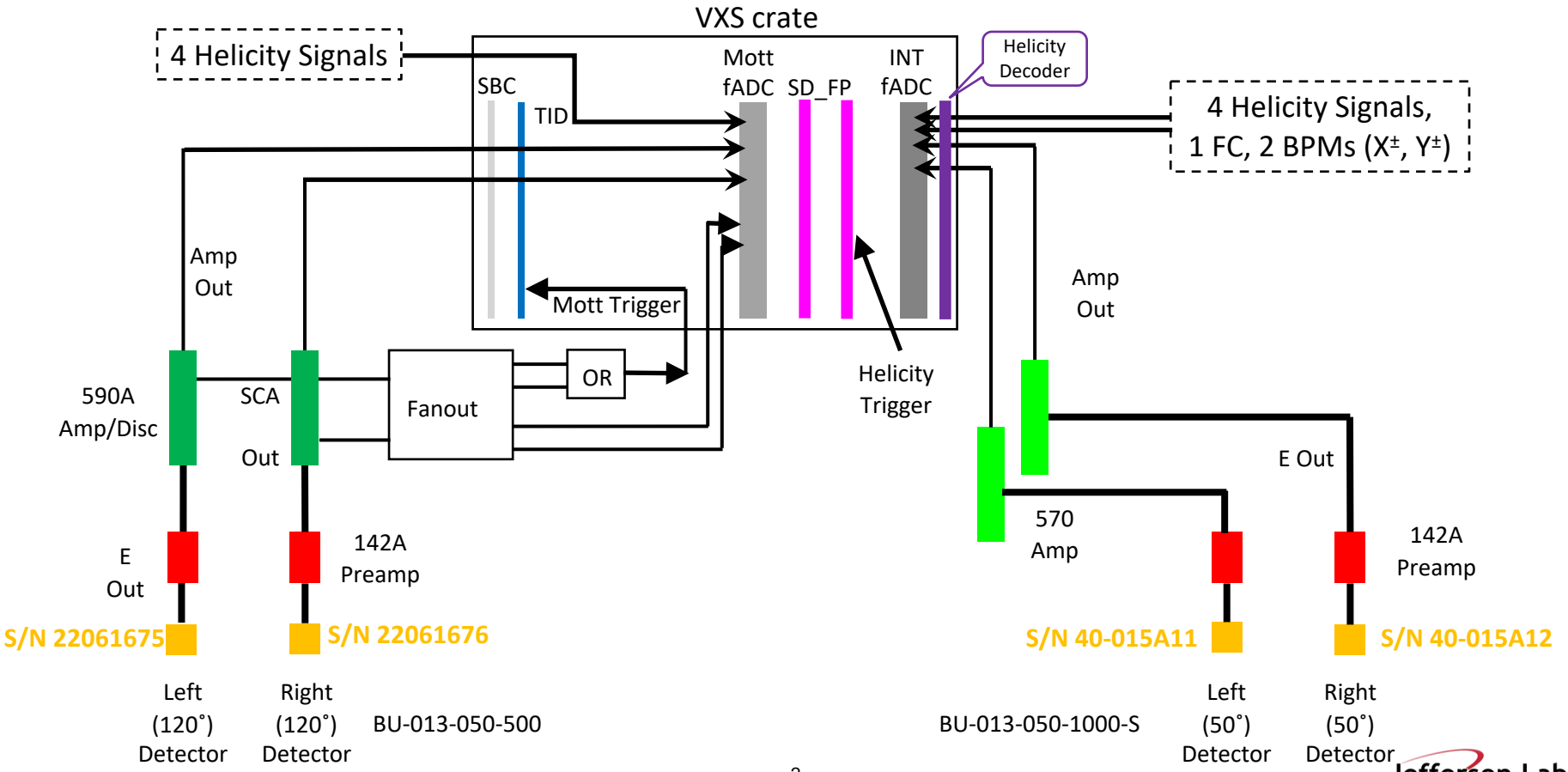
Description of Hardware of UITF 200 keV Mott DAQ

