# MONTHLY STATUS REPORT

Engineering & Technical Services  
January 2001

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### Central Engineering & Technical Services

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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](http://www.noao.edu/ets/newfirm/newfcon.html).

PLANS & SCHEDULE WERE PRESENTED TO IPAC’s JANUARY MEETING FOR CONSIDERATION.

Detailed manpower requirements for concept designs to be presented to February IPAC.
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.

ACCOMPLISHMENTS:

• Repaired the failed 1f/sec board and returned to Gemini.

PLANS:

• Repair the Gemini lab controller and return to Gemini.

PROBLEMS:

• The boards supplied by the stuffing house or board fab house are warped. Investigations with the vendors are in progress. New boards may have to be procured if the warpage is caused by temperature cycling in the electronics racks.
**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.

<table>
<thead>
<tr>
<th>Milestone Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct '00</td>
</tr>
<tr>
<td>HROS Review</td>
</tr>
<tr>
<td>Receive UV CCDs</td>
</tr>
<tr>
<td>Evaluate UV CCD</td>
</tr>
<tr>
<td>Receive HROS Dewar</td>
</tr>
<tr>
<td>Acceptance Test</td>
</tr>
<tr>
<td>Ship System</td>
</tr>
<tr>
<td>Integrate Controller</td>
</tr>
<tr>
<td>% Complete</td>
</tr>
</tbody>
</table>

**ACCOMPLISHMENTS:**

- Disassembled dewar to check for potential problems. None found.
- Detailed tests conducted to isolate reported problem.

**PLANS:**

- Address issue raised during test, then ship.

**PROBLEMS:**


**SOLUTIONS:**

- Continue effort on fault isolation.
Z-ZUP44-5XX GEMINI MODIFICATIONS TO PHOENIX

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

Accomplishments:
- Contracted fabrication of new interface unit with M3.
- Repair of secondary focus mechanism in progress.

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

Electrical
- Install new Gemini Array.
- Adjust new array for tip, tilt, focus and rotation.
- Add remote on/off relay.
- Verify fiber connections are correct for Gemini.
- Change power supplies.

Software
- Sun stand alone code.
- Aladdin III control code.
- TCS interface for header information.
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.

ACCOMPLISHMENTS:
- Design for IMA end of the APD fibers complete.
- WTTM/WFSCam pick off mirror in fabrication at NOCL.
- IMA fabrication test complete, protective coating test completed.
- APD enclosure fabricated.
- IMA front lens completed and ready for coating.
- WTTM bracket detailed and ready for fabrication.
- Error sensor parts ~40% complete.
- M3 remake process finalized, final fab drawings to vendor.
- WFSCam – Pickoff mirror interference problem solved.

PLANS:
- Heidi will fabricate IMA fiber ends when fibers arrive from coating.
- Populate and wire APD enclosure.
- Continue production of optical components, “real” IMA is next in NOCL.
- Detail CIA feed mechanism.
- 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.

PROBLEMS:
- Balfrey has not yet delivered x-y stage, NOAO purchasing pursuing solution.
- WTTM has approximately 7 man-months of instrument maker back-logged; L. Daggert evaluating priority and manpower loading.
- Fibers are now 3 weeks 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 produce 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.

<table>
<thead>
<tr>
<th>Oct '00</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept '01</th>
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**Milestone Schedule**

<table>
<thead>
<tr>
<th>Plan</th>
<th>% Complete</th>
</tr>
</thead>
</table>

**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.

**ACCOMPLISHMENTS:**

- Received PC card.
- Second CCD received (returned from repair).
- Second dewar CCD mount fabricated.
- Second CCD installed in dewar.
- Testing begun on second CCD.
- Started design of new CCD mount.
- Progress on VPH Grating.

**PLANS:**

- Continue tests of both CCDs.
- Continue work on VPH Grating.
- Shape and size field flattener lens.
- Complete mechanical design of new CCD mount.

**PROBLEMS:**

- Residual image when exposed to high flux levels (higher priority work prevented progress on this item).

