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Horizontal Test Stand Control System

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Abstract

This document describes the control system at the Meson Horizontal Test Stand (HTS) facility.

1 Architecture

The control system at the Horizontal Test Stand and CC2 Test Stand in the Meson Lab consists of 4 VME crates, an Ethernet to GPIB converter box, a PLC, a PC running an EPICS IOC to connect to Cryo, a Linux workstation (smartcon1), and a legacy ACNET IRM. Higher level systems include Matlab, EPICS, DOOCS, and ACNET. ACNET and the ACNET IRM are expected to go away in the near future.

The Marconi 2041 Signal generator is monitored and controlled through GPIB via an EPICS IOC running on smartcon1 talking to an Ethernet to GPIB interface box. (Dennis Nicklaus).

The Koyo Direct Logic 405 PLC (Dave McDowell) controls and reads out the HRLF modulator, vacuum, and temperatures. It is connected to the control system via a soft EPICS IOC running in the Linux workstation smartcon1 (Geoffrey Savage).

The Klystron interlocks (Peter Prieto) are controlled and read out through a VME crates. There are two VME crates--one for CC2 (epicsvme1) and one for HTS (smartvme2). These crates also have digitizer cards for digitizing waveform signals such as forward and reflected power. The processor card (Motorola MVE2434) runs VxWorks and EPICS (Dennis Nicklaus). The Klystron status and the waveforms can be displayed via EDM pages (Dennis Nicklaus).

The LLRF is presently being upgraded to a system similar to A0. It will be controlled and monitored through a Fermilab ESECON VME card (Julien Branlard) running in a separate VME crate. The CPU will be a Linux system (VMIC VMIVME 7750) running DOOCS and a MATLAB interface (Ron Rechenmacher). MATLAB and DOOCS will be used for the LLRF operator interface. **(Need update---Fermilab card and DOOCS display. Also how is the timer card in the crate controlled)**

The timing system (Mike Kucera) is controlled through VME cards in the timing VME crate (node0652). The cpu card (Motorola MVE 2434) runs Linac like software in a VxWorks environment (Bob Goodwin) with an EPICS IOC (Dennis Nicklaus). Operator control is done through an EPICS EDM page (Dennis Nicklaus).

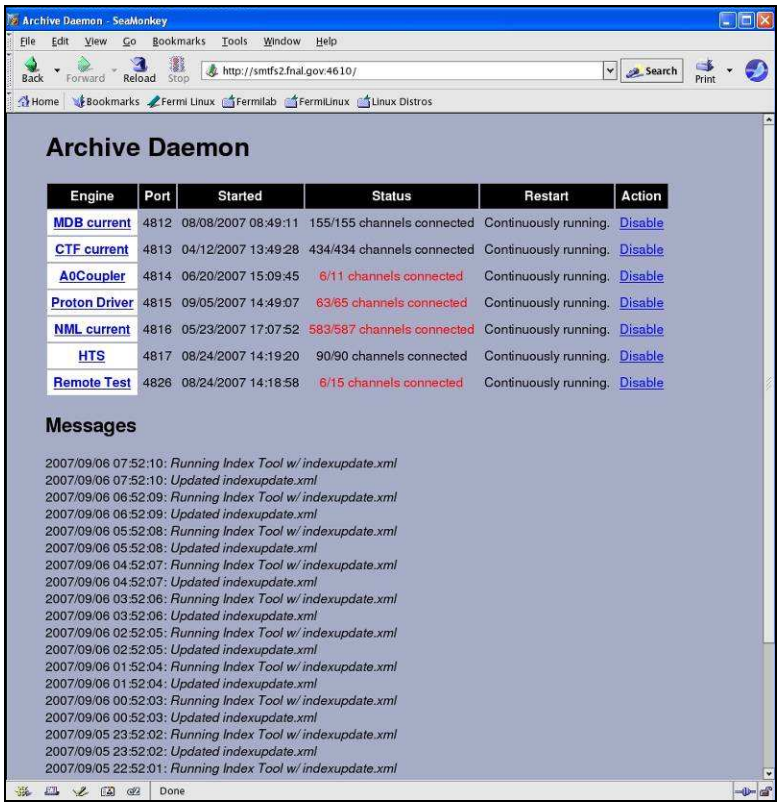
The Cryo system (PLC's) can be monitored and controlled through an EPICS IOC running on a PC (adcryo-ioc) (Vladimir Sirotenko). Operator control can be done through EPICS EDM pages (Sharon Lackey).

