

MONTHLY STATUS REPORT

Engineering & Technical Services
February 2001

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N-NX 529-448 NEWFIRM

DESCRIPTION: This is the first year of a multiyear project to develop a wide-field, near infrared imager designed for use at the Cassegrain focus of the Mayall 4-M telescope. A draft of the concepts for this instrument can be found at <http://www.noao.edu/ets/newfirm/newfcon.html>.

FY2001	
Budgeted Hours thru 2/01	729.17
Actual Expended Hours	606.5
Capital Expended	\$3

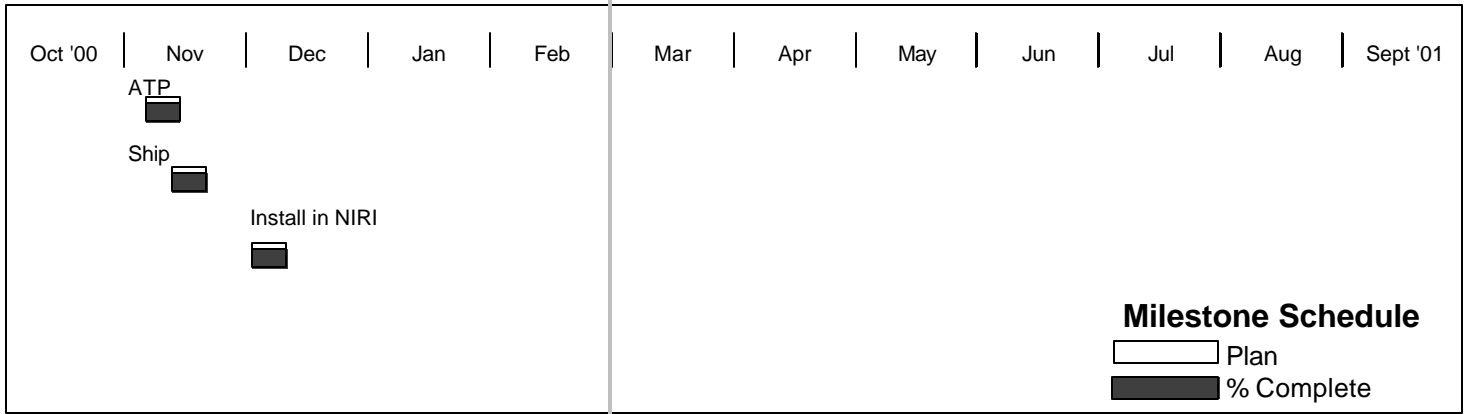
PLANS & SCHEDULE WERE PRESENTED TO IPAC'S JANUARY MEETING FOR CONSIDERATION.

ACCOMPLISHMENTS:

- Detailed manpower requirements for concept designs were presented to February IPAC.
- Plan was given approval to begin as soon as manpower becomes available.

Z-ZUP44-200 GEMINI CONTROLLER 1f/Sec UPGRADE

DESCRIPTION: The 1F/sec upgrade is a project that will upgrade the GNAAC controller to meet the 1F/sec throughput specification. Both hardware and software modifications are required to the existing controller.



FY2001	
Budgeted Hours thru 2/01	546.875
Actual Expended Hours	964
Capital Expended	\$29,180

ACCOMPLISHMENTS:

