Version

7.2

December 18, 2003

D0 EXPERIMENT

Note: *You are invited to make comments and suggestions by writing in this paper version. However, if you do that, please sign & date any comments you write in here, so we can get clarification if needed. Thanks.*

Calorimeter Shifters' Guide

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Introduction

This User's Guide is intended to serve the needs of shifters during their D0 Calorimeter shift, and to provide documentation for the experts to help debug and repair problems with the Calorimeter system. The term "Calorimeter shifter" now has been expanded to include not only the calorimeter, but also the ICD. Do not panic just because this is a huge document – as a shifter you should need only to use the first 40 pages or so (ok – that is a lot, but there is a lot to say). The other material is mostly for expert use or if you are interested in more of the details.

This guide is a compilation of notes, e-mails, D0 notes, web pages, etc. It should provide all the information you need to run a Calorimeter shift. It is organized in such a way as to start with essential information such as contacts (page 5), an FAQ (page 6) a quick guide to running and taking calibrations (page **Error! Bookmark not defined.**), followed by a description of the essential shifter tasks when there is beam (page **Error! Bookmark not defined.**), starting with the very basics of logging on, and the standard monitoring tasks to be run by shifters, and when there isn't beam (page **Error! Bookmark not defined.**). To help you resolve problems, we have included a Troubleshooting guide to common problems (page 5) – this will likely grow as the run progresses. As a reminder of the available troubleshooting tips, we have placed suggested troubleshooting page numbers in the left margins throughout this manual where appropriate. Later chapters give the details for a variety of software programs and hardware. Some of the more arcane details on subjects such as error codes are left for the Appendices. As a shifter you should normally have to read only the Shifter Task chapter starting on page 34.

Throughout the document you should be able to find links to other relevant sections or web links.

This document is created in MS Word 2002 (in Office XP), and is converted to pdf format (preserving all links using PDFMaker) using Adobe Acrobat 6. The master word file is kept in http://www-d0online.fnal.gov/www/groups/cal/Manual.pdf. Please send corrections and additions to mailto:tuts@fnal.gov?subject=Cal Shifter manual, or mailto:parua@fnal.gov?subject=Cal Shifter manual

How to use this Guide

This guide is designed to help you on your shift. Here is how you should use it. First locate the section that is relevant to your shift, e.g. Getting Started, or When there is Beam, etc. Within a section, the numbered steps should serve two purposes: (a) the boldface lead sentence should be a summary of the step (so if you are an experienced shifter, that should be all the info you need, and there is no need to read the attached

paragraph!); (b) if you are inexperienced or have forgotten what the step means, then go ahead and read the paragraph, which will give you the detailed instructions to follow. **Do NOT read it like a novel every time** – use it as a guide to remind you of the necessary steps.

Once you are more expert you can use the Quick Guide in the previous chapter.

Also note that in some cases you will be referred to pages outside of this chapter for more details. You will need the full manual to see those pages. The margin notes should point you to sections in the troubleshooting guide that may help.

Shifter Tasks

Contacting the on-call expert

Tip: Having trouble with phone.pager? See How To page 28

In case of problem, contact first the on-call expert. He will know how to solve many problems and who else to call. If you don't find him, contact people below in the order of the list. If you cannot find any of the people listed here, try people listed in the Expert Task Lists.

Name	Office phone	Home phone	Pager	Cell phone
On call expert			**(630) 218-4777**	
Robert Zitoun	(630) 840-2694	(312) 341-1696	**(630) 266-0634**	**(630) 399-0024**
Pierre Pétroff	(630) 840-6447	(630) 840-3571		
Nirmalya Parua	(630) 840-6792	(630) 985-1160	(630) 218-8489	

Starting you shift

First you should login in the logbook and check if everything is correctly setup. If something is not, have a look in the next section.

1. Locate the monitors and orient yourself. There are three principal calorimeter monitors which by convention we call ***Monitor #0*** (bottom center), ***Monitor #1*** (bottom left), ***Monitor #2*** (top left). Note that each monitor has a labeled workspace in the lower right hand corner, which we will refer to in the following sections.

Tip: Having trouble with e-log book? See How To page

2. Log into the electronic logbook. The logbook is normally open on Monitor #0 so you can record your activities during the shift. You should ***log*** yourself ***in*** (this normally logs out the old shifter) with your username and password so that the entries will be tagged with your name.

Tip: Having trouble with the GUI's? See How To page

3. Locate the calorimeter monitoring GUI's. Normally the standard GUI's should be running on Monitor #1 (***RMI*** , ***IOC***, ***Alarm*** and ***Global Monitor***) and #2 (***Supply***, ***Crate Monitor*** (also called ***T&C*** or ***tandc***), ***hv,*** and ***Pulser***). The color of the entry tells you the state: green is what it should be; yellow means that it is slightly out of tolerance (but acceptable); pink means that it is definitely out of tolerance (note that there may be pink items that do not trigger a MAJOR alarm). Most important are

    a. the ***Alarm*** GUI (Monitor #2). Each line in this GUI corresponds to a page in the ***Supply*** GUI or to the ***hv*** GUI.

Tip: Having trouble resetting the HV supplies? See page 37, tip 0- 0

b. the Calorimeter Power Supply Monitor Display or ***Supply*** GUI (Monitor #1). On this GUI, you will see tabs for the various power supplies: Preamp, BLS N (BLS North), BLS C (BLS Central), BLS S (BLS South), BLS BCK N (BLS backplane North), BLS BCK S (BLS backplane South), ADC Temp (temperatures in the ADC power supplies), PA Temp (preamp temperatures), Fanout, ADC, Pulser, PLS Mode (pulser mode), Mode, Mode Shift.

c. The ***hv*** GUI

4. Make sure that all low voltage and high voltage power supplies are on and working. You should continuously check the status of the calorimeter. Look at the Alarm GUI on Monitor #2 and check to see that there are no persistent (i.e. is there for more than 30 seconds) ***MAJOR*** alarms (which appear in pink). If there are persistent ***MAJOR*** alarms, then use the relevant GUI/page to better locate the problem. You can check against the latest reference screen shots at http://www-d0online.fnal.gov/www/groups/cal/Monitor/test.html. Make an entry in the logbook and reset the power supply which tripped (for HV, see the details on page 96). If the reset fails, report to the on call expert who might tell you what to do, such as to acknowledge or disable the alarm. If you want more details on the status of any "box" in the display (for example you want to find out specifically what made a box turn red), then left-click on the box and it will pop up a detailed list with the offending item in red, that will help you figure out where to look for the problem.

Tip: Having trouble resetting the BLS supplies? See page 35, tips 0- 0

Tip: Having trouble resetting the preamp supplies? See page 34, tip 0

5. Monitor preamplifier temperatures. Go to the ***Supply GUI*** in Monitor #1. Click on the ***PA Temp*** tab. Capture this page as ***/home/d0cal/temp.gif*** (see How To page xxx), print it ***printbw /home/d0cal/temp.gif***. Get the small white binder on the left of Monitor #2. Check the columns against the reference temperatures (on the cover of the binder). Report in the logbook and contact an expert if you see any change more than 2 degrees.

6. Make sure dq_calo and dq_monitor are running.

   a. From any xterm window on ***d0ol45***, type ***ps -C dq_calo_x***. You should see at least one line with dq_calo_x. If not, type ***start_cal dq_calo*** in any xterm window, this will start it.

   b. The dq_monitor GUI should be running on Monitor #0. If not, type ***start_cal dq_monitor*** in any xterm window in Monitor #0. In the taskbar, you will see the current run number and quality. There are 3 frames in that window: the list of available histos, the ROOT histograms and the data quality info (text).

7. Locate the taker. The taker should be running in a window of Monitor #0. If you don't see any, type ***ps –u d0cal|grep*** taker. If you see taker.x, then look

better, the taker is somewhere. If you do not see taker.x, start a taker as indicated in the How To section.

Before a store

This step assures that the latest pedestals are downloaded and the electronics is set in the correct state. You can of course do this at any time, such as when you come on shift and you are unsure of the state that the last shifter left the electronics in. To be conservative you must carry out this step about an hour before the first run of a store. As this download is a severe load on coor for ~1min, get the shift Captain's permission (he generally should give you priority for the download) and inform the DAQ shifter to free the calorimeter crates (if they are not yet free).

Tip: See How To to learn about the taker

Tip: xxx is the version number; in case of trouble for the version call the on-call expert.

1. Download "cal_prepare_for_run". Go to the taker window, click on ***Modify***, and then click on ***Change Trigger***. Find file ***commissioning/cal/cal_prepare_for_run-xxx***. It will tell you ***download in progress***. This will among other things download the pedestals. If you see a message such as "15 good, 1 bad", go again to ***Modify*** and click on ***Revalidate***. If you see a red line stating "Download completed … but with ERRORS" and few lines above "Saw disconnection from devdnl", tell the DAQ shifter to "restart comics". Then do the Modify/Revalidate procedure described above. For any other error, check with the DAQ shifer.

Tip: Having trouble with ADC mode? See How To BLS mode? See How To T&C mode? See How To

2. Verify the calorimeter is ready to take data. In the Supply GUI (Monitor #1), check the ***Mode Shift tab***. All columns should be green except may be the OCC column (TC Mode = 0x10 except the last lign T&C CTRL 0x4C = 0x8089, status = 0x10, ADC ERR = 0x0, BLS Mode = Normal , ADC Mode = Sel 0 Sign Sup, Pulser Off). If you see ***Pulser On***, go to the pulser GUI and press Shutdown. Pulser column should turn to off.

Tip: Having trouble with pulsers? See How To

3. Check that the pulsers are really off. You do that by selecting the ***PLS mode*** tab in Supply GUI. You should basically see 0 everywhere. Check especially that the ICD pulser is off by verifying that the last row called ***ICD LED*** is set to zero.

4. Don't free the trigger.

5. Verify that dq_calo and dq_monitor are running. See step 6 of "Starting your shift" section.

At the Start of a Run

1. Start L1CalExamine. This program should run on ***d0ol23*** and not on d0ol45 which is kept for dq_calo. Look if there is already an xterm window of Monitor #0 logged on d0ol23. If not, type ***start_cal l1examine1***. This will

bring you to d0ol23. Then type ***start_cal l1examine2***. It will start killing any histoscope version running and open a new histoscope, then start L1CalExamine. Once this is running, type ***init*** followed by ***start***. You will see it connect to the distributor, initialize and events will start flowing. Connect histoscope to the data by selecting the ***File/Process*** pull down menu and selecting ***Connect to process***…, that will load in something like ***L1Cal-histos Histograms (d0cal)xxxx***. Highlight/select that file and left click the ***Connect*** button. Now you should see in the ***Sub Categories*** list that there is a single file selected (if there are more, you want the one called ***L1CALEXxxx.HBK***). Double click on this name and a whole set of histogram names will appear in the right-hand pane. Highlight the first 9 and left click on the ***View Multiple*** button.

During a Run

Your main job will be to see that the calorimeter is running smoothly. You do that by monitoring its status through a number of programs and control GUIs.

1. Keep an eye on the alarms

2. Monitor the trigger.

    a. Keep an eye on the histoscope plot.s You can get more information on L1 Cal Examine by looking (careful since the detailed directions may be obsolete) at http://www-clued0.fnal.gov/~kehoe/l1cal/L1CalExamine.txt.

    b. Adjust the L1 Cal Examine thresholds if necessary. You may find that the L1 Cal Examine plots are not useful because it looks like the thresholds are set incorrectly for these particular running conditions. If so, you can change them. in the file ***L1CalExamine.rcp***. ***Open an xterm window***, then type ***cd /online/examines/development/l1calex/l1cal_examine/rcp***. Now edit that file using for example the command ***xemacs L1CalExamine.rcp***. Locate the lines with ***EMcut***, ***TOTcut***, and ***HDcut*** and change the corresponding thresholds accordingly – unfortunately I don't know what accordingly is! (I hear 3.0 looks like a good value, but then the noise on the plots changes to 4.0 or 5.0). If it is a reasonable time of day and you need help, call the L1 Cal Expert. When you are done editing, click on the ***File*** button and select ***Save L1CalExamine.rcp*** and then ***Exit XEmacs***. You will now need to restart L1CalExamine following the previous step directions.

3. Monitor the data. Keep an eye on the cal_monitor display. Especially on

a. tower occupancy and mean energy 2-D distributions for zero bias and jet triggers

b. METx and METy 1D-distributions for zero bias and jet triggers

c. the report window.

For more information, click on the ***Help*** button in the upper right corner of the dq_monitor window.

Tip: dq_calo or dq_monitor are not running? Start it as described in How To xxxpage xx.

If dq_monitor seems to be stalled, quit and restart it: ***start_cal dq_monitor***. If it still seems to be stalled, restart dq_calo. You might have first to kill the current dq_calo. So, type ps –C dq_calo_x and if you see a dq_calo_x task running, type kill nnnnn, where nnnnn is the PID of the first line in the list.

At the End of a Run

Tip: Having trouble getting histos into the e-logbook? See tips page 31 and 35

You must enter histograms into the e-logbook

1. `dq_monitor histos`. Press ***Print*** in the upper right corner of the GUI. A new window appears. Press ***Save***, the file is saved as ***/home/d0cal/calex.gif***; you can enter in the logbook. If you press ***Print***, you will have a color copy of the screen.

2. `Check for hot cells`. In the dq_monitor window, click on ***Report*** to check for hot cells. Report them in the e-logbook.

3. `L1CalExamine`. In the d0ol23 window, type ***import l1cal.gif***. Then click on the histogram window. This will put the plots into file ***/home/d0cal/l1cal.gif***. Enter it into the e-logbook.

Taking a Pedestal Calibration Run

To take a pedestal calibration run, there should be ***no beam activity at all***. You will need either about ***50 minutes*** or ***10 minutes*** of no beam time – in the former case you will take a ***reference*** 10k event run (this is the ***default action***), and in the latter case a ***short*** 500 event run. Note that the quiet time is only required for the actual runs, not for creating and downloading the pedestal file. When you take calibration runs, you will be calibrating all twelve calorimeter crates at once. You will start by running the calibration for the BLS ***x8*** gain, then you do it all again for the ***x1*** gain. ***Strategy*** is the following: if you have plenty of time take 2 reference runs (x8 and x1). If you think you might be short of time, take a short x8 run then a short x1 run; when they are done, then start a x8 reference run and next a x1 reference run. If some reference run cannot be finished, no problem, a short run has been taken.

1. Open the Calibration Manager GUI. This must be done as ***d0run (not d0cal)*** user. In an xterm window which will be devoted to calibration, type:

   > *start_cal D0run*
   > *setup d0online*
   > *start_calib_manager_gui*

   After the calib GUI starts, click on the ***Cal*** tab. Note: NEVER ***exit*** from this GUI if the ***ABORT*** button is showing in the bottom left of the GUI, as that may leave detached processes running which will corrupt the writing to the database, and make you think everything looks ok until you check the plots. If, by accident, you do exit incorrectly, then start the GUI up again and hit the ***ABORT*** button, or wait until you see ***CONFIGURE*** (at which point you can click ***Exit***). If that fails, call the on-call expert, who may in turn call the Calib expert (Taka) to clean up those detached processes.

2. Get a Taker ready. In the Taker, check that recording is on by looking at the upper right hand corner of the taker window, which will show ***Recording: on***. If it is set to ***Recording: off*** then left click ***Modify*** and setting the ***Recording*** box on (as indicated by the little red box next to it).

   Tip: Not finding any taker? See page, tip.

3. Get the calorimeter and SMT crates.

   a) You should ask the permission of the Shift Captain to remove the Calorimeter crates from the global run, and you should ask the DAQ expert to remove them once you have approval.

   b) For several reasons, we need to take pedestals with the SMT being read out. It should not be pulsed to take the data, but ***whenever we are not reading it out for more than 1 or 2 minutes, pulsers should be running (off)***. So, tell the SMT shifter that you are going to read their crates out; ask him to have the SMT pulsed for now.

   Tip: If the SMT crates cannot be used, don't take the pedestal run. If forced by a calorimeter expert, forget about SMT and download expert/*noSMT* trigger files

4. Change the trigger. In the Taker, click on ***Modify***, and then click on ***Change Trigger***. You will now see the configuration window. To make sure you are in the correct directory, click ***UP (Left)*** until you are all the way "up" and the directories no longer change. Double click on the directory ***calibration***, then double click on ***cal***. Now you must choose the appropriate trigger:

   a. if you have a long time (~10 minutes at 20 Hz), double click on ***calib_ref_x8*** (10k events);

   b. if you have a short time (~2 minutes at 20 Hz), double click on ***calib_ped_x8*** (500 events);

Always use the higher version number. It will tell you ***download in progress***. After the download is complete (about 10 seconds), make sure that all 12 ***Processing Status*** lights are ***dark blue*** in the Calib Manager GUI. If they aren't, there is no point starting, so you should call the on-call expert.

5. Start the run. Before starting the run, ask now the SMT shifter to ***stop the SMT pulsers (off)*** (remember to have the SMT pulser on if data are not being taken). When this is done, click on ***Start*** (lower left long button in Taker) to begin the run. A pop-up ***Begin Run*** window will appear. Fill it in with your name in the Shifter box, and ***ref or peds x8*** (depending on the run type) in the Comment box, then click ***OK***. That box disappears and the run starts. If you have trouble, check with the DAQ shifter.

6. Check the calorimeter status. On the Mode Shift page of the Supply GUI (Monitor #1), the 4 first columns should be green (Normal, 0x10, 0xyyyy, 0x0). Next 2 columns should be blue (Force x8 and Unsuppressed or Raw). Next 2 columns should be green (0xzzz, PulserOff). Don't worry for the last column if it appears pink). Check that the last line is green (x8089, 0x10, 0xyyyy).

7. Watch the Run. When the run starts, the ***Processing Status*** boxes turn ***from dark blue to light blue***. In the lower line of the Taker, you will not see the event number increasing: it will stay equal to 0 for the whole run. You must keep checking that the run is progressing by

   a. looking at the Mode Shift column L3TRAN: the number should update every second or so.

   b. keeping an eye on the ***ADC ERR*** column (the ***4th*** one in the ***Mode shift*** page) to make sure everything is green.

   Tip: Problem? Read next step.

   You will know that the run is finishing when the ***Processing Status*** boxes in the Calib Manager GUI turn ***from light blue to green***. Then all 12 ***DB Commit Status*** boxes, starting as grey, turn to light blue. A yellow line saying ***Coor is stopping your run*** appears next telling that the run is finished. Wait until you see the 12 ***DB commit status*** boxes turning to green. The x8 run is completed.

8. If you had a problem in the previous step.

   a) Ask the SMT shifter to start its pulsers.

   b) If, before the ***Processing Status*** boxes turn to green, you see no more activity in the L3TRAN number, ask first the DAQ shifter if something is happening. If you have to restart the run, first ***Abort Run*** (lower left button in the Calib Manager GUI). That should also stop the Taker (yellow line). Go back to step 4.

c) If ADC ERR goes to pink, then try clicking the ***Global T&C Reset*** and the ***Global ADC Reset*** buttons, if that doesn't work, consult with the DAQ shifter, and if that fails restart the run (see step 8a).

d) If a power supply fails during the run, take a new run starting from step 4, but first read page 13.

If it definitely does not work, call the expert. If you do not see anything happening in the calib GUI, the server might need to be restarted on d0ol07. Follow the same procedure as in step **Error! Reference source not found. Error! Bookmark not defined.**. If that does not start it, then see if the DAQ shifter can help, or talk to the on-call expert.

9. Record the run number in the logbook. Record the run number (bottom line in the Taker) and calibration run type (x8 or x1) in the logbook. You will need the information later.

10. Now repeat steps 4 to 9 for x1 gain. Follow steps 4 to 9 above, except that you need to change every occurrence of ***x8*** in those directions to ***x1***. In particular, that means using the ***calib _ref_x1*** if you used ***calib _ref_x8*** or ***calib_ ped_x1*** if you used ***calib _ped_x8*** trigger file.

11. Start DB Collection. When you have finished taking all these runs, ***tell the SMT shifter to run*** pulsers. Then click on ***DB Collection*** in the Calibration Manager GUI. The collection is finished (this takes about 15min) when the ***DB Collection*** button pops up again. Pay attention to the run numbers which will appear in the calibration xwindow you used in step 2 because you will use them in a few moments. NOTE: if you change screens back and force, the Calib Manager GUI will not refresh (the window will remain gray) until the collection is done.

Tip: Problem in that step, read next step.

12. If you had a problem in the previous step (otherwise skip this section).

IF an error window pops up

OR IF 12 files with the present date and time are not present when you type ***ll /online/comics/cal/pic/D0.CAL.*.ADCC:CONFIG.pic*** in the calibration xwindow.

THEN run the following commands from the d0run account: ***cd /online/comics/cal*** and then ***NEW_MakePeds.py***. This can also take about 5-10min.

When you are done, hit ***File/Exit*** in the calib_manager GUI to close it. This will stop printing in the d0run window.

13. Free the trigger. This releases the SMT crates as well as the calorimeter ones. Soon you will get those back. Tell the SMT shifter you are done with his crates.

14. Run Paw. Type the following commands in the xterm window in which you did step 2:

    > *cd /online/comics/cal*
    > *setup cern*
    >*ll peds.txt* (check that the date is the current date, if not call the on-call expert)
    > *paw*
    press the *Enter* key to accept the default workstation type (Paw window opens)
    exec peds xxxxxx yyyyyy and press the *Enter* key (xxxxxx = run number for x8, yyyyyy = run number for x1)
    press the *Enter* key 12 times to cycle through all plots. Do not look at them!
    >*quit*

15. Check the number of bad cells. In the same xterm window as above:

    a) type ***ll peds_bad.txt***. This file is a link to ***/online/comics/cal/valid/pref_bad_yymmdd-hh:mm:ss.txt*** if you took a ***reference run*** (10k evt) or ***valid/peds_bad_yymmdd-hh:mm:ss.txt*** if you took a ***short run*** (500 evt). Check that the date is the current date, if not call the on-call expert.

    b) type ***less peds_bad.txt***. There is one line per bad channels. If the number of channels is greater than ten, you should report that information to the cal expert before downloading the new pedestals. Columns 1 to 5 are the channel address. Next 2 are the recently computed pedestal and noise in gain x8 mode. Next 2 are the previous reference values. Next 2 are the recent pedestal and noise in gain x1 mode. Last 2 columns are the preamp box and type.

16. Check Paw printout. Print the Paw output by typing ***flpr –q dab1_hp8150_d peds.ps***. Get the printout, staple it. Check the plots against a set of reference plots which you will find on pink paper in the large white binder called ***Calorimeter Reference Plots: 02/13/03***. (usually located above the monitors). Note any discrepancies in the logbook, in particular

    a) check the statistics box in the plots to see if the number of over/underflows are different from the reference plots), and if they look severe enough contact an expert.

b) If you see many zeroes in the plots (where there shouldn't be), then it is possible that the earlier mentioned potential problems of detached Calib Manager processes may have caused this – if so, your only recourse is to contact the on-call expert, who in turn may decide to call the Calib expert (Taka).

17. Download cal_prepare_for_run. Unless special runs are planned, do as is explained above.

18. Do not free the trigger.

Taking a pulser pattern ramp run

This type of run will cycle through various pulser patterns, by ramping through pulser settings. It is assumed that you just downloaded ***cal_prepare_for_run***.

1. Set the mode. In the Crate Monitoring GUI (T&C GUI),

   a. click on the purple ***Global T&C Set*** button and select ***Si Buff Normal***.

   b. click on the purple ***Global BLS Mode*** button and select ***x8-2ticks***.

   c. click on the ***Global ADC Mode*** button and select ***PedSub***.

2. In the pulser GUI.

   a. Select the ***All*** button for the ***Pulser Address***. Note you may need to click this twice to actually set it and other buttons in this GUI.

   b. Select trigger bits ***13***.

   c. Set the DAC value to ***5000***.

   d. Set the ***Delay All*** box to a value of ***100*** (make sure you hit carriage return for this value to be entered).

   e. Click the ***DAC Ramp or delay*** button – the ***Request*** box in the upper right should show a value of **65**.

   f. Enter the ramp parameters: ***Steps = 1***; ***Step Size = 0***; and ***Ev/Steps = 100***.

   g. Click on the ***Pattern Ramp*** button (near the middle-right of the screen), that pops up a new window. In this window, click ***Run I Pattern***, then ***Apply*** and finally ***Close***.

h. Click ***Download!*** (only once!) to send the ramp request to the PIB. If the initial value in the Current Ramp Status pop-up window is not zero, then the previous ramp was not stopped. In that case stop the ramp in the Ramp Status Window.