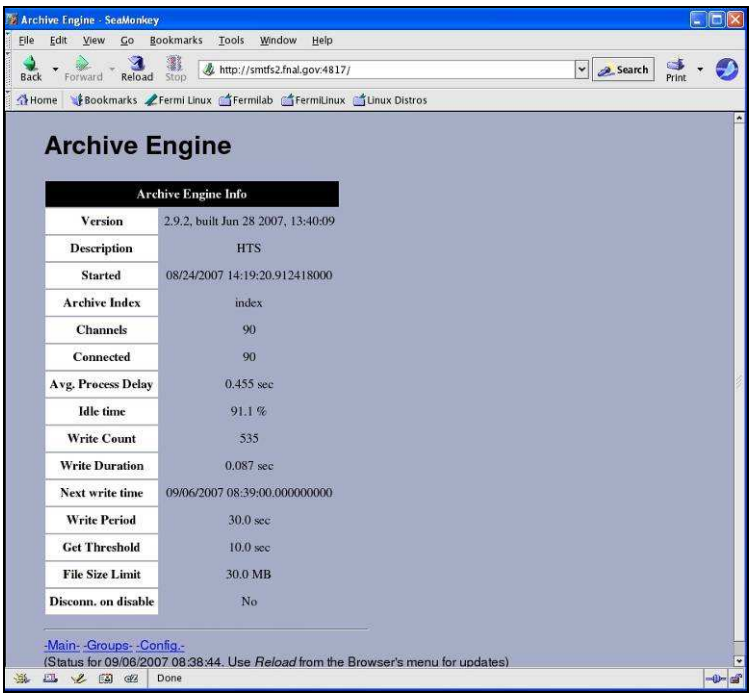
Coupler Processing is achieved through use of an EPICS state machine (program written in the EPICS SNL language run by the EPICS IOC Sequencer) running in the EPICS IOC epicsvme1 (Dennis Nicklaus). Operator control is achieved via a EDM page (Dennis Nicklaus)—see below.

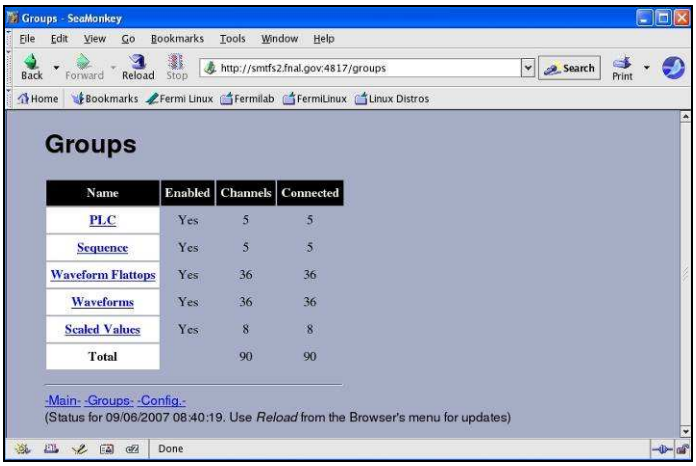
2 Archiving

A number of EPICS archive engines are running on smtfs2 (Vladimir Sirotenkov—ILC doc-414). The EPICS archive engine web server management tool is

available at http://smtfs2.fnal.gov:4610/ from a computer inside the firewall. The following are example displays from this tool







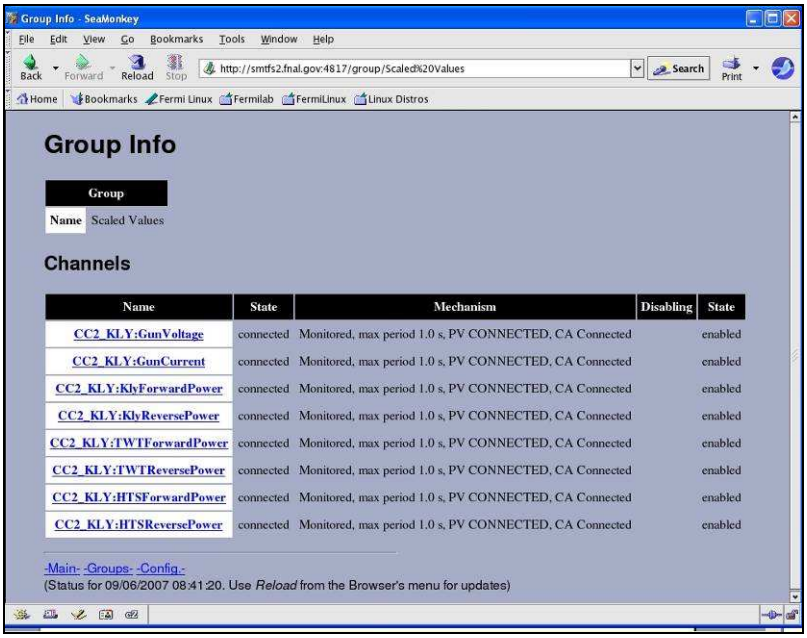


Figure 1: Archive Engine Management Tool

The engine configuration files are available for editing at (on smtfs2) /mnt/smtfs2/archive/current/XXX/engineconfig.xml where XXX is the engine name. The list of archive engines is given on the first page of the display. Current engines for HTS include ctf and mdb for cryo and hts for HTS.

