Beam Modulation Control and Hardware
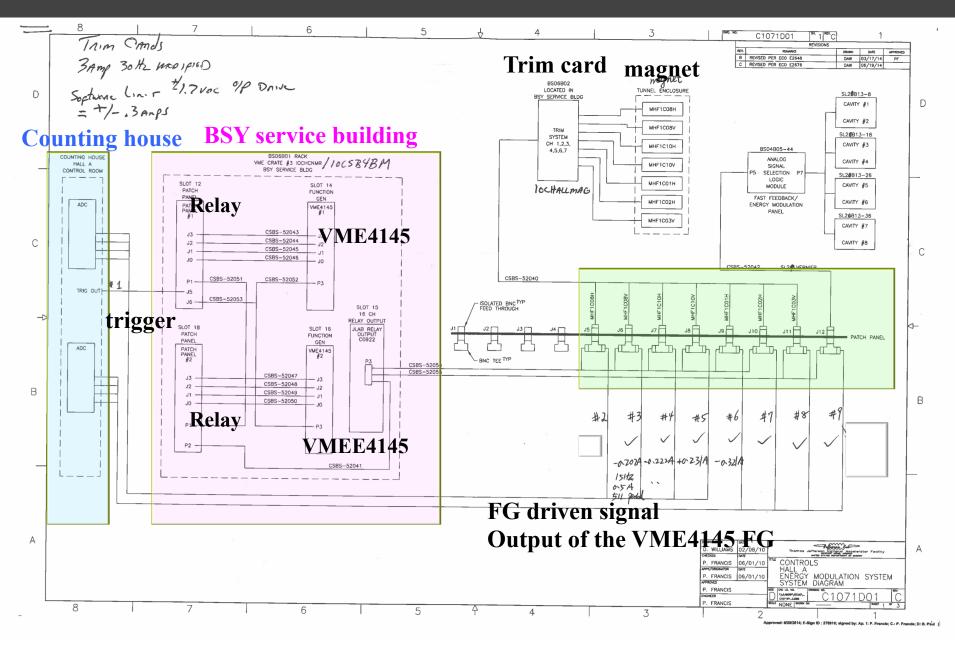
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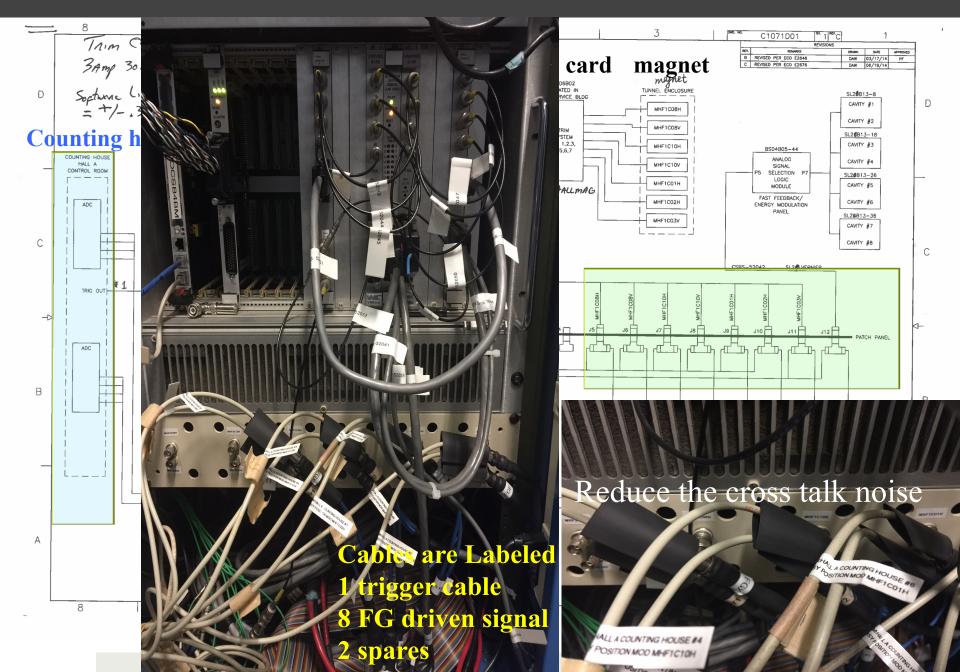
Beam Modulation Updates

- ✓ BSY service building Hall A beam modulation cables that are connected to the counting house and have been labeled. (with help from Pete)

- ✓ Trim card and corresponding wires are rechecked and the issues were solved by Pete.

- ✓ The trim card controlled modulation magnet and the corresponding feedback singles were checked with the software trigger and external trigger.

