MMT Observatory
Smithsonian Institution &
The University of Arizona

End of Trimester Summary

May - August 2009

Summer 2009 Shutdown: Iron Workers at the MMT

Personnel

Bryan Cardwell was hired into an Engineer, Temporary position in May after graduating from the University of Arizona in mid May. Bryan had been an electrical engineering student with the MMTO.

Dallan Porter returned to the MMTO on June 22 as Computer Specialist, Telescope. Dallan previously worked at the MMTO but left in May 2008 to work at the University of Arizona's Flandrau Planetarium.

Duane Gibson was promoted to IT Coordinator in early August. He will be replacing Tim Pickering who will be leaving in October to accept a position at the South African Astronomical Observatory.

Ricardo Ortiz was promoted to Mountain Operations, Assistant Manager in August.

Creighton Chang, student engineer, returned to work in August after taking off a semester.

Talks and Conferences

External Presentations

F. Vilas spoke to high school advanced placement chemistry and physics classes, and seventh, third and fourth grades at the Roycemore School, Evanston, Illinois, on May 26.

Meetings/Conferences

An MMT Council videoconference meeting was held May 11.

R. Ortiz attended the Society of Vacuum Coaters annual meeting on May 11-12 in Santa Clara, CA.

F. Vilas participated in a Lunar Crater Observation and Sensing Satellite meeting at NASA's Ames Research Center held August 17-20, in preparation for the LCROSS impact on October 9.

F. Vilas continued participation as Vice Chair in the National Academies' Committee to Review Near-Earth Object Surveys and Hazard Mitigation Strategies through multiple committee meetings.

Primary Mirror Systems

Thermal System

The one T-series system enclosure currently installed on the primary mirror cell had an internal copper block added for a reference temperature for selected channels (for both thermopile and absolute temperature inputs). Data are continuously being collected for comparison to the existing temperature measurement systems.

Earlier issues with getting calibration data for the new T-series boards motivated the construction of a new 1mV precision floating reference test box for connection to the thermal boards and measurement of their offsets and gain slopes to ensure the previous calibration efforts gave correct data. We are in the process of completing a board inventory to ensure all boards are in working order and have proper calibration data before use on the mountain.

Telescope Tracking and Pointing

A new tracking performance report for the azimuth axis was released in June as MMTO Internal Technical Memo #09-3. The median RMS azimuth tracking reported for the 3rd trimester of 2008 was 0.078". For more details, the technical memo is available at:
http://www.mmto.org/MMTpapers/pdfs/itm/itm09-3.pdf

Telescope Drives

During summer 2009 shutdown, all the telescope drive amplifiers were cleaned and adjusted. In addition, the two linear azimuth amplifiers temporarily used for elevation servo testing were modified to the current status and adjusted to bring them up as operational spares for the azimuth drive system.

Encoders

A pair of test boxes was designed and built for testing and precision alignment of the instrument rotator encoder heads. One test box breaks out the internal test signals on the Heidenhain interpolator boxes for evaluation of the encoder output signals with an oscilloscope. The other, more advanced box, reads the encoder signals and provides a display of the current encoder position counts and counts between successive index marks. Researching the available documentation online reveals that other observatories have experienced the same issue we have with the rotator encoders, namely, inability to reliably detect the index marks on the Heidenhain tape. With this documentation and new test tools in hand, along with the new adjustable tape head mounts, we expect to be able to ensure proper operation of the rotator system encoders.

The elevation encoder tapes were optically checked with a theodolite for axial runout. The east tape has axial variation of between 1-2mm, and the west between 1.5-3mm. The question arose whether the edges of the tape mounting surface are of sufficient accuracy to use as a reference for axial alignment of the tapes (which should be $\leq$ 1mm), as well as the radial runout variation, which was measured before the original encoder tape installation. To properly measure and archive these data, a new test tool was built to simultaneously measure two Sylvac digital dial gauges and the current elevation, and write these data to the MMT MySQL database. Once the measurement has been made, the west tape encoder mount will be taken out of service for replacement with the newer version that has micrometer-adjustable positioning for the head.

