## Table of Contents

### Projects

N-NX529-448 NEWFIRM ................................................................................................................2

Z-ZUP44-200 Gemini Controller 1f/Sec Upgrade .................................................................3
Z-ZUP44-5XX Gemini Modifications to Phoenix .................................................................4
Z-ZUP44-6XX Gemini CCD Controller Integration (bHROS) ...........................................5

N-NX539-202 WTTM ........................................................................................................6
N-NX539-203 Next Generation Optical Spectrograph (NGOS) ..........................................8
N-NX539-211 Cryo Cam Upgrade ......................................................................................9

### Departments

Electronic Design ..................................................................................................................10
Instrument Shop ..................................................................................................................12

### Central Engineering & Technical Services

Infrared R&D Program ..................................................................................................14
NOAO Optics & Coatings Labs (NOCL) ........................................................................15
Computer Services .........................................................................................................17
Programming Group ......................................................................................................18
Safety ............................................................................................................................21
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).

<table>
<thead>
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ACCOMPLISHMENTS:

- Roy Autry has accepted the position of Project Manager for Newfirm. He will start on May 7, 2001.
- A small team has begun looking at the Ball Aerospace report. Packaging the instrument in the space available was a major concern for Ball. An alternate optical design is being explored to reduce the packaging problem. A mechanical design that moves the truss supports outside the dewar is also being developed.
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.

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<th>Oct '00</th>
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Milestone Schedule

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<td>Budgeted Hours thru 3/01</td>
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<td>Actual Expended Hours</td>
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<td>Capital Expended</td>
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ACCOMPLISHMENTS:

- S/N 21003 / 21004 / 21006 continue to function properly.
- Work on S/N 21001 / 21002 / 21005 has been delayed due to efforts on NRII noise issues, and the missing (corrupted) 32 pixels at end of a frame issue.

PLANS:

- S/N 21001 Currently awaiting debug. Expected completion 5/10/01.
- S/N 21002 Currently operational in Hawaii. Requested to be returned to NOAO for rework, inspection, retest cycle. Estimated Completion TBD
- S/N 21005 Currently awaiting debug. Expected completion 5/15/01.
Z-ZUP44-5XX GEMINI MODIFICATIONS TO PHOENIX

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

Accomplishments:
- Received the Gemini interface unit and counter weights from the vendor.
- Phoenix is undergoing thermal testing to determine the effects of changing bench temperatures on focus. Based on testing, we will stabilize the bench temperature to +/- ¼ degree. Two new cold heads have been ordered and will be installed in Phoenix prior to shipping.

Plans:
Mechanical
- 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.
Z-ZUP44-6XX GEMINI CCD CONTROLLER INTEGRATION (bHROS)

DESCRIPTION: Investigation of CCDs provided by Marcon 1, CCD Controllers provided by LEACH and bHROS camera provided by UCL. CCDs will be tested and installed in the camera.

FY2001

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ACCOMPLISHMENTS:

- New workscope in process.

PLANS:

- A fresh plan will be done for “bHROS” when things are firmed up.

PROBLEMS:

- No items.

SOLUTIONS:

- No items.
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 ’02.

![Timeline and Accomplishments Table]

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**FY2001**

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<td>6767.5</td>
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<tr>
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<td>$40,372</td>
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ACCOMPLISHMENTS:
- Machining of pick-off mirror mechanism parts ~95% complete.
- Beam splitter insert tool ready for anodized.
- Beam splitter storage in fabrication.
- WTTM bracket is complete.
- Error sensor and alignment procedure tested.
- Front element back from coating vendor, and 3-beamsplitter substrates and reworked prism back from AR coatings.
- IM backlog continuing to be managed, help from KPNO.
- Fibers received from coating vendor, assembly polishing ongoing.
- Pick-off mirror assembly is complete.
- PI case is complete.
- Testing of pick-off mirror mechanism at mountain is complete.
- Central pulley assembly is complete.
- All beam splitter components designed, detailed and released for fabrication.
- Received x-y stage.

