Online RECSIS

Gilfoyle, Ito, Wolin

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G.P.Gilfoyle
Physics Department, University of Richmond, VA, 23173
M.Ito and E.Wolin
Thomas Jefferson National Accelerator Facility, Newport News, VA, 23606

1 Introduction

The CLAS reconstruction and analysis package (RECSIS) has been modified to read data from the CLAS event transfer (ET) system so users can perform full-fledged track reconstruction and other complex analyses during data acquisition on a down-scaled subset of the incoming data. The capability of reading the ET system is part of the standard RECSIS so that users performing offline analyses can quickly and easily generate a version of their code that can be used during data collection. Send questions, complaints, flames, and such to gilfoyle@jlab.org.

2 Shift Tasks

1. **Is online RECSIS already running?**

   There are several ways to check if the online recsis is running.

   From any CLON machine enter

   `onlb`

   from the command line and you will get the 'online buttons' graphical user interface (gui) which can be seen in Figure 1. Click on 'Information' and a submenu will appear. Click on 'EVT Process Information' and a new, large window pops up that lists the programs associated with the movement and processing of the CLAS data flow on the different CLON computers. A sample of the window is in Figure 2. Under the 'Program' column look for an entry with 'recsis' and 'clasprod' in the name. Under the 'node' column you should see 'clon00'. If the entry is the word 'unknown', then it's not running. See the next section for the procedure to start online recsis. You can also check the number of events that have been processed and the rate at which events are being analyzed.

   Another way to see if online recsis is running is to follow the steps above to start the online buttons gui and then click on 'Information' to get the submenu. Now click on 'ET System Information - clon00' and a list of the processes attached to the ET system on CLON00 will be shown as displayed in Figure 3. Look for 'RECON' (a contraction

of recsis online) among the list and you can read the number of events read in and analyzed and the analysis rate. If it's not there then, see the next section for the procedure to start online recsis.

A third way to check that online recsis is running is also to click on the 'Information' button of the online buttons gui as described above. One of the choices on this submenu is the 'IPC Process Information'. Clicking on this button pops up the window shown in Figure 4. Look for 'recsis_clasprod' in the list of clients. If it's not there then, see the next section for the procedure to start online recsis.

A fourth way to check that online recsis is running is to use the same 'Information' button of the online buttons gui as described above. Click on the 'IPC Process Detailed Information' and look for 'recsis_clasprod' among the list of clients. If it's not there then, see the next section for the procedure to start online recsis.

2. **Starting online recsis.**

   From any CLON machine enter

   `onlb`

   from the command line and you will get the 'online buttons' graphical user interface (gui) which can be seen in Figure 1. Click the "Monitoring" button (a submenu appears) and then click the "online recsis" button and another submenu will appear. Click on 'start' and recsis will start. You do not have to do anything else. To see if you have been successful see the section above. You might have to wait a minute or so because of the time it takes for recsis to start and then be polled by the daq monitoring system.

3. **Stopping online recsis.**

   The simplest and best way to stop online recsis is to log onto one of the CLON machines and enter

   `onlb`

   from the command line. You will get the 'online buttons' graphical user interface (gui) which can be seen in Figure 1. Click the "Monitoring" button (a submenu will appear), click on the "online recsis" button and another submenu will appear. Click on 'stop' and recsis will halt. See above for instructions to see if online recsis is running.

4. **Viewing Histograms**

   You can view the histograms as they accumulate using shared memory in PAW on CLON00. Log into CLON00 (note you have to logon to this particular machine) and enter

   `monb`

   from the command line and you will get the 'CLAS Monitoring Button Panel' which can be seen in Figure 5. Click on the "View Histograms" button and you will pop up another gui which allows you to select the online recsis histograms from shared memory or a file or to view the MON histograms. A picture of the gui is Figure 6. Click on

the appropriate buttons to make your selection (,*i.e.*,"Global Memory Section", "View On Screen", "Online RECSIS", and "Go") and an xterm window running PAW will appear. PAW will start a HIGZ graphics window on your X-terminal with a message that can be seen in Figure 7.

This gui lists some of the kumacs that can be executed to view the histograms. Several PAW command scripts (kumac files) exist to view histograms during data collection. They must be executed from the xterm running the online RECSIS PAW. The essential commands are listed below.

`exec dcmon` - drift chamber data from tracking.

`exec trkmon` - tracking results (electron beam ONLY).

`exec emon` - elastic scattering results (electron beam ONLY).

`exec recon_print` - print photon histograms to clonhp.

`exec tagmon` - tagger histograms.

`exec photon` - all the essential photon histograms.

`exec welcome` - print this message.

That's it. At the end of each run RECSIS online will automatically halt analysis, close the histogram files, and start the next run. No user intervention is necessary. The histogram files are stored in `/work/hist/recon` along with the log files. The PAW subdirectories for RECSIS ONLINE are

```
//RCON/DCMON
//RCON/TAGMON
//RCON/TRKMON
//RCON/EMON
//RCON/CCMON
```

Some of the histograms are listed in Appendix A.

5. **Viewing Time Histories**

Some of the quantities measured by Online RECSIS can be viewed as a function of time or run number using the web-based, time-history routines. To view the time histories from online RECSIS point your web browser to the following address.

`http://claspc10.jlab.org/TIMELINE/timeline_frames.pl`

When you load the page you will see a panel with clickable buttons for choosing the desired quantities. A picture of the panel is shown in Figure 8. Click on the desired buttons and you obtain a plot like the one shown in Figure 9. There are windows and buttons below the plot to modify the plot as you desire.

The quantities currently available as time histories produced by online recsis are listed below.

(a) Recsis_TrksPerEvt - Centroid of the distribution of the number of reconstructed tracks in each event measured in the CLAS.

(b) Recsis_HitsPerEvt - Centroid extracted from a histogram of the number of hits in each event that contains as least one track. The time histories are for all sectors combined and for each sector individually.

(c) Recsis_HitsPerTrk - Centroid extracted from a histogram of the number of hits in each track in a particular sector.

(d) Recsis_ResidR1 - Centroid in region 1 of the distribution of the residual. The residual R is defined as

$$R = |D_f| - |D_c| \tag{1}$$

where D_f is the distance of closest approach derived from the best fit to the track and D_c is the distance of closest approach derived from the measured drift time.

(e) Recsis_ResidR2 - Centroid in region 2 of the distribution of the residual between the distance of closest approach derived from the measured drift time and the distance of closest approach determined from the best fit to the track (see Region 1 above).

(f) Recsis_ResidR3 - Centroid in region 3 of the distribution of the residual between the distance of closest approach derived from the measured drift time and the distance of closest approach determined from the best fit to the track (see Region 1 above).

(g) Recsis_RsdWdR1 - RMS width in region 1 of the distribution of the residual between the distance of closest approach derived from the measured drift time and the distance of closest approach determined from the best fit to the track.

(h) Recsis_RsdWdR2 - RMS width in region 2 of the distribution of the residual between the distance of closest approach derived from the measured drift time and the distance of closest approach determined from the best fit to the track.

(i) Recsis_RsdWdR3 - RMS width in region 3 of the distribution of the residual between the distance of closest approach derived from the measured drift time and the distance of closest approach determined from the best fit to the track.

(j) Recsis_TmaxR1 - Maximum drift time in Region 1 extracted from the integrated drift time spectrum for layer 3 in the axial superlayer. The time histories are for each sector. The value is determined by integrating the drift-time spectrum to obtain the uncalibrated, drift-time-to-drift-distance (X-T) correlation. When the value of this integral exceeds a prescribed fraction (0.85) of the total counts in the drift-time spectrum, that time is taken to be Tmax.

