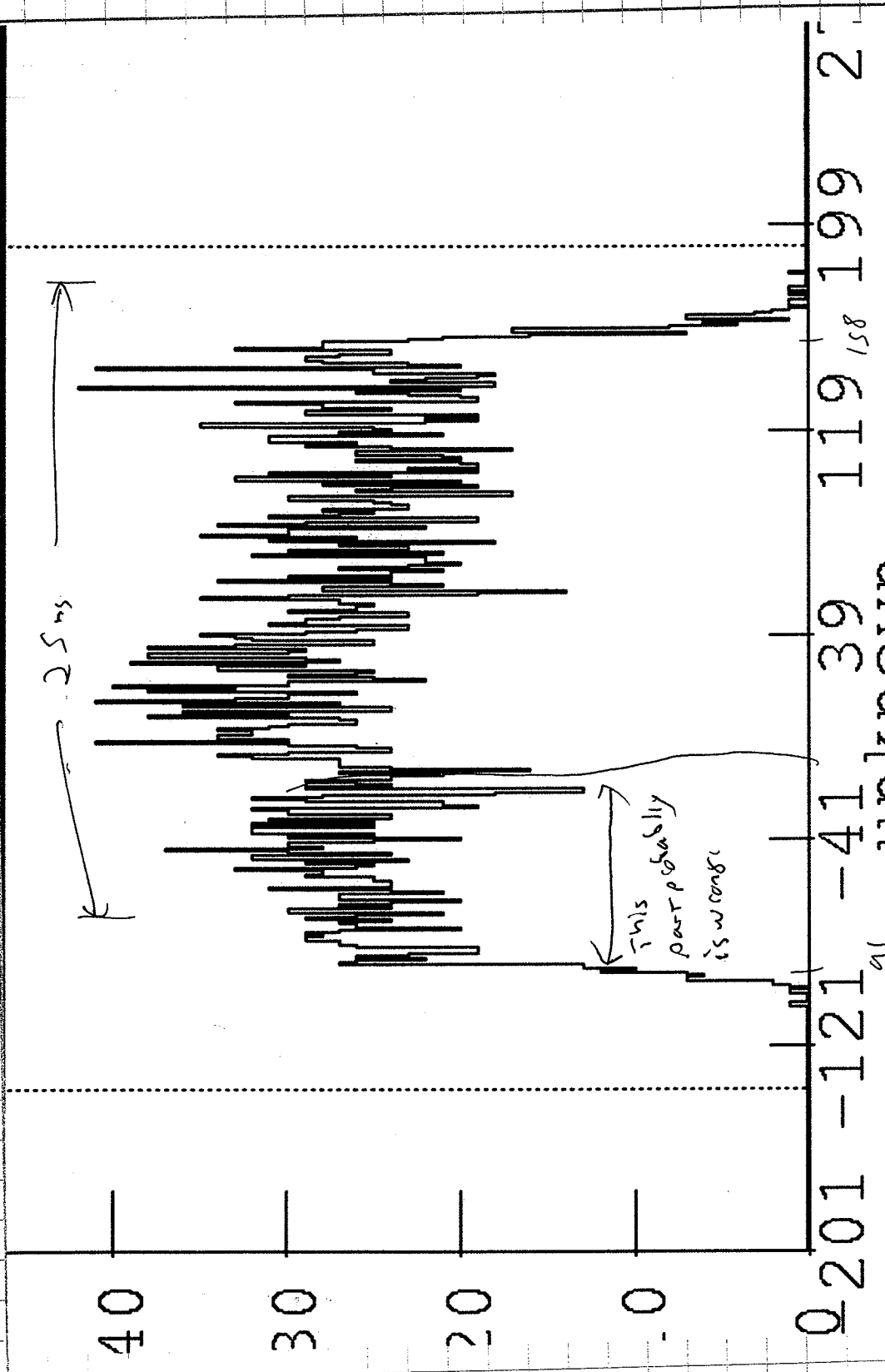
Run 56 Wall B laser position \Rightarrow First attempt.

