HPS Slow Controls Operational Manual v0.2

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1 Contacts

Slow controls cell phone (757) 748-6922.

The people listed in Table 1 should be called whenever there is a problem beyond the on-hand expertise. The slow controls expert is the main source for help.

Who	Expertise	Cell phone	Office	Home
Nathan Baltzel	Slow controls		5902	
Wesley Moore	Slow controls		6033	

Table 1: The slow controls call list.

2 Basics

The HPS slow controls framework is based on the system developed and used by the CLAS collaboration during Jefferson Laboratory's 6 GeV operations. The basic framework of the controls system is EPICS. The display management is using the MEDM EPICS extension package, while the EPICS Alarm Handler (ALH) package is used for alarm notifications. The stipcharts are displayed using StripTool EPICS extension package.

3 Control screens

The control screens for the HPS experiment can be brought up by typing "hps_epics" on the command line on the *clonpc* desktop computers in the Hall B counting house. This will launch a process using the MEDM executable and will start the main control screen such as shown in Fig. 1 that allows one to bring up other control screen for different HPS subsystems. Each button on the main control screen will launch another window which either will have a set of buttons to pop GUI-s for subsystems or will itself be a control screen for some

particular HPS component. In order to close a window one simply needs to click the X-button in the upper corner of the window. This will close that particular control screen but will not end the MEDM session. To close the MEDM session one needs to find the the X-window called "medm" and select *File→Exit* which will stop that particular instance of MEDM. To find the main MEDM window one needs to right-click on one of the MEDM screens and select *Main MEDM Window* menu item.

If there is an instance of MEDM already running on the desktop but the main HPS start-up screen window cannot be found it would be more desirable not to start another instance but to open the window within the existing MEDM session. To open the new startup window, find the main MEDM window and select the *File→Open* menu of that window to open the file called *hps_epics.adl*. This should bring up the main startup GUI with the buttons for the daughter subsystem screens.

4 Stripcharts

HPS uses StripTool extension package to view the stripcharts of the EPICS variables online, see an example in Fig. 2. The program allows one to create a file describing which EPICS variables need to be plotted. Then one can open the desired file by selecting one of the previously configured StripTool files. In order to open one of the preconfigured stripcharts for HPS one needs to open the main control screen using instructions in Section 3. If there is already an MEDM session with the main HPS control screen, there is no need to open a new one. On the main control screen find the menu button labeled "StripTool/MyaViewer" and select "StripTool" option, and then click on one of the menu buttons to select the desired strip charts.

One can also start a StripTool instance from a command line by typing *StripTool* at the Unix prompt. StripTool allows the user to create new stripchart on the fly or to add more EPICS variables to the existing stipcharts by right-clicking on the plotting area of the stripchart and selecting "Configure Menu". This should allow one to configure the properties of the stripchart, such as the axis limits, autoscrolling enable/disable, colors et.

5 MYA Archiver

The archiving of the HPS EPICS (http://www.aps.anl.gov/epics/) variables is done using MYA archiver developed and maintained by the controls group of the accelerator divisions. The EPICS variables for the HPS experiment will be kept in the MYA groups that start with "HB_". The archived data from MYA cannot be displayed using the StripTool utility, but there is a dedicated graphical tool for displaying the history of the archived process variables called MyaViewer. This tool can be started from the main HPS EPICS screen by finding the menu button labeled "StripTool/MyaViewer" and selecting "MyaViewer" op-

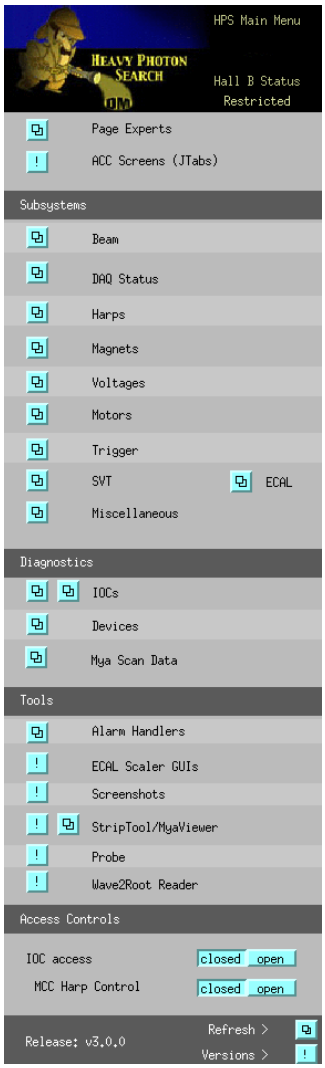

Figure 1: The main HPS EPICS startup screen.

