SEST STAFF INSTRUCTIONS

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Contents

Chapter 1

Miscellaneous Problems and How to Cure Them

Updated by Fredrik T Rantakyrö on November 18 2000

1.1 Problems

Note: One should **always** try do do a software solution first. The hardware reboot described in section 1.2.7 should be done as a last solution. I will describe typical situations below and what needs to be done to fix the problem.

1.1.1 Telescope is not tracking

In case of a tracking failure the software solution described in section 1.2.4 should be tried first. Only as a last solution should you try the solutions in section 1.2.7.

1.1.2 Subreflector is not tracking

If the subreflector does not seem to move (e.g. during a subpointing routine), if you get uncommonly high errors, or, if the source is not seen, then the subreflector may not be tracking properly or may be stuck in one of the initialization positions. In this case the subreflector has to be reinitialized. See section 1.2.3 on how this can be solved easily and quickly without running off up to the antenna.

1.1.3 Quasi–Optics are stuck

If a Rectemp or Connect in PEGASUS fails, because the quasi–optics are not moving then try to move the mirrors and/or loads into the correct positions by using Quasi. Only if this also fails then you will have to do a software reboot described in section 1.2.4

1.1.4 Clamping motors failure during the stowing process

If during the stowing process the clamping motors should fail you will get an alarm and blinking *failure* and *MSH* or *MSA* lamps on the C2 cabinet. If this happens you will not be able to drive the motors until the alarm has been reset. To reset and continue the stowing process follow the step by step instructions below.

- let the alarm run for about fifteen seconds
- open the C2 cabinet
- there are three red buttons (*labeled H1, H2, and H3 reset*) on the top left on the inside of the cabinet. Press the *H1(H3)* to reset the alarm if the clamping motors failed to lock the Elevation (Azimuth) bolts.
- now try to lock the pin again

If this fails again, repeat the reset procedure, but this time first move the pin out so that it is no longer fully in. If even this should fail, repeat the reset procedure, first moving the pin out and nudging the telescope in either Azimuth or Elevation, before trying to put it in and lock it again.

1.1.5 Antenna is moving to arbitrary position

If you send the antenna to park or a source position, but the antenna starts to move rapidly to some arbitrary position, you should immediately set the brakes. Drive the antenna to its park position from the pedestal and reboot the ICCABIN and ANTLIA as described in 1.2.4.

1.1.6 Telescope drives jammed

This is serious and may occur if you didn't set the brakes soon enough, after you lost control of the telescope as described in 1.1.5. It may also occur, if the telescope gets stuck in the high elevation tracking limit or beyond the azimuth tracking limit. First, you can try to move the telescope from the pedestal out of the tracking limits. If you cannot move the telescope this way, you will have to try the backup power controls to move it out of its limits. If this still doesn't work, you need to get the hand wheels and need to crank the telescope manually – two people are needed to do this ! Try to get a few dozen revolutions on the wheels before trying the handset from the pedestal again. If you move the telescope far enough out of the limits, the handset will eventually work again. Now reset the azimuth and elevation drives with their circuit brakers in C3 and reset the ICCABIN and ANTLIA as described in 1.2.4.

1.1.7 C1 failure

NOTE: Do not touch any of the circuit breakers without the presence of an engineer or the electrician.

1.1.8 No communication with SCORPIUS

Sometimes when the observer *aborts* an integration and for other unspecified reasons the link to SCORPIUS can go down. In this case do the simple solution described in section 1.2.1.

1.1.9 Disk crashes or computer breakdowns

If any of the computers does not boot up or if it is impossible to access some of the disks, then consult the *SEST HP-UX and PEGASUS System Administration Handbook*.

1.1.10 Correcting for AOS drifts

If LR1, LR2, or, the HRS are shifted, follow the instructions given below to correct for any drift.

- use a staff account (director or violet)
- there is a logfile for each aos where the fix reference channel as well as the calibration channel are logged for each calibration. The last column, the drift, should ideally be close to 0.0. The logfiles are named:
  - `/logs/aos-logs/hrs.log`
  - `/logs/aos-logs/lr1.log`
  - `/logs/aos-logs/lr2.log`

  List the log file to know how big the drift is in channels.
- to confirm that we have a channel offset as read in the logfile, a good idea is to use the testsignal (The center channel should be 721 for both LR1 and LR2 and 1001 for the HRS)
- open an xterm window and start up a telnet session to SCORPIUS. Login as `root` using the LINUX root password:
- `cd /home/aoscon/src/cid`
- Make a backup of `defaults.c`
  - `ls -l default*`

- Check the date of the last modification of `defaults.c` and use this date (NOT) the current date)
- `mv defaults.c defaults.c_YYMMDD`
- `cp defaults.c_YYMMDD defaults.c`

- edit the file <defaults.c> modify the values for "`program.range[n]`" (*ie.* add the drift value to the channel values), where
  - `n=0,1` for hrs
  - `n=2,3` for lr1
  - `n=4,5` for lr2

  and add a comment of what you have done to the beginning of the file.

- type:
  - `make all`
  - `ps -aux | grep cid` (to get the <`pid`> for the "cid")
  - `kill -9` <`pid`[1]>
  - `cd ..`
  - `make install`
  - `cd /`
  - `shutdown -ry 0` (alternatively, boot SCORPIUS manually)

- in PEGASUS, click Aos button and then *Setup* to select the AOS to be checked. Make a comb integration TWICE! Take note of the values for `ref.channels` and the `width`. Check after in *Setup* that it looks ok. **Note:** You will have to click on the `comb` button even if it is selected as the second time it is selected but the `obsmode` button is unselected. Selecting the `comb` button again will also set the `obsmode` button.

- Login to VELA as 'daprog' and type:
  - `tcsh`
  - `aos`
  - `cd conf`

- Make backup copies by:
  - `pcp aoss.par`

[1]Usually 93

- pcp aost.par

- edit the file <aost.par>
  - replace the channel values for `LR1 (lr1_1, lr1_2)`

  or

  - `LR2 (lr2_1, lr2_2)`
  - `HRS (hrs_1, hrs_2)`

- edit the file <`aoss.par`>
  - replace the channel values for `LR1 (lr1_cstart, lr1_cstop)`

  or

  - `LR2 (lr2_cstart, lr2_cstop)`
  - `HRS (hrs_cstart, hrs_cstop)`
  - modify the values for reference channel and for the width (`lr1_ref_chan, lr1_width, lr2_ref_chan, lr2_width, hrs_ref_chan`, and, `hrs_width`)

- type:
  - `cd ..`
  - `make install`
  - `rms .,aost.par` (and answer 'Y' if needed)
  - `rms .,aoss.par` (and answer 'Y' if needed)

- now, test the new setting with the testsignal
- write down the corresponding changes in the green staff notes binder "AOS CENTERCHANNEL"
- Write a message to the system administrator (*mlerner@eso.org*) so he knows that he has to apply this change to the spare SCORPIUS *ie* VINCHUCA

1.1.11 Odd problems

These can be:

- the opening of the Tune display seems to take forever
- the "quasioptics" do not seem to move
- there is a problem with ANTLIA (e.g. the telescope will not track a planet or comet after a pointing, or it will not move at all).

In all these cases try the steps in section 1.2.4 first and **only** if this failes you should try the steps in section 1.2.7.

1.1.12 More odd problems

If the antenna, subreflector, quasi or any other part in the system misbehaves in some way that is not described here try the solution in section 1.2.2. There is also a description of some problems and their solutions in section 13.

1.2 Step by step descriptions of solutions

1.2.1 Rebooting SCORPIUS

1. Click on Shell and select *Location: Scorpius* and click on *Accept*. It is also possible to open a local shell on VELA and telnet to SCORPIUS (`telnet scorpius`).
2. login with user `restart` and give the *guest password*
   or
   do a `ctrl-alt-del` directly on SCORPIUS. This should only be used if the first method didn't work.
3. wait for more than 60 seconds. There is no message telling you when SCORPIUS has completed the reboot so just keep an eye on the clock.

1.2.2 Logging out and in to VELA

Sometimes there is some communication problem between VELA and the TCS and this can sometimes be solved by:

1. put the brakes in local
2. hit `ctrl-c` in the TCS window
3. logout from ANTLIA

4. logout from VELA (click on button $\boxed{\text{Exit}}$)
5. login again to VELA using the same user
6. start $\boxed{\text{TCS}}$
7. check if things are working and if so
   - reconnect the receivers ($\boxed{\text{Connect}}$)
   - reselect lines ($\boxed{\text{Lines}}$)
   - reselect observation mode ($\boxed{\text{Obsmode}}$)
   - insert the pointing offsets manually with $\boxed{\text{Point}}$
8. start the observations again

If this doesn't work try the steps in section 1.2.4.

1.2.3 How to restart the sub-reflector control software

These are the steps to reboot the sub-reflector:

1. Click on $\boxed{\text{Shell}}$ and select *Location: Iccabin* and click on *Accept*. It is also possible to open a local shell on VELA and telnet to iccabin (`telnet iccabin`).
2. login with user `michel` and password `haaa`
3. type: `subinit 3`
4. wait for about 2 minutes for the subreflector to be initialized (this can be seen when the 4 offsets in the TCS windows display of the subreflector offsets no longer are moving).
5. Check that the actual positions are close to the commanded positions of the 4 offsets (within 0.01 for the first two values and within 2.00 for the last two).
6. if this doesn't work go back and try step 3 and 4 again.
7. If step 6 didn't solve the problem try:
   `subinit all`
8. wait for 2 minutes (see step 4)
9. `exit`

If this doesn't solve your problem try doing the steps in section 1.2.4.