The azimuth axis servo is in the early stage of upgrades to the controller. A test plan for evaluation and documentation of the mechanical and electrical system components was drafted and released for comments from the MMT staff. A modified servo interface board was built to allow easy access to the analog drive signals in the existing servo system with the HP 35670 DSA (Dynamic Signal Analyzer) for repeating the reported closed loop servo response from 2003. We anticipate more advanced encoder counting will be necessary for the new servo, so a copy of the LBT encoder VHDL (Verilog Hardware Description Language) code was acquired for evaluation and possible

deployment. This VHDL code has been loaded into our Lattice Semiconductor programmable-logic tools and run through the complete bitstream-generation process, which ensures we can deploy it in hardware when needed. The test tools and xPC test computer have been delivered to the mountain, ready for testing, except for the DSA, which is currently on loan.

Computers and Software

Numerous computer hardware and operating system upgrades were made during the May-August, 2009, trimester. The RAID array on the main MMT server, 'mmt', located in the storage room downtown on campus, was upgraded from 200M disks to 1000M disks. This expands the disk capacity on this server from just under a terabyte to 4.5 terabytes. This increase in disk space allows files currently stored on external drives to be migrated onto the RAID array. Both this downtown server and the main mountain server, "hacksaw", were upgraded to Fedora 11. The main telescope operator's console machine, 'yggdrasil', also received a disk upgrade along with a fresh installation of Fedora 11. Upgrades of other Linux machines to Fedora 11 are ongoing.

The 'mmtserv' program is used to control a large number of MMT-related software services, such as 'telserver' and 'hexapod_linux'. Code for this program was modified to remove a file descriptor memory leak that occurred when power to the secondary mirror was turned off. Other programming improvements to 'mmtserv' included more efficient network writing.

The newly developed annunciator was added to the 'mmtserv' suite of MMT-related services. This annunciator will alert the telescope operators when critical problems develop in the Telescope Control System (TCS). These alerts will be related to diverse parameters from many telescope subsystems. The graphical user interface (GUI) for the annunciator currently divides the TCS into six subsystems: 1) mount, 2) primary mirror, 3) secondary mirror, 4) environment, 5) utilities, and 6) miscellaneous. It uses an MMT-consistent color scheme of "green/yellow/red" for "OK/warning/error" status states, respectively. Additional details for each subsystem can be obtained by clicking on the appropriate area of the GUI. An audible alarm system is also being developed for the annunciator. This system is currently undergoing preliminary testing.

A variety of software topics were addressed for the f/15 adaptive optics (AO) secondary. Software changes included: 1) adding an integral gain command, 2) fixing an 'Error: can't read "info (Loop_Running)": no such variable' error, and 3) modifying code to avoid tight loops under certain error conditions. Enhancements to the AO GUI were also made. Web-based versions of the AO deformable mirror (DM) status GUI were also implemented. These web pages include time-series plots of data and color-based status indicators.

The f/15 AO wiki (formerly: http://mmtao.org/wiki) was moved to hacksaw at: https://hacksaw.mmto.arizona.edu/ssl/aowiki/. The MMT-wide secure LDAP (Lightweight Directory Access Protocol) authentication is now used to access this wiki. New aowiki users are being added as needed into the MMT LDAP system. Future work will include the migration of the mmtao.org domain and related data onto MMT computers.

Work continued on unifying the miniserver code used at the MMT. These miniservers communicate with various hardware devices, such as the Vaisala weather stations. The Perl class, MMTserver, is currently used in approximately 30 different miniservers. A major benefit of this

class is the sharing of code among the various miniservers. Among other changes, consistent coding conventions are being implemented.

Authenticating 'samba', which is used for Windows/Linux file exchange and interactions, under LDAP was researched. This use of LDAP for samba authentication was being considered as an alternative to the current Window's Server Active Directory used by MMT Windows users.