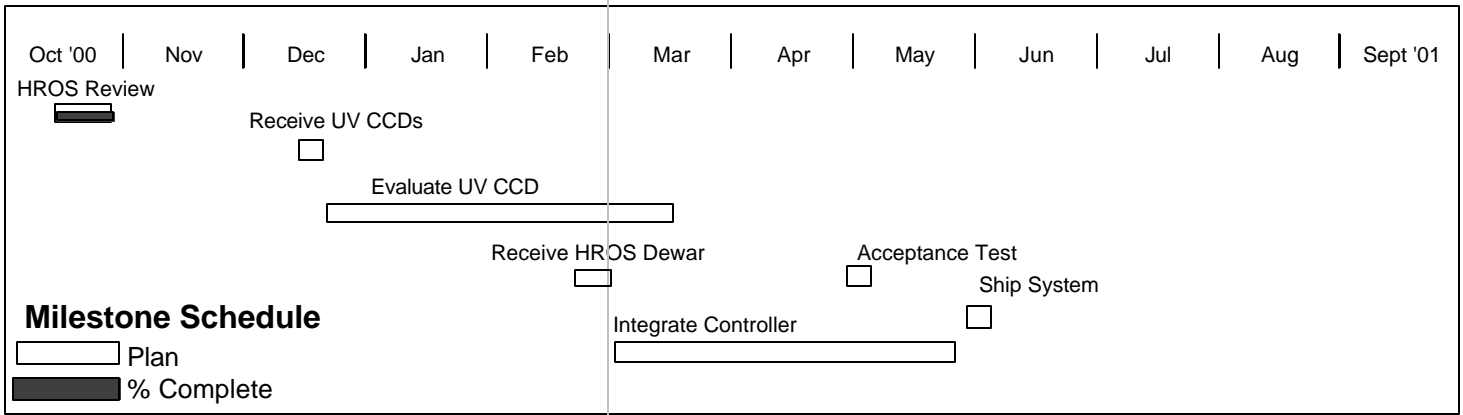
- The 1 Frame/Sec Board reliability problems have been traced to poor board assembly quality exasperated by a pcb warpage problem. A solution has been identified and implemented on the S/N 21003 board which has been shipped to Hawaii to act a spare for the upcoming NIRI run. The solution to this problem is 4 fold:
 - The boards have been fitted with a back surface metal shield. This shield holds the board in a rigid plane, not allowing flexure, and reducing warpage, appropriate for it's insertion in the VME chassis.
 - The boards have been reworked by a quality technician to meet appropriate quality standards.
 - The boards have undergone a rigorous quality control process which includes detailed inspection under a microscope for workmanship standards.
 - The boards have undergone extensive testing including, repeated insertions into the VME chassis to test flexure induced stresses, operation with a cold detector in multiple operational modes to validate performance, operation over a range of thermal environments to test thermally induced stress, and operation over a range of power supply ranges.
 S/N 21006 has been gone through steps 1-3 and is currently in step 4)
 S/N 21004 has been returned by Gemini from Hawaii, has been tested in system and was found to be working properly in our system. It has not undergone rigorous testing however, and will be reworked as described below.

PLANS:

- S/N 21006 will be finishing test this week 3/9/01. We plan to use this board for the Lab system.
- S/N 21001 currently out for rework at board mfg. Due back end of this week, will undergo steps 1, 3 & 4 next week Est complete 3/16/01. We plan to ship to Hawaii to replace S/N 21002, which is currently in NIRI.
- S/N 21005 currently out for rework at board mfg. Due back end of this week. Will undergo step 1, 3& 4 the following week. Est complete 3/23/01. We plan to use this board for the GNIRS controller upgrade (not yet scheduled).
- S/N 21004 Scheduled steps 1-4 Week of the 26th. Est complete 3/30/01. We plan to hold as spare.
- S/N 21002 Currently operational in NIRI in Hawaii. We will request that this board be returned to NOAO following the NIRI observing run so that it can be reworked through steps 1-4 on the week of 4/2/01 if agreed upon by Gemini. S/N 21001 is scheduled to be shipped to Hawaii prior to the return of S/N 21002. Estimated to be complete 4/6/01. We plan to hold as spare.

Z-ZUP44-3XX GEMINI CCD CONTROLLER INTEGRATION (GMOS)

DESCRIPTION: Investigation of CCDs provided by EEV, CCD Controllers provided by LEACH and GMOS camera provided by DAO. CCDs will be tested and installed in the camera. Software will be developed to integrate controllers to EPICS.



FY2001	
Budgeted Hours thru 2/01	0
Actual Expended Hours	396.5
Capital Expended	\$12,801

ACCOMPLISHMENTS:

- GMOS dewar shipped.

PLANS:

- Test CCD when it arrives.

PROBLEMS:

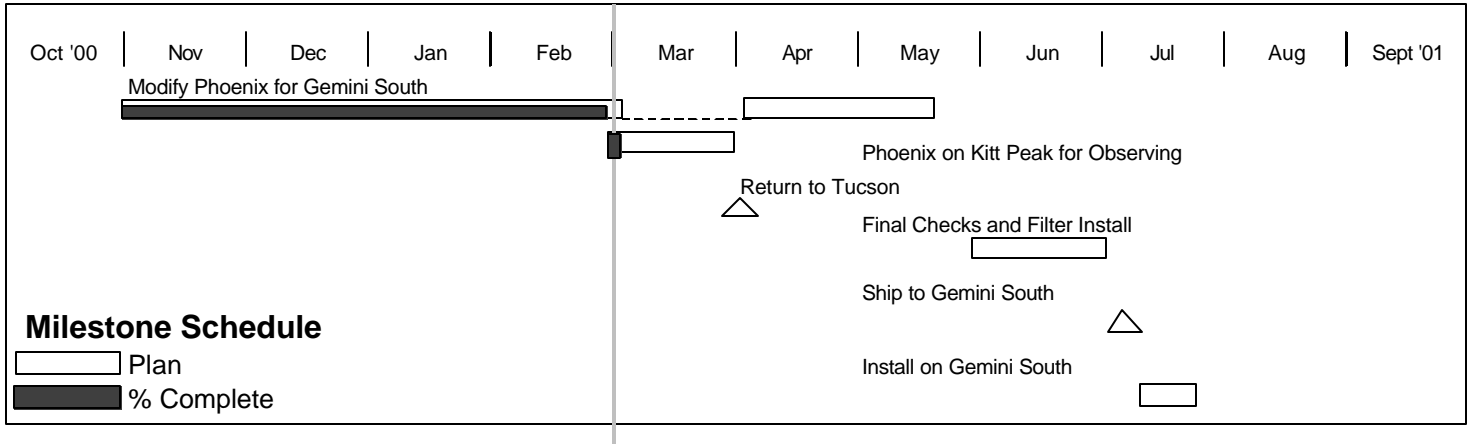
- No items.