1.2.4 How to reset ICCABIN and ANTLIA

1. In the TCS display window hit `ctrl-c`. If you don't have a TCS window open follow the steps below:

   (a) Click on $\boxed{\text{Shell}}$ and select *Location: Antlia* and click on *Accept*. It is also possible to open a local shell on VELA and telnet to antlia (`telnet antlia`).

   (b) login with user `michel` and password `haaa`

2. type `reset`

3. Click on $\boxed{\text{Shell}}$ and select *Location: Iccabin* and click on *Accept*. It is also possible to open a local shell on VELA and telnet to iccabin (`telnet iccabin`).

4. login with user `michel` and password `haaa`

5. type `reset`

6. wait at least 40 seconds

7. Open a TCS window and login with user `michel` and password `haaa`

8. type: `starttcs`

9. The subreflector should be initialized by now. Check that the actual position agrees with the commanded position.

10. Initialize the antenna encoders by selecting $\boxed{\text{Antenna}}$ and selecting `Encoder Initialization` and clicking on *Accept*.

11. wait for the encoders to initialize

12. check the pointing

Sometimes the culprit is **NOT** ICCABIN or ANTLIA but ICCTRL. Symptoms of a problem with ICCTRL is that $\boxed{\text{Connect}}$ and $\boxed{\text{Quasi}}$ are not responding and the steps above didn't solve the solution. In this case try the solution in section 1.2.5.

Note: You can always do a hard reboot instead of using the `reset` command via telnet but this should be only used as a last solution. A *hard reboot* is when the power is cycled on and off on the pertinent machine. See section 1.2.7 for a description of a full hardware reboot of ANTLIA and ICCABIN.

1.2.5 Rebooting ICCTRL VME rack

Before doing this open a shell window and try:

- `ifd music`

If the music sounds then ICCTRL is up and running so go back and try some other solution. If there is no music then try the solution below:

- cycle the power on ICCTRL

1.2.6 Rebooting VELA

Note: Before fiddling with VELA talk to the *system manager* or if he isn't available then read the pertinent sections in *SEST HP-UX and Pegasus System Administration Handbook*. This section here is a short description of the procedures and if you are unfamiliar with these proceedings then it is important to check the *Handbook*.

Never turn off VELA's power switch while the system is up. This can corrupt the file system and in the worst case **the machine may not start up again**. In the case the system is behaving well, but you want to reboot the machine for whatever reason, do as follows:

- $\boxed{\text{Exit}}$ the user session
- log in as `daprog` or as `director`
- open a terminal window ($\boxed{\text{Shell}}$ and selecting *local* and clicking on *Accept*)
- type: `cd /`
- type: `/sbin/shutdown -ry 0` and wait several minutes until VELA is rebooted.

The machine will be ready when the login screen appears again.

In case VELA refuses a login to any user by saying that the login sessions have been locked, you only need to restart the login screen of the HPVUE manager from the *Options* menu.

In case VELA really hangs, and there is no way to login, do as follows:

- use an X-terminal and login to PUPPIS using the account of your choice
- open a terminal window on PUPPIS

- type: `telnet vela`
- log in as `daprog`
- type: `cd /`
- type: `/sbin/shutdown -ry 0` and wait several minutes until vela is rebooted.

The machine will be ready when the login screen appears again.

1.2.7 Rebooting the ANTLIA VME and/or Cabin Controller VME

There can be different situations when ANTLIA and/or the Cabin Controller have to be rebooted the hard way and the software reboot didn't work and different action plans will apply. It is important to remember to never make shortcuts, and to take it easy ! Perform the following actions in the given order step by step. It is possible that a slightly different order may also works once, but then it may not work the next time. In other words, *do it exactly as described below* to get the best results!

Case 1: Somewhat severe problems...

- park the telescope and turn the key to local
- go to the pedestal
- turn off the power to ANTLIA
- go up the cabin
- turn off the power to the ICCABIN
- turn on the power to the ICCABIN
- go back to the pedestal
- turn on the power to ANTLIA
- go back to the control room
- logon to PEGASUS if necessary
- logon to ANTLIA
- type `starttcs` to enable the remote control of the telescope
- Antenna and select *Initialize the encoders* and click on *Accept*
- check the system on a pointing source ...

Case 2: Panic and Despair !

This means everything is screwed up, nothing is working, and you wish the other turno could take over so you could just leave the mountain.

- park the telescope and turn the key to local
- logout from the PEGASUS session ($\boxed{\text{Exit}}$)
- reboot VELA (eventually this could be skipped, but it doesn't hurt)
- go to the pedestal
- switch off the power to ANTLIA
- go up into the cabin
- recycle the power to ICCABIN
- go back down to the pedestal
- turn on the power to ANTLIA
- go back to the control room
- logon to PEGASUS
- open the TCS window (if a TCS is still running, do a <control-C> and type `logout` to close it).
- logon to ANTLIA
- type `starttcs` to enable the remote control of the telescope
- $\boxed{\text{Antenna}}$ and select *Initialize the encoders* and click on *Accept*

1.2.8 Cabin Laptop

If you want to use the laptop in the cabin to tune the receivers, first hook it up to the COI connector. After you turn it on, hit F8 to interrupt the Win95 boot process and choose option 6 to run up Linux without the *gui*. Now change directory to `cd advlink` and then run `advlink.bat`.

Chapter 2

Staff action at power failure

updated by Fredrik T Rantakyrö on November 18 2000

2.1 After a Powercut

After a power cut, the two Diesel generators operated on the mountain should normally supply all telescopes with main power. However, the change to the backup generators is not always smooth and during that time, the UPS batteries at SEST may be used. The UPS can supply power **for not more than 10 minutes** before the batteries are exhausted. If the UPS starts up, the emergency light in the control room will go on. This is the signal to **park the telescope** and follow the **emergency procedures** outlined below.

2.2 Shut down the equipment

To shutdown the all HP's, SCORPIUS, and CETUS the following procedure should be used. **Note: Follow the order of shutdown of machines in points 1-5**:

- Login to the pertinent machine as user `stop` and use the `staff password`. This will shut down and halt the machine in an orderly way

1. Turn off the computers:
   Log off all users and shut down all computers. First, turn off the X-Terminals and the PCs (if the PC's are running windows then just select the `Shutdown` option. If they are running LINUX then switch to the virtual terminal `ctrl+alt+F1` and then press `ctr+alt+del`. Wait for the shutdown to finish and then turn off the power.

   Note: Don't forget HOROLOGIUM running the `Showtime` program.

Now shut down CARINA (by logging in as `stop`). Wait until you get the `OK to switch off power`-message and then switch off the power. First the computer and then followed by switching of its peripherals (external harddisks, DATs, Screen, CD writers etc).
Note: When shutting down CARINA or PUPPIS, the screen usually freezes in graphic mode when the shutdown starts. You then have to press `Shift+Reset` to get the screen back.

If the power doesn't come back on **within 10 minutes**, shut-down PUPPIS in the same way as described above for CARINA (remember, if you need to reboot VELA, PUPPIS has to be up and running *first* as VELA needs to get its clock set by PUPPIS).

2. Turn off the power in the control room:
Shut down all instrumentation cabinets in the control room by tripping their circuit breakers. The control terminals get their power over the same fuse. All circuit breakers are located in cabinet 1 to your left, labeled UPS Rack 1, 2 and 3.

3. Turn off the power in the pedestal:
Go to the pedestal and shut down the motor amplifiers in crate C4 (open the door and trip the circuit breakers labeled Az and El). Now shut down the power of ANTLIA and ICCABIN by turning their keys to off.

4. Turn off the power in the cabin:
The equipment in the cabin can be turned off by tripping the UPS circuit breaker to the right, immediately when you enter the cabin.

5. Shutdown and turn off VELA and SCORPIUS.

2.3 Turn off the compressors

Begin by turning off the compressor for the IRAM 115/230 GHz receiver. Since this receiver is cooled in an "open helium" cycle, it will be easier to cool down again. In fact, if the power cut didn't last too long, you may even continue to use it. Just remember to refill it with helium asap. Turning off one receiver hopefully saves enough power. If UPS fails now, the other receiver will be turned off anyhow.

Note: If the Quantum compressor is switched off, then the solenoid valve cable *must* be disconnected lest the helium leaks out of the safety valve.

2.4 Getting back to observations

1. Turn on the equipment in the reverse order it was turned off (compressors, cabin, pedestal, control room).

2. Check the flow, supply and return pressures meters. These are displayed on the monitor panel for the SESIS JT-circuit in the control room. They should be within their respective ranges (labelled on the meters).

3. Reset the SEST clock by pressing the blue *Sync* button on the front of the unit. Check that you see the 1 PPS tick (green LED).