(k) Recsis_TmaxR2 - Maximum drift time in Region 2 extracted from the integrated drift time spectrum for layer 15. The time histories are for each sector. The value is determined by integrating the drift-time spectrum to obtain the uncalibrated, drift-time-to-drift-distance (X-T) correlation. When the value of this integral exceeds a prescribed fraction (0.90) of the total counts in the drift-time spectrum, that time is taken to be Tmax.

(l) Recsis_TmaxR3 - Maximum drift time in Region 3 extracted from the integrated drift time spectrum for layer 27. The time histories are for each sector. The value

is determined by integrating the drift-time spectrum to obtain the uncalibrated, drift-time-to-drift-distance (X-T) correlation. When the value of this integral exceeds a prescribed fraction (0.90) of the total counts in the drift-time spectrum, that time is taken to be Tmax.

A more complete, but less user-friendly version of the online time histories can be accessed at the following address.

`http://claspc10.jlab.org/CLAS_ONLINE/`

When you load the page you will see a panel with clickable buttons for choosing the desired quantities. A picture of the panel is shown in Figure 10. Click on the desired buttons, enter the time range or run number range at the bottom of the panel and click on the button for the plot you desire (under the "Click ONE Button" heading). You will obtain a plot like the one shown in Figure 9.

The quantities currently available as time histories that are not listed in the previous section are shown below.

(a) Recsis_ElasticPeak - Centroid of the elastically-scattered electron peak at the proton mass obtained by fitting the W spectrum.

(b) RecsisElasticWidth - RMS width of the elastically-scattered electron peak at the proton mass obtained by fitting the W spectrum.

(c) Recsis_TminR1 - Minimum drift time in Region 1 extracted from the drift time spectrum for layer 3 and for tracks with a distance of closest approach less than 150 microns. The time histories are for each sector. The value of Tmin is determined by finding the first time in the drift-time spectrum where the number of counts exceeds a particular fraction (0.005) of the peak height plus any background.

(d) Recsis_TminR2 - Minimum drift time in Region 2 extracted from the drift time spectrum for layer 15 and for tracks with a distance of closest approach less than 150 microns. The time histories are for each sector. The value of Tmin is determined by finding the first time in the drift-time spectrum where the number of counts exceeds a particular fraction (0.005) of the peak height plus any background.

(e) Recsis_TminR3 - Minimum drift time in Region 3 extracted from the drift time spectrum for layer 27 and for tracks with a distance of closest approach less than 150 microns. The time histories are for each sector. The value of Tmin is determined by finding the first time in the drift-time spectrum where the number of counts exceeds a particular fraction (0.005) of the peak height plus any background.

3 Output and Log Files

RECSIS online will produce a log (.log) file when the code is started and and a histogram (.rzn) file for each run id. The names of the files are

re*llll*.log run*mmmmm* re*nnnn* .rzn

where *llll* is the RECSIS sequence number at the moment when RECSIS was started up, *nnnn* is the RECSIS sequence number at the start of each run and *mmmm* is the run number. The files are currently stored in `/hist/recon` .

When online recsis starts up the messages that recsis would normally write to its terminal window are written to a log file stored in

`$CLON_PARMS/run_log/recon.log`

where `$CLON_PARMS` is an environment variable. Old files are backed up in compressed form in `$CLON_PARMS/run_log/recon_logs/` .

4 Building RECSIS ONLINE on your own

The following procedure describes how to get started using the RECSIS_ONLINE package that is an adaptation of RECSIS to the online environment. It enables the user to perform track reconstruction on a downscaled fraction of the incoming data.

1. Develop your own version of RECSIS on the JLAB Computer Center machines. Suppose for the moment your recsis source, libraries, and binaries are stored in

   `/net/fs1/home/jojo/test`

   and you have checked out and modified the *user* library.

2. Log into your account on one of the counting house Suns(clon00-clon03) and setup the environment. The following commands can be placed in your *.cshrc* file. For a sample .cshrc file, log into the CLON cluster and look at the file gilfoyle/.cshrc.

   ```
   source /net/fs2/group/clas/builds/PRODUCTION/packages/cms/jlab.cshrc
   source /apps/smartsockets/rtinit.csh
   setenv CLAS_RTIPC_LIB /apps/smartsockets/ss52/lib/sun4_solaris
   ```

   The first command gets the CLAS environment. The second sets up the inter-process communication package and the third points to the location of a proprietary library. You may also want to set the CVS environment variable TOP_DIR. For our example we do the following.

   ```
   setenv TOP_DIR /net/fs1/home/jojo/test
   ```

   Finally, set another environment variable so you can connect to the ET system. This has historically been called *clasprod* , but you might ask the shift leader what name has been given to the ET session..

   ```
   setenv ET_SESSION clasprod
   ```

3. Change directory to the area where your version of RECSIS is stored (the *user* area for our example). If you don't have versions of your libraries for the Sun, make them now.

   ```
   cd /net/fs1/home/jojo/test/user
   make lib
   ```

4. Now make the RECSIS_ONLINE executable with the following command.

   ```
   make exe ONLINE=yes
   ```

   You should see the executable 'user_online' in the area '../bin/SunOS'. This command links your recsis libraries with the appropriate online libraries instead of the default dummy libraries.

5. Edit your tcl input file (*e.g.* , init.tcl) and include the lines shown below to enable reading of the ET system.

   ```
   set read_et $true
   setc ipc_name "csis"
   ```

   To turn off the ET system reading simple set this tcl variable to zero (or $false) and enter the name of a data file (*e.g.,* with the `inputfile` command). By default `read_et=0` or `read_et=$false` so data is NOT read from the ET system unless you request it. If you do request ET system reading, it overrides reading the data from a file. The second variable defines the unique name of the process so the InterProcess Communication (IPC) system can monitor the data acquisition. More discussion of the tcl parameters associated with reading data from the ET system is below. A sample tcl initialization file is in Appendix B.

6. Now run RECSIS_ONLINE with the following command (for our example).

   ```
   ../bin/SunOS/user_online -t init.tcl
   ```

   You will the usual RECSIS output plus some new messages proclaiming the startup of the IPC (InterProcess Communication software) and the connection to the ET system. All the usual RECSIS commands should work. Send complaints and suggestions to gilfoyle@jlab.org.

5 Tcl Input

The parameters of the Event Transfer (ET) software can be set as Tcl variables. The available parameters, their defaults, and a description are listed in Table 2 below.

*See the description of the CLAS ET system for more details.

Parameter Name	Default Value	Description*
read_et	0	Turn ET reading on/off (0=off, -1=on).
ipc_name	Null	Unique session name for inter-process communication

Table 1: Tcl Parameters

6 RECSIS_ONLINE Libraries

RECSIS is designed to work on a variety of platforms and to be ported to off-site users' computers. The online version of RECSIS uses a number of libraries that are proprietary and/or ones that available only on the CLON cluster. The libraries that are explicitly listed in the make files are listed below. The proprietary libraries are automatically loaded by using the appropriate link command in the file `flags.SunOS.mk` in the `cms` package.

```
ipc    et_    et    bosio    timeline
```

If you build RECSIS on one of the platforms that are not supported for ET system reading, then dummy routines are always substituted for the ones above. If you build RECSIS on one of the CLON cluster Suns without the 'ONLINE=yes' option (see step number 4 above), then the dummy routines are also used. If you try to build RECSIS_ONLINE on one of the Computer Center Sun computers, the link will fail because it can't 'see' some of the libraries. The online version of RECSIS is designed to run only on the CLON cluster.