Run 57 Wall Back ground run = No laser

Run 56



Background
Same tube
A435



[8] POSB5 : 1 [-2048, 2047 : 4096] {WALL1.POS.05}

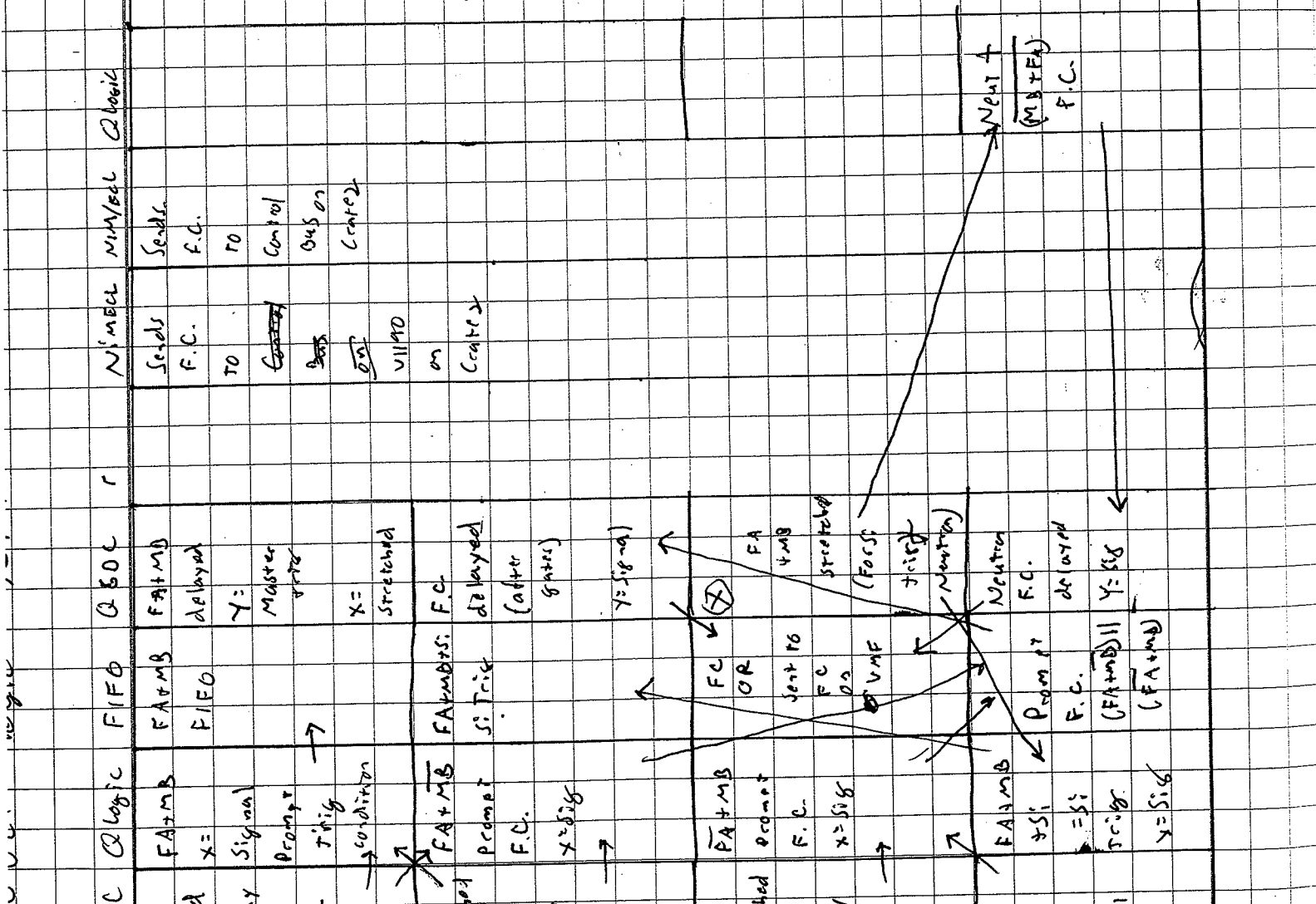
NE-213

Equivalent to BC-50140? $n = 1.505$ (1.53 at $x = 425.0$)

Try w/ Just one channel
- Maybe delays from higher multiplicities.
- want only multiplicities at J