4. Check that you see the 1 PPS tick on the TAC (red LED).

5. Restart `Showtime` (see chapter 3.1)

6. Restart GPS-Maser counter (see chapter 3.2)

7. Boot the ICCABIN and ANTLIA as described in 1.2.4. If you turned off VELA, you need to restart PUPPIS first now since VELA needs to read the clock information from PUPPIS. If you turned off VELA, start it after PUPPIS is up and running. Same thing with CARINA.
   Note: Don't forget to turn on the peripherals to the machines *before* starting up the machines in question.

8. Check the receivers have not warmed up by checking the cryo temperatures for the receivers. Use Phtemp in PEGASUS for this purpose.
   Note: for the IRAM receiver, you need to connect the cable in the cabin (hanging from the roof just above the receiver) to the connector on top of the IRAM cryo unit. **Don't forget** to disconnect the cable after the measurements.

9. Now try to tune the receivers and make a pointing to check the correct encoder setting.

10. Reset the Onsala clock. Open the front panel (two screws at the top) and set the clock ahead of the time shown by the TAC. Then press and and later release the *load* button at the second before the times matches.
    Note: This is critical as the Onsala clock is used as a frequency standard for both the chopper wheel and the bolometer.

11. Restart the `GPS-Maser.600s` program to continue the data logging of the Maser drift (see details in Chapter 3.3).

2.5 Important

Note! Go up to the compressor level and check if the compressors are running after a powercut (this is easily done by feeling with your hand if there are any vibrations from the compressor and that there is a yellow light from the back of the rightmost compressor). You can restart the compressors using the powerswitch on the back.

Chapter 3

VLBI and Time

Written by Mikael Lager on May 28 2000
Updated by Fredrik T Rantakyrö on November 19 2000

3.1 Horologium

HOROLOGIUM is the PC running `Showtime` that operates the *Total Accurate Clock*, TAC. Make sure this is running ie the clock is updating the screen every second. If not you will have to start the program again. To start, go to the shortcut `Start Showtime icon` and start the corresponding program.

Note: Without `Showtime` running, the TAC will produce 1 PPS_{GPS} tick anyway.

3.2 Time difference, (1 PPS_{GPS}-1 PPS_{Maser})

A HP 53131A Universal Counter, in the left rack in the control room, is measuring the time difference between 1 PPS_{GPS} and 1 PPS_{Maser}. To measure and trig correctly, it needs to have the following setting:

`CH1`:	TAC 1 PPS signal, in parallel with a 50Ω termination
`CH2`:	Maser 1 PPS signal, in parallel with a 50Ω termination

`Time & Period`	`External Reference`	`Level: 1.5V`
`Sensitivity: HIGH`	`Common 1: OFF`	`Auto Trig: OFF`
`AC-mode`	`Slope: POS`	`Impedance:` 1 MΩ

The reading on the counter display can sometimes be very close to 1, ex. 0.999998063 [s]. This happens when the 1 PPS_{Maser} is leading the 1 PPS_{GPS}. The counter starts always a count with a start trig from CH1. Since the CH2 signal is leading `CH1`, it skips the first `CH2` flank trig and counts from the first

`CH1` flank until the next `CH2` flank. To get the right time, calculate simply (1-ΔT), where ΔT is the displayed time difference.

On CETUS, there is a piece of software, `GPS-Maser.600s`, that is normally running and stores the time difference every 10th minute (see section 3.3.

3.3 CETUS, Data log `GPS-Maser.600s.dat`

To start the data log for the (1 PPS_{GPS}-1 PPS_{Maser}) do the following:

- Login to CETUS with user `prog`. The `password` is the *Staff password*
- `cd data`
- Check if the process is already running (don't start another!)
  - `ps aux | grep -i gps` (This gives you the *process id* of the running process).
- If there is a process running and you still want to restart, do the following:
  - Stop the process with: `kill -QUIT` <*process id*>
  - Save the old file
    - Save the old file by renaming the `gps-maser.600s.dat` file into: `start date-stop date.dat`. The start date is obtained by looking at the first date in the `gps-maser.600s.dat` (f.ex `head gps-maser.600s.dat`) and the stop date by looking at the date of the last recorded time difference (`tail gps-maser.600s.dat`).
      - Example: `mv gps-mase.600s.dat 000415-00527.dat` (15:th of April 2000 until 27:th of May 2000.)
- Restart the monitoring software with:
  - `~/bin/gps-maser.600s &`.
    This will start the program running in the background and the new time differences will be stored in the file:
    `cetus:/usr2/prog/data/gps-maser.600s.dat`.
- `exit`

3.4 CETUS, Plotting of drift rate data

There is no software yet on CETUS to plot the data. As the file is a normal text file with `tab` separated fields then it can easily be read by `Excel, StarOffice,` etc.

3.5 Onsala Clock

The Onsala Clock is not used anymore to produce the **1 PPS** signals to the system, the SEST Clock unit does that. **BUT** the Onsala Clock is used to send a synch signal to both the chopper and the bolometer so it is vital that it is up and running. To restart the clock read section 2.4 point 10.

3.6 SEST Clock

The SEST Clock outputs all the 1 PPS needed for the system and is synchronized to the TAC 1 PPS_{GPS}. Synchronization reset maybe necessary prior to a VLBI run and is simply done by pressing the blue button on the front of the SEST Clock.

Note: Reset means only that the SEST Clock is synchronized just after the reset. The drift, if any, must be taken care of by adjusting the thumbwheel setting on the phase lock receiver (see section 3.8. If you are running a data log, there will be a jump in the data due to the reset. Send an email to both *mlager@eso.org* and*frantaky@eso.org* if you reset the clock.

3.7 Phase Lock Receiver Unit

This is the 5 MHz receiver in the AOS room, just beside the maser, which outputs 5 MHz signals, synchronized to the maser signal. The leftmost front panel in the unit has a red LED, which indicates if there has been any phase lock errors. This is, most probably, an indication of that the maser output signal is too week. The LED will be most useful during VLBI runs, to verify that there have been no phase lock errors. To reset the LED, just press the switch.

3.8 Receiver Thumbwheel Setting

This is only done if there is a drift larger than 10ps/s, or prior to a VLBI run where the drift rate must be less than 3 ps/s.

To adjust the thumbwheel setting (= adjust for the drift caused by the maser): Measure for 2 days the (1 PPS_{GPS}-1 PPS_{Maser}) or if the data is already there, determine the drift as described in section 3.4.

Lookup in the table below to determine what a particular sign of the drift value means.

Positive value	=	1 PPS_{GPS} leads the 1 PPS_{Maser}
Negative value	=	1 PPS_{GPS} lags the 1 PPS_{Maser}

There is not yet any publicly available software to calculate the thumbwheel settings. Please contact Mikael Lager or Fredrik Rantakyrö on how to calculate this.

3.9 Maser failure

If the maser would fail, which can be seen as large time jumps in the time difference on the HP counter or by looking at the file
`cetus:/usr2/prog/data/gps-maser.600s.dat`
and/or Phase Lock Monitor is red (= phase lock error in the phase lock receiver, due, most probably, to a too weak maser signal), then you could run the system on an external 5 MHz TCXO oscillator.

The oscillator is inside the *10 MHz Frequency Distribution* unit in the left rack in the control room. To make this oscillator master for the system you need to flip a switch, which is at the back of the unit. You need also to reconnect on the rear side of the unit. The 1 PPS going to the TCS system has to be connected to one of the 1 PPS outputs from the Onsala Clock, the other 1 PPS output on the Onsala clock should be connected to the 1 PPS input to the HP Counter (disconnect first the 1 PPS coming from the SEST clock)

Do a reset of SEST Clock and keep track of the GPS-TCXO time, until the day the maser is back in operation again.

Note: This oscillator is not suitable for VLBI but is OK for normal observations. You do need to keep track of the $1\,\mathrm{PPS}_{GPS}$-$1\,\mathrm{PPS}_{TCXO}$ and make a reset of the SEST Clock before the time difference is 10 ms ($\sim$pointing error of 0.15 arcsec.).

Adjustment of the TCXO frequency is not needed, since the TCXO is always turned on, regardless if in use or not, and has already been tuned. But if found necessary, there are two tuning screws, one course, one fine, on the front of the unit. Be aware of that the tuning is sensitive and you need to use a counter for the measurement.

Chapter 4

Auto-Pointing Run and Fitting the Pointing Model for Pegasus

updated by Fredrik T Rantakyrö on November 19 2000

4.1 Introduction

In order to maintain the best pointing accuracy for the SEST, it is an important procedure to run (at least) 24-hour pointing checks at regular intervals. It is important that the weather conditions are as stable as possible, especially the absence of high wind speeds during the run. The strongest SiO masers (and continuum sources) are mapped repeatedly in order to get the best sky coverage possible. The resulting offset from each measurement is stored in a database file. These offsets are analyzed and fitted to a pointing model. The model is then used by on-line to correct for each sky position tracked.

In the following, the pointing run procedure and how to get and apply the pointing model fits will be described in detail. This information should be sufficient so that any staff member can manage to accomplish the observations and implement a new pointing model into the system on his own.

4.2 The Auto-Pointing Run

1. Log onto VELA as Director.
2. Check which pointing sources are available and are not in the sun limit.
3. Select the RX100 and tune it to the SiO maser line.
4. Do a quick pointing and subpointing on one source, to make sure everything is o.k.
5. Open JOB and edit `autopoint.job`, using your favorite editor. This file now should contain all sources to be included in the pointing run. The

line above each source indicates the observing mode and the integration time. Edit this file accordingly and then save it again. (Note, editing this file during a pointing run has no effect. You need to abort the pointing run and reschedule it to read in an edited `autopoint.job` file).

