The CDC High-Voltage Board

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Abstract

This document will describe the CDC on-chamber high-voltage board. The purpose of this board is to connect the wires in the CDC to high voltage and to couple the signals coming off these wire to the preamplifier. The preamplifier is designed to be monuted to the high-voltage board. It is also anticpated that the board will provide strain-relief for the signal cables going from the preamplifiers to the Flash ADC system.

Introduction

The purpose of the High-Voltage board (HVB) is to connect high-voltage to the wires in the Central Drift Chamber (CDC) and to couple the signals from those wires to the preamplifier cards which are mounted to the HVBs. In doing this, there are several functions that the board performs. First, it is a low pass filter on the high-voltage input to remove ripples from the line. Second, it needs to limit sudden large currents in the case of a chamber wire breaking and shorting the high-voltage to ground. Finally, it has high-pass filter which is used to capacitively couple the signal wires to the preamplifer cards. This document is quite similar to the one for the FDC [1] and many of the calculations done there are repeated in this document.

The High-Voltage Board

The HVB for the CDC is shown in Figure 1. Because all the elctronics on the CDC is on one end of the chamber, this board has to serve two purposes. First, it needs to connect the high voltage (HV) to the wire in the straw tube (connection wire). It also has a connection for the shield around the connecting wire (shield). The resistors R_1 and R_2 serve as current limiting resistors to protect the system from shorts on the chamber wires. They also serve as part of a low-pass filter built with R_1–C_1 and $R_2 - -C_2$ which remove high-frequency noise coming from the high-voltage power supply. Caparcitor C_3 serves as a blocking capactior to

isolate the input of the preamp from the high voltgage. It is also part of a high-pass filter built using R_3 and C_3 which passes the signals observed on the wire to the preamp.

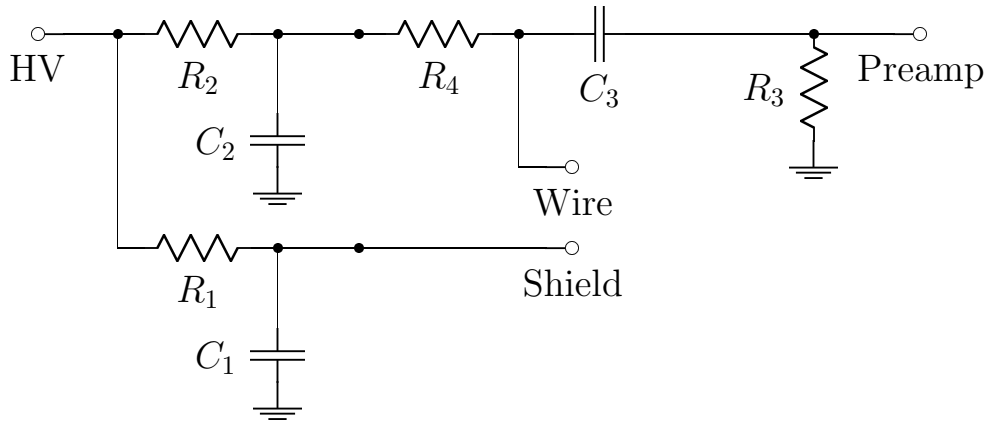

Figure 1: The CDC High-Voltage Distribution Board. R_1, R_2 and R_4 are all $1\,M\Omega$ while R_3 is $280\,k\Omega$. In the board that is currently at CMU, C_1, C_2 and C_3 are all $330\,pF$ $(3\,kV)$ capacitors. In the board that was sent to Indiana, they are $33\,pF$.

Mounting the HVB

The HVB is mounted on the outside of the up-stream gas plenum of the CDC. There are small stand-offs which attach it to the gas plenum. Each board is connected to 24 wires on the CDC which are fed through the plenum in groups of 12 wires. There are options on the board to connect the shield either to high-voltage or to ground. These boards are mounted normal to the surface of the plenum, causing them to stick from the end of the chamber. The preamp cards are then attached to the HVB and finally the signal cable coming off the preamp has strain-relief provided by the HVB.

References

[1] Dan Carman, **FDC On-Chamber Electronics**, GlueX-doc-753, February 2007.

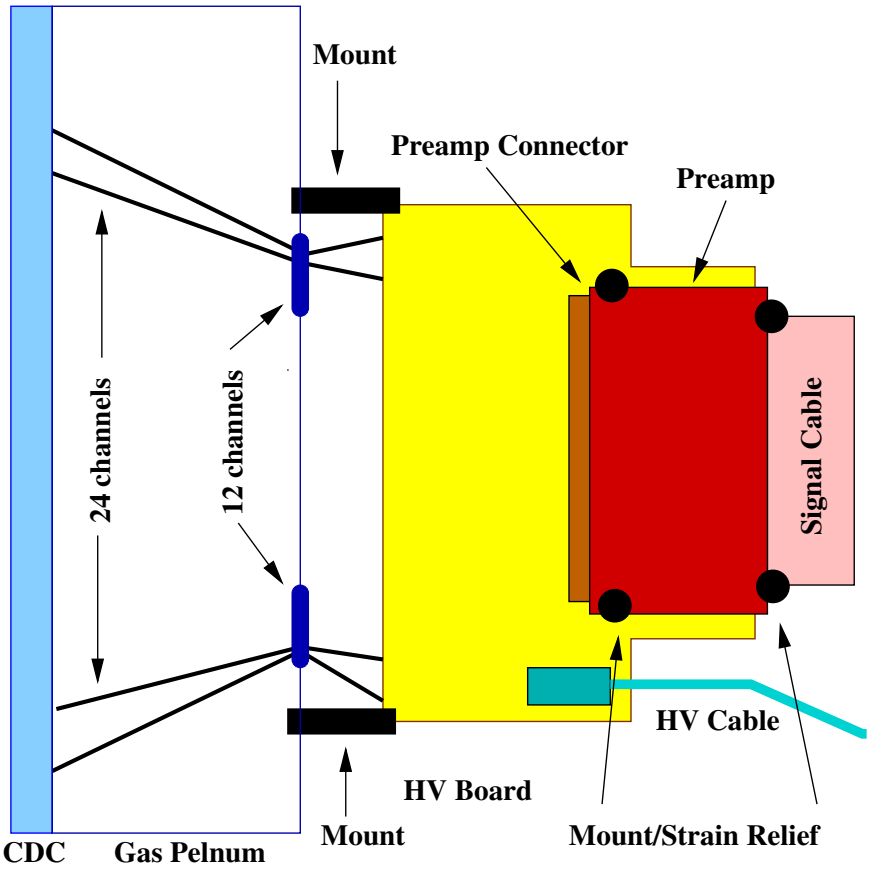

Figure 2: A schematic drawing of how the high-voltgage and preamp boards are mounted to the CDC. The HV boards are crewed onto the plastic gas plenum of the CDC. Each care connects to 24 channels of the CDC which are fed through two gas feed throughs as shown. The preamp mounts to the HV board and the signal cables then come off the preamp. It is assumed that the preamp will be attached to the high-voltage board and there will be strain-relief for the signal cable on the high-voltage board.