NAOMI Faults and incomplete work as of end-September 2000.

wht-naomi-52

There are three tables in this document: a 'Known Faults' table that lists common faults and includes some suggestions as to work-arounds where available; a 'Work Incomplete' table that in most cases also describes proposals for completing the work; an 'Operations Software' table that is severely incomplete but gives a few items where some procedures or calculations that will be needed for the December PATT run were not fully tested or implemented by the end of September 2000. Neither this nor the 'Work Incomplete' table details all the items involved still needed in going up the NAOMI learning curve or for optimisation.

Issue / Problem	**Effect / Work around**
1. CCD drive stage intermittently fails to reach target position. This is usually indicated by the error message '	Usually solved by 'Stop', 'Move', 'Start' cycle. Strictly speaking the 'Move' part of this is not necessary but playing safe is best.
2. While moving the pick-off by small amounts in x and/or y, the CCD stage can run away. In the whole of the September run, the runaway stopped every time after going about 10mm, usually un-noticed. An error message like 'Device n failed' can then be generated if another small pick-off motion is requested with a short move time, because this time demands too high a velocity for the CCD stage to get back to position.	A. Press 'Stop' button on Pick-off GUI to clear message. Change time to about 3 secs. 'Move', 'Start' again. No re-indexing should be needed after this fault.
3. DM X stage (used in white light flats) often fails after small motions, particularly when travelling to lower numbers. When this occurs the error message are not consistent. For example if it fails to reach position the message says 'Failed to reach position', but does not register a stall. Also sometimes it then requests a new datum and sometimes it does not.	Go to the device level driver. This displays both the current and demand position of the x stage. Set the demand position to be the current position. Check that the 'Index' box contains '0'. If it doesn't, make it so. Select 'Index', 'Go'. The GUI should show 'Busy' for a second, then 'Idle'. Re-enter the position you want, then 'Move', 'Go'. **Don't forget the 'Move' part of this.** If you do the motor will move but re-index with wrong values.
4. Related to above but more general, you get 'Device n failed' message when using EPICS, especially in pick-off GUI.	You have probably tried to move a mechanism (lenslet array, pick-off, CCD stage, Fore-optics stage) with a time that is too short for the available velocity. 'Stop' and change the time of motion, then 'Start' again.
5. The shutter on the CCD 'bounces' when the switch detection is 'On'.	When using the shutter, ensure the 'Ignore Switch' option selected is 'Yes' (in the 'Other Mechanisms' GUI within the WFS GUI). The shutter very occasionally still sticks even so, but has always recovered with another 'Close', 'Go', 'Open', 'Go' sequence.
6. The calibration unit has several problems and needs some re-design and new manufacture. The main problem is in the lamp housing. The increased power lamp that was installed in August in an 'emergency upgrade' was at a skew angle. It melted the filter holders and shattered the condenser lens.	Tully Peacocke has done some re-design work. The new parts can be made for less than 2000 pounds. A new water-free fused silica condenser lens will be ordered.
7. The two pinholes in the motorised mask in the NCU have been made very poorly. The holes are not completely	A new mask must be made and fitted.

clear. Also they are the same size (nominally 25um) and one should be smaller (8 – 10um).	
8. Cannot get a sufficiently vibration-free bench to be sure that alignment and any FISBA use will work.	Table must be floated for all sensitive DM calibration work, especially laser flats. Best results of all are obtained when the telescope is stationary and the oil pumps are off. White light flats and Simplex runs are also likely to be better with floated bench but are not so critical on oil pump state.
9. The programmable input to drive the PI tip-tilt mirror in the NCU was 'lost' in a de-scope decision. (There was no EPICS effort to write the driver for the programmable board). A bread-boarded 'pink noise' generator was put together by Simon Tulloch. Its output was found to be about a factor of 3 too low to give a realistic simulation of atmospheric turbulence.	Modify the bread-board noise generator or feed it through an appropriate amplifier (this number should be checked but from memory the input impedence of the PI piezo drives is ~ 1Kohm). By now Simon Tulloch's upgrade to his 'pink noise' generator may meet all the requirements in this area.
10. There are many 'minor' software bugs (i.e. everything works, but some fall over with time or can be crashed too easily with incorrect procedures).	Richard Myers is aware of these and they will be addressed during the commissioning of the higher level software.
11. The Cohu camera is much less sensitive than is desirable (barely detects 10^{th} magnitude stars).	Change its pixel scale by about a factor 4 - 7 by installing fore-optics. An optical design could be done at ATC but it may be cheaper to purchase and install a simple lens system directly at ING. (Up-date on this 30/10/00: because the focus is near the beam-splitter, getting the increased FOV associated with this focal plane scale is not straightforward. More discussion with ING and Durham on requirements is needed here).
12. Problem starting IngridAlign. *Symptom:* You press the INGRID Align GUI on NEG and nothing happens after >10secs (the time it usually takes to come up).	*Likely Explanation/Solution:* There is already an INGRID GUI running. Switch to using this one.
13. IngridAlign stops working. There are 3 stages of recovery from this situation.	A. Kill any IngridAlign that is started on navis, including looking for an IngridAlign process (ps –ef | grep Ingrid then kill the process ID number, on a terminal). Do any normal INGRID exposure using the DAS system. Try re-running IngridAlign after this exposure has completed. B. If the above fails: pull up the window running the Drama Server. CTRL-C from the server on navis. Then (also on navis): Type stop-DramaServer.sh Often this does not come back to a prompt because it has already stopped, so CTRL_C out of it after several seconds. Type drama-cleanup Type Dserver.csh Type start-DramaServer.sh C. If this doesn't work (rare), start again but also re-start INGRID's own software after CTRL_C from DramaServer on navis and going through the Stop and cleanup routines above.