One can plot the archived data by either using the EPICS SLAC archive viewer or Timofei Bolshakov's web based archive viewer. Each of these viewers allows the user to get lists of archives and PV's archived. To use the SLAC archive viewer one does the following commands:

```
smartcon1> setup chan_archiver
smartcon1> archive_viewer
```

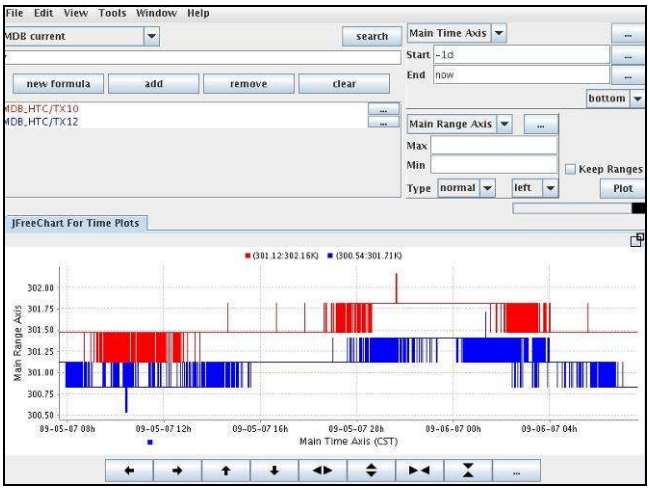
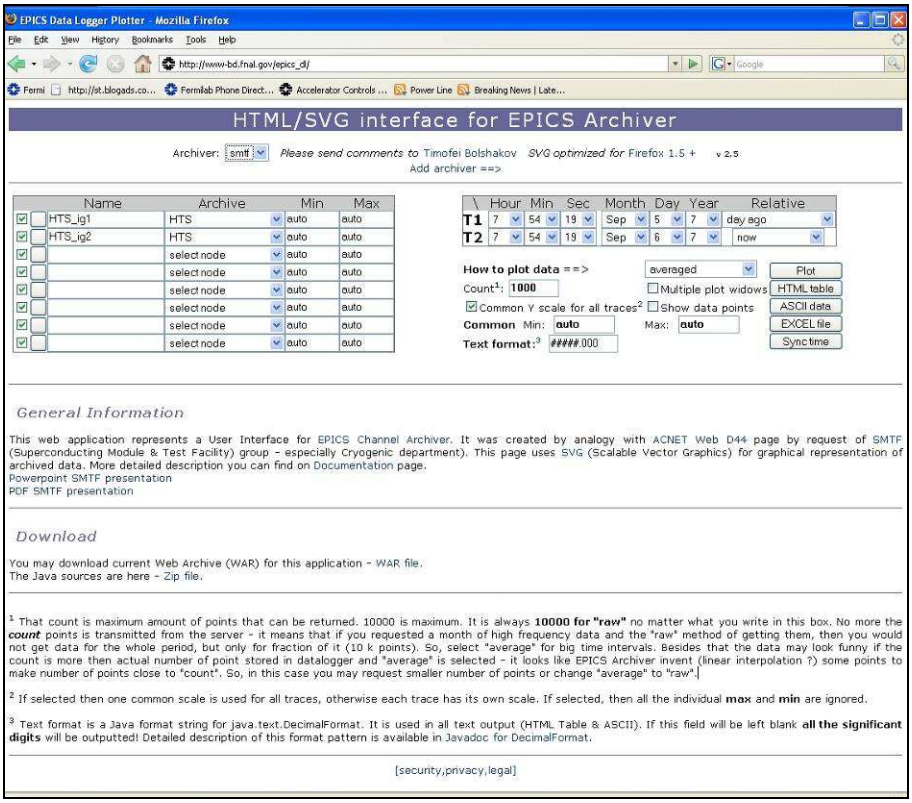


Figure 2: EPICS SLAC Archive Viewer

To use the web based archive viewer one goes to the web address: http://www-bd.fnal.gov/epics_dl/.