**SOLUTIONS:**

- Continue dialogue with LBNL & Lick Observatory to reach solution.
### Design/Drafting – Electronics (D. Stover)

| Jobs in Process/submitted               | Acct No | Est hrs | Accum.hr
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Precision Reference (Al)</td>
<td>NNX 519 128</td>
<td>11.5</td>
<td>Sch done / Eng review &amp; redline</td>
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<td>CAMAC drawings to release</td>
<td>N-NK510-808</td>
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<td>Shelby - corrections and old dwg revised</td>
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<td>GONG new docs for upgrade</td>
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<td>working through Guillermo as needed</td>
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<td>Solis Mount drawing</td>
<td>S-NT400-230</td>
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<td>Mount wiring Diagram (requested to be finished</td>
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<tr>
<td>GNAAC Support document</td>
<td>NNX 510 015</td>
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<td>Layout done, minor mods to be done</td>
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<td>Library standards &amp; Libraries</td>
<td>NNX 510 000</td>
<td>166</td>
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<tr>
<td>GNIRS Hard Stop PCB</td>
<td>NNU 510 160</td>
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<tr>
<td>Solis VSM Galil Interface Brd</td>
<td>NNP 140 110</td>
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<tr>
<td><strong>Heads UP</strong></td>
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<td>SQIID asbly dwg/wiring diag/list</td>
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<td>Solis VSM cover driver brd</td>
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<tr>
<td>Solis FTP bring more cards</td>
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<td><strong>Phoenix Documentation</strong></td>
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<tr>
<td><strong>GNAAC &amp; etc. Documentation</strong></td>
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<td>Temp Control</td>
<td>NNX 510 000</td>
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<td>NAAC A/D with Xilinx</td>
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<td>ACE PA BP</td>
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<tr>
<td>ACE Interface Jumper</td>
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<td>8 Assembly docs, Need to release</td>
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<td><strong>Finished items</strong></td>
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<td>HiRho 1980x800 CCD intrfce</td>
<td>NNX 539 211</td>
<td>24.5</td>
<td>wait input finalize assembly drawing</td>
</tr>
</tbody>
</table>
**Small Purchase Orders** (Account Numbers, Vendors, Products Purchased, and Cost)

- **NNK510-844, Precision Plating, Anodize**: $58.30
- **NNU531-613, Precision Plating, Anodize**: $47.70
- **NNX500-100, MSC, Angle Plate and C-Clamps**: $376.17
- **SNP140-110, MSC, Slitting Saws**: $543.71

**Total Non-Shop Expenditures**: $1,025.88

**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 March.

Fowler, Ball and Sharp train 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 fr 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)

Resolved Problems:

   J Wagner's virus infestation
   Beth's tape drive problem
   Dead PC, Al Davis
   NT-test-gate network error

Unresolved:

   Slow network response
   Hard drive failure, R Bennett, to be completed 7 Feb.

New installations:

   Laptop for Al Davis
   HP tape drive in nt-test-gate
   HP tape drive in starjeep
   Linux in carld
   Multiple Cat5 cables
   VNC program on Servers
   Network probe on draftserv

Routine maintenance:

   Antivirus updates
**Programming Group (R. Wolff)**

**Behzad Abareshi**

1. Made progress in setting up a WIYN simulator. Current status: we can run SSD, and have all the pieces needed to work on Tpro/NTP. Side effect: my mistake in IACK jumpering led us to conclude the spare encoder board was defective; more testing by Charles uncovered a real problem. He is sending it to Wisconsin for repairs.

2. Replaced the MV162 real time clock with the Tpro clock, at least as far as NTP is concerned. Here is how: VxWorks uses clock_gettime() / clock_settime() to get/set the RTC. I wrote gettimeofday() / settimeofday() to get/set the Tpro clock, and integrated them into the VxWorks kernel. Then I rebuilt NTP and forced it to use [g,s]ettimeofday instead of clock_[g,s]ettime. This way when we run ntpdate, it reads and sets the Tpro clock directly, bypassing the MV162 RTC, which, as I had mentioned before, has a drift problem.

3. Previously I had built NTP for VxWorks 5.2, so I didn't expect a problem when it was time to port NTP to version 5.3 (used at WIYN); wrong assumption! Turns out that particular kernel was built with no support for POSIX timers, needed by NTP. I have run NTP and TCS on the rebuilt kernel (with POSIX support), and so far no problems (I'll add some tips to the documentation on this).

**Nick Buchholz**

1. Completed rewrites for wfire code to run ORION (2048x2048) readout.

2. Started rewrite of saver program for ORION arrays.

3. Worked with Al Fowler and Bill Ball on R&D lab code problems.

4. Verified SQIID code for 4-meter run will transfer code to 4m early February.

5. Began new ucode to run Aladdin II array for Phoenix.

**Phil Daly**

Integration of LabVIEW and RTAI in the lab. APD reads take 9us, mirror updates take 50us, status check 35us and LVDT 110 us. LabVIEW 6 crashes and so I have reverted to LabVIEW 5. NI apparently has a fix for Linux systems pending. Had some brief discussions with Barry Starr et al about the IR/Opt controller project but nothing concrete has emerged from this so far.

