

Instructions 201007

Updated: 20100702

This document should be used together with the “*quick guide*” and “*Pictures of setup 200907*”. See “*Further documentation*” at the end of this document.

Computers

There are two computers:

flctpc-lundmon – for monitoring and control
flctpc-lunddaq – for data acquisition

How to login on flctpc-lundmon

user: ilcdaq
passwd:*****

If there is no terminal window open, open one.

How to login on flctpc-lunddaq

Not normally needed except for copying data files. Same user and password as on flctpc-lundmon. Logging in from flctpc-lundmon do not require a password.

How to start up the data acquisition

Login in on flctpc-lundmon. Unless already logged in. If there is no terminal window open, open one.

If the RCUs to be used are not switched on before starting the DAQ program, then one must perform a scan for RCUs from the run control program. The same power supply is also the main power supply for the FECs. *It takes some minutes for the RCU to boot.*

Then do on flctpc-lundmon:
>localdaq

localdaq is a script (can be found in \$HOME/bin) that login on flctpc-lunddaq and starts up the readout task in an xterm window (named ILCSERVER). In this xterm window are currently many cryptic debug outputs written. It opens as well an xterm window from flctpc-lunddaq, this window can be used to edit configuration files. After a few seconds is a graphical run control user interface started.

If the window with the readout task does not appear, and/or most of buttons in

the GUI are cyan, and the 'STATUS' button is red at startup, then the readout program on flctpc-lunddaq has not managed to start. In that case take the following steps.

- 1) exit the GUI
- 2) on flctpc-lunddaq check in /misc/ilcdaq/log-v4.4 for the file ilcserver.pid and remove it if it exists
- 3) if it does not exist, wait for a few minutes. If the readout has recently shutdown then it may be that the network connection is not yet closed.
- 4) close the xterm window opened from flctpc-lunddaq
- 5) do localdaq again

How to start the online monitoring system on flctpc-lundmon:

>startmon

startmon is a script (can be found in \$HOME/bin) that starts up the monitor task in a separate window (named MONITOR) and a presenter (named MONVIEW) as the user interface. Press 'online' in the presenter to connect the presenter to the monitor task. Sometimes this fails (Do not know why), then retry by doing:

>stopmon

>startmon

Event Display

For the event display is a mapfile needed that maps RCU#, Channel# to x,y coordinates, it must be called mapchvsxy.txt and be in the directory /home/ilcdaq/ilcdaq/monitor-v5.2-pro. Format is, one line per channel:

RCU#	CHANNEL#	X	Y
------	----------	---	---

In the file histos.dyn is the definition of the 2-dimensional event display histogram. One need to change the x and y to the correct values.

These files are only read at program start. If they are changed then restart the monitor and presenter.

How to shutdown

How to close down the monitoring system:

>stopmon

stopmon is a script (can be found in \$HOME/bin) that kills the presenter and the monitoring task.

One can also press 'exit' in the presenter and do 'ctrl-c' in the monitoring task window.

When the monitoring task is stopped it crashes with some crash output written into the window.

How to close down the data acquisition:

After having stopped DAQ (how see below), 'EXIT' the GUI and do 'ctrl-c' in the daq xterm window (named ILCSERVER). Type 'exit' in the xterm window opened for editing configuration files

Summary of How to startup everything

- 1) If not already on, switch on the readout electronics power supply in the test beam area.
- 2) If 1) Wait for the red LED on the optical link on the RCU to become green and wait some minutes for the RCU boot before doing
- 3) localdaq
- 4) startmon
- 5) power on FEC – click 'PowOn', this will also load the lookup tables if 'Load lookup tables at power on' is checked, i.e. it will take some time. **If 'STATUS' goes red an error occurred**, retry by checking 'Load lookup tables at Start DAQ' and click StartDAQ. Afterwards do StopDAQ and uncheck 'Load lookup tables at Start DAQ'.
- 6) set and load PCA16 settings – click 'PcaLoad'
- 7) select 'physics' run for beam, 'pedestals' for taking pedestal run. Do not use 'test'
- 8) Click 'Start DAQ'.
- 9) select 'readout events' and set number of events to take, 0=until manually stop run
- 10) if the online monitor is used set 'monitor' to a nonzero value, the value is a 'downscaling' factor; 0= no monitoring, 1 = as many as possible, N = every Nth event.
- 11) If data logging is wanted check 'Logging', else uncheck it. **If you do not want logging be sure it is unchecked before starting a run.** The logging flag is always remembered from the last run started, i.e. doing uncheck and 'StopDAQ' 'StartDaq' without a new run, then the logging flag will still be set if the last run had it set.
- 12) Press 'Start run'
- 13) Press 'Stop run' when wanted

