GNIRS PROGRESS REPORT

March 1, 2003 – May 16, 2003

Accomplishments / Status

Summary: 99% of the work from the Restart Review to delivery has been completed. To date we have attempted three cold cycles, the latest of which is reported in detail below. Daily progress reports are being produced to keep current on status and activities as the instrument nears completion. We anticipate being ready to hold the Pre-Ship AT in early June, and actually shipping the instrument to Chile in early July, as per Gemini's request. The Software Manual is complete, the User's Manual was reviewed by Gemini and is being revised, and the Service and Calibration Manual was sent to Gemini for review and comment.

The first two cold cycles for testing and evaluation revealed small problems in the instrument, all of which have all been successfully addressed. The tests, evaluations, and adjustments included detector cold strap adjustment to set temperature, flexure measurements, tests for optical quality, functional operation, operating software, etc. In addition there was an opportunity to upgrade the OIWFS mechanisms and to install the Shack-Hartman prism. All this work has been completed.

An abbreviated cold cycle (#3) was completed during the first week of May. Activities during this cycle were:

- Verified thermal parameters for the instrument as a whole (cooldown, warmup, and bench temperature control).
- Measured detector performance with increased thermal resistance in the cold strap. Unfortunately, a thermal short at the molecular sieve limited the minimum temperature to just under 31K. Optimum detector temperature appears to be at or slightly below 31K, though it does not appear strongly sensitive to temperature (at least up to 35K). The dark current was verified to be a strong function of bias; all short wavelength observations must be done with 300 mV bias. Higher bias may be useful for some L and M band work. The new detector mask and detector alignment produced some improvement in vignetting at the edges and rotation. We are clearly at or near the limit of mechanical repeatability. The mask did show some scattering off the beveled edges. Light leaks were also seen, at levels in the worst locations >10 electrons/pixel/sec.
- The OIWFS detector could not be read out.
- Flexure measurements showed that the settings were incorrect; this appears to be calculation error and not an intrinsic failure of the compensator. There was also a 50 pixel jump in the grating turret seen over a tilt range of ~2 degrees with the 110 line grating.
- The image quality was degraded by vibration from the cryocoolers.

After the instrument was warmed up, the problems were addressed as follows:

- The detector thermal problem was addressed by installing the molecular sieve correctly; no further remedial work is needed.
- The light leaks were addressed by sealing areas around the focus stage bellows, the detector translation stage, and pinholes in the G-10 isolator tube. The extinction of the light leaks has been verified with a light bulb inside the mount and an integrating CCD camera. A new mask has been produced based on the SQIID design, which minimizes edge scattering.
- The OIWFS detector problem was traced to a broken wire internal to the detector mount, plus an additional problem wire at the external connector. There is no strain relief at the detector mount, so the problem will potentially recur if there is a need to remove and reinstall the focus stage in the future.
- The compensator calculations have been rechecked and modified (this is not complete as some of the data from cycle 3 need to be reduced).

- The image quality degradation is due to a resonance in the compensator, whose Q appears to depend on the degree to which the heaviest weights are clamped. This explains why it was not seen on previous cycles or in the optics shop. The solution is to leave the weights unclamped, but to prevent them from unscrewing and wreaking havoc (which can be done with a simple safety wire approach).

- The grating turret anomaly does not have a proven cause. We did find that the home switch was incorrectly adjusted mechanically, although it was functional as a home switch, and that the friction brake was in minimal contact. This may have left the turret vulnerable in the event of very small imbalances. The friction brake and home switch were correctly adjusted. We also realized that the home switch reverse transition occurs in the midst of the tilt range for the 110-line grating, which has the potential for incorrect settings at the transition due to back-driving by the home switch. We epoxied in a shim to move the transition outside the tilt range. This problem is not present in the other turrets, as all the positions of cameras and prisms are not at transitions of the home switches.

- Since the fixes listed above required full disassembly, we have replaced the temperature diodes (with a couple of exceptions). This was because there was a concern that the diode blocks were compressing and damaging the diodes on cool-down; we have lost several during the past cold cycles. The design has been slightly modified to correct this, and (as a bonus) a more systematic diode calibration has been carried out.

Next Milestones: A complete set of milestones for the remainder of the project has been prepared and is available for viewing on the GNIRS web site. The next major project milestones are:

- Complete Cold Cycle 4 by June 6
- Ready for Pre-Ship AT on June 9

Earned Value:

	June	July	August	September	October	November	December	Jan-Feb	Mar-May
BCWS	$3,546,177	$3,567,153	$3,572,138	$3,572,138	$3,572,138	$3,572,138	$3,572,138	$3,572,138	$3,572,138
BCWP	$3,173,288	$3,202,553	$3,186,692	$3,206,344	$3,216,275	$3,254,387	$3,274,323	$3,276,019	$3,380,046
ACWP	$3,956,665	$4,068,240	$4,137,200	$4,205,116	$4,283,803	$4,370,562	$4,502,594	$4,581,247	$4,724,157
SPI	.89	.90	.89	.90	.90	.91	.92	.92	.95
CPI	.80	.79	.77	.76	.75	.74	.73	.72	.72

This table reflects planned and actual charges to the project as of May 16, 2003. The project has spent $1,576,392 in capital to date. BCWS did not change for this reporting period because MS Project is reporting this number to the August 2000 baseline schedule, which does not reflect adjustments to subsequent schedule revisions. This number would change if the project schedule baseline were updated. We have no plans to update the baseline at this late date in the project.

Project Management: (99% complete) The project plan may be viewed on the GNIRS web site at: http://www.noao.edu/ets/gnirs/ under Management, Planning. A schedule showing work left on the project has been prepared and may also be viewed on the GNIRS web site. The instrument is scheduled to ship to Chile in the second quarter of calendar 2003.

Systems Engineering: (100% complete).

Mechanical Design, Fabrication, Assembly and Test: (100% overall).

Electronics: (100% complete).

Software Development: (100% complete).

Alignment and Integration: (99% complete overall)

	December	Jan-Feb	Mar-May
IV. Cold Tests	26%	41%	90%

Deliverables: (99% complete overall). This task includes Instrument Hardware, Training, and Documentation.

Documentation	**November**	**December**	**Jan-Feb**	**Mar- May**
Test Plans	99%	99%	99%	100%
Software Maintenance Manual	66%	76%	100%	-
Service & Calibration Manual	40%	53%	66%	90%
User's Manual	27%	44%	53%	99%
As-Built Fabrication Drawings	75%	100%	-	-

Procurement: (99% complete overall). Only items being procured are miscellaneous parts and supplies, plus travel and shipping cost to Chile remain.

Problems / Solutions

OIWFS rework has required opening the instrument twice for repairs, and we have been able to use the periods when the instrument was open to make other adjustments and fixes to the instrument.

Key Personnel

No Changes.