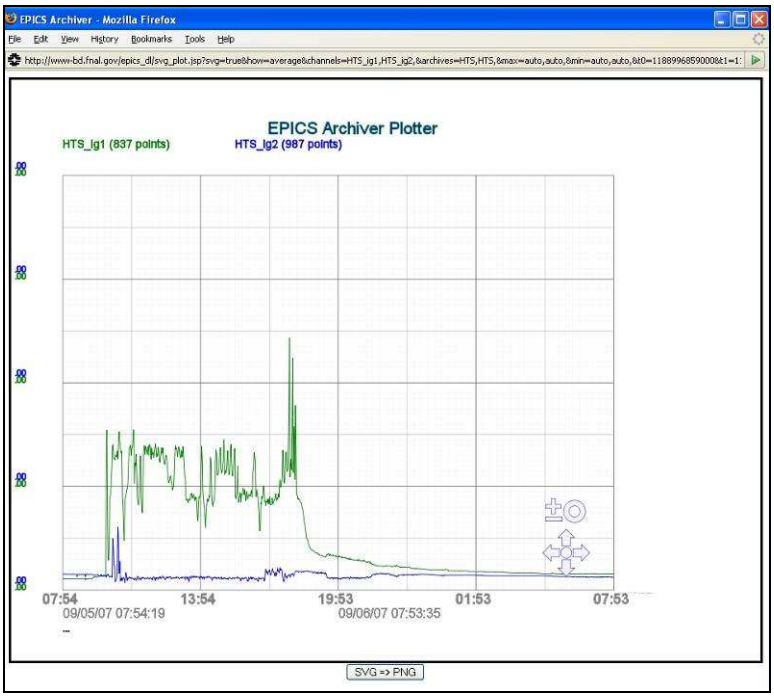


Figure 3: Web Based Archive Viewer and Plot

3 Alarms

The EPICS alarm handler is available for monitoring alarms. One does the following commands:

```
smartcon1> setup epics_alh
smartcon1> alh
```

It needs a configuration file (extension alhconfig). Alarms have been setup for cryo and if one runs alh by clicking on one of the alarm buttons on the Meson Cryo Button Index Page (see below) then the program automatically points to the correct configuration file. Alarms have not been setup for CC2 or HTS.

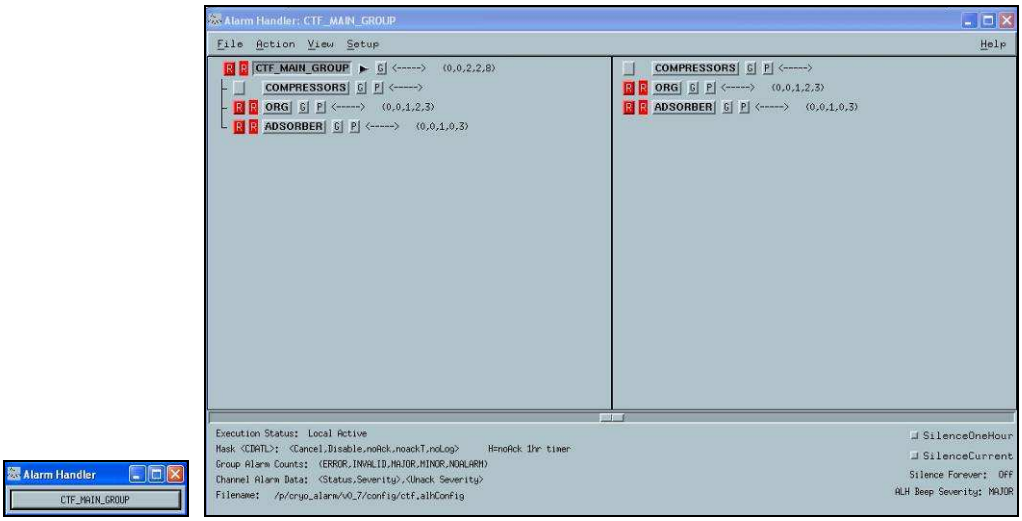


Figure 4: Alarm Handler

4 Save/Restore

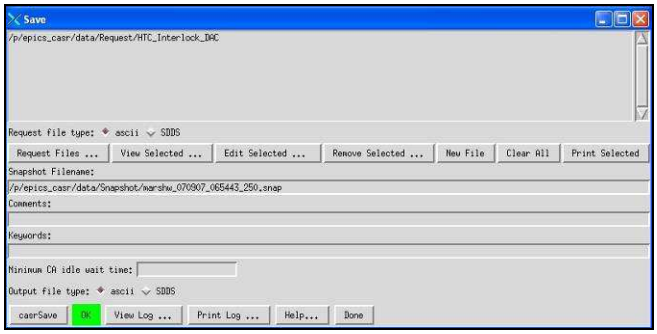
The EPICS save/restore program casr is available for doing save/restores by doing the commands:

:

```
smartcon1> setup epics_casr
smartcon1> casr
```

To save it needs a configuration file identifying the PV's to save. These are located in /p/epics_casr/data/Request. To restore it needs a save file. These are located in /p/epics_casr/data/Snapshot.