Riad Suleiman

Wednesday, June 8, 2022

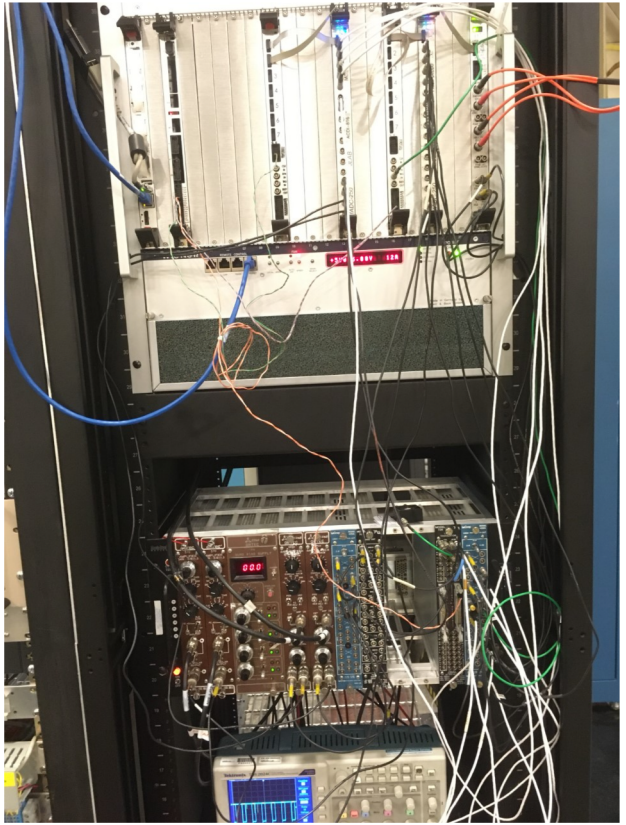
Upgraded Injector Test Facility – Mott Data Acquisition



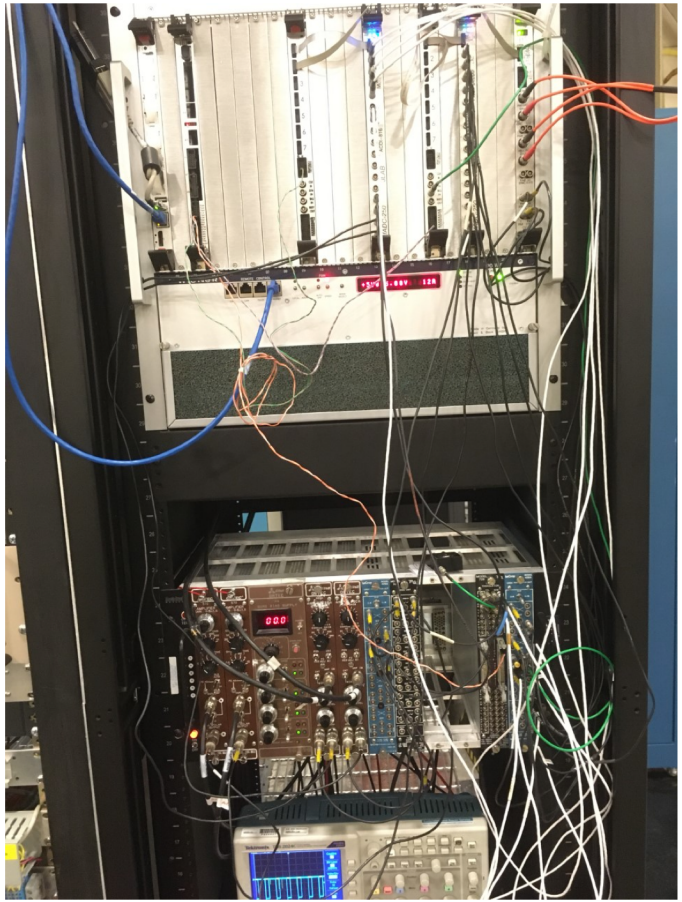
Jefferson Lab

DAQ Hardware

- VXS Crate and NIM Crate
- Mott detectors, Preamps, Amplifiers and Bias Supply
- Helicity signals from Helicity Board