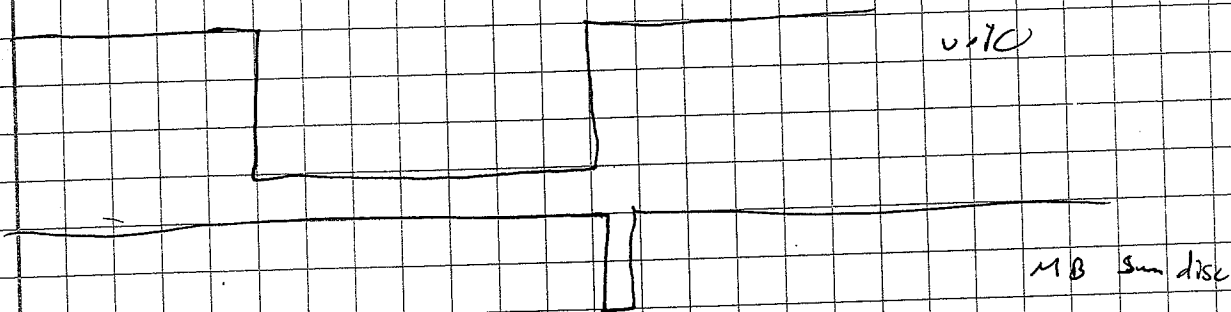
* Run 58 = redo addition R. in. as tube 5 only

Logic	FIFO	Q SOC	NIMBCL	NIMBCL	Q basic	CST Fm	CST Power	FIFO
FA+MB	FA+MB	FA+MB	Sends	Sends	Ribbon	CoI		Veto
x = Signal	FIFO	delayed	F.C.	F.C.	to CSI	0-3		FAF
Prompt	Y = Master wire	Y = Master wire	TO	TO	distro			all dices
condition	X = stretched	X = stretched	Control	Control	Box			Master
FA+MB	FA+MB	FA+MB	on	on				veto
Prompt	SI: Tric	delayed (after gates)	VII 170	VII 170				<u>NOTE</u>
F.C.			Control	Control				set
x = sig								switch
								TO
								IX 14
								wires
								Routing



CsI tests

- Channel 1 still looks funny
 - ~~maybe it's the box~~
- Need to veto CsI
 - probably not too important except for singles since we are gating on S0
- There seems to be some strange interaction in MB discs H4 and 5
 - the Veto ~~fast~~ rising edge seems to trigger the sum output (maybe others?)
 - maybe not a problem since the DAC has already started but we need to make sure it doesn't trigger the Fast Clear maybe OK



- Passing through to 30 mV holes

* Shaper 2, ch 3 is bad so moved to 12

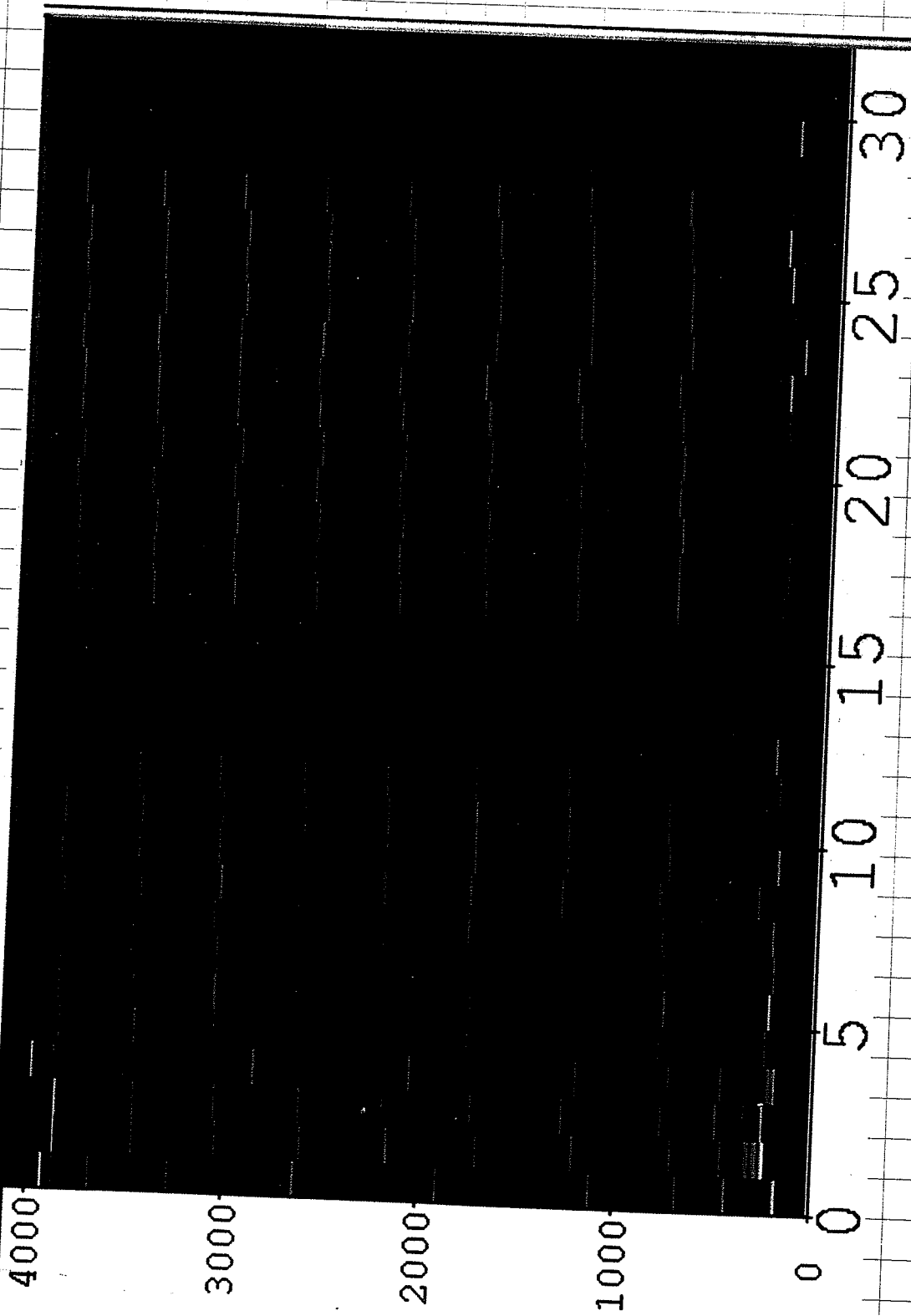
CsI preamps 0 + 3 look bad
 → very high gain
 → odd shape?