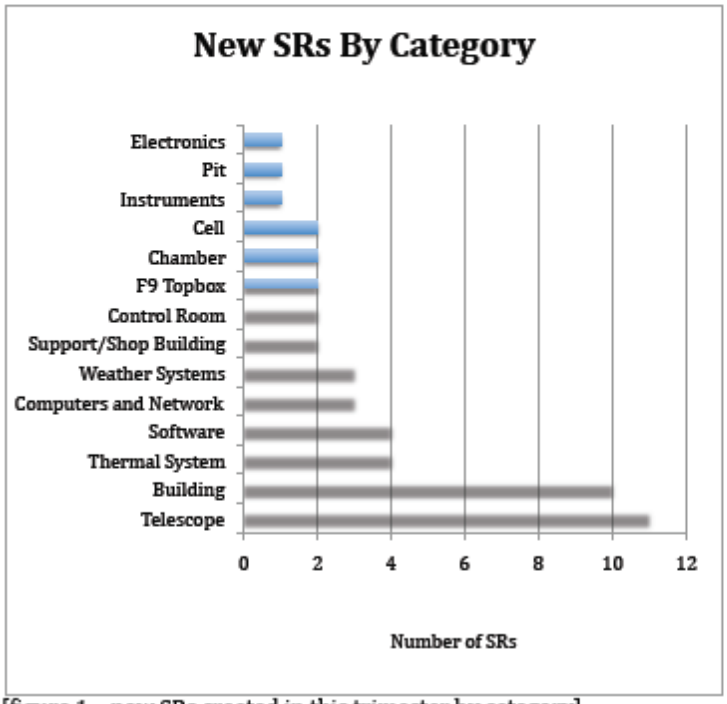
The University of Arizona's Computer Information Security Risk Assessment was completed and submitted to the Information Security Office. This extensive security risk assessment covered the use of Linux, Mac, and Windows computers, servers and software at the MMT.

Various other software and computer-related issues were addressed. These issues are included below as part of the Service Request System (SR System) statistics for this trimester.

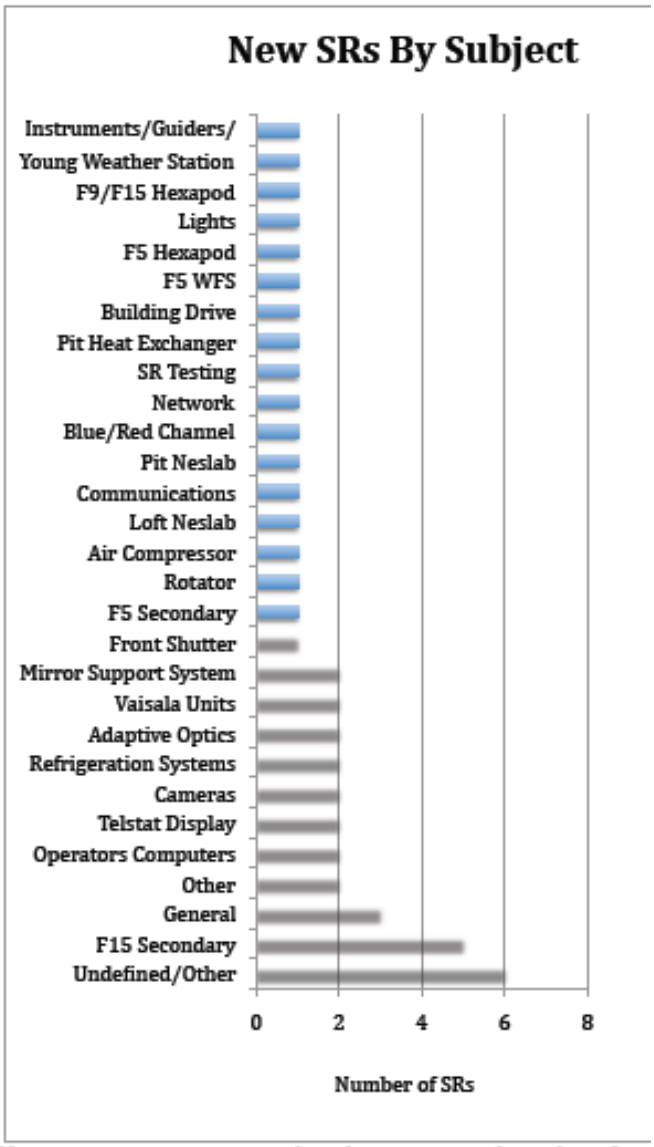
MMTO Service Request System (SR System) Trimester Statistics