SOLUTIONS:

- No items.

Z-ZUP44-5XX GEMINI MODIFICATIONS TO PHOENIX

DESCRIPTION: Modify, ship and install Phoenix on Gemini South.



FY2001	
Budgeted Hours thru 2/01	729.17
Actual Expended Hours	606.5
Capital Expended	\$15,470

Accomplishments:

- Design of calibration system in progress.
- Realigned collimator mirrors.
- Installed new Gemini Array.
- Adjusted new array for tip, tilt, focus and rotation.
- Aladdin III control code completed.

Plans:

Mechanical

- Design and fabricate the calibration mechanism.
- Verify cryo connections and cold head status.
- Add chilled water connection to electronics rack.
- Design and fab shipping boxes.
- Install Gemini filter set.

Electrical

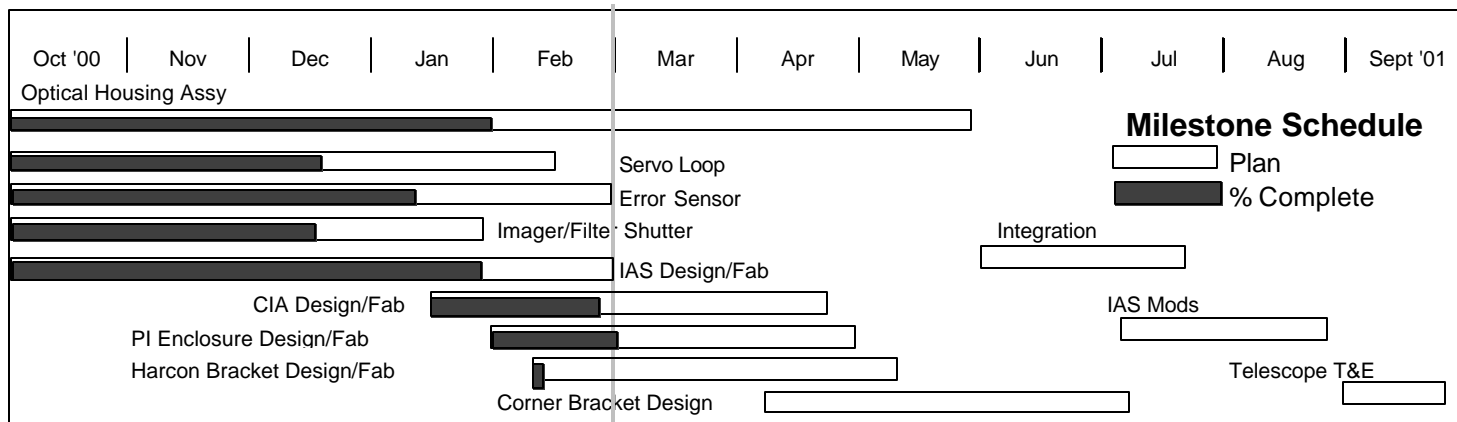
- Add remote on/off relay.
- Verify fiber connections are correct for Gemini.
- Change power supplies.

Software

- Sun stand alone code.
- TCS interface for header information.

N-NX539-202 WTTM

DESCRIPTION: The WTTM is a step to provide VIS-NIR adaptive optics to the NOAO/KPNO/WIYN community. A module will be developed in lab and then integrated into the WIYN IAS as a second port. It is designed for upgrades and will be commissioned in FY '00.



FY2001	
Budgeted Hours thru 2/01	3645.8
Actual Expended Hours	4178.5
Capital Expended	\$23,486

ACCOMPLISHMENTS:

- APD electronic wiring completed.
- WTTM bracket, M3 remake and IMA fiber ends in fabrication.
- Error sensor parts ~80% complete.
- Machining of pick-off mirror mechanism parts ~85% complete.
- CIA optical design on WFSCam mirror stage is finished.
- PI case design is complete.
- Beam splitter insert tool detailed and ready for fabrication.
- Beam splitter storage box designed.
- Released alignment procedure details to outside vendor for fab.

