SPINOR Spring 2005 Operation of SPINOR Cameras

Overview:

The ASP is in transition to SPINOR. At the end of the transition, SPINOR will be operated from an NSO Experiment Control Computer. It will remain a 'research' spectro-polarimeter with the possibility of each set-up being unique. During the transition, SPINOR components will be added as they become available. During the transition, new cameras and optics will be under control of the ASP. To date, all SPINOR optics have been implemented, the achromatic entrance window polarizer, calibration polarizer, calibration retarder, rotating retarder modulator, coordinate transformation retarder just in front of the polarizing beam splitter. These are designed to operate from approximately the G-band (430.5nm) to the Fe line at 1.5648μm. During the transition, the ASP chromospheric and photospheric cameras will continue to be used. In fact at least one of them *must* be used for the ASP timing to work. In addition to the ASP cameras, there are three possible new cameras. These cameras may come and go during development though the plan is to keep the Sarnoff at NSO as much as possible.

1. Sanoff CAM1M100-SFT, thinned back-illuminated, frame transfer, with 512 x 1024 16μm square pixels. The control computer is Hagrid and is just below Oscar in the left ASP rack.
2. Pixelvision Pluto, thinned back-illuminated, frame transfer, with 652 x 488 12μm square pixels. The control computer is Hogwarts and is at the bottom of the left ASP rack.
3. Rockwell RCS8600 HgCdTe near infrared hybrid with 1024 x 1024 18μm square pixels. The control computer is Harry and, due to short camera cables, is on a desk next to the HSG.

Sunrise:

Start up order is:
Fill Rockwell camera with LN_2
Start ASP as usual
Boot all SPINOR computers
Power up all SPINOR cameras
Start SPINOR observing programs

Power On:

Power up Harry, Hagrid, and Hogwarts. First turn on the power switch on the back if it was off for safety reasons. Once that switch in 'on' power can be toggled with a rocker switch behind the top right side front door. This is the normal mode.
 Log in as 'asp' with the same password as for the ASP machines on Hagrid and Hogwarts. Harry has a different log in. See below.
Once the computer has booted, turn on power to each of the three camera control boxes.   The Pluto camera must be switched from off to on at this time. If already on, turn it off then back on.
When the cameras are on, start the software application for each camera. See instructions for each computer, below.

Harry

The Rockwell camera needs to be filled with LN_2 each morning and approximately 10 hours later if observing late. Check it periodically during the day. In about ½ hour the camera will be stable and ready for observations. The camera should not be run more than an hour or so without LN_2.
Observe:
Login as tdarnell on Harry, password rockwell.
If a nistime application shows up, minimize it, leaving it running.
The program to take data is "SPINOR Rockwell", located on the desktop.
Set exposure time by entering the desired time in the edit box. Currently the exposure time cannot exceed 33.1msec and this is the exposure time used.
Set the number of images (8*number of accumulations) by entering the desired number in the edit box.
Click the arrow icon on the tool bar. It will change shape and bring up a highlighted stop sign. The

program is ready to receive commands from the ASP. You can't change exposures or number of frames while the program is running. To change them, stop the program (stop sign), enter new values, and restart the program with the arrow icon.

Test:
Login as tdarnell on Harry, password rockwell.
The program to focus the camera is "Rockwell Camera test".
Set the desired exposure time in the edit box.
Click the arrow icon in the tool bar. The camera will operate in free run mode. One must stop the program using the stop sign icon , to change the exposure time, then restart it with the arrow icon.