Newly Opened Service Requests for Trimester

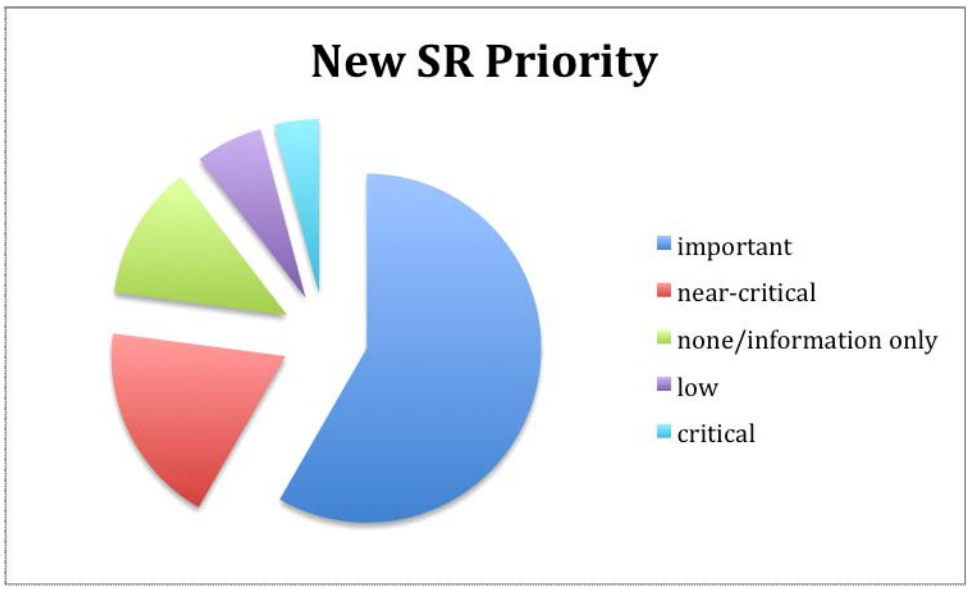
During the last trimester, 48 new Service Requests (SRs) were opened. Figure 1 shows the breakdown of these new SRs in terms of MMT categories. Figure 2 shows the breakdown in terms of sub-categories (subject). Figure 3 shows the breakdown in terms of priority.



[figure 1 – new SRs created in this trimester by category]



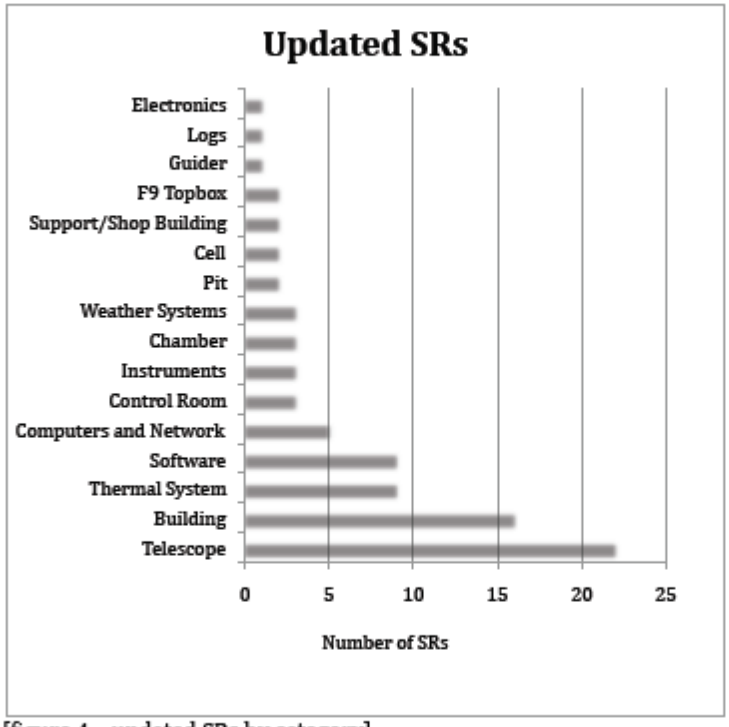
[figure 2 – new SRs created in this trimester by subject]



