COMMISSIONING DATA ANALYSIS

CALIBRATION

Description:

This first part is dedicated to calibrate the chamber, i.e. to find the time pedestals for each channel. This pedestals are splitted into two parts, the fine-granularity calibration, done wire by wire and obtained from test pulses runs, and the coarse-granularity calibration done at SL level.
The fine-granularity calibration procedure produce a text file with the calibration constants (times in ns) related to each (active) channel. These times express the wires delays with respect to the average arrival time of the TP signal.
Once the fine-granularity calibration is done, the time-boxes of each channel must be superimposed to the others around a common time value (with the actual commissioning setup, around 1870 ns). This time value (tTrig) is computed by the coarse granularity calibration for each SL, the 3 (2 for MB4) numbers obtained must coincide with good precision.

Operations:

From the actual chamber directory (in case just type from everywhere:

[daqcms@pccmsbo13] cd $CHAMBER_DIR

) run the Monitor program on a TP run:

[daqcms@pccmsbo13] RunMonitor.csh <runname> TP

the option “TP” means that you are looking at the signal around where the TP is aspected to be (check in the intervals in the first page of the monitor).
At this point you should check the correctness of the TP date. Go to the Time-Boxes page of the Monitor (DTBXTime-Box) and select the chamber time-box histogram (deselect “subtract t0”). Check whether the TP peak is really within the interval aspected. If not, close the monitor and change the parameters according to where the TP peak is:

[daqcms@pccmsbo13] emacs -nw $MONITOR_DIR/RunMonitor.csh

The monitor script will open up , you just need to edit the file where the TP parameters are set.

Now, if the peak is where it was foreseen to be, run again the monitor program. This time you just need to check whether the RMS related to the TP signals are not too high. The maximum value should be around 1. If too many channels have a RMS greater then that try to take another TP run, or just write it down on the logbook.
If the TP signals look ok, just push the button "Write Test Pulse" on the first page of the Monitor program. A file with the pedestals will be written in the current directory.
At this point you have to run the script to translate these pedestals to values around 0.

[daqcms@pccmsbo13] CalculateT0.sh <t0filename>

A file named t0_<Wheel>_<Sector>_<Station>.txt is produced. The fine-granularity calibration is over.
FIXME: THIS PROCEDURE WILL BE AUTOMATIZE VERY SOON

Once the fine-granularity calibration is done you have to define the tTrig. In order to do so run the analysis program in tTrig mode on a cosmics run:

[daqcms@pccmsbo13] RunTDCAnalysis.csh <runname> 30000 ttrig <runname>_tTrig

Once the program is executed (you are in at "tail -f" loop, than you need to type CTRL+C to exit the loop), you will get a ROOT file named <runname>_tTrig.root. You have to open it in ROOT:

[daqcms@pccmsbo13] root.exe <runname>_tTrig.root

and execute the script calculating the tTrigs:

[root #] .x writeTTrig.r

3 plots will pop up fit a fitted time-box. Check whether all the 3 time boxes (one for each SL) has the actual begin of the time-box fitted and not some spikes due to the noise. If the latter is the case for one or 2 SLs assume the value obtained for the SL for which the fit had been correctly performed, to be valid also for the other SLs too. If all the SL are problematic try with another run or add more masses to the chamber and take data again.
FIXME: EXCLUDE THE NOISY CHANNEL FROM THE CALIB. SAMPLES
The program produces text file named MBCalib_PostCalib.txt which contains the 3 tTrigs for the 3 SLs.
FIXME: WRITE A SPECIFIC APPLICATION FOR TRIG CALIBRATION

BASIC QUANTITIES PLOTS AND DIAGNOSTIC

Description:

Once the calibration is completed, everything is ready for the data analysis. This step is basically to produce the basic quantities (time-boxes and occupancies) upon which the quality of the data can be judged. The data are store into ROOT files for further analysis and in pdf files for documentation.
The diagnostic is a ROOT routine running on the previously produced ROOT file with time-boxes and occupancies. It produce a text file with the list of problematic channels (noisy, dead, time-box's pathology, 40 MHz noise) and a ROOT file with the time-box's tail-belly ratio per channel, the time-box's tail-belly dispersion and the distribution of the mean values of the 2^{nd} -1^{st} time's landau fit.

Operations:

From the current chamber directory type run the analysis program on a cosmics run:

[daqcms@pccmsbo13] RunTDCAnalysis.csh <runname> <number of events>

(if just type RunTDCAnalysis.csh w/o options you'll see the possible inline options, the runname beeing the only mondatory).
The program (because of the digitization step) is rather slow, less than 500 events/sec, then you should consider the time needed for processing an entire run.
When the processing is over (again CTRL+C to escape), you'll get a ROOT file filled with FirstHits, AllHits, Noise, AfterPulses time-boxes and occupancies. To have a look a them either browse the ROOT file, or use a specific plotter application:

[daqcms@pccmsbo13] root.exe <runname>.root

[root #] .x loadPlotter

a plotter object is loaded, you can use it to plot the histograms. Just use TAB to view the possible drawable objects:

[root #] plotter-> (TAB)

To run the Diagnostic program just type:

[daqcms@pccmsbo13] RunDiagnostic.csh <runname>

(The <runname> must match the prefix (the name w/o the .root suffix) of the ROOT file filled with time-boxes and occupancies information)
The Diagnostic program will produce a text file named <runname>.txt and a ROOT files named diagnostic_<runname>.root

You now can produce the pdf files containing all the histogram produced so far just typing:

[daqcms@pccmsbo13] creaps.csh <runname>

You'll get 3 pdf file: time-boxes, occupancies and diagnostic