Updated: 2019Sep06

2.4m Trouble Reports

RA Jumps While Tracking
Friday, September 6, 2019 6:43 AM
Problem(s) Encountered:
About a dozen times tonight, rather intermittently but perhaps more often in the north, the telescope would jump eastward and kick the guide star just out of the box, maybe 10-15 arcsec.
Pushing the east guide button for a few seconds brought it back in, but it meant I had to pay more attention than usual to the tracking!

Solution:
Sounds like a subtle artifact from the RA drive train. Jacked up the telescope and reseated the roller. Checked the 4 mounting bolts for the preload plate and replaced them with new ones (old ones felt mildly stressed). Checked spring plate tension. Felt good. Let the telescope track for an hour. Went from RA of 11:21:00 to 11:21:03. Perfectly acceptable. Hopefully the problem disappears.

Echelle CCD Readout Weirdness
Monday, September 2, 2019 1:42 PM
Problem(s) Encountered:
I started to get going at 10:30 pm with flats and HgNe comparison exposures, but then had trouble with Echelle. At first, the frames read out as biases, similar to the problem Eric encountered on Thursday. We cycled the power, both on Owl and on the instrument, and it eventually began reading out, but then had these problems:
(1) flats had an abnormally high level in the blue
(2) flats had wavy noise pattern at times
(3) HgNe had weird noise pattern, and also looked like a flat+Ne (vertical stripe pattern like a flat).
Eventually, it seemed to go back to normal. We lost a less than an hour to this, and I started taking science data at 11:30 pm, and had no problems since.

Solution:
There is certainly something odd with the readout, or electronics in general, for Echelle. With ARC now MIA, alternatives will be explored for how to detail Echelle and get it back to full functionality. Fortunately, it always seems to just fix itself when given the time. Not satisfying though.

OSMOS Producing Low Image Counts
Tuesday, August 27, 2019 1:38 PM
Problem(s) Encountered:
The problem of taking long-ish exposures that turn out looking like very short 10-20 second long exposures, like that happened on the previous night, existed tonight too.
On a partially cloud night, like the last two nights, one might think its due to clouds or cirrus. But by rebooting the IE computer then restarting Prospero, the problem went away and the resulting images look fine.
However, once things got working again, I found that any movement of the telescope, say to another object, or even sometimes doing a small shift in position, would cause the problem to reappear.
 Consequently, my the end of the night, I always rebooted IE and Prospero before starting a fresh set of exposures.

Lost several hours tonight and much of the previous night to this problem.

Solution:
It appears that the issue stemmed from a failing solenoid coil used for shutter actuation. Since I did not have a spare on-hand, I pulled apart the Buckeye filter wheel (FW) and removed its similar solenoid. I then pulled the solenoid from OSMOS and installed the one from the FW. There was one issue and one bit of luck. The issue is that the FW solenoid has two mounting holes on one side while in OSMOS, there is only one on each side. So installing, I could only bolt it down with one bolt. Still, that bolt is nice and tight and I do not think the solenoid is going anywhere. Luckily, I was able to simply slide the shafts out from each solenoid, so the only part replaced is the coil. That made things a fair amount easier. Took a while to adjust the positioning to ensure that the shutter fully opens, but ultimately got there. Tests at various positions appear to work as expected, so OSMOS should be back in action for tonight.Since this solenoid is different from those for the FW, I am going to search some and see if I can order a 1:1 replacement for it. It would be nice to get it back together exactly as it was before this failure. Also, have some breathing room now as the 2.4m FW isn't scheduled for use at all this semester.
Telescope has been used since the repair and counts look nice and stable.

Ensure brakes are OFF
Sunday, August 11, 2019 1:12 PM
Problem(s) Encountered:
Forgot to turn the brakes off after bringing all the systems back up from lightning shutdown a couple days prior. Ended up blowing the drive motor fuse on the MDC. Eric was able to walk me through replacing that and was able to get going before twilight ended.

Solution:
Normally there is no need to use the telescope brakes. However, any time the MDC (Motor Driver Chassis) is cycled, the brakes automatically turn ON. "BRAKES ON" is indicated in a status window on the TCS GUI. Always be sure to disengage the brakes before attempting to move the telescope (from the same popup window used to cycle mirror covers). If the brakes have been cycled, you may notice some squealing when the telescope is moving at slew speeds, particularly in declination. This is normal. Advanced users can bang on the brake calipers to get them to release more fully from the disk.

Power Issue to the Andor PC
Wednesday, July 31, 2019 10:13 AM
Problem(s) Encountered:
The outlet powering the ANDOR PC showed problems (constant high-pitched whine from any PC connected to that or adjacent outlet and the camera PC would not boot). Swapping in a different PC strongly suggested a problem with the two wall outlets we tested in the computer room.

We ran an extension cable from one of the orange 'clean' outlets in the control room to the ANDOR PC, resulting in trouble-free operation of the Andor PC.

No science time lost; this took place before weather conditions allowed us to open.

Solution:

A weird one. Checked the outlets in question this morning and found them both running at 120V. For the UOS-ported outlets, could even verify proper frequency for the AC. Powered down the Andor PC, which was still running via an extension cord from the control room, and moved it back to it's original supply, via the UPS unit. Powered up no problem.I'll chalk this up to a transient issue and keep it in the back of my mind...

MIS Guide Probe Failure, y-stage origin limit
Monday, July 29, 2019 10:12 AM
Problem(s) Encountered:
MIS guider probe CCW limit switch is not stopping the probe motor when it reaches (x,y) = (0,0). The probe motor runs continuously and audibly. This problem only seems to occur when using 'Preset –> Origin' in xmis2 (a process that also seems to be activated on xmis2 initialization, e.g. during the restart process from lightning shutdown). On returning the probe to (0,0), the message 'Warning - not at Y CCW limit' appears in the xmis2 window. Spoke with Eric G, it sounds like the Y limit sensor might be faulty.

Solution:
As a workaround: If the guide probe motor is audibly running continuously, hit 'stop' in xmis2. To return the probe to the origin, command it to (x,y) = (0,0) in xmis2 rather than using 'Preset –>Origin.' Until the Y limit sensor can be fixed, we were advised not to shut down the MIS as part of the lightning shutdown procedure.
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Lost the y-stage '0' limit switch (see image below). This was a relatively new switch so I'm a little frustrated to have had it fail again. At least this time, unlike last, the drive belt is still in one piece. Switch has been replaced. I also replaced the bolts holding the switch in. The new bolts have broader heads. I'm hoping this will distribute forces more effectively and thusly increase the life of the switch.

Dynamic OSMOS Dispersion, FYI
Tuesday, July 2, 2019 9:43 AM
Problem(s) Encountered:
I've discovered that the dispersion of OSMOS seems to change, so that shifting a single calibration using the 5577 line can lead to velocity errors of over 100 km/s in lines far from the 5577 line. It will be interesting to see if this correlates with bench temperature, or what. [Thorstensen]

Solution:
N/A

RA Drive Preload Plate Bolt Sheered
Saturday, June 22, 2019 11:04 AM
Problem(s) Encountered:
At around 1:15 we slewed the telescope to near zenith to rotate the instrument. Once there, one of the screws of the RA drive preload snapped in half and flew out of its hole along with the washers. We've since recovered the half screw and all three washers. Decided to close up rather than risk further damage. Couldn't hear anything in the small movement to the telescope stow position...

Solution:

Jacked up the telescope and brought the roller back into place using the 3 remaining bolts. Then replaced all 4 bolts with new ones, iterating bolt-by-bolt, turning each by first 1/4 turn, then 1/8 turns until all 4 bolts were tight (and evenly torqued as well as I can do by hand). Brought the weight back down on the roller and checked the dial indicator. Slewed around in both directions a number of times then brought back to zenith and checked the indicator again. Roller has walked (settled) into position with a displacement of 0.017". That is on par with what I was expecting. Clearly, this is a bandaid on a much bigger issue. One that will be looked into this summer, possibly (hopefully) including on-site support from DFM.

Rotator Encoder Issue
Friday, June 21, 2019 11:00 AM
Problem(s) Encountered:
Had issues with the instrument rotator again. When I used the handpaddle to rotate and stopped and started in short bursts (as I was approaching the target rotator angle), the value on the TCS would stop updating. After two such occasions, I rotated back to zero and the angle was way off (~10 in one case and ~30 in the other). Noticed this type of behavior at the end of my last run as well, but thought maybe it was a one-off. Seems to be more than that at this point.

Solution:
Adjusted the spring plate tension but problem persisted. Lowered the north-most rotator plate enough to access the two mounting bolts for the rotator roller. Slightly loosened them and hammered the mounting plate inwards slightly. Tightened all bolts back up. The theory here is to increase contact between the rotator and the roller for the rotator's encoder. Testing showed no sign of the previously persistent error.

Tracking Slow - MOVE WEST!
Thursday, June 6, 2019 1:52 PM
Problem(s) Encountered:
No problems to report, although I did want to mention a few things I told Eric. There is starting to be a big pointing offset such that when I go to a new target, the guide star doesn't always appear in the field of view of the guider. You always need to move the telescope west and then the star will move into the field.
I've also noticed that the unguided tracking is not as good as it was. If you turn off guiding, you can watch a star drift. To move it back, again you always have to move the telescope west. In both cases, there is a consistent sense of direction (move the telescope west). [Chornock]
I reported this same problem to Eric during my four nights prior to Ryan's run. At first I thought the RA track rate was not correct but the problem did not persist the entire night. But when it did, even under closed loop guiding, I had to push the west guide button just to keep the star in the guide box. And since the tracking rate was effectively worse at times the pointing became progressive worse. It was good that we were just doing imaging because spectroscopy and slit alignments might have been very difficult. Eric tightened the RA friction drive the next day and we did not have any more big issues that I noticed. We did however have a RA drive coupling break the following night. As Eric told me there are issues with the RA drive right now. [Wagner]

Solution:
I haven't yet convinced myself that this is related to the issues we are having with the RA drive roller walking out (south), but it does appear to be a pretty big coincidence. I'm wondering if both issues are caused by a failing bearing (would likely be the lower of the two). I don't understand why a failure would be occurring as these bearings have been in for less than 2 years, but it might provide an

adequate explanation. That said, nothing we can do until the telescope is off-sky for an extended period. I plan to disassemble the entire drive system this summer and in the least, inspect the bearings. Likely we will change them out.I haven't mentioned the slowed tracking rate to DFM yet but plan to shortly. There is already talk of installing a 5/8" or 3/4" aircraft bolt & nut into the roller assembly as well as fabricating a new bearing retainer (prices pending). This may also require a new roller be fabricated in the event that the existing one cannot be drilled. This summer is shaping up to be a busy one…

TCS/Tracking Issues
Tuesday, June 4, 2019 1:14 PM
Problem(s) Encountered:
June 03: Tracking stopped working around 23:30 even though TCS reported that it was functioning. Had to restart the TCS.
June 04: TCS crashed again tonight with no obvious cause. Totally unresponsive but still tracking on sky. It seemed to have crashed during a slew. The dome and telescope were misaligned when it failed. Same scenario as the crash last night. Just had to restart the TCS and reinit the guider software.

Solution:
If possible, the telescope should be positioned as close to zenith as possible as the mirror covers will close.
Shut down TCS & guider software and reboot TCS PC. Reinitialize software as described in TCS [Manual](). This is particularly important as to getting the guider properly operating.

Airbag Support Failure
Tuesday, June 4, 2019 6:20 AM
Problem(s) Encountered:
At the start of the night the telescope image quality was awful. Checked the mirror bag support computer and found it had crashed.

Solution:
On the mirror support PC, type support, then hit the ENTER key.

No Light on Detector (4K) Weirdness
Sunday, June 2, 2019 1:52 PM
Problem(s) Encountered:
I had a weird thing happen early in the evening when I read out a basically blank exposure (/data/hiltner/n1.1075.fits). There were cosmic rays present, so this is different from what was reported a few weeks ago.
This was a long (1800s) spectroscopic exposure and there was no light from the sky on the CCD. Note that I had already used this setup, so it is not like something was mislabeled. I double-checked the prospero display and the FITS header but the instrument status and configuration seemed normal. I did a shorter test exposure afterwards and it was also blank.
That seemed to me to indicate some sort of obstruction in the light path, either in the filter wheels and mechanisms or possibly the shutter not opening correctly. I rotated the filter, slit, and disperser wheels but didn't hear anything out of the ordinary, so I put the instrument in imaging mode and then I was able to successfully take an image of the field.

My next attempt at a spectrum had a faint trace from the target plus some sky lines, but even the sky lines were much fainter than normal, possibly indicating a partial obstruction. I moved the mechanisms around a few more times and I went out into the dome and wiggled the cord for the shutter to make sure it had good contact.

After that, I didn't have any more problems for the rest of the night, but I'm not sure what resolved the issue.

Solution:
N/A

Rotator - Unexpected Impact on Cabling

Sunday, June 2, 2019 1:05 PM

Problem(s) Encountered:
Attempted to rotate spectrograph 77 degrees, unplugged instrument and after replugging and rebooting were unable to get it to connect with the telescope again.

Solution:
Main power cord for everything on the telescope was pulled out. Ground prong of connector ripped off. New connector installed.
Large-scale motions of the rotator should ALWAYS be performed from within the dome. Perhaps the cable would not have been damaged if it was discovered earlier.

Rotator - Unexpected Rotation

Thursday, May 30, 2019 12:58 PM

Problem(s) Encountered:
When we were testing spectrograph flexure at high hour angle (~5 hours) we heard a noise and noticed that the rotator angle had changed to ~84 deg. We brought the telescope back to Zenith and reset the rotator angle to zero.

Solution:
The rotator is a friction-drive system. Due to the extremely heavy nature of the instrument, the spring plate did not maintain enough friction to keep the rotator from turning. This has only happened once previously, with OSMOS—another heavy instrument. Spring plate was slightly tightened.

System Restarts - Know your Hardware

Sunday, May 12, 2019 5:28 AM

Problem(s) Encountered:
Had several problems rebooting the whole system after ligntning shutdown. Documentation for recovery from lightning page does not include starting airbags or starting prospero. Documentation for 2.4-m manual also does not mention starting prospero or all the other related isis and caliban etc. Also very confused about the Windows Vista for running the slit viewer. Doc says to restart the computer but the photo is not linked. A box in the computer room labeled slit viewer has no lights and does not seem to be plugged into power. But not sure if pressing the button is actually what makes it come back on magically.

We also wasted 2 hours in the middle of the night because the slit viewer went blank. It turned out that the subframe box had been accidentally ticked, but we thought the issue was that it was not talking to the camera. We ended up shutting down and rebooting the IC and hiltner a couple times and getting

messed up in the process. Problem compounded by lack of doc for slit viewer – I forgot at first that there was no manual and kept going back to the old one that is still online and thinking that it was out of date, but having nothing else going round and round in circles thinking it was out of date and still finding nothign else.

Finally, prospero has been acting up. It doesn't accept the default directory name for runinit, so everything just gets dumped into /data/hiltner/.

But even worse, it then started choking on readout. It would seem to recover, and it claimed to have found an existing filename with the same name (one it should not have been using as a name in the first place) and then claimed to rename the file. But in reality it seems the new data were not saved at all – at least we cannot find them. the status window shows strange parameters. We had to quit and restart prospero a few times. But now it seems that it never saved the new exposures we have been doing for the last 2 hours. At least we cannot find them. It has copied existing files to new file names and not saved the new data at all. It is incredibly disheartening and frustrating. See file headers of the 3 fits files in /data/hiltner and file names in 190512. Time stamps show duplicates. We moved the files into that directory by hand at the first prospero reboot.

Also, we cannot get the guider to work. It SEEMS correlated with the rotator. As the other night, all was fine until we rotated. Observing a globular cluster, there sould belots of stars in the guider cam, even without setting the new rotator angle in Jskycalc. But the guider cam looks like no photons are received. So we've been guiding by hand.

Solution:
Be sure to read through all lightning procedures before storms are imminent. That can save a lot of headache later on.

A) I have updated the 2.4m lightning shutdown(/startup) procedures to include information on bringing the airbag support system back online. Data-systems, such as Prospero (and Owl), were not historically included in these write-ups as they are not related to the telescope. However, I did go ahead and add a couple lines with links to the pertinent pages that detail starting Prospero (as well as ISIS, Caliban, and the TCS agent) and Owl. The relevant link for bringing up Prospero and data-handling systems can be found [here](#).
B) The slit-viewing camera for CCDS was recently replaced. This is the first observing program to utilize the FLI camera with MaximDL for CCDS slit acquisition. In fact, final camera mounting/alignment wasn't completed until last week. As such, I have not yet had time to update the CCDS documentation to revise slit-viewing procedures. The computer currently being used for slit acquisition with CCDS is the old guider computer for the 2.4m (for some reason, MaximDL as found on the Andor slit-viewing PC does not recognize FLI cameras in the setup procedures). This PC (currently labelled as guider PC) sits on top of the Andor slit-viewing PC (labelled currently as slitviewer). I will make labels that better describe these two different PCs. That said, the CCDS slit-viewing PC was still powered on and appeared to be initialized and ready for use when I was signed into the various machines around 2215 last night to bring up all systems. This morning, it appears it had been used through the night and was working normally when tested. Regardless, to reiterate, documentation and labelling will be updated to reflect the new FLI/Maxim-based slit-acquisition for CCDS soon.
C) In regards to the slit-viewer going "blank": I'm unsure why the IC and hiltner were reboot a couple times. They have nothing to do with the slit-viewer. Again, documentation will be updated for this extremely recent update to the CCDS instrument. That said, the new slit-acquisition camera and software are synonymous to the guider systems. A good place to get information on operating

MaximDL is the [Autoguiding & Acquisition](#) link on the MDM website, found under the [Useful General Documentation for Observing](#) link from the site's homepage.

D) In regards to Prospero:

1) Directory structure: Prospero has historically disallowed changing the working directory to anything other than */data/hiltner*. Observers can "trick" Prospero into writing files to an alternate directory by adding a path to the filename. My preference is to simply create a subdirectory within */data/hiltner* through a terminal and move the night's files over at the conclusion of observations.

2) I'm not sure what "choking on readout" necessarily means. I'll take this time however to reiterate that the *Prospero Status* & *Prospero Command* windows should be set as "Always on visible workspace" (click on icon, top-left of each terminal and chose appropriate option). This will keep the *Prospero Status* window from going blank when switching between various workspaces. Also, I seem to recall occasionally that if this option wasn't checked for the *Prospero Command* window, it would sometimes suspend integrations for some reason.

3) I'm also not sure what was going on with the "duplicate files" issue. Indeed this morning, I attempted to take a couple test frames and ran into similar issues. Below is step-by-step what I tried:

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In prospero:

file etest (it changed the 'Next:' file accordingly from ccds3.0015 to etest.0001)

go (ran normally but upon writing file, gave the warning about filename already existing. But the listed filename was still ccds3*, not etest*. So it reverted the filename for some reason.)

I then tried the disk recovery procedure, as listed [here](#). I clearly needed to revise this (as of this writing, revisions have been made) to tell users to quit isis, caliban, prospero, xmis2, etc. *before* rebooting hiltner. Also, when I attempted to reboot hiltner, I found I needed superuser permissions. Even *sudo /sbin/reboot* complained. Once I reboot, I restarted ISIS and CALIBAN and tried *RECOVER 20 DISK1* & *RECOVER 20 DISK2*. It attempted to recover the first file, but warned it needed to be renamed. For the remaining files, it spit out the following error:

ERROR: No SIMPLE card in FITS file #n, skipping... where n went from 2 through 20.

Perhaps there was indeed only the one file in the queue? I don't know.

Anyways, at this point, I decided to take everything down and back up (mdm24ws1, IC). After this, I got an initial complaint when starting ISIS, but quitting it and starting it anew resolved that (I've seen that happen before as well). I moved all .fits files away from /data/hiltner (to /data/hiltner/cluster) and commenced with bringing everything back online. All came up as expected. I ran a *startup* and *runinit* in prospero, setting the file to *test*. I then took a couple sample images. All is now working correctly again.

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The above is snipped and lightly revised from an email to Rick Pogge asking if he had any input on these file-naming issues. No input at time of this writing.

4) I cannot locate any lost files taken through Prospero. I am under the assumption that they are indeed lost. I appreciate that this is disheartening and sympathize. That said, particularly when Prospero is spitting out errors about files already existing, it is good practice to verify a file is written before moving on to the next integration. If issues appear, measures should be taken to ensure file integrity prior to running any additional exposures (e.g. moving file(s) to a separate subdirectory).

E) In regards to guiding: Guiding on a whole has appeared to be an issue during this run. I have recommended reaching out to John T. and/or Justin R. (both on distribution again here) for any useful tips and tricks to guide systems. I've also cc'ed the 1.3m observer in case she can benefit from any tips or tricks. I do not have any experience running the guide systems unfortunately. That said, there is a seemingly very comprehensive document, [Autoguiding & Acquisition](#), found on the [General Observing Documentation](#) page that should be quite instructive, particularly [section 2.3](#) and on.

IN SUMMARY: I'm not sure how these problems coalesced through the night, particularly with regards to prospero. I was signed in and assisting the observer as late as 2215 MST. I logged into *mdm24ws1, TCS PC* and the slit-viewing PC. I initialized the TCS and guider programs and verified functionality as best as possible with the telescope at zenith. On *mdm24ws1* I brought up all systems, including data-handling systems, and verified that files were writing as expected. Whatever happened, happened after this.

As of this afternoon, I have brought all systems up fresh. Daylight tests indicate that CCDS is working properly; Prospero is properly writing (and recording) files; the slit-viewer is properly resolving the flat lamp-illuminated slit; MaximDL Pro guider software is functioning as expected.

CCDS Slit-Viewer Image Artifact
Friday, May 10, 2019 11:24 AM

Problem(s) Encountered:
There's a strange vertical shadow on the slit viewer that wasn't there in the afternoon or early evening. It is easily confused with the slit, which has a slight tilt and is thinner and often invisible. There's also a dark black hole shadown taking up much of the center of the slit viewer field. Sometimes when one can actually see things without these features, one finally sees a black spot near the center of the field that seems to be bad pixels or something. These features all obliterate much of the field obstructing the use of the finder.

Solution:
The vertical shadow is, I believe, an artifact of running the camera with the shutter 'permanently open'. It does not seem to appear if the shutter cycles for each exposure. This can be adjusted by clicking the *options* arrow (*expose* or *guide* tab)>*camera settings* and clicking 'open' or 'close' shutter. I currently have it set to cycle for each exposure (close shutter).

I'm not sure what the "black hole shadow" is for sure, but it looks strikingly like a burned-in negative of a previous image of an extended object. It was there when I checked the camera this morning. Cycling MaximDL appears to have made it go away. There might be a simpler way to flush the chip, but I'm not that familiar with MaximDL. If it happens again, I'd suggest cycling MaximDL, reconnect, turn on the cooler and try exposing again.

Prospero Readout Issue, Again
Saturday, May 4, 2019 11:11 AM

Problem(s) Encountered:
For the second night in a row a 30 minute exposure has been blank near the end of the night. The exposure does not look like it saw any light for the full 30 minutes, not even cosmic rays. A restart of prospero did not immediately seem to fix the problem however moving the filter seemed to help a bit. Both nights this failure has occurred with the same filter setup when the telescope was at an hour angle of approximately -2 both times.

Solution:
Reboot of the IC was performed. "I suggest we monitor this for now without changing anything, unless the problem begins to occur more frequently." [Mason] Verbose version below:
Might be worth a reboot, or even a power cycle of OSMOS/IC. You would want to quit out of Prospero. Then on workspace 4, quit OSMOS, tcs, caliban & isis. Then in the computer room, type *quit* on the Raritan. Then do a ctrl+alt+del to reboot. At this point, you can go out and cycle power on the head electronics (red box on south side of OSMOS). Back in the computer room, when

prompted, o for OSMOS and 4 for B4K. Then back on mdm24ws1 workspace 4, in a terminal window type the following commands:

mdmTools start isis
mdmTools start caliban
mdmTools start tcs
In the tcs terminal, type tcinit then tcstatus. You should see header info pop up (as well as header info refresh in the tcsbridge terminal)
mdmTools start osmos

Then start Prospero back up again. You would also need to restart JSkyCalc after this, as well as reinitialize the connection to the guider (step 8 of restarting the TCS).

Hopefully this would help.
I can sign into the workstation and TCS PC from home, but not the IC.

Here's more IC info if desired:

http://mdm.kpno.noao.edu/startup_osu_inst.html

Prospero Readout Issue
Friday, May 3, 2019 4:08 AM
Problem(s) Encountered:
Minor problem with Prospero near the end of the night when frames were only reading out as biases despite having long exposures times.

Solution:
Restarted prospero.

HA Friction Drive Adjustment
Wednesday, April 10, 2019 10:48 AM
Problem(s) Encountered:
The tracking stopped for a few minutes at the beginning of the night.

Solution:
Was able to tighten the cam on the RA motor assembly and bring it back up with no further issues.

Telescope Motion and Guiding Issues
Thursday, April 4, 2019 3:09 PM
Problem(s) Encountered:
Telescope wouldn't stop slewing, instead oscillating in RA around the desired position until we pressed the stop button, which also stopped tracking. Eric had us restart the TCS control system and adjust a bolt on the back of the telescope which seemed to solve the issue. Occasionally had double stars in the e-w direction, possibly still indicating an issue with the RA drive/bearing (also had lots of extended PSFs from wind). Couldn't guide for more than 5-10 minutes before losing the guide star. After reacquiring guide, the telescope often had moved a few arcseconds, ruining mask alignment.

Specific problem with the oalign.py script - the boxes drawn from the .oms file are flipped in in the y-axis compared to those displayed in the image. The rotator angle offset in the solution also appears to have the wrong sign (although hard to tell as we often lost guiding between acquisition images).

Solution:
I think as the telescope drive components worked themselves back into comfortable placement, the system went through some hiccups. This seems justifiable as the telescope has been performing well since then.
The guiding issues may stem from improper calibration settings. A calibration routine was performed, resulting in x- & y-speed numbers that were a factor of 10 off from the documented values (x=-7.8, y=-7.3). Wind was also obviously a factor.
I cannot speak to the issue with oalign.py, but perhaps the author of the code could?