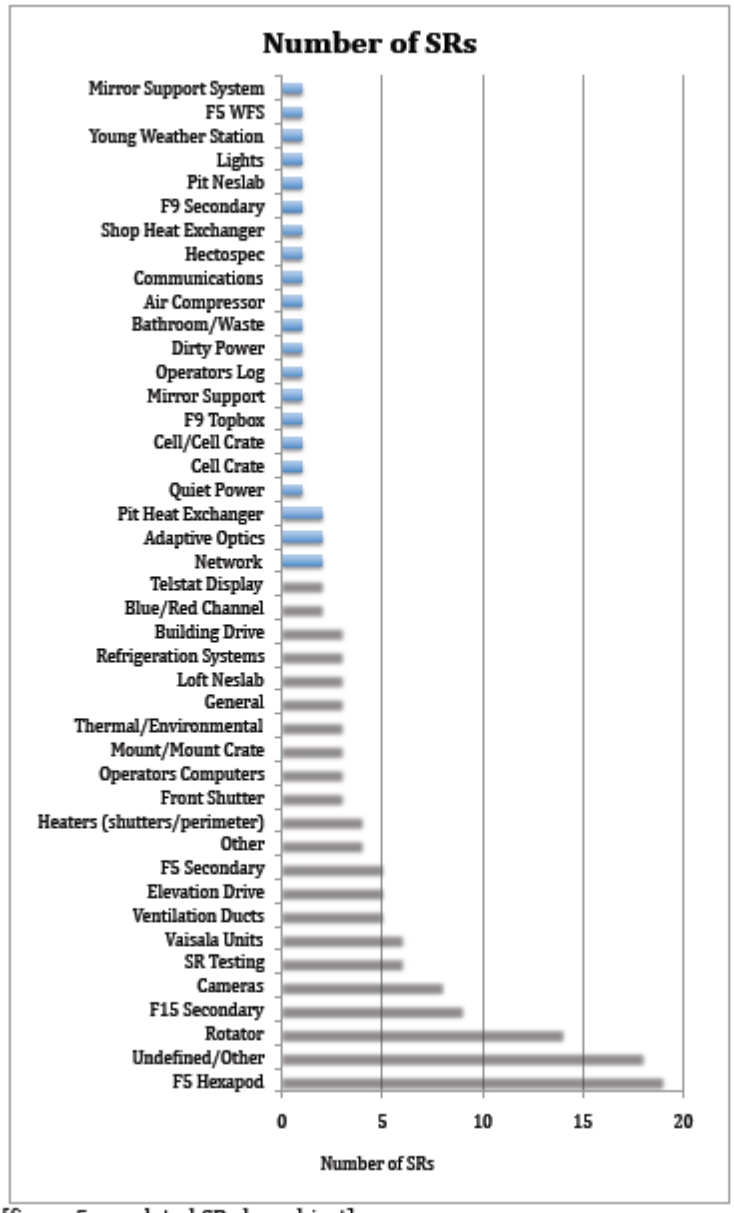
[figure 3 – new SRs created in this trimester by priority]

Updated Service Requests for Trimester

During the trimester 84 new or previously existing SRs were updated (responded to and/or closed). Figure 4 shows the breakdown of these SRs by category. Figure 5 shows the breakdown of these SRs by subject.



[figure 4 – updated SRs by category]



[figure 5 – updated SRs by subject]

Instruments

f/15 Instrumentation

During July, we encountered problems with the f/15 adaptive optics (AO) deformable mirror (DM). During a night with high humidity, water condensed between the shell and the reference plate. This created a capillary effect on the small gap in between the two surfaces, preventing the mirror from naturally opening the gap in order to operate at night. Three days were required to allow the water to evaporate. Problems continued so after the run, the secondary was taken to the Common building for cleaning and testing. After removing the shell, oxidation was discovered and cleaned.

Several actuators presented odd results, suggesting that some calibration values had drifted. Starting August 18th, a series of 30 tests over a 3-week period were conducted to assess the performance of individual actuators and their associated capacitive sensors. Along with testing the actuators and sensors, the tests also provided a means of evaluating the manual cleaning of the DM.