PLANS:
- Continue production of optical components, “real” IMA is next in NOCL.
- Detail CIA lenses and lens cells, and prism mount.
- Complete pick off mirrors in NOCL.
- Finish testing of WTTM pickoff mirror mechanism downtown, send to mountain for software development.
- Begin to finalize Harcon bracket design.
- Modify WFSCAM mirror and mirror cell for additional clearance with WFS camera.
- Give IMA front element to midelement.
- Continue work on APD fibers.
- Design protective cover for x-y stage.
- Design installation bracket.
- Redesign tip/tilt mirror and dummy tip/tilt mirror painting mask fixture.
PROBLEMS:

- One cable clamp is not holding tight enough.
- M3 rework contract has slipped 2 weeks; NOAO is working with vendor to expedite process.
- Stepper motors are stalling at 400rpm.

SOLUTIONS:

- Remake cable clamp with tighter tolerance inside pull arm.
- Reduce speed to 300rpm and look into putting on a flywheel.
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.

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<td>Optical Design</td>
<td>Optical Tolerances</td>
<td>Telescope Interface</td>
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**Milestone Schedule**

**FY2001**

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<tr>
<td>Capital Expended</td>
<td>$11,752</td>
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**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: Recat the Schmidt camera reflective mirror with a protected silver. Acquire and install a new LBNL Hi-Rho CCD. Acquire two new VPH prisms.

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<th>Aug</th>
<th>Sept ’01</th>
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</thead>
<tbody>
<tr>
<td>Acquire &amp; Test CCD</td>
<td>Recat Mirror</td>
<td>Design &amp; Fab CCD Mount</td>
<td>Acquire/Fab/Test New VPH Gratings</td>
<td>Lab Tests</td>
<td>Software</td>
<td>[Milestone Schedule]</td>
<td>Telescope Tests</td>
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<tr>
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ACCOMPLISHMENTS:

• Received prisms.
• Fabricated connector plate.
• Tank/inlet tube taken to Abraham’s Airborne for welding.
• Installed and tested 2Kx2K CCD.
• Successful T&E and shared risk observing.

PLANS:

• Continue work on VPH Grating.
• Shape and size field flattener lens.
• Modify grism cell holder.
• Fabricate CCD mount.
• Additional T&E during May.

PROBLEMS:

• Schmidt mirror coating needs to be shipped and recoated by vendor.

SOLUTIONS:

• Vendor work in process.
Design/Drafting – Electronics (D. Stover)
Instrument Shop (R. Repp)

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

NNK360-000, Bralco Metals, Aluminum Stock............................................... $307.10
NNU531-613, Precision Plating, Anodize.................................................... $58.30
NNU580-310, EMJ, Steel Tubing and Rectangles for Bench Cart................. $306.47
NNU580-310, Bralco Metals, Aluminum Sheet and Blocks.............................. $414.54
NNU580-310, MSC, Plastic Parts Bins and Accessories ................................. $422.68
NNU580-310, Bralco Metals, Aluminum for Grating Turret and Mount............ $1,009.08
NNX539-202, Precision Plating, Anodize (2 orders).................................... $111.30
NNX539-202, Bralco Metals, 440C Stainless Steel ..................................... $283.70
NNX539-202, Perfection Powder Coating, Aero Glaze.................................. $132.00
SNP140-110, McMaster Carr, Misc. Hardware (3 orders)............................... $528.19
SNP140-110, Precision Plating, Anodize (2 orders)..................................... $212.00
SNP140-110, Perfection Powder Coating, Paint VSM Housing....................... $3,663.05
Total Non Shop Expenditures, April 2001................................................ $7,448.41

Hard Purchase Orders: April 2001 (Non-Shop Accounts)
NNU532-130, Req Number 3118227, 4-3-01, Bench Heat Treat...................... $1,725.00
NNU510-007, Req Number 3118229, 4-12-01, Gibbs Training....................... $3,000.00
SNP140-110, Req Number 3118236, 4-25-01, Primary Mirror Lifter............. $2,731.60

Other News:
On target to have Lou Lederer move from the SOLIS Project to GNIRS on May 1.
Ron Harris and Lou Lederer will attend Gibbs training classes the first two weeks of May.
Will be hiring an instrument maker for SOLIS in May.