Revision re: softwarte alignment issue:
As for oalign.py, my own solution is to use my own code, osctrtask.py, instead. [Thorstensen]
I have occasionally seen the sign flip thing in oalign.py, but have not been able to track it down. The solution is easy, namely to put a factor of -1 in the code that reports the offset. I think I have done this fix, and removed it, and done it again, about a half dozen times over the last ten years. As that implies, something else must be going on. Options include switching the order of marking the boxes and stars, nefarious observers fixing the code themselves, changes in now the CCD is installed onto OSMOS over the years, I am losing it, and possibly gremlins. To test if the code has changed, you can re-download it from the OSMOS website.
http://www.astronomy.ohio-state.edu/MDM/OSMOS/#multiacq
Tests of the other hypotheses are harder to design. [Martini]

I have a version of oalign.py in /data/hiltner/wagner that has the -1 flip removed in the code. Line 789 but I left Paul's comment in so I could find it again. But I can't be sure or don't remember if it is just in the portion of the code that works with only the -I option on the command line. That is the option I use.   Line 789 is the only place in the code where gdx is calculated and that is where I fixed it.   I needed to remove the -1 to get oalign.py to work consistently for me some years ago. It is what I use now and it works. I can tell right away after my first acquisition if I have the wrong code. It's possible that others copied my code to other directories and used it. I just checked and my version seems to be in /data/hiltner and on the home account of mdm24ws1. I wonder if there might be a problem in oms? [Wagner]

RA Motion Failure
Saturday, March 30, 2019 3:14 PM
Problem(s) Encountered:
At closing time, the telescope would not move to the zenith using the TCS GUI. We moved the telescope to the zenith using the hand paddle. The rest of the shutdown procedure went as normal. No time was lost.

Solution:
With all the proverbial dust settled:
Found that the 4 1/4-20 bolts that hold the RA drive preload plate to the roller had failed. Three of the 4 bolts had sheered. The 4th bolt was pulled through the preload plate. This culminated in the roller that is physically connected to the secondary drive wheel walking out (south) roughly 1.5cm. The secondary drive wheel came into contact with the assembly holding the RA drive motor and pulleys, leading to greatly increased friction and reduced mobility. This led to torque-limited draw on

the motor and possible damage to the motor encoder (although there's also a chance it was ok and I damaged it when we were focused on the issue being with the encoder). Regardless, the motor encoder has been replaced. Thankfully the sheered bolts were able to be removed from the end of the roller. The telescope fork was lifted (two hydraulic jacks pumped to ~9,000 lbs per), releasing contact between the primary drive wheel and the roller. The roller was then properly repositioned and tested to verify that the bearings are in good shape. With the telescope lowered and contact reestablished between the primary drive wheel and the roller, the preload plate was reconnected using stronger bolts in a temporary configuration—upside down with 3 washers per bolt. This was required since one of the bolt holes was pushed through. Telescope has been successfully back in service since then.I believe the problem occurred due to those 4 bolts holding the preload plate failing. The bolts that failed were grade 2 instead of the demanded grade 8 in strength. It is my belief that when the bearings were replaced coincident to the TCS upgrade in October2017, the wrong bolts were used to attach the preload plate and that they have been slowly failing over the last 18 months. With the proper bolts installed, it is my belief that the system is now fixed. Still, I will check things periodically to watch for any more walking, which may indicate skew misalignment. The last thing left to do, which will be done today, is to drill a new bolt pattern into the preload plate so it can be mounted in the correct orientation.

Guide Probe Motion Failure
Wednesday, March 27, 2019 3:01 PM
Problem(s) Encountered:
Guide probe seems to be stuck in the home position. No move commands work, either preset positions or moves to guide star positions.

Solution:
Power cycled MIS electronics and reinitialized xmis2. Problem solved.

Fill Tube Failure
Sunday, March 3, 2019 2:34 PM
Problem(s) Encountered:
At the end of the night, after filling the dewar,I moved the hose too soon (was still frozen), and it broke into pieces.

Solution:
A good reminder—always let the hose thaw before attempting to move it!

Airbag Failure--Trefoil
Sunday, February 24, 2019 5:43 AM
Problem(s) Encountered:
During initial focus adjustments, I noticed that the objects in the images were very irregular in shape. After some exploration and talking with Eric we determined that the airbag system wasn't inflating to the usual level, and that the cause of this is likely the air compressor outside. It was making loud noises like it was compressing, but the gauges all read 0 psi. The resulting images were too trefoiled to be useful, so no observations were made tonight.

Solution:
Compressor for the mirror support (airbag) system died. Appears to be the head. Plumbed airbag pneumatics into a split connection on the compressor used for the mirror covers and brakes

temporarily. Purchased a new compressor and will replace the dead one when weather permits.In the meantime, everything should be up and running again.

Rotator GUI-controller Failure
Thursday, February 7, 2019 11:21 AM
Problem(s) Encountered:
Tried to use the Rotator GUI, but whenever I tried to send a rotation, it responded with an error message. Found out I couldn't use the hand paddle in the dome either. So I reset the box on the telescope and I regained hand paddle control. I thought the GUI might work after the reset too, but I got the same error message that read: Error: couldn't open socket: host is unreachable. Didn't lose time over this, but there were small rotations I had to make in the dome I would've rather made with the GUI.

Solution:
Power-cycled the port server. Resolved.

Guider Focus Failure, fixed for real this time(?)
Tuesday, January 29, 2019 3:44 PM
Problem(s) Encountered:
The guider was very out of focus and the focus setting would not change. We approximately focused the telescope on the slit viewer, but the guider was extremely out of focus. Pressing the In/Our buttons on the Guider Focus GUI had no apparent effect, even when holding the buttons down for >10 seconds. I changed the track box size to maximum, but the donut was too large to guide on. Took two spectra without guiding, pretty ratty. The weather was poor so this issue had minimal impact on data.

Solution:
Same issue as the previous time this occurred—a failed USB (3.0) port on the TCS PC. I've switched to a different USB port and all is well again. I fear this may be a sign that we have a flaky USB board in the PC. Recall that we previously had issues with our Emerson remote hub that supplied power and signal to the keyboard, mouse and monitors in the control room. Issues with that device seemed to clear coincident to swapping USB ports. And now this... .

Some Startup Hiccups...
Friday, January 25, 2019 11:11 AM
Problem(s) Encountered
We had a bit of a slow start. It is worth noting that after the warming trend of the past few days, the telescope started off about 90 units from the best focus.
Also, I had to power cycle or restart several things at the beginning of the night. The rotator would not move using the handpaddle in the dome until I cycled the power on the control box. The guider stage got stuck several times and did not respond to reinitializing the xmis software and I had to power cycle the MIS box. At the beginning of the night, JSkyCalc couldn't pass coords to the TCS next object. Restarting the TCS bridge and xtcs on the workstation didn't work. I had to exit and restart the DFM TCS software itself. I didn't lose much dark time to all this because I mostly worked it out in twilight.

Solutions:
The focus routine is quite new. Not sure why the value changes from program to program however...

Guider Focus Failure

Problem(s) Encountered:

When I started I found I couldn't focus the guider – the lights on the virtual control panel lit, but the stars did not change. Consulted Eric by phone and determined that I couldn't fix it by myself. It didn't matter to much since MAXIM DL could still guide on the out-of-focus images.

Solutions:

Found the USB port on the TCS machine had stopped (PCI bus 1, device 0, function 0) due to reported problems (code 43).Reboot the PC and all is well again.

Focus Motion Failure

Problem(s) Encountered:

...I can't find a way to focus the telescope. The focus tab in DFM/Misc does not seem to work. The focus paddle also does not work.

Solutions:

We've seen focus functions fail before… . But this time, it was hardware! Broken belt on the drive assembly. Replaced the belt. Pulled the motor as well to get specs so we can look into procuring a spare, just in case.

Micro-stepping was also implemented on the focus drive. This should produce less stress on the belt and motor and result in overall less system vibration. This will be transparent to the user.

System has been tested and all appears functional.

Friday, January 4, 2019

Mirror Covers Fail to Open

Problem(s) Encountered:

...the mirror cover cannot be open. We can hear some sound, but the cover
simply does not stand up. We tried a few times, and it still cannot open, so have to stop observing. The instrument is not rotated back as the mirror cover cannot be open. We tried to open the mirror cover just about one hour before opening the dome, it works! It also worked when we rotating the instrument.

Solutions:

Tried the mirror covers when I arrived this morning. They tried but failed. Immediately noticed that they were closed in the wrong orientation, with the east and west petals both on top of the north and south petals (really wrong!). I could not simultaneously lift up on both E/W petals to allow the N/S to open as I am here alone so far this week (Tony out sick), so I depressurized the system. With air pressure removed from the equation, I tied open the west and east petals, then did the same with the north and south. I then freed up and lowered the E/W petals followed by the N/S ones. I then brought the pneumatic systems back up and tested the covers. Cycling them a few times worked fine. I also de-rotated the instrument (I hope the covers really were open all the way when it was rotated!).

This may have all stemmed from some ice in the lines as it's been particularly cold (<0C) and wet (~5" snow) up here and the system had sat idle for many days. I plan to drain the tanks shortly and will cycle the covers again later today.

Thursday, January 3, 2019

Temperature-dependent Focus Compensation

Problem(s) Encountered:
Started the night getting good focus and using the
temperature-dependent focus shift feature. I noticed midway through the night that the focus wasn't great. So I disabled the feature and used the focus4k prospero procedure to find best focus again. While running focus4k, I noticed that the telescope wasn't going to the values specified by prospero. It was off by about the total amount that it had shifted (-35) using the focus shift feature before I disabled it. This was also true when I plugged in a focus value into the TCS. I used the hand paddle to get to my new best focus and enabled the focus shift feature again. When I did this, it moved the focus by +35 and started doing it's thing. I ended up disabling
the feature again, manually moving it back to the new best focus, and enabling it again. It behaved after that.

Solutions:
Temperature-dependent focus compensation has been thoroughly reworked. System has been updated and appears to be functioning properly.

Tuesday, December 4, 2018

Peripherals Interface Failure x2

Problem(s) Encountered:
Around 1 AM the mouse disappeared on the TCS computer. I
worked around this by VNC-ing in from mdm4ws1 (no need to use
ws2, there's enough real estate on ws1). The mouse was there,
but it was a little bitty square which called for a bit of
squinting. But I could work! I'd had some earlier problems
with the monitor etc connectivity, and Eric had suggested
this workaround; thanks to that, it only took a minute to
get the mouse back.

I tried cycling power on the Emerson box and also plugging and
unplugging the mouse from the Emerson box, but these measures
did about as much as Rainer Wolfcastle's goggles. 'My eyes --
ze goggles, zey do nah-thing'

Solutions:
A number of steps have been taken to mitigate this issue, including driver and BIOS updates. As far as I know, as of end-of-year, this problem has not been occurring. If it does creep up again, a workaround is to VNC to the TCS PC from mdm24ws1 (or any other computer). IP address is on the TCS machine in the computer room and password is same as the wifi.

Tuesday, November 20, 2018

Peripherals Interface Failure

Problem(s) Encountered:

Had an issue with the USB extender for the TCS computer. Neither the mouse nor the keyboard works through the extender, but they do work through the USB ports on the machine in the computer room.

Solutions:
Tried power-cycling the hub located behind the TCS system monitors but that didn't work. Reboot the PC, which did work. Another thing to try might be to simply pull and reseat the USB cables, but I'm not really sure.

Tuesday, October 2, 2018

Telescope Focus Failure Revisited 2

Problem(s) Encountered:
The focus would not move while trying to focus on a bright star in evening twilight. Tried restarting the TCS control program and (eventually) cycling the motor drivers on and off, but nothing worked. Emailed Damon from DFM and he got on remotely to try to diagnose the problem; as far as he could tell, the motor was spinning but the secondary wasn't moving, suggesting a mechanical issue. Did not affect observations much since the
focus was stuck not far from the correct value. Direct images would have been compromised worse.

Solutions:
This is *exactly* like the first failure we had with focus not responding, but the motor apparently saying it was turning (implication of a broken belt). Not sure what to say about this but it really still seems like some software oddity. I just can't explain away why it appears that the counts on the motor are changing. Regardless, after sitting for a spell, focus "just works" again.

Saturday, September 29, 2018

Temperature-Compensating Focus Routine

Problem(s) Encountered:
...I did have some trouble with the autofocus. I disabled it in the middle of the night and touched up the focus, and when I enabled the autofocus again, it drove the focus out by a couple hundred microns. By that time the truss temperature was pretty stable so I turned it off.

Solutions:
There are some known bugs currently in the temperature-compensating focus routine. These should be addressed as time permits but until further notice, this feature is a use-at-own-risk.

Thursday, September 27, 2018

Guider Anomaly

Problem(s) Encountered:
The MaximDL guider was set to a 128 box. At one point, it totally lost it and started guiding as fast as it could in one direction, consistently. This was apparently caused by a hot pixel near the edge of the guider box, which the telescope was trying to follow.

Solutions:

Switched to a 64 pixel box, and had no further trouble.

I've seen the guider get pulled off transiently by a cosmic ray hit in the track box. For this reason, if forced to use a faint guide star, it is better to increase the guide time so there is less of a chance that a cosmic ray wins. [Halpern]

Monday, September 24, 2018

Failure to Complete Slew

Problem(s) Encountered:
The telescope rather frequently fails to complete a slew -- it just stops somewhere midway and rotates the dome to wherever it's pointing. The cure is simply to re-send the coordinates and send it again. I didn't notice any obvious error message except that the telescope wasn't pointed where it was supposed to be.

Solutions:
Cause or coincidence? "I figured out why the telescope was stalling in mid-slew, or at least a correlation. I often start slews before turning off the guider, because it used to not make any difference. If you do that with the new TCS, the slew immediately hangs. [Thorstensen]

Monday, September 24, 2018

TCS-JSkyCalc Connection

Problem(s) Encountered:
The TCS once lost connection with JSkyCalc.

Solutions:
After restart TCS, the issue solved.

Monday, September 10, 2018

IC Failures(?)

Problem(s) Encountered:
...This seemed to hiccup the IC. I ended up power cycling
it three times. Each time I was unable to take an image or
even run a movie. Whenever I did this, Prospero would think
for a while and eventually abort the exposure. Then it would
eventually admit in the Prospero Status window that the IC was
down. The following error message appeared on the mono IC
monitor:

ERROR: TIMEOUT on DMA Channel 6: WordCount= 288
Timeout on WaitTC6: WordCount= 288

Solutions:
That's a low-level hardware error. Could be the HE needed to be power cycled as well.

What was the outside temperature like last night? The HE can be temperature sensitive on very warm nights.
Eric: Next time you're on the mountain, please check that the fans on the HE are working correctly.

Fans are working correctly.

Logged in from home and saw in prospero that the IC was down. Did a 'status' (no errors) and a 'startup'. Everything connected correctly. To take a quick test frame, 'set ccdbin bin=3' and took an image. Exposure started and proceeded as expected (ic_test.001.fits). 'ccdbin bin=1' and took another exposure (1s, no lamps) and all looks well. Last exposure (ic_test.005.fits) is 0.5s flat lamp, SDSS-r, unbinned. It looks fine as well.
Sorry about the issues last night, but not much I can do when everything is working well enough for me from home.

Friday, September 7, 2018

Comp Lamps and Prospero Scripts(?)

Problem(s) Encountered:
The lamps do not turn on if commanded from a Prospero script. This happened last April but it was confined to the flat lamp. This time I had issues with both the flat lamp and the spectral line lamps turning on from within a script that worked previously. Took a lot of dark frames yesterday morning. I can provide the calibration scripts.

Solutions:
Not sure what is going on with this. Checked with the queue observer and verified he has not seen similar issues. Will keep an eye on this.

Thursday, September 6, 2018

Bumping the Dome Workaround (?)

Problem(s) Encountered:
The dome -- which was at 270 at the end of the night -- refused to go home until nudged to the right by the paddle buttons.

Solutions:
Justin may have found an interesting workaround. It the dome is homed prior to the telescope and does not move, subsequently stowing the telescope to zenith has been known to kick the dome into gear and get it moving to home. I'm not sure if this is consistently repeatable, but it is worth trying. This may save the user from having to nudge the dome with the hand paddle.

Monday, June 4, 2018

Echelle Readout Failure (Revisited from 05/09)

Problem(s) Encountered:
An intermittent fault that occurred May 9 recurred - when Echelle was read the image looked like a bias without any cosmic rays, as if the data read from the chip was not making it to the recorded image. This

started immediately after Eric left for the day, and I spent the interval before dinner trying one thing after another to fix it (power cycling the Leach board, pulling out the shutter assembly -- don't try this at home, kids - and verifying that the shutter was opening, setting Owl to read a synthetic image -- which it did, and promptly crashed, and rebooting mdmarc1 because Owl didn't come up again properly. In the end I left the Leach board power supply off during dinner; and on (weirdly) the third frame I tried after dinner, it worked!

The problem recurred once during the night (here we go again, I thought) but this time it started working again as soon as I started taking test images. I lost one exposure and a few minutes fussing.

As a precaution, I turned off the Leach control electronics to let them rest during the (hot) day. I don't know if this will help, but it's unlikely to hurt.

Solutions:
I'm not sure what is going on with Echelle, or more likely, the control electronics associated with Echelle. However, the transient nature of the problem and the excessive heat currently blanketing all of Southern AZ certainly seem to indicate a thermal causation. Powering off the controller during the day is likely a wise idea. I will turn things back on early enough to test things before leaving the mountain for the day.

Since powering down the electronics during the day, the problem has not recurred. I'll run some thermal tests at a point when the instrument is not in use.

Monday, June 4, 2018

Guiding Issues

Problem(s) Encountered:
Tracking in both axes was bad. Intermittent chiming from or behind the TCS
computer in the control room, science images visibly drifting on a timescale of a few minutes. The Camera Control window in MaximDL intermittently displayed the error message "Failure to activate guide relay" (not in time with the chimes), at random intervals roughly every few seconds on average.

Solutions:
Stop tracking. In MaximDL, Camera Control --> Guide tab. Click the Settings button in the middle to open the Guider Settings window. Guider Settings --> Settings tab. In the Autoguider Output box (middle-right), next to the COM Port click the Setup button. This displays info about the guider scope. DO NOT CHANGE ANYTHING. Just click OK. Click OK to close the Guider Settings window. Now start tracking again: Do the Guide --> Expose to check guider coords, and then start tracking.

Friday, June 1, 2018

TCS Connectivity and Tracking Issues

Problem(s) Encountered:
TCS GUI Telescope Position readout shows the telescope tracking (HA
increasing, RA constant), even after switching Tracking Rate for HA to 0. Flipping the Track switch in the computer room to Down had no effect. Other symptom: TCS does not accept new coordinates from JSkyCalc24m.

Solutions:

It's possible that this condition is triggered when a slew is commanded to a new target while the HA track rate is set to zero. The observers accidentally reproduced the condition this way during morning twilight.

Restart the TCS: Write down the dome Azimuth. On the control room rack, set the Track switch to Down. Quit the TCS GUI: File -> Exit. Double click the yellow TCS icon to restart the software. Telescope --> Initialization --> Other Positions. Enter the dome azimuth, click Apply. (At this stage the Other Positions window contains a warning to make sure the dome is switched off: that can be checked by going to Telescope --> Misc --> Switches; the dome should already be set to OFF.) Telescope --> Misc --> Switches. Switch the dome ON and make the dome target Telescope. Hit Apply. Flip the Track switch in the computer room to up. Check that the HA is not changing (since the HA rate should still be zero). Telescope --> Rates --> Track Rates. Set Sidereal Rate, hit Apply. By this point the telescope should be tracking again.

Friday, June 1, 2018

MIS Issue when Changing Filter Position

Problem(s) Encountered:
On attempting to switch filters, the destination filter icon changed to red and a message to the effect that the MIS filter wheel had failed and the filter wheel should be checked and restarted. We tried to use the MIS GUI to reset the filter wheel. No luck.

Solutions:
In the MIS GUI: First move the guide probe back to (0,0). Do this by entering 0 next to the x position and hitting Enter. The probe should move. Do the same for the probe y position. Or simply choose 'origin' from the preset list. Now shut down the MIS GUI. 2.4m Setup --> Quit. Now go to the MIS control box in the computer room. (The MIS controller box is the silver box about 4 feet from the ground in the middle rack facing the window). Flip the switch on the MIS Controller box to OFF. Count to 10. Flip the MIS control box switch to ON. On the mdm24m workstation 1: Applications --> Telescope Control --> xmis2. There should be a big red Initialize button. Click it once and wait about ten seconds. Try advancing the filter. All should be well.

Friday, June 1, 2018

One More Comment on the Dome Issues

Problem(s) Encountered:
One minor thing to report: the dome did start to run away from me one time. I turned the Dome virtual switch to off to stop it and manually moved it back with the paddle before flipping the switch back to on. The azimuth was around 250. Fortunately, it was during the acquisition process, so no time was lost.

Solutions:
The action mentioned above may serve to save observers from losing time due to the dome running away.
Monday, May 14, 2018

Oh the Dome...

Problem(s) Encountered:

Two times during the early part of the night the dome ran away and rotated 180 degrees in the wrong direction. The telescope was at an azimuth between 350-355 each of the times the dome ran away.

It has also been noted that the dome occasionally has to be manually 'bumped' via the hand paddle to get it to start moving when stowing it to HOME position.

Solutions:
Issues with dome control appear to be somewhere deeply imbedded in the software. Work is being performed to improve reliability and stability.

Saturday, May 12, 2018

TCS Command Issues

Problem(s) Encountered:
Problems with the TCS. It would sometimes do what I wanted, but other times not. For example, turning on/off tracking either did not work unless the 'apply' button was hit several times.

Sometimes it seemed that it would do things without updating the display.
I could change the focus by putting in a new value in the box, but the display of the focus value would not update.

Sometimes the dome would go home or track the telescope, other times not. Sometimes a coordinate update (next object) from jskycalc would
appear in the TCS display, other times not.

Restarting the TCS software seemed to help for a short while, but then the problems arose again. I did not go so far as to do a hardware restart on the panel in the control room.

Solutions:
This appears to have been due to excessive memory demand (memory leaks). Coding has been optimized somewhat in hopes to rectify.

Wednesday, May 2, 2018

Telescope Focus Failure Revisited

Problem(s) Encountered:
I was unable to adjust the focus entirely. I attempted to perform the focus4k routine in Prospero at the beginning of the night, but the focus hung up when it was going through the early stages of the routine. I tried using the hand paddle, TCS, and Prospero to pull it out of its hangup, but none of that worked. I powered cycled the driver chassis and closed and reopened all of the data acquisition windows (ISIS, Caliban, etc). Still no good. Basically lost the entire night as a result. I sent an email to DFM who will hopefully get back to us tomorrow during the day.

Solutions:
Was able to get the telescope to change focus position initially. Decided to test out the entire system, running from limit-to-limit. Upon hitting the "IN" (upper) limit, the focus halted and I could no longer move the motor in either direction. Pulled the drive belt and moved off the limit by hand but still could not get the motor to turn at all. Contacted DFM and found that a bug in the code caused the galil thread to crash and not be revived under certain circumstances, including when hitting a limit. This was corrected and the system brought back online. Focus now appears to function fine again.

I have an uneasy feeling about the focus drive motor for some reason and may procure a spare just to have on-site to quickly swap if need ever arises.
Incidentally, instrument focus positions lay well within either limit switch thankfully.

Friday, April 13, 2018

Telescope Focus Shift

Problem(s) Encountered:
The telescope focus slipped over time. For almost all of the night we were pointed at the same target, and the focus value changed from our best initial value of 6350 to either lower or higher values, with a change of about 20 units per half hour. We used the focus button on the hand paddle to correct it every so often. When we slewed back to zenith at the end of the night, the focus changed by 40 units.

Solutions:
The focus slip is normal behavior -- it always creeps a little when the telescope is moved. The units are microns, so these are small changes.

Even if the focus number doesn't move -- in which case the mirror assembly isn't moving with respect to its mount -- the length of the truss varies quite a bit with temperature, so you need to refocus with any significant temperature change. Typically this means chasing the focus for the first few hours of the night as the truss cools. [Thorstensen]

Saturday, April 7, 2018

Dec Jump

Problem(s) Encountered:
Telescope appears to have jumped in DEC during a long exposure. Guiding was not lost during the exposure but all the stars were doubled. Happened when the telescope was between HA=-1:40 and HA=-1:20 at about 11:30pm local time. Repeated the observation and the problem did not occur again for the rest of night.

Solutions:
N/A

Tuesday, March 20, 2018

More Instrument Rotator Clarification

Problem(s) Encountered:
I sent the rotator to PA=0 according to the display, but I could see that the instrument was pretty far from the normal position. I aligned the peg with the fiducial mark and the display read 23 degrees. I reset the rotator angle in the TCS software to be zero at this position, but I don't know how precise it is. I wasn't able to successfully test it on-sky afterwards due to weather, but I did rotate it to +90 and back down to zero and the peg stayed aligned with the fiducial.

Solutions:
Here's a time-saving tip for all you Trouble Report fans out there. If you've moving to a new target and need to rotate,

1) Slew to a position near the zenith, but near to the azimuth of your target.

2) Rotate the instrument -- note that the dome is moving
into position while you're doing this!

3) Set on your target.

In step (1), note that using the middle mouse button in
JSkyCalc sets the program coords to the position of the cursor,
so you can eyeball a position at nearly the same azimuth as
your target; then just "Coords->TCS next object" and initiate
the slew. [Thorstensen]

Wednesday, March 14, 2018

ModSpec Shutter Connection

Problem(s) Encountered:
The first spectrum of the night (of a bright star) came out looking like a bias, indicating that the shutter in
modspec was not opening. I removed the shutter housing from the spectrograph and found that it would
open when I operated it using the switch on the shutter power supply. Eventually
found that the connection between the Leach controller and the
shutter had failed because the connector at the power supply
box had somehow fallen out. Eric told me the correct way to
plug it back in (there were several possibilities) and after
reassembling everything I was back on the air. I do hope that
I didn't dislodge the O-ring between the shutter assembly and
the spectrograph body in re-installing!