3. Check the settings. In the Power Supply GUI, check the settings on the PLS-MODE tab.

4. Start cal_elec. In an xterm window, type ***start_cal cal_elec***, then ***init***, then ***patt*** and finally ***start***. Wait until some lines are printed.

5. Start the run. In the taker,

   a. select ***Modify Trigger*** and download file ***commissioning/cal/cal-all-xxx***.

   b. set ***Recording on***.

   c. click on the taker ***Start*** button. You should see the events changing in the ramp status window. Note that if the runs gets interrupted for some reason and you have to start all over again, then make sure to stop the ramp in the ***Ramp Status Window***. If you have trouble, check with the DAQ shifter and verify that there are no runs either underway or downloaded with zero L3-nodes associated. If that is the case, then ask him/her to stop the run, free the trigger and restart with a fixed (non-zero) number of L3 nodes assigned to their runs.

6. Watch the changing patterns. As the data is being collected, you can open the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) to the PLSMode tab where you will see the pulser patterns change. Make sure they are changing, otherwise something is wrong.

7. Stop the Run. After about 3 minutes, when 3200 (100 events times 32 patterns) events have been collected (as verified at the bottom line of the taker or in the ramp status window), you should stop the run by clicking ***Stop*** on the Taker. You should also ***Stop*** the ramp in the Ramp Status Window. Write the run number in the logbook with any other relevant information.

8. Stop cal_elec. In cal_elec window, type ***pause*** then ***quit***.

If a BLS power supply trips

1. Before resetting the supply. Record, in the electronic logbook, the following information:

a. ***Power supply identifier*** – once you have located the ***pink line*** in one of the three tabs in the ***Calorimeter Power Supply Monitor GUI*** (marked ***BLS N, BLS C, BLS S***), record the name (in the 1st column, something like ***CALx_LVCB_xx_y***).

b. ***Failure diagnostic*** – Left click on the cell called ***STAB*** of the tripped supply (it will be pink). The pop-up list may show one (or more) items in pink indicating what failed (e.g. ***B overcurrent*** or ***A supply OFF***, etc). Record those items in the elog. Click on the same ***pink STAB cell*** to close the pop-up box. Repeat the same steps for the ***STCD cell*** and the ***STEF cell***.

c. ***Failure condition*** – report anything that you think is relevant which preceded the trip, e.g. there was a recent change in state like the remote was turned on/off, etc.

2. Reset the supply. Click ***only once*** the Reset button. If the fault was ***not overcurrent***, you may hit several times the Reset button. If it does not reset, call the expert. Also have a look at the Troubleshooting tips on page 34.

Killing a crate from the readout. If you could not reset the supply, you have to take several BLS boards out of a physics run. Advise the DAQ shifter and the captain that the relevant crate be ***immediately removed from the run***. You want to remove the minimal number of channels – so once you have identified the effected channels, you should "kill" those channels. After the bad channels are killed, the crate can be put back in the run. Use the ***Hot Cell Killer*** to suppress them.

Locations of Documentation

The calorimeter documentation is scattered across many web areas. We are in the process of tidying it up and updating it, but for the moment here are some of the places you should check. Be aware this is a moving target.

URL	Description of contents
http://www-d0online.fnal.gov/www/groups/calmuo/	Joint calorimeter-muon shifter page
http://www-d0online.fnal.gov/www/groups/cal/cal_main.html	Cal online
http://d0-france.in2p3.fr/WORKING_GROUPS/CALORIMETRY/CALO_CAL/calo_cal.html	Calibration
http://hep.pa.msu.edu/cgi-bin/webcal/webcal.cgi?function=webmonth&cal=CAL	Shift schedule
http://www-d0online.fnal.gov/www/groups/cal/calo_shift_tasks.html	Today's task list
http://d0server1.fnal.gov/projects/calorimeterelectronics/tuts/Manual.doc	This document on the web – the word file
http://d0server1.fnal.gov/projects/calorimeterelectronics/tuts/Manual.pdf	This document on the web – the pdf file
http://d0server1.fnal.gov/projects/calorimeterelectronics/tuts/Manual.htm	This document on the web – the html file

Glossary

Here are some of the terms you may hear while taking a shift. It may help to translate some of the calorimeter jargon that is used.

Jargon	Translation
CRATE MONITORING GUI	Crate Monitoring GUI
T&C GUI	Crate Monitoring GUI
Power Supply GUI	Calorimeter Power Supply Monitor Display
Supply GUI	Calorimeter Power Supply Monitor Display
BLS	Baseline subtractor

How to?

In this section we document a series of frequently asked questions. If you have one that you think should be added, let us know. This section has grown so much that we need the following table to summarize the main areas.

Getting Help

1. **How do I place a vocal page?**

   Dial 4074 (or Gosh), wait for the beep. Then place your message twice and hang up.

2. **How do I page the calorimeter expert?**

   *(a) dial "**9**" to get an outside line, (b) dial **4777** (or 1 630 840 4777 if you are not in the 630 area code), (c) wait for the beep, (d) enter the number where you want to be called (for example the control room would be "8800"), (e) then press "#" or hang up, (f) finally wait for the call.* dial "9" to get an outside line followed by the number shown below – note that you may or may not need to use the "630", just try it one way or the other.

3. **What do I do if the expert does not answer?**

   Try to contact directly Robert Zitoun or any expert in the list.

4. **How do I page an expert from on site?**

*(a) dial "**9**" to get an outside line, (b) dial his pager number, (c) wait for the beep, (d) enter the number where you want to be called (for example the control room would be "8800"), (e) then press "#" or hang up, (f) finally wait for the call.*

5. **How do I page an expert from off site?**

(a) dial his pager number, (b) wait for the beep, (c) enter the number where you want to be called, (d) then press "#" or hang up, (e) finally wait for the call

Documentation

1. **Where do I find the D0 Calorimeter Online web page?**

http://www-d0online.fnal.gov/www/groups/cal/cal_main.html

2. **Where can I find other documentation (shift schedule, calibration info, etc) on the web?**

See the section on the locations_of_documentation *in this document on page 5.*

3. **Where can I find the Cal shift list?**

You can find it by clicking on "Calorimeter Shift Schedule " on the cal online web page or at: http://hep.pa.msu.edu/cgi-in/webcal/webcal.cgi?function=webmonth&cal=CAL

4. **I want to make some corrections to this manual. How do I do that?**

Periodically I will check the hardcopy manual that hangs around the calorimeter shifter's console, so you can write your comments in there (be sure it is the latest version!). Also, be sure to date and sign your handwritten comments in case I have questions. If it is urgent, send an e-mail to mailto:tuts@fnal.gov?subject=Cal%20Shifter%20guide%20comments *and cc* mailto:parua@fnal.gov?subject=Cal%20Shifter%20guide%20comments.

Logging on

1. **How do I log on d0ol45 ?**

The username is "***d0cal***" and the password is to be found in the ***D0 Cal User's Guide*** (it is a big white folder) – it is written on the front divider labeled Contact Information. Be aware that just because there is an open window, it may not be a ***d0cal*** window; it may be a ***d0run*** window. To check to see what account is logged into that window, just run ***whoami***.

2. **Where do I find the passwords for the various accounts?**

Since it is insecure to print passwords in a public document, you can either ask the DAQ shifter, or the captain, or find the passwords on the "contact information" yellow front sheet in the D0 Calorimeter User's Guide (big white binder that usually sits above the monitors of the cal console).

3. Where do I log on for calorimeter shifts? Where is the cal console?

The CAL/ICD computer is D0OL45 which is located in the north-east corner of the control room. You will see a blue label above the console that says "CAL/ICD" – actually it appears that someone has stolen that label, oh well.

4. How do I reboot the D0OL45 node? Is that ok?

There is no problem rebooting the node in the sense that you do not need to check with anyone. Assuming it has hung and is not responding, just press the reset button on the computer which you will find ……

5. How do I log on as a d0run user (rather than d0cal)?

Easy. There are two ways depending on your need.

a. *If you don't need any GUI's, then in an xterm window simply type* ***su d0run****, you will then be prompted for a password which you can find in the DAQ shifter's bible under Group Accounts.*

b. *If you need GUI's, then in an xterm window type* ***start_cal d0run*** *(which basically does* ***setup d0online*** *and then* ***d0ssh –l d0run d0ol45).*** *Replace d0ol45 by whatever other machine you would like.*

Window matters

1. How do I pop up a new window/shell?

If other windows are open, do NOT open another window unnecessarily as it wastes computer resources. Click the left-button on the mouse in any open space on your window, then select ***New Shell*** to open an xterm window. Except if you want to open histoscope, it is prudent to enter ***setup d0online*** once it is open – it sets up what you will need, and it never hurts to do that.

2. How do I close an X-window?

If you have tried the normal methods to get rid of it (like exit within the window) and failed, then ***left-click*** *your mouse in an* ***open area on the desktop****. You will see a set of possible choices, select* ***Window Operations*** *and then select* ***Close****. That produces a "skull & crossbones" cursor which you can move to the window you want to close and left click. That should close it.*

Printing

1. How do I print a file?

In your xterm window type ***printbw filename****, where* ***filename*** *is the name of the file you would like to print. The output will come out on the hp8150 printer that is located just outside the control room (as you leave the control room area turn immediately to your left, and it is right there). This is equivalent to* ***flpr –q dab1_hp8150_d filename*** *The command* ***flpr –q dab1_hp8150 filename*** *yields a single-sided printout. The command* ***print_color filename*** *will print on the color printer.*

2. How do I just print what I see in an X-window?

From any window (after issuing the ***setup d0online*** *command), you can run the command* ***print*** *(carriage return), then left-mouse click on the window that you would like printed (note that if you have an overlapping window on top, it will print that piece of it as well!). The output comes out on the HP 8000 printer just outside the control room.*

Useful Tools

1. How can I capture a screen shot?

Well, this is UNIX, so while it can (of course/not only) be done, it is (never/even) transparent, (but/and) there are many ways. Don't forget to clean up after yourself rather than keep cluttering the disk area with these screen captures. Here are some possible ways.

a) *Making a gif image file: In an xterm window on the same desktop as the screen you want to capture, type* ***cd*** *to go to home directory then* ***import screen.gif****. The cursor changes to a small "+" symbol. Move the cursor to the window you would like to capture and then left-click in that window, and wait until it is done. Check that* ***screen.gif*** *is in the directory by typing* ***ll /home/screen.gif*** *(this is the absolute path to the file you created).*

b) *Making a jpg image file: Same as for gif image. Just change gif to jpg.*

c) *Making a ps image file: Same as for gif image. Just change gif to ps.*

d) *Alternate method: in a xterm window run* ***display****, then select* ***File****, followed by* ***Open*** *and then click on* ***Grab****, enter a value of about 5 seconds (enough time to get the cursor to the window you want to capture). Move the cursor to the window you want to capture and wait the 5 seconds until the cursor changes shape to a cross, then click in that window. An image of that window will now appear in the display window; left click on the image and select* ***File****, then* ***Save****. You can add an extension to the name to save it in that graphics format – for example .gif or .jpg.*

e) *Yet another method: in an xterm window run* ***xwd >filename.screen****, the cursor changes to a small "+" symbol. Move this cursor to the window you would like to capture and*

click on it. That will capture the screen. Now convert that file to jpg by typing ***convert filename.screen filename.jpg****. That will produce the file* ***filename.jpg*** *in jpg format in the* ***/home*** *directory.*

Now you need to be able to pick up this image file, so we normally ***mv filename ~/calwww/histos/*** *which is accessible from the web at* ***www-d0online.fnal.gov*** *by then going to the group pages, selecting the Cal page and looking at the directory of histogram files. Copy it to wherever you want.*

f) **How do I convert a postscript file to a jpeg I can insert in the e-log?**

Easy. Once you have a postscript file (where for example you saved the plot as a .ps file), then you can run the following script /home/d0cal/plot4log filename.ps. This will create a jpeg file utilizing ghostscript with the name filename.jpg. To insert that in the e-log, follow the directions on page 28.

g) **How do I edit a file in Unix?**

If Unix is your OS, then you know, but for those Microsoft lackeys among us, then one simple WYSIWYG tool is ***xemacs filename &****. That will pop up a separate window with a windows-like GUI editor. There are surely many other ways, but this one seems easy. You may first have to issue a* ***setup xemacs*** *command.*

h) **The various GUI's are slowing down, how can I check to see if the system is overloaded?**

You can check to see if the system is overloaded (for example lots of lines in the GUI's are greyed out) by running a local copy of d0.ioc. To do that run ***start_cal ioc.*** *You are likely in trouble if* ***d0ctl03*** *shows more than* ***70% CPU*** *or* ***70% MEM*** *usage. If it is urgent (because the system has come to a grinding halt), then page the cal expert. If it is just annoying but you are still running, then wait till the daytime to page the expert.*

i) **How do I check to see what account the open window belongs to?**

Run ***whoami*** *in that window.*

j) **Where can I find the run summary information?**

As long as you wait about 10 minutes after the end of a run, you can access the run summary information by doing

> *setup d0online*
> *runsum.py xxxxxx* (where xxxxxx is the run number)

k) **How do I find a "rogue" node on my node?**

This may be a process that you did not know was running. I need to get the info/steps from Alan Stone – this is a placeholder.

Taker

1. **What is a taker?**

Taker refers to the actual data taking program. It may be running because the DAQ shifter started a Global run, or you may be running one when you take pedestals, download the trigger, etc.

2. **How do I open a taker?**

In any xterm window (Monitor #0), type ***start_cal taker***. Be patient, t*hat pops up a taker window*. You can check if recording is on or off, by looking at the upper right hand corner of the taker window, which will show ***Recording: on***. or ***Recording: off***. To change the mode, left click ***Modify*** and check the ***Recording*** box (as indicated by the little red box next to it).

3. **How do I remove the Calorimeter crates from the Global Run?**

You should ask the permission of the Shift Captain to remove the Calorimeter crates from the global run, and you should ask the DAQ expert to remove them once you have approval.

4. **The instructions say to run a specific trigger (with no version number), yet when I look in the list available in taker I see version numbers. Should I ignore the version number?**

Yes. To make the documentation more robust and stable, we will give the trigger file name ***without a version number.*** *If there is only one version, use it. If there are several versions, ask the calorimeter expert which one to use. If he is not available, use the latest version.*

5. **How do I set the hardware parameters so that we are in data taking mode?**

In the Taker, click on ***modify****, and then click on* ***Change Trigger****. You will now see the configuration window. To make sure you are in the correct directory, click* ***UP (Left)*** *until you are all the way "up" and the directories no longer change. Double click on the directory* ***commissioning****, then double click on* ***cal****, then double click on* ***cal_prepare_for_run-xxx (where xxx is the version number and if you find more than one version call the on-call expert)****. It will tell you* ***download in progress****. This will among other things download the pedestals. When you are finished, make sure to free the trigger. You do that by clicking* ***modify*** *in the Taker, and then selecting* ***Free trigger****.*

Electronic Logbook

1. **How do I start the electronic logbook?s**

In an xterm opened in Monitor #0, ***type setup*** d0online and ***start_daq logbook.*** Once the e-log window pops up, left-click on the ***DETECTOR Shift*** tab at the top, next left-click on the ***CALMUO*** heading in the menu bar at top, and left-click on the only pull down menu entry, ***CALMUO Log***. Expand the CALMUO Log window (left-click on the expand window symbol – 2nd from the right on the top bar). Click on the ***Log In-Log Out*** button on the left and enter your name and password.

2. How do I get a password for the electronic guidebook?

Ask one of the experts to create an account for you. The DAQ shifter or Captain can also create an account for you. This is what they will do. In the logbook click on ***Administrator*** *in the left-hand menu. In that menu click on* ***Select Administrator*** *and then select* ***Shift Administrator****. The password is the same as the one for d0run which the DAQ shifter and Captain should know. In the new window select* ***Add User*** *and fill in your information.*

3. How do I add text to the electronic logbook?

Open a text window by left-clicking (and holding the left mouse key depressed) on the ***Text*** button (top right of screen), then drag and drop (i.e., release the mouse button you have been holding depressed) the little paper symbol onto the main screen of the CAL log window. That will open a text window at the bottom, where you can start entering your comments. When you are done with an entry, you can save it by "archiving" it (right-click in the text window and select ***Archive All non-archived Entries in the Topic***, which will save the entry with your username and time stamp (so you don't need to enter that info in your entry). If you want all the gory details, there is a full users manual that you should find floating around the control room.

4. I would like to go back and edit an archived entry – how do I do that?

Sorry, as far as I can tell you are screwed (at least for the moment). What you can do is annotate an entry to make a correction or comment after the fact. To annotate, just left click the ***annotate button*** *that is attached to each archived entry.*

5. How do I print an entry I just made in the logbook?

This is strange but true – you can't do this easily, despite the fact that you will find menu items that should let you do this (click on ***Entries****, then select* ***Print Selected Entries*** *but you can't actually check the printer box – sigh). Here are two possible workarounds: (a) print to a file (rather than printer) following the above steps, then try and print that somehow, or (b) after having archived your entry, then use the web based tools to search for the entry from* http://www-d0ol.fnal.gov/crl/d0search.jsp*, and when you actually find the entry of interest use your browser print function to print. Simple, right.*

6. I know there is an old logbook entry that I want to see – how do I find it?

One way is to use a web browser and go to http://www-d0online.fnal.gov/crl/Jsp2.jsp?inquiry=d0cal/72hours *where you will find links which will let you access the last 72 hours, the last week or the last two weeks of log entries.*

You probably don't need this, but here are more detailed instructions. It is probably me, but I don't find the e-log user transparent. So this may not be the approved method but it seems to work. On the left side of the e-log window you will find a ***Search*** *button – left click on it. That opens up the search window. Use the* ***Inquiries*** *tab if you have specific search criteria you want to use (they are more or less self evident), or use the* ***Log Entry Explorer*** *tab if you are just fishing for all entries on a particular day or time. You then* ***Execute Inquiry*** *by left clicking on the button, and after awhile you should see the button below that change from* ***Found 0*** *to* ***Found 10*** *(for example if it finds 10 entries that satisfy your search criteria). If you hover on that button it will say* ***Drag this to Report Container****. If you are like me you'll ask what the hell is a Report Container? That cryptic statement means that you open another* ***CAL log*** *by left clicking on the* ***CAL*** *tab (upper left) and selecting* ***CAL Log****, that in turn opens a* ***CAL Log*** *window (this IS a Report Container, I guess). Now left click and hold the mouse on the* ***Found xx button*** *and drag-and-drop it into that window you just created. The entries will now appear there.*

7. **How do I import a screenshot or jpeg file into the logbook?**

Let's assume that you already have a jpeg file of the screenshot in some directory (if you don't know how to get a screen capture just look at page 24) and that you have an open logbook entry into which you would like to paste it. Now go to the logbook and look for the ***Insert Image*** *menu at the top of the logbook window and click on it and select* ***Insert Image from a File****. That will pop up a dialog box asking you to enter the directory and filename. If you don't know the name, you can* ***Browse*** *– usually it is in the* ***/home*** *directory (you can get to the home directory by clicking on the icon that looks like a house/home – get it?). Once you have entered the filename click* ***OK*** *in the dialog box. That will import the jpg image into the logbook.*

8. **How do I copy and paste text from an xterm window into a logbook entry?**

In the xterm window which has the text you wish to copy, highlight the text using your mouse (position the mouse at the start of the text, hold the left mouse key depressed, drag it across the text you want to copy and release the mouse). Leave that text selected and move the cursor into the logbook window. Left-click on the ***edit*** *pull down menu and select* ***paste-from-clipboard****. It will copy the selected text to the logbook at the location of your cursor. This does not appear to work all the time! (ah, Unix).*

GUI's: generic how to

1. **How do I start the standard set of calorimeter monitoring GUI?**

The standard GUI's should be running on Monitor #1 and #2. The basic GUI's required to monitor the health of the calorimeter system can be started by typing ***start_cal shifter*** in any xterm window (no setup d0online is necessary).

2. **How can I remember the name of a GUI?**

If you want to know the GUI names, then run ***start_cal*** with no name, which will list the available names.

3. **How do I start a particular GUI?**

You can start it up by itself by running ***start_cal <name>***, where ***name*** is the GUI you want to start, for example ***alarm*** or ***supply*** . See above if you don't know its name.

Supply GUI's

1. **What does the VBD reset in the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) do?**

In the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) you may have noticed three buttons that are labeled T&C reset, ADC reset, and ***VBD reset.*** *Together with the SCL init, these are the various resets that can be issued to the calorimeter system. The* ***VBD reset*** *is actually an artifact of the system which* ***no longer does anything****. It was supposed to send a reset to the crate readout board (called a VBD in run 1, used early in run 2, but now replaced by an SBC). If it were implemented, it should only be pushed when the DAQ system is NOT running with ANY CAL crates.*

2. **What does the ADC reset in the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) do?**

In the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) you may have noticed three buttons that are labeled T&C reset, ***ADC reset****, and VBD reset. Together with the SCL init, these are the various resets that can be issued to the calorimeter system. The* ***ADC reset*** *command tells the ADC board to abort any operation in progress (including the handshake with the VBD/SBC which if underway will provide corrupt data to the VBD/SBC), and return to its initial power on state. Most (but not all) of the resets are preformed at the beginning of every ADC digitization cycle, so this should never be required. However, there are states that the ADC crate can get into, where it will not recognize a new Start Digitize cycle, and the only way to fix it is to send this reset. It should only be done when the DAQ system is NOT running on ANY CAL crates. Make sure the run is paused before you issue such a reset.*

3. **What does the T&C reset in the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) do?**

In the power Calorimeter Power Supply Monitor Display GUI (= Supply GUI) you may have noticed three button that are labeled ***T&C reset****, ADC reset, and VBD reset. Together with the SCL init, these are the various resets that can be issued to the calorimeter system. VBD reset. The* ***T&C reset*** *command is ORed with the SCL init at the earliest possible place on the board, so it should function exactly like an SCLint, with the following exceptions. It is issued asynchronized to the*

accelerator clock (which should not make any difference, except that the different cards will then be using different SCA cells for the same physics event). It works even when the SCL link to the trigger system is down. Since we usually only run the system when the trigger system is working, this feature is only useful for the expert. So there is no reason that this reset should ever be needed. But if used, it should only be done when the DAQ system is NOT running with ANY CAL crates. Make sure the run is paused before issuing this reset.

4. **What is the Channel Archiver?**

The Channel Archiver is a program that collects and archives all the voltages, currents, etc every 15 min. There are programs that then allow you to look and plot variable values that are stored in the archive.

5. **How do I restart the channel archiver?**

For various (and sometimes mysterious) reasons, the channel archiver process may stop running and archiving – in that case all that monitoring information is lost. If you see that it is stopped you can restart it as follows. Note that the directory file name should be included to prevent a new archive from being created. Open an xterm window and move to the proper directory by typing ***cd /projects/archive/cal/current****. If the lock file is present (to get a listing of files, you could type* ***ls****), then you must remove it by typing* ***rm archive_active.lck*** *Now restart the archive but use the directory name as one of the command line parameters. For example if the directory name is* ***dir.20011019-091652****, then type* ***start_chan_archiver –c config_file –p 4814 –w . –d dir.20011019-091652****.*

How to grab the file before SAM gets it

Since getting data files back out of SAM can be problematic, here is a method that you can use to grab the file before SAM whisks it away.

1. Log into d0olc. Use ssh to login with d0***ssh –l d0cal d0olc***

2. Find the file. Change directory, ***cd /buffer***, then list the files and find their directory using ***ls –l */*x*.raw*** where *x* is the run number.

3. Copy the file. Once you have found the directory, you can copy the file to the project disk ***/projects/D0cal/data***. For example, the command to copy is ***cp buf015/daq_test_0000129054*.raw /projects/D0cal/data/.*** (yes, with a point after the last slash. You should make sure that the file is not too big (no more than about 1000 events).

Pulser GUI's

1. **How to shutdown all pulsers?**

If you need to shutdown the pulsers, then you are likely in big trouble because all your previous hard work is probably garbage. So turn off the pulsers and call an expert. To check the state of the pulsers, go to the pls mode tab in the ***Calorimeter Power Supply Monitor Display GUI (= Supply GUI)*** and see that all entries show zero. If not, the to turn them off, open the pulser control GUI. If it is not running, run ***start_cal pulser*** in your xterm window. Once the GUI starts, shut down all the pulsers by clicking the ***Select All*** button and clicking the ***Shutdown*** button.