7 Testing Your Code

If you want to make sure your online version of RECSIS is working properly you can create your own ET system and pass data through it from a file. To do this task follow the procedure listed below.

1. Log onto one of the CLON machines and set up RECSIS_ONLINE as you did above EXCEPT you will use a different name for the ET_SESSION environment variable. You do this by setting ET_SESSION to something besides the name of the daq ring. It would also be polite to use one of the CLONs that is not heavily used for data acquisition. The first step is to create an ET system. Enter the command

   ```
   clas_et_start -s your_session_name
   ```

   on any of the clon machines. The argument "your_session_name" should be different from the current data acquisition (usually clasprod) to uniquely identify your ET system. I usually use my initials and a number (e.g. gpg1).

2. Feed your ET system! Log onto the same clon machine from another terminal window and you can pass data from a file to your newly created ET system with the command

   ```
   fp2et -s your_session_name -i your_data_file
   ```

   where your_data_file is a file that contains CLAS data. I have used production data files pulled off the silo and stored on the work disks. Lots of stuff scrolls by and then stops when things are working normally.

3. In yet another terminal window go to your user subdirectory and run recsis with the proper environment by issuing the commands

   ```
   cd $TOP_DIR/user
   setenv ET_SESSION your_session_name
   ../bin/SunOS/user_online -t clasrun_init
   ```

   where your_session_name must be the same string that you used in the fp2et and clas_et_start commands.

4. To monitor what is going on issue the following command in yet another terminal window.

   ```
   et_monitor -s your_session_name -p -c 5
   ```

   The "-p" option will print statistics about your ET system and "-c 5" will update et_monitor every five seconds. ¡hr¿

8 Troubleshooting

If you get lots of 'unresolved references' when you try to make the executable remember that RECSIS_ONLINE is designed to run only on the CLON cluster. See 'RECSIS_ONLINE Libraries' above for more.

9 Feedback

For now, send complaints, suggestions, and screeches of agony to gilfoyle@jlab.org.

10 Background

For information on RECSIS see the CLAS Offline page. For information on the Event Transfer (ET) system see the CLAS Event Transfer System page at `http://db6.jlab.org/clas/html/online`