Solutions:
Found that the connection between the Leach controller and the
shutter had failed because the connector at the power supply
box had somehow fallen out. Eric told me the correct way to
plug it back in (there were several possibilities) and after
reassembling everything I was back on the air. [Thorstensen]

The connection is such that the flat-edged terminal on the double-banana connector plugs into the black
port on the shutter controller (closest to MIS) and the other connection plugs into the green port.

Thursday, March 1, 2018

Telescope Focus Failure

Problem(s) Encountered:
When I set on a bright star in twilight I found I could not focus the telescope with either the hand paddle or
the gui - the focus number would not move and the image would not change.

Damon Burke of DFM had been working on the program during the afternoon, so I figured it was
something he did. I called DFM in hopes he'd be there, and got Frank Melsheimer himself on the phone,
who passed the message on to Damon; Damon then logged on remotely and tried to diagnose the

problem. He concluded that the focus motor was spinning, but the encoder was not seeing any change, so we inferred that something in the mechanism has failed (perhaps a drive belt). I observed the rest of the night with the telescope out of focus, losing most of the light on the slit jaws.

Solutions:
At the start of diagnosing the problem, I verified that focus was not moving. I then set up the telescope to allow access to the secondary mirror (M2) system. In order to get a hand paddle up to the M2, I used the 'focus only' hand paddle that was acquired by UM. Tinkering, the focus started working again. While running through focus, I tested the in/out limit switches and found the 'in' switch to be intermittent at best. Also, during this, focus motion stopped yet again. I switched out the bad limit switch but still no movement. Verified power to the motor and that the focus travel was smooth by hand. All seemed ok. At this point, Damon contacted me and had me plug the motor back in for tests from his end. And lo and behold, it worked. He transferred power back over to our end and I was once again able to move the motor. Put everything back together and all still works. Not really sure what was wrong. Symptoms seem to defy all logic. According to Damon, last night he was able to verify that the motor was indeed turning, but focus was not changing. This pointed to a broken belt in the drive But the belt was fine. Then today, the problem for me was that the motor was not turning. But then it was. Then it wasn't. Then it was again. I just don't know. But it is working. And perhaps something we did has something to do with that?
Sorry if this isn't the most satisfying trouble report response, but I'm baffled, tired and ready to head home.

Wednesday, February 28, 2018

Instrument Rotator Clarification

Problem(s) Encountered:
I rotated to zero using the red/blue tape fiducial -- at delta = +75 on the meridian -- and found that the rotator was reading -5 degrees, so the instrument rotator appears to be having an issue. I wonder if it might be position dependent. Is there a more precise zeropoint fiducial than the tape?

Solutions:
It may well slip at large angles as it is a friction drive system and roller interface for the encoder. I know it's demonstrated issues such as this historically, which is why it's recommended to be near zenith when rotating.

Saturday, February 24, 2018

Condensation on Detector Window

Problem(s) Encountered:
The faceplate had condensation on it and I attempted to remove it using dry nitrogen which seemed to help a little bit but the center of the faceplate still seemed out of focus with large out of focus spots despite stars on the outside of the plate being in focus. I pointed the telescope down so that I could see the mirror and it looked fine. I tried to just take some observations to see if the remaining condensation would go down on its own but it never did. Humidity then rose above the limit again and I closed the telescope.

Solutions:

Dry N2 was not run long enough to remove all condensation. N2 run times can be as long as 20-25 minutes if condensation/humidity is bad enough, although typically ~15 minutes should suffice. The problem is more pronounced for large-format CCD's, such as the 4K detectors.

Saturday, February 17, 2018

Data Writing (/hiltner)

Problem(s) Encountered:
The data was taken well at the beginning, but after #0054, the data is no longer stored on the computer. There is no error messages come out. Don't understand what's wrong.

Solutions:
Found that Caliban was stuck after writing image jlt.0056.fits. Ran the "recover 1 disk1" command and it restarted data transfer. I used disk1 because that was the last image written (it tried to re-write image jlt. 0056.fits, which triggered the unique-name protection), then it swapped automatically and began dumping the images backed up on the transfer disk. I was only able to recover up to image ljtflat.0028.fits because after that it apparently filled the transfer disk.

If you notice that data are not transferring, PAUSE taking data so that the data recovery does not conflict with new data.

Then go to the virtual desktop with the Caliban window and type this command in the Caliban console at the CB> prompt:

CB> +swap

This will attempt to restart the transfer queue. If the transfer restarts, wait until it is done before restarting data acquisition, otherwise you will risk losing data on the transfer disk as it gets overwritten by new data.

If +swap does not work, then you have to do a by-hand recovery.

First, scroll back in the Caliban window until you get to the last image you know was written. Look for a message like

OUT: CB>IC DONE DISK1 1

this tells you the last file was written from transfer disk1 and this is likely were it is stuck. Count the number of missing images (for example, 10), then at the CB> prompt, type

CB> recover 11 disk1

Note 11 is 1 more than the number missing. It is likely that the first image recovered is the last image that it successfully wrote, and it will cast up an error message saying that image already exists and it is instead writing using a UNIQNAME code. Just let it go, this is harmless. The missing images should follow.

If they do not, then the missing images are on disk2. Let the command above finish, then type at the CB> prompt

CB> recover 11 disk2

and let it go. Hopefully this will recover your missing images.

Once it is done, you may restart observing. Do not try to do the recovery while observing.

The transfer disks cannot hold 132 OSMOS images (as was the case with this morning's problem), so I was only able to recover 59 of the 132.
[Pogge]

Monday, February 12, 2018

Continued Guider Issues

Problem(s) Encountered:
We continued to have guide probe issues tonight, including the failed
return to origin (X=#### Y=0, with one surprising variation of X=0 Y=###), along with three WARNING:
not at X CW limit errors that required a MIS power-cycle. Also sometimes the probe still just landed in the wrong place.

We were able to reduce the impact on our data by sending the probe to origin in between every target and selecting guide stars as close to origin as possible while still keeping them further away from the detector FOV than usual.

Solutions:
I'm not sure what else to say about this. I brought everything down and reboot machines just to see if that may help. That said, I moved the guide probe around a bunch today and saw nothing odd.
It should be noted that "Warning: not at X CW limit" error is a red herring and in all likelihood, can be ignored.

Thursday, February 8, 2018

Guider Issues

Problem(s) Encountered:
The guide probe misbehaved a lot at the beginning of the night. We had to
restart it before even going on sky (we tested sending it to center and then
origin, and it got stuck). When we went on sky it *seemed* ok as far as the
workstation GUIs were concerned - JSkyCalc was reading the position and it went to origin and center consistently, but when trying to get a guide star it was horrifically off. Even if we sent the probe to center, lined up the telescope on a bright star, then moved to a guide star, the probe was off again. And we were at X<<10000. Eventually we restarted the MIS again and things were fine after that.

Solutions:
This will be dedicated to the guide probe issues as it is possible (likely even?) that the issues there were causing vignetting to a varying degree, resulting in reduced counts.
Pulled off OSMOS and the bottom plate of the MIS this morning and found a sticky 0-limit switch for the y-stage. Within one cycle, it stuck closed completely and failed. Replaced the limit and ran the stage to origin (0,0) and the new limit failed immediately. I chalk that up to a bad limit switch. Hit the "Stop" button on the xmis2 GUI (wonderful feature!!) when it started to scream as the y-stage was trying but could go no further. Moved it back off its limit and replaced the switch with yet another. Very carefully this time, I approached the limit and ran the stage in, verifying that the limit really was working before letting the system run to the limits. All seemed well so I've been exercising the stage, sending it commands via x- y-

demand values, as well as running *preset* commands for motion. During this, while the x- & y- positions appear correct in both the xmis2 GUI and JSkyCalc, the status line on the bottom of the GUI, as well as the indicated values in the log file are curious. See the image below. I don't know where it is getting these exponential numbers (i.e. x=2.208e+06 y=2.01e+06 [steps]) but they are obviously wildly off. Still, as stated, the values elsewhere are correct, and watching the guide probe, it moves where I expect. It is of note that these exponential numbers only occur when using the *preset>center* and *preset>slit* commands to move the stage. If I enter the x- & y-values for, say the *center* position, it goes there correctly, and displays correctly (no exponentials). Also noteworthy, *preset>origin* produces correct values (x=0 y=0) in the status line and log file. Perhaps this is a longstanding bug in the code?

I will run more tests before buttoning everything back up, demanding movement via presets, x- & y-inputs, as well as from JSkyCalc, to make sure all continues to appear nominal. But right now, it all looks like it's fixed.

Once the MIS is back together and OSMOS back on the telescope, I'll run some comp spectra and see if the counts are ballpark where I'd expect them as well.

Remote Access Device Failure

Problem(s) Encountered:
The remote connector for Workstation 1 appears to have died, or it's almost dead. Around UT 5:30, during an exposure, WS1 appeared to go dead - the monitors went into power save mode and it didn't (immediately) respond to mouse movement or hitting arrow keys. After about a minute, everything came back up, we just had to click connect on the remote connector screen. After that (and maybe before?) we heard a low beeping sound periodically but couldn't find a visible cause.

Around UT 10:30, WS1 appeared to go dead again and stayed that way for about 20 minutes. We called Jules and determined that the issue was the connector, not WS1 itself. Power-cycling the connector got it working again, although the connector went on and off ~5 times in the next 3 minutes. It was enough to start a new target, but then it went off and stopped responding to power-cycling.

We borrowed the remote connector from WS2 to get our final primary target. We continued hearing the same low beeping sounds from earlier (I think these are coming from the connector but it's not totally clear). We reconnected it to WS2 and closed up around UT 12:00.

Solutions:
The device that failed is the Dell FX100 Remote Access Device (RAD). Hooked it back up and it showed no signs of life. Replaced with the only spare I have (which incidentally was *acquired* from the National Solar Observatory a number of years ago) and all is well again. As Rick Pogge stated:

"*This is a reminder that we're working with 5+ year old equipment that is hard to replace. We should probably look at a replacement, e.g., a NUC properly configured to take its place. Cost is about the same as a new Teradici, provided we can get one that is compatible with the cards in the Dell computers.*"

I should also mention, as a workaround, one could VNC from the usable workstation in the event of a failure. In this instance:

Go to mdm24ws2 and open a terminal window. From there, ssh to mdm24ws2.kpno.noao.edu (if required to use an IP address, the appropriate address can be found on a list of IPs that is displayed on the cork board in the control room) as *obs24m*. If prompted for a password, use the standard MDM flavor, located on the control room white board. Once in, type:

x11vnc -nomodtweak -display :0 and hit enter.

A bunch of info will scroll by and should end with the line *port=5900*.

Open *tigervnc* from the taskbar and enter the IP address for *mdm24ws1.*

This could also be performed from any user laptop that is wired to the MDM network.

Monday, February 5, 2018

Fill Straw Frozen to Dewar

Problem(s) Encountered:
Both at the beginning and end of the night, after I filled the
dewar, I was initially unable to disconnect the fill tube from the OSMOS
dewar. In both cases, I finger tightened the nut but didn't make
it terribly tight, and at the end of the night, before I opened
the valve on the storage dewar, I made sure I could loosen it again.
But both times after the fill I had to use pliers to loosen
the nut, even though I can usually disconnect the fill tube
easily with just my hands. It also seems like the metal part of
the fill tube is off centered from the metal connector to the
rubber tube (if that makes any sense), which might be affecting
how things screw together, but I couldn't re-center it.

Solutions:
This is a symptom of high humidity. More moisture in the air causes ice on the connection. If you fill early
enough simply let it thaw for a while longer than usual.

Wednesday, January 10, 2018

Dome Home Failure

Problem(s) Encountered:
While I was acquiring a sky image for my first target of the night, prospero crashed. I hit go, and the
command window just hung. Once I safely stowed the telescope (clouds were incoming), I was able to
ctrl+c and restart prospero just fine.

While I was closing up for the rain, I tried to send the dome home from the TCS - I set dome mode to
Home and clicked Apply, but nothing happened. I tried a second time, same nothing. I was able to move
the dome home using the hand paddle, and then closed up successfully.

Solutions:
Disabled autodome on the TCS electronics (switch) and manually moved the dome away from HOME. I
then re-enabled autodome and immediately the dome returned to the home position. A fluke?

Monday, January 8, 2018

B4K Failure

Problem(s) Encountered:
The B4K or related electronics seems to be on the fritz. Regardless of the type of exposure (dark, comp,
etc.) the readout of the camera is three quadrants with pixel values of around 420 in ds9 and the fourth

with values around 7200. I messed with the connection between the HE and the camera to ensure it was truly connected, as this has been an issue in the past. I also power cycled the HE. My final test was to leave the HE powered down for several hours and let it cool down (even though it wasn't particularly warm) and try again, which also failed to work.

Solutions:
B4K HE & cable have been sent to OSU to determine if a problem can be found.

Update 03/06/18:
After completing the usual DC voltage level checks and then half way through checking the clocks, I discovered a 7805 regulator and a 240 buffer chip on the CBB running very hot. Tracing the Ins and Outs of the buffer and looking at them on a scope showed that the Postamp control lines were being pulled down by the load (the Postamp cards). I traced the problem to postamp CCD4 which had the +15V shorted. We repaired that short (a bad bypass cap), replaced all the parts that had been running over hot and put it back together. TV mode visually looks like a working system.

Both ends of the Detector cable were damaged. The existing coax wires were move to new connector housings, backshell/clamps reassembled and beeped out to check it matched as-found condition and also Bruce's documentation.

I blew out the Detector cable connector on the side of the HE and inspected all the coax pins which were fine.
[Pappalardo/Atwood]

System back in service!

Sunday, January 7, 2018

Focus-Guider Interplay and Telescope Run Away

Problem(s) Encountered:
Over the course of this observing run we have noticed that when we change the focus using the GUI, the guider has been freezing, especially with movements more than ten units. Simply stopping and starting the guider again seems to fix the problem.

Twice during the night the telescope jumped so far that the guider could not find the star. We had to stop the observations and reposition the telescope. (Note typing s will abort an exposure and save it when using Prospero.)

Solutions:
It is believed that DFM Inc. has incorporated a software fix for the guider hanging when making large focal adjustments.

Telescope "jumping" during observations is a bit more concerning but hard to diagnose. Note that in Prospero, s will save and stop an exposure.
Friday, December 22, 2017

B4K Chip Quadrant Failure

Problem(s) Encountered:
Got a call around 1830 local time that the top-right quadrant of the B4K was not reading out correctly. I'm not sure from the conversation if it was simply bias-level or not, but there were no stars.

Solutions:
I had the observers focus on the cable connecting the detector to the HE, primarily at the connector on the HE-end. Attempt was made to gently push/wiggle the plastic connector upwards in an attempt to reseat. A test image showed no improvement but on a hunch, I had them try it once more, which corrected the issue. Double-checking this cable this morning, I notice that the threaded collar that is supposed to hold the cable to the HE spins freely in the CW direction, so I fear that this connection may continue to be temperamental.

Thursday, December 21, 2017

Dome Run Away & TCS Restart

Problem(s) Encountered:
Toward the beginning of the night the dome ran away while observing. The telescope was pointed at RA=07:36:51.5 DEC=+65:36:07 at hour angle -3:13. The telescope AZ was 26.2 deg and when the dome began to move to catch up to the telescope it went through the telescope azimuth position to 140.6 degrees before turning around and making it back to the correct position.

Later on the night, the TCS froze, freezing the entire computer handling the TCS, guider, and TCS sub-guis. After searching for TCS computer, we hit the yellow button, that we think is the reset button. After hitting the yellow button, the computer restarted. We then restarted the TCS, the guider, the guider focus gui. We found that there was not a single place to find the information regarding the procedure to restart all of these windows. When the computer froze, it was a completely silent freeze during a long exposure. The telescope drive and tracking continued but we could not access any of the guis on the screen. We were not near any telescope limits when this crash occurred.

Solutions:
The dome runaway is concerning and will be watched to see if it happens again.
Regarding TCS documentation: there is documentation available online, although it is not quite complete. I am currently working on updating all 2.4m TCS support documentation, but it takes time.

Wednesday, December 20, 2017

TCS PC Display & Airbag Control Failures

Problem(s) Encountered:
We encountered a problem with the TCS computer during afternoon calibrations. The issue was that the two TCS monitors (i.e. the two on the right in the control room) were not getting a signal. Both monitors had power, but shaking the mouse and typing did not wake the computer to obtain a signal. Both the DFM Engineering box and black MDC computer chassis in the left computer rack also had green power lights on. Observatory staff reported that the computer was working fine in the morning.

Unplugging the HDMI cable from the rightmost monitor did not solve the issue. Rebooting the computer by pressing the yellow button behind the small lock door solved the problem.

While we were trying to troubleshoot the TCS computer issue, the computer controlling the mirror airbags also reported errors. Restarting the computer and support routine eventually solved this. While it seems likely that this problem was caused when we were trying to fix the TCS computer, we are reporting it just in case it is indicative of a problem with the left computer rack.

Solutions:
Solutions found within report, above.

Monday, December 11, 2017

R4K, more on "icicles"

Problem(s) Encountered:
We encountered the same problem reported by Justin Rupert on 2017 December 8. We saw the icicles show up in the internal flats taken at the beginning of the night (with ROI 4k x 1 k), even though the count rate was not high enough to saturate the detector. Running snapclean did not seem to fix the problem. In fact, it was not clear if snapclean was running at all since it did not change the ROI to 4x x 4k as expected. We tried changing the ROI manually to 4k x 4k and then running snapclean, which gave us a good flat in the 4k x 4k configuration. Switching back to 4x x 1k brought the icicles back. They seem to occupy a smaller area at shorter exposure times but they are still there. Since the weather was bad, we did not really lose time but we were not able to get useable flats.

Solutions:
Snapclean doesn't change the ROI, My experience is that snapclear doesn't completely fix the icicle effect, which appears whenever you use a sub-region. If you require completely clean flats, it is possible to use 4k x 4k flats and cut out from them the region that matches your ROI. (Halpern)

Yeah, my experience with the R4K is that the icicles are a real problem with flats. Remember that the icicles appear to depend on the total counts rather than the peak counts (unlike saturation), which is why they affect flats and not so much the object exposures. You have to use shorter exposure times to avoid icicles, which means that the peak count level is fairly low. The good thing is that fringing is negligible, so there is no need to take spectroscopic flats at the position of the object, and I just take a bunch in the afternoon.

Imaging twilight flats have the same issue, but worse, because there is only a narrow window of sky brightness when you won't have too many icicles. (Chornock)

Sunday, December 10, 2017

R4K "Icicles"

Problem(s) Encountered:
Had to run the snapclean script in Prospero to eliminate the icicles after saturating the camera during sky flats. It took a multiple frames for it took take full effect. This happened periodically throughout the night, even when no saturation occurred. While taking morning twilight flats I realized that doing so with the 4x1k seemed to draw out the icicles even if the rest of the chip was unsaturated. Repeating the same frames with the whole 4K array yielded no icicles.

Solutions:
This is standard behavior, and the icicles shouldn't affect sky exposures, which are at low light levels.
If you're doing long-slit spectroscopy of single objects, even moderate
icicles shouldn't affect the results. The biggest problem is cosmic

rays, so it helps to take multiple exposures.
You should run snapclean before each night, or when the dector has
been idle for some time. You can also reduce the area of the icicles
in flat fields by reducing the exposure time and taking more flats. (Halpern)

Friday, December 8, 2017

Focus Issues in New TCS(?)

Problem(s) Encountered:
Played around with the hand paddle-operated focus during the day. It seems like it gets hung up,
especially when I use the slew button. It will start out going fast as it should with slew, but then it slows
down considerably and sometimes stops, and I will be unable to use the hand paddle to change the focus
at all for a short period of time. It eventually wakes up again on its own.

I also discovered that the focus hangs up when using the focus4k procedure. If the focus is >6000 and
the user sets the first step to be <6150, the focus hangs up at 6000. You need to press the stop button on
the TCS window and give it about 20 seconds and you will be able to move the focus again. I have found
that a short-term solution is to use the hand paddle to set the focus below 6000 if you plan on using
focus4k in the given scenario.

Solutions:
Nothing to report regarding a solution except that this has been noted and will be monitored.

Sunday, November 19, 2017

Prospero/OSMOS Command Issue

Problem(s) Encountered:
We had an issue in Prospero: after entering the go command to start an exposure, the command
window stopped showing status updates. Nothing showed in the isis window, until we hit Ctrl-C. Isis
window then started giving updates on the exposure (correct ones: open shutter, etc...), but not the
command window. The status window showed IC down . We let it finish the exposure and save the file,
and then entered the restart command.

Solutions:
We let it finish the exposure and save the file, and then entered the restart command. Then everything
went back to normal.

Sunday, November 5, 2017

Rotator Positional Errors

Problem(s) Encountered:
Since installing the new TCS system, there are errors that build up with regards to the stated value vs.
real position of the instrument rotator.

Solutions:
This can be worked around by occasionally bringing the rotator back to the 0 position and reseting the
readout to 0 through the TCS. If you have questions in regard to this, ask MDM staff.

osctrtask Hangup

Problem(s) Encountered:
At the beginning of the night, osctrtask would hangup after displaying the acqimage and marking the target. However, after leaving it alone for 5-7 minutes, it worked itself out and continued as normal. Later in the night, instead of hanging up and resolving itself, the following messages sprung up:

Located 1 objects in image acqimage

Exception in Tkinter callback
Traceback (most recent call last):
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/lib-tk/Tkinter.py , line 1486, in __call__
   return self.func(*args)
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/site-packages/stsci/tools/editpar.py , line 1245, in execute
   self.runTask()
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/site-packages/stsci/tools/editpar.py , line 1754, in runTask
   self._taskParsObj.run(mode='h', _save=1)

Solutions:
Found that imexam was the source of the trouble. For some reason its parameter file ~/iraf/uparm/tvimexae.par had become wildly corrupted and ballooned out to 129 Mbyte, when it's ordinarily less than 1k. I erased the
corrupted version and replaced it with a fresh one, and it seems to work now. After one successful run through osctrtask, the tvimexae.par file still looks normal.

I have no idea how this could have happened. (Thor)

Thursday, October 26, 2017

Dome/Telescope (new TCS)

Problem(s) Encountered:
The dome doesn't track the telescope very well. It seems to only move about every 30 minutes by which time the dome blocks part of the mirror.

Solutions:
Adjustments were made to update dome position relative to the telescope on a tighter schedule. It should be noted however that dome rotation frequency is dependent on where the telescope is pointed.

The dome deadband (tolerance) increases with altitude. When the telescope transits near +25 degrees dec, it's only 7 degrees from the zenith, so the deadband is very large (at the zenith, it's 180 degrees since the mount is symmetrical and the telescope is centered in the dome). So an 18 degree error near the zenith may not be a concern. (Thor)

Thursday, October 19, 2017

Guiding Issues

Problem(s) Encountered:
We experienced problems guiding on targets. Guider would freeze and stop guiding and occasionally the guide star would rapidly move.

Solutions:
We fixed the problem by changing the guide camera speed to 1MHz, exposure time to 1sec and aggressiveness to 6 in both x and y. The freezing of the guider may be solved by refreshing the guiding every half hour or so. This may not be necessary as this issue has not occurred for anyone else to this point.

The guiding accuracy with the new setting was quite good.

UPDATE: New range extenders were installed in November. So far, not freezing has been seen since. That said, it takes many more data points to prove a problem is resolved than it does to prove it still exists...

Monday, October 16, 2017

New Hand Paddle Focus Button Sensitivity

Problem(s) Encountered:
We did not encounter any problems other than the focus buttons being very sensitive causing us to go through the desired focus numbers.

Solutions:
We figured out how control telescope focus through the gui menu on the TCS under MISC and this solved the problem.

Sunday, October 15, 2017

Dome Home Failure

Problem(s) Encountered:
The dome did not respond to the HOME switch (it did last night).

Solutions:
Moved it onto the contacts with the hand paddle.

Wednesday, October 11, 2017

Echelle Readout Failure

Problem(s) Encountered:
At the end of a 10-minute exposure the image looked like a bias frame -- noise and structure visible but no obvious cosmic rays. I thought the shutter might have failed, but that didn't explain the absence of CRs.

Solutions:
I powered down the Leach boards; the first image that way was similarly blank, but then it started working and I had no trouble with it the rest of the night. (Thorstensen)

Wednesday, October 11, 2017

MIS Guider Failure

Problem(s) Encountered:
The guider got stuck early in the night and would not move at all along the y-axis. It was also very far off position wise in the x-axis. Eric attempted to fix the guider remotely but was unsuccessful. I lost about an hour and half of observing time trying to fix the guider with Eric.
Using some guess and check work I was able to find guide stars that were along wherever the guider was stuck and was able to successfully guide for the remainder of the night. Guiding was not as good as previous nights but given the circumstances I was still able to observe.

Solutions:
This one was not fun. Verified by a very ugly noise that something was wrong with y-stage of the MIS. Pulled OSMOS and the bottom plate of the MIS. Found that the end cap on the thread that the y-stage travels on had come off, dropping 2 of the 3 bolts used to hold it in place. Amazingly, the tiny set bearing was still there, and thankfully so. Subsequently opened up OSMOS and found the two screws that had fallen off inside the instrument. Put everything back together in the MIS on the y-stage but found that the stage still seemed bound. Ended up taking both end caps off, as well as the stage encoder and motor. At this point we were verified that the two bearings (one on each end) were good, they were. I started to fear something was amiss with the half-nut. Working gingerly but firmly, Tony managed to finally get the stage to rotate freely again, verifying that the half-nut was still good. But what caused the stage to so badly seize in the first place? Looking more closely, the limit switch for the zero-position of the y-stage had failed. Interestingly, this is the same limit switch to have failed on the 1.3m not so long ago. The stage then drove itself until it could go no further. At this point, the motor shook everything in there good enough to loosen the screws holding on the end cap. Replaced the limit switch (I really need to buy a couple more spares!) and put the whole y-stage assembly back together. Tested all and it works. Buttoned up the MIS, re-installed OSMOS and I'm out of here, only 1.5 hours late.
Incidentally, while everything was pulled apart, I went ahead and replaced the y-stage drive belt. Might as well.