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, which 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)

We're back on the air with array testing of final Aladdin devices.

Fowler, Starr, and Merrill worked the ORION 2KX2K InSb initiative. Fowler successfully concluded design efforts at RIO and CDR is planned for late May.

Merrill worked on report to Gemini on the status of 2KX2K devices at RIO for possible incorporation into a 4KX4K imager for Gemini MCAO. Waiting for a white paper from RIO to complete HgCdTe portion of report.

Abu has been sent Gemini. Bill Ball and Nigel Sharp are set to follow it in May.

Continued planning for operating ORION muxes with the lab system. Fowler put together specifications for the Orion lab dewar.
Optical Coating Laboratory (G. Poczulp)

SOLIS VSM Telescope
S-NPI40-110
No significant work was done on this project.

WTTM Fabrication
N-NX539-202
The prisms, along with the IMA front element and three beamsplitter substrates were received from ZC&R after a second attempt at A/R coating - this time the coatings appear to meet or exceed the better defined specifications. A vendor search is still in progress for the neutral metal beamsplitter coatings to be applied to the front surfaces of the three beamsplitters since they have been returned from A/R coating.

MDM 1.3m Primary Mirror Aluminization
Z-ZKP00-029
The MDM 1.3m primary and 0.5m secondary mirrors were delivered to the Mayall 4m telescope receiving area by mid morning on April 3, 2001. The reflectivity and scatter of the existing coatings were measured with the Minolta spectrophotometer before and after washing with soap and water. The coatings were then stripped and the mirrors were cleaned in preparation for aluminization. After the mirrors were placed in the 4m chamber, it was evacuated to a vacuum of 6.2x10^-6 torr and the two rings of filaments were fired to produce the aluminum coating. The chamber was opened the next morning and the Minolta was used to measure the reflectivity and scatter of both surfaces. The measurements indicated excellent coatings and the mirrors were removed from the chamber to be packed for the short trip back to MDM observatory.

2001 Palomar Coating and Cleaning Conference
N-NX500-500
I attended a three-day conference at Palomar Observatory and made three presentations that illustrated the various aspects of coating and cleaning large optics at NOAO.
Optics Excel sheet
Computer Services (C. Danielson)

- Specify a laptop for M. Liang
- Specify a PC for Ruben D
- Ron Harris new PC
- Lou Lederer new PC
- Jerry Smith - two recycled PCs
- Beth - problem with Rich Gomez MAPI
- Dave H ink cartridge problem/replacement
- WallyB - Sony camera class
- WallyB - Office shortcut bar
- Gulliermo - kvm switch questions/scrounging
- Barry Starr's sound problems fixed
- Beth's new hard drive
- GNIRS demo - meeting w/ Larry & Beth
- Jerry S problem w/ recycled PC - problem with cd rom-not PC
- Lepew gets new hard disc - finally!
- Mike P question re: his bad zip drive (solar PC!)
- Dave H Word importing Mathcad non-problem
- Tape restore from 2/24/1993 - Dee Stover
- Ruben D new computer
- Hogman on net AGAIN !
- Barry Starr's question re: Linux
- Add CAT 5 cable from B2-B46A
- Add CAT 5 cable for Kevin S
- Repair cable for Sue H (sylvan)
**Programming Group (R. Wolff)**

**Behzad Abareshi**

- Spent a week in Chile in preparation for WIYN Hydra upgrade. My main goal was to gain a better understanding of the software development issues involved. Rolando Cantarutti was very helpful and knowledgeable in this regard. A nice bonus was that I got to hang out with Dave Sawyer, so I picked up quite a bit of information / trivia on WIYN in general and Hydra in particular. We also spent two days on the mountain and had a close look at CTIO Hydra a couple of times. Unfortunately, due to the chronic problems that CTIO Hydra has developed over the past year, it is difficult to see the performance benefits of upgrading WIYN Hydra. We capped our trip to Chile with a productive meeting involving both the KPNO and CTIO sides, where suggestions where made on what the WIYN Hydra upgrade agenda should include, and how to improve the CTIO Hydra situation.