6. Choose *CATS*, *MAX* and *Infinite Loop* in $\boxed{\text{JOB}}$. Use the *Setup* button behind *MAX* to enter the pointing display. Select *Pointing* with 3 iterations and make sure that *SubPointing, Start with a calibration*, and *Automatically apply results* are off and the *Alert when ready* is on (music after each source indicates, that everything is running well). Save these values and then hit **Accept** in $\boxed{\text{Job}}$.

7. Your auto-pointing will now commence.

8. The auto-pointing run can be stopped at any time by breaking the sequence and can then be continued with no problems.

All of the pointing files will be saved as `fits` files in the `/aux2/home/daprog/director` directory. It is a good idea to check the pointing offsets for some sources every now and then during the run, to make sure everything is OK. Also, please write down the 1st and last scan number of the auto-pointing run, so that these fits files can be retrieved later for our *SiO pointing* monitoring project.

4.3 The Pointing Model

Note: The following is a description of the pointing analysis done on VELA. You **must** be logged in as director. Once you have finished the pointing run:

1. Click on $\boxed{\text{Pointing}}$

2. Open the *pointing data*.

3. Choose *SEST Pointing* for *Extract Data* and *space* for *field separator*

4. Fill in the dates for your pointing run and select *send the data to* `director`.
   Note: `FTP` the data only to PUPPIS or gemini, if you need to make further analysis.

5. The pointing data will now be saved in `poin_yymmdd-yymmdd.dat` in the director's home directory.

6. `mv poin_yymmdd-yymmdd.dat ./pointing`
   Moves the file to the directory `/aux2/home/daprog/director/pointing`

7. `rm poin_yymmdd-yymmdd.sou`
   This file only contains the names of the sources used in the pointing run and can be safely removed.

8. `cd ./pointing`

9. The following steps is how to extract the data in a proper format for later data-analysis:

   (a) `point_file_sort`
   This will start the data sorting/pruning software. If you need a menu of the commands in `point_file_sort` use `?`.

   (b) `ofp` and select `poin_yymmdd-yymmdd.dat` as the database that you want to work with.

   (c) `wf` to create an initial data file for processing.

   (d) Call it `yymmmdd.wf`.

   (e) Type `x` to exit

10. Now we will try to determine the pointing model from the processed database (`yymmmdd.wf`).

    (a) `point_fit` to run an initial fit on the database.

    (b) For `Data base 1` load the file `yymmmdd.wf`, you just created.

    (c) Use a `space` for the second data base if not needed (normally only one database is used).

    (d) Answer the next question about database format with `1`
    (Since you are now using a `wf` formatted file).

    (e) Then, at the next prompt, enter the file name for the fit output.

    (f) Call it `yymmmdd.fit1` for the first fit (at subsequent steps you will increment this number by 1 *ie* in second iteration call the file `yymmmdd.fit2` etc...).

    (g) `point_fit` will exit after the fit has been executed.

11. Look at the fit file just created (`more yymmmdd.fit1`)

12. `cat yymmmdd.fit1|remsh puppis lp`
    to print out the file with the results of the fit on `orion`.

13. First you will see the initial rms fitted to the data. Down below, you will see how big the pointing corrections for each source are before and after the fit.

14. Mark down the numbers for those sources, which you believe should be flagged as bad. Keep these numbers and the printout as later manipulating of the dataset will use these original numbers whenever you want to edit the data (editing of the data is always done on the first dataset). This means that if you find a bad point in an edited file then you will have to identify the point in the original printout to find out its number.

15. Go back into `point_file_sort`, where you can now manipulate the data.

    (a) `ofp`

    (b) Load `poin_yymmdd-yymmdd.dat`

    (c) Now type `md` to manipulate data.

        i. Choose `ma` to mask the bad numbers. Using starting and stopping numbers. To mask a single bad number specify the number twice ie `4 4` to mask scan 4 as the flagging needs both a starting and finish number. Repeat this flagging to flag all bad points as necessary.

        ii. `el` to mask all data taken at an elevation above or below certain limits f.ex 80^o and 25^o

        iii. With `lm` you can list all of the data marked as bad to double-check.

        iv. Type `-` to go back to the main menu

        v. `wf` to write a new file, this time call it `yymmmdd.md`.

16. Now you can run `point_fit` again

    (a) Use the modified data base `yymmmdd.md`

    (b) Write the new fit results into `yymmmdd.fit2`

    (c) `point_fit` will exit after the fit has been executed.

17. `cat yymmmdd.fit2 | remsh puppis lp`
    To print out the result of the fit.

18. Check the results again. If the flagging of the bad data has been done properly, this should give you a satisfying result.

19. If the fit isn't satisfactory then you need to identify the sources with the large offsets in the file (`yymmmdd.md`, see also point 14).

    (a) Go back to the original data set (`yymmmdd.wf`) to find the correct number for flagging the sources with `point_file_sort` again (see step 14 where you noted down the previously bad points) as you also need to flag again the bad points previously flagged.

(b) remove the unsuccesful (`.md`) file.

(c) Run `point_file_sort` and `point_fit` again ie repeat step 19 and add the bad points you found in steps 18 to the bad points in step 14 and 15(c)ii. **Note:** Call the result of the fit `yymmmdd.fit3`

20. If you still are not satisfied with the fit then go back to step 19 (repeat this until you are satisfied with the fit).

21. When finished, print out the last file with the result of the fit:
`cat yymmmdd.fitX | remsh puppis lp`
where `X` is 2, 3, or ... *last fit*

22. Put this printout in the *Pointing binder*

23. On VELA just type: `cd ~`(To go to the `home` directory.

24. `cp .,poin.par .,poin.par.mmmdd_yyyy`
backing up the old pointing file

25. edit `.,poin.par`.
Note! values for `el3` need to be negated (sic).

    (a) Find the old pointing corrections and replace them with the new values in *both* columns, since the second column is what PEGASUS will read as `default`.

    (b) Find the variables `absaz`, `absel`, `az`, `el` and put them all to zero in both columns.

    (c) Save the edited file.

26. Logout as `director`

27. Login to VELA as `daprog`

28. You now have to install the pointing file globally.

    (a) Run the script `update_pointing`

    (b) Follow the instructions

    (c) Check that the new pointing offsets are installed by checking the new pointing offsets in the PEGASUS window Point.

    (d) logout

29. login as `director`

30. Use Files to write all the pointing spectra to tape. Use the pointing DAT tape for this purpose.

31. Use `archive` to backup the `director`'s account on the `director` DAT tape.

32. Clean the account afterwards!

DONE !

Chapter 5

Setup for Comet Tracking

Updated by Fredrik Rantakyrö on July 20 2000

5.1 Setting up PEGASUS for comet or asteroid tracking

If a comet or asteroid program is scheduled, you need to set up the PEGASUS system in order to provide the proper tracking mode of these bodies. This can be done together with the observer when the program is actually started. Logon with the observer who will run the program, open the Comet window and then do the following:

- enter the comet's or asteroid's name
- define the `Input Elements` to `B1950.0`
- define the `Output Ephemeris` to `J2000.0`
- select the `Option 2 variables`
- enter or check the `Orbital Elements` from the Emphemeris
- enter `Begin Date` and `End Date` – note the correct format
- enter `Step Size 0.5 hours`
- *deactivate* `Tracking enabled` and select `Print Result` and an ephemeris window will be displayed if you click on *Accept*.
- click `Print` and then `Quit`

If you want to immediately track the comet, activate `Tracking enabled` in the Comet window *before* clicking on *Accept*. Check that the telescope really starts to track and that your system is set to the current `Epoch`. The par files corresponding to this setup will be on the user's directory: `.,comet.par` and `.,com12.par`.

Note: Take a look at section refhalebopp for a detailed description on how to observe the comet Hale-Bopp.

Chapter 6

Refilling the helium cryostats

updated by Fredrik T Rantakyrö on July 20 2000

6.1 Refilling the 115/230 GHz cryostat

Note: The IRAM receiver has to be refilled once a week.

The following are basic steps that should always be performed in order to guarantee a successful helium transfer. These steps apply only to **re**filling the cryostat, i.e. if it has already been precooled. Always check the amount of helium left in the helium dewar in the bodega before and after refilling the IRAM cryostat. Write down the amount of helium before and after the fill in the table in the binder in the cryo bodega.

1. PARK the telescope and then, from the pedestal, put the telescope into STOW position.
2. When going to the cabin, first turn on the helium gas on the compressor platform by opening the main valve on the He 4 gas bottle.
3. In the cabin, attach the He 4 gas line (on the right side in the cabin) to the small nozzle on the helium dewar (it has a rubber tube on it, which you will have to remove first). **Note:** Before attaching the rubber hose flush it with He first.
4. Now open the top lid of the cross on the cryostat. Be careful not to drop the wing nut or the screw.
5. Verify that the entrance tube to the helium tank is not blocked. For this, use the stainless steel probe available in the cabin[1].