Initialization (Prospero and Data Handlers) Issues

Problem(s) Encountered:
In the early evening I had to perform a lightning shutdown. When I started to restart everything following the instructions, Prospero would fail on the startup command copied below. I know this error was of my own making, but I figured it was good to save for posterity.

pr> STARTUP
Connecting to ISIS...
...Prospero client started on network port 6606
Error: Requested Operation Timed Out
Suggestions:
  1) Is the IC up and the instrument server (ISIS) running?
  2) Is disk full, such that ISIS cannot open its log file?

3) Is ISIS sending random garbage? Check the isis logs
    for out-of-synch messages; you may need to restart isis.

STARTUP failed...

Execution error in Prospero command.
Command: STARTUP

I rebooted the IC and quit prospero numerous times to no avail.
I then realized I should restart ISIS since I had shut off and
restarted Hilter. I then got the error:
pr> startup
Connecting to ISIS...
...Prospero client started on network port 6606
...connected to ISIS server IS

IS> ERROR: No Route to Destination Host IC - host is unknown/unlisted

^C Command interrupted by a Ctrl-C

*** ERROR: Cannot get config status from the IC
Suggestions:
  1) Verify that the system is up and running.
  2) Check the .prospero.ini file and see if
     ICHOST is valid for this system.

STARTUP failed...

Execution error in Prospero command.
Command: startup

I ran the startup again. Then I got the error:
pr> startup
Connecting to ISIS...
...Prospero client started on network port 6606
...connected to ISIS server IS
Loading the TIFKAM instrument initialization file...
Getting Configuration Host (IC) info...
Getting IC status...
Getting Instrument Status...
*** ERROR: caliban expected but missing...
Check to see that caliban is running and ready
Loaded Filter Table 1 of 2...
Loaded Filter Table 2 of 2...
Loaded Slit Table...
Loaded Camera Table...

*** ERROR: the Caliban & IC disks are not synched.
  Image storage will not work until this is done.
  Make sure Caliban is up and running (restart
  Caliban or type >IC PING in the Caliban window)
  and try again

STARTUP failed...

Execution error in Prospero command.
Command: startup

I did the >IC PING command and it worked.

I also had a weird issue with the Coords->TCS Next Obj. button.
I was in the middle of doing one observation when I hit that
button to get my next object ready. When I did this, the
telescope moved to my next object's RA but did not change the
Dec. It kept the same Dec as the object I was in the middle of
observing. I'm not sure if this is a known issue/feature, but
it does not seem intuitive to me that it would do this. I don't
think this is the first time it's happened to me, but it's the
first time I can quantify what was going on. The telescope
seems to be working fine as long as I don't do that. I believe
this is how I slewed to a hard limit a few nights ago. Then,
the telescope didn't display the hard limit error. Maybe this is
the reason?

Solutions:
I don't know what could have caused this. Justin and I had some communication issues with JSkyCalc,
but solved them simply by quitting and restarting the program, which takes relatively little time. JSkyCalc
should not be able to make the telescope move. (Thorstensen)

Monday, September 4, 2017

Some Prospero Issues and Limit Reached

Problem(s) Encountered:
I had some difficulty with Prospero and the IC tonight. It started with
Prospero hanging after I issued it a stopmovie command. I had to close out
of Prospero and open it up again. When I did this, the Prospero Status
window became mostly blank. I tried restarting a few times, but that didn't
fix the issue. It isn't a large deal since You can still print whatever value you
want to see like filter or object name.

After this happened, I was using it for about an hour when the IC became
stuck on movie mode. I ended up having to the lightning shutdown
procedure with the IC. Eventually it came back online. When I started
Prospero yet again, it gave me an error about the IC not being able to
save images (sorry I forgot to save this error verbatim). I had to type
IC PONG on Calibran. This solved that issue.

Yet again I started Prospero, and it seems to be working except when I run
my script it displays IC> WARNING: Telescope controller not responding.
However, it seems like the telescope is doing everything I want, so I'm
ignoring this error for now. Maybe it's like the RA and Dec encoders error?

Late in the night, I hit a hard limit but the LIMIT REACHED error did not
display. It was easy to figure out what was wrong and the solution in the
manual fixed the problem easily.

Solutions:
Typed *status clear* in the Prospero Command Window to reacquire all information in the Propsero Status window. This window will lose information if it is not selected to be visible on all workspaces.

"Telescope controller not responding" was resolved by issuing *quit* commands in the mdmtcs, caliban & isis terminals and restarting them via mdmTools (mdmTools start isis, etc.).

Never knew about the IC PONG command, interesting.

Also not sure why there was no warning issued about approaching a limit.

Dome fugue state (reported in the run report but not trouble report was looked into when CO2 washing the mirror. Dome is functioning as expected currently.

Thursday, August 31, 2017

TCS Pointing/hiltner Timestamp Issue

Problem(s) Encountered:
Going to our first target we noticed that the pointing was wildly off, and the UT and sidereal time on the TCS were about 2 hours fast. Repeated Set UT calls didn't change it. We rebooted the TCS computer and tried again -- no luck. We got on the air by acquiring zenith with the tilt meters, then using the sidereal time from JSkyCalc to set the pointing, and (easily) acquiring a bright star.

We observed all night with the telescope thinking it was 2 hours west of where it was. The main problem was that the dome's computed position was wrong, so we had to move the dome by hand.

After we closed I realized what had happened -- Hiltner had been swapped out the previous day, and when I checked the clock on Hiltner it turned out to be almost 2 hours fast. That's why the set UT command had apparently failed -- it was simply setting the TCS to HIltner's incorrect time. A quick inspection showed that the time stamps on all the OSMOS images were also wrong, so they will have to be fixed in post-production, as the film industry people say.

Eric reset the clock on Hiltner today and made sure it was on ntp. To close the loop it would be good to have some idea of why this happened so we can be assured that Hiltner's clock will remain in synch.

Solutions:
I set the time and also changed the time zone (was set to NYC,NY, now set to PHX,AZ). Lastly, I verified that ntp is running. NTPD synchronization fails on boot, but then the next step passes, which is to start the ntpd. Not sure why they are ordered that way. Still, doing a ntpq -p and a ntpstat appear to indicate that ntpd is running correctly. Also, rebooted the machine and ensured that the correct time remained. Lastly, Rick Pogge (OSU) updated NTP config to match mcgraw, David Will and Pogge found a wrong entry in the /etc/sysconfig/network/ifcfg-eth0 file giving the wrong gateway, and the /etc/resolv.conf was updated to match mcgraw. Once we restarted the network, ntpd synched with the KPNO Stratum 0 servers.

Thursday, August 24, 2017

Hiltner Reboot Failure

Problem(s) Encountered:
This will serve to replace the previous trouble report submitted today.

The previous report's complaint was that hiltner did not boot, and was stuck at either remounting root filesystem for read-write or setting up logical volumes . After waiting 15 minutes the first time, we power cycled hiltner, then it moved past the remounting root filesystem to the next stage, where it appeared stuck. We submitted the trouble report after waiting about 45 minutes from reboot.

This Update: Hiltner eventually loaded at 5:15 am. So, perhaps there is no problem and it just needs to be given a long time to boot.

Solutions:
Hiltner has been replaced with a new physical machine. The only difference that may be noticed by observers is that the TCS GUI is now physically larger. The old hiltner machine has been sent off to OSU for diagnosis. We currently have one spare machine that could be swapped in for hiltner (or mcgraw).

Tuesday, July 18, 2017

Erroneous Pointing, Limit Switches

Problem(s) Encountered:
By our fault entirely, we attempted to point at a target below the horizon and the TCS entered some sort of safe-mode. The telescope was pointing horizontally at the control room, leaking liquid nitrogen, and the TCS wouldn't turn back on. It was early enough that we could get Eric on the phone and he talked us through regaining control - we had to hold down Start while using the paddle to point to zenith. After that, it took some fiddling to regain pointing, but we got it eventually. Then, we parked the telescope, topped off the dewar, and continued our program without any problems for the rest of the night.

Solutions:
Telescope drove itself into a hard limit. Power to the telescope is cut at this point as a precaution. In order to back out, the observer needs to know what direction is safe to move (in this case, south), then move the telescope out of the limit while holding down the green "GO" button on the TCS console. This is best performed while someone is also physically in the dome watching as the telescope is moved. Once back at zenith, the telescope positioning should be zeroed using the tilt sensors, then zeroed again on a bright star (near zenith).

_____
Yow, sounds alarming!

The TCS "shouldn't" try to aim below the horizon -- again, this is one of those flaws that will hopefully* go away with the installation of the new TCS. (Thorstensen)
_____

Thursday, June 29, 2017

Pointing Errors

Problem(s) Encountered:
The telescope pointing definitely deteriorated over the run. Big moves across the sky would sometimes have shifts of a few arcminutes in pointing, as sometimes happens with the 2.4m. By the morning hours of last night, I had one object that did not fall within the OSMOS field of view, even after sending it to center field and reading out the full 4K field. After trying to find a few bright stars, I went to zenith and reset using the tilt sensors. The pointing was off by a few minutes of time. After zeroing at zenith, I was able to find a bright star, reset the RA/Dec encoders and get on with my night. About 45 minutes lost.

Solutions:
Pointing woes have been verified by John on his time subsequent to Ryan. A new pointing model would be a nice thing to run, but likely isn't worth the effort as the TCS upgrade is scheduled for later this year.

Sunday, June 18, 2017

Guide Probe Stage Motion Failure

Problem(s) Encountered:
The guider stage became unresponsive several times during the night and did not actually move when sending moves from JSkyCalc. I tried sending the probe back to the origin, but each time it refused to go back in one axis.
The solution was to reboot the MIS controller. I had to do this three times, losing ~10 minutes each time.
I noticed that when it froze, there was a warning message on the XMIS2 GUI:
WARNING: Not at Y CCW Limit

I think the freezing problem has happened with both the x and y axes.

Solutions:
I ran some tests in hopes of seeing what happens when the guide stage fails.
Demanded movement through the xmis2 GUI, first in x-, then in y-, then in both at the same time. No issues. I then went out to the dome and watched the guide probe while moving it around. Nothing seemed amiss. Next, I pointed to various positions in JSkyCalc and demanded the probe to go to those positions. Again no issue. Did this throughout much of the day between other tasks and never had any issues. I'll move it some more as the day proceeds, but not sure what else to try as for now.
Also popped the top of the MIS and the MLynx units all look good with a solid green LED each.
Subsequently, I believe Ryan reported two more failures over the remainder of his time on the 2.4m. So far, to my knowledge, John has not seen this issue during his program.

Tuesday, June 13, 2017

Dome Encoder Error

Problem(s) Encountered:
Dome was pointed in the completely wrong direction around 10:30pm.

Solutions:
Once I set the dome azimuth encoders the dome behaved well.

Thursday, June 8, 2017

JSkyCalc-to-MIS Link Broken

Problem(s) Encountered:
When I attempted to move the guide probe to a different star in the JSkyCalc Guide Star Selector, I would click a new star on the screen, select Move Guide Probe , and confirm Yes that I want to move the guide probe. No errors are reported, and the MIS reports the status of the guider movement. However, when I look at the guider screen which is constantly updating under the Expose tab, I don't see any change in the field.

It's entirely possible that this is a user error and I'm forgetting to enable an option. However, I remember successfully being able to move the guide probe yesterday when I needed a new guiding field. The fact that it didn't work this time was puzzling, but not particularly urgent. For 5 minute
exposure times, it was perfectly reasonable to just maintain the object on the slit once in a while. But if this is an intermittent problem, I wanted to document it.

Solutions:
Quit xmis2 GUI and power cycle MIS box in computer room. Restart and reinitialize GUI.

Friday, June 2, 2017

JSkyCalc-xtcs Coordinate Input Confusion

Problem(s) Encountered:
The trouble began when an incorrect position was used to reset the RA/Dec encoders. The telescope ended up in the hard limits. Not only that, but the usual procedure to ease out of the limit (hold start button and set button and direction simultaneously) didn't work. The TCS wouldn't accept any input. So I restarted the TCS program, and was then able to ease out of the limit. All operations were normal after that. Including having to reset
pointing using the tilt meters, 1.5 hours was lost. It was a good lesson, however.

This is the exact problem that was discussed in a trouble report of 2016 April 4. It is caused by using JSkyCalc to supply a next object position, under the assumption that this position will be used to reset the encoders. That assumption is not correct. It is the position in the xtcs GUI that is used to reset the encoders, whether or not that position was ever sent to the TCS. IMHO, it is an awkward design flaw to have two different methods to send a next object position to the TCS that don't behave the same way in all respects. If there were only only way to send a next object position, this problem could not occur.

Solutions:
Yup -- that can happen. Given that the entire system is about to be replaced, it may not worth fixing at this point.

If it's easy enough to fix, I suppose I could. I don't know if the xtcs allows an external command to set the 'next object' position in the gui, but I can look into it next month when I'm out there. [Thorstensen]

Saturday, May 27, 2017

SDSS-gri Filter Anomaly Possibly Detected

Problem(s) Encountered:

One anomaly that I don't understand is that imaging with g, r, i filters required *very* different telescope focus, for example:

g 2684
r 2668
i 2678

This is not supposed to happen with OSMOS, and indeed I never noticed a significant difference before, e.g., when I used the same three filters in September 2016.

Maybe I will test V, R, I the next night for the same effect.

Solutions:
Not sure yet if this has been followed up on... .

Friday, May 26, 2017

osctrtask issues

Problem(s) Encountered:
Despite the fact that I had not even closed the window from which I had
successful run 'obsctrtask' yesterday without any problems, said program
decided to not cooperate today.

Closing the current terminal, and restarting the program in various other
directories did not help, neither did the transfer of the .par as suggested the online manual.

In the end, I resorted to drive the objects onto the slit by hand and applying some translational and
rotational transformations. Not ideal, but at least do-able in a reasonable amount of time -- hence, at most
I lost maybe 20min in total.

Below is the detailed error message when the program crashed :
Task osctrtask is running...

Acquisition image number (0:100000) (68):
Slit image number (0:100000) (65):
Exception in Tkinter callback
Traceback (most recent call last):
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/lib-tk/Tkinter.py , line 1486, in __call__
   return self.func(*args)
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/site-packages/stsci/tools/editpar.py , line 1245, in execute
   self.runTask()
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/site-packages/stsci/tools/editpar.py , line 1754, in runTask
   self._taskParsObj.run(mode='h', _save=1)
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/site-packages/pyraf/iraftask.py , line 359, in run
   self._run(redirKW, specialKW)
 File /usr/custom/Anaconda-2.1.0/lib/python2.7/site-packages/pyraf/iraftask.py , line 1202, in _run
   self._pyFunction(*pl)
TypeError: osctrtask() takes exactly 19 arguments (18 given)

Solutions:

The error message indicates that osctrtask is not getting all the header keywords it expects. osctrtask is (of course) entirely free of bugs.

It would be possible, with a little effort, to rewrite that section so it's less brittle, though. (Thorstensen)

Thursday, May 4, 2017

V-band Image Counts

Problem(s) Encountered:
We observed NGC 4395 in a series of V-3x Halpha segments with fixed exposure time. Partway through the night, the V-band counts declined substantially, but the H-alpha was unaffected. The number of counts in the background went down, as did the peak counts in point sources (by considerably more than the background), and the integrated counts from these sources. The decline appeared uniform across the field.

Solutions:
The drop-off was in counts but not count rate, and the exposure time for the high ones was 180 s and the low ones was 120 s. In our observing log, we'd just noted 180 s the whole time, since this was the intended exposure; I guess that at some point my co-observer decided that the S/N was good enough to reduce to 120 s and didn't note it. Thus, I didn't even consider this and glossed over the difference in the header until reading through the full 'diff'.

Monday, May 1, 2017

RA Drift

Problem(s) Encountered:
The drifting problem seen yesterday returned. The telescope would be tracking a target and suddenly would start drifting in RA. (I could see the RA changing on the TCS monitor.) This happened both while guiding and when not guiding. RA was always increasing. Sometimes it would just move a little bit and then stop for a while, but eventually it would just start drifting until a new movement command was sent to the telescope. I was able to do some imaging with 2-3 minute exposures, but when I tried to do spectra or longer exposures it would start drifting before the exposure was complete.
This happened with the last 4-5 targets I attempted, and drifting typically started anywhere from 5-30 minutes after moving the telescope to the target.
Since I was unable to find a target that the telescope wouldn't drift away from, with about an hour left until twilight and clouds getting thicker, I decided to close up for the night.

Solutions:
Knowing that the RA indicated the motion is a good data point. It points towards mechanical issue. Also, knowing about the squeak/squeal is a good thing. In fact, I heard it this morning as well. I lubricated areas that seem to have, in the past been sticking points (pun intended) and run the telescope. Motions do sound much smoother although I could be tricking myself. Regardless, numerous slews followed by leaving it to track showed no discernible change in RA, so that's a good thing.
In regards to the bearing, I'm not ready to "go there" yet. That said, I pulled the inspection plate off and took the chance to clean it out. Visual inspection of the limited area that can be seen shows what appears to be a bearing in very good shape.
Now not much else to do except take a wait-and-see approach.

Friday, April 28, 2017

Network Connectivity Issues

Problem(s) Encountered:
Internet was lost from ~1:00 am until ~3:00 am. I did not do anything to try to fix it, as I did not want to break anything further.
Internet came back around 3:00 am, and seems to be working fine now.
Connection to the telescope seems to have been fine all night.

Solutions:
There has been a persistent issue over the past number of days with something going on with network routing through the UofA, which ultimately feeds the mountain. I've seen some emails from NOAO staff in regards to this recently.

Tuesday, April 25, 2017

Rotator Offset Error

Problem(s) Encountered:
I noticed today that the rotator angle is systematically offset by about -1.5 degrees (i.e. I had to add +1.2-2.3 degrees to get it about right). Previously I had thought it was a problem with the angles in my object list, but comparison with ds9 showed a consistent offset. Although the seeing is good, the actual offset is hard to measure without a dedicated effort; I am not sure if it is a constant offset. I went back and verified that this issue was in the first image I took, so it preceded my run.

The website instructions say not to play with the rotator encoder without consulting staff, so I merely accounted for it in the remainder of my observations.

Solutions:
Rotator was off by 1.6. I carefully aligned the rotator to zero. This is done by raising the platform and peeking in above the rotator on the north side. There are a roller and detent (remnants of the old rotator system) that, when the roller is in the detent, indicate that the positioning is zeroed. With the system reset to proper alignment I ran the rotator through paces and noticed no error accumulating.

Sunday, April 9, 2017

We've got bears

Problem(s) Encountered:
This trouble report is about a bear. At about 10:15 pm, a car alarm went off. I went outside with a flashlight and saw a bear halfway in my (rental) car with its paws on the steering wheel. The car was unlocked but had no food or drinks in it. The bear had opened the car handle and caused no damage. I pointed the flashlight at it and made some noise, and the bear ran downhill into the bushes.

The reason for this report is that the bear seems to have learned that cars sometimes have food, and it has learned how to open them; I doubt it can manage knobs, but there are some doors on the facility that could be pried open. I suggest that future observers lock their car doors.

Solutions:

Please taken care to be more vigilant and cautious when on-site, particularly when alone. MDM staff are keeping garbage housed in the 1.3m shop (except during business hours on days when pickup is expected). Please keep food and garbage out of your vehicles. And lastly, please report any sightings.

Thursday, April 6, 2017

Dome AZ Cable Disconnect

Problem(s) Encountered:
The dome azimuth stopped reading during an exposure, with the result that the dome repeatedly kept trying to correct its position because it couldn't see that it was moving, and walked away from the target.

Solutions:
It was still early, so I called Eric; we established that neither direction was registering. He suggested power-cycling the dome connector box near the top of the ladder in the dome.

When I went to do this, I discovered that the wastebasket that is being used temporarily to shelter the box had blown off the ledge in the high wind, taking the box with it -- the box was hanging by the threaded connector, and the other had pulled out.

Simply re-connecting that connector solved the problem. I closed shortly afterward due to high wind, which is a rarity in my long experience. (Thorstensen)

Thursday, March 30, 2017

Prospero Connection Issues, IC & TC

Problem(s) Encountered:
Went to first target of the night and prospero showed IC DOWN and TC Down. Thought this was an error and went to zenith to trouble shoot
but a quick fix of restarting prospero with tcinit in command window worked

Solutions:
Possibly did not have to restart Prospero. A simple "startup" issue may have resolved the problems.

Saturday, March 25, 2017

Airbag Control PC Failure

Problem(s) Encountered:
Noticed the issue when trying to focus for the start of the night. Stars would not focus, mostly crescent/triangle shape. Tried moving focus to extremes but did not help.   Parked the scope and started to look through trouble reports.
Went into computer room and noticed Air Bag system was showing Error from cycle Not Ready on several lines
there was another error message about a certain cycle when error occurred but did not write it down

At first thought it was an issue similar to Airbag Pressure Failure and tried typing h1 on air bag keyboard. Nothing happened so then assumed it was an issue where the computer needed restart. Restarted the

computer and typed support into system. Reading went to 30lbs so assumed that fixed the problem (if that was the cause at all) went back out and everything seemed fine. I assume it was actually something with the air bags from the previous report (Oct 13 2012) that mentioned the stars being smeared + the error messages on the computer

Solutions:
A reboot of the control PC was in order from the sound of it.

Saturday, March 25, 2017

B4K HE Woes

Problem(s) Encountered:
From about 4am, CCD readout was abnormal.
(showing pixel value=0 at the 4th quadrant or stripes in the x-axis.)
eg. sample : 170319.0104~0114.fits

Auto dome also stopped from ~ 4 30 am.

I tried HE box power recycled, restarted prospero.
But these issue still remain.

Solutions:
Replaced the chipset in the dome encoder interface and it appears to be working correctly. At least for now.

As for the B4K—issue seems to be within the B4K head electronics (HE). Consulted with Jerry Mason and Rick Pogge. On the assumption that it was a thermal issue, checked and verified that both fans in the HE were working—they are. Opened up the side panel and allowed electronics to cool for ~45 minutes, but issue persisted. Pulled the "junk" board out of the R4K HE and swapped it into the B4K HE. However issuing a *seqinit* command led to errors with the sequencer not even being seen. Verified fiber placement to be correct but problem persisted. Replaced the B4K junk board and verified that the B4K system still failed in the same manner—it did.
Consulted the group currently scheduled on the 2.4m and concluded that the best approach at least for tonight was to swap in the R4K and see if they can at least get data. R4K is on OSMOS and currently cooling. I will stick around to verify it is working. Tomorrow, options will be explored as to whether or not to swap to a different spectrograph for the final night of this run. Of course, Proxy Queue observations start next, so right now, unsure on how we'll proceed for that.

As an added bit of fun for today, Caliban failed. Luckily have a spare. Swapped that in and got it back up and running. The failed Caliban will be sent back to OSU for repair.

Sunday, March 19, 2017

Dome "Fugue" State

Problem(s) Encountered:
The dome entered its infamous fugue state and would only register rotations in the clockwise direction.

Solutions:

After talking to Eric, I unplugged and re-plugged the power cable on the dome encoder box. All worked fine after that.

Monday, March 13, 2017

Telescope Motion Failure, hand paddle

Problem(s) Encountered:
The telescope stopped responding to the paddle (N/S directions only). E/W worked fine, but N/S there was no response. Tried with the single direction, direction+set and nothing worked. Eventually tried direction+slew and the telescope moved. That seemed to correct the problem, but that was an alarming issue.

Solutions:
I have seen this happen occasionally, but it almost always corrects itself within a matter of seconds. Worse case scenario, stow the telescope and reboot the TCS (http://mdm.kpno.noao.edu/index/ Hiltner_2.4m_files/TCS_reboot.pdf) should resolve the issue.

Tuesday, February 28, 2017

Mirror Cover Fail-to-Open

Problem(s) Encountered:
The mirror cover wouldn't open right away. I closed and opened them again, and the last one opened after quite some time.

Solutions:
Pneumatic cylinder for the west petal had a leak that would occur in cold (humid?) conditions. Cylinder has been replaced.

Tuesday, February 28, 2017

Slit Acquisition Software (OSMOS)

Problem(s) Encountered:
We (attempted) to follow the new procedure for guiding with no success. Any changed to the guide star X (and Y) did not move the object to the slit. The guide star would recenter but would did not seem to move the telescope. We eventually switched back to using the MIS.

Solutions:
From Thorstensen:
You have to be fairly close for the procedure to work, i.e. the new XY pixel coordinates have to be within the guide box (typically 60 pixels on a side). Here's
a procedure that should work for you:

1) Use whatever procecure to get a target into the slit.

2) Once you're in the slit, be sure the guider XY stage
 is as the position given by JSkyCalc. Note the

position of the guide star on the screen (see (4)
below if the guide star is off the screen).

3) When setting on subsequent targets, use the hand
paddle to set the telescope so that the guide star falls
at nearly the same point on the guider screen. This
is a lot easier if the telescope is pointing fairly well
so the guide star is easy to identify.

4) If in step (2) the guide star is not on the screen,
or is close to the edge, jump the guide stage by steps
of 500 counts in DX or DY until it is. Note the
amount and direction of the jump that put the guide star
where you wanted it, and apply that consistently to
all subsequent acquisitions.

This worked perfectly for over a week in August, so I don't think there's anything wrong with the procedure.
It's intended for moves of maybe 10 arcsec, and it's
extremely accurate for that.

Sunday, February 26, 2017

Duplicate files and Frozen Prospero

Problem(s) Encountered:
During run Prospero gave warning errors that files already existed
and created new files

was able to open files with no issue so did not think this was a real issue

around twilight prospero froze. had to force close and restart
would not respond to startup command in prospero

had error messages in Caliban but did not copy them down and program closed
had CB:-SYNC in prospero window

I found a trouble report about prospero data collection failure and thought the checklist would help.
was going through the IC-to Caliban transfer disk error recovery procedure check-list
and had error in Caliban: specified disk not synched

Solutions:
Headed up and found that the IC was hung, non responsive. ctrl+alt+del to reboot. Brought everything
back up after that without issue. Took some test frames and all looks well.

Not sure why the duplicate files thing is happening to you. When I ran test frames yesterday, I used the
file names *test.nnn.fits* and did not have an issue with duplicate files. This link discusses possible fix for
the issue:

http://mdm.kpno.noao.edu/index/Double-Files.html

Friday, February 24, 2017

Queue Observing Issues

Problem(s) Encountered:
Dome would randomly jump ~180 during exposures, went out noted dome position and reset encoders .
 This worked however it needed to be repeated after about two exposures.