Estimated CsI resolution = 1/pulse

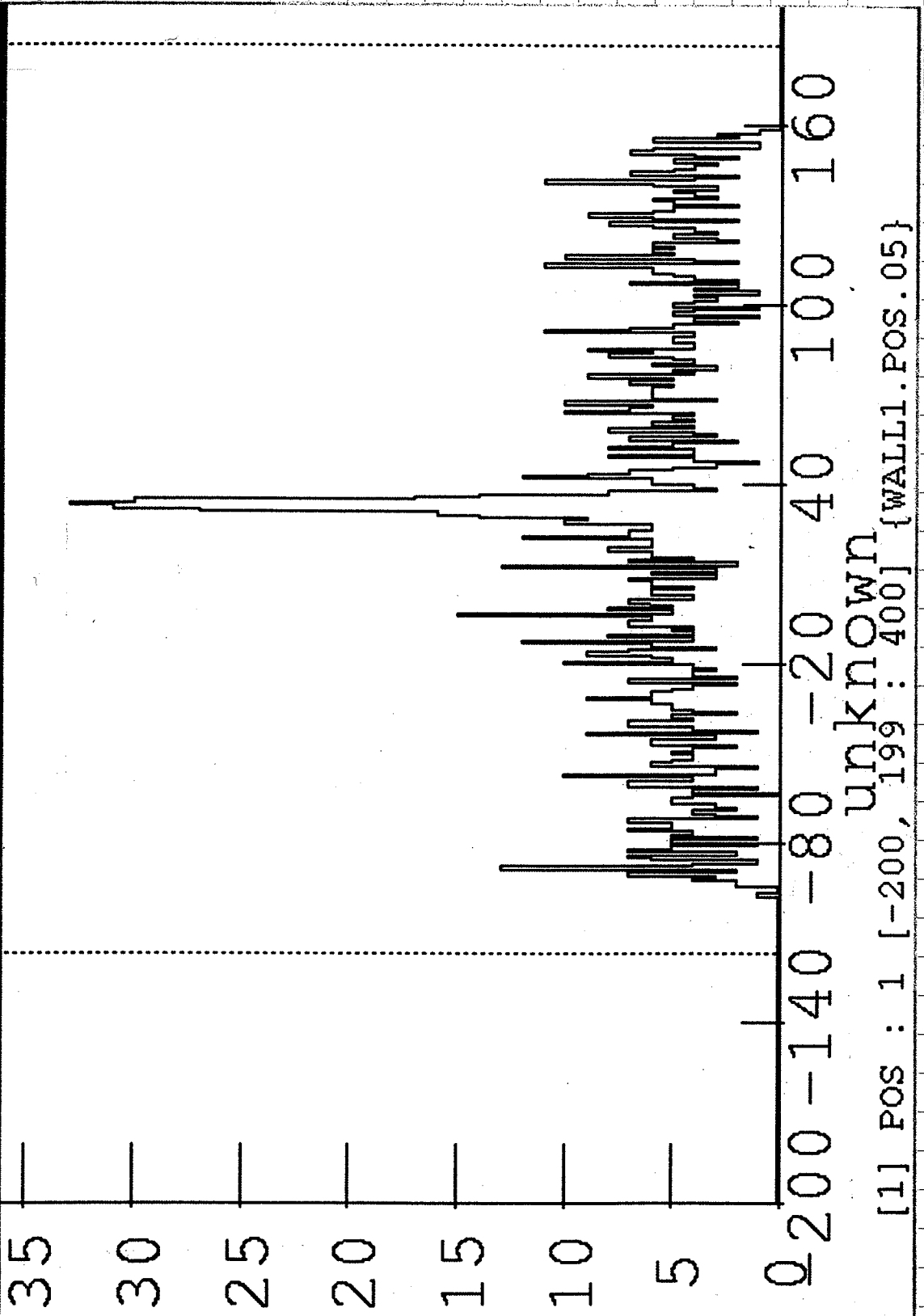
$$A + E \approx 600 \text{ keV} \quad 600 \times (8.0 / 8.4559) = 567.65 \text{ MeV}$$