2. **How do I check that the ICD pulser is off?**

There are two ways to do this.

The Easy Way: Look in the ***CalorimeterPower Supply Monitor Display GUI (= Supply GUI)*** *and select the* ***PLS MODE*** *tab. The last row is entitled* ***ICD LED*** *and contains the information on the delays and voltages. See that they are both set to* ***0****. You can use the next method to change it if you need to.*

The Hard Way: You essentially follow the procedure for setting the ICD pulser. So, to start, ***open an xterm window*** *in the usual manner (see above). Then type* ***setup d0online****, and change the directory by typing* ***cd /home/d0icd/vme/*** *and then run the ICD LMB interface by typing* ***./lmb_int.py &****. That pops up a small GUI. In the All column type in* ***0.0*** *for the* ***Voltage*** *and* ***0*** *for the* ***Delay*** *(which may already be there), then click on the* ***Download*** *button. That will assure you that the pulser is off by setting all the values to zero.*

Control Software

1. **Should I, as a shifter, issue any kind of reset?**

No. The only thing you should do is ask the DAQ shifter to issue an SCL Init after the run is paused. Otherwise leave it to the experts.

3. **What is an SCL init?**

SCL stands for Serial Command Link (SCL). It is the signal (sent on a fiber) that contains all the commands from the trigger framework for the calorimeter system (and other systems). You may hear that the DAQ shifter is issuing an SCL init – that resets the signal to all systems. Nowadays we are more cautious than in the past, so you should NEVER issue one yourself during global running (so I won't tell you how!), but rather ask the DAQ shifter to pause the run and to issue one if you need it.

4. **When should I issue T&C, ADC or VBD resets vs an SCL Init?**

As a shifter, the short answer is NEVER. The reasons are as follows. In principle, the only reset that should ever be needed is an SCLinit. However, in the past (and maybe even still true) we have observed that a SCLinit does not clear the system properly, so additional reset points which exist in the hardware have been made available. There are a few "features" of the SCLinit which make it the "preferred" way to recover from

an error, assuming that it works. First, it has been designed to be able to run "without pausing the DAQ system". ALL the local resets available in the CAL Gui's will definitely cause problems if used when the DAQ system is "running". Most, but not all of these errors will automatically be fixed over the next few events, but as a general rule one should always pause any runs using the CAL crates before issuing the local reset. Second, it occurs in ALL crates over the entire DAQ system (not just CAL), on exactly the same 132ns clock cycle. The local resets exist on individual crate level, as well as grouped for all CAL crates, and are guarrenteed NOT to occur at exactly the same time in any two CAL crates. Third, the SCLinit does not actually reset everything. The ADC and "VBD" were designed to never hang, so should never require a reset. Bottom line: leave those other resets to the experts and ask the DAQ shifter to issue an SCL Init when the run is paused.

Reset a tripped low voltage supply. If a power supply has tripped (which normally means that there are a large number of pink boxes), reset it by clicking the ***Reset*** button corresponding to the supply that is off. If all supplies have tripped, then use the ***Reset all*** button. Sometimes it takes more than one click to reset then try resetting it. If there is only a single isolated pink box (rather than the whole row indicating the supply might have tripped) which is not in the reference plot, then resetting should normally be useless. First check the Troubleshooting guide on page 34, but if that fails, then call an expert. While you are waiting for the expert, if the power supply problem is with the BLS supplies, then you should advise the DAQ expert that the corresponding crate be taken out of the run (because the reconstruction will go nuts if it uses these data). However, you eventually want to remove only the minimal number of channels – so once you have identified the effected channels, you should "kill" those channels. After the bad channels are killed, the crate can be put back in the run. Use the ***Hot Cell Killer*** to suppress them. Start the hot cell killer by typing ***setup d0online***, then ***d0ssh d0run@d0ol45***, then ***cd /online/comics/cal***, and finally ***NEW_HotCellKiller.py***. Check the help menu for usage details.

Monitoring

1. Starting dq_calo

In any xterm window logged on d0ol45 as d0cal, type ***start_cal dq_calo***. You will see some lines written to the screen. After a minute or so, check that dq_calo started by typing ***ps -C dq_calo_x***. If an instance of dq_calo is already running, nothing will be done.

2. Starting dq_monitor

In a xterm window of Monitor #0 terminal logged on d0ol45 as d0cal, type ***start_cal dq_monitor***. A GUI should appear.

Here is a view of the calorimeter that you may find useful. It lists the layers (and their names) in the radial direction, plotted against the towers in the η direction.

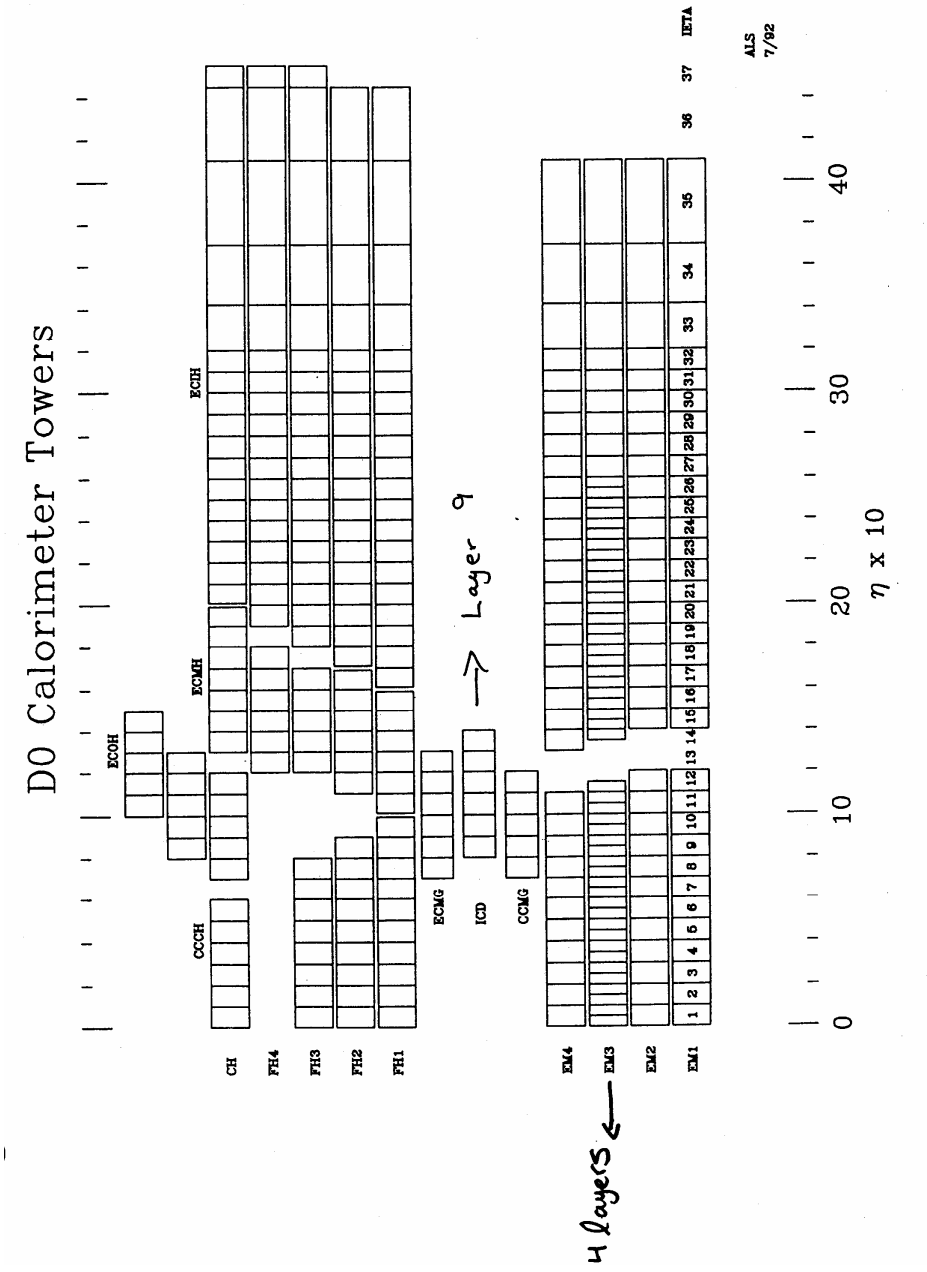


Figure 1

Expert Pages

In this chapter we present a manual for tasks that are normally done by experts, not shifters. On occasion you may be called upon by the experts to perform some of these tasks

Calorimeter Experts

Name	Office phone	Home phone	Pager	Cell phone
Mike Arov	(630) 840-8131		(630) 840-0935	(815) 501-1861
Ashish Kumar	(630) 840-8595			
Silke Nelson	(630) 840-8301	(773) 645-0021		(773) 209-3039
Nirmalya Parua	(630) 840-6792	(630) 985-1160	(630) 218-8489	
Pierre Pétroff	(630) 840-6447	(630) 840-3571		
Kirti Ranjan	(630) 840-8595			
Dean Schamberger	(630) 840-2495 (631) 632-8094 (631) 632-9221 (631) 632-8084	(631) 689-3141		
Junjie Zhu	(630) 840-5252	(630) 740-4533		(630) 740-4533
Robert Zitoun	(630) 840-2694	(312) 341-1696	(630) 266-0634	(630) 399-0024

ICD Experts

Name	Office phone	Home phone	Pager	Cell phone
Lee Sawyer	(318) 257-4053			
Andy White	**(817) 272-2812**			

Trigger Experts

Name	Office phone	Home phone	Pager	Cell phone
Dan Edmunds				
Bob Kehoe	(630) 840-8653	(630) 762-8549	(630) 218-4801	
Joe Kozminski	**(630) 840-3983**	**(312) 421 1629**	**(630) 218-4462**	

Other Experts

Name	Office phone	Home phone	Pager	Cell phone
Ursula Bassler	(630) 840-8740	(630) 840-4230	0612734678@sfr.net,	011-33-612-734678
Laurent Duflot	(630) 840-6852			
Shaoha Fu	(630) 840-8757	(630) 840-4923		
Leslie Groer	(630) 840-5587	(630) 208-8151	(630) 218-8421	
Slava Shary				
Michael Tuts	(630) 840-8304 (914) 591-2810 (212) 854-3263	(212) 316-1902		(917) 627-4646
Christian Zeitnitz	49-6131-392-3668			

Check List

1. Information. When you get the pager, exchange information with the previous expert. At the end of your shift, send a **concise summary** of what happened during your shift (calibration runs, physics run…) to the expert list. State the problems you faced and the way you solved them.

2. Make sure pedestal calibration run are taken. Pedestal calibration runs must be taken regularly ($<\delta t> \sim$ 1day). Make sure a calibration has been taken recently, otherwise remember the shifter to take one at the end of the next store.

3. Make sure a pulser run is taken.

4. Make sure preamp temperature are monitored.

Pulser Run

There are many times when you will want to take a very simple pulser run just to see that everything is alive. For example, after an extended shutdown when there has been lots of activity in the detector and cards have been swapped, it would be prudent to carry out such a run just to check that all channels are basically OK. Experts may ask you to run different parameters, but lacking any further guidance, use these values.

1. Set the configuration. In the taker, select ***Modify Trigger*** and download file ***commissioning/cal/pulser-cal-simple***.

2. Verify or modify the settings.

3. Start the Pulser run. Click on ***Start*** to begin the run. A pop-up ***Begin Run*** window will appear. Fill it in with your name in the ***shifter*** box, the gain (x1 or x8) and the crates being run in the ***Reason*** box, and check the ***Calibration*** button (or ***Test*** if you don't want it saved). That box disappears and the run has started. 500 events take about 5 minutes.

4. Stop the Run. When all the data (500 events) has been collected, you should stop the run by clicking ***Stop*** on the Taker. Write the run number in the logbook with any other relevant information.

Delay Ramp Run

This set of runs will allow you to generate data for a series of fixed pulser signals where the time delay of the pulser signal relative to a fixed sampling time is varied in programmable steps.

1. Set the timing for baseline sampling. The timing for the baseline sampling is set by opening the CRATE MONITORING GUI (=T&C GUI), clicking on the ***Global BLS Mode*** button and clicking on the ***x1 –2 ticks*** button. If it isn't open, go to your xterm window and run ***start_cal tandc***. Don't forget to always close the pull down menus before proceeding or you may be sorry when you forget where the menu came from and you can't close it! You have now set the baseline to be sampled at –5BC rather than the normal –3BC. The gain is fixed at x1 (which should be used for pulser DAC settings of >10000).

2. Set the ADC mode. Click on the ***Global ADC Mode*** button in the CRATE MONITORING GUI (=T&C GUI) and select ***Ped Sub***. This will read out all cells with pedestals subtracted but without zero suppression.

3. Set the T&C mode. On the ***CRATE MONITORING GUI (=T&C GUI)*** (called Crate Monitoring on the GUI) click on the purple ***Global T&C Set*** button and select ***Si Buff Normal*** (which stands for single buffer normal). In an xterm window change the directory, ***cd /online/config/cal/vme***, execute the usual ***setup d0online***, and then run ***./vme_tc_ctrl &***. Now select (left click and hold while you sweep over the entry with the mouse cursor) the number in the 1st column and type in ***89***. Similarly, for the 4th column, type in ***1f0***, and put ***8000*** in the 7th column. These values should now be in the boxes (with a 0x in front of them). Note that the number in front of the ***f0*** determines the number of ticks early that the ramp will be (so ***n***f0 = ramp ***n*** ticks early or late, and ***n*** goes from ***0 to 7,*** where late starts about something like 4 [Editors note: the exact transition between early and late needs to be checked])). You are done, so ***Quit***. You also need to enable Trigger ***Bit 12*** (Fixed Cell) in the Pulser GUI (you will find it near the bottom right) –

remember to start the pulser GUI you can type ***start_cal pulser*** in an xterm window (after a ***setup d0online*** of course).

4. Verify the T&C setting. Open the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) (if you don't remember how to do that, go back and look at the beginning of this chapter), and click on the ***Mode*** tab (the last one on the right). The value of ***DIAG*** (in the last orange/brown column) depends on the value of the ***TICK*** setting you made earlier. If ***TICK***=0 then ***DIAG***=0. If ***TICK*** is not equal to zero, then ***DIAG*** should not be equal to zero. The value of ***MODE*** should be ***0x8a09*** if you selected ***x1 – 2*** ticks , or ***0x8b09*** if you selected ***x8 –2*** ticks.

5. Set the initial pulser configuration. This step will ensure that the pulsers are in a known starting state. Open the pulser control GUI. If it is not running, run ***start_cal pulser*** in your xterm window. Once the GUI starts, shut down all the pulsers by clicking the ***Selecting All*** button and clicking the ***Shutdown*** button. Now initialize the pulser settings in the GUI by selecting the ***All*** button for the Pulser Address and then deselecting address 12 (usually the ICD is left out). Note you may need to click this twice to actually set it and other buttons in this GUI. Now set the DAC value to ***25000*** (for x1) or ***5000*** (for x8). Click the ***Enable All*** button to select all channels. Click the ***Cmd*** All button to set all the ***Cmd*** buttons. Set the ***Delay All*** box to the initial value of ***0***. Finally click the ***Download!*** Button.

6. Check the Pulser settings. Open the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) and go to the ***PLS mode*** tab. Make sure that the selected channels for all selected pulsers show a 1. The selected commands for all selected pulsers should be set to 1. The DAC values for the selected pulsers should be set at the chosen value (25000 if you have been following these directions). The six delay values for all the pulsers should be set at the chosen initial value. All the non-selected pulsers (none if you have been following these instructions) should have DAC values of 0, Delay values of 0, and channels and commands values of 0.

7. Monitor the ramp with cal_elec_ramp. You should monitor the status of your run using Cal Elec running in ramp mode. That means starting ***cal_elec_ramp***. See the detailed instructions on page 68 on how to do that.

8. Start the Delay ramp in the PIB (Pulser interface Board). Go back to the pulser GUI and click the ***Delay Ramp*** button – the ***Request*** box in the upper right should show a value of **66**. Next enter the ramp parameters: ***Steps = 50*** (max 255); ***Step Size = 5*** (min 1, max 255); and ***Ev/Steps = 50***. Now click ***Download!*** (only once!) to send the ramp request to the PIB. Note that if the initial value in the Current Ramp Status pop-up window is not zero, then

the previous ramp was not stopped. In that case stop the ramp in the Ramp Status Window.

9. Start the Pulser run. Open a Taker and select ***Modify Trigger***. Select the ***pulsar-cal-ramp-1.3*** file in the commissioning/cal directory. Click on the taker ***Start*** button. You should see the events changing in the ramp status window. Note that if the runs gets interrupted for some reason and you have to start all over again, then make sure to stop the ramp in the ***Ramp Status Window***. If you have trouble, check with the DAQ shifter and verify that there are no runs either underway or downloaded with zero L3-nodes associated. If that is the case, then ask him/her to stop the run, free the trigger and restart with a fixed (non-zero) number of L3 nodes assigned to their runs.

10. Stop the Run. When all the data has been collected (as verified in the ramp status window), you should stop the run by clicking ***Stop*** on the Taker. You should also stop the ramp in the Ramp Status Window. Write the run number in the logbook with any other relevant information. Send a copy of that to Ursula at mailto:bassler@in2p3.fr

DAC Ramp Run

This set of runs is designed to measure the linearity using the pulser at different settings.

1. Set the run parameters. In the taker, select ***Modify Trigger*** and download file ***commissioning/cal/pulser-cal-DAC-rampx8 (or x1)***.

2. Check the Pulser settings. Open the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) and go to the ***PLS mode*** tab. Make sure that the selected channels for all selected pulsers show a 1. The selected commands for all selected pulsers should be set to 1. The DAC values for the selected pulsers should be set at the chosen value (0 if you have been following these directions). The six delay values for all the pulsers should be set at the chosen initial value. All the non-selected pulsers (none if you have been following these instructions) should have DAC values of 0, Delay values of 0, and channels and commands values of 0.

3. Start the run. Click on the taker ***Start*** button. You should see the events changing in the ramp status window. When a new ramp step starts, the delay values in the supply-all GUI will change. Note that if the runs gets interrupted for some reason and you have to start all over again, then make sure to stop the ramp in the Ramp Status Window. If you have trouble, check with the DAQ shifter and verify that there are no runs either underway or downloaded with zero L3-nodes associated. If that is the case, then ask him/her to stop the

run, free the trigger and restart with a fixed (non-zero) number of L3 nodes assigned to their runs.

4. Stop the Run. When all the data has been collected (as verified in the ramp status window), you should stop the run by clicking ***Stop*** on the Taker. You should also stop the ramp in the Ramp Status Window. Write the run number in the logbook with any other relevant information. Send a copy of that to Ursula at mailto:bassler@in2p3.fr

DAC + Pattern Ramp Run

This type of run will cycle through various pulser patterns but differs from the previous section by different steps for the x8 mode and a x1 mode as well. The following table is a quick reference. Notice that the "Value-Value-Value" column in the table refers to the fact that you will run the same cycle three times, and change the values as shown in the table – to make it clearer those values that change from run to run are shown in bold. This whole cycle takes about 30 minutes.

GUI/Parameter	*Value – Value - Value*
	In the T&C GUI
T&C Mode	*Si Buffer Normal - Si Buffer Normal - Si Buffer Normal*
BLS Mode	***X8-2ticks - x8-2ticks - x1-2ticks***
ADC Mode	*Ped sub - Ped sub - Ped sub*
	In the Pulser GUI
Pulser address	Enable *All* - Enable *All* - Enable *All*
DAC value	***0 - 0 - 0***
Delay value	*100* enter - *100* enter - *100* enter
Trigger bits	Enable *13* - Enable *13* - Enable *13*
In Pulser GUI click on "Pattern Ramp" to open sub GUI	
Read File	RunIItestpattern
Apply	click – click - click
Close	click – click - click
In Pulser GUI click on "DAC Ramp" and enter	
Steps	***40 - 40 - 40***
Step size	***40 - 400 - 3200***
Ev/step	*50 - 50 – 50*
In Pulser GUI click on "DOWNLOAD"	
Power Supply GUI	Check settings on PLS-MODE page
	In Taker
Modify	Recording *on*
Select a trigger	*Change Trigger*
	Commissioning/cal/cal-all-xx
	Download

Start run **Stop taker when ramp is finished**

It is assumed that you downloaded ***cal_prepare_for_run***. You have to take 3 runs, a low DAC x8 run, a "normal" x8 run and a x1 run.

1. Set the mode. In the Crate Monitoring GUI (T&C GUI),
    a. click on the purple ***Global T&C Set*** button and select ***Si Buff Normal***.
    b. click on the purple ***Global BLS Mode*** button and select ***x8-2ticks***.
    c. click on the ***Global ADC Mode*** button and select ***PedSub***.
2. In the pulser GUI.
    a. Select the ***All*** button for the ***Pulser Address***. Note you may need to click this twice to actually set it and other buttons in this GUI.
    b. Select trigger bits ***13***.
    c. Set the ***Delay All*** box to a value of ***100*** (make sure you hit carriage return for this value to be entered).
    d. Set the ADC value to 0.
    e. Click on the ***Pattern Ramp*** button (near the middle-right of the screen), that pops up a new window. In this window, click ***Read File***, find file ***RunIItest*** pattern, then ***Apply*** and finally ***Close***.
    f. Click the ***DAC Ramp*** button – the ***Request*** box in the upper right should show a value of **65**.
    g. Enter the ramp parameters: ***Steps = 40***, ***Step Size = 40***, and ***Ev/Steps = 50***.
    h. Click ***Download!*** (only once!) to send the ramp request to the PIB. If the initial value in the Current Ramp Status pop-up window is not zero, then the previous ramp was not stopped. In that case stop the ramp in the Ramp Status Window.
3. Check the settings. In the Power Supply GUI, check the settings on the PLS-MODE tab.

4. Start the low DAC x8 run. In the taker, select ***Modify Trigger***, then select ***cal-all-***xx in the ***commissioning/cal*** directory. Click on the taker ***Start*** button. You should see the events changing in the ramp status window. Note that if the runs gets interrupted for some reason and you have to start all over again, then make sure to stop the ramp in the ***Ramp Status Window***. If you have trouble, check with the DAQ shifter and verify that there are no runs either underway or downloaded with zero L3-nodes associated. If that is the case, then ask him/her to stop the run, free the trigger and restart with a fixed (non-zero) number of L3 nodes assigned to their runs.

5. Watch the changing patterns. As the data is being collected, you can open the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) to the PLSMode tab where you will see the pulser patterns change. Make sure they are changing, otherwise something is wrong.

6. Stop the Run. When all the data has been collected (as verified in the ramp status window), you should stop the run by clicking ***Stop*** on the Taker. You should also stop the ramp in the Ramp Status Window. Write the run number in the logbook with any other relevant information. Now repeat the process with new values in the following steps.

7. Start the "normal" x8 run. Start everything from step 2e above, just change ***Step Size=400***.

8. Start the x1 run. First set the BLS Mode to ***x1-2 Tick***. Then start again from step 2e above just changing ***Step Size=3200***.

Well, if you got this far it is now eight hours later – go home, have a drink and relax. You deserve it!

Double Digitization Run

These runs take data simultaneously for the x1 and the x8 gain paths separately. The basic procedure is the following

1. Select the Taker . In the Taker, download file ***commissioning/cal/cal-double-digit-nopulser-xxx***. After the download is complete (about 30 seconds), ***start*** the run.

2. Stop the Run. When all the data has been collected, you should stop the run by clicking ***Stop*** on the Taker. Write the run number in the logbook with any other relevant information.

Triple Digitization Run

These runs take data simultaneously for three samples in time, which are then used to carry out timing studies. Usually you would take these runs while there is beam.

1. Select the Taker. In the Taker, download file ***commissioning/cal/cal-triple-xxx.*** Set ***Recording off***

2. Adjust the prescale. You need to adjust the prescale so that you get the highest rate without ADC errors. Ask the DAQ shifter what the ***and-or rate*** is for your trigger (it should be the only trigger). ***Divide*** that number ***by 4*** and use that as your prescale factor. (this should correspond to about a prescale of 25 at a luminosity of 2E30). To set the prescale, click on ***Modify***, and then click ***Change Prescales…***, then enter the value of the prescale (e.g. 25) in the appropriate box (it should be obvious – but ask the DAQ shifter if you need help). Now verify that the prescale is correct by clicking Start. The rate seen at the bottom of the window should be about 10-12 Hz (slower than that and you are wasting time, and faster than that and you will incur ADC errors). If it isn't in that range, adjust the prescale accordingly. Once you are satisfied, ***Stop*** the run (click on the bottom left button).