A screen shot of the GUI is further down,

Power settings:

cyan/blue indicates the status of FECs for RCUs not readout according the configuration file, where blue means that the FEC should have been on if the the RCU was readout. Cyan means it should have been off.

For FECs in an RCU to be readout indicates red that the FEC is powered off and green that it is powered on. White mean that the FEC is off but should be on. For FECs 0,1,2 and 16,17,18 can it also mean that they are powered but not readout. These power bits are also used to set the power of FEC 13,14,15 and 29,30,31.

When the GUI is started all are cyan/blue. The status is updated when powering

on or 'Start DAQ'.

PCA16 settings:

polarity – checked is positive polarity and unchecked negative polarity of input signal. We have it checked.

Shutdown – checked is that the PCA16 chip is switched off. Should be unchecked.

Preamplifier enable – checked is that the output is before the shaper.

Gain – 12, 15, 19, 27 mV/fC is the gain of the amplifier when Preamplifier enable is unchecked, and 5.25, 5.50, 5.80, 6.50 mV/fC is the gain of the amplifier when Preamplifier enable is checked.

Shaping – 30, 60, 90, 120 ns is the shaping time when Preamplifier enable is unchecked, 10, 30, 60, 80 ns when Preamplifier enable is checked.

Decay time – 0-2500 (0-1.5V) is the decay time in preamp enable mode, in shaper mode it does not influence very much.

Diagram illustrating the PCA16 settings interface with annotations:

- Status of FEC power
- Power on FEC Load PCA16 settings
- Power off FEC

Power settings

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

RCU0 RCU1 RCU2 RCU3

☒ Load lookup tables at power on ☐ Load lookup tables at Start DAQ

PCA settings

☒ Polarity ☐ Shutdown ☒ Preamplifier enable 27 mV/fC Gain 120 ns Shaper 0 Decay time

DAQ Active

Stop DAQ

Running

Pause

Stop run

Status

SCRIPT

[2010-03-04 14:26:14] SRV:*PCA SR 134 DAC 0 ERR 0

[2010-03-04 14:26:15] Stopping DAQ

[2010-03-04 14:26:15] SRV:*STATUS DAQ 0 RUN 0 LOG 0 MON 1 EVT 431 TYPE 3 MODE 1 RUNNB 16

[2010-03-04 14:26:18] Starting DAQ

[2010-03-04 14:26:18] *START CONTROL 1 MODE 1 TYPE 3 LOAD 2

[2010-03-04 14:26:18] SRV:*STATUS DAQ 1 RUN 0 LOG 0 MON 1 EVT 431 TYPE 3 MODE 1 RUNNB 16

[2010-03-04 14:26:18] Retrieving power status...

[2010-03-04 14:26:18] SRV:*POW S0 1 RCU0 C0000 P0 0 S1 1 RCU1 440000 P1 0 S2 1 RCU2 48 P2 0

[2010-03-04 14:26:18] Retrieving PCA settings...

[2010-03-04 14:26:18] SRV:*PCA SR 134 DAC 0 ERR 0

[2010-03-04 14:26:19] Starting run

[2010-03-04 14:26:19] SRV:*STATUS DAQ 1 RUN 1 LOG 0 MON 1 EVT 0 TYPE 3 MODE 1 RUNNB 1675

[2010-03-04 14:26:21] Retrieving status...

[2010-03-04 14:26:21] SRV:*STATUS DAQ 1 RUN 1 LOG 0 MON 1 EVT 19 TYPE 3 MODE 1 RUNNB 167

[2010-03-04 14:26:22] Retrieving status...