$$\text{chan} = 3870.644$$

$$\text{FWHM} = 2.85 \text{ ch} = 0.417 \text{ MeV} \Rightarrow 7.35 \times 10^{-4} \text{ intensity}$$



CsI rough pulse rate
- Moved to Fix channels 0+3! Not sure what's wrong



- Redid laser pulse calibration on walls
- seems ok now, but not sure what I did differently
- processes delay in ROS that I forgot to remove?
- bar that would shift everything

Run 60

CsI signals

- pulser ramp coarse
0.5 to 8.0 V in 0.5 V increments

Settings Fast Clear window

Set so that it ^{ends} about 5 μ s after widest gate.

- CsI gates

Gates

- Neutrons

- Fast ≈ 33 ns- Slow ≈ 400 ns after start

- FA

- 3.6 μ s

- MS tail

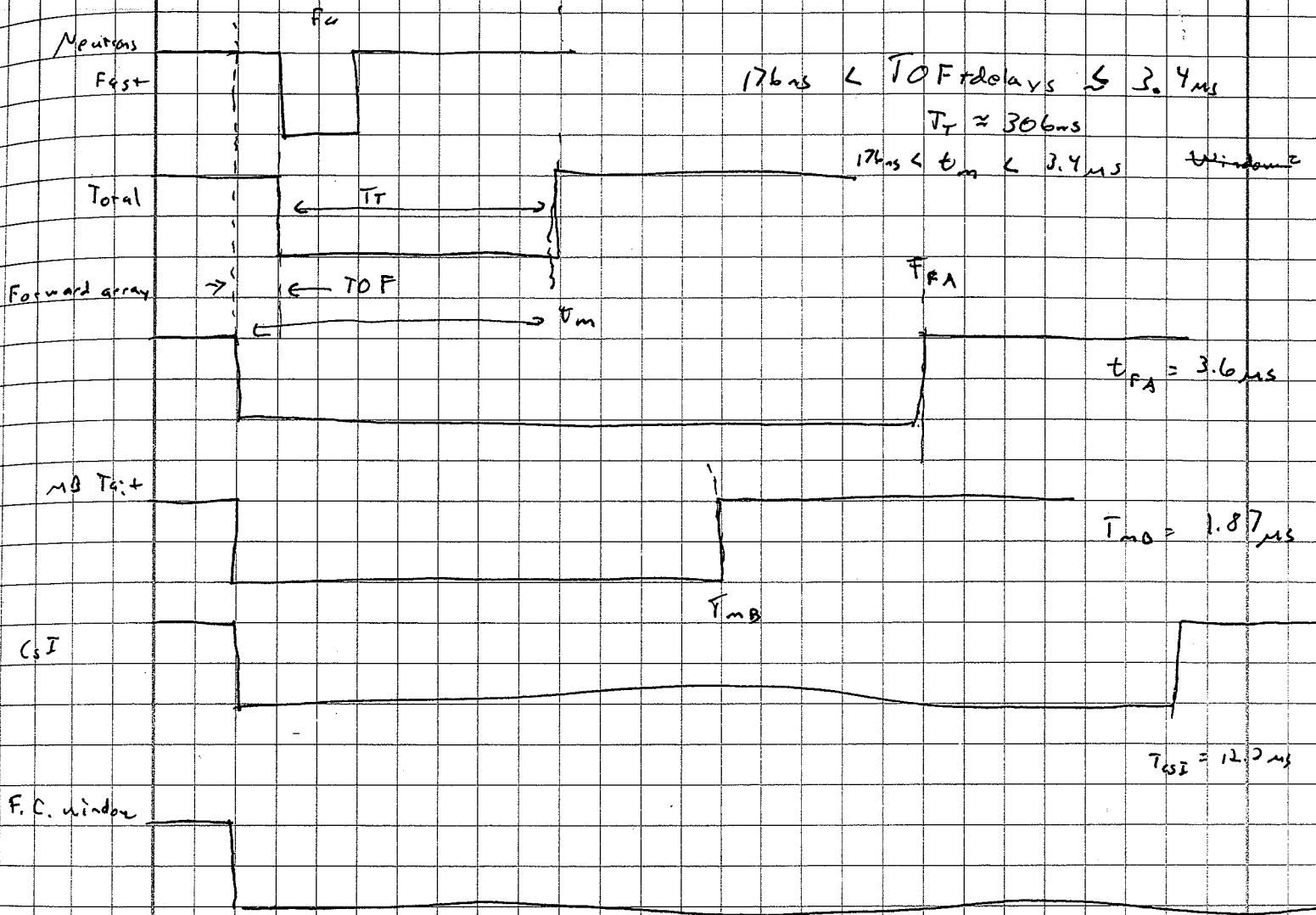
- ≈ 2.9 μ s after start

- CsI

- ≈ 12.2 μ s after start