Mott DAQ

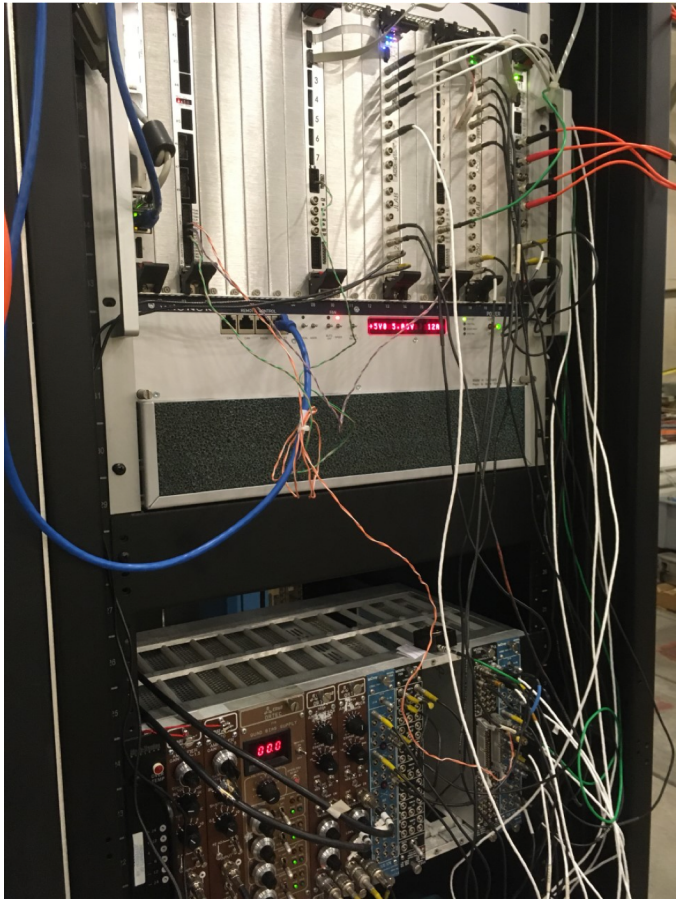


Hardware	Rack
itfmdaq0	ITF 07
Mott VXS Crate	
Mott NIM Crate	

Mott DAQ crates

VXS Crate

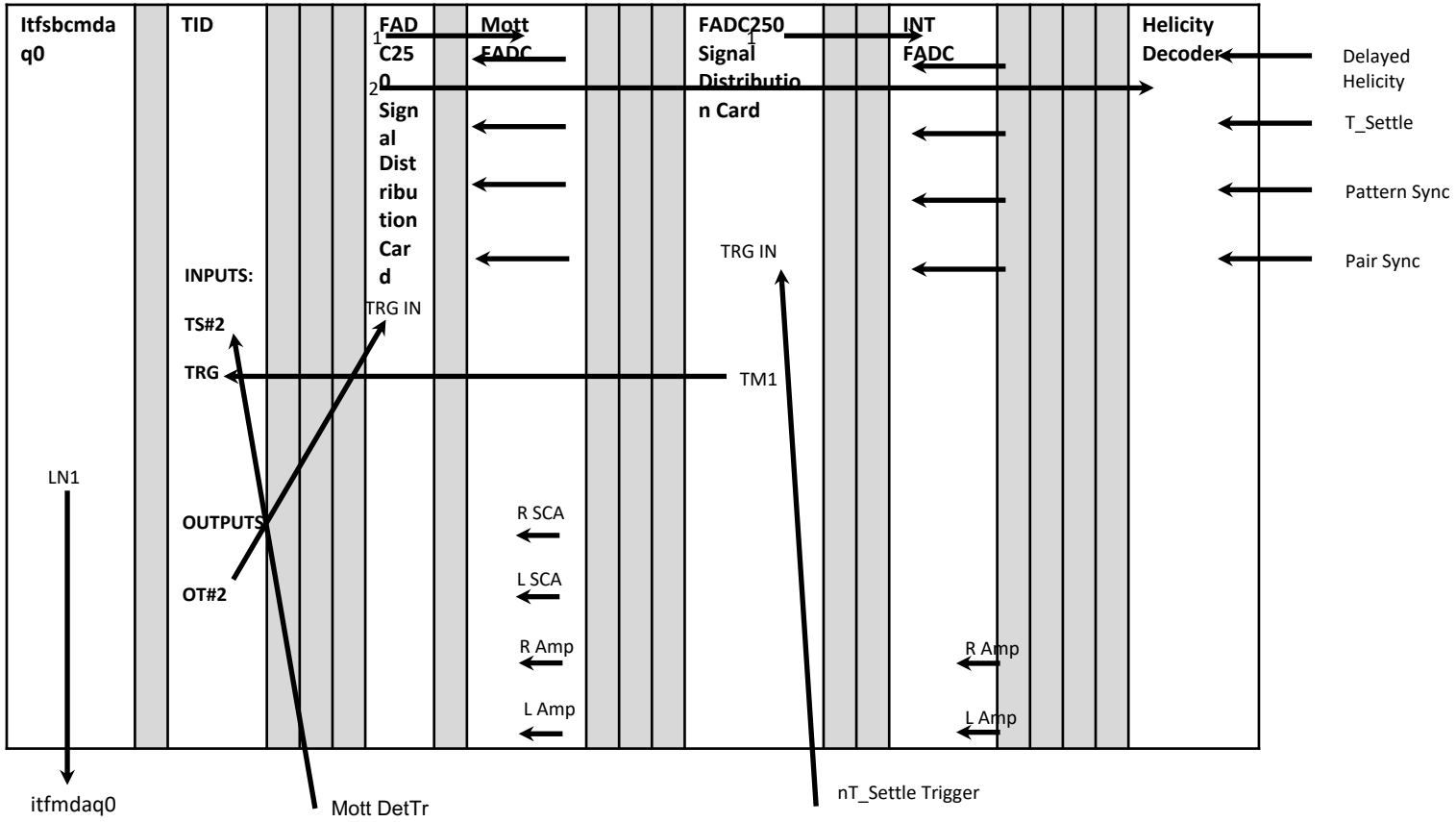
Slot	Board
1	Linux SBC
2	Empty
3	TID
4	Empty
5	Empty
6	Empty
7	Empty
8	Empty
9	SD_FP (0xEA00)
10	Empty
11	Empty
12	Empty
13	Mott FADC
14	Empty
15	Empty
16	SD_FB (0xEB00)
17	Empty
18	INT FADC
19	Empty
20	Empty
21	Helicity Decoder (0xA80000)



Mott NIM Crate

Slot	Board
1	570 Amplifier
2	570 Amplifier
3-4	ORTEC QUAD BIAS SUPPLY
5	590A Amplifier
6	590A Amplifier
7	LOGIC FAN IN/OUT LeCroy 429A
8	Empty
9	Empty
10	Empty
11	LEVEL TRANSLATOR PS726
12	LOGIC FAN IN/OUT LeCroy 429A

VXS CRATE


Itfsbcmdaq0
TID
FADC250 Signal Distribution Card
Mott FADC
INT FADC
Helicity Decoder
Delayed Helicity
T_Settle
Pattern Sync
Pair Sync
INPUTS:
TS#2
TRG
OUTPUTS:
OT#2
LN1
itfmdaq0
Mott DetTr
TRG IN
TM1
nT_Settle Trigger
R SCA
L SCA
R Amp
L Amp

Mott NIM Crate

570 Amp (50°) LEFT	570 Amp (50°) RIGHT	ORTEC QUAD BIAS SUPPLY	590A Amp (120°) LEFT	590A Amp (120°) RIGHT	FAN 429A	LOGIC 758			LT 726	FAN 429A
→ IN E ← OUT E	→ IN E ← OUT E	142A Preamp (120°) LEFT +180 V	→ IN E ← OUT E ← SCA	→ IN E ← OUT E ← SCA	→SCA	→SCA →SCA			→ nT_Settle IN ← TTL/ECL OUT	→ Delayed Helicity
		142A Preamp (120°) RIGHT +180 V			→SCA					→ T_Settle
		142A Preamp (50°) LEFT +115 V								→ Pattern Sync
		142A Preamp (50°) RIGHT +115 V								→ Pair Sync
A10	A9		B9	B10						