For each test, the DM was held in its "flat" position under active closed-loop control. Each test sampled 4000 position and current values for the 336 actuators at a sample rate of approximately 10-Hz. Each test resulted in approximately 10 Mb of data. Sets of actuators were de-activated and re-activated during the tests.

The position data were then analyzed with standard statistical analysis, including mean and standard deviation calculations. Maximum and minimum standard deviations were also recorded to evaluate the stability of the results. Linear regressions and plots of the data were also prepared.

The performance tests had positive results and the f/15 is scheduled to be used again during September.

We experienced a failed capacitance in a TSS slave board. This appears to be a known failure mode. We are investigating whether the replacement of all the capacitors might be necessary.

f/9 Instrumentation

Blue Channel and Red Channel Spectrographs

The Red Channel Spectrograph failed during the first trimester of 2009 and it was determined that the detector needed to be replaced. We are expecting to receive it soon for testing and it is scheduled to be used for observing in November.

f/5 Instrumentation

The weather was less cooperative than usual during this time of year and caused the loss of a few nights in May and more than half of the observing time during the July run.

MMIRS

A lot of emphasis this trimester has been on MMIRS: the MMT-Magellan InfraRed Spectrograph. This instrument can obtain JHK images over ~ 7' x 7' field. It can also obtain spectra in the near infrared with R~3000 using multi object slit masks. The instrument arrived in early May and was assembled by a team from SAO with much appreciated assistance from the MMT mountain staff. The instrument obtained scientifically significant data on its first night when it established that GRB 090515 was fainter than 19.3 at K. Significant work on the wave front sensor hardware and software was required during the May shakedown run and continued into the June science run. Work is continuing to improve the performance of MMIRS and it promises to be a great tool for both observatories.

The MMIRS cable drapes work as predicted with only minor adjustments. New brightly colored foam was installed on the guy wires for the cable support post as a safety precaution.

Hectospec

The work on the MMIRS guider software extended into the adjacent Hectospec time due to unforeseen conflicts between the newer software platform version being used with MMIRS and the established version incorporated in the Hecto code. After a couple of days of attempting to massage a merger, John Roll reverted to the earlier version of the Guider code for the Hecto software and observations ran smoothly.

The Hecto positioner required less annual maintenance this year so the SAO August service mission was a little more relaxed than in previous years. The PI and SAO staff performed the usual inspection and cleaning of the instrument along with re-lubrication of the drive axes. They then strengthened the fiber chain which failed last December. All the links and stays were examined carefully, and portions of the chain near the transition box were replaced because some wear was visible on the parts in this high stress area. A few of the teflon tubes that protect the fibers were carefully repositioned into the metal cylinders at the thermal break and at the positioner. A small amount of epoxy was dabbed onto a couple of the teflon tubes to help them stay in the cylinders. A new "Nichol's cart"/fiber transition ladder was constructed that should simplify the instrument installation process.

Protection for the spectrograph room, the positioner, and the fiber chain was set up prior to the start of construction during the summer 2009 shutdown. The construction process was monitored with an eye toward safety of instrumentation and of personnel.

The calibration boxes on the 4th floor landing have rarely been used over the last few years, so the fiber optic and electrical connections to the boxes were removed for construction. The connections have been left off and the boxes will be moved to the Common Building, IOTA, or basecamp warehouse.

Wavefront Sensor

The start of the July Hecto run was complicated by the failure of the f/5 wavefront sensor. The operators were able to use their experienced eyes to focus and collimate the telescope manually. We were able to get reasonable images on the positioner's cameras for guiding and get most of the available light into the fibers.

MMT staff have made good progress toward fixing items in the wavefront sensor that have been issues for a while, and we should have a much better instrument when it is called back into service in October.

Telescope Operations

The telescope backup operator program was put to the test when one of the operators needed to leave the mountain a few days early to attend to a family emergency. The backup operator, who had been in training, was successful in covering the time without a glitch.

General Facility

A new fiber-optic connection from the summit communications room to the Common Building was completed in May. This provides higher-bandwidth, more reliable ethernet communications for both ad-hoc use in the dorms, common areas, and for AO testing in the downstairs lab area. Part of this work required bringing a contractor to the mountain to clean out the summit road conduit, which had filled with water and silt over the years, making it impossible to pull new fiber into it.