3. Turn on recording and start the run.

4. Check that there are not too many ADC errors. You should make sure that you are not getting too many ADC errors by watching the Mode status page (purple columns – Status) 0x3f is normal but bits on in the high order 8-bit word indicates some error.

5. Stop the Run.

ICD LED Pulser Run

The ICD needs to establish the running conditions (intensity and delay) for the LED pulser runs. In order to do this, we require a large set of runs taken under varying settings. Follow these instructions to take these sets of runs. You may wish to check in the logbook to see where we are up to. One run at a given voltage and delay setting will take about 30 minutes, and it should be done when there is no beam in the machine.

1. Get the calorimeter crates. Verify with the Captain/DAQ shifter if you can take the Calorimeter crates out of the global configuration. The LED pulser runs should only be taken when there is no beam in the detector (no collisions, no halo, prior to shot setup and not during beam studies).

2. Download the Trigger. In the Taker, click on ***Modify/Change Trigger*** and download file ***commissioning/cal/cal-icd-led-pulser-xxx***. Set ***Recording on***.

3. Make sure that all low voltage and high voltage power supplies are on and working. In the Power Supply GUI, perform the following checks:

    a) In the Preamp tab, verify the ICD low voltage power is on. The last row of cells which begins with ***ICD_LVCP_PW09*** should be green (except for those that are grey), and in the column titled ***STAT*** you should see ***0x3***. If not, first click on ***RESET***. If that does not work, click ***ON*** and if that fails, call the Calorimeter expert.

    b) Verify the BLS power supplies in the North and South are on;

    c) Verify that all of the preamp pulsers are off (Pulser 00 through 12). Click on the ***PLS Mode*** tab, and make sure there are zeroes in every row and column, if not turn them off;

    d) Click on the ***Mode*** tab, then click on all four orange buttons in the ***Global*** row: ***Global T&C Reset***, ***Global ADC Reset***, ***Global VBD Reset*** and ***Reset VBD CTRL***. Verify all cells in the ***BLS M*** column show ***Normal***, and the cells in the ***ADC M*** column show ***Unsuppressed***.

4. Check Trigger Bit 12 in the Pulser GUI. Check in the pulser GUI that that ***trigger bit 12 is on***: the colored boxes under the trigger bits should be set to all pink except for 12 which should be green.

5. Verify that the ICD high voltages are on. The ***HV Global Monitor*** GUI should be displaying ***light blue*** boxes, and the ***HVC Channel Monitor Display*** GUI should be showing ***green*** boxes for the voltages and currents. Check page 96 if you need more explanation of the HV GUIs. If you think there is a problem, carefully read the documentation for instruction.

6. Check the Voltage and Delay setting for the ICD LED pulser. Open the ICD LMB Interface:

    >setup d0online
    >cd /home/d0icd/vme/
    >./lmb_int.py &
    >cd /online/examines/scripts
    There are detailed instructions on how to use this GUI on the web at: http://www-d0ol/www/groups/icd/controls/icd_lmb.html. Please take a few minutes to read the documentation before proceeding further. For a simple "snapshot" of the ICD, use a voltage setting of ***8.6*** (V) and a delay setting of ***100*** (ns). Type these

values into the ***ALL*** column and then click on the ***Download*** button. Click on the ***Read*** button to verify that the values you just entered appear in all four columns.

7. Start the Run. Return to the taker. Click on the ***Start*** button at the bottom. Enter your ***name***, type in the ***voltage*** and ***delay settings*** [for example: ***7.8V, 10ns***] in the comment field, toggle the ***Calibration*** option (not Physics, not Cosmics, not Test) and then click on ***OK***. The run should start within 15-20 seconds. At the bottom of the taker, you will see the ***current time***, the ***current run number***, the ***total number of events*** taken by this run, a ***rate*** in Hz and some number with a "+" sign in front of it which is just the number of events recorded by taker in the last 15 second cycle period, and the elapsed time of this run. Watch to make sure the ***rate increases to several hertz*** (depending on prescale). If you see no rate, there is a problem either with the calorimeter readout system or L3. Consult with the DAQ Shifter.

8. Run cal_elec for the ICD. Type ***start_cal cal_elec***. Once started, type ***init***, then ***icd***, then ***start***.

9. Display the Histograms. Return to the histoscope window. We recommend you make the histoscope window as tall as the screen and a little wider. If the event count is more than 16 in the xterm window, select ***File/Process*** then ***Connect to Process***, and a smaller window titled ***Available Processes*** will open with the item ***cal_elec ICD histograms (d0cal)*** selected. Click on ***Connect***. In the left hand side, you will see under ***Sub Categories***, ***CALELEC.HBOOK0***. Select with the mouse and click on the ***Open*** button at the bottom of HistoScope. A long list of histograms will appear in the right hand window according to Calorimeter crate and ADC card. You will notice that only calorimeter crates 0 (0x40), 1 (0x41), 4 (0x44), 5 (0x45), 6 (0x46), 7 (0x47), 10 (0x4a) and 11 (0x4b) are listed, and only ADC cards 1, 2, 4, 5, 7, 8, 10 and 11 are available. We are primarily interested in the ***Mean vs. ch*** and ***Sigma vs. ch*** histograms.

10. Print out the Histograms. Just in case the files don't get saved properly, we would like a printout of the histograms. Make a ***Multiple Histogram*** plot of the means for ***Crate 0 and Crate 1***, ***Crate 4 and Crate 5***, ***Crate 6 and Crate 7***, and ***Crate 10 and Crate 11***, i.e. four pages with 16 histograms per page. Now ***Print*** these four pages and file them in the white binder called ***Calorimeter Reference Plots***.

11. Collect 7000 events. You will need to glance at the bottom of the taker now and then. If you see ***IPC_STATUS 0*** and ***Waiting for message***, the data taking has stopped. You can confirm this by looking at the bottom of the taker, and noticing a rate close to ***zero Hz*** followed by ***+0***. Consult with

DAQ Shifter. We are interested in taking ***7000 recorded events*** for each run (for each combination of voltage and delay setting).

12. Stop the accumulating data and save the histogram files. If the number of events booked by histo in the cal_elec xterm window is greater than 200 events, return to the xterm window and type ***stop*** and then ***quit*** . If this does not work, ***CTRL-C*** will stop the run. However, we would need to have the hbook file from each run so we can look at the mean and sigma histograms to get a quick idea of which runs to give highest priority for analysis. In ***/online/examines/output/*** there is a file that looks like ***cal_elec__$date_$time.hbook0***. If you can stop and quit normally, then go to that directory and rename (you can use ***./icd_rename_hbk 7.8 10*** to rename for 7.8V and 10 ns for example) the file like the following: ***21_1_2002_7.8V_10ns_ICD_LED.hbk*** (it should be clear what the filename format is, i.e. day_month_year_voltage_delay_ICD_LED). You can verify if the file was closed properly by looking at it within the HistoScope. Select ***File/Process*** then ***Open HBOOK File***, select the file of interest and click on the ***OK*** button. If nothing shows up in the right hand side, and/or the ***Current Category*** is ***Uncategorized***, then the hbook file was ***not*** closed correctly. In that case please start over for this voltage and delay setting.

13. Stop the Taker and record run data. Click on the ***Stop*** button at the bottom of the taker. Type in the comment field the name of the ***hbook file***. Enter the following information into the logbook: ***Run number***, ***Voltage offset***, ***delay time***, ***Approximate number of events*** (see the bottom of the taker), ***Did a hbook file get saved***? Copy and paste this into an email and send to mailto:d0icd@fnal.gov. There is a little whiteboard above the CAL/ICD console for Beam Off Tasks. In one space, I wrote ***ICD LED Runs Performed***. After you have done the run, write, for example: (***7.8V,10ns***) so the next shifter to take a ICD LED pulser run does not repeat that voltage and delay combination.

14. Run another if time permits. Each run will take approximately ten to fifteen minutes. If you have time, proceed to the next voltage and delay setting combination (see whiteboard for what has already been done). If there is not enough time, or the DAQ Shifter/Captain have requested the calorimeter crates be returned to the global run, then proceed to the next step and shutdown the pulser. This is ***VERY important***.

15. Free the Taker Trigger. Locate the taker, select ***Modify*** , then select ***Free Trigger***. Now you are done.

BLS trip

1. ***Undervoltage*** trip. Our experience tells us that a fuse in the BLS supply has melted. Try resetting the supply a number of times quickly. Sometimes that brings it up because it lets you charge up all the capacitances. If it does not reset, there is nothing to do but replace the supply and take out the old one for repair.

2. ***Overcurrent*** trip. The supply is presumably ok, but there is a real load on the supply. In general, one of the BLS cards could have failed with a short on one of the voltage rails (e.g. a bad cap). You need to access the BLS crate and check whether a card has failed: pull out 8 boards out of 16, etc.

3. A ***full quadrant*** (like for example ECS NW) of BLS supplies has tripped, i.e. all boxes in ***all six rows are pink***, and cannot be reset. This is an external interlock problem which you have to reset first. I n the appropriate BLS page (either ***BLS N***, ***BLS C***, or ***BLS S***), check if column ***STB8*** reads ***0x44***. If so, click on that particular box to get more detail, and you may see something like a box with ***Ext Int Fault*** in pink. The problem is likely a tripped rack monitor, so check the ***Rack Environment Monitor Display GUI*** (in Monitor #2). Select the ***Central***, ***North***, or ***South*** tab corresponding to the BLS that tripped (making the association is not obvious unfortunately, so look for any pink box!). Click the ***Reset*** button for that row. A variant on this is that the Rack Environment Monitor Display looks ok (all ***green***) BUT it ***still needs a reset***. In that case try resetting them all (that way you are sure to get the right one).

4. A ***full quadrant*** of BLS shows some ***pink/yellow***, in particular the ***+7VA I*** and the ***-3VB I*** columns (and sometimes others like ***-12VDI*** and ***+13VCI***), and all ***the rest is green***. In fact the currents are not off, but merely a little lower than normal (say 17A vs 19A). This problem can be caused when the ***clocks*** for the experiment (and the T&C in particular) go away. This sets the BLS in a lower power safe mode, hence the lower current draw. So, check to see that the ***CETEC supply*** (the last row) is on in the ***ADC tab*** in the ***Supply GUI***. If it has tripped, then clocks have indeed gone away, so try resetting it. If, however, the CETEC supply looks ok, then ask the DAQ shifter or the Captain if the experiment clocks are off. If so, then just wait until the clocks are restored, in which case the problem should go away once data starts flowing.

5. ***A pair of BLS supplies*** (0 and 3 or 1 and 4 or 2 and 5) show ***pink STB8***, ***STCD***, and ***STEF*** boxes and a ***yellow STB4*** box. Everything else looks normal. It is just a readout problem and ***data taking is unaffected***. The ***STxx*** represent status bits that are read out from the BLS supplies, such as the state of the 3 phases, the temperature trips, etc. If they appear to have tripped (i.e. have turned pink or yellow), and yet all the currents and voltages look ok, then

that means, most likely, that ***the digital cable has fallen out or come loose from the BLS supply*** in the platform. An authorized expert will request a short (15min) access to go in and reconnect the cable.

6. ***A pair of BLS supplies*** (0 and 3 or 1 and 4 or 2 and 5) indicates that ***one (or more) of the 3 phases has tripped*** (i.e. turned pink). This means that one of the phases is removed due to the AC cord being twisted. An authorized expert has to "untwist" the AC cord during an access. If ***everything else looks OK***, the phase has tripped momentarily, but the warning light has latched the error, leaving the warning pink: ***the supply is fully working***.

7. Old stuff (to be checked) *Problem:* I pushed the top of a BLS supply and it tripped off. What happened?

   Solution: The problem has been traced to the lugs on the transformer in the supply that are too close to the top cover (especially if they haven't been bent out of the way). They can short out the leads when the cover is depressed. We are working on adding an insulating layer on the cover to avoid this. In the meantime, releasing the pressure should solve the problem. However you should note in the e-log which supply this happened to.

8. Old stuff (to be checked) *Problem:* A BLS supply has tripped and it won't come back on. What do I do?

   Solution:

   a. If it looks as if the voltages and currents are "trying" to come up, then it may be necessary to remove (temporarily) some of the load, i.e. pull out BLS cards from the crate, turn on the supply and see if it comes up (obviously that requires access). Then the cards are plugged in under power (carefully!).

   b. If it looks as if they are not "trying" to come up and you have an under voltage trip, then experience tells us this may mean that the internal fuse holder has melted. At that point the supply must be replaced with spares that are sitting in the collision hall.

Troubleshooting Guide

This chapter is exactly that – a troubleshooting guide. Use it when you run into problems or while waiting for the expert to call you back.

In this chapter we will try and compile a list of problems that have arisen and their possible solutions. If you find a problem and can explain how you fixed it, let us know and we will add it to this section. It should grow to be quite useful.

Software problems and failures

The list of categories for which we have documented troubleshooting hints on software and GUI's are:

Calorimeter Power Supply Monitor Display GUI

1. *Problem:* The GUI has stopped responding, all the boxes are greyed out, and clicking the ***Reconnect*** button doesn't do anything.

Solution: Exit the GUI by left-clicking on the ***Exit*** button on the lower right. Now restart the GUI by opening an xterm window and running ***start_cal supply***. If that doesn't work, check the next problem down below.

2. *Problem*: I cannot start the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) from an xterm window. I keep getting the error message ***start_cal: Command not found***.

   Solution: While the cause of this problem is not known, you can start the GUI up by hand. Run ***/online/config/cal/supplies/supply_all &*** from your xterm window.

3. *Problem*: A lot of preamp power supplies now read red – in particular the currents for the secondary (unused) power supplies read something like -0.2 and the limits are -0.1. How do I make all that red go away?

   Solution: This can be caused by having one of the front-end nodes (like d0olctlxx) reset. After a reset they get their limit data (these are the limits that set the yellow and red colors) from the database, and the database has not been updated so it has the incorrect limits. This is being worked on, but in the meantime you will need to contact Dave Huffman to set the correct limits by hand.

4. *Problem*: The Calorimeter Power Supply Monitor Display GUI (= Supply GUI) is behaving strangely. Some rows of boxes just show grey, and when I try to ***Reconnect*** (the box in the lower left) it occasionally fixes the problem row, but a new row gets the same problem! How do I fix this?

   Solution: The problem can be that the computer resources are being used by some rogue process. You can check that by going to the ***IOC resource display*** GUI (probably on Monitor #3) and selecting the ***Cal*** tab and looking at the ***d0olctl03*** row and checking the ***CPU %*** and ***Mem %***. If either is above about ***70%***, you probably have a ***runaway GUI/process***. To find that process you will likely need to call a ***cal monitoring expert*** (e.g. Leslie Groer).

5. *Problem*: I just noticed that a large number of BLS current readings show pink, but then they return to normal green. Is that normal?

   Solution: Possibly. If you notice that the current readings turn pink and data taking has stopped, then this is ok as long as they return to green once data taking resumes. For a more detailed explanation and solution see problem 0 on page 34). If it persists as pink after data taking starts, then there is a problem. Call the on-call expert.

Histoscope

1. *Problem*: When you try to ***Connect to process…*** you get the following error message ***Error listing file: Error scanning /tmp directory***.

   Solution: First make sure that you have collected at least 15 events – otherwise you will get this error. If know that you have taken more than 15 events, then this workaround, which was not necessary in the past, seems to solve the problem. Hey, it's all black magic! You will need to type ***setenv TMPDIR /tmp/dummy_name*** (yes it means ***dummy_name*** exactly) in both the xterm windows from where you are running examine (or the cal_elec that is producing the histogram) and from where you are running histo. It is also possible that your problem is due to additional Examines that are running. In that case do a ***ps –u d0cal*** to identify those processes and then kill them.

2. *Problem*: I tried to start the cal examine process using start_cal examine, but it doesn't seem to run. Is there another way to get this process started?

   Solution: The script is supposed to do everything for you, but sometimes there are problems because you might be on the wrong node etc. You might first try opening a fresh xterm window and trying again. If that fails you can try starting it by hand. That means

   >setup d0online
   >d0ssh d0ol45
   >setup histo
   >histo &
   >setup d0online
   >cd /online/examines/scripts
   >./cal_examine.sh
   … *after you see the message: command reader starting*
   init
   start

   …*open the histograms and look at plots, then finally*…
   …*when you are done*…
   stop
   quit

3. *Problem*: I tried to start the L1 cal examine process using start_cal l1examine, but it doesn't seem to run. Is there another way to get this process started?

   Solution: The script is supposed to do everything for you, but sometimes there are problems because you might be on the wrong node etc. You might first try opening a fresh xterm window and trying again. If that fails you can try starting it by hand. That means

```
>cd /online/examines/p12.04.00/l1calex
>setup d0online
>setup D0RunII p12.04.00
>d0setwa
>cd l1cal_examine/online

>./Runme.sh
init
start
…and when you are done…
 stop
 quit
…in new xterm
>setup histo
>histo &
```

Data Taking Problems

1. *Problem:* I have crates that are missing in the event. What do I do?

   Solution: Go to the ***Mode Shift*** page (which you get to from the ***Mode Shift*** tab in the ***Calorimeter Power Supply Monitor Display GUI (= Supply GUI)***). Ask the DAQ shifter to ***pause the run***. Then click on the ***Global T&C reset***, then ***Global ADC Reset*** and ***Global T&C reset*** again. Ask the DAQ shifter to issue an ***SCL init***, and then ***restart the run***.

2. *Problem:* I see lots of ***0x30*** (pink) flashing in the 2nd column on the mode shift tab in the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) , but otherwise everything looks normal.

   Solution: Don't worry it is normal. The ***0x30*** simply means that it is waiting for the L2 decision.

3. *Problem:* Data taking has stopped, the DAQ shifter has told me one of the calorimeter crates is at fault, and I see the crate showing ***0x11*** in the 2nd column of the ***Mode Shift tab*** in the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) . What should I do?

   Solution: The most prudent course of action is to ask the DAQ shifter to ***pause the run*** and issue an ***SCL init***. Issuing an SCL Init while we are running can cause all sorts of grief to the data. Do not do it yourself.

4. *Problem:* The DAQ is looking to me to reset the Cal crates because of a problem. What should I do?

   Solution: Don't believe him/her. The first thing you should do is ask the DAQ shifter to ***pause the run*** and ***issue an SCL Init***. If that solves the problem

you are done. If not, then you can ask the DAQ shifter to ***pause the run*** again, and you issue an ***T&C reset***, then an ***ADC reset***, then a ***T&C reset***. Make sure that after that the DAQ shifter issues a ***SCL Init***. If that hasn't solved your problem, it is time to call the on-call expert.

5. *Problem:* My calorimeter console node seems to have slowed down a lot. What can I do?

   Solution: You might have a number of "rogue" processes running (such as a bunch of Examines). You need to find them and kill them by doing [here this is a placeholder for instructions that I should get from Alan Stone]. In the meantime, try looking at page 34 which tells you how to find the processes even if your console appears frozen.

Calib Problems

1. *Problem*: There appears to be something wrong with the Calib GUI and I see many zeroes in the calib printout. Any ideas?

   Solution: If you ***exited improperly*** from the Calib GUI. For example you did an ***Exit*** from the GUI when the ***ABORT*** button was showing on the bottom left, then you may have created detached processes that corrupt your calib data. You should first try restarting the Calib GUI and exiting properly (i.e. click the ***ABORT*** button, or wait until ***CONFIGURE*** appears in the GUI and then Exit). If that fails you should call the on-call expert, who in turn may call the Calib expert (Taka).

2. *Problem*: The calibration process looks like it never completed. What can I do?

   Solution: This is caused when a previous calibration run did not completed or it was not aborted properly. This can happen when a second calibration run is started before the first one is completed or when a calibration run is stopped from a taker window instead of from a Calib_Manager gui window. I have put in a fix to deal with this situation. But it still happens once in a while due to subtle timing in which itc processes communicate. So, the current fix is to kill ***processes that are left over from the previous calibration runs***. To do that, logon to ***d0ol08*** as ***d0run*** and type ***ls -f -u d0run***. At the end of this paragraph we have included the text you would see when doing this for a specific example with the database interface process called Subsystem_Validator.py. Type ***kill -9 pid*** (where ***pid*** is the process ID) on the main thread. The threads created by the main thread will die when the main one is killed. In the example , the ***pid is 5810***. You might have to kill more than one such processes, if somebody tried to run the calibration more than once after Calibration Manager got into this state. After killing all these processes, you should be able to take calibration runs again. Do not kill Calib_Manager for this. Problems? Contact Taka.

```
d0run 5810    1 5 09:54 pts/9 00:00:01 python
/online/products/onl_calib_system/onl00-03-
00/Linux+2/py/Subsystem_Validator.py
d0run 5811 5810 0 09:54 pts/9 00:00:00 python
/online/products/onl_calib_system/onl00-03-
00/Linux+2/py/Subsystem_Validator.py
d0run 5812 5811 0 09:54 pts/9 00:00:00 python
/online/products/onl_calib_system/onl00-03-
00/Linux+2/py/Subsystem_Validator.py
```

3. *Problem:* The peds.txt link has the wrong date. What do I do?

   Solution: You need to establish the proper link by hand. If you really don't know what you are doing, call the on-call expert.
   > *ln –sf valid/peds_ped_yymmdd_hh:mm:ss.txt peds.txt* (short 500evt run)

   OR

   > *ln –sf valid/pref_ped_yymmdd_hh:mm:ss.txt peds.txt* (long 10kevt run)

Alarm Server/Significant Event Server (SES)

1. *Problem*: The alarm server GUI has a major alarm showing (a pink box). How do I find out what has gone wrong?

   Solution: First you should left-click on the pink box in the alarm server GUI. That will pop-up a more detailed window with information about what specific device caused the error. The names can be cryptic, but the name should be somewhat informative – for example you may see the same name in the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) . You will probably also see a pink box in the power supply monitor GUI (again left-click on the box for more details) which should help you to localize the problem to a specific power supply. Once you have identified the problem, reset the appropriate supply (if that is the problem), and note it in the e-logbook. If you can't find or fix the problem, call the on-call expert.

Downloading & Creating Pedestals

1. *Problem:* I completed taking the ***x1*** and ***x8*** pedestal runs but when I ran the ***make_peds.sh*** script I got the following error message:

```
....
.....
set run8=160564
set run1=160560


./cal_peds_query_x8_x1.py $run8 $run1
make_peds takes about 2 minutes per crate
```

```
crate  64 is being done
Traceback (most recent call last):
  File "./cal_peds_query_x8_x1.py", line 236, in ?
    main ()
  File "./cal_peds_query_x8_x1.py", line 229, in main
    writePickle(name3, dataList)
  File "./cal_peds_query_x8_x1.py", line 67, in writePickle
    crateClass.readList(dataList, dataDelim, killValue)
  File "./pickleClass.py", line 93, in readList
    self.dataTable[adcCount][dataOffset] =
int(listname[listOffset])   #
Load gain x8 pedestal value into dataTable
IndexError: list index out of range
....
....
```

What is wrong, and what do I do?

Solution: The problem is that one of the runs was not fully committed into the Database. Verify that there is indeed a problem by typing in an xterm window ***setup oracle_client***, then ***sqlplus cal_calib/cal_calib@d0onprd1*** now in the program ***type sql>select count (*) from pedestals where run_number=xxxx***, where ***xxxx*** is the run you would like to check. If the answer is anything but ***55296*** (the number of cal channels), then there is indeed a problem. In that case, if you have time, take the pedestal calibration runs again. If you don't have time, call the on-call expert.

2. *Problem:* I tried to download pedestals using Taker's ***cal_prepare_for_run-xxx (where xxx is the version number and if you find more than one version call the on-call expert)*** trigger. All the crates failed to download with a ***devdnl timeout*** error.

   Solution: First just try it again. If the problem persists, then this problem has been seen to be associated with a comics download problem. Ask the DAQ shifter to stop comics (***stop_daq comics***) and restart it (***start_daq comics***).

3. *Problem:* I tried downloading the pedestals using ***cal_prepare_for_run-xxx (where xxx is the version number and if you find more than one version call the on-call expert)*** and although most of the crates appeared to download correctly, a few failed. What do I do?