[2010-03-04 14:26:22] SRV:*STATUS DAQ 1 RUN 1 LOG 0 MON 1 EVT 27 TYPE 3 MODE 1 RUNNB 167

[2010-03-04 14:26:32] SRV:*UPD EVT 125

Temperature alarms:

[2010-03-04 14:25:45] ALARM level: 1 sensor: 1 value: 44

[2010-03-04 14:26:36] Sensor with highest value: 1 value= 44

Events: 125

Run:16752

[2010-03-04 14:26:19]

Exit

Run type:

Run mode:

☒ Physics ☐ Pedestals ☐ Test

☒ Pedestal subtraction ☒ Zero suppression ☐ Logging

Monitor 1 Read events 0

Data files

Data are stored in /misc/ilcdaq/data on flctpc-lunddaq as the readout-<runnb>_<filenb>.dat. Maximum file size is 2GB, after that is the file closed and a new file is started with one higher file number. The data files must be copied somewhere, else the disk will quickly be full. The disk on flctpc-lunddaq is 450GB.

How to change configuration

- 1) stop run
- 2) stop DAQ
- 3) edit adequate configuration file. Note that rescan active RCUs must be done manually from the run control. The configuration files are on flctpc-lunddaq in the directory /misc/ilcdaq/config-v4.4).
- 4) start DAQ. First power on FEC again if FEC configuration to read was changed, and in this case reload the PAC16 settings.
- 5) Start run

configuration files are on the flctpc-lunddaq computer in the directory /misc/ilcdaq/config-v4.4. These files are described in another document (in the readout document under further documentation further down). They are ASCII files and editable with an editor. Normally is there only a few values that needs to be edited.

The FECs to read and power are given in rcu-X.cfg:

RCU.POWER	<hex number>
RCU.READOUT	<hex number>

The <hex number> is a bit pattern, one bit per FEC. How to set these bits is described in the document:

<http://www.hep.lu.se/eudet/daq/doc/readout-v4.4.pdf>

This document also contain description of the other configuration files.

Zero suppression threshold and number of samples to read are set in the file global-altro.physics:

ZSTHR.ZS_THR	<value> (ADC counts between 0-1023)
TRCFG.ACQ_END	<value> (samples to take, e.g. 300 for shaping, 1000 non shaping mode)

The threshold used 200907 varied between 3 and 10 depending on PCA16 settings and noise. Be sure you set these correctly.

From version 2.7 of the run control can these values be set from the run control. This is described in:

Summary How to shutdown everything

- 1) stop run if run is active
- 2) press 'Stop DAQ'
- 3) power off FEC if they should be off - 'PowOff'
- 4) shutdown the monitor and presenter programs
- 5) click 'exit' on the run control
- 6) do 'ctrl-c' in the daq xterm window
- 7) close all xterm windows opened from the flctpc-lunddaq
- 8) If needed, switch off the readout electronics power supply in the test beam area. This do also switch off the RCU.

Using the presenter

- 1) choose RCU and FEC to monitor – only one FEC at a time can monitored
- 2) Select online – this connects to the online monitoring task
- 3) Change FEC when needed – then press 'FEC to monitor' – all histograms are cleared.
- 4) press 'Getevent' to fill one event histograms (e.g. time distributions, event display).
- 5) Change the value of and press 'Altro to show' too view another ALTRO in the selected FEC.
- 6) 'Time distribution' and 'Pulse Height histograms' show all 16 channels for an ALTRO.
- 7) 'Clear' will clear all histograms. Histograms are not cleared at a new run!

A screenshot of the presenter is shown below.

Single event histograms are filled when 'Getevt' is selected.

Available histograms of interest are for the FEC selected:

HPH – pulse heights for individual channels

HTIME – time distribution for a single event

HMAXCHTIME – time for maximum found pulseheight

HMAXCHADC – maximum pulse height for each channel

For selected RCU:

HCHEXIST – plots of found channels (none should be missing for FECs readout)

General:

LENGTH_2AEE – data length for channels with h/w readout error

LENGTH_2AAA – data length for channels with no readout error

EVENTNB_DIFF – differences in event number between readout/DBOX and readout/TLU.

