Hall C Reference

HMS Drift Chamber HV and Signal Connections

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Abstract

This documents the signal ribbon cable and high voltage cable routing on the HMS drift chambers and the HMS drift chamber TDC's.

1 Related *Howtos*

The following Hall-C *Howto* documents may be helpful. User Level Documents-

- Monitoring HMS "Utilities" Systems [1]
- Base Equipment Checklist [2]
- High Voltage System Use and Reconfiguration [3]
- Operating the HMS Shield House Door [4]
- Operating the HMS Vacuum Window Shutter [5]

Expert Level Documents-

- Starting Up and Shutting Down the HMS Detectors [**?**]
- Drift Chamber Gas System [6]
- Operating the Hall-C Flammable Gas Leak Detector System [7]

Reference Documents-

- HMS Nominal Settings: Voltages, Currents, Flows, etc. [8]

2 HV and Signal Cables on the Chambers

The two HMS drift chambers are essentially identical. A number of preamplifier cards read out the six planes of signal wires in each chamber. The wire orientatation and layer order is shown in Fig. 2. The preamps are a mix of Nanometrics and LeCroy cards which function similarly. If it is necessary to exchange preamps you do not need to be concerned about which type of preamp you install. Ribbon cables run from the preamps to the inputs of TDCs. The TDCs are in a FASTBUS crate inside the HMS shield house.

Threshold voltages for the preamp cards (actually they are preamp / discriminator cards) are normally supplied from a power supply in the counting room. Each chamber has its own threshold supply. There are also threshold supplies in two aluminum boxes on the frame underneath the HMS detector stack. These supplies allow local control of the threshold voltages and are only for use by experts when debugging the drift chamber electronics. These boxes have a local / remote switch that should remain in the 'remote' position under normal conditions.

Each signal plane is served by three independent high-voltage supplies. They are called 'circle', 'square', and 'triangle'. Each sense wire is located at the center of a rectangular cell with the sides and corners of the cell defined by field or cathode wires held at one of these potentials. Fig. 2 shows the arrangement of wires and voltages. In addition, each drift chamber box has two 'guard' planes as the most upstream and downstream layers. Thus there are 6*3 + 2 = 20 high-voltage channels for each drift chamber box.

As viewed from the target, the preamplifier cards are located along the top and right sides of each box. The high-voltage connections are on the lower left side and the left bottom side. Labels on the chamber indicate the funtion of each connector. Some of the labels are difficult to find or read, but at present they are the only 'documentation' we have about which connections should go where.