[1] If the tank bottle-neck has an ice-plug, inject helium gas through a stainless steel tube, which you find in the cryo bodega, to blow out the ice, then continue.

6. Introduce the transfer tube into the helium dewar first slowly to precool it, then more quickly further down (don't hit the bottom !), until you reach a pressure of about 200-300 mbar. Wait until you see a flame–like output of helium on the other side of the tube, then introduce this end into the cryostat.

7. Wait $\approx$ 5 minutes (max. 10 min) for the transfer to be completed. You may actually want to time this to make sure that enough Helium has been transferred[2]. When the tank is full there will be an acceleration of gas in the output and "smoke" from the tank (water condensation) will increase. Open the red main valve of the dewar shortly to release excess helium pressure and remove the transfer tube from the cryostat first, then the dewar.

8. Measure the helium level in the cryostat with the dipstick to make sure enough helium has been transferred ($\sim$25 cm of He).

9. Close the top of the cross on the cryostat. Make sure the small relief valves on the dewar and the cryostat (with the rubber tubes on the end) are open.

10. Wait 5 minutes and re-tighten the wingnut on the cryostat. This is typically done after taking down the dewar and closing the back door to the cabin (**don't forget to secure the crane**).

11. As you leave the cabin, close the hatch.

12. Close the helium valve on the He 4 gas bottle at the compressor level as you go down.

13. From the pedestal, drive the telescope back to PARK position.

Important: As the RX115/230 temperature sensor interferes with most frequencies of this receiver it is always unplugged during observations. It is a good idea to plug it in and check the IRAM cryostat temperatures after a refill. Don't forget to disconnect the cable afterwards.

6.2 Refilling the 345 GHz cryostat

The procedure is very much the 115/230 GHz receiver, except for the addition of nitrogen.

[2]If the pressure in the dewar drops below 50 mbar, open the helium gas line and the small valve on the dewar and increase the pressure back up to above 100 mbar.

1. Fill the two small nitrogen containers with liquid nitrogen and take them up to the cabin (be careful not to spill any on yourself or someone following you up the ladder !).

2. Release the screw on the left of the receiver mount to bring the receiver in an upright position.

3. Remove the rubber tube and fill the nitrogen into the outer tank of the cryostat using the small funnel until nitrogen begins to spill out of the small funnel nuzzle.

4. Remove the plug in the middle of the cryostat and begin the helium transfer from the helium dewar as described in 6.1.

5. Bring the receiver back into its tilted position and tighten the screw holding it fast.

Chapter 7

The JT circuit and the JT compressor Cooling down the SESIS receiver

updated by Fredrik T Rantakyrö on July 20 2000

After a power cut, make sure that all compressors in the compressor level are still running. If the J-20 or 8500 compressors failed, the SESIS RX 100/150 receiver may have warmed up.
If the flow meter in the control room drops down to 3.0 V, the JT circuit may have been blocked by a contamination plug, which may have slowly formed in the system. In this case the SESIS RX 100/150 receiver needs to be warmed up and the JT circuit has to be evacuated and refilled.

If the SESIS RX 100/150 receiver has warmed up and needs to be re-cooled to its 60/15/4 K stages, first turn off the 8500 compressor (on the right side) and the J-20 compressor (on the left side - the on/off buttons are in the back at the bottom left), and then follow the procedure outlined below:

7.1 The 8500 compressor

Check the *static charge pressure* in the 8500 compressor. It should be $\approx$80 psi at the compressor. For the J-20 compressor it should be 8-12 bar at the control panel in the control room. If it is lower than 8 bar, then helium gas grade 5 should be added as described in the Cryo-Torr manual, Chapter 7.3.1

Note - if the mixer plate temperature is only slightly above 5 K, but the other stages indicate normal temperatures, the receiver cryostat may have a poor vacuum. In this case you need to switch off only the 8500 compressor. Let the temperature go up to 50 K while evacuating the cryostat with the vacuum pump, then start the 8500 again.

7.2 The J-20 compressor

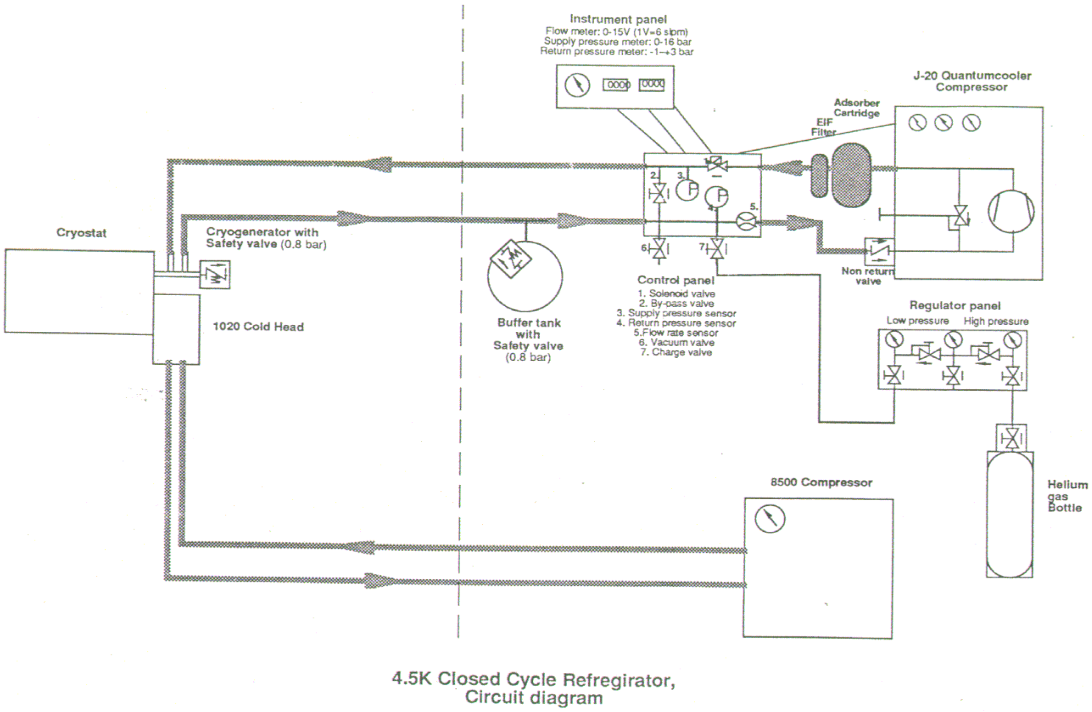


Figure 7.1: J-Circuit diagram

Check the "outlet" pressure in the J-20 compressor. The pressure gauge is in the left back of the J-20 compressor and can be seen through the mirror kept behind the compressor. The numbers written onto the window (5, 10, 15) indicates the pressure in bar. It should be 8-12 bar. If it is lower you need to add helium gas grade 5 from the helium bottle. The supply pressure is also displayed on the monitor panel for the SESIS JT-circuit in the control room.

1. Turn off the J-20 compressor.

2. Close the solenoid valve by disconnecting the electric cable (orange) from the mains.

3. Attach the copper tube to a two stage regulator on the helium grade 5 bottle and to the 1/4" flare fitting of the standard charging manifold found in the lab. With the second regulator set to 5 bar, flush the copper tube and the manifold via the yellow release valve on the manifold. Make sure you open the black charge valve and the yellow release valve first before opening the bottle, to avoid air from flowing back into the bottle. Then open the bottle and let helium run freely through the system. Close

the yellow valve first again and then the black charge valve to keep the manifold pressurized.

4. Now connect the manifold to the J-20 compressor inlet. Remove the helium line from the inlet. The lines and the inlet are self-sealing valves - so don't worry. Make sure, however, you open the silver nuts and *not* the bronze safety return valve.

5. Set the lower regulator at the helium bottle to 20 bar and slowly open the charge valve on the manifold while reading the pressure gauge in the back of the J-20 compressor. Continue until the pressure has increased to 8-12 bar inside the J-20 compressor.

6. Disconnect the manifold.

7. Open the solenoid valve by connecting the electric cable (orange) to the mains.

7.3 The JT circuit

Check the return pressure in the JT circuit. It should be 0.2-0.4 bar (=3-6 psi at the "inlet" gauge) at the control panel in the control room. If the meter in the control room does not work, you need to check the pressure at the regulator panel. Make sure that the 3rd regulator on the regulator panel reads a pressure of 0.2-0.6 bar. This would be grade 5 helium from the last refill, if done correctly. If so, you can now open the charge valve (7) and the last valve on the regulator panel. This will now equalize the helium line up to the pressure regulator on the regulator panel. If the pressure is lower than 0.5 bar, helium grade 5 has to be added to the JT circuit (See chapter 7.3.1). If the pressure reads 0 and you suspect that the JT circuit has been contaminated with air, you will have to vacuum pump it before filling it with helium (See Chapter 7.3.2).

7.3.1 Refilling the JT circuit

To do this, first close the last valve on the regulator panel again to isolate the JT circuit. Now you need to flush the regulator board. Open the first two regulators and the first two valves up to the free unused line, attached behind the second valve, which is open to air. Now open the helium bottle and let helium flow freely. After a few seconds, close the valves again beginning with the one furthest away from the helium bottle. If the seals are tight, you can now keep the bottle open. Adjust the second regulator to get a pressure of 2-5 bar.