ERR_REG1 – bit pattern of RCU trailer error register 1 bits

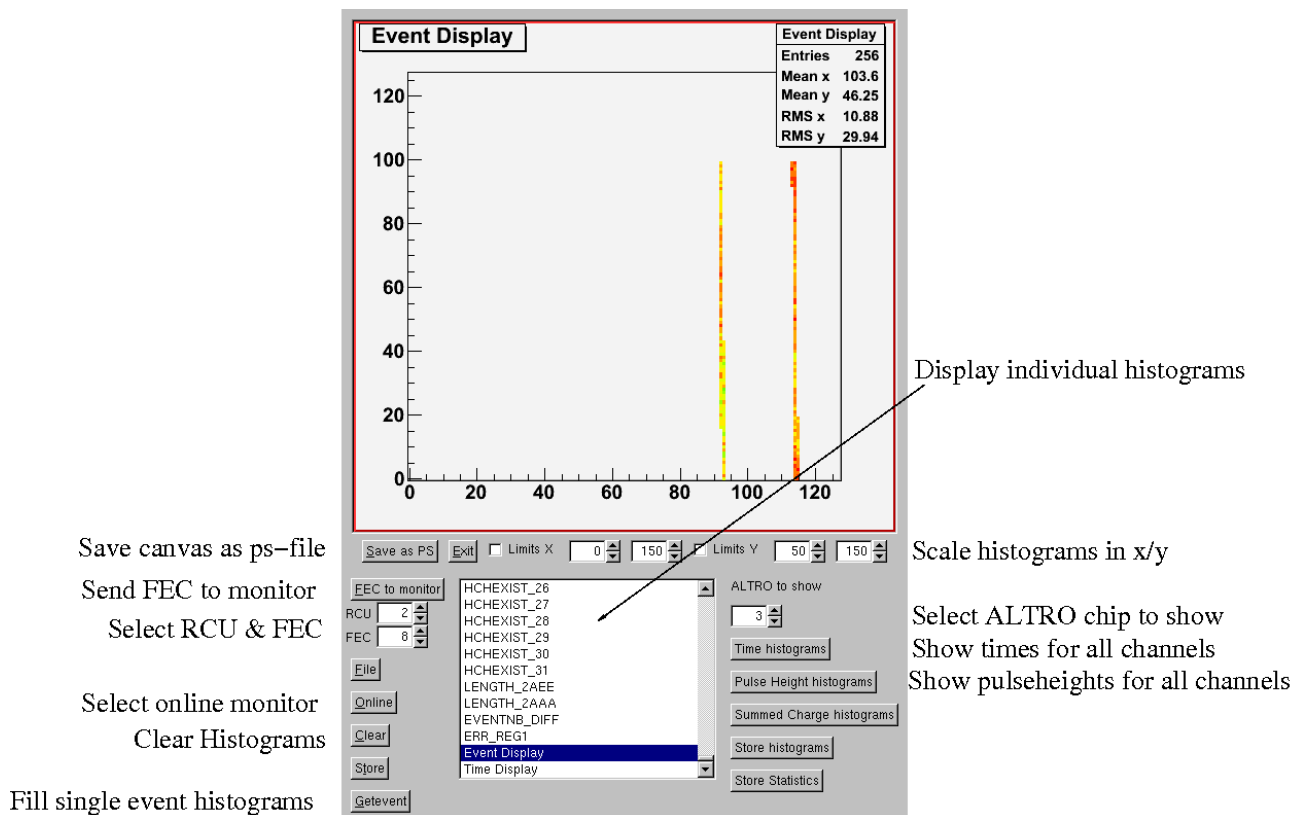
ERR_REG2 – bit pattern of RCU trailer error register 2 bits

Event display - color coded pulse heights for all channels and one event
 Time display - color code times for all channels and one event
 NBCLUSTERS - number clusters per event, in the testbeam 200907 gave < 2000
 clusters acceptable file sizes:

500 -> 600MB for 20000 events

2000 -> 3GB for 20000 events.