PLANS:

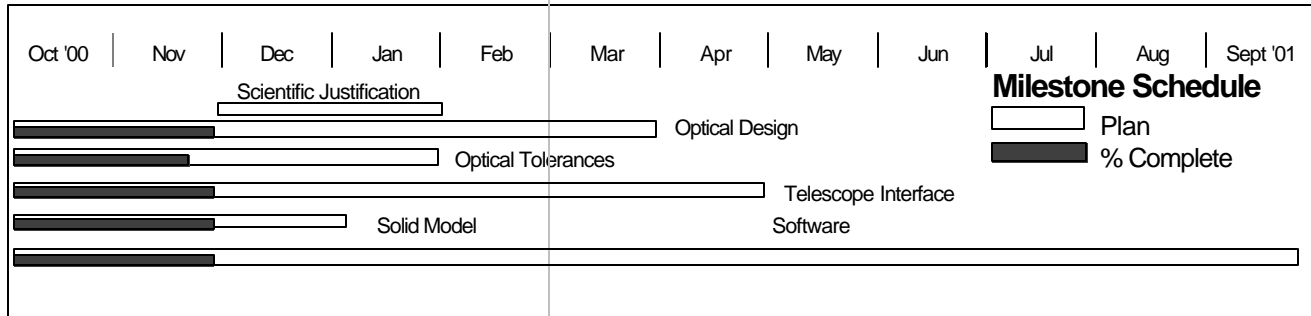
- Continue production of optical components, “real” IMA is next in NOCL.
- Detail CIA feed mechanism.
- Continue to design and detail beam splitter components.
- Complete pick off mirrors in NOCL, ground and ready for polish and sizing.
- Continue fabrication of error sensor parts.
- Begin testing of WTTM pickoff mirror mechanism.
- Evaluate feasibility of eliminating integrating sphere from CIA.
- Investigate hardware limit protection for WFSCam and pickoff mirror.
- Detail PI case.
- Begin to finalize Harcon bracket design.

PROBLEMS:

- Balfrey has not yet delivered x-y stage, NOAO purchasing pursuing solution.
- WTTM has more work than the IMs can handle. L Daggert evaluating priority and manpower loads.
- Fibers are late from coating vendor. Continue to pursue prompt delivery, will turn over to NOAO purchasing at 4wk mark.

N-NX539-203 Next Generation Optical Spectrograph (NGOS)

DESCRIPTION: This is a conceptual design phase of a multi-year project to product a wide field, imaging spectrograph utilizing state-of-the-art technology, thus permitting high efficiency and spectral resolution over a wide field of view. It will be designed for use at the Cassegrain focus of the Mayall 4 meter telescope.



FY2001	
Budgeted Hours thru 2/01	1093.75
Actual Expended Hours	797
Capital Expended	\$8,329

ACCOMPLISHMENTS:

- No items.

PLANS:

- No items.

PROBLEMS:

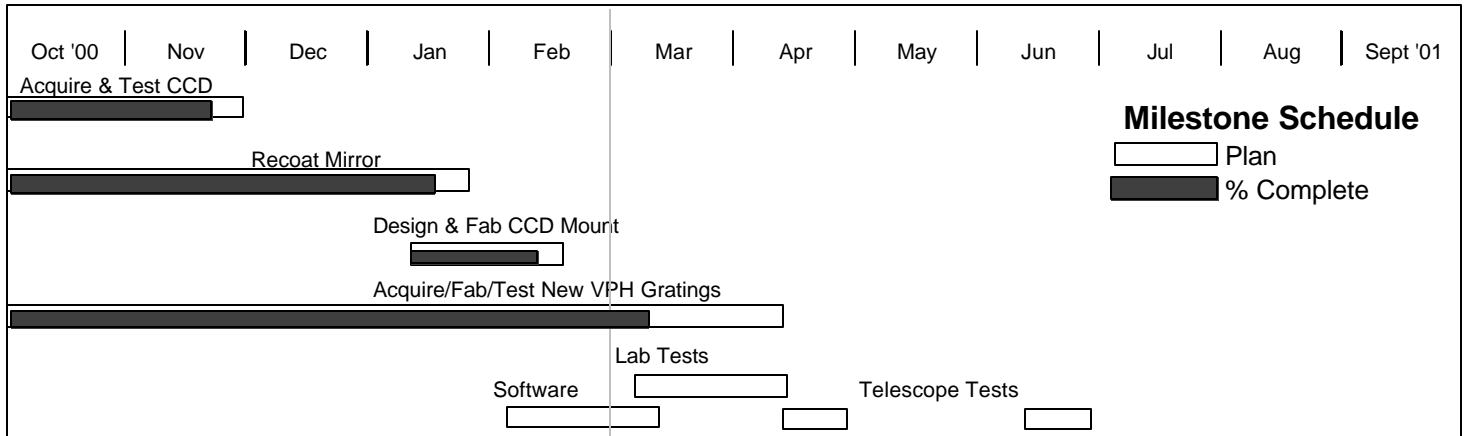
- Due to lack of assigned resources, effort will be reduced to optical design and tolerancing.