Adjust the last regulator to 0.6 bar. - the line to the control panel of the JT circuit should still be partly pressurized with grade 5 helium from the last time. Remember, if it is 0 and you suspect that the JT circuit or the control panel has been contaminated with air, you will have to evacuate the circuit before filling it with helium.

7.3.2 Evacuating the JT circuit

1. Turn off the J-20 compressor.
2. Close the solenoid valve connecting the JT circuit to the J-20 compressor by disconnecting the electric cable (orange) from the mains.
3. Open the vacuum valve (6)[1] on the control panel just enough to bleed out the over-pressure from the return lines. Leave the valve slightly open.
4. Open the bypass valve (2) on the control panel just enough to bleed out the over-pressure from the supply lines.
5. Connect the turbo molecular vacuum pump to the vacuum valve (6) with the metal connector tube. Make sure that the pump is set to a delay time of 120 sec. Wait until the pump gives you a yellow light, then open the valve to the metal connector tube. When you get a green light fully open the vacuum (6) and the bypass valve (2). Pump for $\approx$ 7 hours.
6. Once you have a good vacuum, close the vacuum valve (6) again and disconnect the vacuum pump.
7. Evacuate the control panel and set the 3rd regulator to 0.6 bar as described in Chapter 7.3.1.
8. Open the charge valve (7) and open the valve behind the third regulator, thus filling the JT circuit to 0.6 bar.
9. Now close the bypass valve (2) and the helium charge valve again. Close the valve on the regulator board. The connecting tube is also at 0.6 bar filled with grade 5 helium. Open the solenoid valve again (connect the orange cable to the mains).

[1] The numbers in parenthesis in this and the following paragraphs refers to the labelling in figure 7.1

7.4 Evacuating the SESIS receiver

It is a good idea to evacuate the SESIS receiver if it has warmed up. Take the turbo molecular pump up to the receiver cabin and connect it with the metal tube to the SESIS receiver. You'll find the valve to connect it to at the front end of the receiver. Remember to pump the vacuum pump itself first until you get a yellow light, then the connecting tube until you get a green light, before opening the valve to the receiver. Make sure the pump is set to 120 seconds delay time. Pump for ≈ 7 hours.

7.5 Starting the compressors

The flow meter in the control room should read 2-7 V after refilling the J-20 compressor. The supply pressure may be high at around ∼15 bar at the beginning. The return pressure meter should read ∼2 V (if it works).

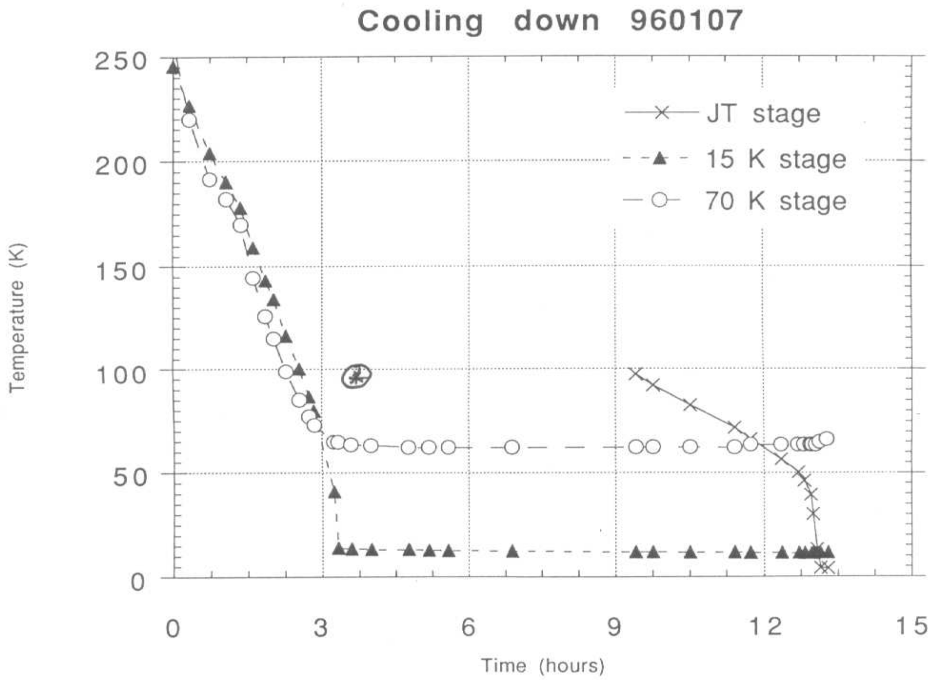


Figure 7.2:
The JT stage can be cooled down by turning on the J-compressor after 4-9 hours.

Now start the 8500 compressor. Keep it running overnight or at least for ≈ 4 hours, until you reach 60-70 K and 15 K in the first two stages. The JT stage should now have around 200 K. On the control panel, the flow should now stabilize at 3-7 V, the supply pressure at 8-12 bar. After you reach the low temperatures in the cold head, start the J-20 compressor (see Figure 8.2). When the 3rd stage reaches $\approx$ 60 K, monitor the flow and make sure that it doesn't decrease - this could indicate that an contamination plug has formed and you may have to stop the cool down process and warm up the receiver again.

After a few hours, the third stage should reach 4 K, the flow should now stabilize around 5 V and the supply pressure at around 10 bar.

7.6 Warming up the receiver

1. Switch off the 8500 compressor.

2. Wait 10-15 minutes or until the mixer plate has reached a temperature of 10 K. Now switch off the J-20 compressor (if an accelerated warm-up is needed - 8 instead of 14 hrs - then leave the J-20 compressor running). **Important:** Close the solenoid valve by disconnecting the orange cable from the mains.

3. The supply pressure in the JT circuit, which is now isolated from the J-20 compressor after turning it off, will fall and the return pressure will rise, causing the safety valves to open at 0.8 bar. This is normal.

Important: If you stop the J-20 compressor then you **must always** close the solenoid valve by disconnecting the orange cable from the mains.

Chapter 8

Data Archiving and Cleaning Guest Accounts

updated by Fredrik T Rantakyrö on November 19 2000

8.1 Vela

Archive files are made at the end of each observing project. They are written on DAT tape and stored on VELA and PUPPIS. There is a DAT tape for each month and a corresponding log sheet. Both are kept in the cupboard near the computer room. The DAT tapes must be initialised before using any of the archive commands on vela. While the files are stored on Vela and Puppis they are backed up every second week on DAT tape with the regular backup procedure. Every 6 months all the archive files are written on two cds. One cd is kept in the cupboard near the computer room and the other is kept off site.

8.1.1 To initialise a DAT tape for use on Vela

- Insert a new tape into the Vela DAT drive and wait until the light on the drive stops blinking.
- Type the following:
  `touch init`
  `tar cvf /dev/rmt/dat init`
  `dat_off` (to rewind and eject the tape)
  or `dat_rew` (if the tape is to be used immediately)
  `rm init`

8.1.2 To archive data

The following procedure creates a gzipped tar file containing all the observing files from a specified account and copies it to `/archive/MmmYY` on VELA and to `/vela_archive/MmmYY` on PUPPIS. There is an option to specify which account is to be archived. There is also an option to append the file to a DAT tape. This option must be selected and the appropriate monthly DAT tape used. The default file name of the tar file is determined from the project number and Observer's name (which are entered at the beginning of every new observing session). There is an option to change this name if it is not suitable.

- Obtain the monthly DAT tape and log sheet. If it is a new month then a new tape must be initialised first (see above). However, there is no need to create new directories in `/archive` or `/vela_archive`, since they will be created automatically.
- Left or right click on the background of the PEGASUS desktop and select `For Staff Only`↘`Archive`. It is also possible to open a shell and type `archive`. Follow the instructions with the option to write to a DAT tape (default).
- Fill out the log sheet
- **Note:** It is possible to specify any account to be archived. This procedure is not restricted to the current observing session.
- **Note:** The archived files are temporarily stored in `/archive/incoming/MmmYY` after this script has been run. An automatic archiving program will then move them to `/archive/MmmYY` and to `/vela_archive/MmmYY`. This program runs every hour and writes a log to the file `/tmp/archive.log` on VELA.

8.1.3 To make a DAT tape for an observer *(Optional)*

The files can be written to an initialised DAT tape directly from VELA using PEGASUS. However it is better if the observer `ftp's` their data to PUPPIS after each day of observing and then makes a backup of all their files on PUPPIS at the end of their observing run (see 8.2.1). Most observers will also ftp their data to their home institutions.

To use Pegasus:

- Insert the initialised DAT tape into the VELA DAT drive and wait until the light on the drive stops blinking. See section 8.1.1 on how to initialize a new tape.
- Click on $\boxed{\text{Files}}$ from the PEGASUS tool bar. Select the options *Write FITS files* and *All Files*. Take note of any *Session Override* options (see below) and then click *Accept*.

It is possible to write files from a different observing account by selecting the option *Session Override* and by specifying the account colour (f.ex `blue`) in the entry box. This option can be executed at any time and will not affect the current observing session.