Pream power

CHANNEL ASSIGNMENT – ORTEC QUAD BIAS SUPPLY

OUTPUTS	Detector	HV
1) **B7**	142A Preamp (120°) LEFT	**+180**
2) **B8**	142A Preamp (120°) RIGHT	**+180**
3) **A7**	142A Preamp (50°) LEFT	**+115**
4) **A8**	142A Preamp (50°) RIGHT	**+115**

CHANNEL ASSIGNMENT – PREAMPLIFIERS

07152253

OUTPUTS	142A Preamp (120°) LEFT
E	590A Amp E IN **B5**
T OUT	- **B2**
Test	**B1**

07152257

OUTPUTS	142A Preamp (120°) RIGHT
E	590A Amp E IN **B6**
T OUT	- **B3**
	B4

2725

OUTPUTS	142B Preamp (50°) LEFT
E	570 Amp E IN **A5**
T OUT	- **A1**
Test	**A4**

2728

OUTPUTS	142B Preamp (50°) RIGHT
E	570 Amp E IN **A6**
T OUT	- **A2**
	A3

CHANNEL ASSIGNMENT – AMPLIFIERS

Channel	590A Amp (120°) LEFT
E IN	142A Preamp E
E OUT	Mott FADC CH0
SCA	Mott FADC CH2

Channel	590A Amp (120°) RIGHT
E IN	142A Preamp E
E OUT	Mott FADC CH1
SCA	Mott FADC CH3

Channel	570 Amp (50°) LEFT
E IN	142B Preamp E
E OUT	INT FADC CH0
SCA OUT	-

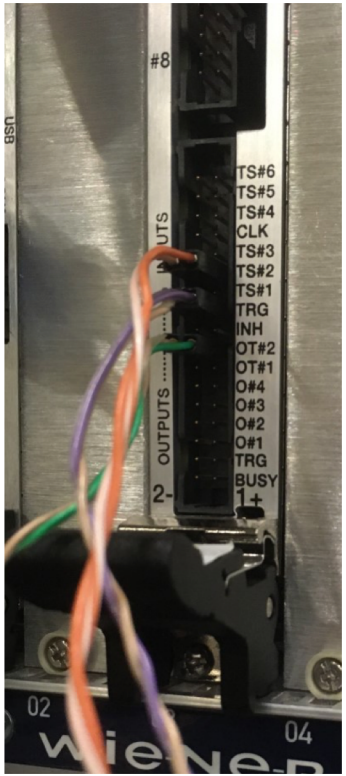
Channel	570 Amp (50°) RIGHT
E IN	142B Preamp E
E OUT	INTFADC CH1
SCA OUT	-

AMPLIFIERS CONTROLS

Controls	590A Amp (120°) LEFT	590A Amp (120°) RIGHT
FINE GAIN	1	1
COARSE GAIN	100	100
INPUT POS/NEG	NEG	NEG
OUTPUT UNI-BI	UNI	UNI
PZ ADJ	50 µs	50 µs
INT/WINDOW		
WINDOW		
LOWER LEVEL		
LL REF (INT/EXT) (rear panel)	INT (front- panel control)	INT (front-panel control)
SHAPING TIME (side panel)	1.5 µs	1.5 µs
Window (internal jumper)	0 – 1 V	0 – 1 V

Controls	570 Amp (50°) LEFT	570 Amp (50°) RIGHT
FINE GAIN	1	1
COARSE GAIN	100	100
SHAPING TIME		
BLR AUTO		
PZ ADJ		
THRESH		
Input Polarity (POS/NEG)	NEG	NEG
COARSE GAIN Attenuation (internal jumper)	X0.1	X0.1