- Si

- doesn't need F.C. as it's not triggered w/o a trigger
and clears low before F.C.



Fast clear windows = $t_{FC} - t_{min}$ $T_{FC} = 17.2$

$\hookrightarrow t_{min}$ = minimum time for tail of event.

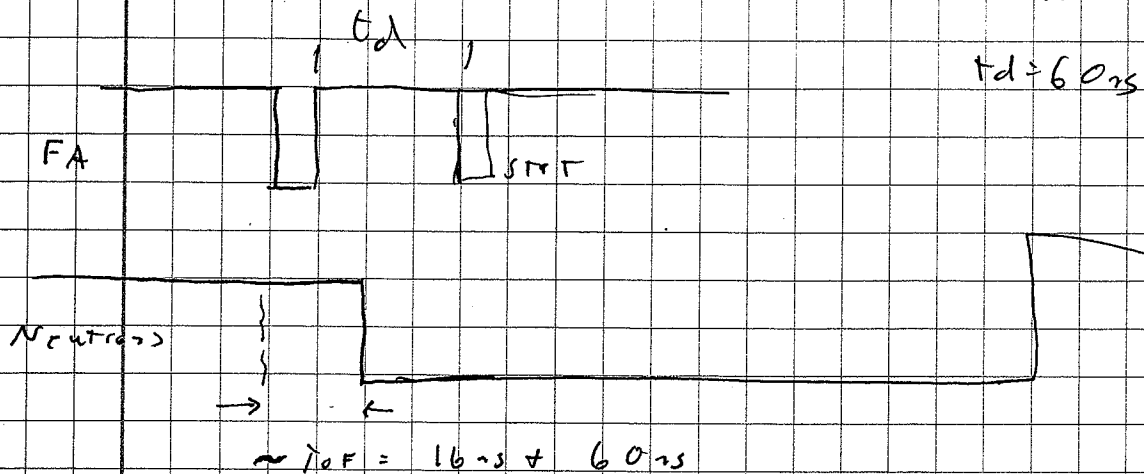
- CsI $\Rightarrow t_{FC,CsI} = 17.2 \mu\text{s} - 5.2 \mu\text{s} = 12.0 \mu\text{s}$ add 1 μs for good luck
- MB tail $\Rightarrow t_{FC,MB} = 17.2 \mu\text{s} - 1.87 \mu\text{s} = 15.33 \mu\text{s}$ $N = 299$
- Forward array $\Rightarrow t_{FC,FA} = 17.2 \mu\text{s} - 3.4 \mu\text{s} = 13.8 \mu\text{s}$ $N = 343$
 = For TOF \Rightarrow set to 17.2 μs since start is lost
- Neutrons = $t_{FC,n} = 17.2 \mu\text{s} - 0.176 \mu\text{s} = 17.024 \mu\text{s}$ $N = 320,768$