A tar file with the name `ddmmyy-hhmm.tar` will be created in the user's home directory. The filename and the number of observing files will be displayed in the *Feedback* window in Pegasus. The file is automatically appended to the tape. Once the message `Completed successfully` appears in the *Feedback* window the tape will be automatically ejected and can be removed. Note that if a *Session Override* option was selected then the message `Completed successfully but had some problems` will be written to the *Feedback* window and the tar-file will be stored in the **current** user's home directory.

Note: This procedure must not be used to write the files to the monthly archive DAT tape as it uses a different naming scheme.

8.1.4 To clean an account

Once the files have been archived the account must be cleaned for the next observer.

- Left or right click on the background of the Pegasus desktop and select *For Staff Only*↘*Clean Account*. You can also open a shell and type `clean_account`.

Note: It is possible to specify any PEGASUS account to be cleaned.

8.2 Puppis

8.2.1 To make a DAT tape for an observer *(Optional)*

- Insert the tape into the Puppis DAT drive and wait until the light on the drive stops blinking.

- In the appropriate directory type:
  `tar cvf /dev/rmt/dat` *files* (you can use wild cards)

- Check that the files have been written successfully with:
  `dat_rew`
  `tar tvf /dev/rmt/dat`

- Eject the tape by typing:
  `dat_off`

8.2.2 To clean an account

- Login to Puppis as `sest` user
- Type the following:
  `cd guest_setup`
  `clean` *colour 'guest password'*

8.3 Some useful commands for the DAT drives

- To write to a blank tape type:
  `tar cvf /dev/rmt/dat` *file-name*

  Sometimes you may need to add a * at the end of the file name

- To append to a tape that already contains data type:
  `tar rvf /dev/rmt/dat` *file-name*

  If you have too many files in your directory and the tar command complains, go up one directory and type:
  `tar cvf /dev/rmt/dat` *directory-name*
  Be careful no to use the full paths (e.g. /home/green/data) since this may cause problems when extracting the data from the tape.

- To rewind the tape type:
  `dat_rew`

- To list files on the tape type:
  `tar tvf /dev/rmt/dat`
  or
  `mt -t /dev/rmt/dat rew` If files have been written to tape separately then this command must be typed twice after listing the first file in order to list the next file.

- To retrieve all data from a tape type:
  `tar xvf /dev/rmt/dat`

- To retrieve only specific files type:
  `tar xvf /dev/rmt/dat` *file-name*
  where *file-name* is the full pathname (given by listing the files first)

- To rewind and eject the tape type:
`dat_off`
or
`mt -t /dev/rmt/dat offl`

8.3.1 Increasing the disk quota on PUPPIS

On PUPPIS, the Pegasus user accounts (blue, red, yellow, etc.) each have a disk quota of 200 MB. In some cases an observer may need some more disk space temporarily. In such a case, it is very easy to increase this quota. You need to know the root password to PUPPIS, since only `root` can modify the quota.

- login as root on PUPPIS
- type: `edquota <user>`
- increase the soft and hard blocks (in kB)

Remember to reset the quota to its normal values afterwards or at least to send a note to the *System Administrator* to do it for you.

Chapter 9

Getting Data From 9-Track Tape

by Steve Curran and Felipe Mac-Auliffe July 11 2000
Updated by Fredrik T Rantakyrö on November 19 2000

First determine which tape the data is on from the log (these are kept in the SEST bodega). The older tapes are located in the telescope pedestal. Take the tape to the La Silla computer room and spool it onto `LU10`. Place the DAT on which the data is to be copied in `LU31`. **Saul Vial** will then perform the transfer for you. Following this, before leaving the computer room, the DAT can be checked on `dev/rmt/0mn` via one of the terminals there. After logging onto a machine, e.g. `kila`:

- `mkdir sesttape`
- `cd sesttape`
- `mt -t /dev/rmt/0mn rew`
- `tar tvf /dev/rmt/0mn >log.txt` (to read tape contents)
- `mt -t /dev/rmt/0mn rew`
- `more log.txt` (look at the log of the files on the DAT)
- `tar xvf /dev/rmt/0mn` (to retrieve the data)
- `chmod u+rw` <*project ID*> (e.g. for 1988 tape 15 this is `88_15`)
- `chmod u+rw Dfile`
- `rm Dfile`
- `cd ..`
- `mt -t /dev/rmt/0mn offl`

The data required should then be transferred to PUPPIS. It's best to tar these first (tar cvf data.tar <sesttape>) then transfer them as there may be too many files for a straight ftp. **Note:** Don't forget to clean up after you on kila (ie. \rm -r sesttape data.tar). Once on PUPPIS:

- tar xfv data.tar (creates a dir with the name sesttape with the data files inside)
- cd sesttape
- \rm =VXSG* (deletes the pointing files)
- drp (don't forget to set the environment on your terminal)
- getsest -file *filename* (one of the files to check if everything is okay so far)
- show

The data files will have very cumbersome names, so you want to rename these using Felipe's rename script on PUPPIS[1]. So first of all put each file type into different subdirectories:

- mkdir AVE;mv *.AVE AVE/
- mkdir SPE;mv *.SPE SPE/
- cd AVE
- cp /home/sest/gildas/rename .

IMPORTANT! Don't forget to edit rename accordingly ie. *.SPE* and
$f:r.spe (to rename SPE files) or *.AVE and
$f:r.ave (to rename AVE files), etc.

- ./rename (this should rename all the *AVE* files to *.ave)
- getsest -file *file.ave* (to check)
- show

These files can then be converted to the required format using drp2fits, class, etc.

[1] Look for a copy in /home/sest/gildas

Chapter 10

Getting Data To Absent Observers

by Fredrik T Rantakyrö on November 19 2000

After making the back-up and archiving the data to PUPPIS (see Chapter 8.1.2) then you can make the data available for download from the ESO ftp account by:

- Login to PUPPIS as `sest` or as a staff user
- `cd /vela_archive`
- `cd` *<current month>*
  (f.ex `cd May00`)
- `ls -l`
  (to locate the file in question)
- `ftp ftp.eso.org`
- `user:ftp`
- `password:`*your email adress*
- `cd pub/general`
- Check that the `sest` account exists if not create it (`mkdir sest`)
- `cd sest`
- If you have more than one file to deposit, then create a new subdirectory with a proper name and move into it:
  - `mkdir` *directory-name*
  - `cd` *directory-name*

- `bin`
- `put` *file-name*
- `bye`
- send an email to the observer that he can get the file from `ftp.eso.org:/pub/general/sest/`*directory-name/file-name* using `user ftp` and `password` it emailadress and ask him to mail you when he have downloaded the file.
- After you have received an email that the observer has downloaded the file then you can delete it. Files will be automatically removed after 2 weeks.
- `ftp ftp.eso.org`
- `cd pub/general/sest/`
- `del` *file-name* (deletes the file)

Chapter 11

How to burn a CDROM on Vela

Updated by Fredrik T Rantakyrö on May 19th 2000

11.1 Introduction

This is a very brief description on how to burn a CDROM on VELA using the *GEAR* software.

11.2 Setup, Preparation, and Burning

1. Make a tar file of the data you want to make a CDROM backup of.
2. Telnet to vela and login with the `daprog` user
3. Change to the CDROM burning partition:
    - `cd /cdscr`
4. Create a subdir with an appropriate name in this dir. For example:
    - `mkdir sest12aug99`
5. Change to that subdir and untar the tarfile:
    - `cd sest12aug99; tar xvf <full path to your tar file>`
6. Go back up one level
    - `cd ..`
7. Start the CDROM mastering software:
    - `gear`

8. Make the virtual image:

    - NEWVOL <vol-name> 74 ISO

    The volume name cannot be more than 8 ASCI characters, f.ex SEST01. In our example the full command would be:

    - NEWVOL SEST01 74 ISO

9. Now copy the files to this virtual image

    - CP -r <source-spec> <dest-spec>
      in our example this would be:

        – CP -r sest12aug99 SEST01

      This will copy the files with the RockRidge standard with NO filename translation ie. can be perfectly read under Linux, Windows 98 and HP,....

10. Insert the blank CD in the writer

11. Write the image to the blank CDROM

    - WRITECD <volume-name>

    in our example this would be

    - WRITECD SEST01

    This will take 30 minutes for the writing and approximately 30 minutes for the verify process. The disc will be ejected when finished.

12. Check that you can read the CDROM

13. Delete all your traces ie. the subdir you created and the GEAR configuration files. In our case this would be:

    - 'rm' -r sest12aug99/ SEST* *TMP tape* *tmp

14. In the case of uncertainties there is a manual for the GEAR and you can also issue HELP for a general help and HELP <command> for help on a specific command (this is of course while running gear).

Chapter 12

Hale-Bopp Observation Instructions

by Fredrik T Rantakyrö on December 4 1999

12.1 Introduction

This is a short introduction on how to do a COMET observation of the comet Hale-Bopp. I have assumed that the observer is familiar with the PEGASUS system and knows how to do a standard spectral line tuning and observation. Study section 5.1 for some more information on comet observations.