gilfoyle@jlab.org

APPENDICES

A Recsis Online Histograms

The list of histograms contained in online recsis is shown below for run 21856.

```
DCMON

 ===> Directory :
        100 (1)   Number of Tracks (Run21856 )
        101 (1)   All Hits/Event (Run21856 )
       1000 (1)   All TDCs
       1001 (1)   All R1 TDCs
       1002 (1)   All R2 TDDs
       1003 (1)   All R3 TDCs
       1101 (1)   S1R1 FDCOAs
       1201 (1)   S1R2 FDCOAs
       1301 (1)   S1R3 FDCOAs
       2101 (1)   S2R1 FDCOAs
       2201 (1)   S2R2 FDCOAs
       2301 (1)   S2R3 FDCOAs
       3101 (1)   S3R1 FDCOAs
       3201 (1)   S3R2 FDCOAs
       3301 (1)   S3R3 FDCOAs
       4101 (1)   S4R1 FDCOAs
       4201 (1)   S4R2 FDCOAs
       4301 (1)   S4R3 FDCOAs
       5101 (1)   S5R1 FDCOAs
       5201 (1)   S5R2 FDCOAs
       5301 (1)   S5R3 FDCOAs
       6101 (1)   S6R1 FDCOAs
       6201 (1)   S6R2 FDCOAs
       6301 (1)   S6R3 FDCOAs
       1102 (1)   S1R1 Tdrift
       1202 (1)   S1R2 Tdrift
       1302 (1)   S1R3 Tdrift
       2102 (1)   S2R1 Tdrift
       2202 (1)   S2R2 Tdrift
       2302 (1)   S2R3 Tdrift
       3102 (1)   S3R1 Tdrift
       3202 (1)   S3R2 Tdrift
```

```
3302 (1)   S3R3 Tdrift
4102 (1)   S4R1 Tdrift
4202 (1)   S4R2 Tdrift
4302 (1)   S4R3 Tdrift
5102 (1)   S5R1 Tdrift
5202 (1)   S5R2 Tdrift
5302 (1)   S5R3 Tdrift
6102 (1)   S6R1 Tdrift
6202 (1)   S6R2 Tdrift
6302 (1)   S6R3 Tdrift
1103 (1)   S1R1 hits/trk
1203 (1)   S1R2 hits/trk
1303 (1)   S1R3 hits/trk
2103 (1)   S2R1 hits/trk
2203 (1)   S2R2 hits/trk
2303 (1)   S2R3 hits/trk
3103 (1)   S3R1 hits/trk
3203 (1)   S3R2 hits/trk
3303 (1)   S3R3 hits/trk
4103 (1)   S4R1 hits/trk
4203 (1)   S4R2 hits/trk
4303 (1)   S4R3 hits/trk
5103 (1)   S5R1 hits/trk
5203 (1)   S5R2 hits/trk
5303 (1)   S5R3 hits/trk
6103 (1)   S6R1 hits/trk
6203 (1)   S6R2 hits/trk
6303 (1)   S6R3 hits/trk
 103 (1)   R1 hts/trk
 203 (1)   R2 hts/trk
 303 (1)   R3 hts/trk
1104 (2)   S1R1 TBT hits
1204 (2)   S1R2 TBT hits
1304 (2)   S1R3 TBT hits
2104 (2)   S2R1 TBT hits
2204 (2)   S2R2 TBT hits
2304 (2)   S2R3 TBT hits
3104 (2)   S3R1 TBT hits
3204 (2)   S3R2 TBT hits
3304 (2)   S3R3 TBT hits
4104 (2)   S4R1 TBT hits
4204 (2)   S4R2 TBT hits
4304 (2)   S4R3 TBT hits
5104 (2)   S5R1 TBT hits
5204 (2)   S5R2 TBT hits
```

```
5304 (2)   S5R3 TBT hits
6104 (2)   S6R1 TBT hits
6204 (2)   S6R2 TBT hits
6304 (2)   S6R3 TBT hits
1106 (1)   S1R1 Residual(21856)
1206 (1)   S1R2 Residual(21856)
1306 (1)   S1R3 Residual(21856)
2106 (1)   S2R1 Residual(21856)
2206 (1)   S2R2 Residual(21856)
2306 (1)   S2R3 Residual(21856)
3106 (1)   S3R1 Residual(21856)
3206 (1)   S3R2 Residual(21856)
3306 (1)   S3R3 Residual(21856)
4106 (1)   S4R1 Residual(21856)
4206 (1)   S4R2 Residual(21856)
4306 (1)   S4R3 Residual(21856)
5106 (1)   S5R1 Residual(21856)
5206 (1)   S5R2 Residual(21856)
5306 (1)   S5R3 Residual(21856)
6106 (1)   S6R1 Residual(21856)
6206 (1)   S6R2 Residual(21856)
6306 (1)   S6R3 Residual(21856)
 107 (1)   R7 Residuals(21856)
 207 (1)   R7 Residuals(21856)
 307 (1)   R7 Residuals(21856)
1011 (1)   Hits/Event, S1, Run  21856
1012 (1)   Hits/Event, S2, Run  21856
1013 (1)   Hits/Event, S3, Run  21856
1014 (1)   Hits/Event, S4, Run  21856
1015 (1)   Hits/Event, S5, Run  21856
1016 (1)   Hits/Event, S6, Run  21856
1021 (1)   Hits/Track, S1, Run  21856
1022 (1)   Hits/Track, S2, Run  21856
1023 (1)   Hits/Track, S3, Run  21856
1024 (1)   Hits/Track, S4, Run  21856
1025 (1)   Hits/Track, S5, Run  21856
1026 (1)   Hits/Track, S6, Run  21856
1121 (1)   T?drift! for R1S1
1122 (1)   T?drift! for DOCA "o#  50[m]m, S1R1, Run 21856
1123 (1)   T?min! for S R , Run
1124 (1)   X-T R1S1
1125 (1)   T?max! for R1S1
1221 (1)   T?drift! for R2S1
1222 (1)   T?drift! for DOCA "o#  50[m]m, S1R2, Run 21856
1223 (1)   T?min! for S R , Run
```

```
1224 (1)   X-T R2S1
1225 (1)   T?max! for R2S1
1321 (1)   T?drift! for R3S1
1322 (1)   T?drift! for DOCA "o#  50[m]m, S1R3, Run 21856
1323 (1)   T?min! for S R , Run
1324 (1)   X-T R3S1
1325 (1)   T?max! for R3S1
2121 (1)   T?drift! for R1S2
2122 (1)   T?drift! for DOCA "o#  50[m]m, S2R1, Run 21856
2123 (1)   T?min! for S R , Run
2124 (1)   X-T R1S2
2125 (1)   T?max! for R1S2
2221 (1)   T?drift! for R2S2
2222 (1)   T?drift! for DOCA "o#  50[m]m, S2R2, Run 21856
2223 (1)   T?min! for S R , Run
2224 (1)   X-T R2S2
2225 (1)   T?max! for R2S2
2321 (1)   T?drift! for R3S2
2322 (1)   T?drift! for DOCA "o#  50[m]m, S2R3, Run 21856
2323 (1)   T?min! for S R , Run
2324 (1)   X-T R3S2
2325 (1)   T?max! for R3S2
3121 (1)   T?drift! for R1S3
3122 (1)   T?drift! for DOCA "o#  50[m]m, S3R1, Run 21856
3123 (1)   T?min! for S R , Run
3124 (1)   X-T R1S3
3125 (1)   T?max! for R1S3
3221 (1)   T?drift! for R2S3
3222 (1)   T?drift! for DOCA "o#  50[m]m, S3R2, Run 21856
3223 (1)   T?min! for S R , Run
3224 (1)   X-T R2S3
3225 (1)   T?max! for R2S3
3321 (1)   T?drift! for R3S3
3322 (1)   T?drift! for DOCA "o#  50[m]m, S3R3, Run 21856
3323 (1)   T?min! for S R , Run
3324 (1)   X-T R3S3
3325 (1)   T?max! for R3S3
4121 (1)   T?drift! for R1S4
4122 (1)   T?drift! for DOCA "o#  50[m]m, S4R1, Run 21856
4123 (1)   T?min! for S R , Run
4124 (1)   X-T R1S4
4125 (1)   T?max! for R1S4
4221 (1)   T?drift! for R2S4
4222 (1)   T?drift! for DOCA "o#  50[m]m, S4R2, Run 21856
4223 (1)   T?min! for S R , Run
```

```
       4224 (1)   X-T R2S4
       4225 (1)   T?max! for R2S4
       4321 (1)   T?drift! for R3S4
       4322 (1)   T?drift! for DOCA "o#  50[m]m, S4R3, Run 21856
       4323 (1)   T?min! for S R , Run
       4324 (1)   X-T R3S4
       4325 (1)   T?max! for R3S4
       5121 (1)   T?drift! for R1S5
       5122 (1)   T?drift! for DOCA "o#  50[m]m, S5R1, Run 21856
       5123 (1)   T?min! for S R , Run
       5124 (1)   X-T R1S5
       5125 (1)   T?max! for R1S5
       5221 (1)   T?drift! for R2S5
       5222 (1)   T?drift! for DOCA "o#  50[m]m, S5R2, Run 21856
       5223 (1)   T?min! for S R , Run
       5224 (1)   X-T R2S5
       5225 (1)   T?max! for R2S5
       5321 (1)   T?drift! for R3S5
       5322 (1)   T?drift! for DOCA "o#  50[m]m, S5R3, Run 21856
       5323 (1)   T?min! for S R , Run
       5324 (1)   X-T R3S5
       5325 (1)   T?max! for R3S5
       6121 (1)   T?drift! for R1S6
       6122 (1)   T?drift! for DOCA "o#  50[m]m, S6R1, Run 21856
       6123 (1)   T?min! for S R , Run
       6124 (1)   X-T R1S6
       6125 (1)   T?max! for R1S6
       6221 (1)   T?drift! for R2S6
       6222 (1)   T?drift! for DOCA "o#  50[m]m, S6R2, Run 21856
       6223 (1)   T?min! for S R , Run
       6224 (1)   X-T R2S6
       6225 (1)   T?max! for R2S6
       6321 (1)   T?drift! for R3S6
       6322 (1)   T?drift! for DOCA "o#  50[m]m, S6R3, Run 21856
       6323 (1)   T?min! for S R , Run
       6324 (1)   X-T R3S6
       6325 (1)   T?max! for R3S6

TAG

 ===> Directory :
          2 (1)   Number of good hits/event
        100 (1)   Pattern E binned
         10 (1)   Energy pattern (GeV)
```

```
         11 (1)   TAGR time (ns)
        101 (1)   Pattern T binned in time
        102 (1)   Pattern T binned all hits
        103 (1)   Pattern T unbinned in time
        104 (1)   Pattern T unbinned all hits
        105 (1)   Raw T scalers
        106 (1)   T gate 1 scalers - G1SL
        107 (1)   T gate 2 scalers - G2SL
        108 (1)   T gate 3 scalers - G3SL
        109 (1)   T gate 4 scalers - G4SL
        200 (2)   Ttime - Etime (ns) vs E_id
        300 (2)   Ttime - RFtime (ns) vs T id
        500 (1)   Tagger time - ST time, all Tagger hits
        510 (1)   Tagger time - ST time, best Tagger guess
        520 (1)   Tagger time at vertex- ST time
        501 (2)   Tagger time vs ST time, all Tagger hits
        511 (2)   Tagger time vs ST time,best Tagger guess
        301 (2)   Ttime - PCtime (ns) vs T id
        302 (2)   Ttime - PStime (ns) vs T id
        303 (2)   Ttime - TACtime (ns)  vs T id
        304 (2)   Ttime - STtime (ns)  vs T id
        305 (2)   Ttime - STtime (ns)  vs ST sector
        311 (2)   T-Signal arrival time at Trigger supervisor (ns) (using PC as ref)
        312 (2)   T-Signal arrival time at Trigger supervisor (ns) (using PS as ref)
        313 (2)   T-Signal arrival time at Trigger supervisor (ns) (using TAC as ref)
        314 (2)   T-Signal arrival time at Trigger supervisor (ns) (using ST as ref)
        400 (1)   T0 tagger - RF (ns)


EMON

 ===> Directory :
          1 (1)   number of tracks per event, Run 21856
          2 (1)   charge of tracks, Run 21856
        110 (1)   [f] any neg. , Run 21856
        111 (1)   [q] any neg. , Run 21856
        112 (2)   any electon [q] vs. [f]
        105 (1)   MM^2! any e
        106 (1)   MM any e
        120 (2)   px vs. py any neg.
        125 (2)   MM vs. electron angle [q]
        126 (2)   MM vs. electron angle [f]
        510 (1)   [f] any pos. , Run 21856
        511 (1)   [q] any pos. , Run 21856
        512 (2)   any pos. [q] vs. [f]
```

```
 520 (2)   px vs. py any pos.
1005 (1)   MM^2! 1e 1p
1006 (2)   [f] proton vs. [f] electron
1007 (2)   [q] proton vs. [q] electron
1055 (1)   MM^2! 1e 1[p]
1201 (1)   [q] any pos. , Run 21856
2211 (1)   [q] any neg. sector 1, Run 21856
2221 (1)   [q] elastic e sector 1, Run 21856
2231 (1)   [q] elastic e, [f] cut, sector 1, Run 21856
1251 (1)   [q] any pos. sector 1, Run 21856
1261 (1)   [q] elastic p sector 1, Run 21856
1271 (1)   MM sector 1, Run 21856
1202 (1)   MM sector 1, Run 21856
2212 (1)   [q] any neg. sector 2, Run 21856
2222 (1)   [q] elastic e sector 2, Run 21856
2232 (1)   [q] elastic e, [f] cut, sector 2, Run 21856
1252 (1)   [q] any pos. sector 2, Run 21856
1262 (1)   [q] elastic p sector 2, Run 21856
1272 (1)   MM sector 2, Run 21856
1203 (1)   MM sector 2, Run 21856
2213 (1)   [q] any neg. sector 3, Run 21856
2223 (1)   [q] elastic e sector 3, Run 21856
2233 (1)   [q] elastic e, [f] cut, sector 3, Run 21856
1253 (1)   [q] any pos. sector 3, Run 21856
1263 (1)   [q] elastic p sector 3, Run 21856
1273 (1)   MM sector 3, Run 21856
1204 (1)   MM sector 3, Run 21856
2214 (1)   [q] any neg. sector 4, Run 21856
2224 (1)   [q] elastic e sector 4, Run 21856
2234 (1)   [q] elastic e, [f] cut, sector 4, Run 21856
1254 (1)   [q] any pos. sector 4, Run 21856
1264 (1)   [q] elastic p sector 4, Run 21856
1274 (1)   MM sector 4, Run 21856
1205 (1)   MM sector 4, Run 21856
2215 (1)   [q] any neg. sector 5, Run 21856
2225 (1)   [q] elastic e sector 5, Run 21856
2235 (1)   [q] elastic e, [f] cut, sector 5, Run 21856
1255 (1)   [q] any pos. sector 5, Run 21856
1265 (1)   [q] elastic p sector 5, Run 21856
1275 (1)   MM sector 5, Run 21856
1206 (1)   MM sector 5, Run 21856
2216 (1)   [q] any neg. sector 6, Run 21856
2226 (1)   [q] elastic e sector 6, Run 21856
2236 (1)   [q] elastic e, [f] cut, sector 6, Run 21856
1256 (1)   [q] any pos. sector 6, Run 21856
```

```
       1266 (1)   [q] elastic p sector 6, Run 21856
       1276 (1)   MM sector 6, Run 21856

TRKMON

 ===> Directory :
        100 (1)   Number of Tracks
        101 (1)   EC E, S1
        102 (1)   EC Ein, S1
        103 (1)   EC Eout, S1
        104 (1)   [q] S1
        105 (1)   W (GeV), S1
        106 (2)   In-Out S1
        107 (2)   E-p S1
        108 (2)   p-[q] S1
        109 (2)   ^2!Q-W, S1, Run 21856
        201 (1)   EC E, S2
        202 (1)   EC Ein, S2
        203 (1)   EC Eout, S2
        204 (1)   [q] S2
        205 (1)   W (GeV), S2
        206 (2)   In-Out S2
        207 (2)   E-p S2
        208 (2)   p-[q] S2
        209 (2)   ^2!Q-W, S2, Run 21856
        301 (1)   EC E, S3
        302 (1)   EC Ein, S3
        303 (1)   EC Eout, S3
        304 (1)   [q] S3
        305 (1)   W (GeV), S3
        306 (2)   In-Out S3
        307 (2)   E-p S3
        308 (2)   p-[q] S3
        309 (2)   ^2!Q-W, S3, Run 21856
        401 (1)   EC E, S4
        402 (1)   EC Ein, S4
        403 (1)   EC Eout, S4
        404 (1)   [q] S4
        405 (1)   W (GeV), S4
        406 (2)   In-Out S4
        407 (2)   E-p S4
        408 (2)   p-[q] S4
        409 (2)   ^2!Q-W, S4, Run 21856
        501 (1)   EC E, S5
        502 (1)   EC Ein, S5
```

```
        503 (1)   EC Eout, S5
        504 (1)   [q] S5
        505 (1)   W (GeV), S5
        506 (2)   In-Out S5
        507 (2)   E-p S5
        508 (2)   p-[q] S5
        509 (2)   ^2!Q-W, S5, Run 21856
        601 (1)   EC E, S6
        602 (1)   EC Ein, S6
        603 (1)   EC Eout, S6
        604 (1)   [q] S6
        605 (1)   W (GeV), S6
        606 (2)   In-Out S6
        607 (2)   E-p S6
        608 (2)   p-[q] S6
        609 (2)   ^2!Q-W, S6, Run 21856


CCMON

===> Directory : CCMON
       1100 (1)   CC id
```

