GlueX-doc-XXXX
SVN: docs/reviews/ExperimentalReadinessReview_HallD/ExpProc
Version: May 15, 2014

Experimental Procedures

for the Base Equipment in Hall D

DRAFTDRAFT***DRAFT***

GlueX Collaboration

Contents

1 Introduction

This document defines the procedures used by non-experts to operate the experimental equipment in Hall D. It is part of the CEBAF experiment review process as defined in Chapter 3120 of the Jefferson Lab EHS&Q manual. The operating parameters for each detector subsystem will be determined by their respective expert owners and are not to be changed except under direction by the expert. The lists of experts for each subsystem are given in their respective sections along with information for the operator. Key features of the Hall D subsystems can be found in the Summary of Hall D Subsystems [1]. Information and questions regarding the experimental hazards and mitigating measures should be referred to the Experimental Safety Assessment Document [2].

2 Barrel calorimeter (BCAL)

The barrel calorimeter (BCAL) is a lead-scintillating fiber matrix readout with 3840 S12045 Hamamatsu multi-pixel photon counters (MPPCs). The MPPC light sensors operate a bias voltage less than 76 V. Liquid coolant is circulated through the readout assemblies to set and maintain the temperature of the sensors at their operating temperature between 5 and 25°C.

2.1 Routine operation

During routine operation the user will need to monitor the environmental conditions, which may affect BCAL performance, as well as turn the system on and off. Control and monitoring of the system is accomplished using the Hall D graphical user interfaces (GUI) to EPICS [3]. A description of how to bring up the GUI screens can be found in Section **??**. The two screens pertinent to the BCAL are shown in Fig. 1 and Fig. 2. We briefly describe the use of these interfaces:

2.1.1 Checking the environment

The temperature and humidity measurements of the BCAL can be displayed using the GUI shown in Fig. 1. The controls and monitoring of environmental conditions is accomplished separately for the upstream and downstream readouts of the BCAL, which are connected to individual chillers and nitrogen gas flow lines. The coolant in the chiller (water for initial operations and later water and 20% propylene glycol for operation at 5°C) is circulated through input and output manifolds which feed two readout assemblies in series. The temperature of the chiller will be set prior to operation to maintain a relatively constant temperature for the light sensors. The coolant flows through the cooling plate in each readout assembly, which is in thermal contact with the multi-pixel photon counters (MPPCs), and their temperature is recorded using RTDs attached to the plate. The temperatures are displayed in the figure and should normally read within about 1 degree of each other. The space enclosed by the readout electronics is monitored using four temperature and humidity sensors, which determine the dew point, on both the upstream and downstream. These measurements are displayed on the GUI to monitor the humidity level of the environment of the electronics. The space enclosed by the readout assembly is purged with dry nitrogen to avoid condensation, and the nitrogen flow rate is also indicated on the GUI. During routine operation, this GUI is for information only.

2.1.2 Voltage control

The low voltage (LV) and bias voltages for the MPPC sensors can be set using the GUI show in Fig. 2. The voltages for normal operation are recorded in files, which can be restored using the button in the top middle of the screen. The LV and bias settings must be restored separately. Once the voltages have been restored to the memory of the voltage supplies, the user may turn the voltages on by using the "All U Bias" and "All U LV" left buttons in the middle of the BCAL sketch. The voltages for the downstream side are controlled using the buttons on the right. The voltage read back and the current draw of each channel are historgramed and plotted at the bottom of the GUI. When all voltages are on at their set values, the display turns green. Changes to the voltage settings are only allowed by an expert, or under his/her guidance.

2.2 Interlocks

The voltages and the chiller are interlocked using the temperature and dew point measurements described in Section 2.1.1. If the temperature exceeds the preset value in the GUI, or the dew point comes within a predetermined window of the measured temperature, or the chiller goes off, the interlock will be set and it will disable the voltage supply crates and turn off the chiller. Changes to the interlock settings are only allowed by an expert, or under his/her guidance.

2.3 Expert personnel

The individuals responsible for checking that the BCAL is ready to take data and setting its operating parameters are shown in Table 1. Problems with normal operation of the BCAL should be referred to those individuals and any changes to their settings must be approved by them. Additional experts may be trained by the system owner and their name and signature added to the document residing in the Hall D Counting House.

[1]Phone prefixes are the following: Telephone numbers: 757-269-XXXX, Pager numbers: 757-584-XXXX.

Name	Extension [1]	Signature	Date
Elton Smith			

Table 1: List of expert personnel for the BCAL system.