- For April T&E installed and tested the latest version of wiyntcs, which now features automatic time-source switching (IRIG-B / NTP). Encountered a minor bug in SSD that would mess up the warning messages issued prior to switching the time source; since the bug was not critical, I patched it after the T&E.

- Spent time on the Hydra code, courtesy of Rolando. He gave me both the last set of code from Lee Groves, and also the latest version running at CTIO. These are besides the current WIYN Hydra code. Depending on the extent of the upgrade and the path taken (the decision will be made in May), we may be able to salvage some of the CTIO code. Two things that seem certain to be adopted from the CTIO model are porting the code to Linux, and using Richard Wolff's C version of Phil Massy's whydra (FORTRAN).

- Have been spending time on the wiyntcs code in preparation for Jeff Percival's visit in May. Part of the plan is to seek his help with the TCS position calculation problem, and also have him give us a lowdown on the overall TCS design.

**Nick Buchholz**

- Worked on speed tests of Dell dual CPU Linux box and Systran board for NDAS.

- Worked on Phoenix to Gemini software issues, (TCS interface, code cleanup, interface issues etc.)

- Took part in ArcVIEW discussions and review.

- Got Systran FXSL boards working and tested data throughput rates under various conditions.

**Phil Daly**

- April was spent, roughly equally divided, between the WTTM project and the Optical/IR controller project. On the WTTM side, we have run the system to characterize the APDs in the low signal-to-noise regime. The data has been collected at 1, 25, 50 and 100Hz for ~60000 samples and analyzed using some cobbled together stats routines. This confirms that the distribution at high signal levels is a very good Gaussian. Chuck is working on the results presented to him by yours truly where the distributions are skewed because of low-number statistics. Eventually, we'll come up with a plan based on all this to implement the correct signal-to-noise algorithm.

- The Optical/IR controller project asked me to evaluate ArcVIEW, a LabVIEW based instrumentation and CCD controller system being built for SOAR. The requirement was to see if we could use it locally. We can use ArcVIEW should we decide to embrace the LabVIEW product as an observatory. However, deeper studies of ArcVIEW are on hold until Mike Ashe, the main author of ArcVIEW, gets the latest system ready for the SOAR TCS final review on May 10.

- Also helped Nick with his suntest-mpg machine from time to time.

- Astonishing news: after a 15-month+ delay, the WTTM X-Y stage finally arrived.
Shelby Gott

- I finally received the WTTM mirror slide assembly, and spent most of April testing it and incorporating it into the IAS program.

- This assembly introduces something new to the IAS; the possibility of a collision between two motorized devices, which could do real damage. If I were to follow the original WIYN design philosophy, as in the OSSCS, any potential collision would result in an error and a rejected command. This would put the burden on the telescope operator to remember, when moving the WTTM slide into the beam for example, to first park the WFS focus stage, wait for it to finish, then move the WFS mirror slide out, wait for it, and then command the WTTM slide in. I thought it would be better to automate the sequence so it could all be done with one command, so I wrote the extra tricky stuff to do that.

- Continued tuning and tweaking the WIYN dust monitor software as we learn more about dust.

- Also did a little detective work at the 4-m and some troubleshooting on the WIYN IAS.

Bob Marshall

- Project related work:
  4-meter Nod & Shuffle: investigated problems with guider stage motions. Looked into ways to decrease the overhead involved with the nods.

  Mountain software inventory: wiyn_page and the WIYN router. Finished the updates to the "wiyn_page" program. Added pages for the Bench Spectrograph and Hydra and the MPG router. For the WIYN router fixed the status message output problem, modified the FIFO error messages, added time stamps for the logs, added a version command, cleaned up the code.