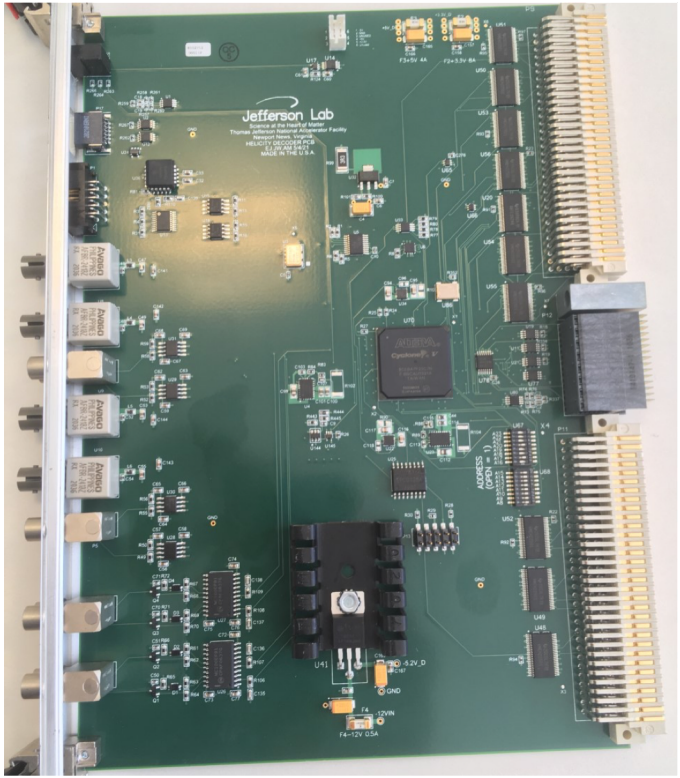
CHANNEL ASSIGNMENT – TRIGGER INTERFACE (TID)



TID Chan	INPUTS
7	
6	
5	
4	
3	
2	TS#2 (Mott DetTr)
1	
0	TRG (FADC SDC MT1)
INH	

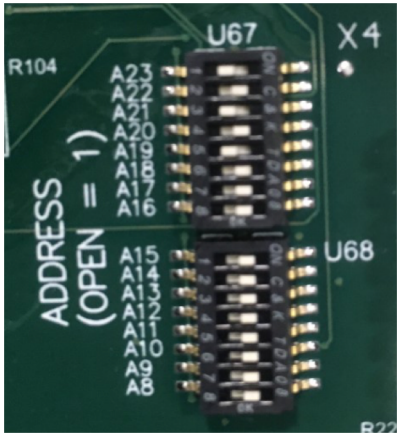
TID Chan	OUTPUTS
7 (OT#2)	SD_FP1 TRG IN
6	
5	
4	
3	
2	
1	
0	

CHANNEL ASSIGNMENT – HELICITY DECODER BOARD



Chan	INPUTS
1	
2	
3	

ADDRESS	0xA80000



Chan	OUTPUTS
1	
2	
3	

FADC

Mott

FADC Chan	Signal
1	L EFT Amp
2	RIGHT Amp
3	LEFT SCA
4	RIGHT SCA
5	
6	
7	
8	
9	
10	
11	
12	
13	Delayed Helicity
14	T_Settle
15	Pattern–Sync
16	Pair–Sync

INT

FADC Chan	Signal
1	LEFT Amp
2	RIGHT Amp
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	Delayed Helicity
14	T_Settle
15	Pattern–Sync
16	Pair–Sync

Mott NIM – QUAD FAN IN/OUT 429A

QUAD FAN IN/OUT		
		Delayed Helicity – IN
		INT FADC CH12
		Mott DADC CH12
		T_Settle – IN
	INT FADC SDC TRG IN	INT FADC CH13
	50 Ω	Mott DADC CH13
		Pattern Sync – IN
		INT FADC CH14
		Mott DADC CH14
		Pair Sync – IN
		INT FADC CH15
		Mott DADC CH15

Mott NIM – LEVEL TRANSLATOR 726

	LT			
	NIM IN	TTL/ECL OUT	NIM OUT	NIM OUT
1	Mott DetTr **(NOW a 10.13 kHz NIM Pulser)**	TID TS#2	50 Ω	SCOPE
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Mott NIM – OCTAL LOGIC UNIT PS 758

Mott NIM – QUAD FAN IN/OUT 429A

QUAD FAN IN/OUT		
		LEFT SCA – IN
		OCTAL LOGIC UNIT
		Mott DADC CH2
		RIGHT SCA – IN
		OCTAL LOGIC UNIT
		Mott DADC CH3

Data Taking Modes

Name	Readout	Output	Trigger
Mott_Sample	Mott FADC (Mode=1), INT FADC	Mott_Sample_%d.dat	Mott Detector
Mott_Int	INT FADC	Mott_Int_%d.dat	nT_Settle

VXS Crate

Mott NIM Crate