- ✓ Beam modulation CODA (run but not as expected)

VMI4145 Waveform Generator Card: BMOD1

Channel 0 — MHF1C08H

Load Waveform Data

Issue was Fixed

| 0.000 | Amplitude (Volts) |

Load Test Waveform

16.000	Frequency (Hz)
0.500	Amplitude (Amps)
511	No. Periods

Load Sine Waveform

| 2046 | Number Waveform Words Loaded |

Waveform Controls

Enter Trigger State

Software Trigger

Leave Trigger State

Expert Config

Waveform Status

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 0 Status

Channel 1 — MHF1C08V

Load Waveform Data

| 0.000 | Amplitude (Volts) |

Load Test Waveform

15.000	Frequency (Hz)
0.500	Amplitude (Amps)
511	No. Periods

Load Sine Waveform

| 2046 | Number Waveform Words Loaded |

Waveform Controls

Enter Trigger State

Software Trigger

Leave Trigger State

Expert Config

Waveform Status

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 1 Status

Channel 2 — MHF1C10H

Load Waveform Data

| 0.000 | Amplitude (Volts) |

Load Test Waveform

15.000	Frequency (Hz)
0.500	Amplitude (Amps)
511	No. Periods

Load Sine Waveform

| 2046 | Number Waveform Words Loaded |

Waveform Controls

Enter Trigger State

Software Trigger

Leave Trigger State

Expert Config

Waveform Status

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 0 Status

Channel 3 — MHF1C10V

Load Waveform Data

| 0.000 | Amplitude (Volts) |

Load Test Waveform

15.000	Frequency (Hz)
0.500	Amplitude (Amps)
511	No. Periods

Load Sine Waveform

| 2046 | Number Waveform Words Loaded |

Waveform Controls

Enter Trigger State

Software Trigger

Leave Trigger State

Expert Config

Waveform Status

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 1 Status

VMI4145 Waveform Generator Card: BMOD2

Channel 0 **MHF1C01H**	Channel 1 **MHF1C02H**	Channel 2 **MHF1C03V**	Channel 3 **SL20VERNIER**

Load Waveform Data (Channel 0)

0.000	Amplitude (Volts)

Load Test Waveform

15.000	Frequency (Hz)
0.500	Amplitude (Amps)
511	No. Periods

Load Sine Waveform

2046	Number Waveform Words Loaded

Load Waveform Data (Channel 1)

0.000	Amplitude (Volts)

Load Test Waveform

10.000	Frequency (Hz)
0.500	Amplitude (Amps)
511	No. Periods

Load Sine Waveform

2046	Number Waveform Words Loaded

Load Waveform Data (Channel 2)

0.000	Amplitude (Volts)

Load Test Waveform

15.000	Frequency (Hz)
0.500	Amplitude (Amps)
511	No. Periods

Load Sine Waveform

2046	Number Waveform Words Loaded

Load Waveform Data (Channel 3)

0.000	Amplitude (Volts)

Load Test Waveform

15.000	Frequency (Hz)
0.178	Amplitude (MeV)
511	No. Periods

Load Sine Waveform

2046	Number Waveform Words Loaded

Waveform Controls (Channel 0)

Enter Trigger State
Software Trigger
Leave Trigger State
Expert Config

Waveform Controls (Channel 1)

Enter Trigger State
Software Trigger
Leave Trigger State
Expert Config

Waveform Controls (Channel 2)

Enter Trigger State
Software Trigger
Leave Trigger State
Expert Config

Waveform Controls (Channel 3)

Enter Trigger State
Software Trigger
Leave Trigger State
Expert Config

Waveform Status (Channel 0)

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 0 Status

Waveform Status (Channel 1)

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 1 Status

Waveform Status (Channel 2)

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 0 Status

Waveform Status (Channel 3)

MODULATION OFF

OFF STATE	Wave State
0x0	VCR Register
0.000	Trigger Peak Volts Out

Update Engine Status

Channel 1 Status

FG Board Operation

States:

- **Modulation OFF** the Relays to the Trim cards will be set to ground.

- **CONFIG** can set amplitude, N periods, frequency. Relays are open.

- **Trigger** with initiate function on front panel trigger. The relay for the FG to Trim card is connected.

- **Test States**

Counting House Trigger Signal

3.7.3   **External Trigger**

Each channel has an external input for a user-supplied trigger. If the user decides on using an external trigger instead of a software trigger, the user must guarantee this trigger is within the specifications of voltage and period. It must also meet the setup and hold times specified below. See Figure 3.7.3-1.