   Solution: While we are unsure of the cause of the failure, the best advice we can give at the moment is to ***try the download again***. If that fails, it may be that you have ***too much CPU useage on d0clt03***. To see if that is the case, look at the ***IOC Resource Monitor Display GUI*** (it should be on the monitor above your head), click on the ***CAL tab*** and check the ***CPU%*** usage for ***d0ctl03*** – if it is large, ***close all power supply GUI's*** and if that still does not get you below 40%, then ***close the CRATE MONITORING GUI (=T&C***

GUI). If it really keeps on failing, call the on-call expert. If you closed GUI's, then make sure to open them again once the problem is resolved.

Channel Archiver

1. *Problem:* The Archiver cell in the lower left has turned pink. What does that mean?

   Solution: The channels archiver that records the state of all currents, voltages, etc has stopped running. See below on how to start it up again.

2. *Problem*: The channel Archiver has stopped running. How do I start it up again?

   Solution: The archiver can be pretty finicky. Dave Huffman is our local expert, and Vladimir Sirotenko is the D0 expert. For detailed instructions check http://www-d0online.fnal.gov/www/groups/cal/Archiver.pdf, but here is a quick summary:
   > *setup d0online*
   > *setup chan_archiver*
   > *cd /projects/archive/cal/current*
   > *rm archive_active.lck*
   > *start_chan_archiver –c config_file –p 4814 –w . –d dir.xxxxx-yyyyy* (where dir.xxxxx-yyyyy is the directory file name that has stopped, e.g. dir.20011019-091652)

Hardware Problems and Failures

The list of categories for which we have documented troubleshooting hints on hardware problems and failures are:

Preamp Low Voltage Power Supplies

1. *Problem:* The preamp supply has tripped and will not reset. What do I do?

   Solution: Because of the difficulty of accessing preamp power supplies during running, they have been made redundant. That means you can turn off the "bad" supply and turn on the secondary supply. When you look at the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) (if it is not going, then run ***start_cal supply*** in an xterm window) and select the preamp tab (on top), you will notice that the supplies are labeled something like ***CALC_LVCP_PA02P*** and right under it is another labeled ***CALC_LVCP_PA02S***. The one that ends in "***P***" is the primary supply and the one that ends in "***S***" is the secondary supply. The way you can tell which one is being used is by noting the currents – the active supply will show non-zero currents, whereas the spare supply will show very small or zero currents. Use the buttons on the right hand side of the GUI to ***turn off the bad supply*** and ***turn on the spare***. Obviously you should leave a note for the experts telling them about this. It has recently been noted that when one supply tripped BOTH primary and secondary showed a red box. In that case, the

tripped supply was turned off and the other was turned on, then both became green again – try that procedure first before calling an expert.

High Voltage

1. *Problem*: I see a major alarm for the HV. What do I do?

   Solution: This normally means that the HV has tripped (this has occurred on occasion during shot setup). You can check that on the HV display (the one that normally shows a lot on blue boxes). If there is a trip, you will see one (or more) of the boxes in red. If it is an ICD HV trip, then follow the instructions in the HV section (p. 97, because you will need to turn off the ICD preamps. Otherwise if it is a calorimeter HV trip, then left click on that GUI in the section that has the trip – that will pop-up another GUI with the details of the HV (setting, readings, status etc), the offending HV channel will be pink. ***Left click on the pink box*** in this GUI and select ***unlock***. Now left click again and select ***ramp***. After some time the voltage should ramp back up to its set point. Click on the ***Lock*** button on the bottom of the GUI and you will see the boxes ***turn turquoise and say locked***. That's it.

2. *Problem*: I tried to reset the HV, but it doesn't ramp up. How do I get the voltage up?

   Solution: Occasionally the voltage won't ramp up all at one time. In that case try ramping up the voltage in steps – go to 10%, then 20%, etc until it gets up to 100%. In order to set the voltage sets, look in the HV GUI for the ***Set HV*** tab, it will show various percentages, ***check the box*** (indicated by a red diamond) for the appropriate voltage percentage, and then ramp it up.

3. *Problem*: For some reason one of the ***HV has been set to 0***. When I click in the ***V_Set*** box, it turns yellow and I appear to be able to change the setting. But when I click out of that box the setting goes back to zero. How do I set the voltage?

   Solution: The way you can select the appropriate setting for ***V_Set*** is to look in the HV GUI for the ***Set HV*** tab, it will show various percentages, ***check the box*** (indicated by a red diamond) for the appropriate voltage percentage, and then ramp it up. So if you want the full ***V_Max*** voltage (which is usual), then select ***100%***.

Calorimeter Workstation

1. *Problem:* I cannot move the mouse and have lost total control of my workstation. What do I do?

   Solution: There are a number of things you can do. First try and identify the process which is causing the problem (for example too many Examines?), then type ***CRTL-ALT-F1*** or ***F2*** (all screens will go blank and you will be prompted to login). Login as ***d0cal***. Type ***ps –ef | grep d0cal***, then type ***kill -9***

process# where process# is the exactly that, the process number you see listed. Now return to the normal screen by typing ***CTRL-ALT-F7***. You can repeat this procedure as needed to kill other jobs. If there many Examines that you need to kill, then you can kill them all at once by typing ***killall CalExamine_x*** or ***killall L1CalOnlineExamine_x*** for example – be careful because killall is a powerfull command! If that fails, then I'm afraid you should ***reboot***.

Power Outage

Overview

Normally (as if anything is ever normal) you should never have to deal with recovering from either a planned or unplanned power outage. Please contact an expert to turn on after a power outage, but if you are on the owl shift and no-one else is around you may need these instructions. Besides turning on the computers and power supplies, you will need to reload the pedestals in the ADCs.

Preparing for a power outage

1. Turn down Low Votage Pulser.

In the Power Supply GUI, Press "Turn Off All" and confirm in the following tabs: Preamp (including ICD), BLS N, BLS C, BLS S, ADC and Pulsers.

2. Turn down High Votage Pulser.

In the HV GUI, click on an ICD blue horizontal bar and on a CAL blue bar. This opens 2 HVC Channel Monitor displays. These displays have tabs: NE, NW, SE, SW for ICD and N, C, S and Argon Mon for CAL. The following has to be done on each of these tabs:

   a) press "Unlock" at the bottom right of the screen. States turns from locked to Holding.
   b) Select 0% in the Set HV Menu at the top left of the page. Column V_Set turns to 0, V_Read becomes pink (V_Read differs from V_Set) and the Ramp button becomes pink.
   c) Press "Ramp" at the bottom of the page. The voltages ramp down to zero. That may take some time. Some individual channels may pause. You left click on the state and select "Resume" (or do it globally from the bottom). When the voltages are below 100V, you have to turn them "Off" either individually by left clicking"Off" in the State box.

3. Turn down the supplies themselves.

   a) BLS low voltage supplies: in the 36 BLS power supplies located below the detector, throw the white breakers. Put the 3 little switches on "off", "local", "off" to prepare for the restart. At the same time, power off the

   b) Pulsers low voltage supplies: the pulser power supplies are located below the BLS power supplies. Throw the breakers and switch the supply to "local"

c) ICD low voltage supplies: in rack PW09, on the west side of the detector, throw the breaker at the bottom left of the rack. Throw also the pulser breaker and switch the supply to "local".

d) Preamplifiers: throw the 30 breakers (24 black + 6 white) in PW06 (rack facing PW09).

e) ADCs: In MCH3, throw the breakers of the 6 power supplies (3 in MC307 and 3 in MC311) and put the 3 little switches on "off", "local", "off" to prepare for the restart.

f) CETEC: put the 2 little switches to "local", "off" (in crate MC307)

g) unplug the cables from the back of the 2 computer crates: MCH300 bottom crate and MCH309 crate at eye height.

h) turn off HV low voltage supplies in M117 (7 white breakers; you can also switch off the 5 green fans and the LEVEL0 supply).

4. 5K test stand.
   a) Throw the breakers of the BLS and pulser supplies.

   b) Upstairs, switch off the ADC power supply and throw all breakers in the power distribution chassis

Restarting Computers & GUIs

We will assume that all "other" computers have been turned on by others like the shift captain. But just in case, you may need to turn on d0ol45. That computer is attached to the three screens that are located at the CAL/ICD console in the D0 control room. The CPU itself can be found behind the Monitor #1. You may also need to reboot the d0ol32 computer, which is attached to the 4 displays that sit on top of the CAL/ICD, CONTROLS, CFT/CPS/FPS, and MUON consoles. The CPU is located at knee level in the CONTROLS console – open the red door to access it.

1. Reboot d0ol45 and d0ol32. To power-up these machines, just press the pushbutton.

2. Log into D0OL45.

3. Open a new xterm window.

4. Start the GUI's

Recovering from a Power Outage

Undo whatever was done for the power outage preparation.

1. Restart 2 EPICS nodes. Plug the cables in the back of the 2 computers in MCH300 bottom crate. Don't plug in computer in MCH309 crate yet.

2. In the Supply GUI. In the BLS N page, press Turn All Off and Reset. Do the same for BLS C, BLS S, ADC and Pulser pages.

3. Turn on the supplies themselves.
   - BLS low voltage supplies: in the 36 BLS power supplies located below the detector, make sure the 3 little switches on "off", "local", "off". Throw the white breakers on and press the reset button. If the crate does not reset (some red LED except the ON/OFF one), hit the reset button several times. If it does not reset, call an expert. Put the central switch to "remote"; don't worry if some crates will power on while other won't. Make sure the RMI have 4 green LED lit. If one is not, press the Reset button. If it does not reset to green, report to an expert. At the same time, power on the

   - Pulsers low voltage supplies: the pulser power supplies are located below the BLS power supplies. Throw the breakers on and switch the supply back to "remote".

   - ICD low voltage supplies: in rack PW09, on the west side of the detector, throw the breaker at the bottom left of the rack on. Put it on remote (second button "G=Remote"). Throw also the pulser breaker on and switch the supply to "remote".

   - Preamplifiers: throw the 30 breakers (24 black + 6 white) in PW06 (rack facing PW09).

   - ADCs: In MCH3, throw the breakers of the first power supply and put the 3 little switches on "off", "remote", "off". Hit the reset button and **wait until the SBC beeps** (not to crash the boot server). Do this for the other 5 supplies. Make sure the RMI have 4 green LED lit. If one is not, press the Reset button. If it does not reset to green, report to an expert.

   - Don't turn on the CETEC crate yet!!!!!

4. Now go to the "Restarting Power Supplies" section.

Restarting Power Supplies

1. Reconnecting the GUI's. If any GUI is opened, exit from it (Hit Exit in the File tab). Restart all the GUIs by typing "start_cal all". If the GUIs have no connection, most probably the EPICS nodes booted before the host was ready to serve the information. You have to reboot these nodes by pushing the RST button on the 2 CPUs (d0olctl09 and 11) at the bottom of rack M300. Then you will have to hit the Reconnect button on every GUI.

2. Rack Monitoring Interfaces (RMI). Find the 2 Rack Environment Monitor Display GUIs on the upper left screen. If you don't find them, type "start_cal rmi" in a window of the upper left screen. One is for the platform (pages for Central, North, ...). Only pages Central, North, West, South and Cath(edral) are calorimeter related. In North, South and Cathedral, all lines are calorimeter. In Central, all lines except PC03/04/19/20 are calorimeter. In West, all lines except PW03 are calorimeter. The other is for the Movable Counting House (MCH). Only pages MCH1N and MCH3S are relevant for the calorimeter. In MCH1N, only line M16/17/18 are calorimeter. In MCH3S, all lines except M301/02/03 are calorimeter. All relevant (see above) RM DSTAT should be normal and no box should be pink. If not, click the reset button. If that does not do anything, may be an expert can help.

3. Preamp Supplies. In the Calorimeter Power Supply Monitor Display GUI, select the "Preamp" tab and click on Turn OFF all (confirm), next "Reset All". Column STAT on the right should all display 0x2 (Power Off). If a box is pink, click the Reset button on the same horizontal line. If that does not clear it, record the fault (left click on the pink box) and contact an expert (who will call Tom Regan). If the pink box shows 0xffff, no AC power is getting to the power supply. May be someone turned off the breaker intentionally, may be the power supply failed. In both cases, a failed primary (resp. secondary) supply makes its fellow secondary (resp. primary) supply have voltage boxes be pink as well. Now click on either the "Turn On Primary" button or the "Turn On Secondary" button (lower left). You must ask experts which is available because we periodically exercise the primary and secondary supplies. Of course if there is an individual supply that fails to come on, then you must try the other one. If a power supply failed, record its name along with the voltage and/or current. You should also check that only primaries or only secondaries are on. If not, turn them on a second time.

4. BLS Supplies. In the Calorimeter Power Supply Monitor Display GUI, select the "BLS N" tab and click on "Turn OFF all" (confirm), next on "Reset All". If "STB8" is not 0x40, record the fault (left click on the pink

box) and contact an expert (who will call Tom Regan). Columns STAB, STCD and STEF should be 0x0. If not, try individual resets and if still not, record the fault (left click on the pink box) and contact an expert (who will call Tom Regan). Then, click on the Turn ON all. You might have to Reset individual supplies (multiple clicks may be needed). Also, +7VA and -3VB currents may be pink. Don't worry at that moment. Now select the BLS C and BLS S tabs and turn those on in the same way.

5. ADC Supplies.
    a. In the Calorimeter Power Supply Monitor Display GUI, select the "ADC" tab and click on "Turn OFF all" (confirm), next on "Reset All" and on "Turn ON all".
    b. Walk to MCH3 rack MCH309 crate, unplug (if not already unplugged) the power chord of the EPICS node and replug it. Return to the control room.
    c. Type start_cal vme_adc_north and fill the left column with 41 (hit return!) 6 times and quit. Do the same for south as you did for north. This sets the ADC crate controllers in the special mode "readout disable=0x41".
    d. We must now power up the CETEC power supply (T&C crate supply) which is not yet computer controlled (volunteers?). Walk to MCH3 rack M307, turn the little switches to "local" and "on" on the T&C power supply (labelled CETEC) near the top of the rack. Reset the VIC (Vertical InterConnect) in the T&C crate. Wait 15 to 20 seconds (you could hear a beep) then reset (plug/unplug) EPICS node in rack M309. Wait about 1 minute and observe if any BERR LED shows red in the 4 VIC masters. Return to the control room.
    e. You should be reconnected in Mode and Mode Shift pages. The FPGA column in the Mode tab of the Supply GUI should be the current FPGA version (32 on October 19, 2003). If not, reset (the button!) EPICS node and try again downstairs.
    f. You are ready to program the T&C in the T&C GUI (if not found, type "start_cal tandc"). Click on Global T&C Set purple button, select Normal, go to CELL and type 0 and Enter (0x0 should appear); go to the TICK box and do the same. Close the box. Click T&C CTRL on the botom of the page. Enter MODE 8089 and press Enter (it sould echo 0x8089 in blue) and DIAG f0 (not 0xf0) and press Enter (it sould echo 0xf0 in blue). The T&C mode column in the "Mode Shift " tab should be green; if not, call an expert.
    g. Back in the T&C GUI, click now on the Global BLS Mode and select Normal (close the box). Click now on the Global ADC Mode and select Sel0SignSup (does not matter really). In the Mode

Shift page, ignore ADC ERR, PED VERS, PULSER and OCC until the first event is taken. Everything else should be green, especially STATUS should be 0x10. If not, reset individual T&C.

6. Pulser Supplies. In the Calorimeter Power Supply Monitor Display GUI, select the "Pulser" tab and click on "Turn OFF all" (confirm), next on all 13 individual "Reset" buttons (presently "Reset All" does not seem to work). Column STAT on the right should all display 0x2 (Power Off). Finally, hit "Turn ON All". If necessary, "Shutdown" the pulsers from the Set Calorimeter Pulser GUI (purple bottom left button); may be this will be done by downloading the file from a taker.

7. HV supplies. Go to on page 96.

If the ADC crates have been Power Cycled

If the power to the ADC crates has been cycled, then you will need to reload the pedestals. You should do this anyway after extensive work on the calorimeter system, which includes power cycling.

To download the pedestals and set the correct data taking state for the electronics, follow these steps – but first make ***sure to ask the shift Captain for permission*** to download pedestals and inform the DAQ shifter (since it can interfere with all other runs for the 5-10min it takes). Make sure the calorimeter crates are not used in any run – if so ask the DAQ shifter to stop those runs and release the calorimeter crates for your use. If a ***taker*** is not running somewhere, start one by running ***setup d0online*** and then ***taker &***. In the Taker, click on ***modify***, and then click on ***Change Trigger***. You will now see the configuration window. To make sure you are in the correct directory, click ***UP (Left)*** until you are all the way "up" and the directories no longer change. Double click on the directory ***commissioning***, then double click on ***cal***, then double click on ***cal_prepare_for_run-xxx (where xxx is the version number and if you find more than one version call the on-call expert)***. It will tell you "download in progress". This will among other things download the pedestals. When you are finished, make sure to free the trigger. You do that by clicking ***modify*** in the Taker, and then selecting ***Free trigger***.

The above steps should have set the electronics in their correct state, but just in case they didn't, you could also set the ADC and BLS modes. Set the ADC mode to ***0 Sign Sup*** and the BLS mode to ***Normal*** – at least that is a good "normal" starting value. After you have set those values, then click on ***Global T&C Reset***, then ***Global ADC Reset*** and finally ***Global T&C Reset*** again. That should do it. This will occur automatically when you start running following the usual run start procedures, but it can't hurt.

If the T&C Crates have been Power Cycled

It is probably wise to set the T&C system after a power cycle. The steps are similar to those you use to set the mode.

This method is in flux, but follow these instructions for the moment. However, it may already be set properly, which you can check by looking at the ***T&C CTRL*** row in the ***Mode*** tab of the ***Calorimeter Power Supply Monitor Display GUI (= Supply GUI)*** – if the ***brown Mode column*** (the 1st column) is set to ***0x89***, and the 4th column is set to ***0xf0***, then you are done. Otherwise, in an xterm window change the directory, ***cd /online/config/cal/vme***, execute the usual ***setup d0online***, and then

run ***./vme_tc_ctrl &***. Now select (left click and hold while you sweep over the entry with the mouse cursor) the number in the 1st column and type in ***89***. Similarly for the 4th column, type in ***f0***. These values should now be in the boxes (with a 0x in front of them). You are done, so ***Quit***.

Detector Performance Monitoring Software

Overview

The programs that can be used to monitor the state of the electronics and the data during data taking (and for debugging and commissioning) are called cal_Elec and cal_Examine. Normally you would not recompile these programs, but if you have to, then you should log into d0ol02.

Cal_Elec

Overview

This program is used to check the calorimeter electronics, both for debugging and commissioning and during data taking. If you need to recompile ***cal_elec***, only ***setup D0RunII t01.xx.xx***. Otherwise you might get a KAI error message.

Running the software for debugging

In order to run the software you need to

1. Change directory and setup. You should ***cd /online/examines/scripts***. Then run ***setup d0online*** and ***p13.06.00*** and finally ***d0setwa***.

2. Edit the rcp file. You should edit the rcp file to place the program in the correct mode. Use you favorite editor or follow these directions to start a WYSIWYG editor if Unix is not your friend. Edit the file by typing ***xemacs cal_elec_rcp/cal_elec_HS.rcp*** and set ***PEDS=true*** and all others ***false***. Then save and exit the editor. This should set you up with the "normal" conditions. Experts may want to set it in other modes.

3. Start histo. You can start histo by typing ***histo &.*** This will pop up a window where you will select the histograms you wish to look at (see below). Next change directory by typing cd ***/online/examines/scripts/*** and then ***setup d0online***.

4. Run cal_elec. Run the following ***./cal_elec.sh*** and type the following (you can go ahead and type ahead before the prompts show up if you wish):

   init
   1 (this is the number of crates so you choose this number, max of 12)

0 (this is the crate you want, if you are doing two crates then enter the first crate number, carriage return, and then the second crate number)
start

This could take some time – be patient! When you are done, you can type
stop
quit

5. Open the histograms. To do that, return to the histo pop-up box. Select ***Connect to Process***, then select the histograms you want to look at (highlight them with the mouse), and finally select ***View Multiple*** to display the histograms.

6. Pop up the Cal Preamp map/conversion GUI. It can be very helpful while debugging to have the GUI that allows you to translate the ADC channel number to BLS/Tower/Depth. To run this GUI change directory ***cd /online/config/cal/map*** and run ***./cpmap &***. Just type in the values in any box, and the others will change to reflect the translation of that channel in all possible types of coordinates.

Running the software to monitor a ramp

When using the pulser system to generate signals that ramp up (or down) the calibration pulse, you will need to monitor the ramp. These instructions tell you how to do that.

1. Change directory and setup. You should ***cd /online/examines/scripts***. Then run ***setup d0online*** and ***setup D0RunII t02.08.00*** and finally ***d0setwa***.

2. Start histo. You can start histo by typing ***histo &.*** This will pop up a window where you will select the histograms you wish to look at (see below).

3. Run cal_elec_ramp. Run the following ***./cal_elec_ramp.sh*** and type the following (you can go ahead and type ahead before the prompts show up if you wish):

init
expert
0 (this is the crate you want, choose from 0->11)
0 (this is the ADC card you want, choose from 0->11)
12 (this is the number of channels you want)
start

This could take some time – be patient! When you are done, you can type
stop
quit

4. Open the histograms. To do that, return to the histo pop-up box. Note that the pulser ramp parameters should also have been downloaded in other instructions on the pulser and linearity ramps (but are not specific to cal_elec_ramp). Select ***Connect to Process***, then select the histograms you want to look at (highlight them with the mouse), and finally select ***View Multiple*** to display the histograms.

Running the software for monitoring

1. Change directory and setup. You should ***cd /home/d0cal/RUNEXAMS/cal_elec_test/cal_elec/rcp***. Then run ***setup d0online*** and ***d0setwa***.

2. Start histo. You can start histo by typing ***histo &.*** This will pop up a window where you will select the histograms you wish to look at (see below).

3. Run Cal_Elec. Run the following ***./run_NET_HS_EXPERT.sh crate1 [crate2].*** Where the values for crate1/crate2 can take on any value between 0 and 11 (remember that we are limited to two crates at a time).

4. Pop up the Cal Preamp map/conversion GUI. It can be very helpful while debugging to have the GUI that allows you to translate the ADC channel number to BLS/Tower/Depth. To run this GUI ***cd /online/config/cal/map*** and run ***./cpmap &***. Just type in the values in any box, and the others will change to reflect the translation of that channel in all possible types of coordinates.

Error messages

Cal_Examine

Overview

The Examine software is designed to allow you to monitor the health of the detector by looking at a variety of plots that show things like detector cell occupancies, energy deposits vs eta and phi, and so on. There will be reference plots available for the shifter to compare the running data to. We are now running the Root version as the default, but there is a Histoscope version. Instructions for running both versions are shown below. Root is now in RCP so this is the display that should be used, histo probably won't work now.

Running the Root version of the software

1. Open a new xterm window. Click the left-button on the mouse in any open space on your window, then select ***New Shell*** to open an xterm window. It is prudent to run ***setup d0online*** once it is open – it sets up what you will need, and it never hurts. Examines should be run on d0ol23 node which is faster and relieves the load from d0ol45. If there is an Examine GUI open, then you are done. If not, the open a new xterm window (on the left screen usually), type the usual ***setup d0online*** and then ***d0ssh d0ol23***.

2. Check to see no other Examines are running. Now check to see if any examines or xgooey processes are running by typing ***ps –ef | grep Xgooey*** and then ***ps –ef | grep examine***. Kill those processes using ***kill -9 xxx*** where xxx is the process number.

3. Start the program. In the xterm window ***setup d0online*** and run ***start_cal examine***. This opens the ***Examine Control Panel***. Click on the ***Edit*** button and select ***Preferences***. Change ***EXAMINE*** to ***d0ol23.fnal.gov*** and check the ***Canvas Menu Bar*** option under ***DISPLAY***. Back on the main control panel, click the red ***Start*** button (upper left), which will bring up a list of histograms.

4. Choose one or a set of histograms that you would like to monitor. Select them with a left mouse click (at the moment ***do not select Total Energy, Total Et, EM energy, Had Energy, EM cell energy ieta/iphi, HAD cell energy ieta/iphi***).. Now click on the light-green ***Display*** button in the ***Histograms*** menu (which is at the bottom of the ***Examine Control Panel***). That will pop open a window with those histograms. Don't forget to unselect the histograms before opening a new display (or "canvas" in root language), otherwise you will see them again! You can play with adjusting sizes, scales etc. Keep the number of histograms displayed to as small a number as possible. The system tends to slow down or hang otherwise. You can report problems in an "observation file" which you can copy (with xemacs) into the logbook.

