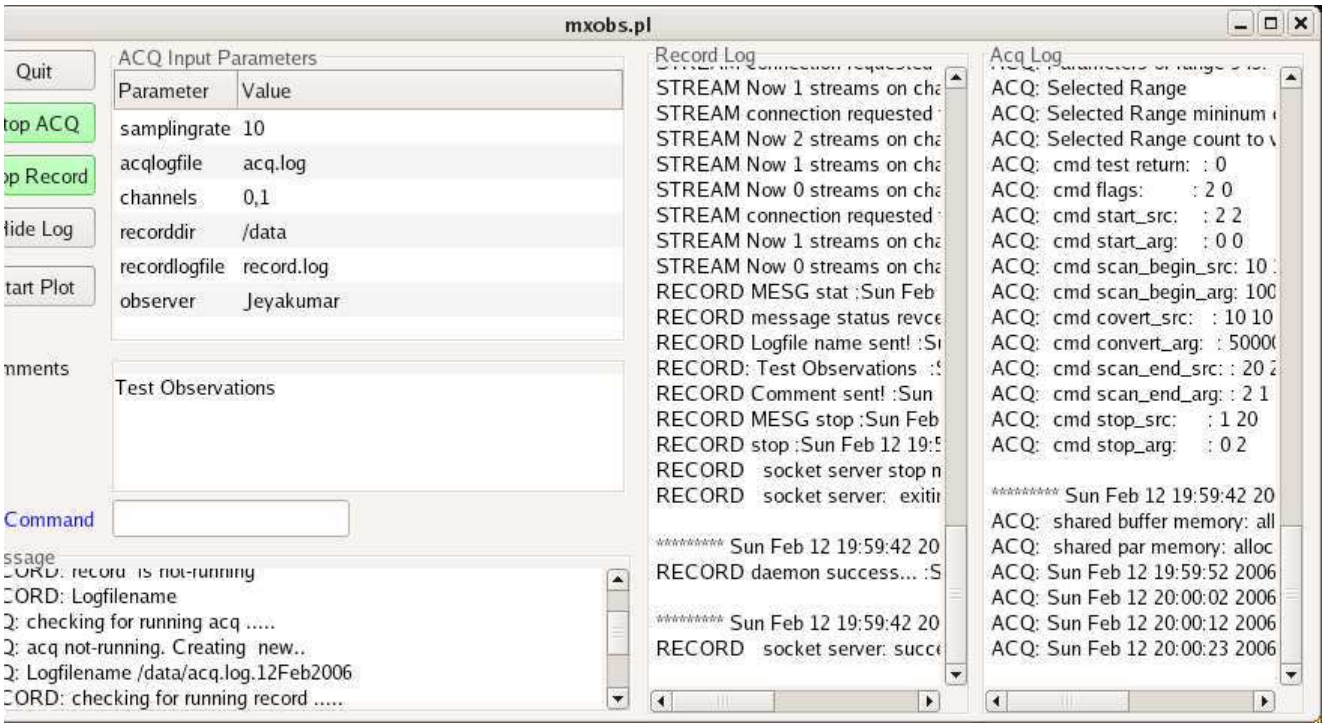
MEXART: Programs for observation and online plotting [1]

S. Jeyakumar
Instituto de Geofísica, UNAM

1 Observing with mxobs

1. Login as *obs*.
2. Type mxobs.pl to get the following GUI window. You can also click on the MXOBS button on the desktop to get the same window.



3. Change the parameters and the comments, if you want to change. Click on "Start ACQ" and "Start record".
4. To save the data to the disk Click on the check button "Chan 0", "Chan 1" etc.,
5. If you want to change the comments, then click "Stop record" and change the comments and click "Start record". Do the step above to save the data.
6. To plot the data use mxgplot.

[1] Version-3/7Nov06

2 Web display

1. Login as *obs* in the computer 'mexart'.
2. In a terminal type the command:

   ```
   xoc &
   ```

3. In another terminal type the command:

   ```
   mxdonline
   ```

4. If you restart mxrecord in 'prometeo', then it is necessary to restart mxdonline.

3 Observing session: Detailed example

1. Login as *obs*.

2. Copy the file, *acq.inp* from the directory */home/obs/acq* and change the required parameters. A sample input file is given below.

```
# Setup file for  acq                 #
# line starting with '#' are ignored  #
#
# sampling rate in milliseconds
acqlogfile         = acq.log
samplingrate       = 10
# the channel numbers for acquisition to be comma
# separated such as channels = 0,1,5
#
channels           = 0,1,2,3
#
#
# For record
recorddir          = /data
recordlogfile      = record.log
```

   The log files are appended with the data and stored in the *recorddir* directory (e.g., *record.log.04Nov2005*).

