Description of muTr Calibration DAQ and Analysis Procedures – MJL – 8/19//08

DAQ

- on phnxrc@phoncsc:mutr/calib/
- the shift-person initiates this whole thing (by using docalib.pl) at least once a day when the beam or HV are off and normal data taking not taking place.
- docalib.pl – Perl/Tk GUI to control calibration of either arm
    - calib1.pl – Perl script called by above for initialization, for each of 13 DAC values and for finishing up. For each 13 runs:
        1. Set calibration system pulse amplitude & load user words for packets using calib.c program
        2. Then use RC to take >100 event run
    - prdf file names are recorded in the file filelist_xx_yy_zz.txt
    - After a successful sequence it puts "tag" name into newcalibS.txt or newcalibN.txt (which is the signaling file used to communicate with the automatic analysis, see below)
    - And last it calls getTemp.csh to readout and check the FEM/Glink temperatures, voltages, currents and put results in the mySQL database
- Alternatively, the fast pedestal only calibration can be done with doped.pl
    - ped1.pl – perl script to take one run with zero amplitude pulse
    - prdf file name recorded as above (but here only one set)
    - newpedS.txt or newpedN.txt files made with tag name inside

Automatic Analysis

- On phnxmutr@va078 in ~/calib/ (which is actually at /data2/phnxmutr/calib/)
- CVS repository is at /phenix/PHENIX_CVS/online/calib/mutr
- For below - full calibration procedures are listed with pedestal only files in parenthesis
- cauto (cautoped) – cron jobs (one for south, one for north) run every 2 minutes and look for newcalibX.txt files in the DAQ directory (above). When one of these files is found the cauto (cautoped) script initiates an analysis by calling docalib (deped).
- docalib (doped) – csh script to analyze a set of calibration runs for a muon arm (south or north)
    - sets LD_LIBRARY_PATH to get working libraries
    - makes a sub-directory for this analysis using the "tag" name
    - get filelist_xx_yy_zz.txt from DAQ directory
    - calib.C (quick.C) – root macro to analyze all data for calibration & produce threshold files
    - for pedestal only analysis, gets lastest full calibration from database and merges with new pedestals to form a new "full" calibration txt file, then treats this same as for a regular full calibration from here on
    - plot.C – root macro to plot calibration results
    - mon/… - comparison macros/programs to compare these results with results from previous calibrations & make some plots
        - docalmon arm (with arm=0 for south arm or =1 for north arm)

- getf - csh script to get list of calibrations to scan and compare
- calmon(arm) - using libcalmon.so library scan the listed calibrations and make the calmon ntuple
- make some plots with drawp.C drawg.C and drawr.C
- make history plots with pedhist.C rmshist.C and gainhist.C
- make plots for each packet with dopedpkth arm
- uses X virtual frame buffer (Xvfb) for display

- check.pl - sanity checks before recording anything in db
- copy new threshold files to $DCM_THRESHOLDS/mutr.s or mutr.n
- update database
  - with dodb.pl
  - checks that the files to be entered into db do not have all zero gains in either arm, uses db_check_txt.C macro and sends emails indicating problems or not
  - makes dodb script which uses dbputAll.C to put results in db, then verifies with dbgetAll.C as follows:
  - dbPutAll.C
    - txtGetAll("merge.txt")
    - txtPutAll("cal-intermediate.txt")
    - dbPutAll(start,stop,descript)
  - dbGetAll.C
    - dbGetAll
    - txtPutAll("cal-check.txt")
  - records in dbhistory.txt
  - then the following checks are made by dodb.pl
    - that the following files are time ordered:
      - dodb, dbhistory.txt, cal-intermediate.txt, cal-check.txt
    - and that the contents of cal-check.txt and cal-intermediadte.txt are identical (which verifies what was put into db comes back out again)
- then a check of the present (just updated) status of the db is made using the macro, checkdb.csh, which checks for zero gains
  - note – not clear this test is made after the db update, since that is done in background??
- use domove to update results & histograms on Web via Samba mount of /phenix/WWW & at /data2/phnxmutr/www/calib_results
- email results to caliblist (defined in ~phnxmutr/.mailrc)
- optional: call dobits.csh which analyzes calibration prdf files for stuck bits
  - in directory ~/dobits/ using dobits.csh, check_mutr.C and check_stuck_bit
- new web areas on logbook.phenix.bnl.gov that can be reached via "one tunnel to rule them all" (see offline Wiki):
  - http://logbook.phenix.bnl.gov/va078/calib_results/calib_results.html

Analysis Code Overview

- code in CVS at /online/calibration/onlcal/subsystems/mutr/
- calib.C – macro called by docalib (or calibX.C where X is S or N)
  - load libraries: libonlreco.so & libMutCalib.so
  - create MutCalib object
  - initMappingObj or txtGetFullMap – get channel mapping
  - getPreviousCalibration – get most recent previous calibration results
  - txtputMap
  - process_tag
    - loop over 13 prdf files
    - process_run
      - process_event – stores adc values internally
    - calcCalibVal
      - calc avg
      - calc rms
      - calc for DAC=0
        - thresh = (avg-nrms*rms-0.5) ^ 0xfff
  - writeThreshFiles – write out thresholds into files formatted for DCM's
  - rootPutInfo
  - fit – fit for pedestal, linear and non-linear gain vrs input pulse size (DAC) description
  - txtPutCalib – put resulting desription for each of ~22k channels/arm in text file
  - writeROOTFile – write ntuple that's useful for debugging or looking at more detail
- building libMutCalib library in phnxmutr@va032:/data2/phnxmutr/mjl/online/
  - presently using new
  - cd /data2/phnxmutr/tmp2/
  - mkdir build source install
  - cd source
  - cvs co -d ./source online/calibration/onlcal/subsystems/mutr
  - cd build
  - ../source/autogen.sh --prefix=/data2/phnxmutr/tmp2/install
  - make install
  - then use setenv LD_LIBRARY_PATH "/data2/phnxmutr/tmp2/install/lib:$OFFLINE_MAIN/lib:$LD_LIBRARY_PATH"

Setup of calibration analysis machine (VA078)

* use tar to transfer /tmp2, /calib and /dobits directories
* change cauto to accept the new machine for running on
* get email working (install mutt?)
  test with,
  mail -s "testing" leitch@rcf.rhic.bnl.gov < temp.txt

  mail -s "testing" caliblist
* set up samba mount
  for /mnt/win/phenix/WWW/publish/calib_results/
  with mount made from phnxmutr account with phnxrc password
* have framebuffer running for internal x-display
  called Xvfb
  test with,
  setenv DISPLAY :1
  xclock
* cron working with
phnxmutr@va078> crontab -l
0-59/2 * * * * /home/phnxmutr/calib/cauto South
0-59/2 * * * * /home/phnxmutr/calib/cauto North
0-59/2 * * * * /home/phnxmutr/calib/cautoped South
0-59/2 * * * * /home/phnxmutr/calib/cautoped North