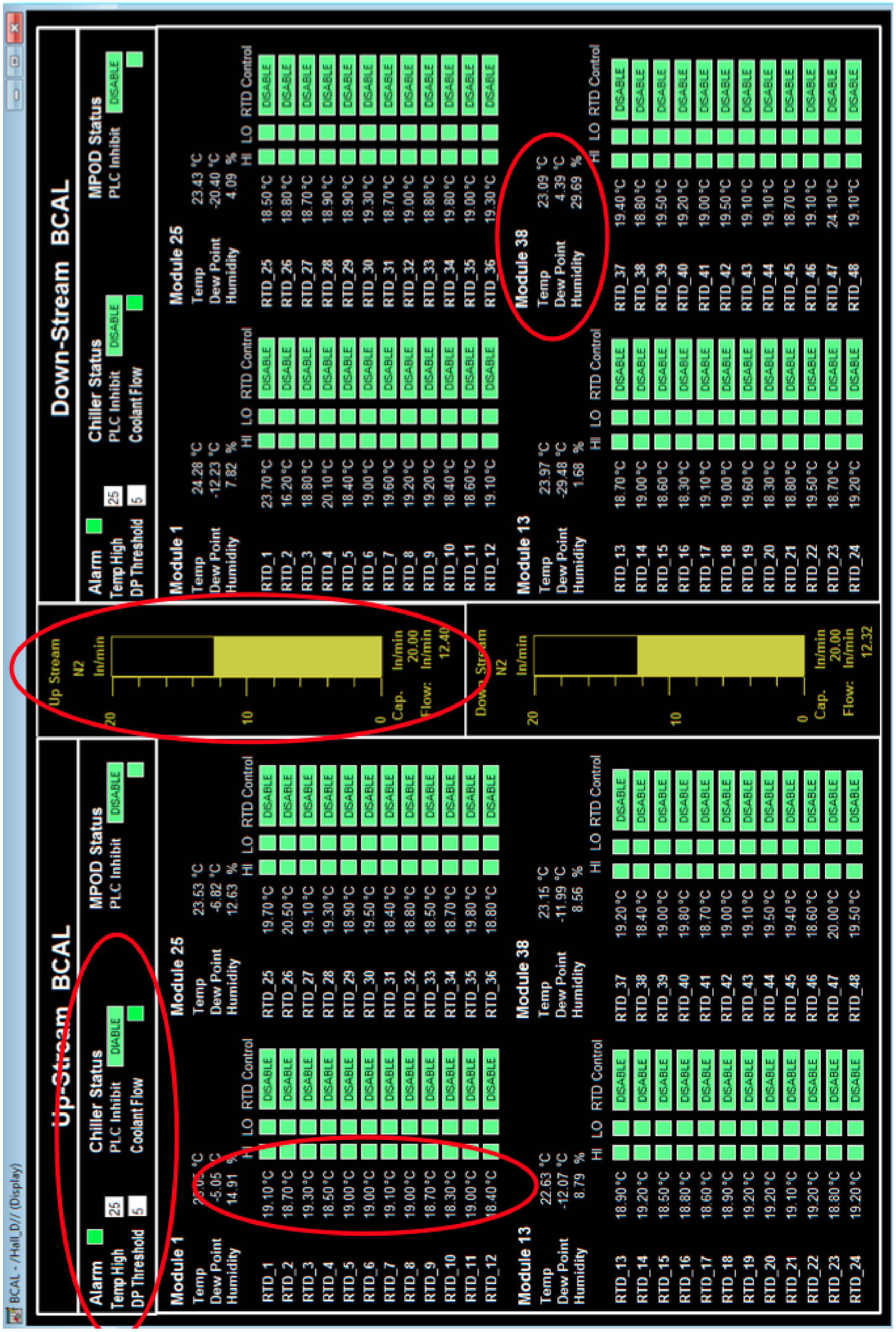

Figure 1: Environmental sensors for the BCAL. The red ovals highlight the information provided to the user, available for the upstream and downstream ends independently. This includes the forty-eight temperature readings of each RTD on the cooling plates, which are in thermal contact with the back of the MPPC sensors, the nitrogen flow, and the four measurements of temperature, humidity and dew point of the gaseous atmosphere of the readout electronics. The power to the electronics is interlocked with signals that require the none of the MPPC temperatures exceed a maximum temperature or the dew point to rise above a preset value below the ambient temperature.