Running the Histoscope version of the software

This probably does not work anymore. But I leave it here for historical purposes.

1. Open a new xterm window. Click the left-button on the mouse in any open space on your window, then select ***New Shell*** to open an xterm window. It is prudent to run ***setup d0online*** once it is open – it sets up what you will need, and it never hurts.

2. Start the programs. In the xterm window type ***start_daq cal_examine***. Now type ***init*** <carriage return>, and ***start*** <carriage return>. That will start reading the data (which you can see flowing), and now you need to plot it. In another xterm window start up Histoscope by starting with ***setup d0online***,

followed by ***histo &***. That pops up a window in which you can connect to the data by selecting the ***File/Process*** pull down menu and selecting ***Connect to process…***, that will load in something like ***Calorimeter Examine Histograms (d0cal)xxxx***. Highlight/select that file and left click the ***Connect*** button. Now you should see in the ***Sub Categories*** list that there is a single file selected, if so, left click on the ***Open*** button. A whole set of histogram names will appear in the right-hand pane.

3. Choose one or a set of histograms that you would like to monitor. If you want to see a single histogram, then highlight it and left click on the ***View*** button. If you want to look at multiple histograms, select them (either by holding the shift key and clicking on a starting one and then and end one, or select them individually by selecting them with a Ctrl-click), and left click on the ***View Multiple*** button.

4. Adjust the axes etc. Once you display the histograms, you may want to adjust the axes, select log scales etc. For example if you want to change the axis range, left click on the numbers on the axis and drag them. Many things can be done. You can check the users manual for more details (see http://www-pat.fnal.gov/histo_doc/histo_ug.html).

5. Writing the data to a file. The histograms that you were looking at on the fly can also be saved to a file. That is done automatically as long as you stop the program correctly. In the window that shows the data being taken type ***stop*** <carriage return> and then ***quit*** <carriage return>. That will stop the data taking and also save the histograms to ***/online/examines/output/cal_examine_xxx.hbk*** where ***xxx*** is probably some random number like the process number (hopefully it will be clear which is the file you saved).

Histoscope Error messages

Error listing file: Error scanning /tmp directory.

You may get this error when trying to connect to process. This can occur because you haven't given the job long enough to collect sufficient data (it needs about 15 events before you can connect), or it can occur because of problems with temporary files (the detailed cause is unknown, but there is a fix). In the second case, you will need to type ***setenv TMPDIR /tmp/dummy_name*** (yes it means ***dummy_name*** exactly) in both the xterm windows from where you are running examine (or the cal_elec that is producing the histogram) and from where you are running histo. Now try it again.

Monitoring and Control Software

Overview

There are a number of programs that allow you to monitor and interact with the calorimeter hardware. For example you can "kill" cells (which means making the window so large that the cell will never be read out), or you can start, control and stop the pulser, you can turn on and off power supplies (both low voltage and high voltage).

Calorimeter Global Monitor

Overview

GUI Features

Crate Monitoring

Overview

GUI Features

Calorimeter Pulser

Overview

The Calorimeter Pulser GUI is designed to allow you to control the calorimeter pulser via the pulser interface board (PIB). It only needs to be used during calibration and debugging. The latest version of this GUI is Version 2 (the manual for version 1 can be found at http://www-d0.fnal.gov/~hohlfeld/pls_old.html). The GUI was designed by marc hohlfeld and current documentation is available online at http://www-d0online.fnal.gov/www/groups/cal/pulser_control.html. There are 12 pulser modules for the Calorimeter and 1 for the ICD. In turn, each pulser module has up to 96 channels that can be pulsed, which are in turn fanned out to the individual preamps. The pulse height (actually a current) can be adjusted by setting the DAC value. You also have control of other more advanced features such as the delay, relative to the trigger; of the command signal that allows groups of 16 pulse channels to be sent to the preamps; the ability to step through a series of delays and pulse heights automatically; and the option to select specific pulser patterns to fire. In other words, the DAC value and the command signal must be enabled for a pulse to make it to the preamp.

Starting the Pulser GUI

To start the GUI, first type ***setup d0online*** (if you have not already done this), then change directory by typing ***cd /online/config/cal/pulser*** and ***./pulser.py***. The GUI ***Set Calorimeter Pulsers*** will pop up (see Figure 2) . The ***PIB Clock*** in the top line of the GUI should update every second. If at some point the update stops either the GUI has died or there is something wrong with the PIB. You can change the update rate by clicking on the PIB Clock field.

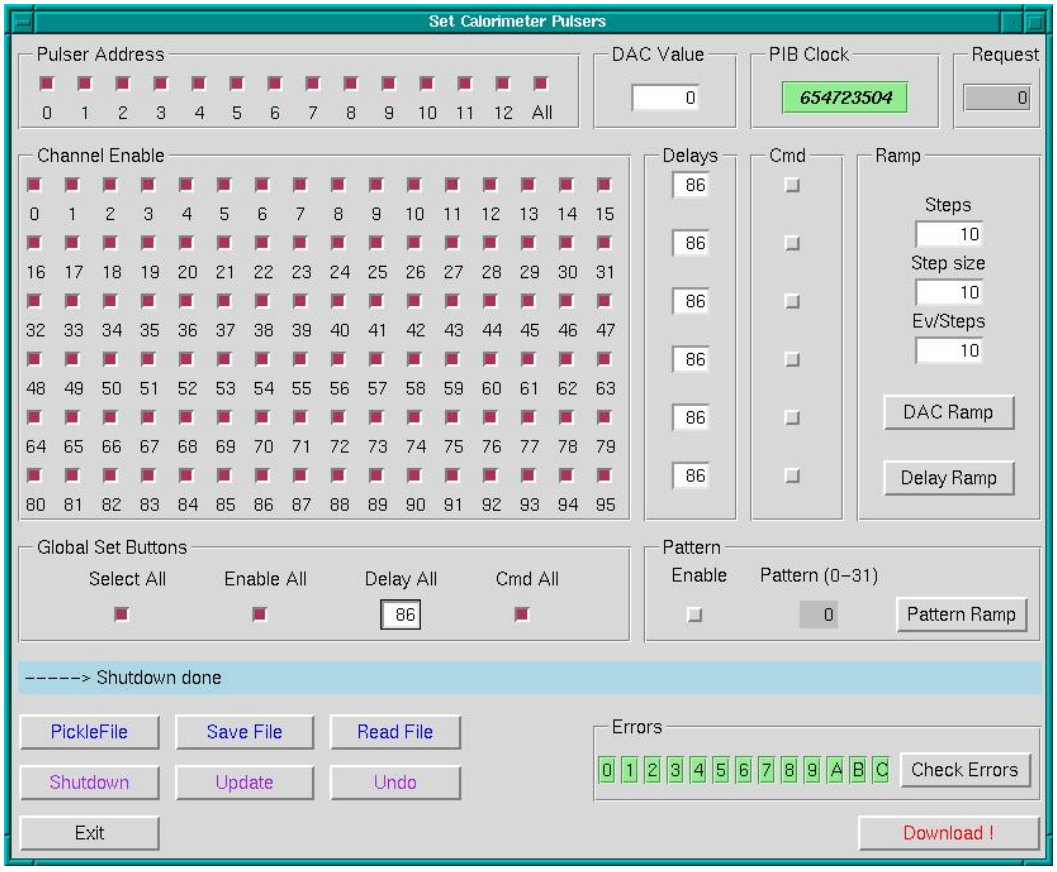


Figure 2: Set Calorimeter Pulsers GUI

Downloading a pulser

Here you will select the pulser or pulsers you wish to download, choose a pulser amplitude setting (the DAC value), choose the delay in the pulser signal relative to the trigger pulse, select the individual channels you want to pulse, and download that configuration into the PIB. To do so, follow these steps:

1. Choose the pulsers you wish to you want to download. Click on the appropriate buttons in the ***Pulser Address*** section (upper left), when it turns

red, you have selected that pulser. (0-11 corresponds to the CAL, and 12 to the ICD). If you want to download all pulsers (12 CAL + 1 ICD) click on the ***All*** button.

2. Enter a DAC value. You can type in a value from 0 to 131071 in the DAC Value box. (middle top).

3. Enable the pulser channels. Select which of the 96 pulser channels (0-95) you want to enable (red box) by clicking on the appropriate button in the ***Channel Enable*** section. Note that you can make global selections by clicking on the ***Select All*** button in the ***Global Set Buttons*** section. You may have to toggle that button twice to make the selection.

4. Enter the desired delays. You can enter a delay value of 0 to 255 for each of six sets of channels (enter your value in the ***Delays*** section). Again you can set all six of them at once by entering a value in the ***Delay All*** box in the ***Global Set Buttons*** section.

5. Set which commands are enabled. Recall that although you have selected which channels (0-95) will have a current setting corresponding to the pulse height. These channels will not actually pulse unless the command line, ***Cmd***, is enabled. There are 6 command lines that control sets of 16 channels. Again, for your convenience, you can enable all 6 command boxes at once by setting the ***Cmd All*** button in the ***Global Set Buttons*** section.

6. Download the values to the PIB. Click on the ***Download!*** button to send these values to the PIB.

That should complete the download of all the pulser settings to the PIB. You should now be ready to take pulser data.

Checking that the download was successful

Now that you have downloaded the pulser, you should check to make sure that the download was successful before you actually use the pulser.

The colored boxes (0-B CAL, C ICD) in the ***Errors*** section (lower right in the GUI show the error status for every pulser. The different colors indicate the type of error:

- purple: error was never checked
- green: download without errors
- red: an error occured during the download
- yellow: somewhere between green and red, it usually means that there was no download to this pulser since the last reset of the PIB.

If an error occured you can see more details if you click on the ***Check Errors*** button. The ***Error Status*** window pops up. Enter the pulser address (0-12) in the ***Pulser Address*** field and click ***Update***. The ***Error Message*** indicates the type of error (See also "Some other things you can do" later in this documentation).

How to make Global settings

It is also possible to make global settings of the basic selections for the ***Pulser Address***, ***Channel Enable***, ***Delays*** and ***Cmd***. This is more convenient than making each selection individually and can be a timesaver.

Make sure that the ***Select All*** button in the ***Global Set Buttons*** section is on (red), and then:

1. To enable/disable all 96 channels, click on the ***Enable All*** button.

2. To choose one value for all the six delays, enter the value in the ***Delay All*** field and press "enter".

3. To enable/disable all six commands, click on the ***Cmd All*** button.

How to set a DAC/Delay Ramp

Just as you have done in the preceding sections, choose the channels, delays and commands as you did earlier. Now you can set the range and step size for automatically looping over a range of DAC settings and/or a range of delay settings.

Click on ***DAC Ramp*** button and/or ***Delay Ramp*** button on the right side of the GUI. Another window, ***Current Ramp Status***, will pop up, as shown in Figure 3.

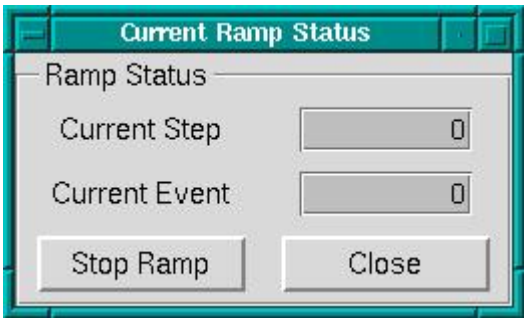


Figure 3. Current Ramp Status GUI.

Some default values for number of steps, step size and events/step will be automatically set in the appropriate fields on the right side of the GUI. If you want, you can change these values by hand. Also the needed request (65 for ***DAC Ramp***, 66 for

Delay Ramp) will be set in the ***Request*** entry field. Do not edit this field by hand unless you know exactly what you are doing!

To start the Ramp, click on the ***Download!*** button. The current step and event should be updated in the ***Current Ramp Status*** window.

To stop the ramp, click on the ***Stop*** button in the ***Current Ramp Status*** window.

How to create a picklefile

Choose channels, delays, commands and ramp parameters as before.

Click on the ***PickleFile*** button.

The default filename is CAL_CCCP_PLSxx.pic, where xx indicates the number of the pulser (00-15).

The default directory is /online/comics/cal (only write permission for d0run!). If you are not logged in as d0run, choose a directory, where you have write permission.

The layout of the picklefile is as follows (list of lists): [[word0, word1, word2, word3, word4, word5], [PrimaryAddress, WordOnOff, Steps, StepSize, EvSteps, Request]]

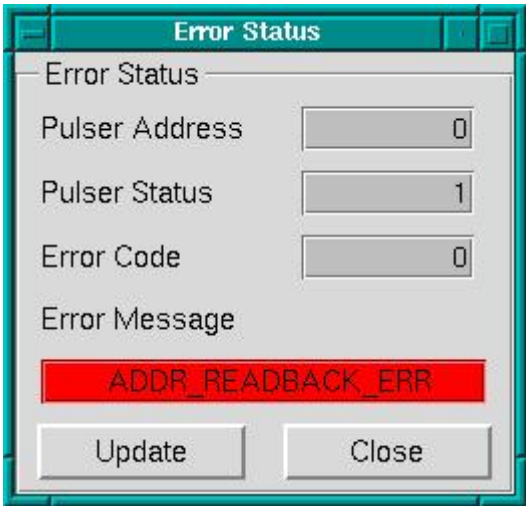
How to choose a predefined pattern

Click on the "Enable Pattern" button. All channels and all commands will be set to the off value and you cannot click on them anymore.

Enter the pattern number (0 to 31 are valid at the moment) in the adequate field and press enter. Three channels and the three belonging commands will be set.

Some other things you can do

1. Check errors: To see if the download was successful, click on the "Check Errors" button in the bottom line of the GUI. Another window ("Error Status") appears.

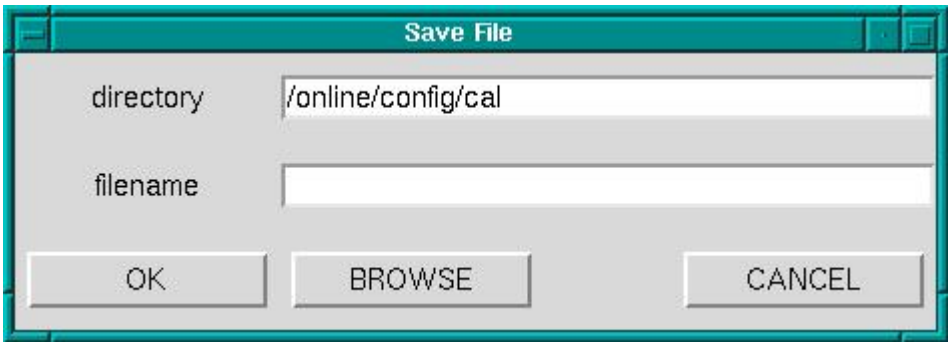


It shows the pulser address, the pulser status and the error code. Do not worry about the error code, the error message should indicate what went wrong, if something went wrong. If an error occurs, the "Error Message" field turns red. After each download the window updates automatically, but if you want to check without a new download, enter the pulser address of the pulser you want to check in the "Pulser Address" field and click on the "Update" button.

2. Read the current status of a pulser: Enter the address of the selected pulser in the "Primary Address" field and click on "Update".

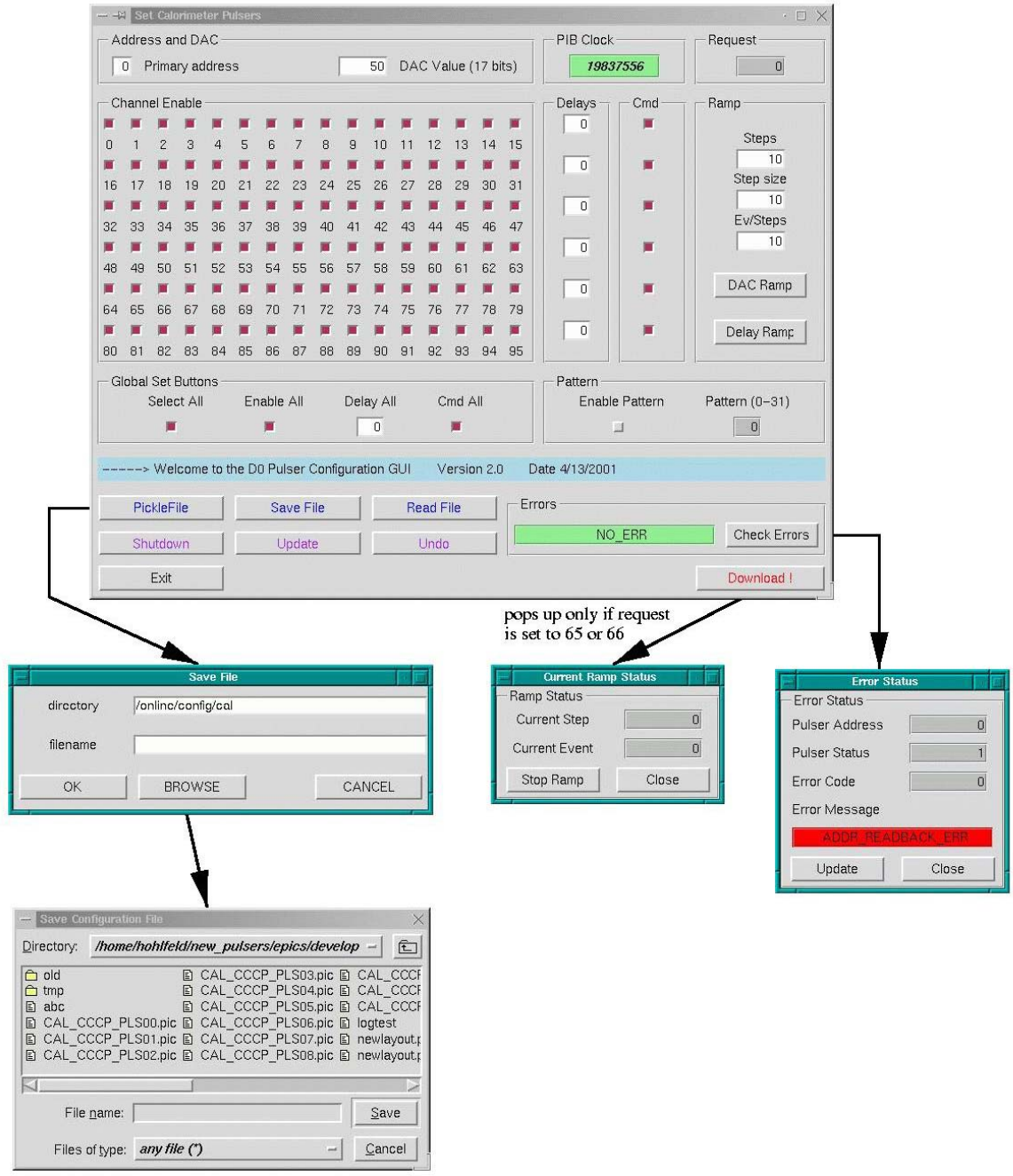
3. Shutdown: To turn off a selected pulser, insert the number of the pulser in the "Primary Address" entryfield. Click on "Shutdown", the DAC and Delay values are set to 0 and Commands and Enables are disabled.

4. Save the current status of a pulser in a file: Choose the "Primary Address" of the pulser, read the current status of the pulser by clicking on "Update". Clicking on the "Save" button will pop up a new window. Enter the directory and the filename or browse through the file tree, then click on "OK".

5. 

6. Read the status of a pulser configuration from a file: Click on "Read", choose your favorite configuration file and the appropriate directory and click "OK". Hopefully the GUI shows your selected configuration.

7. Set the GUI to its default values: Just click on the "Undo" button.



GUI Features

HV Control

Overview
GUI Features

Hot Cell Killer

Overview

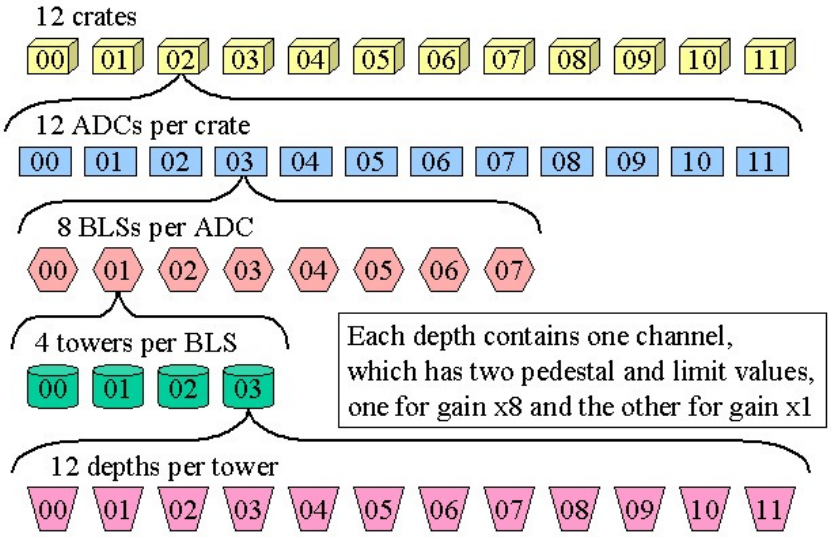
The so called "hot cell killer" is designed to allow you to "turn off" particular calorimeter cells so that they will not be readout. The hardware accepts a pedestal value and a window. If the ADC value for a particular cell falls within plus or minus the number of window channels around the mean value, it will be suppressed and never read out. The basic idea of the hot cell killer is that it downloads a very large window value, hence assuring that the cell is never readout. It is based on the latest pedestal sets which produce a new download (pickle) file and a database entry. A backup of the previous version of the download files is kept in case of fatal error.

The GUI also contains an expert mode which allows one to modify the downloaded values. Of course nothing happens until the new values are downloaded to the hardware. In order to carry out the hardware download, you follow the usual procedure of using the cal_prepare_for_run trigger file in Taker. The indeces of the current calibration sets used are indicated at the top of each GUI page. At the bottom of each GUI page are a number of display buttons. The DISPLAY HOT button shows all the cells killed by the Hot Cell Killer in the current download file. The DISPLAY BAD button lists all the cells killed by the regular calibration validation. The DISPLAY MOD button lists all the cells that have been modified in Expert mode.

The tabs at the top of the GUI are for: (a) the shifter to kill cells (Shifter – Kill); (b) the shifter to unkill cells (Shifter – Unkill); (c) the expert to modify the download values for a cell (Expert – Modify).

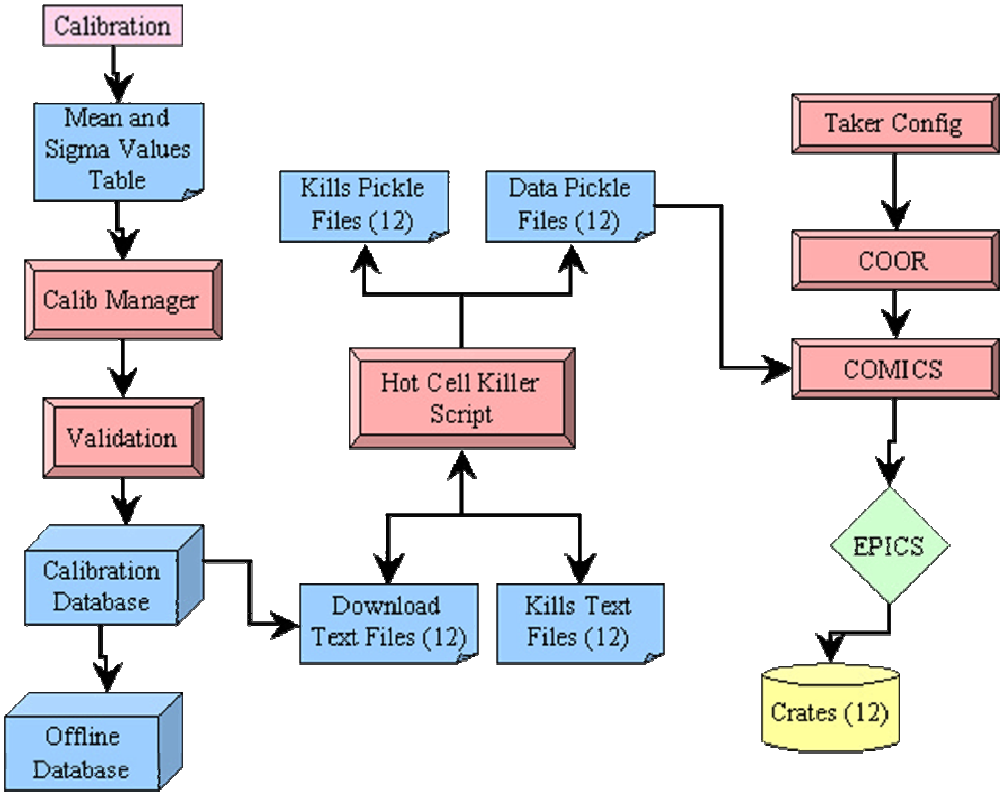
Channel Hierarchy

The hardware channel hierarchy is represented in the following diagram. This structure is represented in the hot cell killer GUI.