Hagrid

The Sarnoff camera is connected to Hagrid. The same routine can be used for testing and observing.
Observe:
Log in as asp
If a nistime application shows up, minimize it, leaving it running.
Select the "SPINOR Sarnoff" DST image icon. This will bring up the Sarnoff observing program. There may be an error message upon startup. If so, Quit and restart the program. It may take several tries.
Select Camera… This will bring up the camera settings window.
The ASP should be running and the modulator rotating. Select the 'triggered' radio button.
Make sure the 'Enable Temp Control' box is checked and the temperature set to '15'.
You are 'Done' with the camera setup.
In the main dialog window check the Hex value and use the slider to change it if necessary. Currently the value is 1.
Check the 'Demodulate' box. Then select "Acquire". You should see the progress bar indicating accumulation of frames, then a display of a full resolution intensity image in the upper window, and half resolution IQUV images in the lower window. If there is no progress, the ASP is not generating camera pulses.
Check the 'Write' box. The Sarnoff camera is ready to accept commands from the ASP and save them to disk. It has created a directory 'd:\Data\Spinor\yyyyddoy' where data will be saved. During operation, it is possible to set the display gains for I, Q, U, and V using the sliders. The Sarnoff application must be started each day to get new yyyyddoy directories created. Once started, data will continue to go to the same directory even if the date rolls over the next day.
Test:
Select the "SPINOR Sarnoff" DST image icon. This will bring up the Sarnoff observing program. There may be an error message upon startup. If so, Quit and restart the program. It may take several tries.
Select Camera… This will bring up the Sarnoff Camera Control Panel. If the ASP modulator is running, then the 'triggered' radio button should be checked. If the modulator is not running, then select the 'Continuous' radio button and use the slider or edit box to pick an Exposure (ms). "Set" the exposure time.
Check the 'Enable Temp Control' box if not already and set the control temperature to '15' using the edit box or slider. "Set" the value.
You are 'Done' with the Camera Control Panel.
In the main dialog window select 'Focus'. The camera will display images in the upper full resolution window. Use 'Stop' to get out of focus mode.
The Sarnoff "Demo" program can also used for testing. It is reasonably self-explanatory. One useful feature is the ability to zoom using the converging arrow icon.

Hogwarts

The Pluto camera is connected to Hogwarts. Different routines are used for testing and observing.
Observe:
Log in as asp
If a nistime application shows up, minimize it, leaving it running.
Select the "SPINOR Pluto" DST image icon. This brings up the observing screen.
Go to "Adjust Stuff". Accept the only option and a settings window will appear.

Look at, "Hexadecimant offset" and "Accumulations". Accumulations are appropriate for the observing run, typically 8 or 16. The total number of frames is this number times 8. Hexadecimant offset is whatever was determined when phasing, currently 2.

Close this window with "OK".

Select Commands->Camera->Run. You should see a status field change color while frames are being collected and an IQUV display presented. If there is a message about serial error. exit the program, cycle power on the Pluto camera, and try the program again. It the program just sits there, the camera is not receiving strobes from the ASP.

Select Commands->Data ->To disk. The Pluto camera is ready to accept commands from the ASP. It creates a directory "d:\Data\SPINOR\yyyyddoy" where data are stored. Data will continue to be stored to this directory even if the time rolls over to the next day. The program must be stopped and restarted to get a new directory for the day.

Test:

Select PixelView.

Click the camera icon in the tool bar to record one image.

Click the green octagon to continuously record images. Click the red octagon to stop.

Exposure time can be set in the edit box in the upper right. Stop animation. Enter your new value. You must 'Update' the new exposure time for it to take effect. Run the animation again.

End of Day:

Harry, Hagrid, and Hogwarts send data to their local disc drives in real-time. At the end of the day, data need to be sent to the SAN for archiving.

Log in as 'asp' if not already. On Harry one may have to log off as 'tdarnell' and log in as 'asp'

Select the 'C Shell' icon.

At the 'C Shell' command prompt enter "tosan h". This will list the usage for "tosan" and show the available local data directory names. Normally the one of interest is the last listed, the one for today. Save all the files in this directory to SAN by entering

$$\text{tosan obs\_account dirname}$$

where "obs_account " is the current observation account such as "T691" and "dirname" is the name of the directory where today's data files reside, such a "20050502" on the Harry or 05d162 on Hogwarts. On Harry these directories are yymmdd, on Hagrid yyyyddoy, and on Hogwarts yyddoy. In case of some error "tosan" can execute only one of its three functions, creating a local tar file, writing that tar file to the SAN, and writing a file to the "fits_ready" directory on the SAN. These are selected using the 't', 'c', or 'r' switches respectively.

Scientists will want to copy data from Harry, Hagrid, and Hogwarts to their own USB disc drives. They can do this after observing, even at the same time the "tosan" exercise is going on.

Once data have been transferred from the SPINOR computers to the SAN and written to DLT *and* the scientists have picked up the data desired on their USB drives, data can and will have to be removed from the SPINOR computer hard drives. Harry produces lots of data and will have to be purged several times. Hogwarts and Hagrid may not need to be purged at all. To be safe frequently check the 'properties' of the D:/ drives on all the SPINOR computers for sufficient room for a day of observations and warn scientists when drives are near full. At full speed and 64 frames, the Rockwell camera can record about 6.5GB/hour.

Power Off:

Quit, exit or whatever, the observing programs.

Shut down the Windows operating systems as usual.

If bad weather is expected switch off the power on the back of the computer chassis otherwise leave it on.

LCD displays have a power switch on the bottom right.

Switch off each camera power supply box for the new cameras.

Top off LN_2 in the Rockwell camera.

- End-