3. Start the acquisition by executing *mxacq* and *mxrecord* .
   Example:

```
[obs@obs observe]$ mxacq
  ACQ: checking for running acq .....
  ACQ: No running acq. Creating  new..
[obs@obs observe]$ mxrecord
  RECORD: checking for running record .....
  RECORD: running record not found...
  RECORD: Creating  new..
[obs@obs observe]$
```

   The output of the record.log can be viewd using "tail -f" command. This file gives the status of the channels which are recording. Example: tail -f record.log.04Nov2005.

4. For displaying the data online from the channels chan1 chan2 ...., use the command *mxplot -c chan1 chan2 ...* .

   Example: To display channels 0 and 1.

```
[obs@obs obs]$ mxplot -c 0  1
```

Zero-offset is adujusted automatically such that all the cannels will have the same mean value. The mean and rms of the incoming data and all the data in the display are printed below the plot. The data can be zoomed by typing, *z N*, where a small value of N corresponds to zooming in. The default value is 5.
Example:

```
[obs@obs obs]$ mxplot -c 0  1
z 2.0
```

5. To save the data on the channel 0 to a file use the command,

   mxscan begin channel sourcename.

   Only the first 8 characters of the *sourcename* is used. If *sourcename* is not provided, the *sourcename* is assumed as TMSERIES.

   The following command does the same as before but will stop recording after *endmin* minutes from the start.

   mxscan scan channel endmin sourcename

   Example:

   ```
   [obs@obs obs]$ mxscan begin 0  cygnus-a
   [obs@obs obs]$ mxscan scan 1 3 0108-388
   ```

6. To stop recording channel to a file use the command *mxscan end channel.*
   Example:

   ```
   [obs@obs obs]$ mxscan end 0
   ```

7. Stop the acquisition using *mxrecord stop* and *mxacq stop.*
   Example:

   ```
   [obs@obs obs]$ mxrecord stop
   RECORD:  stop message sent!

   [obs@obs obs]$ mxacq stop
   ACQ: checking for running acq .....
   ACQ:  sent stop message!
   ```