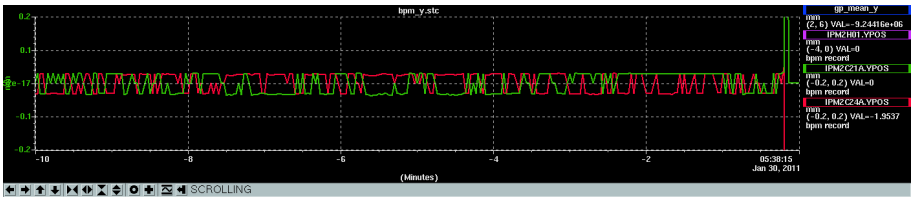

Figure 2: An example StripTool chart displaying the time history of the y-position of the electron beam in Hall B.

tion. MyaViewer utility can also be started from the command line by typing at Unix prompt *MyaViewer*. In order to view the history of an EPICS variables in MyaViewer one needs to:

1. Determine the name(s) of the EPICS variables that one wants to view. A convenient way of determining the variable name if the variable is present in an MEDM screens is to right-click on the screen where that variable is displayed, select *PV Info* menu item, point the white dot to the widget for that variable and left-click on it. The variable name will be shown above the line of "=" symbols.

2. Setup the axes and traces on MyaViewer to view the history of desired EPICS variables. For instructions how to use MyaViewer please refer to the MyaViwer User's Guide at
http://devweb.acc.jlab.org/controls_web/certified/MyaViewer/doc/myaviewer_ug.pdf
.

One can also have the history of a given EPICS variable or time slice tables be printed on the screen using command line tools like *myget*, *myData*, *mySampler*. There is also a command line tool called *myStats* that allows one to compute and printout the statistics on EPICS channel history stored in the MYA archiver. Please refer to the MYA official web page at
http://devweb.acc.jlab.org/controls_web/certified/mya/ .

6 Alarms

The EPICS alarm system is based on Alarm Handler (ALH) extension package widely used at Jefferson Lab. The Alarm Handler display for each subsystem consists of two types of windows, a runtime window shown in Fig. 3 and a main window shown in Fig. 4. While the Alarm Handler is executing, the runtime window is always displayed. The runtime window is a small icon-like window that contains a single button containing the name of the alarm configuration root alarm group. The color of this button is used to show the highest alarm severity of any outstanding alarms. Beeping and blinking of the button is used to show the presence of unacknowledged alarms. Pressing the runtime window button will open the Alarm Handler main window or, if already open, bring the main window to the top of the window stack. The Close or Quit item on the window manager menu allows the user to exit the Alarm Handler.

The Alarm Handler main window is divided into three parts: a menu bar, an alarm configuration display area, and a message area. The alarm configuration display area is divided into two major parts: an alarm configuration tree structure display and an alarm group contents display. The current alarm configuration tree structure appears in the first area, and a list of the contents of the currently selected alarm group from the alarm configuration tree structure appears in the second area. Color is used to show alarm severity. A single character severity code is also provided for an operator with a monochrome display.

Figure 3: An example of EPICS Alarm Handler's runtime window for the SVT detector subsystem.

