

Documentation for the Hadron and Muon Monitors:

ChannelMapping.pdf - There are several different indices for the hadron and muon monitor electronics and physical chamber locations, i.e. Channel (software and hardware), Row, Column, Pixel, SWIC plane (V or H), SWIC wire (1-96), Acnet Index (104-199), Tube (muon monitors only), and Used vs Unused Channels. This document describes in detail the mapping of all of these labels to one another.

DeadChannels.pdf - This file shows the physical location and software channel of any dead chambers of the hadron and muon monitors. It contains the date that it was last updated. It requires another update since I recently discovered that there appears to be another dead chamber in Muon Monitor 1.

HadMuMonACNETDevices.pdf - The daq for the hadron and muon monitors and all related devices, e.g. pressure sensors, etc, is read out through ACNET. This document describes in detail, all of the existing devices, their trigger settings and any corrections that are applied to a device.

HadMuMonHighVoltage.pdf - This document describes in detail, both pictorially and in words how to reset/turn on the hadron and muon monitor high voltage. In describing this it also documents the number of HV channels that exist for each monitor and which monitor chambers each HV channel is physically connected to.

HadMuMonSWICSCANNERS.pdf - The DAQ for the hadron and muon monitors are SWIC Scanners (i.e. they are Fermilab designed to read out SWIC devices but have been modified to read out each chamber of each hadron and muon monitor). The SWICS are all connected through the Front End Electronics. This document describes pictorially and in words how to reset the scanners if necessary and also provides information about trigger settings.

HadMuMonSignalDiagnostics.pdf - This document is a guide for analysing the total signal from the hadron and muon monitors. It focuses primarily on helium gas contamination, pictorially describing how to recognise gas contamination and the reasons for such contamination. It also briefly describes Horn Current Scans; how to visually analyse them and also provides the typical Signal in each monitor for each beam configuration. This is helpful in diagnosing problems with the horn, e.g. if the beam is in LE010z185i but the muon monitor signals are closer to that of 0kA, then there is potentially a problem with the horn(s).

References : Mostly hardware references, but also discussion of signal performance. However, some of this information is out dated, please refer to the above documents for more up-to-date information on the hardware/electronics and Minerva-doc-6944 for more up-to-date information on signal response/analysis.

1. Robert Miles Zwaska, "Accelerator systems and instrumentation for the NuMI neutrino beam", Ph.D. Thesis, The University of Texas at Austin, 2005. Fermilab Thesis Server
2. Dharmaraj Indurthy, "Secondary beam monitors for the NuMI facility at FNAL", Masters Thesis, The University of Texas at Austin, 2006. UT Austin Library
3. Kopp, S. et. al., "Secondary beam monitors for the NuMI facility at FNAL", Nucl. Instrum. Meth., A 568, 503-519, 2006. Also on the Fermilab Publication Server.
4. Zwaska, R. et. al., "Beam-based alignment of the NuMI target station components at FNAL", Nucl. Instrum. Meth. A 568, 548-560, 2006. Also on the Fermilab Publication Server.
5. Zwaska, Robert M. et al., "Operation of the NuMI beam monitoring system", AIP Conf. Proc., 868, 558-565, 2006. Fermilab Publication Server
6. http://www.hep.utexas.edu/wiki/NuMI_Hadron_and_Muon_Monitors