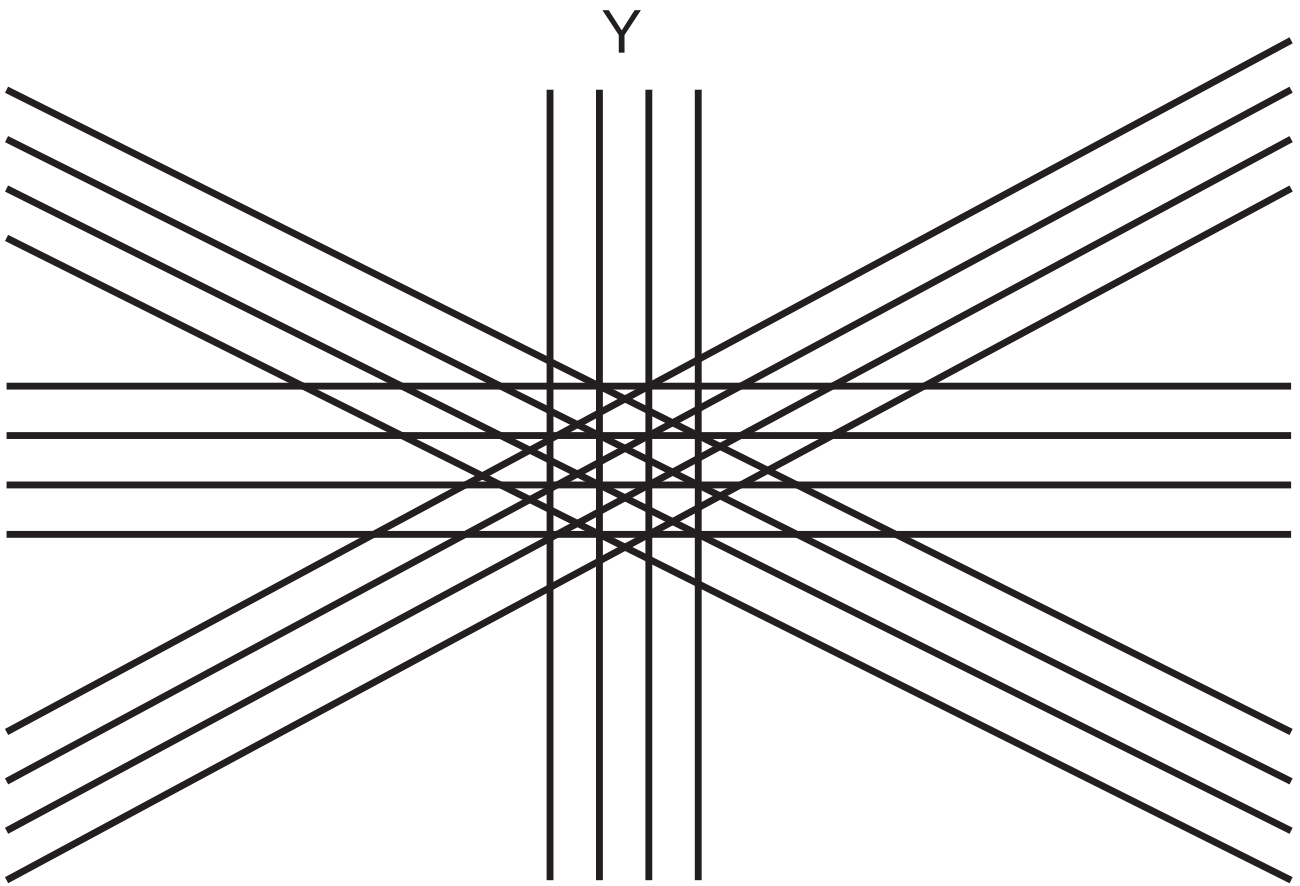
3 Preamp Low Voltage

Preamplifier power and threshold are distributed over the chamber via traces on the printed-circuit board into which the preamps are plugged. The preamp power is supplied by two Acopian power supplies (+5V and -5V) mounted in the rack under / behind the detector stack. The LeCroy preamp cards have red and green LEDs which can be used as a visual confirmation that the low-voltage power is turned on. The $\pm$5V power is connected through a distribution box near the

Acopian supplies. This box contains fuses for each power circuit. Spare fuses should be available in the toolbox that resides in the shield house.

4 TDC Signal Map

The signals from the HMS drift chambers are carried over twisted-pair ribbon cables to the inputs of the TDC's in the FASTBUS crate inside the shield house. The signal wires going to each TDC channel are as shown if Fig. 4.



FROM TARGET

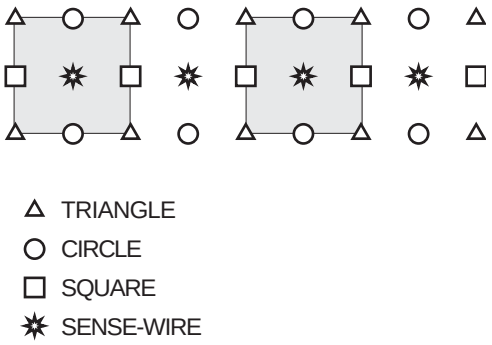


Figure 2: HMS Drift Chamber Cell Configuration. The electric field within a drift cell is defined by the voltages on the 'CIRCLE', 'SQUARE', and 'TRIANGLE' wires, with the sense wire at ground.

HMS FASTBUS CRATE TDC MAP -- AFTER DC2 RECABLING. VALID FEB. 1, 1999

Slot	0-15	16-31	32-47	48-63	64-79	80-95
25						
24						
23						
22	X'17-X'32	X'33-X'48	X'49-X'64	X'65-X'80	X'81-X'96	X'97-X'112
21	V92-V107	Y'1-Y'13 #,#,#	Y'14-Y'28 ###	Y'27-Y'39 ###	#, Y'40-Y'52 ###	X'1-X'16
20						
19	X'113, # V1-V14	V15-V29 #	V30-V45	V46-V60 #	V61-V76	V77-V91 #
18	U15-U29 #	U30-U45	U46-U60 #	U61-U76	U77-U91 #	U92-U107
17						
16	X97-X112	Y1-Y13 #,#,#	Y14-Y28 #,#,#	Y27-Y39 #,#,#	Y40-Y52 #,#,#	X113, # & U1-U14
15	X1-X16	X17-X32	X33-X48	X49-X64	X65-X80	X81-X96
14						
13						
12						
11						
10						
9	X'81-X'96	U77-U91,#	X'113,#, V1-V14	X1-X16	X'97-X'112	U92-U107
8	U46-U60,#	X33-X48	X'65-X'80	U61-U76	V15-V29,#	X17-X32
7						
6	X'33-X'48	U30-U45	V46-V60,#	X49-X64	X'49-X'64	V30-V45
5	V77-V91,#	X81-X96	X'17-X'32	U15-U29,#	V61-V76	X65-X80
4						
3	Y40-Y52	Y'1-Y'13, #,#,#	V92-V107	X97-X112	X'1-X'16	X113, U1 - U14
2	Y1-Y13	Y'40-Y'52 #,#,#	Y14-Y28	Y'27-Y'39 #,#,#	Y27-Y39	Y'14-Y'28 #,#,#
1						
0						

Figure 3: HMS Drift Chamber TDC Channel Assignments.

References

[1] H. Fenker. Monitoring hms "utilities" systems. http://hallcweb.jlab.org/document/howtos/PDF/hms_detector_monitoring.pdf. Hall C User Howto.

[2] Written by Staff and Users of Hall C. Hall-c base equipment checklist. http://hallcweb.jlab.org/document/howtos/PDF/base_equip_checklist.pdf. Hall C User Howto.

[3] S. A. Wood. Operation of the caen high voltage system. http://hallcweb.jlab.org/document/howtos/PDF/CAEN_HV_operation.pdf. Hall C User Howto.

[4] H. Fenker. Operating the hms shield house door. http://hallcweb.jlab.org/document/howtos/PDF/open_hms_door.pdf. Hall C User Howto.

[5] H. Fenker. Operating the hms vacuum window shutter. http://hallcweb.jlab.org/document/howtos/PDF/open_hms_shutter.pdf. Hall C User Howto.

[6] H. Fenker. Drift chamber gas system operation. http://hallcweb.jlab.org/document/howtos/PDF/drift_gas_system.pdf. Hall C Expert Howto.

[7] H. Fenker. Drift chamber flammable gas leak detectors. http://hallcweb.jlab.org/document/howtos/PDF/flam_gas_sensors.pdf. Hall C User Howto.

[8] H. Fenker. Hms nominal settings: Voltages, currents, flows, etc. http://hallcweb.jlab.org/document/howtos/PDF/hms_nominals.pdf. Hall C Reference.