Abstract
This manual describes how to operate the Caen High Voltage system in Hall-C from both the front panel and from the GUI.

1 Related Howtos

The following Hall-C Howto documents may be helpful.
User Level Documents-
  - Monitoring SHMS “Utilities” Systems [?] 
  - Monitoring HMS “Utilities” Systems [1]
  - Base Equipment Checklist [2]
Expert Level Documents-
  - Starting Up and Shutting Down the SHMS Detectors [?] 
  - Starting Up and Shutting Down the HMS Detectors [?] 
  - Operating the Hall-C Flammable Gas Leak Detector System [3]
Reference Documents-
  - Detector Signal and High Voltage Cable Map [4]
  - SHMS Drift Chamber High Voltage and Signal Connections [5]
  - HMS Drift Chamber High Voltage and Signal Connections [?] 
  - SHMS Nominal Settings: Voltages, Currents, Flows, etc. [?] 
  - HMS Nominal Settings: Voltages, Currents, Flows, etc. [6]
2 Normal HV Operation - using the Graphical User Interface

2.1 Starting the Control Screens

The detector High Voltages are controlled from the cvxwrks account of any counting house machine running RHEL 6 or later.

1. Open an terminal window.

2. Execute one of the following commands:

   (a) cd $EPICSHL/HV/shms_all # All SHMS detectors
   (b) cd $EPICSHL/HV/shms_cal # SHMS Lead Glass Calorimeter
   (c) cd $EPICSHL/HV/shms_cer # SHMS Cerenkov detectors
   (d) cd $EPICSHL/HV/shms_dc # SHMS drift chambers
   (e) cd $EPICSHL/HV/shms_hodo # SHMS hodoscope
   (f) cd $EPICSHL/HV/hms_all # All HMS detectors
   (g) cd $EPICSHL/HV/hms_cal # HMS Lead Glass Calorimeter
   (h) cd $EPICSHL/HV/hms_cer # HMS Cerenkov detectors
   (i) cd $EPICSHL/HV/hms_dc # HMS drift chambers
   (j) cd $EPICSHL/HV/hms_hodo # HMS hodoscope

3. ./hv.tcl

4. After several seconds the GUI screen will be displayed.

2.2 Operation

The operation of the HMS and SHMS HV screens is menu driven. The main GUI window includes a pair of histogram-style charts, with each bar indicating the readback voltage or current for a channel. It also provides drop-down menus and two control buttons.

To turn on or modify the high voltage, use the “Group” menu to pull up a control screen for the desired detector subsystem. A global ON option exists for
Figure 1: A snapshot of the SHMS Main High-voltage GUI Screen

each “group”. Turning on the high voltage will set the voltage last stored in the Caen High Voltage mainframes. If these voltages are incorrect, they can be set with the group screens, or the restore menu item on the main screen may be used to retrieve a previous set of high voltage settings. To set a new operating voltage, click the cursor in the Vset box of the appropriate channel and change the entry to the desired setpoint. Be certain to press Enter while the cursor is still in the box in order to actually enter the new voltage. Similar changes may be made to the trip current (Itrip), maximum allowed voltage (Vmax), and the Ramp-Up and Ramp-Down rates (Volts per second).

2.2.1 GUI Menu Items

- File
  - Backup Initiates a Backup of the current settings
  - Restore Starts a Restore of saved settings.
  - Quit Terminates the GUI

- Command
  - Trip RESET Resets all Tripped channels. Use freely.
– **IDLE** Stops the GUI’s communication with the HV supplies (Not currently implemented)
– **unIDLE** Restarts the communication with power supplies (Not currently implemented)
– **IDLE** beep ON/OFF Start/Stop audible IDLE warning (Not currently implemented)
– **TRIP** beep ON/OFF Start/Stop audible TRIP warning (Not currently implemented)

- **Group**
  – One entry for each detector group presently defined. Select the one you want to manipulate.

### 2.2.2 GUI Buttons

- **TURN ALL HV OFF** Turn off all high voltage channels
- **TURN ALL HV ON** Turn on all high voltage channels

### 2.3 Monitoring the Status and Resetting Trips

The column labeled “Vset” contains the setpoint for the voltage, and the column labeled “Vmon” contains the actual voltage as read back from the power supply. The “Imon” column contains the current drawn by the channel. The “Status” column shows whether the channel voltage is actually set or not. Occasionally a channel may trip off for some reason. This is indicated by the word “Tripped” in the Status column. To correct this, select **Trip Reset** under the **Command** menu.