External Trigger:
Voltage: CMOS   TTL   Compatible   (Low   <0.8   VDC, High >3.15 VDC)
tp Trigger Period: 500 nanosecond period (minimum)
ts Setup Time: >50 nanoseconds
th Hold Time: >100 nanoseconds
Trigger Latency: 300 nanoseconds
ta Clock edge to Analog value change: 200 nanoseconds (maximum)
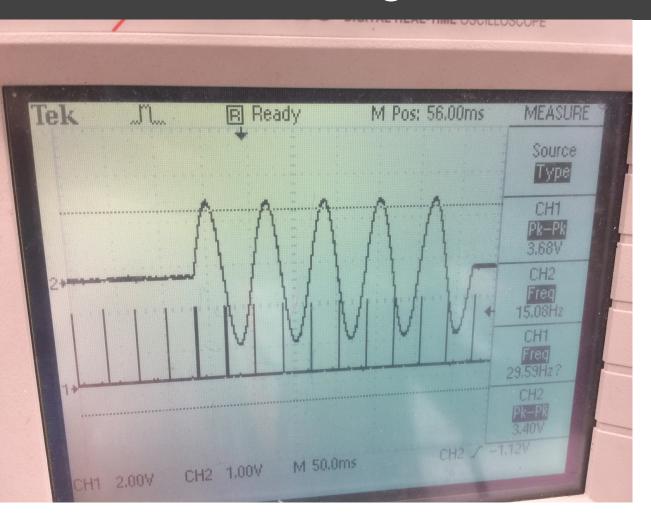
Figure 3.7.3-1 External Trigger

Trigger signal specification
Voltage: TTL
low<0.8 VDC
High>3.15 VDC
Trigger Period: 500 ns

Test TTL trigger signal: trigger formed in CH by coincidence of MPS and FlexIO signal

Feedback Signal with External Trigger

Sine Waveform:

Frequency: 15 Hz
Number of period: 5

External Trigger works !

Vxworks Script

Start supercycle ---------- complete unit of dithering: a series of up to 8 sequences
Pause FFB
 Loop over "sequence"--------single step of dithering, composed of 1 or 2 magnets
   configure first sequence
   set FG to Trigger
   request trigger
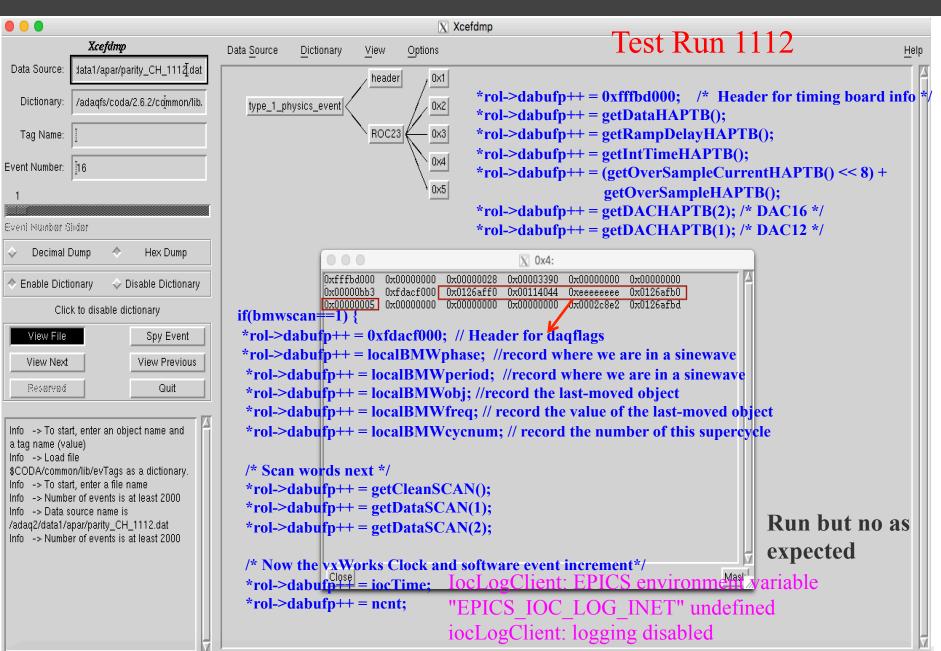   count sequence+buffer time
   set FG to CONFIG
 End loop
Count till next supercycle

Words in data stream
- 8 channels of FG readout
- Bmw_cycle (arbitrary cycle count, usefu for indexing)
- Bmw_object (which sequence number is running)
- Bmw_active (Vxwork script thinks this sequence is stll active)