B Sample Tcl Initialization file

The listing below is a sample tcl input file used by online recsis. It includes the commands for reading data from the Event Transfer (ET) system.

```
# init file for photon version of online RECSIS.
#

#  load in  Tcl procedures.
puts "Using local version of recsis_proc.tcl in current dir directory.\n";
source recon_proc.tcl

setc prlink_file_name prlink_88_00.bos

# define packages
turnoff ALL
set ltrk_do    $true;
```

```
set legn_do    $true;
set ltof_do    $true;
set lst_do     $true;
set ltagger_do $true;
set lec1_do    $true;
set lusr0_do   $true;
set lhbid_do   $true;
set lusr1_do   $true;  # DO NOT TURN OFF !!!
set lseb_do    $true;

# turn on global memory for real-time histogram viewing.
global_section on

# turn on data reading from the ET system
set read_et $true
setc ipc_name "csis"

# remove comment to read from a data file.
# inputfile /work/clas/disk3.old/gilfoyle/clas_012418.A00

# uncomment to choose an output file.
#outputfile prova.evt

#level of analysis 0: raw  2: hbt 4: tbt
set trk_level 4
set trk_beta1_part 1

# tbt stuff realistic curve for drift time to drift distance.
#set dc_xvst_choice 4

#tagger warning messages
set Tagger_warning 1000

#      fixes timing shift due to level2 trigger stuff in TAGE crate
#      8/19/99 D. Lawrence
#to change the E TDC minimum accepted value       :
set Tagger_ETDCmin 1000
#to change the E TDC maximum accepted value       :
set Tagger_ETDCmax 1400

# tell FPACK not to stop if it thinks you are running out of time
fpack "timestop -999999999"

#  define the prompt.
setc rec_prompt "photon> "
```

```
# tell recsis to pause or go
go
```

Figure 1: Screen capture of the graphical user interface (gui) for the online buttons. Bring this gui up by entering 'onlb' at the command line in the clasrun account.

Figure 2: Screen capture of the window produced by the 'EVT Process Information' button on the online button panel..