In anticipation of the MMIRS commissioning in May, new power and network wiring was installed on the drive arcs for instrument connections.

For AO operations, a new PI (Principal Investigator) connector panel was installed on the west drive arc to help support and clean up instrument connections for AO-LGS operations. Another set of panels was built and installed on the AO electronics rack to facilitate easier connection of the electronics to the telescope system cables.

A new blower fan and enclosure for cooling the chamber bridge crane hoist motor is in the process of fabrication; we expect to install it soon.

A request for automation of the facility controls (e.g. the ventilation fans) was made, and hardware was purchased for evaluation to bring the control system hardware onto Ethernet under Linux. This hardware, which uses the increasingly-popular industry standard EtherCat for real-time, very low-latency Ethernet I/O, looks very promising for long-term support of a variety of systems in use at the MMT. To this end, a vanilla Shuttle PC was patched with the RTAI kernel and the EtherCat master software, which includes a Simulink Real-Time Workshop target to make it possible to both hand-write and auto-generate C code for the EtherCat application. This evaluation and learning process will be ongoing over the coming months.

A new documentation book was completed that collates all available schematics, write-ups, and manuals pertaining to the electronics racks in the MMT drive room. This is a central resource for documentation for the I/O and drives system hardware for maintenance and repairs.

Summer 2009 Shutdown: July 25 - August 24

The chamber underwent a major construction project during shutdown to provide access to the telescope for large instruments. TBR Construction was contracted by the Smithsonian Project Office to be the prime contractors. Prior to the start of the construction work, all instruments and the Optic Support Structure (OSS) were wrapped in plastic by MMT personnel. Under TBR's direction, teams of iron workers, electricians, and door subcontractors converged on the MMT.

The first goal was to reinforce the structural steel of the building before removing two large structural building members. Approximately 45 new steel reinforcement columns, flanges, and braces were welded and bolted into the steel support structure of the building before removing a large diagonal brace in the east wall and a concrete support column in the back of the chamber.

A second floor loading dock was then welded to the support columns on the east side of the building. After the loading dock was in place, an insulated rolling door was installed. In addition, a new rolling door/shutter was installed to replace the man-door and two large doors along the back of the east wall of the chamber.

Installation of the new second-floor loading dock

Newly completed second-floor loading dock.

As a result of the construction, large wide and heavy loads can now be delivered safely to the back of the telescope chamber, with the use of Whipple Observatory's new 19-foot scissor platform truck pictured below.

Whipple Observatory's 19-foot, 35,000 gross vehicle weight scissor platform truck unloading at the new second-floor loading dock

During summer shutdown, a routine inspection of the chamber overhead crane revealed minor cracking on the festoon cable. All damaged connections were re-terminated and heat shrunk.

To support the new structural modifications during summer shutdown, major re-work of the AC service wiring on the 2nd, 3rd, and 4th floors was required. Most of the work was done on the 2nd floor, where virtually all of the service conduits from panels N2, PN2, and Q2 were removed. Two truckloads of EMT conduit were subsequently hauled away, along with significant amounts of old wire and hardware. All of the removed conduits were replaced with individual runs of plastic conduit to clear the new door opening into the chamber. The receptacles and other loads were then relocated to new connections in strategically-placed gutter boxes. This was a heroic effort from T. Gerl, B. Comisso, B. Cardwell, C. Knop, and others to complete around the contractors' efforts and in a very timely manner.

Reworking conduit

Other contract support work provided by MMT personnel included methanol plumbing and installing lights and ceiling tiles.

A cleaning day was held on August 24 in preparation for reopening the MMT on August 25.

Other Facility Improvements and Repairs

The new software for the Minolta Spectrophotometer was tested with NOAO in June. The results were very encouraging and data from different units and standards matched with NOAO's results.

The new dump valve was installed for the ventilation blower.

The overhead flood lights in the chamber were secured with wire rope so that the overhead hoist trolley would not contact fixtures.