CODA Status for the Beam Modulation

Test Run 1112

rol->dabufp++ = 0xfffbd000;   / Header for timing board info */
*rol->dabufp++ = getDataHAPTB();
*rol->dabufp++ = getRampDelayHAPTB();
*rol->dabufp++ = getIntTimeHAPTB();
*rol->dabufp++ = (getOverSampleCurrentHAPTB() << 8) +
                        getOverSampleHAPTB();
rol->dabufp++ = getDACHAPTB(2); / DAC16 */
rol->dabufp++ = getDACHAPTB(1); / DAC12 */

if(bmwscan==1) {
*rol->dabufp++ = 0xfdacf000; // Header for daqflags
*rol->dabufp++ = localBMWphase; //record where we are in a sinewave
 *rol->dabufp++ = localBMWperiod; //record where we are in a sinewave
 *rol->dabufp++ = localBMWobj; //record the last-moved object
 *rol->dabufp++ = localBMWfreq; // record the value of the last-moved object
 *rol->dabufp++ = localBMWcycnum; // record the number of this supercycle

/* Scan words next */
*rol->dabufp++ = getCleanSCAN();
*rol->dabufp++ = getDataSCAN(1);
*rol->dabufp++ = getDataSCAN(2);

/* Now the vxWorks Clock and software event increment*/
*rol->dabufp++ = iocTime;
*rol->dabufp++ = ncnt;

Run but no as expected

IocLogClient: EPICS environment variable
"EPICS_IOC_LOG_INET" undefined
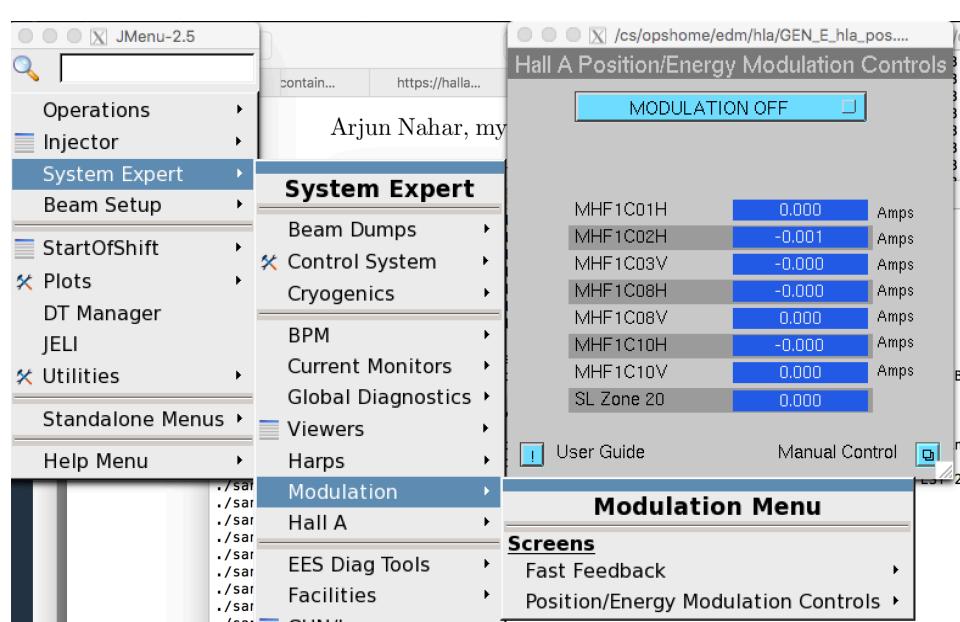iocLogClient: logging disabled

To-do List

➢ Connect the FG feedback signals to V2F/scalars.

➢ Debug bmwClient.C

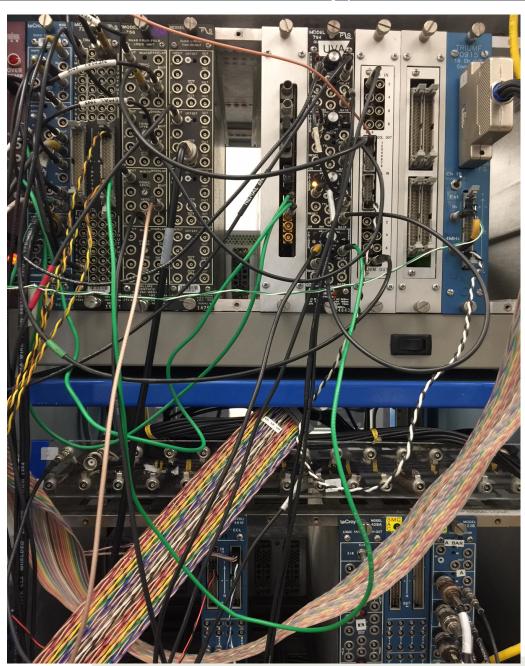➢ Run CODA to test BMW process during the APEX is safe

Any comments and suggestions ?

Back Up

Call MCC to access I0CSB4BM and I0CHCNmR

trigger formed in CH by coincidence of MPS and FlexIO signal