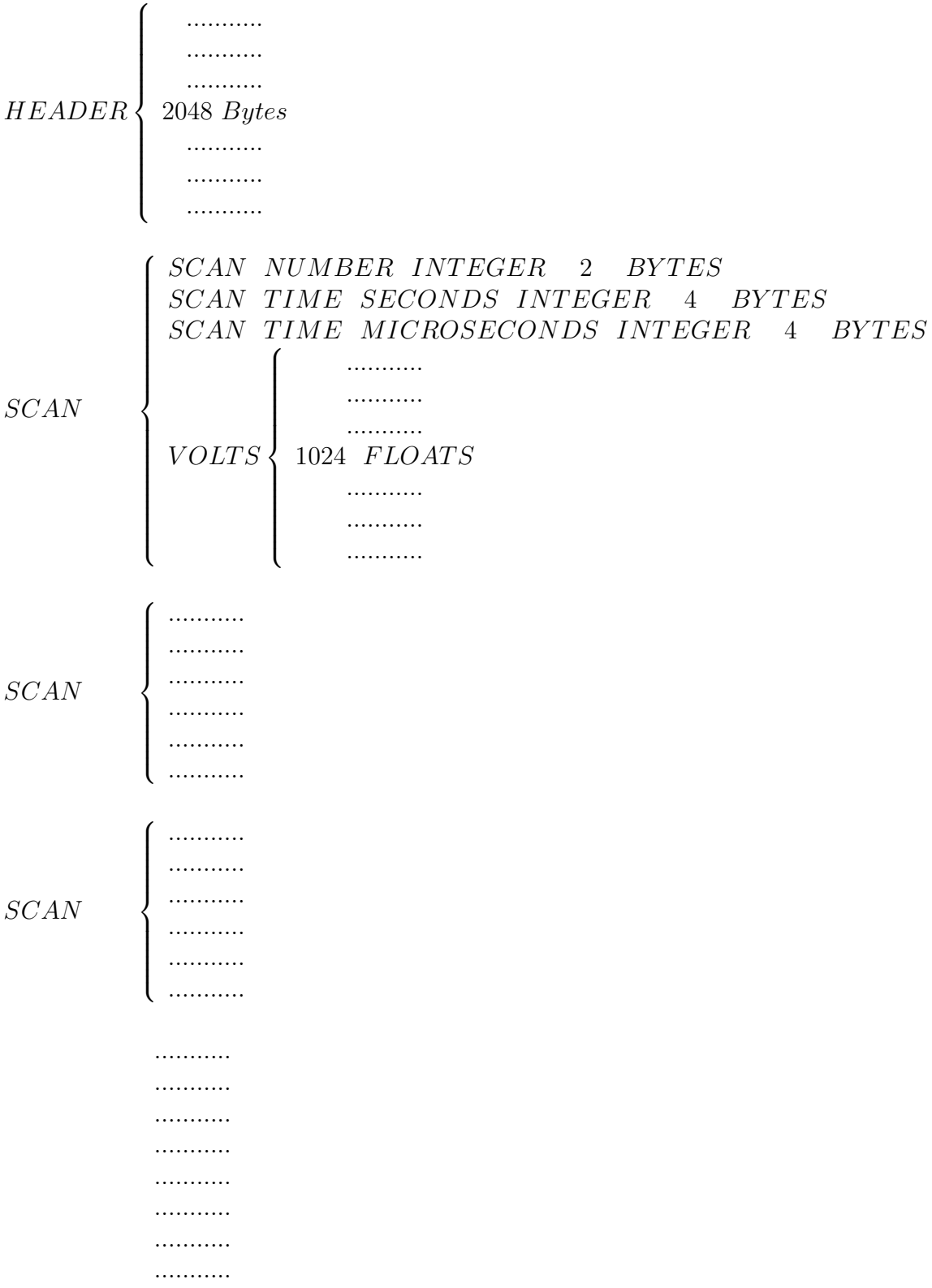
8. To get the data as an ascii file, use the command *mxasci* .
   Example:

   ```
   mxasci /data/02Aug2005/2005-08-02-102212.chan-1.newrecvr.mxd > output.asci
   ```

   The first column is hour and the second column is volt.

9. To be able to use the programs *mxscan* and *mxplot* over the network, the variable *record-serverip* in the file *server.h* has to be set to the IP number of the obs pc. After setting this variable, recompile the prorams using the command *make all*. Stop any running *mxrecord* and restart it.

4 Data file format



The data file structure is shown above. Many SCANs follow the HEADER to the end of the file. The HEADER structure is as follows,

```
typedef struct  {
        char    magic[11]  ;
        char    obsdate[25] ;
        char    source[9] ;
        int     chan ;
        int     sampling ;
        char    other[2048-49];
      } mexartheader ;
```

5 Structure of the programs

The program uses the drivers from COMEDI project. The driver and the associated header files need to be installed before compiling the programs for mexart. The driver has to be loaded before using these programs. This is achieved by the following lines in */etc/rc.local* or in an appropriate place.

```
/sbin/modprobe ni_pcimio
/usr/local/sbin/comedi_config /dev/comedi0 ni_pcimio
```

mxacq: This program deals with the hardware. This sets up the parameters of ADC card, channels and sampling rate. Collects the data from the ADC card and writes it in a shared memory as a SCAN. Each SCAN is 1024 integers times the number of channels. Additional shared memory is allocated to hold the header information.

mxrecord: This program uses the same shared memory allocated by *mxacq* which is a prerequirement. This program runs two threads. The serverthread opens the port, 'recordcmdport', to receive 'commands'. These 'commands' are used to start/stop recording the data of the channels in a file. The 'commands' can be sent from any pc over the network. The recordthread start/stop recording the data according to the 'commands' received by the serverthread.

mxscan: This program sends 'commands' to *mxrecord* which is a prerequirement. The commands are sent to the 'recordcmdport' of the pc running *mxrecord*, over the network.

mxplot: This program sends a command to the streamport managed by *mxrecord* to ask it to stream the data over the network. The incoming data are collected and plotted online. This program can also send a command to stop or start streaming a particular channel interactively.

mxasci: This program reads the data file created by the *mxrecord* and prints the data in asci. The first column is hour and the second is the volt.