Using the DBE1 and Mk5B+
with merged IF0 and IF1 (geodesy)

A. Niell
MIT Haystack Observatory
2008/06/09

1. Starting the mark5B+

Turn on Mk5B or B+; wait for linux to boot
Find out IP address, e.g. dhcp191 is for 192.52.61.191
    Westford: wfmark5-09: 192.52.63.109 (or wfmark5-09.haystack.mit.edu)
    mv3: 206.196.178.55 (or test6.maxigigapop.net)
Connect using putty (secureCRT, xterm, xwin-32) (call this screen1)
user/password: *call Richard Crowley 781-981-5503*
For hardware machine name at top of putty window, type *wt*
For other screen name type *wt screen_name*, e.g. *wt screen1*
From x-window type *xt* to open other windows, or open with putty, etc.
From tty type *xstart &*; to get tty, use ctrl-alt-Fn where n = 1 through about 6.
    (At Westford, if mouse marker is not responding, type ctrl-alt-F1 (gives login screen),
    then type ctrl-alt-F7 to get back to original screen.)
To record session at *oper* prompt type

```
% script –af filename (e.g. 20071029_mk5b_aen.script)
```
    (terminate script with ^D or exit **after** mk5 program is terminated.)
Start mark5 program (use `ps -ef` to see if `dimino` is already running):

```
% dimino –m0 –s1 | & LLogr &
```
    (alternative to `dimino` is the command `Mark5B`, which is obsolete)
    This screen does not get used again until `dimino` is closed with command ???

2. Starting the DBE1

See Alan Hinton or Shep for details and options for other modes.
Open another window (screen2) using *xwin32*, *putty,* or other ssh program, and login as
    oper. This leaves screen1 open to be able to see log information.
Synchronize the DBE to GPS

```
% ~/dbe/dbers232 –arm
```
Set the digital gains to initial value of 1000

```
% ~/dbe/dbers232 –g 1000
```
Start DBE (how can I check to see if this has already bben run?):

```
% ~/dbe5bsetup2bit
```
    This executes the following commands and echos `!cmd = 0` if successful

```
mode=ext:0xffffffff:1;
clock_set=64;
1pps_source=vsi;
dot_set=:force;
```

3. Running the mark5B+ program and recording data

Open another window (screen3) and login as *oper*.

Start `tstdimino` (the interface to `dimino`) in order to make a test recording:

```
%wfmark5-09:/usr2/oper/:>tstdimino
> record=on: gain01 (this will be the scan name)
> dot?
```
    reply should contain `FHG_on` and `syncerr_eq_0`
```
> record=off
(> scan_set?   (returns scan name in second field))
(> scan_check?)
> scan_set= (needed to point to the just-written scan)
> disk2file=::+10000000:;
```
    this writes from the StreamStore card to a file with the name from the `record=on` command, with ".m5b" appended, e.g. `gain01.m5b`.

    Files residing on the StreamStore card can be listed from screen2 with *DirList* (case-sensitive).

    Files that have been previously transferred can be listed from screen2 with *ls *.m5b*.

4. Setting the gains using *bstate*

Move to screen2 so `tstdimino` can be left running in screen3.

Run the *bstate* program

```
% ./bstate/bstate gain01.m5b 100 |tee gain01_corr.txt
```
This prints gain corrections to screen2 to the file `gain01_corr.txt`.
```
cp gain01_corr.txt gain01_corr1.txt
     (for correction of IF1)
cp gain01_corr.txt gain01_corr0.txt
     (to be modified for correction of IF0)
vi gain01_corr0.txt (modify for IF0)
```
    swap 0 and 1; 2 and 3; …; 14 and 15 (e.g. using vi: dd,p,j,dd,p,j, …)

    renumber lines as 0, 1, 2, …15

Update gain settings for IF1 using gain corrections file `gain01_corr1.txt`:

```
% ~/dbe/dbers232 -sgfile1 gain01_corr1.txt
```
Update gain settings for IF0 using gain corrections file `gain01_corr0.txt`:

```
% ~/dbe/dbers232 -sgfile0 gain01_corr0.txt
```
RERUN *bstate* and update the gains if the state counts shown in the output of *bstate* are not distributed properly (approx 17% 33% 33% 17%), and if the gain adjustments are not *near* 1.00 (where near is +/- 0.03 as of 080602).

5. Cross- and auto-correlation

After the gains are set, an autocorrelation can be done to check the bandpasses or to look for a test signal.

In the ./corr directory is the correlation program *vlbi2*

To autocorrelate the recorded file:

```
% ./corr/vlbi2 gain02.m5b gain02.m5b -2bit 1 -rev 1
```
    where I've assumed that the second recording is acceptable.

The option `-rev 1` reverses the channel order. For NZ 2 this puts the lowest frequency channel at the left of the plot, although the band is still LSB with the highest frequency on the right-hand edge of the channel.

The output postscript file is written to the `oper` home directory and named *dd1.pos*. I usually rename it *xxx.ps* where *xxx* is informative of the site and test being done, e.g. *mv3_080414_gain02.ps*.

To display the file in an *xterm* window (if the operations are being done using *xwin32)* use

    `% gs ~/xxx.ps` (a new window will be opened by ghostscript)

OR copy this file to another computer to plot, e.g.

    % `scp xxx.ps franklin:~/`
    Then I copy to my PC and plot with ghostview.