12 crates
00 01 02 03 04 05 06 07 08 09 10 11
12 ADCs per crate
00 01 02 03 04 05 06 07 08 09 10 11
8 BLSs per ADC
00 01 02 03 04 05 06 07
4 towers per BLS
00 01 02 03
Each depth contains one channel, which has two pedestal and limit values, one for gain x8 and the other for gain x1
12 depths per tower
00 01 02 03 04 05 06 07 08 09 10 11

Data Flow

A schematic view of how the hot cell killer script fits into the larger picture of the pedestal calibration files and how the killed files enter the download path.



Step-by-Step Hot Cell Killing

Follow these steps to kill hot cells. This assumes you have found a set of hot cell coordinates you want to kill.

1. Start the Hot-Cell-Killer-GUI. Run the following script by typing the following: ***/online/comics/cal/New_HotCellKiller.py***
2. Determine the crate/bls/adc/tower/depths coordinates. If you have used cal examine to identify hot cells, then the cells you want to kill are known in ***ieta/iphi/layer*** coordinates. You can convert that into hardware coordinates of ***crate/adc/bls/tower/depth*** "manually" by running ***start_cal cpmap*** in a new xterm window to make the conversion. However, it is more convenient to use the second set of numbers generated by the hotcell finder report (the ***5 numbers in the 2nd set of parentheses***) which is exactly in the ***crate/adc/bls/tower/depth*** coordinates you will need.
3. Select the cell(s) to kill. First click on the ***Shifter Kill*** tab in the ***hotcell killer GUI*** and ***select the boxes*** that contains the cell(s) to be killed. Note that you can click on more than one box in a row (you can clear your selection by

clicking on the ***Deselect*** button). Once you are satisfied that you have the correct cells, then click the ***Save*** button and the selected channels will appear in the text window at the bottom of the page. You can keep doing this until you have selected all the cells you want. You can clear the list of cells by clicking the ***Reset*** button. Once you have selected the cells, click on the ***Kill*** button to produce a new download file and database entry. Finally follow the usual cal_prepare_for_run procedure to actually load these values in the hardware. In case of a database error, contact Ursula Bassler by email (bassler@in2p3.fr) or telephone (+33 (6) 12 73 46 78).

4. Or select the cells to unkill. It may be that there is good reason to "unkill" some cells. For example if you killed cells because of a bad BLS power supply which is now fixed. The procedure to unkill is similar to the kill procedure above except that you start by clicking on the ***Shifter Unkill*** tab in the ***hotcell killer GUI*** and ***select the boxes*** that contains the cell(s) to be unkilled. Note that you can click on more than one box in a row (you can clear your selection by clicking on the ***Deselect*** button). Once you are satisfied that you have the correct cells, then click the ***Save*** button and the selected channels will appear in the text window at the bottom of the page. You can keep doing this until you have selected all the cells you want. You can clear the list of cells by clicking the ***Reset*** button. Once you have selected the cells, click on the ***Unkill*** button to produce a new download file and database entry. Finally follow the usual cal_prepare_for_run procedure to actually load these values in the hardware. Note that the button called ***Unkill All Hot*** will restore all cells either killed or modified by the Hot Cell Killer since the last calibration was taken. In case of a database error, contact Ursula Bassler by email (bassler@in2p3.fr) or telephone (+33 (6) 12 73 46 78).
5. Or modify the download values UNDER EXPERT GUIDANCE only. An expert, or you under their guidance, can modify the download values for a cell "by hand". First click on the ***Expert Modify*** tab in the ***hotcell killer GUI*** and ***select the boxes*** that contains the cell(s) to be modified, or select the unique ***channel-id number***. Click on the ***Retrieve*** button to get the pedestal values, zero-suppression limits and possible error-ids for this channel, and modify them as you wish. Once you are satisfied that the values are correct, click on the ***Save*** button; you will see this channel appear in the text window near the bottom of the page (you can click on the ***Clear*** button to remove all the channels you have saved if you need to). Repeat this procedure until you have modified all the channels you wish to change. Finally, click on the ***Commit*** button to produce a new download file and database entry with all the modifications you made. You will need to enter ***your name*** and a ***short comment*** before you can complete the commit procedure. In case of a database error, contact Ursula Bassler by email (bassler@in2p3.fr) or telephone (+33 (6) 12 73 46 78).

6. Download the new pedestals. The download can take 5-10min and nearly "locks-up" Coor, so for that reason, you ***must first request permission of***

the Shift Captain and inform the DAQ shifter that you would like to download the calorimeter pedestals – they should care, and generally should give you priority for the download. Remember to ask the DAQ shifter to remove the calorimeter crates from any other runs that might be going. In the ***Taker*** click on ***Modify***, and then click on ***Change Trigger***. You will now see the configuration window. To make sure you are in the correct directory, click ***UP (Left)*** until you are all the way "up" and the directories no longer change. Double click on the directory ***commissioning***, then double click on ***cal***, then double click on ***cal_prepare_for_run-xxx*** (where xxx is the version number and if you find more than one version call the on-call expert). It will tell you ***download in progress***. If you get an error like "**`Attributes conflict with already-owned item: crate:ecnnw. Request to coor failed.`**", it probably means that some other run is using the calorimeter crates. Otherwise, the download takes a few minutes, and you will see lines like ***Done: crate:ecnnw*** written in the taker window. When you get to ***Done: crate:ecnne***, then you are done. Check with the DAQ shifter and ask him/her to remove the Cal crates from whatever running (global perhaps?) that is using them. Finally, if you know you don't have time to find hot cells again, then you should free the trigger by going to the Taker window, clicking on ***Modify*** and then clicking on ***Free Trigger***.

Channel Archiver

Overview

The channel archiver is the program that captures and archives all the information about the voltages, currents, etc for the calorimeter subsystem. The present archiving for Calorimeter logs all channels every 5 minutes. At that rate the raw data files average about 600MegaBytes for 7 days of running. It is therefore convenient to stop and start a new archive every week. This section covers the procedures to follow to maintain the archives. An archive in this context is actually a new directory.

Setup

As is usual, there are standard steps involved in dealing with the channel archiver. You should start by opening an xterm window and typing the following:

>setup d0online
>setup chan_archiver

That will put you in the right directory and ready to issue archiver commands. NOTE that these archives should be started and stopped by a ***d0cal*** user. Also the d0online and chan_archiver setup should be completed

Starting a new Archive

When you start a new archive, you essentially create a new directory. The commands to do that are:

>cd /projects/archive/cal/current
>start_chan_archiver –c config_file –p 4814 –w . (note the "." at the end!)

Stopping the Archive

In order to divide up the data into manageable pieces, we usually stop and create a new archive on a weekly basis. It is a convenient time and size (the data almost fills a CD).

>cd /projects/archive/cal/current
>stop_chan_archiver –p 4814

Remove previous data

We have been keeping the previous week of data in the /previous folder. Before the new data can be moved to this area the folder must be cleared out.

>cd /projects/archive/cal/previous
*>rm –r **

Move Current data to previous

With the previous folder empty, the current data can be moved there with this script

>chan_arch_move cal

Determining if the Archiver is Running

Occasionally the archiver stops. It is useful to have a method to tell if it is running. Here is how you can tell.

>ps auxww | grep arch

that will generate output that looks something like

```
D0RAD      31924   0.3   0.2  11868  2532  ?           S
SEP25     4:52
/D0USR/PRODUCTS/CHAN_ARCHIVER/V1_9_1A/LINUX/BIN/A
RCHIVEENGINE  CONFIG3
D0RAD      31925   0.0   0.2  11868  2532  ?           S
SEP25     0:01
/D0USR/PRODUCTS/CHAN_ARCHIVER/V1_9_1A/LINUX/BIN/A
RCHIVEENGINE  CONFIG3
D0RAD      31926   1.4   0.2  11868  2532  ?           S
SEP25    19:58
/D0USR/PRODUCTS/CHAN_ARCHIVER/V1_9_1A/LINUX/BIN/A
RCHIVEENGINE  CONFIG3
```

```
D0CAL      14530   0.4   0.5  15332  5016  ?           S
11:14     1:03
/D0USR/PRODUCTS/CHAN_ARCHIVER/V1_9_1A/LINUX/BIN/A
RCHIVEENGINE  CONFIG4
D0CAL      14531   0.0   0.5  15332  5016  ?           S
11:14     0:00
/D0USR/PRODUCTS/CHAN_ARCHIVER/V1_9_1A/LINUX/BIN/A
RCHIVEENGINE  CONFIG4
D0CAL      14532   0.4   0.5  15332  5016  ?           S
11:14     1:07
/D0USR/PRODUCTS/CHAN_ARCHIVER/V1_9_1A/LINUX/BIN/A
RCHIVEENGINE  CONFIG4
```

In this example you see three d0cal processes running, which is normal for the archiver.

Restarting a Stopped Archive

If the archiver should stop (there various known and unknown reasons for that), then you can restart this in the following way. First you need to check if the lock file is present. If so, it must be removed.

>cd /projects/archive/cal/current
>rm archive_active.lck

Now you need to restart the channel archiver using the directory name as one of the command line parameters. For example, if the directory name is dir.20011019-091652, then the commands are:

>cd /projects/archive/cal/current
>start_chan_archiver –c config_file –p 4814 –w . –d dir.20011019-091652

Making a CDROM copy of the data

A copy of each weeks worth of data must be placed on a CDROM. A PC with a CD burner and running WRQ (X-windows software with Kerberos) can be used to FTP the data and place it on the CD. The only current machine with FTP capability appears to be d0ol02.

Viewing the Archive

The PC can view an archive using WinBrowser. Refer to http://d0server1.fnal.gov/www/online_computing/online_computing.html PPT, PDF, or PS: 4-Apr-2001-D0 Archiver Tutorial, Vladimir Sirotenko. Sirotenko is the expert on Archiving.

Downloading

Calorimeter System Overview

Preamplifier

BLS

Pulser

ADC

Timing and Control

LaR Monitoring

Preamp

Overview

Design

Performance

Details

Safety

BLS

Overview

Design

Performance

Details

Safety

Pulser

Overview

Design

Performance

Details

Safety

ADC

Overview

Design

Performance

Details

Safety

Trigger

Overview

Design

Performance

Details

Safety

Timing and Control

Overview

Design

Performance

Details

Safety

Rack Monitoring

Overview

Design

Performance

Details

Safety

High Voltage

Overview

There are two high voltage systems – one for the Calorimeter and one for the ICD. This section covers both of those systems. You should normally not have to play with the High Voltage. Once it is up, it should remain up forever (although we have noticed that on occasion the GUI stops updating – so it looks like it is alive but it really isn't! In that case you will notice that the small "propeller" on the title bar stops turning). However there maybe be occasions when you need to start them up after power outages or when it hangs. Most of this documentation is taken from Alan Stone's web pages http://www-d0online.fnal.gov/www/groups/icd/controls/hv_control.html. Check there for the latest updates.

Starting the GUI Software

There are actually two GUI's that are relevant. The first one provides a global view of the HV state (indicating with colored boxes the state of each channel, but not providing any details). It is used for monitoring. The second one is arrived at by clicking in the first GUI, that will pop-up a GUI that gives all the gory details about the HV, and it is the one that is used to actually control the HV.

Starting the Cal/ICD HV Monitoring GUI

If you need to start up the Cal/ICD HV GUIs to monitor the High Voltages, follow these steps:

1. Open an X-window. See the open xterm instructions **Error! Bookmark not defined.**.

2. Start the HV monitoring GUI. Type ***start_cal hv***. That will pop-up a monitoring window which is a representation of the HV racks in the first floor of the moveable counting house (M116 and M118). The colors indicate the state of the individual HV modules. Blue indicates that it is up and running at the set voltage. For more details see the following sections.

Starting the Cal/ICD HV control GUI

If you need to start up the Cal/ICD HV GUIs to reset or start up the High Voltages, follow these steps:

1. Start the HV monitoring GUI. See the steps above for starting the Cal/HV monitoring GUI. You will use this GUI to start the control GUI.

2. Select the Cal or ICD control GUI. To open the control GUI, left-click on the title bar for each HV crate. For example to start up the ICD control GUI, ***left-click*** on the bar that says ***ICD North-East***. Or if you wanted to start up the Cal HV control GUI, then ***left-click*** on the title bar that for example says ***CAL North***. The GUI that pops-up will have four tabs on top that allow you to look at the details of each crate. It is from this GUI that you can reset or turn on and off the high voltages.

Resetting the HV (ICD and Calorimeter)

If the HV trips, then you will need to reset it. Assuming that the HV GUI is up and running (as it normally is), then follow these steps to reset the HV:

1. Select the tripped channel. The HV monitoring GUI (called the ***HV Global Monitor Display*** on the GUI label) will display a red bar. Left mouse click on the title bar of the "crate" that contains that red bar, and the HV control GUI will pop-up with the tripped channel again shown in red (this GUI is labeled ***HVC Channel Monitor***).

2. Turn off ICD preamp power. If you are going to reset or turn on ICD HV, then you should first ***turn off the ICD preamps*** – otherwise the voltage spike may kill the ICD preamps. You turn off the ICD preamp power using the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) . Go to the ***Preamp*** tab and near the bottom you will see ***ICD_LVCP_PW09***, and then click on the brown ***Off*** button on the right corresponding to that supply. This applies only to the ICD, there is no need to turn off Cal preamps if you are working with the Cal HV.

3. Reset the HV. In this new HV control GUI, left-click on the tripped (red) cell. Left click on the cell, and a pop-up box will appear, select ***Reset***. The box will now turn orange and say ***On***. Note this does NOT mean that the HV is actually on, you must, in fact, left mouse click again and select ***Ramp***. The bar will now turn yellow, showing ***Ramp***, as the voltage ramps up. You can watch the voltage ramp up. Once it reaches its operating value (usually 2,000V) the box will turn green and show ***Holding***. At that point you want to lock the channel by left mouse clicking and selecting ***Lock***. Finally you should quit the GUI by left mouse clicking on the ***Quit*** button in the upper right hand side. If you don't succeed using this procedure, you might try increasing the voltage in stages. If that fails, call an expert. Make an entry in the logbook and if it is a calorimeter trip, send an email to mailto:parua@fnal.gov?subject=Cal%20HV%20trip, and if it is an ICD trip send it to d0icd@fnal.gov.

Calorimeter High Voltage

The Calorimeter HV modules are located in the moveable counting house on the 1st floor. Here we describe how the HV modules are arranged. There are 32 HV pods for each quadrant of the ICD (NE, NW, SE, SW). Each pod sends voltage to a 1:3 fanout. There are 96 channels of HV for each quadrant.

There are eight HV pods in each HV module, and there are six modules per crate. The ICD uses 4x32 pods or 4x4 modules. The 16 modules are housed on three crates (a, b and c) which sit in the rack MCH116.

Crate B controls power to all of the Northeast quadrant (pods NE01-32, channels 1-96), and the first half of the Northwest (pods NW01-16, channels 1-48). Crate C controls power to the second half of the Northwest (pods NW17-32, channels 49-96) and all of the Southeast (SE01-32, channels 1-96). Crate D controls only the power to the Southwest (SW01-32, channels 1-96).

ICD High Voltage

The ICD HV modules are located in the moveable counting house on the 1st floor. There are 32 HV pods for each quadrant of the ICD (NE, NW, SE, SW). Each pod sends voltage to a 1:3 fanout. There are 96 channels of HV for each quadrant.

There are eight HV pods in each HV module, and there are six modules per crate. The ICD uses 4x32 pods or 4x4 modules. The 16 modules are housed on three crates (a, b and c) which sit in the rack MCH116.

Crate B controls power to all of the Northeast quadrant (pods NE01-32, channels 1-96), and the first half of the Northwest (pods NW01-16, channels 1-48). Crate C controls power to the second half of the Northwest (pods NW17-32, channels 49-96) and all of the Southeast (SE01-32, channels 1-96). Crate D controls only the power to the Southwest (SW01-32, channels 1-96).

If you see something different than the above image, there is a problem.

For more information, check out the web link made by Alan Stone http://www-d0online.fnal.gov/www/groups/icd/docs/hv_map.html.

In general, the calorimeter shifter should not modify the ICD HV settings which have been painstakingly adjusted. There is a lot of effort needed to adjust and calibrate the ICD signal, which is still being defined and must be considered an Expert Task.

However, sometimes it will be necessary to turn off or on the ICD HV because:

- Work is being done in or near racks MCH116 or MCH117. The drip detector can accidentally be triggered by moving cables, so a controlled ramping down of the HV is preferable to a sudden and potentially harmful trip. The PMTs are quite old and fragile.

- A cooling fan or power supply needs to be replaced, so the crate or rack needs to be powered down.

- Water cooling or humidity problems may cause accidental RMI trips, so the HV needs to be ramped down as a preventative measure.

Details

The racks MCH116, MCH117 and MCH118 are checked at the beginning of each shift by the DAQ Shifter as part of the checklist procedure. This includes making sure the Rack Monitor Interfaces are in a good state, and that the cooling fans are all on.

The CAL-ICD HV monitoring GUI should already be open in the computer monitor above the CAL/ICD console (d0oxt00). There are two columns each with four blocks of LED cells in this monitoring GUI corresponding to the HV crates housed in MCH116 and MCH118.

If the CAL-ICD HV monitoring GUI is not open, then while logged onto an online account (d0icd, d0cal, d0run, etc.) type the following:

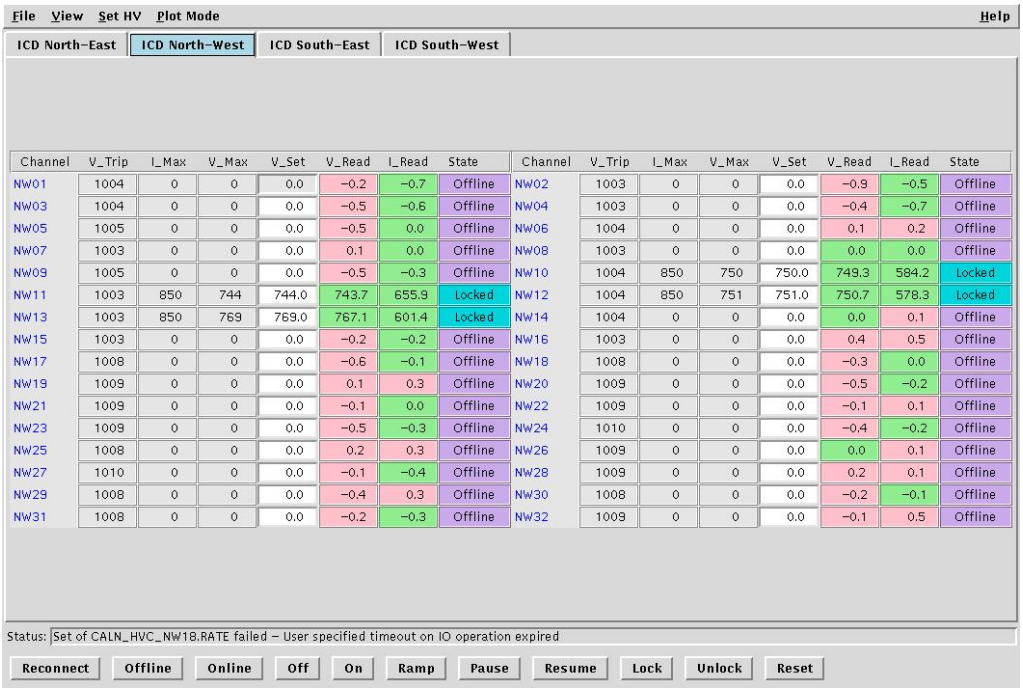
```
> setup d0online
> cd /online/config/cal/hv/
> ./cal.hvg &
```

The following HV Monitoring GUI will pop up:

First, you need to open the ICD HV Control GUI.

Move your mouse cursor to the Crate panel on the HV Monitoring GUI. You should see a little pop-up window with the phrase: Left click to display channels. Do so.

The following HV Control GUI will pop up:



Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State	Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State
NW01	1004	0	0	0.0	−0.2	−0.7	Offline	NW02	1003	0	0	0.0	−0.9	−0.5	Offline
NW03	1004	0	0	0.0	−0.5	−0.6	Offline	NW04	1003	0	0	0.0	−0.4	−0.7	Offline
NW05	1005	0	0	0.0	−0.5	0.0	Offline	NW06	1004	0	0	0.0	0.1	0.2	Offline
NW07	1003	0	0	0.0	0.1	0.0	Offline	NW08	1003	0	0	0.0	0.0	0.0	Offline
NW09	1005	0	0	0.0	−0.5	−0.3	Offline	NW10	1004	850	750	750.0	749.3	584.2	Locked
NW11	1003	850	744	744.0	743.7	655.9	Locked	NW12	1004	850	751	751.0	750.7	578.3	Locked
NW13	1003	850	769	769.0	767.1	601.4	Locked	NW14	1004	0	0	0.0	0.0	0.1	Offline
NW15	1003	0	0	0.0	−0.2	−0.2	Offline	NW16	1003	0	0	0.0	0.4	0.5	Offline
NW17	1008	0	0	0.0	−0.6	−0.1	Offline	NW18	1008	0	0	0.0	−0.3	0.0	Offline
NW19	1009	0	0	0.0	0.1	0.3	Offline	NW20	1009	0	0	0.0	−0.5	−0.2	Offline
NW21	1009	0	0	0.0	−0.1	0.0	Offline	NW22	1009	0	0	0.0	−0.1	0.1	Offline
NW23	1009	0	0	0.0	−0.5	−0.3	Offline	NW24	1010	0	0	0.0	−0.4	−0.2	Offline
NW25	1008	0	0	0.0	0.2	0.3	Offline	NW26	1009	0	0	0.0	0.0	0.1	Offline
NW27	1010	0	0	0.0	−0.1	−0.4	Offline	NW28	1009	0	0	0.0	0.2	0.1	Offline
NW29	1008	0	0	0.0	−0.4	0.3	Offline	NW30	1008	0	0	0.0	−0.2	−0.1	Offline
NW31	1008	0	0	0.0	−0.2	−0.3	Offline	NW32	1009	0	0	0.0	−0.1	0.5	Offline

There is tab for each of the four ICD quadrants, each powered by 32 HV pods. It depends on which of the three Crate panels in the HV Monitoring GUI you clicked which determines the tab you first see in the ICD HV Control GUI.

Much of the ICD is not instrumented. To differentiate those channels, they have been put in the Offline state.

How to turn off the HV:

1. Go to the bottom and click on the button Unlock.
2. At the top, click on Set HV and select 0%.
3. Go to the bottom and click on the button Ramp.
4. Never Turn Off any pods before ramping the voltage down to or near zero.
5. Once all the values in the columns for V_Read and I_Read are at or very near zero, go to the bottom and click on the button Off.
6. Do the above for all four quadrants, chosen by the tabs North-East, North-West, South-East and South-West.

How to turn on the HV:

1. First ***turn off all ICD preamps***.

2. Go to the bottom and click on the button On.

3. In the NE, NW and SE, only some part of the ICD is instrumented. Therefore, it is better to only turn on the individual pods one at a time. Click on the cell with the left mouse button and choose On. You can tell which cells should be On by looking at the values in columns I_Max and V_Max. If the value is zero, then that cell should always be Offline.

4. At the top, click on Set HV and select 100%.

5. Go to the bottom and click on the button Ramp.

6. The values in the columns for V_Read and I_Read should increase and the status cell will be yellow with the words Ramping or Average.

7. When the status cell changes to Holding for all cells that are On, go to the bottom and click on the button Lock.

8. Do the above for all four quadrants.

If you see in the monitoring GUI that some cell or cells have started flashing red, this means that some HV pods have tripped, usually on over-current.

How to reset the HV if it has tripped:

1. Go to the ICD HV Control GUI (see above if you need to open one).

2. Click through the four tabs to find the HV pods where the status cell is flashing red.

3. Click on the cell with the left mouse button and choose Reset. If there are multiple trips, go to the bottom of the GUI and click on Reset. This should change the state to On.