FECNBCLUSTERS - number of clusters per channel (all FEC superimposed).



The presenter

How to make a pedestal run

Pedestals are calculated by the online monitor task. Pedestals are dependent on the PCA16 settings, i.e. there must be pedestal files for the settings used if one want to use pedestal subtraction.

In the run control GUI:

- 1) Stop DAQ
- 2) check the pedestal check box
- 3) Set and load PCA16 settings
- 4) Start DAQ
- 5) select 'monitor events' instead of 'readout events'
- 6) set number of events to use in the calculations, e.g. 300 should be enough.
- 7) start run

- 8) the run will stop automatically after the number events requested are monitored
- 9) set back to 'readout events' and number of events to read to what it should be (0 = infinite or until stop run)

the files are stored in \$HOME/root/pedestals (one file for each possible RCU) on flctpc-lundmon. The files are named pedestals-<rcuid>-<pac16 settings in hex> -<decay time in decimal>.new.

The pedestal files can be analyzed in the directory \$HOME/ilcdaq/analys/pedestals by and copied to flctpc-lunddaq:

- 1) remove old pedestal files from \$HOME/ilcdaq/analys/pedestals
- 2) copying the last made pedestal files from \$HOME/root/pedestals to \$HOME/ilcdaq/analys/pedestals
- 3) then run the command ./anasum.sh in \$HOME/ilcdaq/analys/pedestals. The result is stored in the file combined.pdf
- 4) Look in combined.pdf with acroread, and check result
- 5) With the command 'pedsync' (a script in \$HOME/bin) will all new pedestal files in the directory \$HOME/root/pedestals be copied to the DAQ computer (to the directory /misc/ilcdaq/config-v4.4 on flctpc-lunddaq) with the same file name but with extension .dat.

Copying data and configuration files

Data files are written into the director /misc/ilcdaq/data on flctpc-lunddaq, as the file readout-<runnb>_<filenb>.dat. For every run with data logging are the used pedestal files copied to /misc/ilcdaq/pedstore, and the used configuration files copied to /misc/ilcdaq/configstore. These must be copied to external disks. Eventually to the grid. In the 200907 test beam two disks were used, one to which data was written regularly, and one once a day. At the end all data was copied to a third disk. These disks were used in 200907, labels:

- 1) datadisk1 (still connected to flctpc-lunddaq)
- 2) LUND1 (brought to Lund)
- 3) datadisk2 (was brought to the Lund office)

The files in /misc/ilcdaq/data must regularly be deleted, else the disk (500GB) will become full.

Copy most recent data files

create data directory on USB disk, if not existing, e.g if the USB disk os named datadisk1:

```
mkdir /media/datadisk1/200908/  
mkdir /media/datadisk1/200908/data
```

go to the directory with the data files:
cd /misc/ilcdaq/data

List data files, oldest first, the most recent last
ls -lrt readout*.dat

Copy most recent runs, one by one:

```
cp -a readout-<runnb>_*.dat /media/datadisk1/200908/data/.
```

Remove the oldest data files if needed from /misc/ilcdaq/data:

```
rm readout-<runnb>_*.dat
```

You will get a question like:

rm: remove write-protected regular file `readout-6980_0.dat'?

answer y if OK.

Be sure not to remove any data file from /misc/ilcdaq/data before they have been copied it to the grid.

I copied during July test beam as this:

1- after about 5 runs to LUND1 disk

2- after one day running to datadisk1

3- at the end of run period to datadisk2

For 3 do one need a better procedure to copy files, since copy them one by one is not possible.

I used wildcards as:

```
cp -a readout-72*.dat /media/datadisk2/200908/data/
```

Copy the configuration and pedestal files

Create directories on USB disk e.g.

```
mkdir /media/datadisk1/200908/configstore
```

```
mkdir /media/datadisk1/200908/pedstore
```

```
cd /misc/ilcdaq/configstore
```

```
cp -a --reply=no * /media/datadisk1/200908/configstore/
```

```
cd /misc/ilcdaq/pedstore
```

```
cp -a --reply=no * /media/datadisk1/200908/pedstore/
```

I think it is enough to copy them once a day.