Figure 5: casr page



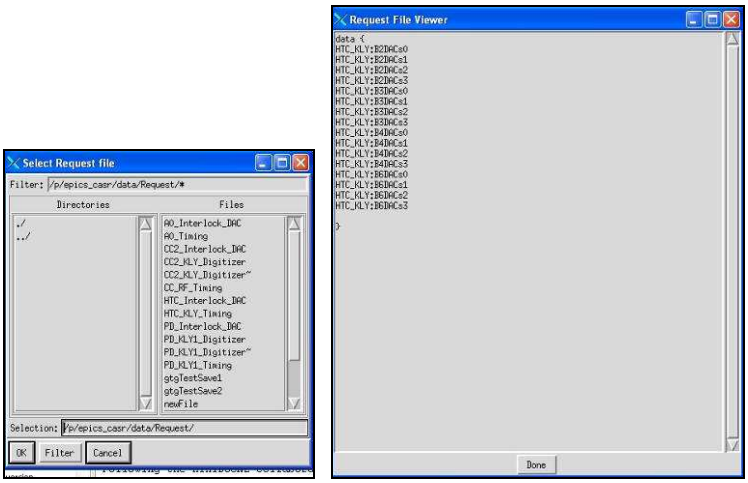


Figure 6: casr save pages

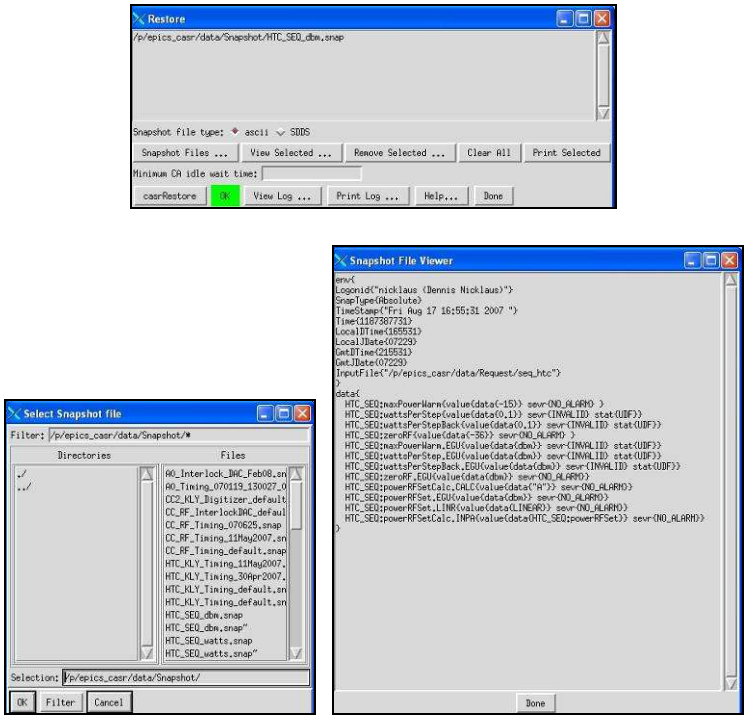


Figure 7 : casr restore pages

5 EPICS Utilities

The EPICS utility Probe which can monitor one PV and display information about the underlying database record is available by doing the following commands:

```
smartcon1> setup epics_probe
smartcon1> probe
```

Figure 8: Probe

The EPICS utility IRMIS (Integrated Relational Model of Installed Systems) (J. You) is available by doing the following command:

```
smartcon1> irmis
```

IRMIS allows one to search for a PV, to list all the PV's on an IOC and to display all fields of a PV.

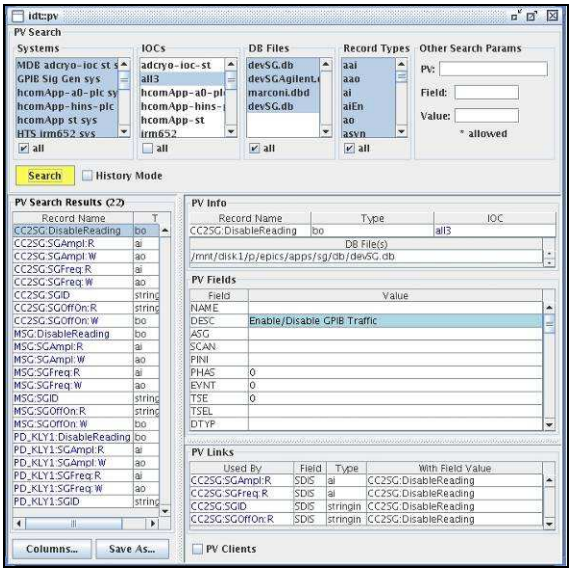


Figure 9: IRMIS PV Display

6 Operator Control

An overall button index EPICS EDM page (Sharon Lackey) which includes buttons to activate many of the displays documented below and above is available by doing the following commands:

```
smartcon1> setup llrf_hts_edm
smartcon1> hts_edm
```