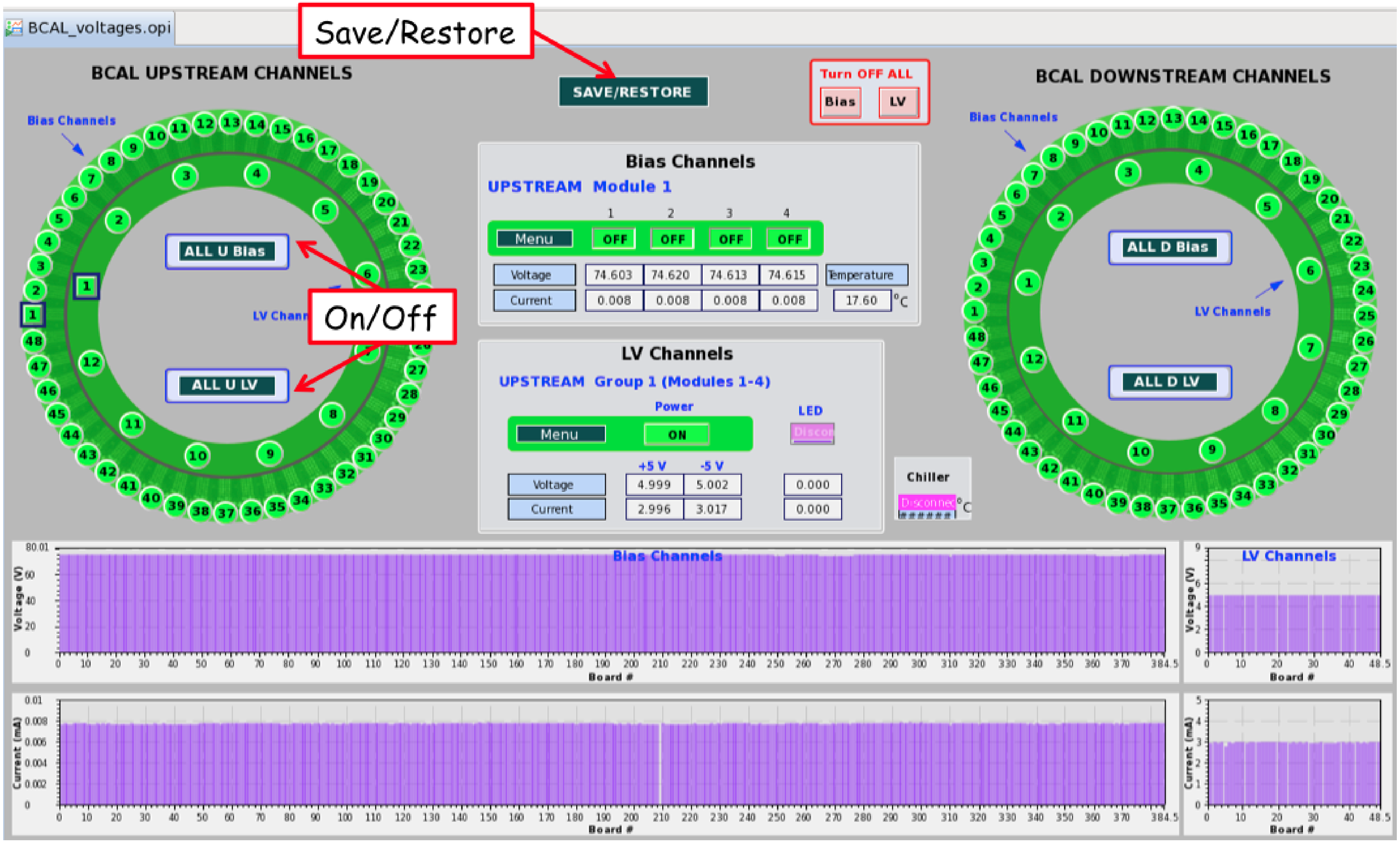

Figure 2: Graphical interface for setting the voltages on the BCAL. Indicated are the pulldown menus for retrieving saved voltages from a file and the menus for turning the voltages on and off.

3 Forward Calorimeter

The forward calorimeter (FCAL) is a circular array of 2800 lead-glass blocks, each viewed by FEU 84-3 photomultiplier tubes. The high voltage to operate the photomultiplier tubes is generated internally to the base assembly using a Cockcroft-Walton voltage divider assembly. External supplies deliver 24 V to power the bases.

3.1 Routine operation

3.2 Interlocks

The power to the photomultiplier tubes is interlocked using sensors that verify that the room is dark and closed. Access to the dark room is administratively controlled to trained personnel and crash buttons are installed if an experimenter need to exit quickly. Procedures for use of the dark room and a description of required training are detailed in D00000-01-06-P006.

3.3 Expert personnel

The individuals responsible for checking that the FCAL is ready to take data and setting its operating parameters are shown in Table 2. Problems with normal operation of the FCAL should be referred to those individuals and any changes to their settings must be approved by them. Additional experts may be trained by the system owner and their name and signature added to the document residing in the Hall D Counting House.

Name	Extension [1]	Signature	Date
Elton Smith			

Table 2: List of expert personnel for the FCAL system.

References

[1] E. Chudakov et al. Summary of Hall D Subsytems. Specification D00000-00-00-S006, Jefferson Lab, May 2014. https://misportal.jlab.org/jlabDocs/document.seam?id=79548. 2

[2] E. Chudakov et al. Safety Assessment Document for the Base Equipment in Hall D. ESAD, Jefferson Lab, May 2014. http://argus.phys.uregina.ca/cgi-bin/private/DocDB/ShowDocument?docid=2462. 2

[3] EPICS Documentation. WWW page. http://www.epics.org/ and http://www.aps.anl.gov/epics. 2