The trigger system

Trigger system is in a NIM crate. The parallel port on the DAQ computer is used to communicate with the trigger (reset,enable). The trigger is either a beam trigger or pulser. One must swap the cables when choosing the trigger source. Pictures and a drawing is shown in the document:

<http://www.hep.lu.se/eudet/pictures/fectest/beam200907/beam200907.pdf>

as well as pictures of other parts of the system.

DRORC and RCU used

The DRORC and RCU are given in the file:
/misc/ilcdaq/config-v4.2/drorc.cfg

This file contain the mapping of DRORC channel to RCU id, and status of RCU usage. Entries are:

```
# RCU.ID <id> id of RCU
# DRORC.REVISION <revision> revision number of DRORC
# DRORC.SERIAL <serial> serial number of DRORC
# DRORC.CHANNEL <channel> DIU on DRORC (0,1)
# DRORC.STATUS [0,1] channel not used,used
```

Software locations

a summary

flctpc-lundmon:

/home/ilcdaq/bin	Scripts
/home/ilcdaq/ilcdaq/gui-v2.7-pro	Run control
/home/ilcdaq/ilcdaq/monitor-v5.2-pro	Monitor program
/home/ilcdaq/ilcdaq/presenter-v2.2	Histogram presenter
/home/ilcdaq/root	Shared memory/root files
/home/ilcdaq/root/pedestals	Pedestal files for pedestal runs
/home/ilcdaq/ilcdaq/analys	Place to analyze pedestal files

flctpc-lunddaq:

/misc/ilcdaq/log-v4.4	Logfiles
/misc/ilcdaq/config-v4.4	Config- and pedestal files
/misc/ilcdaq/ilcserver-v4.4-pro	Readout communication program
/misc/ilcdaq/readout-v4.4-pro	Readout program
/misc/ilcdaq/data	Data files
/misc/ilcdaq/configstore	Used configuration files
/misc/ilcdaq/pedstore	Used pedestal files

Programs running

associated with this system are.

flctpc-lundmon>

```
ssh -Xfn root@lunddaq xterm -T ILCSERVER -e /misc/ilcdaq/ilcserver-v4.4/ilcserver
ssh -Xfn ilcdaq@lunddaq cd /misc/ilcdaq/; xterm
java DaqPanels
xterm -T MONITOR-v5.2 -e ./mon-online.sh
/bin/sh ./mon-online.sh
```

```
./monitor --reversed --format 1 --online --pedestal --server 192.168.185.200 --pport 9091  
/bin/sh ./monview.sh  
./monview online
```

flctpc-lunddaq>

```
ssh: ilcdaq@notty  
xterm -T ILCSERVER -e /misc/ilcdaq/ilcserver-v4.4/ilcserver  
bash -c cd /misc/ilcdaq/; xterm  
xterm  
bash  
/misc/ilcdaq/ilcserver-v4.4/ilcserver  
/misc/ilcdaq/readout-v4.4/ilcsrc-readout --configdir /misc/ilcdaq/config-v4.4/ --logging 0 --control 1  
--config 1
```

Further documentation

quick guide:

<http://www.hep.lu.se/eudet/daq/doc/QuickDAQmanual200907.pdf>

presenter:

<http://www.hep.lu.se/eudet/daq/doc/presenter-v2.2.pdf>

run control:

<http://www.hep.lu.se/eudet/daq/doc/gui-v2.7.pdf>

monitor:

<http://www.hep.lu.se/eudet/daq/doc/monitor-v5.2.pdf>

readout:

<http://www.hep.lu.se/eudet/daq/doc/readout-v4.4.pdf>

dataformat:

<http://www.hep.lu.se/eudet/daq/doc/dataformat-v4.2.pdf>

Pictures of setup 200907:

<http://www.hep.lu.se/eudet/pictures/fectest/beam200907/beam200907.pdf>

This document can be found as:

<http://www.hep.lu.se/eudet/daq/doc/instructions-200907.pdf>

Backups of 200907 things

<http://www.hep.lu.se/eudet/daq/beam200907/>

contains the last used configuration files of 200907 beam test, and two tar files with the programs used.