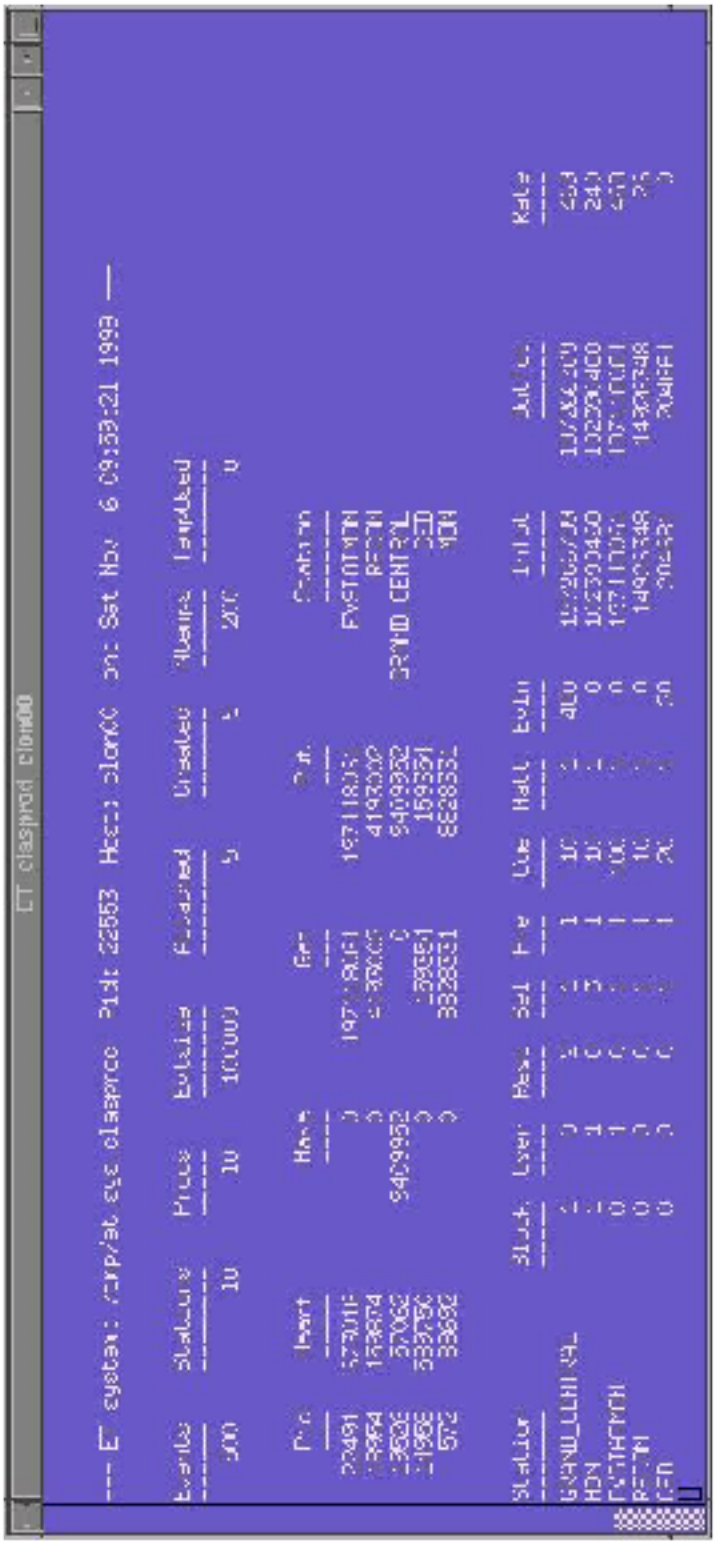

Figure 3: Screen capture of the window produced by the 'ET System Information' button on the Information subpanel of the online buttons panel.

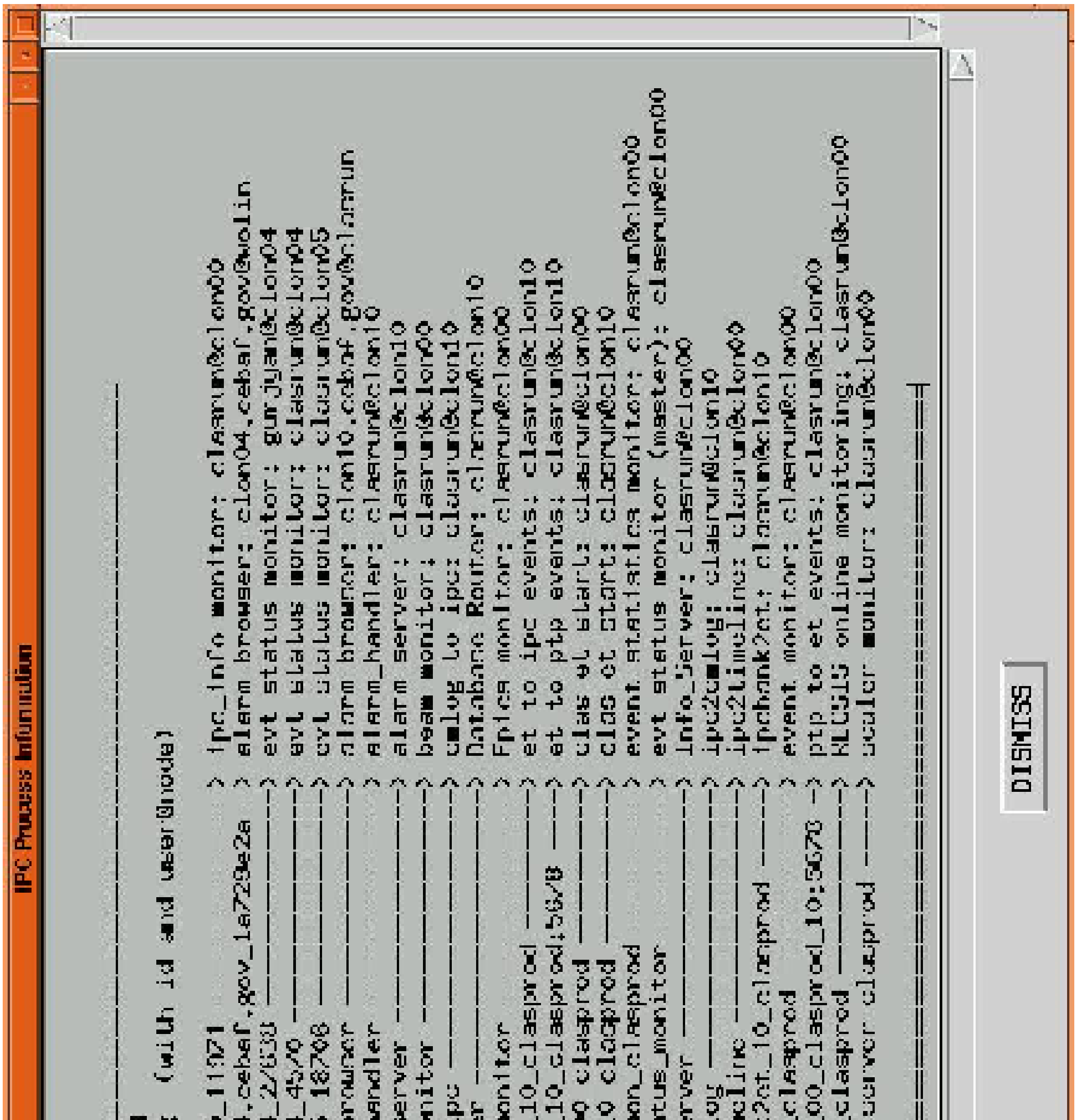

Figure 4: Screen capture of the window produced by the 'IPC Process Information' button on the Information subpanel of the online buttons panel.