Really confused with what happened the rest of the night...

Had already taken spectra with no problems. The guider computer was set up so screen had a box roughly where the guide star needed to be in order for target to be in slit.

Guide star did not show up and quick search nearby showed nothing. Tried to move around to different guide stars but this did not work. Reset MIS and tried again. Thought this fixed the problem but on exposure could not locate target. Tried cycling MIS one more time

Next guess was the telescope was in the wrong spot, double checked RA& Dec listed. Went to nearest brightest star and it was not there (had done this at start of the night with no problems). Went to zenith and did TCS reboot, realigned with tilt sensors. Observed another target, everything worked fine

Next target up in rotator angle, target guider was not going to correct location again, thought this was an issue with the rotator angle (have had issue before) reset guider/MIS did not help. Moved rotator back and tried another target and believe it was the same problem as above
----
Double checked all RA & Dec were listed correctly and that inner slit was selected in Jskycal and tracking rates/ rotator angle were correct
---
Not sure what happened tonight, Went back and looked at images where I could not find target, found one , ran
osctrtask, it asked for + 2500dx

Not sure what happened or why it failed so quickly after TCS reset

Solutions:
Not really sure what is being reported here. Was the problem that the target was seen in the science camera but no guide star was found, or was everything off, indicating a telescope set issue?
I can say that the tilt sensors appeared to be off some relative to what they should read at zenith (since replacing the load cell on HP2, tilt sensors have been around **0.11 & 0.07** when at zenith).
I went ahead and brought everything down and back up (excepting the HE and IE on OSMOS, which remained powered up). It was worthwhile to give *hiltner* and the workstation a reboot anyways. With everything fresh, I've been moving the telescope around, checking the guider (as much as one can during the day) and checking the MIS. All appears well to me. We'll see what happens tonight. Just please remember to set to the appropriate tilt sensor values if reseting encoders at zenith.
As for the dome, I went ahead and replaced the chip set. I did this after seeing a similar sort of jump in encoder readout. I also "wiggled" the wires to the IR heads and blew them off with compressed air. After doing this, the system appears to be working a bit better. Not sure yet how much better. Only time will tell.
One potential way to keep the dome from walking away in the middle of an observation is to turn "Auto Dome" *off* during scans. As error builds up, auto dome could be briefly turned back on to zero the error (error > 5 degrees or so) after ensuring that the readout for dome azimuth is roughly equal to that of the telescope. Once the dome resets to match telescope azimuth, auto dome could then be turned back off.
 In the meantime, if the dome azimuth readout changes to a nonsensical value, the observer could reset it

through the TCS GUI before enabling auto dome. This would certainly require more user interface and tending, but it might be useful if desired.

Monday, January 30, 2017

Multiple Issues x2

Problem(s) Encountered:
Normally let dewar fill until steady flow however tonight I waited too long and when moving back tank dropped dolly creating hole/chipped paint.
This is my fault as I should have been paying more attention. Went to clean up mess and more paint chipped away, not sure if this causes any issues outside of cosmetics

As mentioned thought issues with telescope from previous day were caused by seeing/weather or improper focusing. Used the prospero script call focus4k#### could not get rid of coma-like appearance. Followed instructions from Eric's email however same results when focusing with B filter. Results were the same with/without filter. (Same results with OIII filter too.) Ran movie on 1k and moved through focus just in case I missed something. I am unaware of anything else I can do to fix this issue and believe it is something with collimation. Have multiple request for imaging in queue however can not get usable data with these conditions

Went on to try spectroscopy and dome was off 20 degrees each move. This is a problem I have encountered multiple times and will move dome to home after turning off auto dome, reset leads in dome encoder box, set dome encoders to home (320). This normally fixes the problem for the night however that was not the case tonight. This problem reoccurred
three times, each time I reset as above. Also noted that when homing for end of night dome was off again. (the yellow light also appears to be out in computer room)

When taking some images noticed double star/ trails. I have also had this occur in previous run and knew resetting TCS should solve the issue. Parked scope and followed
http://mdm.kpno.noao.edu/index/Lightning_Hiltner_files/TCS_reboot.pdf
During first reset TCS Link was still down after TCINIT in prospero. Not sure what caused this but tried check-list again, it worked.

Had to establish pointing with the telescope after reset and as mentioned zenith tilt sensor readings require 4K readout to find star. I don't remember having to use 4K in previous runs, it's not a real problem as star is in image but it is time consuming.

Tried to move telescope to -2h HA and heard loud thump. Went out to check and as suspected the west mirror cover was closed. Moved telescope to +4H to see if gravity would open cover but did not. Climbed up and opened cover. Tried to move telescope to another target and same issue. I checked gauge in dome and pressure was normal. I know Eric warned of this in an email however I thought it was only an issue during closing. Moved telescope back to +4h HA and opened mirror cover again. Thought about using rope to keep mirror cover open but considering the focus and all other issues tonight decided against it. When moving back Zenith heard mirror cover close again, went back out and opened to have cover close in correct order. Moved telescope to ~2h HA to close however mirror covers closed in wrong order.

Solutions:
Earlier this week, the load cell for HP2 of the primary mirror support system failed, along with the power/ data link to the pneumatic/electronics interface box (Sussman box on the north side of the mirror cell). I replaced the load cell, recompiled the code with new calibration coefficients for the new load cell and

brought the system back online. In doing so, I also ended up having to reset the zero point for the load cell for HP1. I had a feeling that this may impact collimation, and it does appear that it has. Right now, things appear to be "good enough" for the majority of spectroscopic observations, and even some imaging programs. That said, collimation will be revisited, likely some time in the 2/1-9 frame. I hope to use the Andor CCD to collimate since it provides the best feedback to see real time changes relative to fixture adjustments. In the meantime, I think it is ok that we limp along as is. Anyone who is in the queue for observations on this current run, especially for those requesting imaging, should be advised of this.
UPDATE, 02/14: On 02/07, collimation was touched up and is now better than it has been for many months.

Not sure how the "O-50" dolly was dropped. It all checks out ok thankfully. Care should be implemented when moving the O-50 as the siphon tube inside is plastic (nylon? fiber glass?). Also, with the tank under ~15psi of pressure, and filled with LN2, any damage to it has the potential to cause serious damage to equipment or worse, personnel. The paint chips on the platform are superficial and not a big deal.

The dome continues to be an issue. What I have found with tests today is that when demanded to moved CCW (descending AZ encoder counts), the display often jumps by large amounts (e.g. 320>290>260>255 instead of 320>319>318>317). Certainly even one of these jumps and the dome will be lost. When this has occurred, it is only upon initially starting movement and then seems to correct itself. It has never occurred for CW movement. A potential simple workaround is to watch the dome AZ readout and if a large jump is noticed, to immediately switch off auto-dome and reset the dome to the telescope azimuth (if the telescope and dome are still co-aligned). I really am unsure what else to do with this system. The failures are so intermittent and touching any portion of the system seems to have an impact (positive or negative) that troubleshooting is extremely iterative (read: frustrating). Worst case, the dome can be controlled manually. Not ideal, but it's a work around.
UPDATE, 02/14: Dome encoder issues seem to be highly temperature-dependent. When I performed subsequent tests, then worked on collimation on the night of the 7th, I saw no dome encoder issues at all.

TCS testing has shown no issues whatsoever today. Not sure what else to say about this one.
UPDATE, 02/14: Other than tilt sensors values at zenith changing (now +0.11 & +0.07), I have seen no TCS issues. In fact, telescope pointing/setting has been reliable over the past 10 days and tracking (with guiding disabled) has been steady and positive.

The west mirror cover subsystem failed. I replaced the two needle valves on the cylinder and initially this appeared to solve the problem. However, subsequent testing indicates otherwise. The problem is limited to the west cover. Air flow goes up to the telescope where it enters a manifold that feeds both the west and east covers (one T-off for each of the two air lines). Since the problem does not show itself on the east cover, the only other thing it could be is in the lines to the west cylinder, or the cylinder itself. Testing the lines, valves and cylinder, I find no leaks. So I'm left thinking that the problem is either with the cylinder, or with an ice blockage. I've been running N2 through the system all afternoon in hopes of mitigating the problem if it is indeed an ice blockage. We will also look for a spare cylinder as replacing the cylinder is a relatively trivial job. In the meantime, it seems like the cover will open and close as commanded, even if sometimes it takes a little effort. And my hopes are that it will start to work more consistently as the temperatures start to rise again. I've spoken with Jessica, and she is ok with tying off the cover to force it to stay open if there is another failure with it. Not optimal, but it is a work around. For tonight, I'm tempted to, and may, leave the covers open before I depart the mountain.
UPDATE, 02/14: The issue with the west mirror cover seems to be extremely temperature-dependent. No issues with the cover at all over the past 10 or more days.

Thursday, January 26, 2017

RA Motion Issues

Problem(s) Encountered:
The hour angle motion and east-west coordinate readout is showing some serious-looking symptoms - I'm wondering whether yesterday's adjustments had some unintended consequences.

The telescope will occasionally stop tracking altogether, though the drive keeps trying -- it's as if the motion jams up. This happened three times. Also, the pointing drifts relatively quickly, necessitating a coordinate reset with nearly every slew. The error appears to be entirely along east-west. As the telescope guides on an object -- so its true RA is really constant -- the indicated RA creeps upward at the rate of something like 20 seconds of time per hour.

There's also a fair amount of squealing, and they don't sound like squeals of delight. The last time the telescope jammed, I heard a short, rhythmic chirp coming from the dome that sounded for all the world like some kind of alarm. I went out to investigate and found the RA drive pushing, then slipping, then pushing, then slipping -- didn't look good!

One possibility that occurred to me was that one of the support rollers on the main drive is going, but when that happened before the failure was more gradual -- the telescope developed a rhythmic slip/ recover motion that would last for several minutes and occur at random, and which grew steadily worse over several months. The present symptoms weren't happening at all the previous nights -- in fact, the pointing was pretty good.

Solutions:
I found that when tracking was initiated, or when moving at SET speed (same motor), there were occasional, non-periodic high-pitched squeals accompanied by a slowing, and sometimes *reversing* of the drive train. It is hard to hear exactly what was squealing, but my best guess is one of the clutch interfaces, designed to slip when running at non-slew speeds. I lubricated this clutch interface and the occasional squealing has completely gone away, as has the odd drive anomolies (tracking drive belt slowing/reversing). However, the RA continued to slowly climb over time when tracking is turned on. This corresponds to the telescope drifting *east* if I'm correct, or tracking slower than desired. I've tightened the cam that provides contact to the drive friction plate and have gotten that drifting to all but disappear. Time will tell if this is a fix. I'm wondering if this is temperature related.

Wednesday, January 18, 2017

Multiple Issues

Problem(s) Encountered:
Not really a problem but lost twilight flat time to make sure that no water was on mirror. (A lot entered the dome when opening) Climbed up didnt see any standing water on mirror covers. Went ahead and opened to take flats. First flat had distortion in middle of frame.

 Didn't know if I missed something or if it was condensation inside so ran both the dry nitrogen and moved telescope over to double check mirror again. Mirror was fine, after 15min took another exposure, no distortion so must have been condensation.

Later the dome encoders failed. This is a problem I have had almost every run. Went into dome, reset dome encoder box, set encoders to home. Moved to next target without a problem.

Guider failed to move in x direction, used same solution as last time, quit MIS, reset machine in computer room then restart. No problems

Noticed the RH jumped from 75 to 95 (on wa readout). Not sure what happened it lasted about 30 sec before dropping back to within standards.

Towards the end of a long exposure noticed lost guide star. This was very confusing, no clouds outside, went into dome to see if dome failed again, dome was fine. Thought it was guider probe failure and reset MIS. (had failed earlier) Moved back to target and started tracking. Took an exposure and noticed star with trails (tear shaped). Moved guide probe back to position and watched stars drift out of image. Thought the problem was something with tracking so did a TCS reboot.   First attempt at restarting TCS forgot to move dome back to home and the rotator to zero so had to move dome/ rotator then restart.

Following TCS reboot, set track rate 15.06 and moved on to tilt sensors.
Aligning with tilt sensors (zenith, reads 0.05,-0.03) first time after aligning moved to nearest brightest in 1k image and nothing was there. Moved back to zenith and reset sensors with sidereal time again. This time was able to see nearest brightest and reset guiding. Not sure what caused the issue, believe it to still be an issue with TCS since restarting TCS solved the problem.
Lost a good portion of dark sky to this problem as the moon was up by the time I got everything working again.

No other problems occurred and the last part of the night was more productive.

Solutions:
N/A

Sunday, December 18, 2016

Guide probe Issue at Large Rotator Angle

Problem(s) Encountered:
Same issue as previous runs with guide probe not going to correct location. Target NGC4395 first attempt with rotator -80, and guider angle -10. Guide Star field was very sparse and was not able to use same trick as last time by moving guider to different star locations, noting where a star was located as the guider moved and then moving back to that location to find a guide star. Had to instead decrease angle to -60 which allowed guider to find
a guide star no problem. Not sure if there is a real solution or if changing angle is the easier fix. lost 20 min or so trying the guider trick that had worked before giving up and changing the angle.

Solutions:
Not sure what could be causing this, or how to test it. My only question is in regards to the guider angle being set to -10. By the equation (-90-rotator angle), shouldn't it have been set to -170? Or is there some sort of wrap-around? If anyone has any input on this issue, I would be most welcoming to it.

Monday, December 12, 2016

Light Not Reaching Detector (ModSpec/Nellie)

Problem(s) Encountered:
This time, the problem really does appear to be the ModSpec shutter.

We were able to take calibration data, but once we tried to go on sky an hour or so later, we couldn't get any signal. We troubleshot using Jules's advice from last night - we could see stars on the slit-viewer, we

tried every combination of the open shutter checkbox and the open/close shutter button in OWL, we could hear the shutter clicking, we restarted OWL. We then tried power-cycling the shutter control box, which also didn't work.

On Eric's advice, we shone a light into the ModSpec eyepiece and took a quick exposure - this gave us signal, indicating that Nellie was still OK. We then unplugged the shutter control from the detector electronics box and then switched the shutter to open manually. This still didn't work, and Eric said it would be best to wait until he could take the shutter out and investigate further during the day, so we closed down.

Solutions:
I hate to admit this one, but the problem was actually caused by the set screw on the eye piece being left loose, causing the eye piece to slide back into the beam when the telescope slewed south for the initial target. An extremely unfortunate oversight that led to a lost night.
The good news is once again, the shutter continues to work perfectly, as does Nellie.

Monday, December 5, 2016

Light Not Reaching Detector (ModSpec/Echelle)

Problem(s) Encountered:
The ModSpec/Echelle shutter is not working.

When we started taking calibration files at the beginning of the night, all of the images came out like bias frames. The open shutter box was checked, and we also tried using the open/close shutter button within OWL. We also restarted OWL, which did not solve the problem.
With Jules Halpern's help over email, we troubleshot issues with something else blocking the slit, and determined that it had to be the shutter.

Eric called and offered two options: power-cycling the shutter electronics control box or unplugging it from the detector and throwing the shutter open completely for the whole night. We did power-cycle the control box, but this didn't fix the issue. We decided that we don't want to mess with the electronics or deal with the always-open shutter, so we called it a night and will wait for the staff to look at the electronics tomorrow.

Solutions:
Turns out it is not the shutter, or anything with respect to Modspec. Something is going on (again) with Echelle. I am able to get it to see light, sort of, if I shine light incidentally in through the access port by the grating. Otherwise, it's always bias levels. Tried using the electronics interface for Nellie and Templeton but still nothing useful. Swapped in Templeton since it is still cold from being on the 1.3m last night and sure enough, spectra! So I am currently looking at pulling Echelle and setting up with Nellie.

Since this was written, Echelle has been tested twice, but both times with a different power supply. All appears to be well with Echelle. This is very strange and currently, I have little faith that the problem is resolved. More tests will be performed as time and scheduling permits.

Sunday, December 4, 2016

Dome Manual Control Button (Yellow Button)

Problem(s) Encountered:

It appears the indicator light for the dome manual control button has burnt out.

Partway through the night, we noticed that the yellow button wasn't illuminated anymore. We were worried that the dome had somehow switched itself into manual mode, but when we pressed the button it switched to manual mode and we realized that the light was just out. We returned it to auto mode and continued observing with no problems.

Solutions:
The connection for this light is intermittent. Cycled the switch and the light came back on. Maybe some quiet day I'll go in an see what's what with this connection.

It is worth noting that even if the light does burn out, it bears no impact on telescope systems functionality.

Saturday, December 3, 2016

West Mirror Cover Fail-to-Open

Problem(s) Encountered:
After taking a break to let the clouds clear somewhat, we attempted to start up again. When we did, the West mirror cover petal did not open, though we could hear it trying. We slewed as far as we could to the W and a bit N to see if we could open it by gravity, which didn't work, so we used the rope to pull it open. It opened far more gently than it usually does, and when we attempted to slew over to a new target, it immediately closed itself again.

We went back to zenith, closed all the mirror covers, left them alone for 30 minutes while another cloud went over, and then tried to re-open again.The west mirror cover petal still will not open, so we're calling it a night.

Solutions:
Needle valve adjustments have been performed. More work will be needed to fine-tune the system, but it is at least working again. One thing to note is that if a problem occurs where the west petal is stuck on the baffle, the telescope should be slewed *east*, not west. This allows gravity to shift the baffle slightly, freeing up the petal.

Thursday, December 1, 2016

Proper LN2 Fills

Problem(s) Encountered:
Around 2 am, background count was ~8000. I figured out it is because of
high CCD temperature (~ -35). It is weird because I filled liquid nitrogen and 5:30pm and I checked the nitrogen leaking which means it is totally filled.

Anyway, around 3 am, I refilled nitrogen again, temperature went down, and background count came back to normal value.

Solutions:
An improper LN2 fill can ruin your night, and perhaps the next couple nights as well! It's always better to waste a little extra LN2 and be sure the detector is full. The LN2 should be pouring out at a steady flow before stopping the fill. If there is any question, consult with MDM staff to see a demonstration of a proper fill.

Thursday, November 24, 2016

osqlsp Software Issue (OSMOS)

Problem(s) Encountered:
Issue with osqlsp, when trying to check spectra wouldn't show final graph with wavelength on two
exposures for a target. got error message

IrafError: Error running IRAF task dispcor
IRAF task terminated abnormally
ERROR (752, Seek error on file (mdm24ws1!/lhome/obs24m/thor/oscenter/x0452.ms.fits))

not sure why, tried restarting pyraf/ osqlsp but still wouldn't open final graphs for the two files (first 2
graphs seemed normal) however took two more exposures and those worked so no real impact on
observing but would be interested in hearing the solution to prevent future problems

Solutions:
The osqlsp failure appears to be because the spectrum did not extract properly for some reason --
the .ms file is the 1-d spectrum (four of them actually) extracted from the 2-d image. These failures tend
to be due to some unanticipated feature of that particular image. (John Thorstensen)

Friday, November 18, 2016

Mirror Cover and Dome Rotation Failures

Problem(s) Encountered:
As mentioned the mirror covers closed in the wrong order W E on top N S
Called Eric and helped him pull covers open.

After Eric left went to first target and dome continued to spin CW. Tried a couple of solutions but finally
sent dome home, cycled power and reset @ home to 320 that worked for a few targets. This happened
several times throughout the night, resetting seemed to fix the issue for a few targets then back to
spinning. When sending the dome to home it was off by 20.
Stopped trying to fix dome and just went to moving dome manually for rest of night.

Solutions:
Since both, the east and west petals had closed incorrectly, there was simply no way for a single person
to resolve the issue. Indeed even with two people, it is a fight to get the E/W petals up high enough to
allow for the N/S petals to open. This issue was likely caused by a failure with the compressor used to
actuate the pistons used to cycle the petals. The compressor tripped, likely leading to the petals closing
in an uncontrolled order. Compressor has been running reliably since the trip early yesterday morning.
 That said, work has finally begun on plumbing in a "new" oilless compressor, purchased ~1 decade ago,
that is housed out by the compressor used for the airbag system. This will act as a replacement, moving
the currently used compressor into the role of spare system. This will provide added redundancy to the
already in-place backup of N2 bottles.
As an aside, when working on getting the mirror covers open last night, I found an elastic rope connected
on the far eastern edge of the southern petal. Pulling on it broke the strap. This appears to have no
impact on system performance, so I am unclear as to what the purpose of the band was.

Tested dome motion this morning and found that the encoder was not reading out CW motions. This would lead to the symptoms described below. My guess as to why the dome behaved for some targets after rehoming the system is that targets desired demanded dome motion in the CCW direction. I cycled the connection to the dome encoder interface box, correcting the problem. Numerous tests were run throughout the day to ensure that the system is functioning properly.

Tuesday, November 15, 2016

Rotator Motion Failure

Problem(s) Encountered:
The first issue was that the instrument rotator failed (i.e., the hand paddle in the dome didn't work).
I came inside and tried to issue a command for a small rotation through the GUI, which also failed and sent up an error message that the mirror covers were closed.
I verified that the mirror covers were indeed all open.
As in http://www.astronomy.ohio-state.edu/~martini/osmos/rotator.html, I turned the power on the rotator box off and on and restarted the GUI. The rotator still didn't work and gave the same error message. I thought I would close and open the mirrors again, so I stowed the telescope, and closed the mirror covers. However, they would not open again when I flipped the switch. Not sure what else I can do, but at least this happened at 4 a.m.

Solutions:
Check valve on the compressor got stuck open, causing the compressor to run at full duty cycle. This overheated the motor, which subsequently went into thermal shutdown. As pressure bled off, the mirror cover petals could not stay fully open, causing the rotator to balk.
Cleaned up the check valve and it appears to be working correctly again. Also, I tore apart the air transfer line and fittings and cleaned them up as there were some small leaks there as well.
We are looking at finally performing the swap over to the oilless compressor system for the mirror covers and brakes. This will put the load on a much newer and cleaner compressor, and result in the old compressor being relegated to spare status.
Lastly, I showed the observer how to use the N2 bottles to pressurize the system in the event that the compressor fails again.

Thursday, November 3, 2016

Humidity & Weather Sensing

Problem(s) Encountered:
Not sure if related to sensor but when moving to a new target the guide camera failed to find star. Tried restarting and center guide camera to verify position, still nothing. Walked outside to see if something was wrong
and noticed it was very humid out but WA sensor was reading RH in 70s.
When walking back inside noticed the telescope AC display screen blinking blue stating Sensor Disabled- system appears to be malfunctioning

Parked the telescope and closed the dome. Restarted the WA sensor which now reads RH above 85.
 The warning on the telescope ac display is no longer there but will stay closed due to humidity for rest of night as precaution.

Solutions:

Unless there were clouds passing through the FOV, I suspect the lack of a star in the guide camera and the sensor (or humidity) were unrelated.

The "System Disabled - Sensor appears to be malfunctioning" is something that happens with the mirror AC system with fair regularity. In the past, it would typically last for days and require a system restart, often accompanied with either swapping ICs and/or uncalibrated jiggling of the ribbon cables between the electronics interface and the control PC. Now, while this still is required from time to time, often the "issue" will resolve itself within a matter of minutes. Not wholly satisfying, but certainly an improvement. Currently, the AC system appears to be functioning correctly, although there is evidence in the plot of anomalies throughout the night.

That all said, the mirror AC system, and its accompanying humidity/temperature readouts is completely unrelated to the values displayed through the *WA* widget, which gets it's readings directly from the Davis Weather Module, as well as the weather stations for ARO and the VLBA (and the dome status from the summit). Not sure why or how this could have failed to continue updates. If in doubt, weather stats can be viewed on the wall-mounted display, behind the TCS display in the control room, or they can be viewed directly from the Davis system display within the computer room. Both of these were checked this morning and are also functioning properly.

It should also be noted that a second Davis display box is located in the 1.3m control room.

Sunday, September 11, 2016

Dome Home Error

Problem(s) Encountered:
When closing down due to high humidity auto dome sent the dome to 020.
Turned off Auto Dome and manually moved dome to home position to close.
Could have continued by manually moving dome however stayed closed
due to humidity for rest of night.

Solutions:
Upon arrival on Friday, the dome AZ readout was incorrect. After a reset to 320 (home), the telescope and dome were moved around without issue. I suspect this was simply a case of the dome getting lost upon homing. Likely, any subsequent attempts to automate dome control during the night would have been successful.
For good measure, connection to the dome control interface box was cycled as well.

Thursday, September 8, 2016

Propsero Data System Issues

Problem(s) Encountered:
The data-taking system had problems. First, during a series of biases the machine started claiming that the file it was writing to already existed - it claimed to be trying to write to 157, but the file number had already incremented beyond that, and in any case it made up a string of characters and saved the data. To cure this we followed the instructions in Duplicate Files Generated by Prospero (CCDS) which involved quitting prospero, quitting caliban, quitting the IC, powering down the IC and the caliban disk, and starting back up. The first time we did this prospero would not 'startup', so we did it again, and it worked. However, when we tried to take data we got

TELESCOPE CONTROLLER NOT RESPONDING ACQTAG=OSMOS

even though tcstatus gave normal results. Telescope information was evidently not written to the headers. We ended up quitting from all four of the control programs, powering down the IC and caliban, and bringing everything back up from scratch. Things appear to be working now, but weirdly the Prospero Status window is not painting completely -- it doesn't
have the nice ledger lines and so on. I'm not sure what information is missing, if any.

It sure would be nice if this system were simplified.

Solutions:
I believe you did the correct procedure for resolving the data-taking issue. Not sure why it balked on the telescope controller, or really even what that refers to. Incidentally, I did find that "Num Lock" on the keyboard had been shut off. This leads to issues with key-mapping that can affect interaction with the TCS GUI. I turned it back on and am consulting with David Will on steps to take to disable this undesired consequence of *Input Methods*. As for the Prospero status window: I performed a *status clear* in the Prospero command window and that resolved the display issues. Interestingly, simply typing *status* returns some of the display to the window, but not all of it, leaving it in a configuration as you described in the trouble report.

