KMTNet: Procedure for pumping dewar (cryostat) vacuum

Version History

Author	version	Date	Change history
Atwood/Koorts	1	November 2015	origin
D. Carter	2	9-January 2017	Added extra info
D. Carter	3	16-January-2017	Added cooldown graph

At the end of observing the observer should:

a. Park the telescope at the service position and insert the safety lock pins to prevent telescope movement (Fig. 1).
b. Start the temperature/pressure logging program
c. Ventilate the dome by opening the windows slightly (depending on wind conditions) in case of possible hydrocarbon leaks.

Figure 1: Safety lock pins inserted on east and west side of the fork (yellow handles)

Pumpdown procedure:

1. Obtain the old IRSF pump OR borrow the SALT portable vacuum pump (a better option – it's smaller and fits better).
2. Fetch the collection of vacuum fittings from the IRSF dome – found in a plastic packet alongside the vacuum pumps. . You will need the short pipe with KF16 flanges, a KF16 to KF25 adaptor, and a 500/600mm length flex pipe with KF25 flanges. (Fig 2)

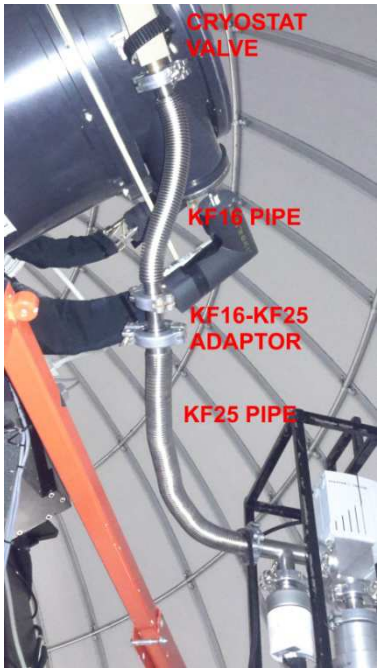

Figure 2: vacuum pump to cryostat connection fittings

3. Put the pump on the scissor lift.
4. Park the SkyJack scissor lift in position as shown in figure 3. Note the rear of the carriage is roughly lined up with the middle of the double doors. This important to avoid hitting the CCD controller box mounted on top of the telescope.

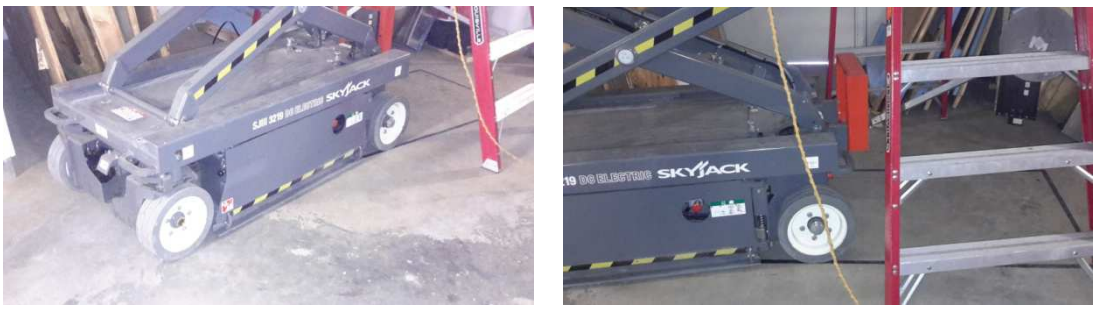

Figure 3: SkyJack scissor lift positioning

5. Borrow a UPS if possible to supply the vacuum pump (we used one from the 1.9m dome). Note that the KMTNet dome power distribution is standard SA 220V, so a 220/110V transformer will be necessary for the IRSF vacuum pump.
6. Connect up the pump as shown in figure 2, pump on the pipe to a pressure lower than the cryostat pressure.
7. In the equipment room, switch off all three cryotiger compressors. (Power switches are “round the back” facing the wall)
8. Open the cryostat valve. After about 10 hours pumping, start both PT30 compressors. Monitor the temperatures – rate of fall should be around 4 degrees per 10 minutes. If the temperature drop stops (or reverses), stop the relevant Cryotiger compressor, reverse the supply/return hoses at the compressor (19mm spanner needed). Start the compressor and run the system “backwards” for about 30 minutes

then swap the hoses back to the standard connection. Continue to monitor the temperatures.

9. When the PT30 temperatures are <195K (-78ºC), start the PT13 compressor. Monitor the temperature rate of fall, check for blockages as for the PT30 units.
10. When the Cryostat pressure is <10-5 Torr, close the cryostat valve and stop the pump.
11. Save the log file (it will be the newest xxx.txt file on drive E (USB flash drive) of computer IC K). See “How to retrieve the log file” below.
12. Return all the borrowed bits ‘n pieces to where they came from.