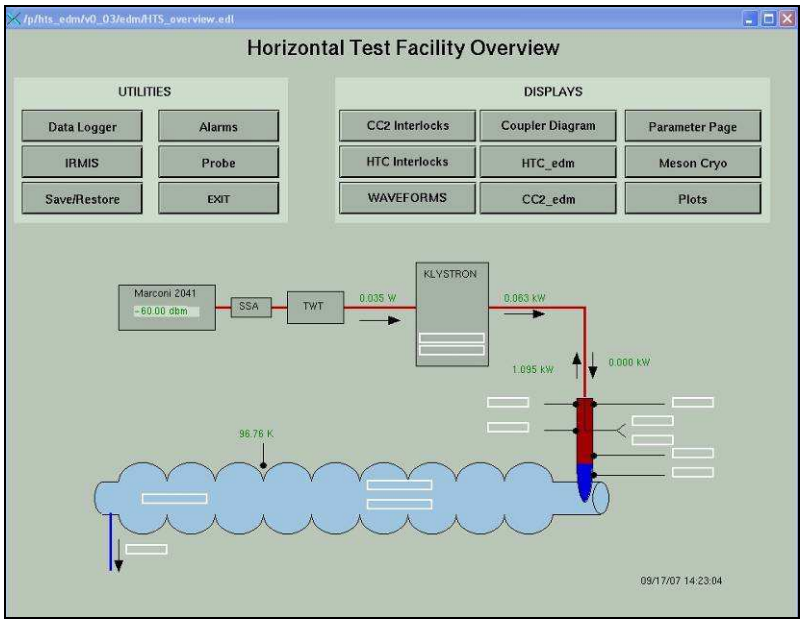


Figure 10: HTS Button Index Page

To get the Klystron Interlock, Coupler Processing, and timing EDM pages on smartcon1, smartcon2, smtfs1, or smtfs2 type the following commands:

```
smartcon1> setup llrf_edm
smartcon1> htc_edm            # for HTC
smartcon1> cc2_edm            # for CC2
smartcon1> llrf_edm           # for A0
```

The Klystron Interlock page displays the Klystron interlock bits and parameters. he Coupler Processing page displays the Coupler Processing sequencer parameters. The Timing page displays the timing parameters.

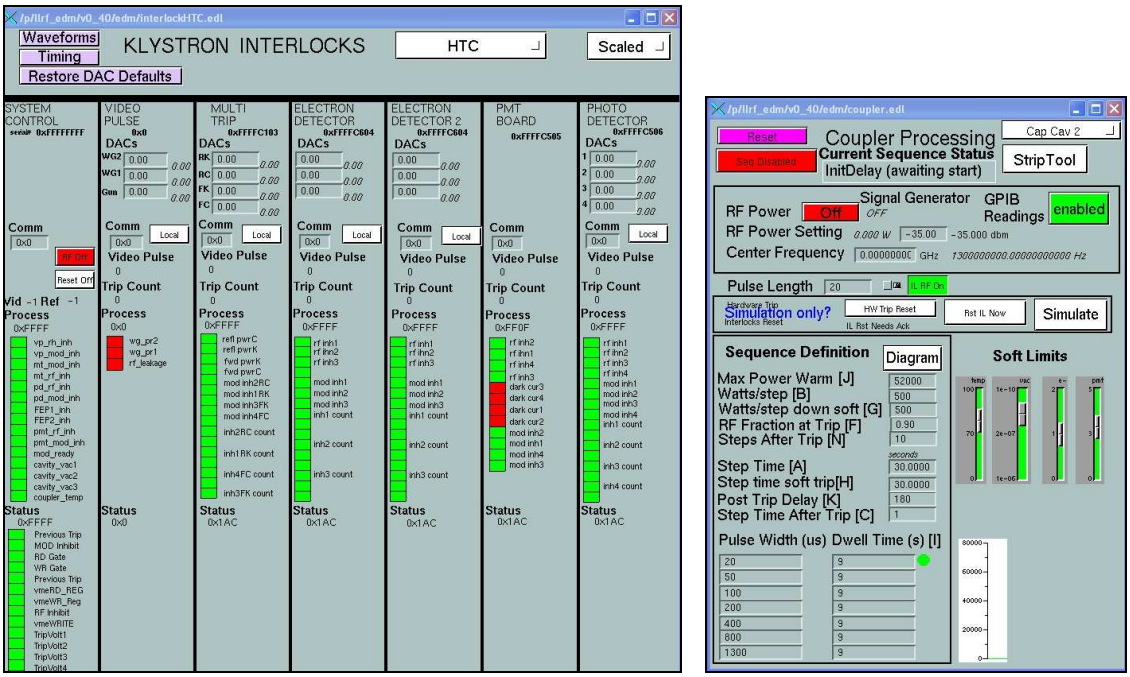


Figure 11: Klystron Interlocks and Coupler Processing EDM Pages

Figure 12: Timing Card Parameters

If one clicks the Waveform Button on the Klystron Interlocks page one gets the waveform plot definition page from which one can display the waveforms.