Tuesday, August 16, 2016

Dome Tracking Failure

Problem(s) Encountered:
The dome is not following correctly, and it was immediately apparent that the cause is that the encoder is only registering changes in one direction of rotation. We set the dome manually for half the night

Solutions:
Tried cycling power to the dome encoder interface ("buffer") box. This often helps when the dome setting becomes unreliable. However in this case, with the encoder only counting in one direction (CCW if you're interested), this did not resolve the issue. Replaced chipset in the dome encoder interface box and verified that dome azimuth changed predictably in both directions. Slewed and tracked the telescope around a bit with the dome slaved to it and sent the dome back home (Dome Home). All worked well. Not sure why this chipset fails with relative frequency, once or twice a year. It is a bit concerning as a couple of the chips are no longer produced and subsequently are becoming more and more difficult (and expensive) to find. As an aside having nothing to do with anything, I found that the *External Computer* switch (top-left on the TCS panel) was flipped up, ON. I believe this is typically left down, in the off position, although it probably doesn't matter for anything.

Tuesday, August 16, 2016

Guider Failure

Problem(s) Encountered:
The guiding system did not work: the guide star showed oscillations.

Solutions:
I noticed that the x- & y-speeds, found under the *Settings* tab, were set to -8 & 8 respectively. While this is the case for observations on the 1.3m, the 2.4m currently, due to some nebulous bug in the TCS, needs to be set to roughly -16 & 16, as noted in the manual (http://mdm.kpno.noao.edu/Manuals/guiderdoc/autoguiding.html#using).

Sunday, August 7, 2016

Rotator Connection Failure

Problem(s) Encountered:
The rotator did not work:
When we tried to rotate the instrument, the buttons in the hand paddle in the dome and the rotator GUI did not work both.

Solutions:
As the manual says (http://www.astronomy.ohio-state.edu/~martini/osmos/rotator.html),
we turn off and on the rotator electronics box and it worked.

Saturday, August 6, 2016

Mirror Covers

Problem(s) Encountered:
We encountered this problem when I opened the 2.4m dome around 11PM:
All of the mirror covers failed to open.

I found two possible solutions.

1) Changing COMPRESSOR/CYLINDER valve
I found this in the 2.4m manual (http://mdm.kpno.noao.edu/24_manual/hilt09.html).
But it seems that I was not allowed to do this.

2) Clearing a hung up mirror cover petal
I found this from the trouble reports: 2.4m, Closing Mirror Covers
http://mdm.kpno.noao.edu/index/Trouble.html
But I don't know I can do this or not because
I am afraid to take the risk of injuries (how much dangerous is it?)
as the solution mentioned.

So, we could not solve this problem.
I figure that none of the staffs will go up to the mountain during weekend.
Please let me know what can I do to fix this.

Solutions:
Found the condensate trap immediately downstream from the compressor had, well, blown up. I am guessing it became internally clogged with debris over years of use and ultimately, the pressure had to go somewhere. See attached image. The plastic collar at the top of the trap completely sheared. I looked for a spare trap but it does not appear we have one on site. Nevertheless, I was able to find parts from old traps (o-rings, fittings, pass-throughs) here and there and build my own. It is now installed and appears to be holding pressure. The only downside to this kludged trap is that there is no obvious user-set pressure regulation or gauge on it, as there were on the old trap. Still, checking pressure at the gauge farther down-line in the dome, it is only running a few psi higher than nominal: the old trap regulated at 80psi, the new "system" is running at ~85psi. This should be tolerable for the time being. I'll plan on buying a new trap soon.

While up here, I also tested out the N2-fed backup to the compressor-driven system. It works as described. See images below for the valve that needs to be turned to swap between the two feeds. This valve is found immediately *east* of the N2 (orange) bottles in the *southwest* corner of the dome. Regarding opening stuck mirror covers—obviously this was not the issue. Still, you did the right thing by not trying to cycle them by hand if you had any concerns at all. Safety first! It is a somewhat jolting experience when they pop open suddenly.
All systems are now up and running. Sorry you lost an entire night for this.

Friday, August 5, 2016

Dome tracking issues

Problem(s) Encountered:
the dome lost its positioning and tracking. The positioning issue may be due to observer error in accidentally reseting the dome encoders
We stowed telescope, turned off auto dome and tracking, and manually moved the dome to home position. Then reset the dome encoders and started everything back up.

This solved the position issue, but not the tracking. Dome would not adjust position during long exposures.

We continued to move it manually so that we could take data while trying
to troubleshoot. This didn't last very long as bad weather moved in before we had the chance to find a solution.

Solutions:
Verified that the problem existed—when the telescope was slewed to a position via the TCS GUI, the dome would follow correctly. But then as the telescope tracked, error built up (>7.1 degrees) without the dome correcting. I then moved the telescope manually, using the hand paddle. The dome followed accordingly once again. This time however, the dome corrected for the accumulating error while the telescope was left tracking. Did this a couple more times to verify what I was seeing. Indeed, as long as the telescope was moved manually, the dome would move, and track, correctly. If the telescope was moved via the GUI, the dome would fail to track. I know this is a "huh?!" moment, but it's what I saw. Power-cycled the dome controller box in the computer room and restarted the TCS GUI. After this, several tests, both yesterday and today, and the dome appears to be functioning normally. We will watch for this to occur again while on-sky, weather permitting.

Monday, June 27, 2016

Echelle Failure

Problem(s) Encountered:
Telescope would not record data from the slit and only recorded zeros, not even a bias level. Called Eric Galayda at beginning of night to try to find a solution. he tried restarting the computer, restarting the electronics on the telescopes and none of these seemed to help. The electronics box was then shut down for an hour to let it cool down, but at this point KPNO had closed the 4m due to smoke so the dome and telescope remained off for the rest of
the night.

Solutions:
Turns out to be a problem with Echelle. It looks like the problem is within the electronics box for the detector, which apparently is specific in use to Echelle. Found nothing obvious upon inspection of all

boards and components. Reseated everything but the problem persists. The electronics box has been sent to ARC and we are awaiting word on what they find out.

Monday, June 20, 2016

OSMOS IE hung

Problem(s) Encountered:
When moving filters and disperser for a new object, OSMOS stopped responding. Any filter change command just ran silently and never terminated. I tried restarting the IC and all the various operations windows, but could not restart the instrument.

Solutions:
Found the OSMOS IE terminal window missing and Prospero in some sort of limbo. ^C and quit Prospero then opened the OSMOS IE terminal. Opened Prospero and attempted a *startup*. Very early into the startup procedure, the OSMOS IE terminal indicated a segmentation fault and started a 10-down countdown followed by closing the terminal window. ^C and quit Prospero again then power-cycled the IE (IEB), black box on the north side of OSMOS (switch on the east). Back at the workstation, opened the OSMOS IE terminal window and Prospero. Had no issues when doing a *startup*. Took a test frame and all is working fine.

Friday, June 3, 2016

Tracking stuck ON

Problem(s) Encountered:
The 'track' switch on the front panel does not seem to work. Whenever the 'drives' switch is on, the telescope tracks no matter what position the track switch is set to. So there was no impact on observing, but when parking the telescope at the zenith it is necessary to turn off the drives switch in order to suspend tracking.

Solutions:
This has been seen previously as well. It is a state that hangs in the TCS PC. The solution is to reboot the TCS computer (making sure to note the focus position, reset the track rate to 15.06 and reset telescope encoders by the tilt sensors).
Computer reboot and everything should be ready to go again tonight.

Wednesday, June 1, 2016

OSMOS and certain KPNO Filters

Problem(s) Encountered:
[Although] the seeing is good, there is always strange tails around bright stars in Halpha band.

Solutions:
For some of the KPNO NB filters the issue is that they are not flat enough to be used in the OSMOS collimated beam. I say some of the KPNO NB filters because we used two of them in February and there were no issues. These were a pair of 2x2 inch filters that corresponded to a redshifted Halpha line. Unfortunately, you don't know a priori which NB filters from the KPNO inventory can be used successfully

in OSMOS. However, there is a list of approved KOSMOS 4" filters given on the KPNO web site. These might be the place to start.

http://www.noao.edu/kpno/filters/KOSMOS_KPNO_FILTERS.html

For reference, the flatness specification for new OSMOS filters is described here:
 http://www.astronomy.ohio-state.edu/MDM/OSMOS/filterspecs.html
Any of the existing KPNO filters that do not meet these specifications could produce such distortions.

Monday, May 9, 2016

Guide Probe and OSMOS

Problem(s) Encountered:
In many images or imaging flat field, there is a dark region, which I don't know the reason.

Solutions:
That dark region on the left of the displayed frames is the guide probe vignetting the image. This is easy to do when using OSMOS for direct imaging. See the following link:

http://www.astronomy.ohio-state.edu/MDM/OSMOS/#guiding

Monday, May 9, 2016

R4K Quadrant Noise

Problem(s) Encountered:
The upper-left quadrant (as oriented when opened in ds9) of R4K has developed a rather extreme increase in noise, as though the readnoise jumped by an order of magnitude.
To illustrate this, I subtracted the overscan of a bias frame with proc4k.py and plotted a random row in the upper half (row 610 of a rroi4x1k image). In the right side (corresponding to the upper-right quadrant), the mean is 0.14 with an RMS of 1.9 counts, very much what we expect. On the left side, the mean is -0.29 with an RMS of 13 counts.
See here for the dramatic increase in noise in the left half compared to the right: http://www.phy.ohiou.edu/~chornock/science/bad-bias.tiff
Or get the FITS file here: http://www.phy.ohiou.edu/~chornock/science/n1.0002b.fits

This electronic noise appears to be additive, not multiplicative, and it is sufficiently close to random that averaging N biases lowers the RMS by sqrt(N) without revealing any clear pattern. However, the amplitude is sufficiently large to make that quadrant of the detector useless for faint object spectroscopy.

I looked back at my biases over the past year and found that this was not present last fall. In March, that quadrant was noisier than the others, but at a lower level than it currently is. So clearly there is a bad trend.

I was doing long-slit observations of single objects, so I put objects in the bottom half to avoid this bad quadrant. However, the lower-left quadrant has its own issues. There is obvious pattern noise after subtracting the overscan which is not stable from frame-to-frame, but which you just have to live with.

Solutions:

No solution really exists for this yet, but this is some information pertaining to tests performed the next day:
Post Amplifiers for each quadrant (one per quandrant) were swapped around to see if the issues would follow PAs. It did not appear to. Interestingly though, when they were put back in their original configuration, the problem appeared to improve by roughly a factor of 2. Unfortunately, through the night, the problem appeared to once again worsen.

Wednesday, May 4, 2016

Guide Probe Motion Failure

Problem(s) Encountered:
When we moved to our first target and tried to start the guider, we found that it wouldn't move in the X direction.
Resetting and Reinitializing the MIS didn't help, nor did sending the guider to the Origin.

Solutions:
Talked to Eric and he suggested quitting the MIS GUI, power cycling the MIS box in the computer room, then restarting the GUI.
Once the MIS GUI was back online, everything worked fine.

Thursday, April 14, 2016

Setting RA/Dec Encoders (input fields)

Problem(s) Encountered:
Had trouble with setting RA/Dec encoders - if you use a bright star from JSkyCalc and don't update the coordinates in the xtcs window, the RA/Dec encoders don't set properly (they set to whatever coordinates are in the xtcs window NOT the next object coordinates).
The result of the RA/Dec encoder problems was that the telescope got lost and hit a west limit. Was able to get it out by slewing East.

Solutions:
This one is new to me. Whenever the RA/Dec encoders have needed to be reset, the standard procedure from my experience has been to enter the coordinates in the the xtcs GUI and click SEND. This places the desired coordinates in the "Next Object" line on the TCS Display. Then when appropriate, click on "Reset RA/Dec encoders" from the pull down menu. This has always been the way I've known to reset the encoder readouts. From what the current observer showed me this morning, simply entering the coordinates in the RA and Dec fields on the xtcs GUI and clicking "Reset RA/Dec encoders will send the new coordinates to the TCS.
To exemplify, last night, an object was found using JSkyCalc and centered up. Different coordinates were listed in the RA/Dec fields on the xtcs GUI, *but SEND was never hit*. With the correct coordinates showing on the "Next Object" line on the TCS display (but incorrect in the xtcs GUI RA/Dec fields), "Reset RA/Dec encoders" was hit. The coordinates reset to the values shown in the RA/Dec fields (the incorrect coordinates)*, not* the coordinates listed on the "Next Object" line.

From John:
As it turns out, the program resets the encoders to the
numbers that show in the xtcs gui on the main computer, not to the 'next object' coordinates. This is a distinction
I didn't understand when I wrote some of the documentation,

so there is very likely some bad advice out there with my name on it.

Monday, April 4, 2016

Andor (slit-view) Failure

Problem(s) Encountered:
Around midnight, the Andor slit viewing camera failed. We ended up using retrocam for some imaging for the rest of the night. The next day the problem with Andor was solved by setting the gain from x4 to x2.

Solutions:
What are the chances—same problem as experienced on 2/6 at the 1.3m (http://mdm.kpno.noao.edu/index/Solutions/Entries/2016/2/6_1.3m%2C_Andor_(direct)_failure.html). 4x gain pre-amp seems to have failed. Will not work at 4x with any readout rate (50kHz, 1MHz or 2.5MHz). Other pre-amp gain settings continue to function however (1x & 2x). Will wait for the observer to wake up before swapping out to the other camera as running under the 2x pre-amp gain may be sufficient.

Incidentally, for future reference, to test the pre-amp integrity, and switch to a different value if needed, the user would bring up the "Setup Acquisition" window in the Andor SOLIS software and choose the *Setup CCD* tab. Center-right is a box for 'Horizontal Pixel Shift'. Nominal settings are a *readout rate* of 2.5MHz @ 16-bit with a *pre-amplifier gain* of 4x. In this current case, switching to a *pre-amplifier gain* of 2x allows for imaging.
Once it is determined if running at 2x is good enough for slit-viewing, we will need to decide whether or not to send this camera in for repair, and if so, what the priority on it would be.

Thursday, March 3, 2016

Prospero Com Errors

Problem(s) Encountered:
11)While taking a loop of flat fields in the afternoon (with go 10 command), files stopped being written to disk.

22)Prospero lost contact with the IC during evening twilight.

Solutions:
11)Re-started all of the data acquisition software components and the problem did not recur.

22)Reboot the IC and everything worked smoothly after that.

Monday, February 29, 2016

RA Tracking Oscillations

Problem(s) Encountered:
At 4:45 am, an image came up on the display that was trailed in segments. Looking at the telescope coordinates, the RA was oscillating back and forth. Inspection of the drive showed that it too was oscillating back and forth. I obtained a 20 sec video of it with my cell phone. Rather than risking anything further, I turned off tracking and stowed the telescope. Not sure if this is a balance problem or some other issue with the tracking system.

Solutions:
Attempted to reproduce the problem the following morning with no failures or issues. It seems this problem is at least currently, transient in nature. I would suggest if it happens again that the observer shuts off tracking and drives and cycles the power on the TCS control box in the observing room. This may (or may not) resolve the issue.

Wednesday, February 24, 2016

Airbag System Fault, Small Visible Motions

Problem(s) Encountered:
The problem from last night repeated itself twice, where the telescope jumped around and the mirror airbag forces fluctuated between 15-70. The first incident occurred close to the same time as it did last night - around 0730 UT. It subsided quickly and we continued observing. The second time was around 1030 UT, and lasted for at least 30 seconds. We slewed back to zenith, turned off tracking and drives, and waited half an hour. After that it was fine.

Solutions:
Problem is with HP1, specifically where the connector plugs into the electronics on the back of the telescope. Pulled the cable for the H1 hard point sensor and cut the connector off. Redid all solder points to the wires as cleanly as I could (have I mentioned how small these wires are?) and tested the cable for continuity. Reconnected the cable and brought the airbag system back online and all appears to be functioning. Slewed the telescope around while watching the sensors and saw no failures. The real test will be a few nights on-sky as the problem was intermittent at worst. If this turns out to not solve the problem, the issue likely lays within the female end of the connector, on the electronics box itself.
If this occurs again, the simple workaround is to swap the system to "pressure-equalization" mode, by disabling feedback associated with HP1. This is simply done by typing *h1* at the airbag keyboard. Do not expect an echo of the command. Once issued, the observer will notice a string, indicating that HP1 is disabled and that the airbag pressures for all three subsets attempt to equalize pressure between them. It is also worth noting that while disabled, HP1 measurements will still read out and update real time. This would get the telescope through the night with little impact to observations. Incidentally, to get back to standard operating mode, the observer would once again type *h1* to enable feedback associated with HP1, then type *cn* to return to normal operations.
Telescope is currently being slewed about to test the integrity of the readouts, particularly HP1.
The observer will note that the airbag control computer has been swapped, as has the keyboard.

Saturday, January 30, 2016

Dec Moving (North)

Problem(s) Encountered:
Around 4 am while attempting our fourth target, our field images were all streaks. We then realized that the telescope would continue to slew after reaching the RA/Dec of the intended target. The telescope would continue to slew in positive declination. I found some similar issues in the trouble logs, but nothing that I could find a solution to.

Solutions:
Verified that the problem exists. Wording was a bit confusing as the telescope was not slewing after-the-fact, but instead setting, or even clocking, to the north whenever the drives were powered up. Stowed the telescope and cycled the TCS computer using the online manual (http://mdm.kpno.noao.edu/index/

). After the TCS was back online, reinitialized connection, reset the focus encoder to the stated value prior to cycling the PC and tested the telescope. All seems well again. I'll attribute the problem to a hung bit. Hopefully it is not a sign of a board starting to fail…

Monday, January 11, 2016

OSMOS Disperser Wheel Timeout

Problem(s) Encountered:
During the night, the disperser showed problems every time when we changed the disperser wheel from Blue (#1) to Open (#2). We encountered this problem about 8 times until 2AM and we could solve the problems following the troubleshooting in manual. However, after 2pm, turning off the IE and restarting Prospero did not help anymore. We turned down IC and it seemed to solve the problem. However, again, the disp shows the same problem. We tried same procedure again, again, and again, and finally gave up. I'm not sure we can observe tomorrow.

Solutions:
Exchanged email with Eric and logged in remotely this morning. Found that the disperser wheel microlynx controller was not responding to remote serial port commands.

Quit the OSMOS IE program, and verified that the Comtrol serial port server was releasing all the ports normally. Then restarted the IE program, verified that it connected to the Comtrol normally, and confirmed at the disperser microlynx was still not communicating.

Used low-level IE commands to power cycle just the disperser microlynx
controller and reset communications. This restored serial communication with the disperser wheel controller.

I ran a few diagnostics and had no problems, so I attempted to repeat the reported problems by running a Prospero script that did a repeated series of 200 moves between disperser position 1 and 2 (the positions where the observers reported problems), with a pause between. All moves completed without faults.

On repeating this sequence, I got an out-of-position fault indication after about 30 moves. The disperser wheel correctly reset on a "disp reset" command from Prospero, and after running some quick checks, was able to run another 200 moves as before without problems.

I did not get any repetition of the communication time out fault reported by the observers.

After consultation with Eric, I left OSMOS in a working state, and instructed the observers to proceed tonight. I send the lead observer an email asking that if they have problems before 9pm MST/11pm EST, to email me immediately and not take any corrective actions until I can login and see what state the disperser wheel is in. If the problems occur after I go to bed, I gave the observers some special instructions for recovery procedures that may give us useful information.

On Monday once Eric is back on the mountain, we will run some more tests, and may decide to swap the disperser controller to one of the spare controllers. These tests require a person to make a visual inspection of the fault LEDs on the microlynx unit, as if we again get into a state where the microlynx drops serial communications, we cannot use remote commands to read the error buffer.

Saturday, December 26, 2015

Mirror Cover Pneumatics Issue

Problem(s) Encountered:
When we were closing up, one mirror cover (the one farthest from the garage door when the telescope is at zenith) did not close. We had turned the drives switch off shortly after hitting the mirror cover switch, if that might have had any effect. We solved the problem by switching the mirror cover switch to open again (which did not actually open any additional petals) waiting a bit, then flipping it back to closed again. Then the one petal finally closed itself.

In the middle of a long observation around 0500 UT/2200 local, as the dome was rotating towards Az=10 degrees (moving in decreasing Az) we heard a loud sound like a door slamming. It was not either of us. We couldn't find anything visibly wrong with the telescope, and all the readings were normal. So we finished our exposure, shut off the auto dome, sent the telescope to zenith and closed mirror covers (the humidity has also been dancing around, so we didn't want to worry about that too) and inspected the dome for any problems.

Solutions:
The remainder of the reported issues are actually related to each other. Checked the mirror covers this morning and as suspected, found the West cover to be the last one to have closed, meaning they were no longer in order. I used the carabiner and rope to pull up on the west cover to allow the other petals to open. They opened quite slowly. The west petal opened, but seemed to have very little pressure to hold it in the "open" position. Indeed, I could easily push it over and it would slam shut and not open back up. This is the last petal to open in a system that effectively distributes pneumatic (air) pressure in series. Therefore, if there is anything throttling back the air pressure upstream, this petal would show symptoms more readily than any other. The dome was opened to allow the temperature inside to come up (it was warmer outside than in the dome) above freezing. The pneumatic lines, as well as the cylinders, were all warmed with a hair drier. Problem solved. After allowing the telescope, and subsequently, the pneumatic system, to warm up a bit more through the day, the pneumatic lines from the compressor to the relays were purged, exhausting more water than I've ever seen from them. This is somewhat surprising as the lines were purged yesterday as well. Perhaps some of the condensate yesterday was in solid state? I don't know. Regardless, a lot of water was removed. The line will be purged again before we depart for the day.

In summary, I think there was a slight ice plug in the line, limiting air pressure to the cylinders, and thus limiting the holding force applied by the cylinders to keep the petals, especially the West petal, up. I believe this also limited the closing pressure on the same petal. I think this led to the issues exhibited when closing the telescope this morning. In addition, I think this also led to the west petal slamming shut at some point during observations last night. My theory from this morning was that this was the actual cause of the BANG, and not a door closing. I held off on writing this up until I could get some more information from the observer. The information received appears to bolster this theory—counts on a star were mysteriously lower last night than expected when running an integration, leading to the need for a longer exposure time. All this—the BANG, the reduced flux, and the issues with closing—points to issues with pneumatic flow to the mirror cover petals resulting in one of the mirror cover petals being closed through observations. The second BANG witnessed can also be explained by this: the air pressure in the system was slow to come back up (~80psi). Once it did come back up, the petal opened up again. But with little holding pressure, fell back down as the telescope was moved to zenith.

Tuesday, December 15, 2015

Guider Failure

Problem(s) Encountered:
At one point in the evening (0145 local/0745 UT) we found a guide star and set up the autoguider, but within 30 seconds the guider started moving the telescope by 10-20 arcseconds at a time, even though we could see the guide star clearly in the guide camera box (briefly, until it lost itself). It basically moved in larger and larger circles until we stopped auto-guiding. We tried changing guide stars, and the problem repeated. We guided by hand for that target, but didn't encounter the problem again.

Solutions:
This sounded to me like the rotation angle on the guider software was not set correctly for a nonzero rotator angle. Verified with the observer that this was indeed the case. [-90 - rotator position]

Tuesday, December 15, 2015

Closing Mirror Covers

Problem(s) Encountered:
The only serious problem was in the afternoon of 12/13, when I was attempting dome flats. The mirror cover petals closed in the wrong order. Eric G. talked me through the procedure to get them to open again, and I was ready to go before sunset.

Solutions:
Mirror covers were closed when the telescope was pointed over for dome flats, causing them to close out of order. As stated in documentation, the mirror covers should only be cycled with the telescope pointed at zenith. Standard procedure for correcting the issue was described, in detail, to the observer. This can be found in the telescope documentation. With the proper instruction, and the 1.3m observer acting as spotter, he was able to correct the issue.

From the telescope documentation:
"Go out in dome and *verify* that all four mirror petals are up.
The mirror petals are driven open by a pneumatic air system. If there's a failure in that (e.g., ice in the lines) they may not come up; also, they barely clear the sky baffle so they sometimes hang on that.

Clearing a hung up mirror cover petal is an intrinsically dangerous operation, but here are the instructions if you wish to try. Alert the 1.3m observer and have them come up to watch, or at least tell them that if you don't get back to them in 10 minutes they must come up to summon aid in case you injure yourself. Using the control paddle stored on the west side of the telescope, slew the telescope way over so you can get access to the sky baffle. Get the aluminum ladder and a stick about 5 feet long (e.g., a broomstick). Get up on the ladder. *That petal is going to open explosively!!! Look out where it's going to go before you do anything!!!!* Once you're sure you won't be knocked off the ladder by the opening petal, gently push on the sky baffle to free the cover. BAM! - the cover opens *violently*. Stop shaking and climb back down. Tell the 1.3m observer that you're OK."

Sunday, December 13, 2015

Dewar Warmed Up

Problem(s) Encountered:
WIth the bad weather, I never opened nor closed. As a result, I stupidly forgot to refill the dewar and the CCD warmed to -3 C.

Solutions:
Came up to verify that all looked ok with the detector as well as to pump on it prior to refilling, just to be safe. Waited until the temperature for the detector was above freezing before pumping and cooling. If the dewar ever warms up, especially this much, it is imperative to notify staff before simply refilling as ice can form on the window or chip.

Friday, December 11, 2015

Documentation and Power Blips

Problem(s) Encountered:
At around 3 AM the main power shut off briefly, 1--2 seconds, a few times. I had recalled reading in the MDM manuals before arriving that there were procedures for determining if we were on generator or back-up power, but I didn't recall the specifics and the power interruption killed the Internet, which was my primary link to the MDM manuals. So both I and the observer at the 1.3m had trouble figuring out what to do in the case of the main power having brief interruptions. The paper manuals in the observing rooms are scattered and some pages note that they are out-of-date. I couldn't locate the discussion of the power supply in the main paper manual in the 3-ring binder in the notebook. Conservatively, we both decided to follow the lightning shut down procedure, just in case the power troubles worsened/or we were running on battery backup. The next day, Eric noted that the MDM pages are on the local intranet, and so could still be accessed without internet connectivity, but you need to know the IP address. That fact should be posted in the control room. And perhaps all of the basic emergency/hazard procedures (not just the lightning shutdown) should be printed out in a single red three-ring binder.