Figure 5: Screen capture of the graphical user interface (gui) for the CLAS monitoring button panel. Bring this gui up by entering 'monb' at the command line in the clasrun account.

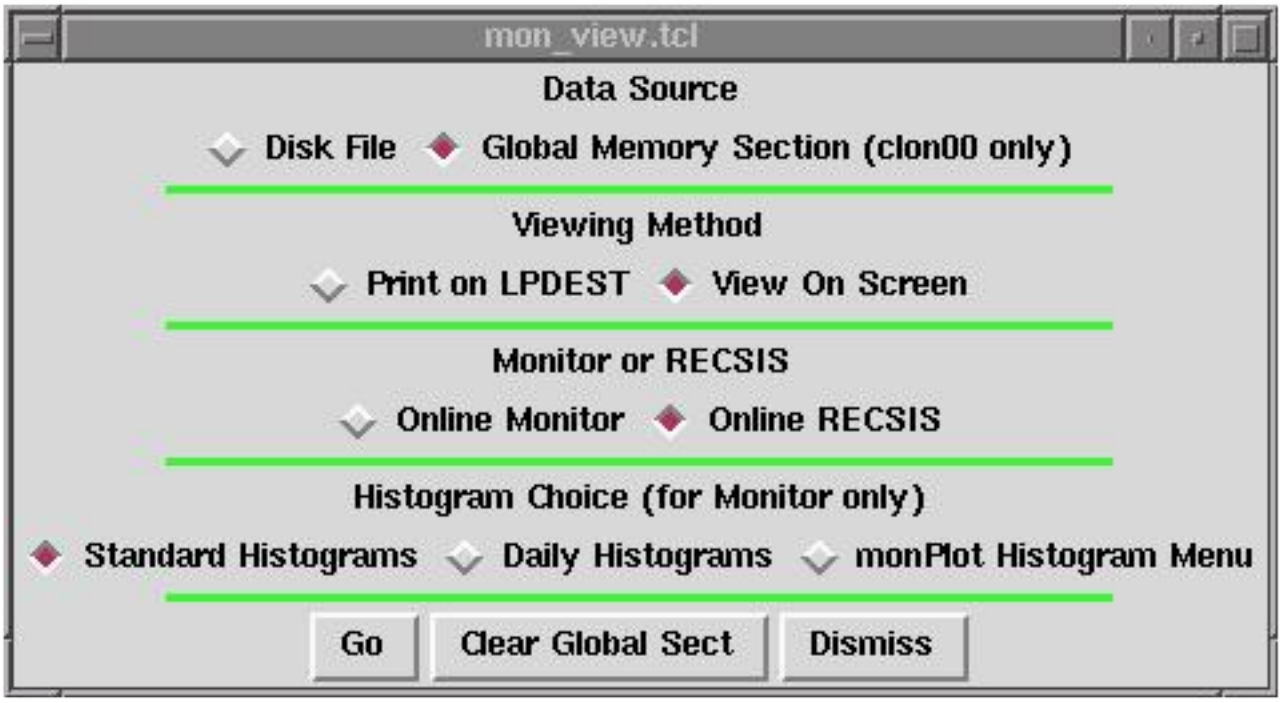

Figure 6: Screen capture of the graphical user interface (gui) to view the CLAS monitoring histograms. Bring this gui up by clicking on "View Histograms" in the CLAS monitoring button panel described in Figure 5. to view the incoming histograms choose "Global Memory Section", "View On Screen", and "Online RECSIS" and then click the "Go" button last.

Figure 7: Screen capture of the opening message that can be seen when viewing the online recsis histograms from the CLAS monitoring button panel.

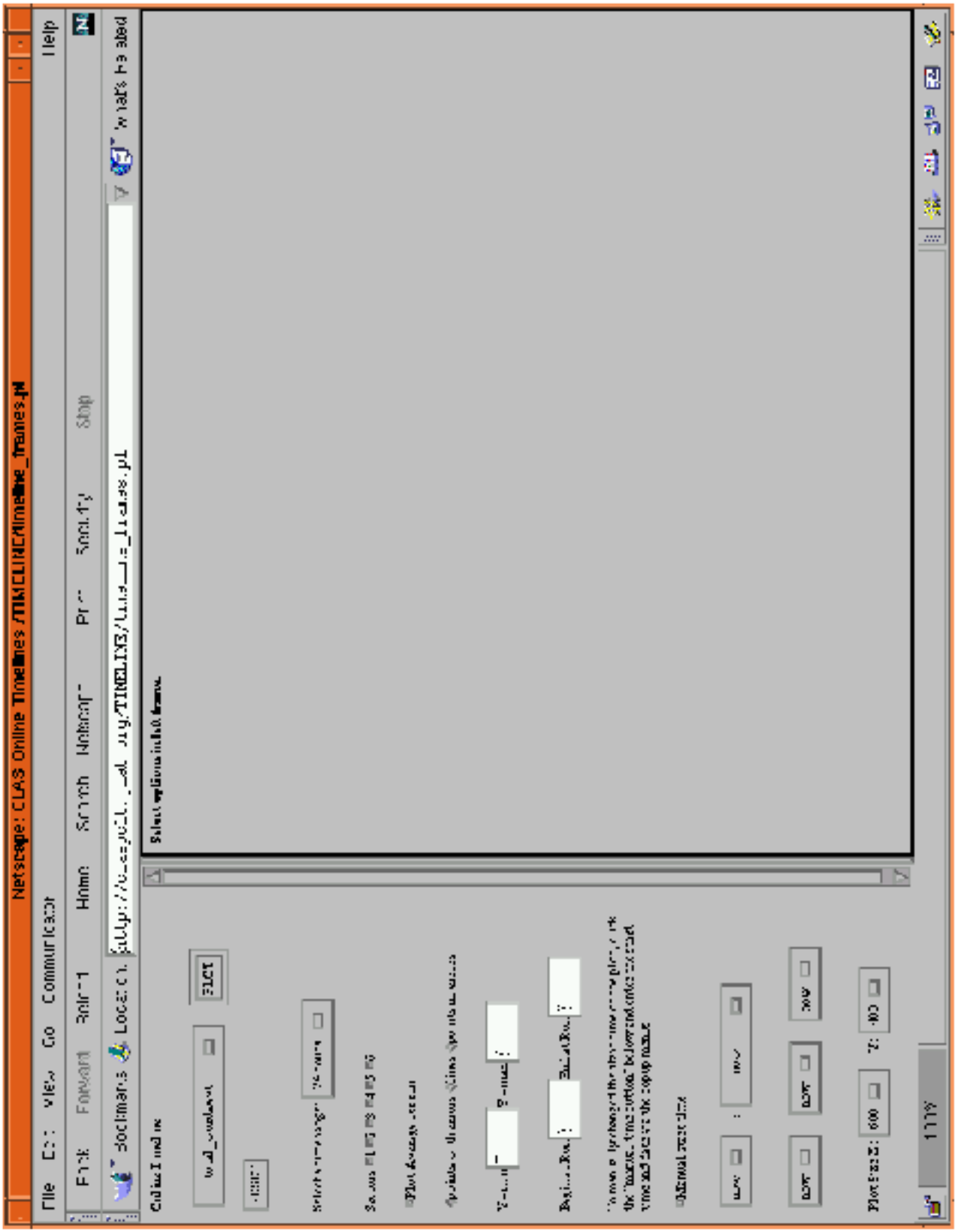

Figure 8: Screen capture of the CLAS time histories panel.