\Rightarrow * Make sure F.C. is at least 30 N's wide!

z Terminal Server addresses

- 35.8.35.124 : MiniBall power
- 35.8.35.123 : Neuron wall power
- 35.8.35.102 : white pulser
- 35.8.35.118 : Blue pulser

- Neuron walls + MiniBall TDC trigger timer



- we should put window, say $-50 \text{ ns} \Rightarrow 50 \text{ ns}$ before trigger for extra ~~width~~ margin and make it $2 \mu\text{s}$ wide

- probably also OK in M.B.

Telescope bias \downarrow current

<u>Position</u>	<u>SI</u>	<u>Bias (V)</u>	<u>Current (μA)</u>
1	1144-17	-66	1.31
2	1133-19	-80 -80	4.46
3	1674-12	-60	0.96
4	1140-26	-85	1.52
5	1640-19	-65	3.25
6	1742-4	-55	0.92

* Tel 1 : Noise increases when biased
 \rightarrow corrected backwards perhaps?

April 4, 2009

To do:

- Remove N-wall Frame

SOL testsNoise: white ≈ 75 mV rms

telescope I: strange problems again!

Voltage & currents

	<u>Tel</u>	<u>V</u>	<u>I (mA)</u>
1115	1	-	-
	2	35.2	0.39
	3	60	0.61
	4	85	1.31
	5	65	2.72
	6	55	0.48
1152	1	-	-
	2	35.2	0.39
	3	60	0.61
	4	85	1.28
	5	65	2.71
	6	55	0.48

* Run 84: Pulser Ramp Front.
0-10 V 21 STEPS 30 s/step

* Run 85: Pulser ramp Back
0-10 V 21 STEPS 30 s/step

- Things to do when venting

- Check cabling on Tel 1 again. \Rightarrow bias while remove

~~insert source~~

- pulse tel 2

- apply bias

- check noise w/ spectra on 2

- see if it goes down w/ bias on 2

- re

- Missing pulser preamps

Slot	chip	chan
14	1	4
		14
6	0	15
	1	15

15 \rightarrow No pulser \Rightarrow pulser input broken?
 \Rightarrow \checkmark is ok, pulser missing

Find depletion voltage of T_{012}

- Raise V
- Find RMS noise on Front & on Back
- Find width of Pulsor spectrum on the Back layer.
- Examine & spectra

Pulsor $V = 6V$

Examine (ch) on F + B

Bias (-)	RMS Front (mV)	RMS Back (mV)	Pulsor FWHMback (ch)	I (uA)
35	1.77	5.95	32.51	0.39
40	1.70	5.00	28.022	0.83
45	1.85	4.21	22.01 22.08	1.42
50	1.80	3.98	21.50	1.98
55	1.80	3.61	18.01	2.50
60	1.40	3.30	17.50	2.96
65	1.92	3.10	14.96	3.34
70	1.93	3.77 2.80	11.80	3.73
75	1.96	2.60	12.0	4.11
Probably around 60V				
75V 76.0 70V 70				
80	2.0	2.50	11.0	4.46

⇒ All detectors Biased

Det	Bias (V)	I (uA)
1	-66	0.90
2	-75.1	4.07
3	-60	0.62
4	-85	1.33
5	-65	2.76
6	-55	0.49

Run 86 ~~Pulsor Ramp All Events 0-10 V => 21 steps~~

Source test Run on all channels

- Broken Preamps

<u>Slot</u>	<u>Chic</u>	<u>Chan</u>
6	0	15
	1	15
14	-1	No pulsor at all => check cable

Scaler

- Crate 2, Slot 7, base 0x777700
Crate 2, Slot 9B, base ~~0x777700~~ 0x999900
- work

To do:

- Broken Preamps
- do Source pulsor
- AB connection => Kollay David 107
- FA Shaper
- NSF visit => Monticoy
- LASSA Si resolution examine
- power grid map
- Repair BR20 patch.
- Check logrs wall A tubes
- wall A tube 15 => No position!
- wall A tube 8 delay diff.
- wall A tube 14 delay diff.
- wall A pos tubes 15 -> 23

Wall B Laser Calibration

- double check \Rightarrow tube 2
 \rightarrow tube 14 \Rightarrow BR had problems

Have another look
BR 14 - No pos sig
BR 15 - " " "

* BR 20 \Rightarrow Disc threshold should be low ~ 8

* BR 14 \Rightarrow }
BR 15 \Rightarrow } Low thresholds + High Voltage.