Solutions:
As far as I know, we have no documentation for what to do when there are 1 or 2 second power blips. Not sure what there would be to document since there really is no procedure to worry about when this happens. Being on a remote mountaintop, we are prone to power blips, especially during bad weather. The best way to tell if the facility is on generator power is to listen for the generators. Another way to verify is that certain appliances no longer have power, such as the coffee maker, the tv, or the microwave. Bringing documentation up-to-date in the control rooms is an ongoing process. That said, paper manuals are either kept orderly on the shelves, when bound, or in the case of the quick startup and shutdown procedures and the lightning shutdown procedures, on the bench, where they are stacked before the start of each observing program. Useful documentation pertinent to MDM are already up-to-date. I will go ahead and fast-track updating the KPNO emergency docs and binder and amend it to include our lightning procedures in detail. This will also include the IP address for our online support, which can be found locally at 140.252.83.20. Home pages on the work station web browsers have been updated to reflect the IP address instead of the one given by the name server.

Thursday, December 10, 2015

Tilt Sensor Display Errors

Problem(s) Encountered:
In the evening we lost pointing and restored it using the tilt sensors, but the E/W sensor showed 0.00 with no change until we tapped the monitor, at which point it showed the correct value.

Solutions:
This may have been the source of a number of anomalous readings regarding the tilt sensors. I verified this afternoon that tapping on the E/W tilt display did indeed change the readout, sometimes somewhat drastically. I pulled the display out of the rack and checked connections and found the E/W connector to

be somewhat loose. I reseated it and installed the display back in the rack. The readout remained constant when any further tapping was made. It will be good to watch this, but I think we may have solved the issue with wandering tilt readouts.

Saturday, November 28, 2015

Dome Rotations and Erroneous TCS Messages

Problem(s) Encountered:
At the end of the night the dome encoders got lost and the dome started rotating and getting stuck, occulting the telescope (possibly similar to the fugue state mentioned in prior trouble reports).

The TCS stated (and continues to) Dome occulting telescope and Attempting to move with drives off and RA or DEC encoders not responding (earlier it just said Dec). We manually moved the dome to home at the end of the night and put the telescope at zenith, but both may still be somewhat lost.

We tried to follow solutions from the archive, but nothing seemed to work. Since daylight was breaking, we didn't investigate pointing, but the telescope was able to basically find zenith.

Solutions:
First thing I did this morning was to reset the telescope to zenith via the tilt sensors. Declination was good, but HA read -0 1 1ish.

Reported dome position was incorrect when we arrived today. Dome was at the home position physically, but Dome Azimuth read something around 20. Reset the Dome Azimuth encoder to 320 via the Setup menu on the xtcs GUI. Moved the telescope around with the dome slaved to it. Errors in dome position were almost immediate. Values for the position would increment in both directions, unlike yesterday, but the slit was misaligned from the telescope. Further telescope motions were accompanied by the dome turning in the wrong direction. Never seen that before. Stowed the telescope and performed a "Dome Home". Dome encoder went to 320 but dome was significantly off. Moved dome manually back to the physical home position and reset the encoder once again. Before switching the yellow "Auto Enable" switch back on, I power-cycled the dome controller box (red switch above the Auto Enable switch). With power back on, I manually moved the dome 360º in both directions. Encoder agreed with physical position throughout. With "Auto Enable" back on, more telescope/dome tests were performed. The dome followed the telescope perfectly. The dome also stowed correctly when switched from "Dome Free" to "Dome Home". Telescope/dome will be exercised more this afternoon, but right now, there just aren't issues to fix.

The "Dome occulting telescope" message is completely normal when the telescope is pointed to zenith. This is not a problem and is detailed in the Telescope Manual, Section 5.6.4 (http://mdm.kpno.noao.edu/24_manual/hilt05.html).

The "Attempting to move with drives off" message typically occurs when the telescope is still trying to go to a position demanded via the xtcs GUI and the drives are powered down. This can happen if the observer shuts things off before the move is completely executed. One way to know a move is complete is to check the "Next Object" entry for Hour Angle. If there are numbers, the telescope is still moving. If instead, the display appears as * * * then the command is likely complete. Aother way to know is that in the display on the lower-right, it will say "Move Complete". Hitting the "Stop" button in the xtcs GUI will also complete the demanded movement of the telescope. An interesting aside that I noticed was the RA entry box on the xtcs GUI was tinted red this morning upon arrival, unlike the normal cream color. Upon issuing my first demand to move the telescope, it went from red back to cream.

Ra & Dec encoders not responding is a red herring. It is a known bug with the telescope, dating back to the *olden days*. See: http://mdm.kpno.noao.edu/Manuals/mdmguide_current.html#dgotchas

It was also reported in the Run Report that "*In addition, slightly after this problem started, the Dec encoder stopped responding and thus we basically lost tracking (stars appeared as streaks).*" I'm unclear what this means. Did the encoder really stop updating even though the telescope was moving in declination? Was it reporting inaccurately? By "tracking", do you really mean "guiding"? As stated previously, everything with the telescope has been tested this morning and at no time have I seen any issue with the declination (or telescope at all for that matter). The guider software also looks to be set up and running correctly. More tests after lunch, but if nothing develops, there should be no addendum to this report.

Monday, November 23, 2015

Dome Motion Issues

Problem(s) Encountered:
When homing the dome at the very end, it got stuck at AZ 95 degrees, which is - if I am not remembering incorrectly - the same location it gave me trouble a few nights ago. TCS however showed that the dome was properly at home ! Manually drove it to 320....

Solutions:
Checked out the dome this morning and found that the encoder readout would only increment when the dome was moved in one direction. Also, not surprisingly, when the yellow button was pressed (computer control), the dome started up with the fugue state—never stopping because the encoder never read out to the desired '320' home position.
Opened up the electronics box for the dome encoder and replaced the *MM74C221N*, Dual Monostable Multivibrator IC. Ran a series of tests slewing the telescope around with the dome slaved to telescope position; also sent the dome to the "home" position. All tests were successful.

Saturday, November 21, 2015

Guider Communications Issues

Problem(s) Encountered:
The most severe problem was the guider and guide probe failing or malfunctioning.

Apart from generally not providing accurate positions for possible guide stars via Jskycalc (which may have to do with the pointing problem), the guide probe showed some erratic behaviour.

At one point during a routine procedure to put the object into the slit, the guide probe would not move when given the dy command in the MIS window. dx moves, and moves of the telescope apparently worked fine (as I could see a guide star moving appropriately when dx commands were issued, or the hand paddel was used in any direction, including y).

In addition, the guide probe did not move to y positions issued either by Jskycalc or in the xMis window-- that window would INDICATE that a move in y had been made, but looking at the screen, one could clearly see that
nothing had happened (star stayed in exactly the same position).

Furthermore, the guiding itself went fairly poorly, as positional errors would not be dampened, but rather increased rapidly -- despite having the recommended settings for X and Y speed.

In order to get objects into the slit, I manually jogged them in their after having calculated have far to move. A bit cumbersome, yet not critically destructive. The biggest problem, however, is that the guiding fails ! For longer exposures, that it obviously a huge problem - I basically reverted to the old fashioned put a box around a guide star, and keep it manually in there procedure, but given the rapidity of it marching out of the box, this is very cumbersome.

Solutions:
The control port on the guider was erroneously set (should be LPT378, as stated in the Autoguider Manual, section 2.1.2). Looks like a default reset was accidentally issued at some point last night. I've gone ahead and reset that back to the correct setting.
The last problem checked was the guide probe. This turned out to be the most problematic. It quickly became apparent that motion in the y-stage was not occurring. Attempting to reset the MIS (drive the guide stage to the limits, 0,0) would not complete. Fortunately with OSMOS installed, I could look into the port to check for stage motion. There was none, although I could hear the motor turning. Further checking and it was confirmed that the drive belt had split. At 1430, we removed OSMOS and the bottom plate of the MIS. The linear drive screw had to be removed to pull the belt, as did the motor and encoder wheel. This is nontrivial, but we were still able to get things swapped in time for Paul and Tony to catch the bus down. I stayed behind to get OSMOS cabled up and bring the software back online, as well as to consult with the observer (plus a few loose ends at the 1.3m).
Just heard from the observer and all is running well on the 2.4m tonight.

Monday, November 16, 2015

TC>IC Link Fault

Problem(s) Encountered:
Apparently, there is a problem with the TC>IC link, which manifested itself in a rather interesting way.

Operations went perfectly smoothly, until around UT 07:00, when the program we use to get the objects into the slit (osctrtask on a pyraf session on /hiltner) started complaining, and ultimately aborting with the following error message :

****
Exception in Tkinter callback
Traceback (most recent call last):
 File /usr/lib/python2.3/lib-tk/Tkinter.py , line 1345, in __call__
   return self.func(*args)
 File /usr/local/pkg/lib/python/pyraf/epar.py , line 789, in execute
   self.runTask()
 File /usr/local/pkg/lib/python/pyraf/epar.py , line 1041, in runTask
   self.taskObject.run(mode='h', _save=1)
 File /usr/local/pkg/lib/python/pyraf/iraftask.py , line 271, in run
   self._run(redirKW, specialKW)
 File /usr/local/pkg/lib/python/pyraf/iraftask.py , line 1074, in _run
   apply(self._pyFunction, pl)
 File osctrtask.py , line 259, in osctrtask
   obsep, rotangle = biasquads(acqroot, acqimage)
 File osctrtask.py , line 165, in biasquads
   rastr, decstr, eqstr, rotangstr, filtid2str, objectstr, exptimestr, datestr, timestr, jdstr = hselout[0].split('\t')

ValueError: unpack list of wrong size
****

I looked at the FITS headers for the files in questions, but could at first glance not find what may have been wrong in those compared to the ones used just before that error message.

Everything else behaved totally normally, and there were no apparent warning signs that something with the TCS link may have gone awry.

Since I was able to circumvent the problem of not being able to use this specific tool for slit alignment, I simply began jogging the objects into the slit manually, and encountered no other problems.

However, when towards the end of the night, I looked over the TCS agent console messages, I found out that ever since then error messages like the following had occured :OUT: TC>IC DONE: TCSLINK=Down
DATE-OBS=2015-11-14 TIME-OBS=14:37:40.654
TIMESYS=UTC JD=2457341.109498 MJD=57340.609498

It hence seems that the TCS server does not communicate with IC. Restarting the TCS PC (as per the description provided) successfully brought that PC back into normal operation mode (which had not been affected anyway), but the TCSLink remains down. The Prospero Status window, however, shows both TC : Up + TCSLink in green (and hence I did not check the TC>IC communication earlier, as I had no indication that the problem could be rooted there).

The red power supply indicator lamp on the TCS Power rack has begun
flickering.....

Before messing unneccesarily in my tired state with this, I have decided to leave the problem alone (also because the weather forecast predicts two nights of almost zero chance to observe).

Solutions:
Logged in and saw the errors in the TCS Agent Console terminal. Performed a "Clear Link" in the TCS GUI (under <<Setup>>, then issued a *tcinit* followed by a *tcstatus* in the TCS agent console terminal. Doing the *tcstatus* issued current and correct header info. Did a test scan via prospero and checked header information. Saw no errors and the header looks fine. Additionally, the TCS Agent Console terminal indicates *tc=active* now instead of the erroneous *tc=down* previously.
Incidentally, the light on the TCS power supply, in the computer room, does tend to blink. This is normal. There is no need to power cycle the TCS. In fact, I wouldn't recommend ever power-cycling it without it being a last resort (or imminent storms).

Friday, November 13, 2015

Rotator Motion Failure

Problem(s) Encountered:
The main problem I encountered was that the rotator hit the limit and stopped working. I was observing a target where the parallactic angle was near -77 deg, which should be within the limits of the rotator. I was out in the dome rotating from a PA near zero to that angle and I heard a sound and was then unable to rotate back any more (i.e., back towards PA=0 deg, not the direction I was going). I tried going back and forth in both directions but all that did was to move up to the limit of -85 deg.
This was near the end of the night, so I just used PA=-85 for the remaining objects and I left the telescope in that rotated position.

Solutions:
The hint in the report was the statement "...*I heard a sound...*". That sound was the connector for the CCW limit cable snapping apart and subsequently disconnecting. This is why the rotator could only be moved in one direction—it assumed it was in the CCW limit.
A cable wrap that is mounted to the mirror cell and routed around the rotator snagged or came free or something. Hard to tell what happened first. But included in that wrap is the CCW limit switch cable, along with a number of other cables. When it came free, it snagged the cable wrap that rotates with the rotator and pulled taught, resulting in the CCW limit cable connector ripping out. Overall, we're lucky.
 The connector itself is in good shape, as are the pins. I've reconnected it to the electrical panel and duct taped it into place until I can order some spare connectors (206429-1 4-pin Male CPC plug) and perform a real fix. Also luckily, no other cables were damaged. Almost surprised about that.
The offending cable wrap has been connected to the mirror cell in a much more rigid manner and where possible, cables exhibiting a potential to snag were shored up as much as allowable. All systems test out functional.

Wednesday, November 11, 2015

Guide Probe Motion Failure

Problem(s) Encountered:
Around 2AM local time, the guide probe stopped responding to commands.

Solutions:
I fixed this problem by power cycling the MIS controller box in the computer room and re-initializing the MIS application.

Sunday, November 8, 2015

"Coils Appear to be Frozen"

Problem(s) Encountered:
The AC computer is saying: "Coils seem to be frozen! Defrosting to 13 C. Coil heater ON."

but the coils aren't frozen as far as I can tell -- I opened
the hatch and looked at 'em -- and the A/C cooling coils are at
9 C, close to ambient.

Solutions:
The temperature sensor for the coils does not appear to be well calibrated. The temperature for this fault can be set by the user by hitting 'i' on the AC computer. I believe it is safe to set it as low as -6. The temperature to which the coils need to warm back up to is also able to be set by the user (default is the ambient dome temp). This can be set down at or near 1C without issue from what I can tell. Note that any user-set values return to defaults if the program is restarted.

Saturday, October 24, 2015

Guider Exposure Window Shrinks

Problem(s) Encountered:

At one point it got into a state where, under the guide tab, when I hit expose, it only took a postage-stamp size picture.

Solutions:
The cure was to go to the guider settings popup window, in exposure settings at the lower right, and press the reset button.

TCS START Button Does Not Turn on TCS

Problem(s) Encountered:
The START controller switch on the TCS would not turn on due to an apparent issue with the telescope platform.

Solutions:
The telescope interlock was manually overridden (switch is up in the Telescope Control Junction Box). This should not be done without consulting with MDM staff first. The problem arises from a limit switch not being actuated as the platform is lowered. This switch has been adjusted and should actuate correctly now.

Prospero-MIS Communication Issues

Problem(s) Encountered:
Attempted to take lamp flats, but it seemed like the lamps were never turned on using MIS, as the resulting images did not show any lines. Didn't worry about this, as was likely not going to open, and could also do this at the end of the night.
At the end of the night, attempted again to take lamp calibrations and Prospero would not update its GUI when lamps were turned on or off with MIS. Subsequently tried to RESTART, but Prospero complained (error has
subsequently been lost, but it essentially was that ISIS connection
was lost). IC and Caliban were restarted, and entire startup procedure was done. Prospero listed everything up and running, but lamp status still would not update. When took spectrum (which was empty again of expected lines), received following error :

IC> WARNING: ERROR: Host not found ACQTAG=OSMOS.19800104175805

IC> WARNING: Telescope controller not responding. ACQTAG=OSMOS.19800104175805

Made no further attempt to correct.

Solutions:
This morning, saw the errors as listed in the trouble report. Verified that the lamps were functioning correctly by moving the Finder to "IN", the Guide Probe to "CENTER" and watching on the guide camera as I cycled through the lamps. Lamps are all ok.
Ran a "snap" through prospero and got no errors. Also used prospero to cycle the lamps on/off without issue. Running a "go" resulted in the same errors as reported. Quit prospero, HE was power-cycled and IC reboot. Brought prospero back up and ran some test images. No more errors. In addition, verified

that prospero is indeed updating Finder mirror position as well as lamp status. Did not have to restart any connections to Caliban, ISIS, etc.

Guide Probe Motion Failure

Problem(s) Encountered:
...the x and y guider stages do not move. Commanding the unit to go to the field center resulted in an immediate reset to 0 0. Putting in a x position like 7000 in the x field did exactly the same thing. I looked at the telescope and the documentation but could not find a smoking gun as to the possible cause that could allow me to continue. This effectively closed me down.

Solutions:
Shut down the xmis2 GUI and power-cycled the MIS. Brought the GUI back up and the guide probe is moving again.

Saturday, September 5, 2015

R4K Saturation Issues

Problem(s) Encountered:
Saturated the CCD during sky flats in both twilight and sunrise hours, resulting in 'icicles' of saturated pixels on the top and bottom of the CCD.

I called cleansnap several times over the course of the observing run, and seemed to clear the CCD for the more important science frames.

Solutions:
The R4K is very sensitive to light. It is best to err on shorter exposures and slowly increase exposure rates from there. Note the instructions for twilight flats here:
http://www.astronomy.ohio-state.edu/MDM/OSMOS/#flat

especially the order of filters to use, and make sure you start with a very very short exposure (e.g. 0.1s) to test the sky brightness.

Friday, June 12, 2015

Filter-Dependent Aberration with OSMOS

Problem(s) Encountered:
We were attempting to take a narrow-band Halpha band image of V1974Cyg with the 6567 filter. Upon a 300s exposure, we found significant abberation and halos around each object in the field.

We went to 6691/78 band and took another 300s exposure to find a similar problem.

We were not able to remedy the issue, but noted that a 300s r-band exposure did not seem affected by the problem.

Solutions:
Unfortunately I am fairly sure this problem cannot be fixed with the filter you used. It has occurred because the filter is not flat enough, and thus it is distorting the wavefront. In direct imaging (no OSMOS),

this is not usually an issue, as the converging beam is relatively unaffected by mild non-coplanarity in the filter. However, the OSMOS filters are in the collimated beam, and the filters need to be manufactured to a tighter specification. The r-band data are fine as the r-band filter meets this specification.

It is worth noting that this happened with Kitt Peak filters.

If you are interested in new filters, here are the specifications:
http://www.astronomy.ohio-state.edu/MDM/OSMOS/filterspecs.html

Thursday, June 11, 2015

Guide Probe Motion Failure

Problem(s) Encountered:
The guide probe stopped responding and would not leave it's current location.
I followed the instructions here and reset the system:
http://mdm.kpno.noao.edu/Manuals/guiderdoc/autoguiding.html

I did not get a chance to check if it solved the problem as high humidity
caused me to close up.

Solutions:
Tested out the guide probe this morning and still found it to not be functioning properly. Tried closing the GUI and power cycling the MIS. After this, I was able to move the guide probe again, but it would not travel all the way to the demanded values. Thankfully, OSMOS allows for access to the guide probe so I checked and found that the probe was in a very odd position. While the GUI registered that it was at the origin, it was actually so far north that I could not reach the motor mic. It was clearly lost. On the xmis2 GUI, I reset the MIS by *2.4m Setup>Reset MIS* which drove the guide probe back to its home position. It now appears to function as expected.

Thursday, April 23, 2015

Dome Rotation and Encoder Errors

Problem(s) Encountered:
Had trouble with the dome encoders multiple times throughout the night, and eventually disabled the auto dome entirely. Some details:

- Periodically while tracking, the dome encoders would get lost. First the dome would be moving, but the Dome Azimuth field on the TCS would not be changing.
Then, if left long enough, the Dome Encoders Not Responding error message would appear.
The dome would then continue to rotate until both the Auto Dome switch was turned off AND the yellow button in the control room was disabled.
If we moved the dome manually to some azimuth and reset the encoders, we could turn the auto dome back on and it would work for a time, but eventually it got lost again.
The times the problem occurred and target coordinates are copied below.

- First occurrence was UT 3:45, early in the evening.
This happened while we were pointing near zenith, and we accidentally set the RA/Dec encoders to a value by the horizon.

The dome started moving to account for the new coordinates, but we then reset the RA/Dec encoders to the correct values, and the dome encoders stopped responding.
We reset the dome encoders, and it worked fine for a few hours.

- At UT 7:26:00, right after finally acquiring a target through the clouds and starting an exposure, the encoders stopped responding again.
This time, the auto dome switch on the TCS control panel did not stop the dome moving; only turning it off in the server room made a difference.
We reset the encoders to Az of 180, then turned the auto dome back on.

- At UT 7:40:00, shortly after restarting the dome, it lost the encoders again.
Target Alt/Az=72/170, RA/Dec=12:59:49.4/14:08:19. We left the auto dome off until the exposure completed.

- At UT 8:04:00, roughly 1 minute after restarting the auto dome, the encoders were lost again.
Target Alt/Az=72/188, RA/Dec=12:59:49.4/14:08:19. We decided to leave the auto dome off until the current target was finished.

- At UT 8:50:00 we moved to a new target and turned the auto dome back on. 5 minutes later (8:55:00) it stopped responding again.
We disabled the auto dome again.

After the fifth time the dome encoders stopped responding, we disabled the auto dome and left it off until the end of the night.

Solutions:
Telescope/dome motions were started early this morning, around 0800 local time.
Dome was found to be at the home position this morning, but the readout on the TCS display showed it was roughly 200 (120 degrees off from the expected 320). When autodome was turned on, the dome started turning. Autodome was turned off, stopping the dome. The dome was then hand set to the home position. When an attempt was made to "reset dome az encoder" in the xtcs GUI, the GUI gave an error that it could not communicate with the TCS. xtcs was closed, restarted and reinitialized. After this, there were no further issues with the dome tracking. Tests have been performed once again throughout the day without issue. Besides simply slewing the telescope around, we also let it track, ensuring that the dome caught up with the telescope as it tracked westward.
Another thought was that there might be issue with the optical transmitter on the encoder (I believe these are IR LED illuminated). Perhaps with stray light in the dome during the day, there is enough light for it to work properly, but once it is dark, it might fail. Night was simulated with dark cloth.   Considering we have a fairly bright moon currently, I think I could get it at least ballpark equivalent to the night sky. Tests performed with the encoder assembly shrouded showed no issues.
I pulled the encoder device and thoroughly cleaned the transmitters and receivers as well as the toothed wheel. Lastly, the encoder chipset was replaced. This had been done less than a month ago, but with chips that have an unknown history. While I don't have any reason to believe that these chips were faulty, the current chipset is with all new chips. Still, it is of my opinion that the chipset was fine.
Everything is back together again. As this is typed up, the telescope/dome is in a tracking state (currently in the SE). It is working as expected. The only portion of this system that hasn't been checked is where it goes through the TCS computer (C/T #1, C/T #2, A/D boards). I'm extremely hesitant to simply start throwing new hardware at the TCS PC as we do not have a working spare currently. Besides, when the system is run during the day, it works fine.
My only recommendation to the observer will be to close the xtcs GUI and restart/reinitialize if this happens again. Other than that, enough variables have been added to ensure that if there really was a problem that has been solved, it will remain a mystery what it was.

Monday, March 30, 2015

Dome Encoder Issues, Fugue State?

Problem(s) Encountered:
Had trouble with the dome encoders getting lost multiple times throughout the night, requiring manual reset. See trouble report for details.

Solutions:
Per John Thostensen:
The problem sounded a bit like an intermittent issue we've had, which I dubbed the "fugue state*" in which the dome starts to rotate slowly for no reason until it finally decides not to at some random point. There's no way to clear it; one just keeps observing using this procedure:

- disable the yellow button at the bottom of the left computer rack - this gives manual control of the dome.

- read the telescope azimuth on the TCS (or the repeat monitor in the dome)

- In the dome, use the rotation control to manually set the dome to the correct azimuth; match the red reflective tape at the bottom of the dome shutter opening to the red reflective strips every 10 degrees around the dome

- continue to observe.

- After about a half-hour, try re-enabling the dome; if it takes off, wait some more.

Sunday, March 29, 2015

B4K 1Kx1K ROI Failure

Problem(s) Encountered:
When trying to subarray 4K with the scripts (roi1k, roi512), we couldn't take data with prospero. An exposure would start, but it would seem to hang, and then (after a long time) it wold report that the exposure had completed (nothing was written to disk) and then it would report that the observation had been aborted (which we hadn't tried to do). Things worked ok in the larger formats. But as a result, we had longer than desired readout times during our frequent focus checks.

Solutions:
This appears to be a bug in the code. Currently it is unclear what causes issues when subarraying to 1K or less. Be advised that 1K ROIs can be performed when using OSMOS.

Wednesday, March 25, 2015

OSMOS/4K Chip Readout Failure

Problem(s) Encountered:
Never saw any error messages, just a blank quad in every data set.

Starting with image #58 (taken at UT 07:53), the upper right (NW) chip appeared to stop collecting photons. I've no idea why this happened (it was an unremarkable star/obsrvation otherwise), but I was able to manually shift all of my targets onto one of the three normally-functioning disks. .

Solutions:
Bad connectivity of the cable attaching the detector to the HE. Replaced locking collar on cable.

Saturday, March 14, 2015

Telescope Motion when TCS PC Reboot

Problem(s) Encountered:
During the TCS restart to resolve the dome encoder issue, the telescope moved on its own to the south in declination. I hit the emergency stop button in the dome to halt the slew. Manual slew was required to put the telescope back to the stow position. The telescope focus was found to be way off from previous nights even though the focus encoder reported the same value used the previous 3 nights. Best focus before was 2660 but tonight that same value gave a big donut on the image. After resetting the focus encoder by moving to the full-out position and setting to 0.0, we found the best focus at 1650 instead. At the out limit, the focus encoder reported a value of 455.

Solutions:
This is a nasty bug in the system. If the TCS control panel in the control room is powered on when the TCS computer is powered off (or disconnected due to a reboot), the telescope will start to move on its own. (Perhaps it also moves focus?) It's critical therefore, to never power cycle the TCS computer when the TCS control panel is powered up (thus allowing power to the telescope). Interestingly, this will occur even if the "Drives" toggle switch is powered off. This implies that the problem is very low level in the TCS architecture.

Thursday, March 12, 2015

Dome Encoder Failure

Problem(s) Encountered:
Dome encoder is not working properly. Does not respond to TCS enabled
slews. Azimuth does not update through the computer. Dome error advances slowly even with the dome sitting in a parked position. Operated manually for the remainder of the night.