12.2 Pointing and focus

Before starting the actual observations the observer should determine the pointing and focus offsets as is usually done for a standard spectral line observation:

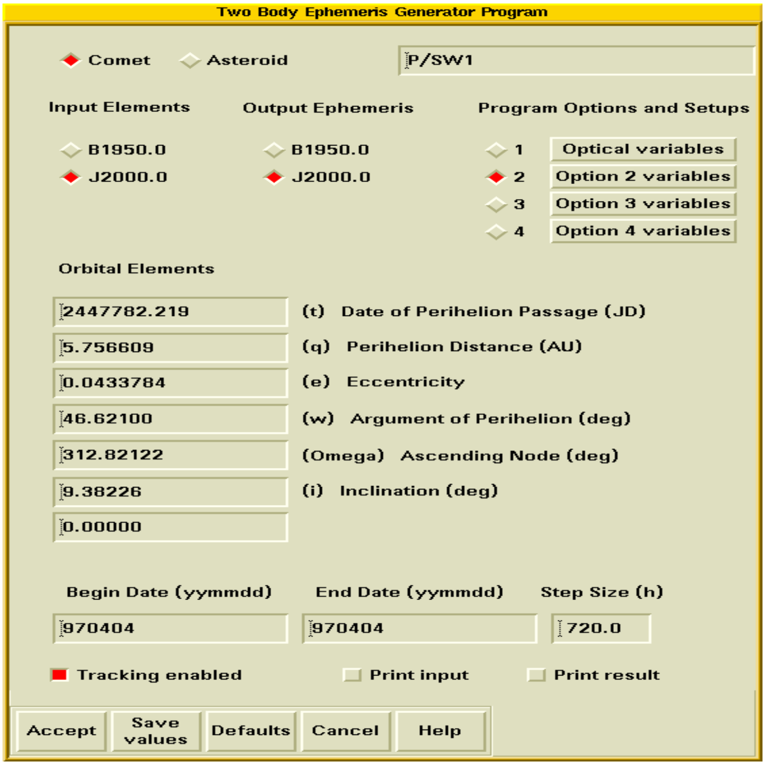
1. Connect the RX100 to the HRS
2. Select **R Dor** in Source by clicking on `Pointing`
3. Select Single Beamswitch wide in Obsmode
4. Select SiO(2-1) v=1 transition in Lines
5. Tune the RX100
6. Do a Rectemp
7. Do a 3 loop Pointing run with `pointing` selected and `subpointing` unselected using default integration times
8. Do a 3 loop Pointing run with `pointing` unselected and `subpointing` selected using default integration times

12.3 Hale-Bopp Ephemerides

This will assume that you know the proper epheremides. I have included some real ephemerides below:

Elements J2000	Date	99 17 12	00 06 01
Date of Perihelion Passage	t	2450539.5153328	2450539.5049930
Perihelium Distance	q	0.91390201270462	0.9139931731
Eccentricity	e	0.994929610144	0.99492915977
Argument of Perihelion	ω	130.56177234156	130.56360346075
Ascending Node	Ω	282.3451070718	282.340675661
Inclination	i	89.427887965859	89.42835461589

- Type in the appropriate values in the $\boxed{\text{Comet}}$ window.



Always check the ephemerides in Pegasus against the written down ones every time you start $\boxed{\text{COMET}}$.

- Select `0.5hour steps` and print out the values, **do not forget to change the dates**.
- Check that the antenna goes to the source and that it starts tracking.

12.4 Observations

1. $\boxed{\text{Connect}}$ the RX115 and RX230
2. Select the CO(1-0) and the CO(2-1) in $\boxed{\text{Lines}}$
3. $\boxed{\text{Tune}}$ the RX115 and the RX230
4. Do $\boxed{\text{Rectemp}}$
5. Set DUAL BEAMSWITCH WIDE in $\boxed{\text{Obsmode}}$
6. Click on $\boxed{\text{Single}}$
7. Select 120S INTEGRATION TIME with 5S CALIBRATION spectra
8. Do 36 SPECTRA with a calibration every 3 spectra. *This will take about 2 hours.*
9. After these **36** SPECTRA a new POINTING should be done, and also a new FOCUS if the antenna temperature has changed drastically *ie* after/before sunset, midday, or a strong change in the weather.

12.5 Post Observation Procedure

Please make a photocopy of the logs and the final spectra and put them in the Hale-Bopp binder. The binder can be found in my office in the leftmost unlocked locker.

GOOD LUCK!

Email: *frantaky@eso.org*

Chapter 13

Miscellaneous Questions

updated by Fredrik T Rantakyrö on November 19 2000 This chapter is divided into sections where each sections covers some common problems, odd situations or just a normal FAQ (Frequently asked question).

13.1 Rosasix

13.1.1 Rosasix weather station

- **Q: What do I do if there is no weather data from Rosasix weather station ?**
  A: This is serious as it might produce a lot of `read_rosasix` processes building up on VELA and the machine will rapidly degrade and get slower. To confirm that we have a problem, open a shell on VELA and type:
  `ll /tmp/weather_sest`. The update time on the log file should be recent, i.e. within the last minute. If it isn't, continue reading...

  - Next, check the position of the integration time on the Rosasix unit. It has to be in the 2-minutes mode in order to put out data properly.
  - Maybe the cable connection between Rosasix and VELA is broken. Check cable on the floor behind CETUS and make sure it is really connected to the serial port number 1 at the back of VELA.
  - Another possibility is that the output from Rosasix is garbled (although the display shows reasonable values). This can be corrected by opening rack 3 and pulling the power cable to Rosasix for 15 seconds.
  - Login to VELA as `daprog` (or from an X-terminal if VELA is unreachable) and type: `psgrep read_rosasix | wc -l`. The result

should be “0” or “1”. If you get > 1 as output, several read processes are running and indeed we seem to have a problem !

  * type: `psgrep read_rosasix` and type `kill -9` <*pid*> for each one of the processes identified by their <*pid*>.

13.1.2 Weather data

- **Q: In which files are the weather data saved on disk ?**
  A: ESO Vaisala weather data is saved in `/tmp/weather_eso` and SEST Rosasix weather data in `/tmp/weather_sest`. The SEST Rosasix wind data is saved in `/tmp/weather_log`. For further information on the weather handling system, see the SEST HP-UX AND PEGASUS SYSTEM ADMINISTRATION HANDBOOK.

13.2 Pegasus

13.2.1 The Pegasus accounts

- **Q: Which are the different pegasus accounts ?**
  A: The official user accounts (password posted on the notice board) are `red, green, blue` and `yellow`. The unofficial user account (password same as above) is `orange` – you can use this one for monitoring projects, for example. The staff accounts (password known only to staff) are `director, violet` and `pegasus`. The development account (password known only to staff) is `daprog`.
  Please be aware that all accounts above starts up a PEGASUS session after login, except for *daprog*.

13.2.2 Spectra not show automatically

- **Q: What do I do if the spectra are not shown automatically?**
  A: Check the file `~/.sysstate`. The variable *graph* must have the value *on*.

13.2.3 Telnetting to VELA

- **Q: How do I open a `telnet` session to a Pegasus account on VELA without disturbing the observations?**
  A: If you really have to (don't do this at home kids):

  – login via `telnet vela` from either PUPPIS or CARINA.

– Hit `Ctrl-C` immediately after you get the last message saying that you are not allowed to login via `telnet`. You have only 2 seconds to do this before the autologout kicks you out.

13.3 Checking, running and killing processes

13.3.1 Checking processes

- **Q: How do I check if a certain program is running or not ?**
  A: type: `psgrep` <*program*> from any shell window.

13.3.2 Aborting the `alarm` program

- **Q: What do I do when I cannot abort the alarm program ?**
  A: If the abort of an alarm does not work and instead the alarm window remains, open a shell window and type: `psgrep alarm`. A ´alarmh process is probably pending, which you will have to kill using `kill -9` <pid>, where <pid> is the process id number.

13.3.3 Autoparking

- **Q: Is there a way to switch off the autoparking facility?**
  A: Yes, but don't do it! Type `psgrep wind` in a shell window to get the `process id` and then kill <process id>. If you want to restart it without logging out and in again, type `wind 14 18 1 &`.

13.3.4 Alarm keeps on beeping

- **Q: What do I do if the alarm keeps on beeping and I can't switch it off from the *Alarm* window?**
  A: Open a shell window on VELA and type `ifd reset`.

13.4 Hardware diagnostics and problems

13.4.1 Music generator

- **Q: What do I do if the music generator starts playing a whole symphony ?**
  A: Get a screwdriver and unplug the music generator card (unscrew the uppermost screw to be able to unplug the card) for a few seconds and plug in back in again.

13.4.2 Sending commands to the IF-chassie

- **Q: How can I send commands manually to the IF-chassie?**
  A: Open a local shell window on VELA and use the `ifd` command (Use `ifd -h` to get the online help). The following options are available:

Command	Function
`ifd fsw on`	set frequency switch on
`ifd fsw off`	set frequency switch off
`ifd pll iram`	set pll picture to iram
`ifd pll sesis`	set pll picture to sesis
`ifd if on`	set if on
`ifd if off`	set if off
`ifd comb on`	set aos combs on
`ifd comb off`	set aos combs off
`ifd blank on`	set aos blanking time on
`ifd blank off`	set aos blanking time off
`ifd relay b1`	set relay b1
`ifd relay b2`	set relay b2
`ifd path 1`	set IF path 1
`ifd lo3 a`	set lo3 to pos a
`idf lo3 b`	set lo3 to pos b
`ifd music`	set music
`ifd alert`	set alarm
`ifd reset`	reset audible alarm