All tubes accounted for.

- Wall B tube 15 \Rightarrow NO position!
- look into tomorrow

Wall A tube 8 is off by a lot! $\approx 53 \mu s!$
- check length sometime

Check & source resolution vs bias on Tel 1 (starting from

Bias (-V)	I (nA)	FWHM (r. & m.v.) (channels)	FWHM (l.i.) (channels)
35	0.39	59 59	49
40	0.8	67	46
45	1.43	58.5	43.9
50	1.98	69.5	48.9
55	2.49	67.9	47.6
60	2.93	74.16	54.98
65	3.34	66.22	62.85
70	3.73	64.27	67.76
75	4.19	70.55	55.93
80	4.45	68.88	64.86
85	4.81	64.16	60.56

Testing 8) : All detectors biased.

Tel	I (nA)	Bias -V
0	0.87	66
1	1.27	50
2	0.60	60
3	1.31	85.1
4	2.71	65
5	0.48	55

Will do pulse runs

Pulse on Front : 0-10 V 21 steps 30s/step
Ion gauge off

Still NO pulse on Asic Tower @ 405V!

- Did we forget to plug it in?

- Seeing weird background.

- The source got on something?

So Back pulse Run 0-10 V 21 steps, 30s/step
Ion gauge off

- Slot 14, chip 1 = No pulser

- Slot 15, chip 0, NO pulser

- Slot 11, chip 2, chs 4 \Rightarrow wire signals.

4-100 Ramping Pulser Fronts only ion gauge ON.

= 0 - 10 V 21 steps, 30 μ s/step

9-1000 Testing pulser resolution

- Look at S15, Ch 7, Chan 7.

- example FWHM

- RMS Noise

- Fully Biased. 16 V closed

- Fully Biased 16 V open.

Pulser = 1.5V

	<u>closed</u>	<u>downstream open</u>	<u>Both open</u>
RMS-Font	2.75 2.75 μ V	2.75 μ V	\sim 2.75
FWHM	5.60 \sim 6.0	\sim 6.0	\sim 6.0

No effects correlating to beam line.

Testing Allos Bradley PLC

Method

- look at RMS noise signal w/o PLC
- Take pulser spectra ~~with~~ w/o $V=1.5V$
- Measure width
- Measure trigger rate
- plug MD thermocouple into PLC

	No PLC	PLC
RMS Noise	$\sim 21.8 \text{ mV}$	~ 21.8
Pulse width (chan)	$P=0.4$	1.00 8.00
Rate	$\sim 100 \text{ Hz}$	~ 100

There is no apparent excess noise with the AD PLC

pril 19, 2004

To do:

- Talk to Dave about G-line crookedness
- Preamplifier saturation?

pulsers on Back chips is not linear
- it is the chip.

Things to try

- changing pulser jumper
- changing settings
- changing slots

- for

To do:

- Prof tests on J1
- Benchmark OAQ
- Timing signals for O7018
- Look at det J
- wire Board det 2
- Views
- Targor ladders
- Readout Calours
 - add EPics chans
- Cover upstream views

Screw MBell cooling fans
into place

April 11, 20

Swapped electronics for LASSA O and I
to see if the noise on I is electronic in nature

- After Bias

$$I(\phi) = 1.06 \mu A \quad (\text{chamber on})$$

$$I(I) = 3.78 \mu A$$

Pulse resolution w/ swapped electronics 5V pulse test

Te 10	F : chans	FW MHz
	0	10.60
	5	6.08
	7	10.32
	12	~7.00
	15	10.79
	B chans 0	10.8)
	5	4.40
	7	9.57
	12	5.53
	15	11.07

Te 11	F chans	FW MHz
	0	7.14
	5	8.00
	7	7.98
	12	8.80
	15	8.58
	B chans 0	20.23
	5	13.93
	7	11.11
	12	12.19
	15	17.63

Looks like Tel 1 really is bad.

- will pump down and try ALE & source.

- Alpha tests indicate noise was pretty crazy on Q1, but also on Q2. Maybe grounding/cable issue. will look at this and try again tomorrow