SOLUTIONS:

- Reduce scope of project, with resource allocation that will preserve existing accomplishments.

N-NX539-211 Cryo Cam Upgrade

DESCRIPTION: Recoat the Schmidt camera reflective mirror with a protected silver. Acquire and install a new LBNL Hi-Rho CCD. Acquire two new VPH prisms.



FY2001	
Budgeted Hours thru 2/01	1093.75
Actual Expended Hours	503.5
Capital Expended	\$12,232

ACCOMPLISHMENTS:

- PC card and AIN substrate to UC Santa Cruz.
- New CCD mount design progressing.
- Progress on VPH Grating.
- No residual image on 2nd CCD; CCD #1 exhibited this poor performance.

PLANS:

- More telescope test in April and then shared risk observing using new CCD.
- Continue work on VPH Grating.
- Shape and size field flattner lens.
- Complete mechanical design of new CCD mount.
- Modify grism cell holder.

PROBLEMS:

- No items.

SOLUTIONS:

- No items.

Design/Drafting – Electronics (D. Stover)

<u>Jobs in Process/submitted</u>	<u>Acct No</u>	<u>Est hrs</u>	<u>Accum.hr</u>	
Precision Reference (AI)	NNX 519 128	11.5		Sch done / Eng review & redline
CAMAC drawings to release	N-NK510-808	62		Shelby - corrections and old dwg revised
Gong documents to release	S-NP100-520	45		Going through to release all documents
GONG new docs for upgrade	S-NP100-750	35		GM has prioritized list working as I can
Solis Mount drawing	S-NT400-230	30		Mount wiring Diagram (requested to be finished
GNAAC Support document	NNX 510 015	233		
Library standards & Libraries	NNX 510 000	166		
Solis VSM Galil Interface Brd	NNP 140 110	76		in review w/engineer

Heads UP

SQIID asbly dwg/wiring diag/list	NNX 510 000			No information
Heater board				Waiting for Andy & Paul to review what it needs
Solis VSM cover driver brd				
Solis FTP bring more cards				

Phoenix Documentation

GNAAC & etc. Documentation

Temp Control	NNX 510 000	3		old (need to release) phoenix
NAAC A/D with Xilinx	NNX 510 000	8	127	Documentation to finish
ACE Pre Amp	NNX 510 000	2		
ACE House Keeping	NNX 510 000	2	66.5	
ACE ABC	NNX 510 000	2	69.5	
ACE PRCD	NNX 510 000	2	128.5	
ACE ADC	NNX 510 000	2	80	
ACE Data Transmitter	NNX 510 000	2	37.5	
ACE ADC MOD BP	NNX 510 000	2	55	
ACE PA BP	NNX 510 000	2	25	
Cable drawings	NNX 510 000	24		90%
WF Interface & dewar tmp snsrs	NNX 510 000	2		add notes to asby OBSOL
ACE Interface Jumper	NNX 510 000	2		add notes to asby
ACE Temp Control	NNX 510 000	2		add notes to asby
Quad Stepper Controller	NNX 510 000	2	8	Assembly docs, Need to release

Finished items

GNIRS Hard Stop PCB	NNU 510 160			need to update assembly drawing
WTTM DAC Cards	NNX 539 202			Finished all documents for card > to release

COMMENTS

I have managed to create a design information worksheet to help in gathering and reviewing data on each pcb design. This will also be useful to quickly find information after a board has been done and we are questioning what was done.

Time was spent finding information about phoenix that Paul S. requested, and some time spent in working out details of the coadd board rework.

Problems with the material and current method used to blacken the slit masks for the 4M presented themselves. Working with Roger Repp a new material was suggested and given to the vendor to make a sample. The sample is being evaluated for reflection and slit dimensions.

Guillermo has given me a priority list of documents to create and/or finish for GONG+ deployment. I am working on this list in between layouts, Phoenix fires, coadd fires and other smoldering projects.