**The alarm and tripped channel notification is not currently implemented**

The GUI includes a system to automatically monitor the status of all channels. When not silenced, an audible alarm will sound if any of the high voltage channels is found with a voltage far away from its setpoint. **This alarm feature should never be silenced unless an operator is manually monitoring the high voltages!** The yellow button on the GUI should always read **Silence**, indicating that the silence function has not been selected. Channels which are in alarm state are listed on the bottom line of the main GUI window. They are identified in the format `hv_CR_CH`, where `CR` is the Caen crate number and `CH` is the high voltage channel number. If necessary to identify the bad channel(s), you can refer to the auto-
matically generated high voltage map files $EPICSHL/HV/shms_all/channel_map and $EPICSHL/HV/hms_all/channel_map discussed in references [4].

2.4 Backup and Restore

If permanent changes are made to the high voltages, these new settings should be saved with the **Backup** menu item. Similarly, you can **Restore** setpoints that have previously been backed up.

3 Non EPICS operation of High Voltage Power Supplies

The CAEN High Voltage system for the HMS and SHMS consists of set of CAEN SY403 and newer CAEN SY4527 mainframes. The HMS is supplied by 5 SY403 units (crates 1-5) located in rack CH03B17 in the electronics room of the counting house. The SHMS is supplied by 2 SY403 units (crates 11 and 12) located in rack CH03B16 and 2 SY4527 units, crate 13 which is also in rack CH03B17 and crate 14 which is located in rack CH03C02 in the Hall C room (200A) on the second floor of the counting house.

3.1 SY403 Alternate Control

These power supplies may be controlled through a variety of methods other than EPICS. While EPICS control is preferred these other methods may be used for setup, diagnostics and testing of a detector system prior to running, or in cases when the EPICS control system is not working or configured properly.

The SY403 mainframes may be controlled through the front panel. Front panel control is required to set the crate number and RS232 configuration (should be 9600 baud, no parity, 1 stop bit.). Channels may be turned on and off and voltages set through this panel. Use the arrow and menu buttons to get the desired channel on the LCD display, then use the arrow buttons to select the parameter you wish to change. Use the **Modify** and **Change** menu items to initiate the change; use arrows or numeric keypad to set the new value. To turn a channel **ON**, for example, display the channel, move the cursor over the word **OFF**, and press **MODIFY**. For further information consult an experienced person or review Chapter 4 of the Caen Technical Information Manual [7].
The SY403 may also be controlled through its RS232 interface. Move the RS232 cable to the the mainframe you wish to control and connect with `telnet hctsv4 2008`. After connecting type Enter to bring up the menu. The command `D` will bring up a page allowing HV channels to be set.

### 3.2 SY4527 Alternate Control

The SY4527 mainframes do not have front panel control, except for interlock configuration and overall on/off. These mainframes may be controlled with CAEN’s GECO (GEneral COntrol system). To bring up GECO, type `hvcaen` to bring up the connection screen (Fig. 2). Enter the correct IP address (129.57.168.93 for crate 13 and 129.57.168.94 for crate 14), `cvxwrks` for the username and the password (same as used for the `cvxwrks` account on counting house computers.). All HV channels can be controlled through GECO. GECO is also required to reset trip alarms.

![GECO connection screen](image)

Figure 2: GECO connection screen

### 4 Outside Influences

Each Caen mainframe has an *Interlock* input on the front panel which may be used to disable high voltage output unless desired external conditions are satisfied. The interlocks may be based on gas flow to the drift chambers or on other conditions as...
configured by the current experiment. If you discover that you cannot get certain high voltage channels to come up, try to find out if they are interlocked.

5 Moving a PMT to a different HV channel

In the event that a HV channel goes bad, the PMT that it is hooked to can be connected to a spare HV channel.

- The HV power supply channel should be changed by moving the cable coming from the PMT to a spare channel at the patch panel in the detector hut for the HMS and the electronics hut for the SHMS. If it is urgent and the Hall is not accessible, the PMT to can be assigned to a new channel by moving cable at the power supply.
- Be careful that tubes requiring negative high voltage are only connected to negative power supply channels and that tubes requiring positive high voltage are only connected to positive power supply channels.
- Thoroughly document the cabling change in the Hall C electronics logbook.
- Update the EPICS HV GUI as described below.

To reconfigure the GUI to adjust for the cabling change, follow this procedure:

- Go to the appropriate directory for the detector being re-cabled. E.g. $EPICSHL/HV/hms_hodo for the HMS hodoscope, $EPICSHL/HV/shms_cer for an SHMS Cerenkov detector.
- Edit the crate, slot and channel information for the given PMT in the file HV.hvc.
- Run the make command.
- Watch for errors indicating an HV channel has been assigned to multiple PMTs
- Go to the “all” directory for the given spectrometer, e.g. $EPICSHL/HV/hms_all for the HMS and $EPICSHL/HV/shms_all for the SHM.
- Run the make command.
• Again watch for duplicate channel errors.
• Restart the appropriate GUIs
• Include the fact that the GUI configuration was edited in the logbook entry.

References

Hall C User Howto.

Hall C User Howto.

Hall C User Howto.

Hall C Reference.

Hall C Reference.

Hall C Reference.

Describes firmware version 1.45.