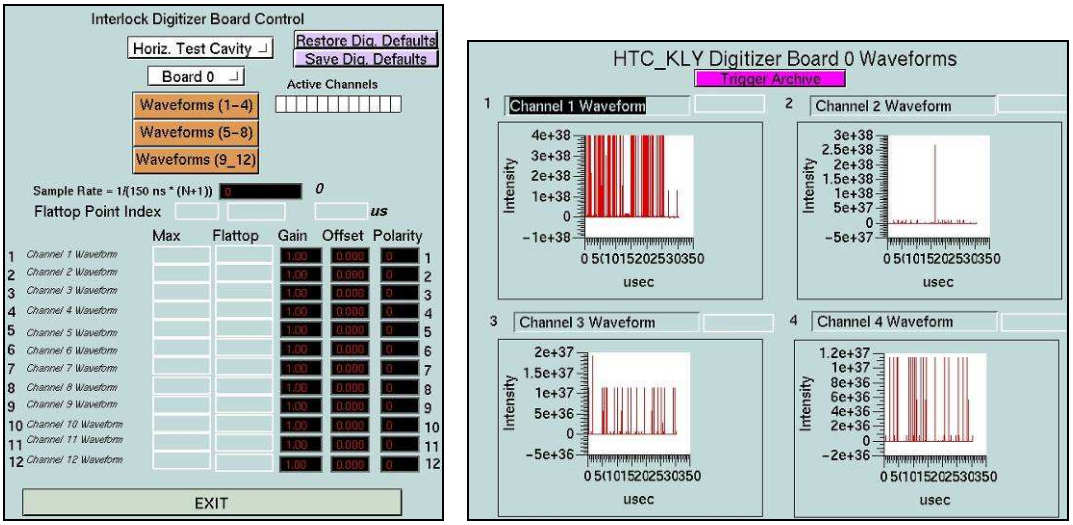


Figure 13: Digitizer Board Control and a Digitizer Plot

If one clicks on the Strip Tool button on the Coupler Processing Page one gets a strip tool page with a standard set of devices. If one right clicks on the strip tool page and selects Control Dialog menu item one gets a control page where one can change devices and plot parameters. One can also run strip tool by doing "setup epics_striptool" followed by the command StripTool.

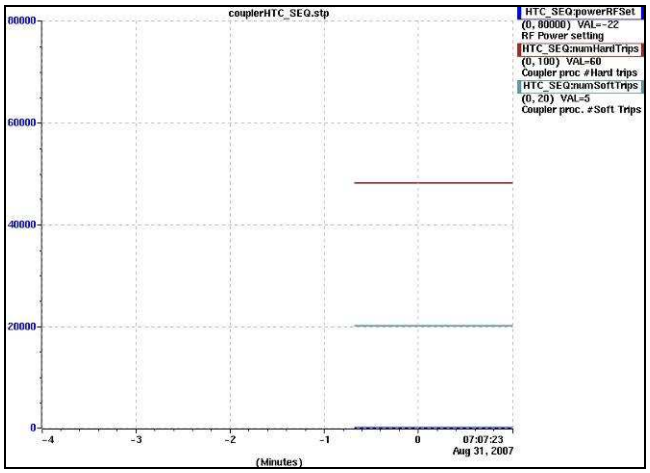


Figure 14: Strip Tool Plot

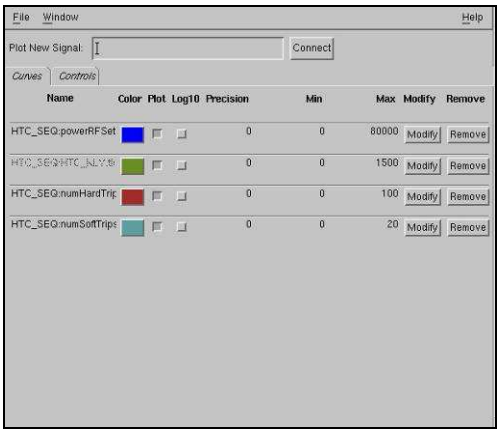


Figure 15: Strip Tool Plot Control

7 Cryogenics

To get the cryo EDM pages on smartcon1, smartcon2, smtfs1, or smtfs2 one does the following commands:.

```
smartcon1> setup cryo_edm
smartcon1> cryo_edm
```

One gets a menu button page from which one can select Meson or NML.

Figure 14: Cryo Start Menu Button Page

If one selects Meson then one gets the Meson Cryo Button Index Page.