Instrument Shop (R. Repp)

Small Purchase Orders (Account Numbers, Vendors, Products Purchased, and Cost)

NNK510-844, Precision Plating, Anodize	\$57.24
NNU580-310, MSC, Misc Endmills and Counterbores	\$484.25
NNU580-310, Cole Palmer, Ultrasonic Cleaner and Accessories	653.05
NNX539-202, Precision Plating, Anodize	\$47.70
NNX539-202, Bralco Aluminum, Aluminum Stock (3 Orders).	\$418.27
SNP140-060, MSC, Cordless Drill and Reciprocating Saw	\$481.13
SNP140-060, McMaster, Punch and Hex Bits.....	\$60.46
SNP140-110, Precision Plating, Anodize (2 Orders).....	\$415.52
SNP140-110, Perfection Powder Coating, White Paint on VSM	\$450.00
SNP140-110, EMJ, Steel Tubing.....	\$114.40
ZZUP44-582, Precision Plating, Anodize	<u>\$47.70</u>
Total Non-Shop Expenditures, February 2001	\$3,229.72

Other News:

Ron Harris is scheduled to return to NOAO to work on the GNIRS Project. March 19 will be his first day.

Lou Lederer will move from the SOLIS Project to GNIRS on April 2.

Rene Muhlberg will be retiring from NOAO on March 30. His sure hands will be sorely missed.

Instrument Shop Monthly Spreadsheet

Since 1995, all work in the shop has been tracked by using spreadsheets. Each major assembly is logged on a spreadsheet, and the information from the assembly sheets is passed on to one other spreadsheet entitled "Instrument Shop Work Sheet." Any manager of project engineer who has work in the instrument shop, and wants to track it can use this sheet to help them know what stage their project is in. Since this is the first time some of the readers have seen this work sheet, a brief explanation of how the sheet works follows:

Name: The name of the instrument maker assigned to the project.

Project: Wherever possible, drawing numbers, and proper titles are included under this column.

Charge Number: The all mighty account number.

EST: The estimated time, (in hours) remaining on the project.

EST Start: The date the project was started, or is expected to start.

ECD: Estimated Completion Date.

Revised ECD: If a project is starting to fall behind schedule, a new ECD is established. There is a number before the date, that is the "revision number" of the changed ECD.

Date Complete: The date that the project is deemed fabricated "complete per drawing." (There are often minor changes and revisions to any given assembly after it is deemed complete.)

Comments: Miscellaneous remarks about job progress, processes, etc.

Instrument Shop Excel sheet

Infrared R&D Program (K. M. Merrill)

Bill has modified the lab system to accommodate new pre-amp and AD boards for testing. Al and Nick are modifying code to utilize the new arrangement. Final Aladdin arrays will be tested and a new hybrid HgCdTe on Aladdin readout will be evaluated during the coming month(s).

Fowler and Merrill worked the ORION 2KX2K InSb initiative. Funding package has been approved by NSF and AURA. Formal kick-off meeting is scheduled for the end of March.

Merrill has agreed to report to Gemini on the status of 2KX2K devices at RIO for possible incorporation into a 4KX4K imager for Gemini MCAO.

Fowler, Ball and Sharp trained Gemini South personnel to install, operate and support Abu. Abu is ready to go.

Continued planning for operating ORION muxes with the lab system. Muxes should be available in 6 months.

Optical Coating Laboratory (G. Poczulp)

Solis VSM Telescope

S-NP140-110

The aspheric polishing of the VSM M2 was completed at Rayleigh Optical. The final figure reported on 1/10 for M2 was 0.026 waves rms surface at 632.8 nm (16.4 nm rms, the spec. is 16 nm). The surface roughness is in the 1-2 nm rms range (the specification is 3 nm rms). A final report was issued and the system testing is set to take place early next month.

Harold Johnson Optical Laboratory delivered the cylindrical lenses and the glass compensator blocks. All of the elements were inspected with crossed Polaroid filters to check for any residual grinding induced stress birefringence. None was observed.

Protective covers for the various Offner optics were fabricated and the design of the shipping boxes for M1 and M2 was completed. The M1 lifting hub was designed. An additional protected silver coating vendor was identified and a set of prints was sent out for quotation.

WTTM Fabrication

N-NX539-202

The WTTM tip tilt mirror, the spare (after having the back surface reworked), and the dummy tip tilt mirror were received from Newport Thin Films Laboratory after receiving a protected silver coating.

The ten WTTM beamsplitter substrates were interferometrically measured and thoroughly documented prior to having serial numbers applied.

The coating of the optical fibers at Deposition Sciences Incorporated was delayed for unknown reasons.

4m APS Wavefront Camera

N-NK510-844

The two prisms ordered from Lambda Optics arrived and it was found that the wrong size (50 mm) had been ordered. The prisms were returned for credit and the proper sized replacements were ordered. After the 38.1mm replacements arrived, the optical surfaces and wavefronts were interferometrically tested and documented. Additional tests were performed on the existing 35mm prism and it was decided that all three prisms would be milled down to 25.4mm height by the optical shop.