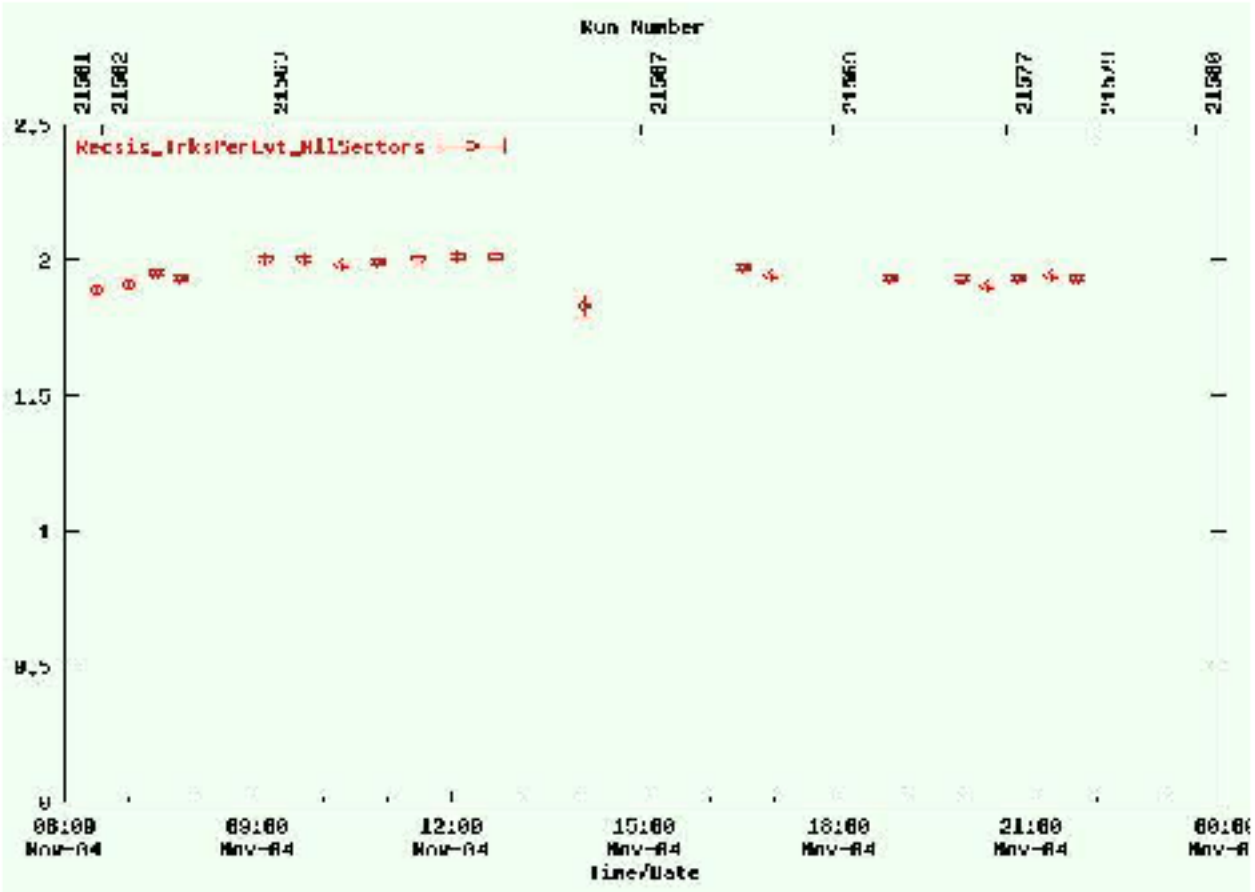

Figure 9: Screen capture of one of the CLAS time histories plots showing the average number of tracks in an event during a 24-hour period..

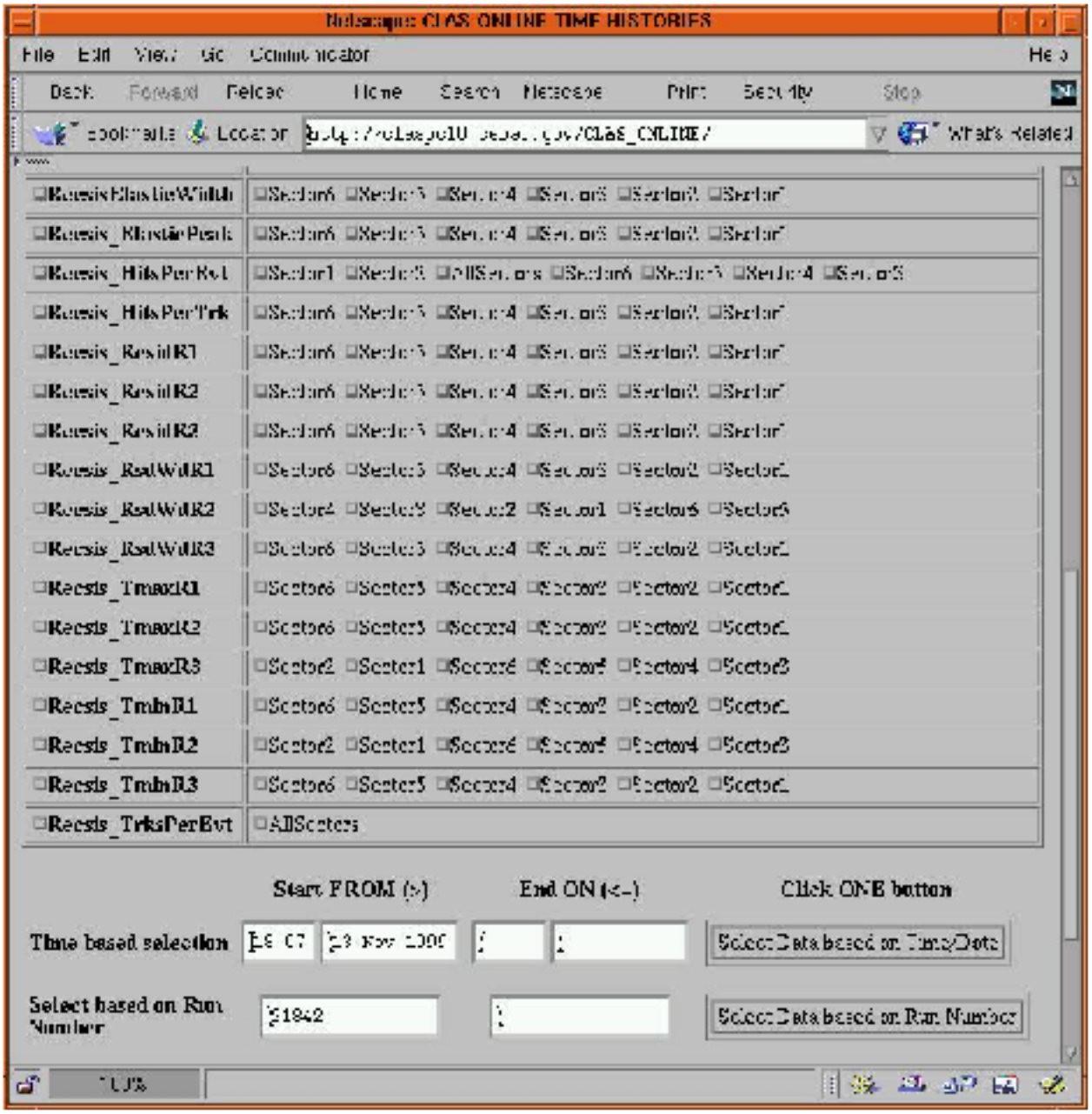

Figure 10: Screen capture of a portion of one of the CLAS time histories control panels.