4. Go to the bottom and click on the button Ramp.

5. The values in the columns for V_Read and I_Read should increase and the status cell will be yellow with the words Ramping or Average.

6. When the status cell changes to Holding for all cells that are On, go to the bottom and click on the button Lock.

7. Make a note in the logbook and send email to Alan Stone (alstone@fnal.gov).

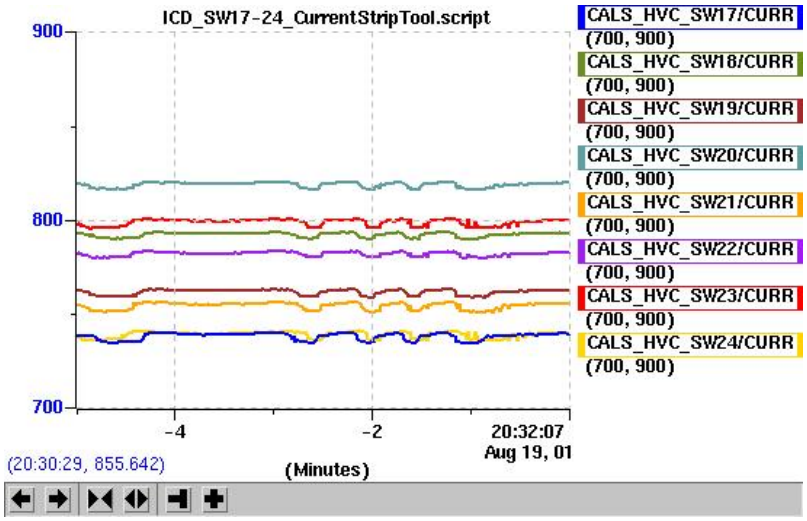
I have setup up scripts to launch StripTools of all the ICD currents and voltages. They are set with a circular buffer of some finite number of seconds, so one can go back in

time to see why something tripped. Both scripts generate nine separate windows stacked on top of each other, so you will need to space them out in order to view them all simultaneously. The default window shows the last five minutes with a resolution of one second. We are still trying to understand the behavior. The currents read from the ICD HV SW crate have an oscillating feature which appears to be real.

You need to be logged into d0ol45 (as d0icd, d0cal, d0run) Type the following:

> setup d0online
> cd /home/d0icd/hv/
> ./ICD_CurrentStripTool &

Nine stacked windows like the following will open:



There are six buttons on the bottom which allow you to: pan left; pan right; zoom in; zoom out; auto scroll; refresh.

When you manipulate the pan or zoom functions, the StripTool may no longer appear to be updating. This is not the case. The information is still stored in buffer but not displayed. You can continue the updating by clicking on the Autoscroll button.

The upper and lower limits for each channel are set in the script such that increasing current draws that lead to a trip can be seen. Alternatively, a trip may be caused by something very sudden. As long as a trip can be spotted and recorded shortly after it happened, we can go back and look in the StripTool.

To open the ICD voltage StripTools, type the following:

> setup d0online
> cd /home/d0icd/hv/
> ./ICD_VoltageStripTool &

Only as long as the StripTools have been open can we look back in time to see the current or voltage behavior. So, if you noticed that the StripTools have been closed, please relaunch them. I have dedicated one screen each to voltage and current. If memory or space is limited, I would prefer that voltage be sacrificed first. They should also be added to the start-up procedure for the Calorimeter/ICD console (d0ol45).

LAr Monitoring

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Appendix A – Rack Maps

There are a number of locations where you will find electronic racks that contain electronics relevant to the calorimeter system.

On the Calorimeter

The term "rack" is used rather loosely defined for the locations on the calorimeter. It is the location of the preamplifiers and their associated power supplies.

Preamps
Preamp Low Voltage Power Supplies
HV distribution

Under the Detector

The signals from the preamps are transported via twist-and-flat cables from the preamp boxes on the calorimeter to the crates that contain the BLS cards.

BLS
BLS Low Voltage Power Supplies

In the Moveable Counting House (MCH)

The signals from the BLS crates are sent via twist and flat cables from the BLS racks to the ADC's and the L1 Cal Trigger located in the Moveable Counting House (called MCH). The MCH has three floors.

ADC
ADC Low Voltage Power Supplies
Timing and Control
CETEC Low Voltage Power Supply
HV Power Supplies
L1 Cal Trigger

In the Control Room

Appendix B – Safety Documentation

Appendix C – Scripts Explained (for Experts)

Overview

In this appendix we capture some of the detail behind the scripts. It is not intended that any of this information needs to be used by shifters, but it is collected here so that when the corporate memory of the scripts are lost, then there will be some documentation of what they are supposed to do. Essentially this Appendix is created by moving documentation sections from the front of the shifter manual to here – as new scripts are developed.

The Scripts

This is a somewhat haphazard collection of documentation that are presently obsolete, but may prove useful.

Downloading Pedestals

The pedestal download is now done by the script **./download_peds.sh**. Here are the steps that it essentially takes.

1. Change the directory. In your xterm window, prepare the way by doing a ***setup d0online***. Then change the directory with ***cd /online/config/cal/comics*** and type ***su d0run*** (which has a password that you will have to find in the written documentation in the control room – it is written on the front divider labeled Contact Information).

2. Check to see if Comics is running. You can check to see if Comics is running with ***ps axx | grep comics***. If it is running, you will see a four lines that look like

   21653 pts/18 S 0:00 python ./comics.py

   If it isn't running, then start it up with the usual ***setup d0online*** followed by ***./comics.py &***.

   a. Start the download. As usual, try ***setup d0online*** to start with (never hurts). Then run ***./talkcomics.py –f download_peds.txt***. You will see it scroll through each of the crates starting with 13. There may be failures to load individual crates (watch the messages as they scroll by) – if so, simply try running it again till it passes. Note that if it turns out that comics is not running, then you will see the error message ***Couldn't connect*** when you try this step – go back in that case. There may also be failures to download individual crates (watch the messages as they scroll by, and if you see "n ok", where "n" is a crate number, then that crate has been downloaded). Since the script repeats four times, they should be properly downloaded by the time the script finishes running. If not, run it again. Note that once a crate is correctly downloaded, it stays that way, so

each time you run the script you will eventually get all of the crates to download properly.

Taking pedestal Calibration Runs

In the past, it used to be that you could only take calibration runs for pairs of crates, so you would have to cycle through 6 pairs to do the whole detector. Here are some of the steps we followed then. These are just copied from obsolete steps from the front of the shifter guide.

1. Select the trigger for the Taker and start the run. In the Taker, click on ***modify***, and then click on ***Change Trigger***. You will now see the configuration window. To make sure you are in the correct directory, click ***UP (Left)*** until you are all the way "up" and the directories no longer change. Double click on the directory ***calibration***, then double click on ***cal***, then double click on ***calib-0X40-0X41-1.0***. It will tell you "download in progress". After the download is complete (about 30 seconds) click on ***start*** (lower left long button in Taker) to begin the run. A pop-up ***Begin Run*** window will appear. Fill it in with your name in the ***shifter*** box, the gain (x1 or x8) and the crates being run in the ***Reason*** box, and check the ***Calibration*** button. That box disappears and the run has started.

2. Repeat for all other crates. You now go back to the taker and repeat this same procedure for the other remaining crates, starting with step **Error! Reference source not found. Error! Bookmark not defined.** (the files are called calib-0x42-0x43-1.0 and so forth; it should be obvious). That means you will modify the trigger file appropriately. When you have run through all crates (6 files) you have completed the pedestal calibration run for the x1 gain.

Checking the memory on the T&C board after it is power cycled

This is a step that can now be carried out through the CRATE MONITORING GUI (=T&C GUI), but it is included here for archival purposes.

1. Check the memory address 0x40ff0088 is set to 0x88b. If it is not set, then you need to set it. The amber SCL synchronization light on the SCL receiver card should now be on. If you need to get to the VME memory, then you need follow these directions:

   Log into any online linux machine or d0ola or d0olb, and type

   - setup onl_apps
   - cd /online/config/cal
   - ./vme_xx & (where xx is crate 40 to 4A)

   A window will pop up; click on the left side of up to four panes in the window. Another pop-up window will appear, change the desired value and click on the ***Apply*** button.

Make sure we are running in the correct mode for data taking

These instructions allow you to set the electronics into the correct mode for data taking. This is now all taken care of by the download called "cal_prepare_for_data_1.1".

You can check this in the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) by going to the ***Mode*** tab (the last one on the right). Check the first purple column labeled ***MODE***. It should show ***0x80f*** for all 12 crates. If it showing anything else, you will need to change it by starting up the ***Crate Monitor GUI*** (more commonly referred to as the Timing and Control or CRATE MONITORING GUI (=T&C GUI)). If you need to open this GUI, run ***start_cal tandc*** in your open xterm window. Click on the ***Global BLS Mode*** button and click ***Normal*** on the drop down menu. Now close the menu by clicking the ***Global BLS Mode*** button again. Finally click on the ***Global ADC Mode*** button and then click on the ***0SignSup*** button. Close the drop down menu by clicking the ***Global ADC Mode*** button again. Click on the ***Global T&C set*** , and click on ***x88b***, which corresponds to the so-called "fixed bunch" mode. You can check this by looking at the ***Calorimeter Power Supply Monitor Display*** and selecting the ***Mode*** tab – the first column (of yellow/beige color), ***MODE***, should show the corresponding value ***0x88b*** for all 12 crates. Finally, you should check to see that the Cell and Tick settings (which may have been changed for pulser running) are correct – that means that the 4th yellow/brown column in the Pulser GUI called ***DIAG*** should read ***0x0***. If it is not 0x0, then go to the CRATE MONITORING GUI (=T&C GUI) and click on the ***Global T&C Set*** button, click on the ***CELL*** box and type in ***0***, and then on the ***TICK*** box and type in ***0***. There are also two columns to the left of the yellow reset buttons on the right. Those two columns should be green and labeled ***Normal*** and ***0 Sign Sup***. If not, go back a few lines and make sure you followed instructions.

Set the Timing and Control system to fixed cell mode, 0x889

To do this, go to the ***Crate Monitoring*** GUI (called the CRATE MONITORING GUI (=T&C GUI)). If it isn't open, go to your xterm window and run ***start_cal tandc***. Click on the purple button, ***Global T&C Set***, and select ***0x889*** and enter ***f0*** in the ***CELL*** box. The ***MODE*** column on the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) (the first orange/beige column) should now show ***0x889 (fixed cell)***.

Starting the HV GUI's

This is now done via a single script ***start_cal hv***. Here are the pieces that go into that script.

1. Set the directory and setup. First type ***setup d0online*** and then change the directory by typing ***cd /online/config/cal/hv***.

2. Start the calorimeter HV GUI. Enter ***./cal.hvg &*** .

Run the HISTO version of Calorimeter Examine

We have switched over to the Root version of Examine, but in the past we ran the histo version. Here is how we did that. Open a new xterm window (on the left screen usually). Start with the usual ***setup d0online***, then, run ***start_daq cal_examine***, on completion, follow by ***init*** <carriage return> and ***start*** <carriage return> (see page 70 for more details). That will start reading the data, and now you can plot it. In another xterm window start up Histo by starting with ***setup d0online***, followed by ***histo &***. That pops up a window in which you can connect to the data by selecting the ***File/Process*** pull down menu and selecting ***Connect to process***…, that will load in something like ***Calorimeter Examine Histograms (d0cal)xxxx***. Highlight/select that file and left click the ***Connect*** button. Now you should see in the ***Sub***

Categories list that there is a single file selected, if so, left click on the ***Open*** button. A whole set of histogram names will appear in the right-hand pane. If you want to see a single histogram, then highlight it and left click on the ***View*** button. If you want to look at multiple histograms, select them (either by holding the shift key and clicking on a starting one and then and end one, or select them individually by selecting them with a Ctrl-click), and left click on the ***View Multiple*** button. Eventually we will have a set of reference Examine plots for you to compare with. For now just keep an eye out for anomalies, such as new and unusual structures in the distribution of hits, etc.

1. Run the Root Calorimeter Examine. Examines should be run on d0ol23 node which is faster and relieves the load from d0ol45. If there is an Examine GUI open, then you are done. If not, the open a new xterm window (on the left screen usually), type the usual ***setup d0online*** and then ***d0ssh d0ol23***. It used to be – maybe not necessary now? -- that you should now check to see if any examines or xgooey processes are running by typing ***ps –ef | grep xgooey*** and then ***ps –ef | grep examine***. These instructions should list all the processes that contain ***xgooey*** in their name, if for some reason you want to see ***all processes*** then type ***ps –fu d0cal*** – this should not be necessary, but shifters have reported problems with the first instructions. Kill those processes (i.e. any processes that contain ***xgooey*** in their name, like ***xgooey_xx*** etc) using ***kill -9 xxx*** where ***xxx*** is the process number. Then ***setup d0online*** and run ***start_cal examine***. This opens the ***Examine Control Panel***. Click on the ***Edit*** button and select ***Preferences***. Select the ***EXAMINE*** tab and set ***Server Address*** to ***d0ol23.fnal.gov*** and check the ***Canvas Menu Bar*** option under the ***DISPLAY*** tab. Back on the main control panel, click the red ***Start*** button (upper left), which will bring up a list of histograms. Choose one or a set of histograms that you would like to monitor by selecting them with a left mouse click. Now click on the light-green ***Display*** button in the ***Histograms*** menu (which is at the bottom of the ***Examine Control Panel***). That will pop open a window with those histograms. Don't forget to unselect the histograms before opening a new display (or "canvas" in root language), otherwise you will see them again! You can play with adjusting sizes, scales etc. Keep the number of histograms displayed to as small a number as possible. The system tends to slow down or hang otherwise. You can report problems in an "observation file" which you can copy (with xemacs) into the logbook.

2. For now, run the Histoscope Examine version. At some point this will be the Root version, but not just yet. You should monitor Examine throughout the run – starting a fresh Examine at the start of the run, and stopping at the end of a run. To run the Examine, open a new xterm window and run :

```
> setup d0online
> d0ssh d0ol23
> setup histo
> histo &
> setup d0online
> cd /online/examines/scripts/
> ./cal_examine.sh
  init
  start
```

When you ran the histo command then it popped up a window in which you can now connect to the data by selecting the ***File/Process*** pull down menu and selecting ***Connect to process***…, that will load in something like ***Calorimeter Examine Histograms (d0cal)xxxx***. Highlight/select that file and left click the ***Connect*** button. Now you should see in the ***Sub Categories*** list that there is a single file selected, if so, left click on the ***Open*** button. A whole set of histogram names will appear in the right-hand pane. If you want to see a single histogram, then highlight it and left click on the ***View*** button. If you want to look at multiple histograms, select them (either by holding the shift key and clicking on a starting one and then and end one, or select them individually by selecting them with a Ctrl-click), and left click on the ***View Multiple*** button. Eventually we will have a set of reference Examine plots for you to compare with. For now just keep an eye out for anomalies, such as new and unusual structures in the distribution of hits, etc. You must look at least at the set of plots for Nhits vs ieta-iphi, and Energy vs ieta-iphi. If you find a "tower" that is abnormally high (or low) compared to its neighbors, then you should cycle through the similar plots for the individual layers, in order to identify the problem cell. Record your findings in the electronic logbook (try pasting in a copy of the plot in the logbook).

Run the Root Calorimeter Examine. It is broken at the moment. Examines should be run on d0ol23 node which is faster and relieves the load from d0ol45. If there is an Examine GUI open, then you are done. If not, the open a new xterm window (on the left screen usually), type the usual ***setup d0online*** and then ***d0ssh d0ol23***. Now check to see if any examines or xgooey processes are running by typing ***ps –ef | grep Xgooey*** and then ***ps –ef | grep examine***. Kill those processes using ***kill -9 xxx*** where xxx is the process number. Then ***setup d0online*** and run ***start_cal examine***. This opens the ***Examine Control Panel***. Click on the ***Edit*** button and select ***Preferences***. Change ***EXAMINE*** to ***d0ol23.fnal.gov*** and check the ***Canvas Menu Bar*** option under ***DISPLAY***. Back on the main control panel, click the red ***Start*** button (upper left), which will bring up a list of histograms. Choose one or a set of histograms that you would like to monitor by selecting them with a left mouse click (at the moment ***do not select Total Energy, Total Et, EM energy, Had Energy, EM cell energy ieta/iphi, HAD cell energy ieta/iphi***). Now click on the light-green ***Display*** button in the ***Histograms*** menu (which is at the bottom of the ***Examine Control Panel***). That will pop open a window with those histograms. Don't forget to unselect the histograms before opening a new display (or "canvas" in root language), otherwise you will see them again! You can play with adjusting sizes, scales etc. Keep the number of histograms displayed to as small a number as possible. The system tends to slow down or hang otherwise. You can report problems in an "observation file" which you can copy (with xemacs) into the logbook.

3. Monitor Examine plots during the run. Once you have selected the plots of interest, you can update the histogram to include more statistics by clicking the ***Update*** button. Note that at each update all the settings for the histogram are lost and it is returned to the default settings. You should try and start a fresh set of histograms for each "significant" run (you be the judge of what is significant). You can check with the DAQ shifter to see when runs start and stop. Once you have checked the plots for a run, and noted the various "hot" regions (if any) in the Runs Database, then you can check the ***Online Checked*** option in the runs database. If you want to place a screenshot of a histogram in the logbook, you can follow the directions on page 24.

Set the BLS/ADC mode to 0xb01. Go to the CRATE MONITORING GUI (=T&C GUI). If it isn't already open go to an xterm window and run ***start_cal tandc*** (if you have trouble, check the troubleshooting guide). Click on the purple ***Global BLS Mode*** button, and then click on ***Force x8***. Remember to close the pull down menu by clicking once more on the same ***Global BLS Mode*** button. Now click on the purple ***Global ADC Mode*** button and click on ***Unsup*** (for unsuppressed). That should have changed the ***MODE*** column (first purple column) on the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) to ***0xb01***. You can also check to see that the change was carried out by checking the Calorimeter Power Supply Monitor Display GUI (= Supply GUI) 's ***Mode Shift*** tab, where you will see two blue columns (labeled ***BLS MODE*** and ***ADC MODE***) indicating ***Force x8*** and ***Unsuppressed***. Under normal data taking conditions these two columns are green.

What the pedestal calibration does. (for example while the pedestal calibration is running, it checks for cells with pedestal values less than 400 and greater than 800 or a zero-suppression threshold greater than 100 for the x8 gain path), and those cells are suppressed by putting a zero-suppression threshold of 32760 in the pedestal download file (/online/comics/cal/calib/data/crate0x%%-download.txt where %% is a crate number from 40 to 4b). All the cells that are suppressed are listed in /online/comics/cal/calib/valid/crate_all_bad.txt.

If the FPGA code needs to be downloaded into the T&C crate

If the T&C board power has been cycled, you will need to reload the code into the FPGA's. To do this involves finding the ADC racks on the 3rd floor of the movable counting house, plugging in and moving a cable. These instructions should allow you to do that, but it is best left to an expert unless it is an emergency.

1. Locate the download computer in MCH309. The PC used to download the FPGAs is located on the third floor of the movable counting house (MCH) in rack 309 (the racks are labeled on top). Open the door in the rack to access this NT PC. If the PC was rebooted, you may need to log in as ***d0cal*** with the same password for d0cal as for the online (see the password written on the front page of the user guide binder).

2. Start up the FPGA software. On the desk you will find the ***max+Plus2*** icon, double click on it. The ***Altera maxplusII*** window should pop up. Click on ***Max+plusII***, then ***Programmer***. Another window pops up. Now leave it while you attach the cables.

3. Attach the Programming cable to the fanouts. Take the 8-pin ***FPGA Programming cable (the blue one,*** or is it ***grey with a blue and red stripe?)*** and plug it into the ***smaller*** of the two ***fanout*** boards (the one on the right). There are two fanout boards which are located in the small section between the top electronics crate and the one below it, in rack ***M308***. The connector is marked by a ***white stripe that faces left*** (and matches the white mark on the fanout board connector), and it plugs into the ***leftmost male connector*** on this smaller one of the two fanout boards – the small fanout board is on the left, and the larger one on the right. Now verify that the cable labeled ***12*** is plugged

into the ***4th open connector*** (counting from the right) on the small fanout board. It should be the only "open" connector (i.e. one without a little two pin jumper in it). Be very careful not to pull on the cables going to the ADC boards, as they detach from their connectors on the boards quite easily.

4. Download the files to the FPGA. Go back to the computer now, and pull down the ***JTAG*** menu in the ***Max+plusII*** window, select ***Restore JCF***, and browse through ***Directories*** starting at ***maxplus2*** then ***work*** then ***tandc_ctrl***. In that directory select ***tandc_ctrl.jcf*** by double-clicking on it. At that point, the programmer window displays ***Multi Device JTAG Chain*** (4 programming files). Click on ***Configure***. You will see activity indicating that the files are being downloaded. When it is done, you will see the message ***Configuration complete: 4 devices configured***. If you do not see the complete message, or if there is an error like ***jtag information mismatch***, it is most likely due to the cable not being plugged in correctly, or perhaps upside down. Correct the problem and try again.

5. Move the Programming cable and repeat for the large fanout board for cables 0 to 5 – CAREFUL, these next three steps have a tendency to fail, if so, skip them and go to step 8. Remove the blue programming cable from the small fanout, and move it to the large fanout, where you will again plug it into the rightmost connector (and again the white mark is on the left and matches the one on the fanout connector). Verify that the cables labeled ***0*** through ***5*** are plugged in in sequence to all the open connectors on the large fanout (the open connectors are the ones without the 2-pin jumpers in them).

6. Download the files to the FPGA. Go back to the computer now, and pull down the ***JTAG*** menu in the ***Max+plusII*** window, select ***Restore JCF***, and browse through ***Directories*** starting at ***maxplus2*** then ***work*** then ***tandc.*** In that directory select ***tandc6.jcf*** by double-clicking on it. At that point, the programmer window displays ***Multi Device JTAG Chain*** (18 programming files). Click on ***Configure***. You will see activity indicating that the files are being downloaded. When it is done, you will see the message ***Configuration complete: 18 devices configured***. If you do not see the complete message, or if there is an error like ***jtag information mismatch***, it is most likely due to the cable not being plugged in correctly, or perhaps upside down. Correct the problem and try again. Note however that after power cycling of the crate it is possible that you may not be able to program the FPGAs using the large fanout card. In that case skip the next step and go to the one after.

7. Change cables 0-5 with cables 6-11. Now remove cables ***0-5*** from the large fanout board, and plug in cables ***6-11*** that should be dangling nearby. Click on ***Configure***. You will see activity indicating that the files are being downloaded. When it is done, you will see the message ***Configuration complete: 18 devices configured***. If you do not see the complete message, or if there is an error like ***jtag information mismatch***, it is most likely due to the cable not being plugged in correctly, or perhaps upside down. Correct the problem and try again.

8. If you cannot program using the large fanout, which is likely! If can succeeded in programming with the large fanout board, then skip this step. Otherwise, as was mentioned above, it is possible that after a power cycle you will be unable to program the

FPGAs using the large fanout card. In that case you will have to fall back to the mode of programming using the small fanout and programming one card at a time. Sorry. So, in this case start by plugging in cable 0 into the one open slot in the small fanout card (of course don't forget to plug in the blue programming cable into that rightmost slot!). Go back to the computer now, and pull down the ***JTAG*** menu in the ***Max+plusII*** window, select ***Restore JTAG***, and browse through ***Directories*** starting at ***maxplus2*** then ***work*** then ***tandc.*** In that directory select ***tandc.jcf*** by double-clicking on it. At that point, the programmer window displays ***Multi Device JTAG Chain*** (3 programming files). Click on ***Configure***. You will see activity indicating that the files are being downloaded. When it is done, you will see the message ***Configuration complete: 3 devices configured***. If you do not see the complete message, or if there is an error like ***jtag information mismatch***, it is most likely due to the cable not being plugged in correctly, or perhaps upside down. Correct the problem and try again. Now repeat one at a time for the remaining cables ***1-11***.

9. Exit the program. Click ***File***, then select ***Exit***.

10. Verify that you have entered the correct FPGA code version. The Calorimeter Power Supply Monitor Display GUI (= Supply GUI) has an entry for that version number (presently 27), which you should check to see that it is correct. Also, the T&C controller mode should be set according to step **Error! Reference source not found.** on page **Error! Bookmark not defined.**.

Appendix D - Calorimeter Checklist

The calorimeter checklist is now just part of the combined calorimeter-muon checklist which is available in the electronic logbook.

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