Optics Excel sheet

Computer Services (C. Danielson)

- 1 George Jacoby PC question (from programmer)
- 2 N. Buchholz monitor questions.
- 3 N. Buchholz pc questions
- 4 Heidi V home loaner PC work (solis)
- 5 Server error messages - low disk space on draftback c\$
- 6 F Bull part question/search
- 7 M Peralta re: antivirus
- 8 M Peralta re: Sony lappers
- 9 R Wolff follow-up on disk crash
- 10 Ongoing Anti-virus updates
- 11 Larry D Antivirus program update
- 12 Al Fowler Antivirus program update
- 13 CFO - replacement monitor for mountain machine (give bad one to Jerry!)
- 14 Email to Gloria asking about order for antivirus software - still no answer!
- 15 Ongoing tape backups for stockroom
- 16 Answer Beth questions regarding file backup for Paul McIntyre's pc
- 17 Assist Beth in recycling mag tape media
- 18 Ink cartridges for Dave H
- 19 N Mills questions regarding upgrading his computer
- 20 Roger Repp re: upcoming computer order
- 21 Discuss memory and bios upgrades with CarlD
- 22 Video card loan to Nelson Z
- 23 Questions from Dave H re: PC communications
- 24 Doubled memory for G Muller
- 25 Doubled memory for E Hileman
- 26 Added memory for John A
- 27 Installed LAN monitor on draftserv
- 28 Ordered more memory for drafting
- 29 Provided a Pentium machine for J Penegor
- 30 Poked on draft net re slow down problem

Programming Group (R. Wolff)

Behzad Abareshi

1. Made progress in understanding how WIYN TCS uses the encoder board and Tpro to maintain its clocks and perform tasks at different cycles. This understanding, the majority of which was gained slowly during two nights of T&E in the company of Bob and Charles, helped in discovering a couple of bugs that seem to have been the culprits in the infamous tracking problems at WIYN. The fixes seem to be working: the TCS time remains stable despite occasional feats of flakiness displayed by the Mountain IRIG-B (typically a deviation of about 4000 seconds from the real time and back to normal again, all within a 100 ms).

2. Set up the new GPS unit for WIYN in my office and tested the NTP functionality; set up a web page (<http://moby/datum/datumConfig.html>) describing the steps to configure it for WIYN. Currently the unit is at WIYN, and serves as a stratum 1 NTP server (version 3.0) and also provides the IRIG-B signal to Tpro, thus removing the Mountain IRIG-B from the list of possible excuses when things go wrong.

3. Have been reading up on Hydra in general, and been trying to understand what is involved in the upcoming Hydra upgrade project. In this regard Dave Sawyer was quite helpful; he and Phil Massey showed me around Hydra, and explained which parts are to be changed (whether to change the gripper is still up for debate). I also spent some time with Phil and went through the whole process of setting up Hydra for a typical observation. Phil gave me a copy of his WHYDRA document.

4. Started to use CVS for revision control. Thanks to Bob's efforts WIYN TCS has been ported to CVS, and I have already checked in a couple of minor revisions.

5. Have been doing boring leg work to prepare for my trip to Chile (getting tickets, and obtaining a visa). Got the tickets; visa still in progress; I have also made initial contact with Rolando and Tom Ingerson at CTIO; will be bugging them more in the upcoming month before my trip, and even more once I am there!

Nick Buchholz

1. Continued rewrite of saver program for ORION (2048x2048) arrays
2. Worked with A Fowler and Bill Ball on R&D lab code problems.
3. Completed new ucode to run Aladdin II array for Phoenix.
4. Worked with new Linux box getting system set up and working
5. Worked on test code for linux NDAS testing

Phil Daly

February has been spent integrating the WTTM control system with the LabVIEW GUI and verifying the hardware still works OK. This is going well and the purchase of a (hand held) laser pointer rigged up with a Heath-Robinson contraption allows one to see the mirror wiggle at high frequencies (remember to duck when you enter the WTTM Lab, B-38, though). One sour note on the horizon is that the LabVIEW 6i crashes are real and unrelated to real-time Linux. A patch was issued (6.0.2) by NI to cover Linux systems and this has been applied but not tested in anger. Watch this space.

A modest amount of time was spent fixing GONG's graph problem (failure to reset properly after midnight). This works well so no further action is anticipated.

Some time was also spent assisting in setting up the new Linux box for the NDAS/controller project and reviewing documentation destined for IPAC on this topic.

Shelby Gott

After much experimentation, I've managed to get a GWC client running on the DIMM-PC. This demonstrates that a cheap, low-power Linux system with only a 16 Mbyte flash disk can run an embedded application and connect to the GWC router via ethernet.