Work still incomplete (Opto-electro-mechanical)	**Opportunities to do it**
1. No integration of the higher level software was completed (TopGui, Level 0 GUI). Substantial progress was made in these areas and some tests were carried out on TopGui during August.	Nigel Dipper is continuing to work on TopGui. This will need further detailed communication with Craige Bevil.
2. No scripts to run a series of commands through the sequencer have yet been written. This is partly a time issue, but also some additional work is needed from Andy Vick to complete all aspects of the Python/EPICS/Python converter	Andy is working on this at present. A schedule for completion and testing suggests the end of November 00 for provision of the basic software and mid-December for completion of the first scripts is possible but tight.
3. There is a separate calibration unit for the WFS that allows the WFS to be tested in stand-alone mode. This is in the NAOMI cupboard.	Could be installed if Tully Peacocke comes to ING to fit and test the repaired Zeiss FSM. Needs to be given a place in the priority list. I suggest low as we haven't really needed it so far.
4. The current FSM mount is spaced off from one of its eccentrics (back right looking towards the NCU) by three shims (red, yellow and black). These have been taped to the top of the FSM mount. A larger eccentric has been manufactured but not installed.	Install the new eccentric IF NEEDED when the Zeiss FSM is installed and tested (the Zeiss mirror mount may sit differently and render a larger eccentric un-necessary).
5. This work is not essential, but it may be preferable that the CCD cables are brought out through the topof the WFS.	?? ING are probably now in the best position to evaluate the need for work and a possible schedule in this area.
6. Gao would prefer that the SDSU power cables are separate in the feed through from the GHRIL control from the signal cables.	We looked at this briefly and couldn't find a different route, but it may be worth re-examining when the cables are reinstalled after the STJ run.
7. Focus off-load from the WFS signals has been calibrated against the secondary mirror motion, but the off-load has not been tested in any feedback loop (or open loop).	Schedule test for November / early December?
8. EPICS documentation	Reasonable progress being made at present by Chris Tierney. Goal is to finish it by mid-December, before the PATT run. At worst a substantive first draft will be available by then.
9. Other ATC software documentation (includes DRAMA/Python converter)	Andy Vick is working on this at present. The goal is to complete it by the end of November and then have some of his effort available to help with script writing before the PATT run.
10. User documentation	Chris Benn has offered to take responsibility for this, which is very helpful. AJL will try to hold some time in reserve to contribute as required. AJL is now working on a description of the system as it was at the end of September (possibly already out of date but could act as a back-ground document detailing underlying procedures).
11. General improvements to operations software	See separate table below.
12.	

Operations software to be done	Priority / opportunity
Determine all WFS initialisation values for on-axis point source.	Tully Peacocke could do this if he comes out at the end of November to assist with further work on the FSM.
Install these values and test	As above

Implement and test calculation of background subtraction for binned CCD modes	RMM goal for Nov/Dec 2000.
Implement and test WFS offset values for binned CCD modes	Partly done during September 2000. Should be completed by RMM during Nov/Dec 2000.
Calculate ADC angles appropriate for telescope position	URGENT that this is done before December PATT run, as Orion fields will be at relatively high air mass. Needs a calibration of dispersion angle with prism offset angle in GHRIL x,y coordinates and calculation of projection of atmospheric dispersion onto same coordinates.
Calculate DM position appropriate for guide star offset angle	Low priority as the effects of the pupil shift will be small for most practical guide star angles.
Calculate sky angles to probe space conversion	Done in Mathcad package. Hand-over of formulae from AJL to RMM/CRB and implementation of built-in calculation required.