**Shelby Gott**

Two projects that were supposed to keep me busy this month haven't materialized (f/8 encoder upgrade, WTTM feed slide), so I've had time to work on my embedded Linux project.

Finished building and began testing the prototype PC/104-to-STDbus bridge. Looks good so far. I've tested it with a QSC (quad stepper controller) board and a DAD-48 (ADC) board. Need to test for compatibility with additional STDbus boards.
Installed White Dwarf Linux on my Jumptec DIMM-PC system. This is a very lean distribution of Slackware that has been tailored to work on Jumptec boards. Installation wasn't bad, but porting applications from Red Hat isn't as easy as it should be (or I just haven't found the trick yet). Stay tuned.

Bob Marshall

Project related work:
Worked some more with Behzad in setting up a WIYN TCS test system.
We discovered problems with the spare encoder board, which were later verified at WIYN.
Setup the new WIYN DCA computer (sand).

Operations:
Worked with Daryl to recalibrate the Coude Feed TCS after the alt. encoder was installed.

Reworked the disks on "oatmeal", the WIYN Hydra control computer. Removed unneeded files, built new disk partitions for the Hydra status files and the Hydra program files so they no longer share space with the home directories.

Worked on the WIYN TCS source files (from Shelby). Moved the history files from "Razor" to CVS and installed Shelby's latest version in CVS. Review the changes made since Jeff Lewis left.
Prepared the files so that Behzad can take over the main responsibility for the WIYN TCS.

Maintenance:
Restored deleted files from the operators account on mocha.
Cleaned up some mountain log files.
Setup printer access from the 4meter to downtown.

Computers:
Setup the software (drivers and Xcdroast) on my Linux system to use the Plextor CD-RW drive.

Dave Mills

Started working on the wavefront camera for the 4MAPS enhancement. This is a commercial SBIG camera that connects via a parallel port. The camera successfully acquires frames under Linux using a basic driver. I am building a tcl scriptable shared library version. Status is written, but not tested yet.

Another WIYN T&E achieved some more incremental checkout of the autofocus/guider ports.
Spent some more time trying to understand the unpredictable behavior of the WFSCAM when used in fast readout (DIQ) mode. It turns out we may not actually have a fast readout mode even though the controller "advertizes" one at initialization.

Minor changes to WIYN XTCS and other GUI's. Altered the shared/sockets code to dynamically choose new socket numbers to avoid problems associated with XTCS stop/restarts. This works well and will propagate to the 2m/4m versions. Installed the new DS9 based guide-star visual selection option. This works well and will also propagate to the other telescopes.

Obtained and rebuilt the latest catalogs/astro/misc/vec/times code for WIYN (from Wisc.). I still need to identify how our local copies have diverged over time and merge in the new code.

Minor changes to the WIYN schedules for new data and content change, new external users etc.
Upgraded my desktop kernel to support the IDE cd-writer. Made some cdr backups - looks good. Installed a 2.4-test kernel to start preparing for Linux 2.4 systems.

**Peter Ruckle**

Work has been started on the GNIRS EPICS interface, specifically the components controller Apply Cad interface. This work will likely take about another month, at which time testing on a hardware system will be necessary. Until then limited testing of the system in simulation mode will be done on the VME crate in my office.

After the components controller is operational, the SAD database will be finalized, and integration of the Instrument Sequencer and WFS will be done.

**Richard Wolff**

Work on GMOS continued with extensive testing to attempt to understand both the shock induced bias shifts and the strange bias change that happens in some channels for a few hundred rows after the readout starts. Neither is understood. The former is associated with something in the dewar; the latter is probably a VME backplane problem.

A few small modifications in the GNIRS software were made and the new VME crate tested for operation with the motor test set.
Safety (B. Everett)

There were no lost time injuries reported in January.

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

Reviewed resumes of potential candidates for Safety Officer position.

Met with Kitt Peak EMT’s to discuss future of emergency medical services on the mountain. Discussion centered on the need for continuing maintenance of competency throughout the year. A list of maintenance requirements was presented and all EMT’s agreed to meet the standards. In return, EMT’s will receive quarterly incentive bonus for standing call and maintaining competency. Those not meeting the quarterly requirements will not receive the bonus.

Conducted a training exercise in conjunction with St. Mary’s Lifeline medivac unit. Medical personnel conducted a classroom and hands-on training for mountain EMT’s in patient preparation, helicopter safety, and landing zone preparation. EMT’s also received in air orientation.

Conducted evaluation of visitors’ nighttime program. No problems were noted during the evaluation. However, it was stated that some facilitators cover the red strip lights on the stairs and in the dome. This concern was relayed to the program manager with instructions that the lights are to remain visible at all times to enhance visitor safety.