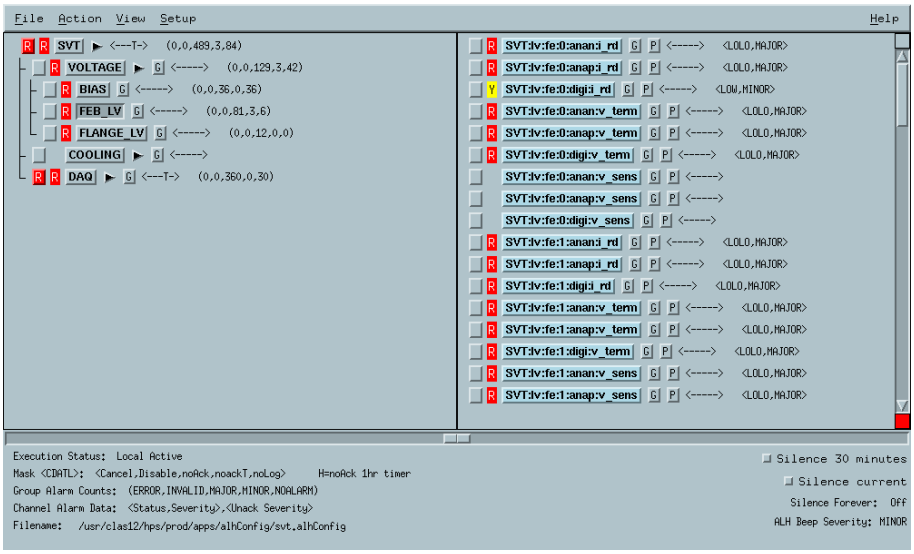

Figure 4: An example of EPICS Alarm Handler's main window for the SVT detector subsystem.

The message area displays the name of the current configuration file and has indicators to show definitions of the summary alarms fields for the currently open alarm configuration file.

Alarm Tree view allows one to browse the alarm hierarchy tree to find the variables that are in alarming state. Each node on the alarm tree may have a button for information and guidance, and for performing an action, for instance opening a related MEDM window. The shift personnel needs to read all information items marked by "G" on the left side to get more information about the event and to get guidance on the possible actions required to solve the problem. The related action button is marked with a "P" character.

To start the alarm handler for a particular HPS subsystem one needs to :

1. login to one of the *clonpc* console machines in the Hall B counting house,
2. if there is a MEDM session with main EPICS GUI running on that computer then skip to Item 4 of this list,
3. at the Linux prompt type *hps_epics.adl*. This will bring up a start-up screen described in Sec. 3,

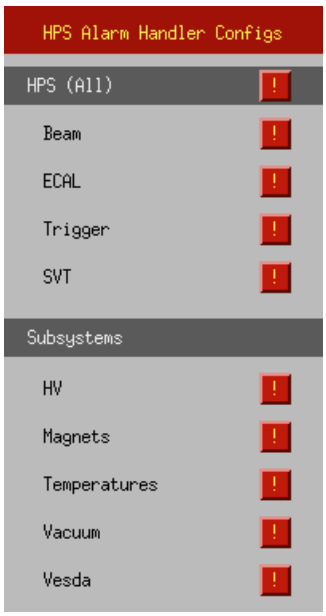

Figure 5: Hall B controls screen for launching alarm handlers for individual subsystems.

4. click on the button with **Alarm Handlers** label. This will open another panel with red square buttons, see Fig. 5.

5. click on the red square action button next to the subsystem for which one wants to launch the alarm handler. This will launch an instance of the ALH and the runtime window will show up on the screen.

Shift personnel should take actions suggested by the information buttons and after that should acknowledge the alarm by clicking the appropriate acknowledge button on the left side of the alarming group name or the alarming variables name. That should change the color of the acknowledgment button but may leave the color coded severity status present until the alarming condition goes away. If the same EPICS variable alarms again, the acknowledge button color and the severity status character will show up, in which case the shift personnel should repeat the actions suggested by the guidance unless the information screen explicitly suggest different set of action for repeated alarms.

For more information about the EPICS Alarm Handler please refer to the Alarm Handler User's Guide at
http://www.aps.anl.gov/epics/EpicsDocumentation/ExtensionsManuals/AlarmHandler/current/ALHUserGuide.html .

Figure 6: EPICS screen to monitor Hall B IOC-s hartbeat and to reboot the problematic IOC-s.

7 Input/Output Controllers (IOC-s)

All of the HPS EPICS variables are served by the Input/Output Controllers (IOC-s) which are processes and tasks running on various computers in Hall B and in the counting house. If one of the IOC-s stops communicating and there is at least one EPICS variable present in the running alarm handler configuration then there will be an alarm indicating a disconnected channel (a so called “white alarm”). In addition, there is a separate EPICS screen to monitor the heartbeat of all HPS IOC-s that displays a continuously incrementing number. A static number in the “Heartbeat” column indicates a problem with that IOC.

If a white alarm condition lasts for more than one minutes, the shift personnel needs to page the EPICS expert. If there is a problem with any of the IOC heartbeats the first action for shift personnel to take is to reboot that particular IOC by clicking on the “Reboot” button next to that IOC. This will most likely lead to a “white alarm“ condition on a all the EPICS variables served by that particular IOC, but after the IOC reboots the white alarms should go away. If the ”white alarm“ persists for more than one minute or after rebooting the heartbeat problem continues, the shift personnel should page the EPICS expert.