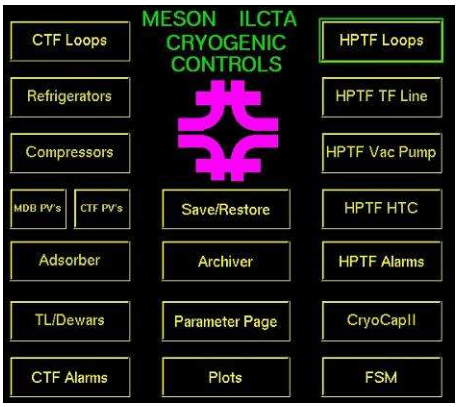
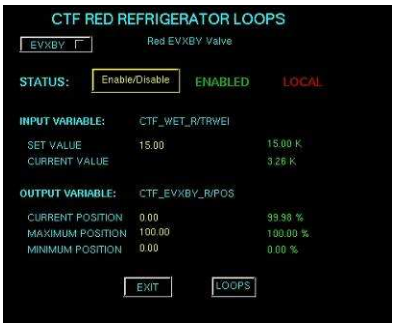
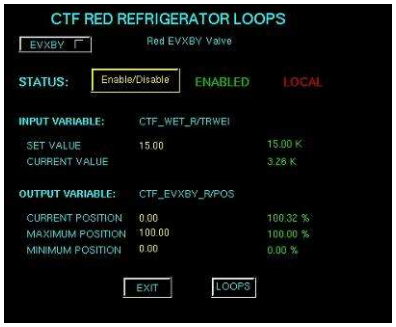
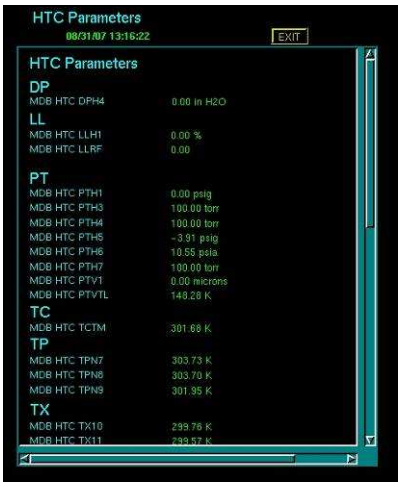


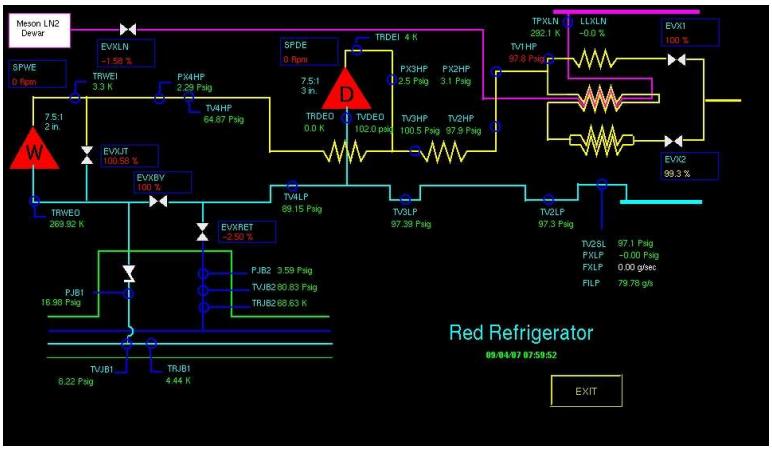
Figure 16: Meson Cryo Button Index Page

One can then select various display pages some of which are shown below. One can also select the EPICS save/restore program (CASR), the SLAC archive viewer, alarm displays, the Java Parameter Page, and the strip tool program.









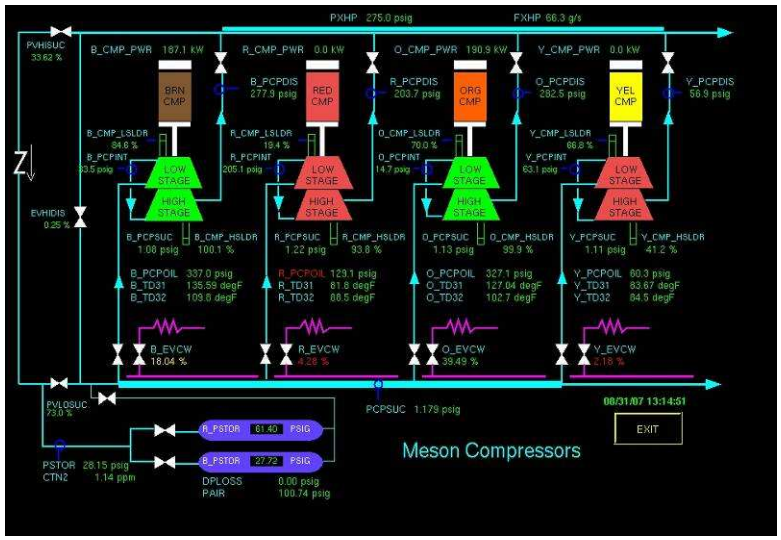


Figure 17: Various Cryo Display Pages