Cryostat cooling curve

The cryostat takes approximately 14.5 hours to reach operating temperature. See the cooldown curves in Figure 4. Note the erratic temperatures at the start of the cooldown. These were the result of stopping the cryotiger compressors to reverse the hose connections in order to clear cold end blockages.

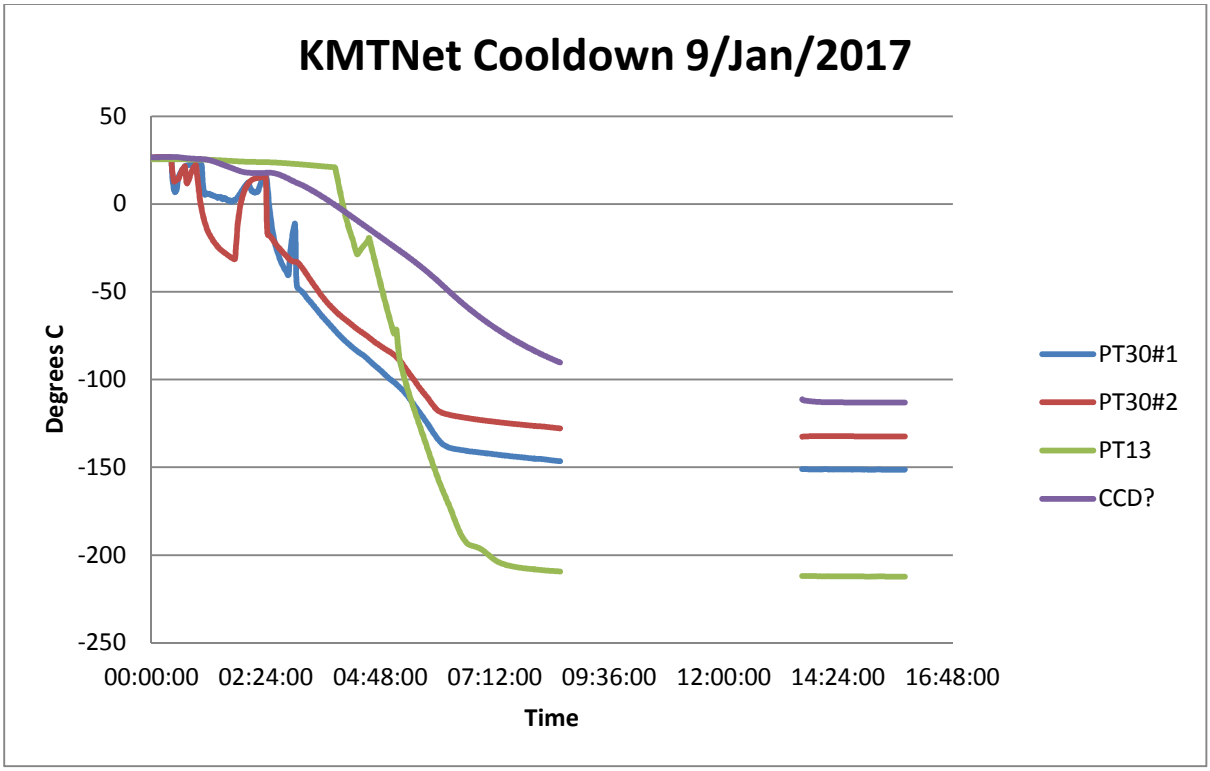

Figure 4: Cool down temperature behaviour.

Cryostat vacuum pumping setup

Pump fittings

How to retrieve the log file:

with the camera electronics on

1. Reboot computer IC K
2. At the linux/dos prompt select dos (you only have 45 seconds or it will boot linux)
3. At the C: prompt type "bruce", this will take you to the working directory on the thumb drive and start DS. DS is a dos shell that some of us old farts like. You should be able to see .txt log file in the listing.
4. Write down the name & hit F9 to exit DS.
5. Use the DOS command "ren oldfile.txt newfile.txt." where oldfile is the name you found and newfile is the name you invented, 8 characters max.
6. Type DS to get back into DS, point to the logging program (.bas)
7. Shift F1 right arrow, right arrow + return to run it.
8. The program will make a new log file named oldfile.txt
9. Or you could use DS to rename, point to the file and r is the command (i think).
10. If you want a copy of the log file:

a. Note the full path of the logfile.txt
b. pull the usb stick a copy the file onto a laptop.
c. You can pull and reinsert the usb stick while in DOS, just don't type anything while it is out.