The application I'm running is a clone of the "f8mid" program. I ported it to Linux, and then built it with the -static flag, so it can be copied and run on a small system without all those shared object libraries. It compiles to a binary of about 4 Mbytes this way. White Dwarf Linux installs in about 8 Mbytes, including several useful things like bash, vi, and ftp, but no graphics.

I still have a problem with the DIMM-PC form factor. The SO-DIMM sockets have pins that are too tiny and closely spaced for wire-wrap prototyping, so I'm shopping for another small Linux platform with similar performance, but in the shape of a PC-104 module, which I think will be easier to work with.

For a change of pace, I volunteered to resurrect the WIYN Particle Counter (aka Dust Monitor). I'm playing with it in the "lab" while ME gathers parts to repair its fiber link.

Bob Marshall

Project related work:

Worked on the "mountain software inventory": reconciled source code, verified builds and installations, listed software components, checked documentation. Completed these items: WIYN TCS, Linux tip, service.

Did the long awaited updates to "service". Streamlined the post-processing code by combining 2 programs and 1 c-shell script into 1 tcl script. Added a priority level to the MSR and mailing lists for selected categories.

Operations:

Finished preparing the WIYN TCS code so that Behzad could take over main responsibility.

Did tests with the IRIG-B signal at the WIYN T&E. Worked with Behzad on updating the TCS to make the time related code more robust.

Redid the disk partitions on the new WIYN DCA computer (sand) and help debug the network routing problems (bad ethernet driver).

Added TCS slew limits for Flamingos at the 2.1-meter. Also added "flmn" to the instrument configuration.

Maintenance:

Fixed the "oss tertiary load range" command in the WIYN CLI.

Made other changes in the WIYN CLI as requested by Charles Corson at the WIYN T&E.

Computers:

Installed the latest version of CVS and tkCVS.

Dave Mills

Rewrote the WIYN DIQ code to use the IRAF method of calculating fwhm. Tested and installed new version which now agrees with measurements made manually with imexamine.

Modified the WIYN guider to provide switchable input selection (imaging or FOPS guider). Fixed a color palette bug which was affecting all installations of the Linux guider, on screen images should now have better contrast/range.

Fixed start/shutdown problems with WIYN Xtcs gui on linen.

Did a bit of research in preparation for the expected arrival of the DIMM hardware.

The main project this month was to sort out my codebase and get it all into CVS. All my code currently running on the mountain computers has now been archived onto a set of cd-r backups. All currently running code has been integrated into my development tree on triangle, and loaded into CVS on indus. The following projects have been processed: html documentation (user and programmer), gui's (arcon/mosaic, adc, 4mspec, pfccd, gstar, kpno_2m, kpno_4m, oracle, phoenix, xobject, 4maps), loadable library modules (piccd, astro, dgh, gsc, usno, xtcs, arcon, wifoe, muxnex, oracle, sbig, rpc, dss, tcp4m, otc, ccd, sfd), and guiders (2m, 4m, wiyn + autofocus, and new version) Misc (wiyn wfscam, sectilt, arconremote, wavefront, old Itex code for vxworks)

Peter Ruckle

The capfast and related c software are being developed for the components controller for gnirs. The cad, car, apply structure is being tested to ensure that things are set properly. Next, when hardware is available, or a simulated version of the low level software, the low level code will be run with the epics interface.

Richard Wolff

Resolved the GMOS "shock" problem with the simple expedient of telling Gemini "Don't do that", deemed a reasonable solution given the probability that all dewars suffer from this to some degree and the very small likelihood we could actually fix anything.

Resolved the (GMOS) low level banding problem: obscure hardware fault in the VME interface board, which has to be fixed by the vendor.

Provided final diagnostic images to GMOS; the dewar has been packed for shipment.

Gemini and Marconi have worked out a deal to cut off the delivery of CCDs at 11 (rather than 12); provided suitable administrative middleman support for this.

Prepared some information for upcoming bench HROS discussion.

Prepared presentation for mid-Fab GNIRS review.

Reworking GNIRS low level software to clean up little messes. Tested new VME crate. With Andy Peters help, found and repaired problem with temperature readback hardware.

Safety (B. Everett)

There were no injuries reported in February. We have currently experienced 657 days without a lost time accident at the downtown location.

Routine inspections of downtown, Gong Farm & mountain facilities have produced no major safety findings.

Currently investigating a near-miss occurrence on the mountain involving a crane. Preliminary information indicates that the limit switch on the unit was damaged and failed to function properly. Will be conducting interviews of the engineering and maintenance personnel involved to gain the complete picture of events leading up to the incident and actions taken afterward. Complete report and lessons learned will be published after investigation.