Solutions:
Tests showed that the encoder appeared to be working correctly for CCW dome motions. Encoder was not updating however for CW motions. This would obviously lead to large errors very quickly. Pulled the interface electronics for the dome readout and replaced chipset. Since there are only 4 chips to pull, I swapped new ones for all instead of testing each chip individually. I might try testing the failed set at some point, but I was more concerned with solving the problem for now. After reinstalling the interface electronics, slewed the telescope around manually to ensure that the encoder was reading out for motions in both directions. Then slaved the dome to telescope motions and verified that the dome tracks properly. Finally, homed the dome via the TCS successfully. Dome systems appear to be back to fully functional.

Thursday, March 12, 2015

Rotator Position Readout Error

Problem(s) Encountered:
At one point while rotating the instrument, the readout went from around -20 degrees to somewhere around -600 degrees. We rotated the instrument back the other way and it didn't happen again.

Solutions:
This occasionally crops up, but it solved by simply rotating back toward, or through "0".

Friday, January 23, 2015

Prospero IE Hardware Disconnect

Problem(s) Encountered:
The only issue we had was with prospero not being able to communicate and move the slit wheel, which we experienced at around midnight.

Solutions:
This problem could occur with the slit wheel, disperser wheel, or either of the filter wheels. To fix, find the "IE" terminal window (typically on desktop 4) and type *quit*. Go out in the dome and power off the IE (black enclosure on the north of OSMOS, power switch on the east side of that). Count to 30, power back on. Start the "IE" terminal window again and reinitialize prospero (*startup*--it might be necessary to cycle prospero). See:
http://www.astronomy.ohio-state.edu/MDM/OSMOS/#trouble

Wednesday, January 21, 2015

Dome Shutter Motion Failure

Problem(s) Encountered:
Main dome shutter wouldn't open at the beginning of the night, for no apparent reason since the contact points were well aligned. Had to try a half dozen times. Moved the contact point back and forth a couple of times manually, but I'm not sure that had anything to do with it.

Solutions:
Ran the shutter, and drop leaf, this morning without issue. Still went ahead and cleaned the oxidation from the contact plates and skids. Also lubed the springs and shafts for the contact skids. Homed the dome and tried again. All continues to work as expected.

Tuesday, December 23, 2014

RA Tracking Drive Failure

Problem(s) Encountered:
I followed a target far to the west and around 2:30, near an HA of 5:30, the tracking stopped. I figured the telescope had hit a limit, though I had thought it would go to 6h west at this dec (+26 degrees).

I slewed out of the limit and when I got to the next position
the telescope never settled. The HA was not moving, and I

couldn't get it to move; the telescope responded to the paddle,
but not to set rate in the E-W direction.

After turning the tracking on and off, turning the drives on and off, and cycling the power on the black box several times, I took the dangerous step of restarting the TCS computer. I didn't power it down, but rather hit the reset button, and it did come up, but had lost pointing entirely. This didn't cure the problem.

Finally I went out and looked at the RA drive assembly. The tracking motor was spinning but the small toothed drive belt that connects it to the mechanism was slipping. I had Erek flip the motor on and off, and it started and stopped as
expected but the drive belt was still slipping. By exerting gentle pressure on the belt I could get it to move, but it would slip as soon as it came back to the same bad spot on the belt.

Solutions:
Replaced drive belt for HA stepper system. Pulled pulleys and cleared grunge and grease from them as well. Decided to also check the dec stepper drive belt. While it looks fine, I went ahead and replaced it as well. Since the telescope tracks in HA and not dec, it is expected that the HA belt would go quicker. Reset pointing by the tilt sensors and successfully tested all motions/speeds.
Regarding the rotator encoder setting: There is an old detent/switch assembly above the rotator plate that was used to trigger a light when the rotator hit "0" on the old system. This was not implemented with the new system. I peaked in and set the zero-point by allowing the switch to settle into the detent. This aligned nicely with the "fiducial". An upgrade to be performed when time permits would be to find the end of the old wire from the switch and hook it to a multimeter to more accurately find 0.

Wednesday, December 10, 2014

Owl Binning & Subarray Initialization

Problem(s) Encountered:
The Owl Log seems to have reset itself since this happened several hours ago, so I can't put in the actual messages, sorry.
Owl stopped in the middle of reading out data, and could not read the CCD tempreature. This happened after I attempted to redefine the subarray.

I reran the controller setup, then tried to redefine the subarray again and Owl stopped mid-readout again. After talking with Jules Halpern over the phone, the problem appears to have been caused when I redefined the subarray without defining the binning first.

Solutions:
Speaking with Jules, I have learned that if an observer wants to both bin and subarray the field, binning parameters must be set first. It's unclear to me though whether this was the problem last night or not as unbinned observations (1x1) were desired. This morning, I closed Owl and restarted it. I then ran test frames, full-field, then subarrays, to make sure all is working correctly. It is.
The only other issue I could notice is that the CCD temperature was being plotted out in real time. I don't know how memory-intensive this is, but perhaps it is enough to cause the system to hang. This is purely speculation as I have no real feel for what running real-time temp plots do to the software.

Monday, November 10, 2014

Guide Probe, x-axis hung

Problem(s) Encountered:
The guider probe got stuck. It would move in the Y axis, but not on the X axis. We tried moving it around, sending it to origin, but the probe was stuck at X=3800.

Solutions:
Quit the xmis2 GUI, power cycle the MIS. Bring GUI back up and initialize it.

Thursday, October 30, 2014

ModSpec Shutter Controller Failure

Problem(s) Encountered:
At around 11:30pm, we found that the spectrum of the last science target was showing almost no signal, just noise. We first checked that the dark hatch was open. Next, we reset Owl and the MIS software. The problem persisted. We checked a quartz frame and there was almost no light getting in. We then opened and closed the dark hatch. After this, we took a quartz frame and the signal was back to the appropriate level. We then tried a science target but the problem was back. (The guide probe had no problems moving to a guide star outside of the instrument fov.) We tried opening and closing the dark hatch again and then going straight to a star (to see if moving the finder in and out was part of the problem) but there was still severe light loss.

Solutions:
Found that there was a failure with the shutter controller electronics box. When commanded, the shutter would open but almost immediately close. Voltage should read ~5V but was showing around 0-1.5V. Failure was intermittent, occurring roughly 3 out of every 5 attempts. Opened the controller box and found no obvious issues. Cleaned contacts and tested to find box worked every time over roughly 100 tests, both manually and Owl-controlled. Worked flawlessly last night too.
We have a "spare" controller box, from the MkIII, in case this one goes belly up. I'll look around to see if another unit can still be purchased.
Interestingly, as mentioned, with load (the shutter), the voltage would go to 5V (on) and 0V (off) immediately. If load is removed, the voltage, upon switching on, spikes to ~60V, then slowly lowers to ~9V over a period > 30 seconds. This is the case with both shutter controllers mentioned above.

Sunday, August 31, 2014

TCSlink on Prospero "Down"

Problem(s) Encountered:
The TCSlink on the Prospero Status GUI was not connecting, after we reset the TCS system. Therefore, we could not run commands such as 'telfoc', 'east' etc. from the command line i.e. we could not control the telescope using the Prospero command line.

Solutions:
TCS link was down due to cycling the TCS without then performing a *tcinit* in the TCS terminal window. No big deal. Went in and verified the link was down, then performed a *tcinit* and then verified the link was up (*tcstatus* in the same terminal). *startup* then commanded in Propsero. This changed the "link down" status to "link up". I also verified that the track rate was changed back to the nominal value of 15.06 (from the default of 15.002)—it was. Propsero and the TCS should now be back on talking terms.

Saturday, June 7, 2014

Erroneous Encoder Issue Warning

Problem(s) Encountered:
A TCS message complained about losing connection
with the RA and DEC encoders. Restart with the levelers was required.

Solutions:
If this was a message along the lines of "RA and/or Dec encoder(s) not responding", then this is a non-issue—well known although not easily removed. Thankfully, it does not relate to a real issue occurring.

Monday, June 2, 2014

Auto Dome Status Confused

Problem(s) Encountered:
We had a bit of hiccup when the TCS reported that the auto dome was turned off even though it was on.

Solutions:
Cycling the auto dome switch cleared the displayed error.

Wednesday, May 21, 2014

Telescope Hand Paddle Issues

Problem(s) Encountered:
The paddle to move the telescope works on and off. For half the night, it wasn't responsive in all directions and then it started to work later in the night.

Solutions:
We have seen this previously, particularly with the hand paddle in the dome. Typically when it stops working, simply let off all buttons momentarily. Once you try moving again after this, it tends to work.

Saturday, May 17, 2014

Scripts Missing* & Failing

Problem(s) Encountered:
When executing osctrtask, the scratch frames have been created
but then it appears that osctyrtaks is looking for/expecting
files with some additional information.

Solutions:
There were also some missing SExtractor program files that it looks like John T logged in to install early this morning.

Everything should now be working for Matthias and others provided there is nothing else we're missing. (Pogge)

*Scripts were apparently accessed via Agung in the past. However, with Agung now deceased, scripts can be found either on the workstations or Hiltner (/lhome/obs24m/Scripts).

Wednesday, May 7, 2014

Guider Drift/Failure

Problem(s) Encountered:
The guiding system seems not to be working well. Sometimes seems totally stuck , and when it works the graph shows huge oscillations. I tried the standard solutions but didn't work. The drift in the images is big.

Solutions:
Looks like the spare C/T #3 (DT2819) board installed the previous week has issues of its own. Found that this board also controls interactions between telescope and guider. Pulled the board out of the currently dead "spare" TCS PC and installed it. Guiding seems much improved now.

Friday, April 25, 2014

Dome Motion Failure

Problem(s) Encountered:
When the telescope was sent to positions on-sky, the dome would not follow. Work around for the night involved manually setting the dome.

Solutions:
With the failure the previous night with dec motion, the spare TCS computer was called into service. Dome control is through the C/T #1 (DT2819) and A/D (DT2816) boards in TCS computer. Unfortunately, while testing the system with spare boards, the computer has completely died. Motherboard issue? It's unclear currently if the problem stemmed from the Counter/Timer or the A-to-D. We currently do not have spares for all boards, however I am looking for spares, and OSU is sending us some spare ISA motherboards that we might be able to use to salvage the spare computer. In the meantime, we are down to a single TCS control PC.

Wednesday, April 23, 2014

Continuous North Motion at Guide Speed

Problem(s) Encountered:
2.4-m always moving at guide rate to north. Believed this was problem with hand paddle, so shut down TCS computer, turned off TCS power, disconnected both hand paddles from Model 70, and started TCS. Still moving in Dec. Shutdown again, reconnected hand paddles, and restarted. Both hand paddles show identical behaviour - pressing just the set button causes rapid motion.

Solutions:
Isolated problem to C/T #3 (DT2819) board in TCS computer. Swapping in a replacement board corrected the issue.

Tuesday, April 22, 2014

Prospero Data Interruption

Problem(s) Encountered:
We discovered that if a window is placed over the Prospero Command Window while a series of exposures is being taken, the integrations will pause after the current one has read out. The proceeding one will resume once the top window is moved away from Prospero.

From Halpern:
also noted in February that Prospero doesn't reliably take a series of exposures. It always stops if you move to another desktop and come back during a sequence. This was similar to what the current observer reports as happening when "a window is placed over the Prospero Command Window." Doing a 'startup' didn't fix the problem for me.
No explanation was offered. Below are my previous reports.

-Jules-

MDM Trouble Report for 2014 Feb 09

Telescope: 2.4m
Observer(s): Jules Halpern (Columbia)
Instrument: OSMOS

Problem(s) Encountered:
When executing a long series of exposures using

 go 30

it will sometimes stop at the end of an exposure
and not start the next one. A warning that this
might happen is that the blue Time Remaining line
will stop updating in the Prospero window (even
though the exposure continues to completion),
and there are none of the usual STATUS reports
in the window that come at the end of an exposure,
even though everything is being reported normally
in the real-time display monitor.

Is 30 maybe too large a number of exposures? It hung after
the first one, but started again after I hit Enter.
It stopped next after number 15, but then I could only
keep going after aborting the sequence and starting again.

This is very inconvenient because it means that I can't
turn away for even 10 minutes during a 5 hour sequence.
It's hard to maintain that level of vigilance when there
is other work that I could be doing, like data reduction.

Solutions:
I am guessing this is a legacy issue from days where cached memory came at a premium. Another artifact is the Prospero Status screen going blank if switching to a different workspace. While I am unsure

of any fix for this issue, I think a reasonable workaround would be to "pin" both windows (Prospero Status and Command) to the current workspace. This way, the windows will go with you from space to space.

Guider Image Motion and Focal Issues

Problem(s) Encountered:
Had trouble locating guide star. We weren't sure if it was
pointing or some other problem.

Later in the night tried to diagnose, reset encoders, etc. and everything involving telescope pointing was good.

The guide probe seems to be the issue because each time we moved to a new star the position of the star would shift (even when returning to the original star). Also at the end of this it seems that the guider probe focus shifted drastically producing a very large donut image. It seems almost as if something is loose in the guider probe hardware, and/or encoder is skipping, though not clear why that would affect focus.

Solutions:
Pulled the detector and filter wheel and found that the motor mic for the guide system had slid itself essentially as far "in" as it could go. This was expected from the described symptoms. Pulled the bottom plate off the MIS since we were there anyways so that the tension clip at the rear of the motor mic could be tightened up. Tightened up a bunch of assembly screws inside the MIS while there as well. Checked all motions and travels before buttoning everything back up.

JSkyCalc Errors

Problem(s) Encountered:
The guider on JSkyCalc was having issues. The software didn't know where the probe was. Restarting it and trying to update it didn't work. The only location that was recognized was the origin, but after moving the probe the location would be lost again.

Solutions:
The guider position reported in the JSkyCalc program is unreliable for some reason. The guider position reported by xmis2 should be correct. If it's not, the first thing to try is to cycle the power on the MIS box. If it still doesn't work, it's possible there's something going wrong in the hardware. (John T)

Dec Drive Friction System (Lost Motion)

Problem(s) Encountered:
Telescope will not move south below ~+33 00 00. It got stuck
early in the night and I managed to slew it back to zenith and it
seemed to work OK briefly, but I was only going for northerly
objects. After trying to go south it stopped responding. I
restarted xtcs then the tcs computer and then everything I could
think of. I tried to send it to the zenith and it wouldn't quite
make it (its at DEC: +33 45 50, so its not sideways). It will slew
north, east and west without a problem but not south. It also
seemed to make a groaning noise. perhaps it always makes that

noise but I only heard it because I sent the dome home after
a while.

Solutions:
Arrived to find that the motor assembly turns without issue but that the power was not being transferred to the large friction wheel. The power was not being transferred to the telescope due to the small cam turning and removing the friction from the drive. Reseating that cam immediately produced the necessary friction to transfer power to the dec axis.
Telescope was moved about the sky in all directions and appears to be fully functional again.
Lastly, I reset the track rate from 15.002 to the nominal 15.06"/s.

OWL Nonresponsive

Problem(s) Encountered:
The Owl log kept showing warnings about being unable to calculate the average temperature. We weren't sure what was wrong so we started observing. We got a few good images before Owl stopped responding. The log kept showing an error that read something like Reset controller failed . First we tried going into Setup and reapplying the controller settings, but that didn't work. Next, we exited Owl and restarted it, but it also didn't register a change.

Solutions:
We called Eric and he guided us through shutting down the CCD controller and restarting it and Owl. At first, Owl appeared to be working again, and then the same warnings about temperature showed up, followed by the same error about the reset controller fail and Owl stopped responding again. We shut down the controller again and restarted Owl and this time it worked.

Rotator Angle Discrepancy

Problem(s) Encountered:
When rotating the slit angle, the rotator angle suddenly went to numbers around -600 when I was rotating to +70 degrees. After rotating all the way to +90, then back again, the problem fixed itself.

Solutions:
This rotation-angle reading glitch occurs from time to time and has never been traced. It's a known bug. Rotating to a limit and de-rotating back out is known to typically solve the issue.

CCDS Acq. Camera Saturation/Brightness

Problem(s) Encountered:
The CCDS Acquisition Camera yielded some confusing images: close to zenith, the images were dark as one would expect. When we pointed at what we thought were our science targets, the images were lighter than we expected as if there were some interfering light, but we couldn't find any source of light in the dome.

Solutions:
While verifying the pointing, a bright star was found and placed on the slit. The star looked good in the acq. cam. for CCDS. When the telescope was moved to a galaxy, the image looked "bright" again. Reducing the exposure from 30 seconds to 15 seems to have improved this. Also, it is likely that the cooling was powered off during at least some acquisitions last night.

Erroneous Pointing

Problem(s) Encountered:
We set up the instrument and got some calibrations but were unable to take any science images. We think the pointing might be off but we reset the pointing from the zenith and that did not help. We were not able to find any of our science images.

Solutions:
With the tilt sensors at their nominal values for zenith, HA was at ~1sec but declination showed +31 54 12. Tried to set the encoders to zero the errors (+31 57 12) but the declination value did not change (RA changed as expected). Tried setting the declination readout to various values and found that it came out consistently 4 minutes south of the demanded position. This could obviously cause issues with moving target-to-target. Powered down TCS software/hardware and restarted. This appeared to correct the issue (perhaps the epoch was not reading out correctly?). Just spoke with the observer (21.00 LT) and was informed that pointing looked good so far.

OSMOS MOS Mask Deformities

Problem(s) Encountered:
No major issues, however for multiple masks the dispersed light through the slits (comp, flat, and science images) all showed a slight bending toward the edges of the field. Now that I notice this, I also see much slighter versions of this deformity in the data taken on previous nights.

Solutions:
It's been determined that installing masks into their holders has to be done with a gentle hand. Over-tightening retention clips can easily deform the masks curvature. A properly seating mask should show a uniform concavity in orientation.

OSMOS Hardware Control Failure

Problem(s) Encountered:
Experienced problems with Filter1 communicating with the IP.
Disperser, Slit, and Filter2 wheels all worked fine.

Solutions:
The normal restart procedure for "stuck" mechanisms in OSMOS is

  0) Leave the IC and Head Electronics Box alone (they have play no role with the mechanisms)
  1) Quit out of the osmos IE agent program (mdmTools stop osmos)
  2) Power cycle the IE
  3) Restart the OSMOS IE agent program (mdmTools start osmos)
  4) Type "startup" in prospero
  5) Run ossetup in prospero

The last step does a full reset of all the mechanisms after the power cycling. (Rick Pogge)

Guider Erroneous Correction Pulses

Problem(s) Encountered:
An issue that popped up again last night was on a few exposures, the guide star would start moving around in the window very erratically and either start doing a counter-clockwise rotation or once it left the field completely and the guider switched to another guide star half way through the exposure. When this happen it normally ruined the exposure and had to be retaken. I have left the graph for the last star we used for guiding up on the guider screen so the 2.4 support staff can take a quick look at to see the error in the x and y.

Solutions:
The rotation angle (changed under the settings option on the guide tab) is set by the following equation:

angle = -90 - rotator angle

Since observations were being performed with the rotator set to 0, the angle should have been -90. It was instead set to around -13. In retrospect, I'm surprised the guider was working for them as well as it was. The number has since been changed to -90 in preparation for tonight's observations.

RA Drift Issue (?)

Problem(s) Encountered:
We noticed that 5-7 exposures (of the same object, we only did the dithering) after we did pointing we could not see any stars on the Autoguider Image window. And sometimes we could see different stars (we were comparing the positions of the stars in the Guide Star Selector window of JSkyCalc), that told us that we need to re-point. We were choosing the nearest bright star (and for all the times it was the same star, since we were moving the telescope by only ~1-2 minutes) and bright star was always far to the right on the TIFCAM screen (and was not moving in the vertical position). The shift was that big that we had to switch to roi2k.
If it were just a problem with the guider we would have been able to keep using it by just manually selecting X and Y coordinates in the MIS window, but it seems the telescope also has some problems.

Solutions:
If the dither routine depends on the telescope coordinates retaining their integrity, this may be manifestation of the drift in the RA readout. Fixing that issue has hopefully resolved this one.

RA Readout Drift (Lost Pulses)

Problem(s) Encountered:
I sat on a single target for 3+ hours tonight, and the RA readout drifted upward by something like 30 seconds. This is indeed way beyond the size of pointing-model corrections. There is unquestionably something wrong with the RA positional readout (I've learned not to say with the RA encoder because it is not necessarily the encoder that's giving the trouble).

Observers should be advised to reset RA and dec encoders frequently, especially before a move, so as to have the freshest RA possible. Note coordinates appear to be read from the display field in xmis2.

Solutions:
Replaced the chipset in the encoder "buffer box" (signal amplifier). This appears to have corrected the issue. This is known to happen from time to time, so we have spare chipsets available.

Hung xmis2

Problem(s) Encountered:
At the end of the night, I tried to move the MIS finder mirror into place, but it froze and would not move. This attempt was using the interactive MIS window on hiltner. I then attempted to issue the command into Prospero and got the following result:
ERROR: Could not move MIS finder mirror

Solutions:
Found the xmis2 GUI hung. Used mdmTools to stop the process. Restart and initialize. Finder moves correctly--verified motion on the motor when commands issued--from the GUI. Also verified that the finder moves when command *mirror out* is issued.
I noticed that the prospero status window was blank. Issuing the command *status clear brought that back up.*

Frozen Water Pipes

Problem(s) Encountered:
There is no running water in the observatory. I noticed this around 1:30 AM.

Solutions:
The valve and pipe assembly off the pump for water supplied to our facilities was, according to Mike Hawes, "frozen solid". Water pressure is at zero.   For now, we don't see any signs of cracked water lines. Hopefully that will remain the case once we hit temperatures >0C as well.
Heat tape has been added to the pump assembly but best estimates are that we will not see running water today, possibly not until late tomorrow.
Jugged water has been brought down from the summit for use with toilets and we have bottled water for drinking/cooking. We also have an open invitation to use the dorms on the summit for showers as needed, during normal business hours (8.15-16.00). Just have to get access through admin (Belina).

Rotator Issues when not at Zenith

Problem(s) Encountered:
When the telescope was at hour angle -3 hours/7 minutes, with declination of +36 08, I attempted to rotate the instrument from -79 to -10 degrees. When the instrument reached -37 degrees, it began to struggle and stopped rotating. The rotator was still running, however the instrument failed to rotate past that angle.
This occurred at 3:07 am, and the temperature outside was 19 F. When the telescope was put at zenith, the instrument rotated as if nothing was wrong.

Solutions:
There is a known issue with the rotator not working through the full travel range when the telescope is pointed at large angles. This appears to have something to do with the torque associated with rotation of

the friction-drive system for the rotator. We check the friction drive tensioner from time to time in hopes that keeping it tight will mitigate this issue.

Prospero Data Collection Failure

Problem(s) Encountered:
After aborting a focusing script in prospero, no more data acquisition was possible. An error saying that Data Acquisition was already in progress appeared.
Did a restart of Prospero and Caliban, new error appeared when restarting Prospero saying Caliban & IC disks are not synched.
Did a complete restart of the observing workstation, but the problem still persisted and -SYNC was red in Prospero Status window.

Solutions:
We referred to the IC-to-Caliban Transfer Disk error recovery procedure. We then proceeded with a cold reboot of the IC, after figuring out which keyboard it was connected to. After the IC restart and restart of the workstation, Prospero was able to be started properly and data acquisition was possible. The only lingering effect is the lack of some graphics in the Prospero Status window.

Finder Mirror Motor Drivetrain

Problem(s) Encountered:
When closing the MIS hatch at the end of the night it was noticed that a small belt with around toothed wheels was about to break (or more accurately, a previous repair to this belt was about to fail. The belt is on the MIS finder unit, above a component labelled 160.

Solutions:
We replaced the belt for the Finder mirror (retrocam mirror) and tested the system, all works fine.

Airbag Pressure Failure

Problem(s) Encountered:
Mirror support airbag pressure is failing. Stars are smeared and triangular in shape, and we dare not observe except near zenith.

Solutions:
I came to the observatory and found that there was no air to the regulator for the mirror. Checked the circuit breaker in the dome side room and they were ok. Found that there was no air also at the pressure regulator under the dome floor. After I had gotten the panel off on the compressor shed I found that there was no air in the compressor tank. I then checked the circuit breakers and found that one had tripped, we will find another way to circuit control. Once the breaker was reengaged the compressor started to work and pressure started to come up on the cell regulator. Noticed that the SE hard point had very strange numbers and had to remove and re-install the hard point pressure sensor. Once it was corrected the system went back to behaving normal. I moved the telescope in all four directions on sky but did notice that the airbags lagged a bit more than they should. Monday after the instrument changes we will re-plumb the air regulators . Do not like the way it is right now. Also I do believe that the observers would never have been able to get into the compressor shed to reset the circuit breaker, a door will be added to the shed and the shed will be clearly marked .

PSF Triangularity

Problem(s) Encountered:
We noticed that after slewing the telescope, the PSF looks slightly triangular. The effect usually lasts a few seconds. While moving from dec -05:09 to dec +20:12 (HA between 0 and 1, airmass from 1.3 to 1) though, the effect was more persistent: ~60 sec. We don't know if this is expected, so we prefer to note it down.

Solutions:
Triangular PSF for a few seconds after slewing is probably due to the time it takes the airbags to rebalance the primary mirror support, i.e., it is to be expected.

Prospero Command Window Freezing

Problem(s) Encountered:
When we started calibrations in the afternoon, prospero was frozen.
We closed it and tried to reinitialize (startup), but it froze again.

Solutions:
The IC computer had frozen, and rebooting it fixed the problem.

Restarted all of the data acquisition software, and everything went back to normal.

OSMOS Component Comm Failure

Problem(s) Encountered:
Prospero complained about the disperser wheel (couldn't find the disperser wheel). Following the troubleshooting, we tried to reset the disperser, but the error persisted.

Solutions:
Cycled the power on the OSMOS IE box, and restarted TCS, MIS, and the data acquisition software. Everything came back to life, but filter2 (currently empty) was not recognized (which caused some scripts to fail at first). Filter2 issues were ultimately traced to a blown MicroLynx controller. If after a power cycle, the problem persisted, it may have been necessary to perform a "*call ossetup*" in the Prospero command window.