  Did some "raw socket" tests for the new TCS interface for the 0.9-meter. Also tested sockets with VxWorks.

- Operations:
  Did some system setup work for the new DCA computer ("sand") at WIYN.

- Maintenance:
  WIYN: tpro/pointing.
  Coude Feed: indigo disk restore.

Dave Mills

- A 3 night WIYN T&E ensured that we finally got on sky with the new guider/autofocus/fops guider etc. The main functions were confirmed to be working well; a small bug was fixed in the FOPS guider. Seeing was not good enough to determine whether the FOPS auto-focus was working (but the calculated correction was "reasonable"). Guiding limit was about mag 16.5

- Prepared a VNC environment for running pearl remotely from the new MiniMo DCA computer (sand). This had a problem with color LUTs but a bit of experimentation has fixed this.

- Sky tested the 2m guider at another focus/instrument combination. Guiding was observed to increase peak intensity of measured spectral lines by ~5% over a fifteen minute exposure. Guide star limiting magnitude was 15-16th mag.

- Sky testing the guider in nod-and-shuffle mode at the 4m. The astronomers want it to be quicker and we hope to have some improvements ready for the next test.

- Installed the new XFree86-4 Matrox video-out combination at 2m, 4m, and WIYN guiders.

- Made 4 copies of the Digital Sky Survey cdroms (102 of them) onto 70Gb disks. Installed three of them in mocha, teal and linen. This data will be used by the next generation guide star search (currently in use at WIYN using 100x compressed data).

- Fixed a feature in the 2m gstar which could cause it not to see changes to the rotator angle.
Peter Ruckle

- Debugging the niri coadder problems seems to be a somewhat continuous process. Some of the errors were caused by code changes made when converting code to the powerpc.

- The 0 second problem on GMOS turned out to be a problem setting epics flags. New code was written to fix the problem.

- Testing of the GNIRS components controller is continuing. The epics software was connected to the hardware test setup and worked with only minor annoyances. The GMOS instrument sequencer is being modified to work on GNIRS. The components controller mechanisms still need to be connected to the IS, and later integration with the DC and WFS will be done.

Richard Wolff

- Cleanup and small modifications continued on the GNIRS low-level software. The VME crate and the motor driver chassis were checked out and a couple of small bugs (both hardware and software) fixed.

- A few days were spent developing a Python interface to the VxWorks system so that tests, such as moving mechanisms back and forth to test for dropping of motor steps, could be run from any workstation. VxWorks, since we're not using Tornado, has no reasonable scripting capabilities; it was quite simple to do this through Python.

- Several minor software changes were either needed for, or requested by, the GMOS team. So far, this support has been a minor effort.

- Participated in review of Labview as possible environment for a new array controller. The SOAR ArcVIEW system is a likely basis for this system.

- Administratively, time was spent on GMOS, bHROS, and telephone interviews associated with Phil Daly's green card application.
There was one injury reported in April. It involved an OA who sustained a lacerated scalp after being struck in the head by a falling rock while clearing the roadway during a storm. Employee was transported to UMC was treated and released for return to duty. Results of the investigation prompted this office to strongly recommend that the practice of clearing the roadway during adverse weather be discontinued and only be conducted during daytime hours and when adverse weather conditions have ceased. It is also recommended that all mountain personnel be made aware to drive slower and maintain a higher degree of alertness when utilizing AZ386 during and after storms to avoid vehicular damage from rocks in the roadway.

Routine inspections of downtown, Kitt Peak and Gong Farm facilities have produced no major safety findings.

Two ergonomic evaluations were conducted with recommendations forwarded to the subject departments.

A light duty electric winch was pulled from service and red tagged due to odors and sounds noted from the unit after being used in excess of its limits. Unit must not be returned to service until it has been evaluated and repaired or replaced.

An employee reported finding a 9mm slug in the southwest parking lot. Apparently the bullet had been fired from a distance and hit the southwest wall of the main building causing a slight gouge in the concrete. No injuries were sustained and property damage was minimal. Incident was reported to both U of A & Tucson Police Departments.