Weather and Environmental Monitoring

The WXT520 (Vaisala3) had its heater power supply fail during a lightning storm. It was removed and a new power supply is awaiting installation. This supply is not needed unless icing conditions are encountered so it was deferred until after summer shutdown. Vaisala confirmed that this new power supply, which is a cheaper switching unit than the factory linear one, will not affect the output data integrity.

The AKCP sensor probe in the Common Building AO room was reported inoperative. The IP address for the unit was reassigned and the software server was reset to bring it back into operation. It reports temperature and humidity, and outputs an alarm if either exceeds a preset safety value.

A new set of lightning protection boxes were designed and built for the weather station poles at the east and west sides of the summit to help protect the copper connections to the weather instruments. Installation will be done soon after summer shutdown.

Visitors

None

Publications

MMTO Internal Technical Memoranda

ITM09-3: Azimuth Tracking for the 3rd Trimester of 2008
D. Clark, T. Trebisky, T. Pickering, June 2009
(http://www.mmto.org/MMTpapers/pdfs/itm/itm09-3.pdf)

MMTO Technical Memoranda

None

MMTO Technical Reports

None

Scientific Publications

09-25 Mass Outflow and Chromospheric Activity of Red Giant Stars in Globular Clusters. II. M13 and M92
Sz. Meszaros, A.K. Dupree, T. Szalai
AJ, **137**, 4282

09-26 The Planetary Nebula Population of M33 and its Metallicity Gradient: A Look into the Galaxy's Distant Past
L. Magrini, L. Stanghellini, E. Villaver
ApJ, **696**, 729

09-27 Host Galaxies, Clustering, Eddington Ratios, and Evolution of Radio, X-Ray, and Infrared-Selected AGNs
R.C. Hickox, et al.
ApJ, **696**, 891

09-28 The COSMOS Active Galaxtic Nucleus Spectroscopic Survey. I. *XMM-Newton* Counterparts
J.R. Trump, et al.
ApJ, **696**, 1195

09-29 Quiescent Isolation: The Extremely Extended H I Halo of the Optically Compact Dwarf Galaxy ADBS 113845+2008
J.M. Cannon, J.J. Salzer, J.L. Rosenberg
ApJ, **696**, 2104

09-30 The Star Formation and Nuclear Accretion Histories of Normal Galaxies in the AGES Survey
C.R. Watson, et al.
ApJ, **696**, 2206

09-31 Mid-Infrared Galaxy Luminosity Functions from the AGN and Galaxy Evolution Survey
X. Dai, et al.
ApJ, **697**, 506

09-32 Discovery of the First Retrograde Transneptunian Object
B. Gladman, et al.
ApJ, **697**, L91

09-33 Kinematic Signatures of Subvirial Initial Conditions in Young Clusters
E.-M. Proszkow, et al.
ApJ, **697**, 1020

09-34 Kinematics of the Orion Nebula Cluster: Velocity Substructure and Spectroscopic Binaries
J.J. Tobin, et al.
ApJ, **697**, 1103

09-35 Expanding the Search for Galaxies at $z \sim$ 7-10 with New NICMOS Parallel Fields
A.L. Henry, et al.
ApJ, **697**, 1128

09-36 Lyman Break Galaxies at $z \approx$ 1.8–2.8: *GALEX*/NUV Imaging of the Subaru Deep Field
C. Ly, et al.
ApJ, **697**, 1410

09-37 MMT/AO 5 □ m Imaging Constraints on the Existence of Giant Planets Orbiting Fomalhaut at ~13–40 AU
M.A. Kenworthy, et al.
ApJ, **697**, 1928

09-38 The Radio Luminosity Function and Galaxy Evolution in the Coma Cluster
N.A. Miller et al.
AJ, **137**, 4450

09-39 A Spectroscopic Study of Young Stellar Objects in the Serpens Cloud Core and NGC 1333
E. Winston, et al.
AJ, **137**, 4777

09-40 A Near-Infrared Spectroscopic Survey of Cool White Dwarfs in the Sloan Digital Sky Survey
M. Kilic, et al.
AJ, **138**, 102

09-41 A Survey of $z \sim 6$ Quasars in the Sloan Digital Sky Survey Deep Stripe. II. Discovery of Six Quasars at $z_{AB} > 21$
L. Jiang, et al.
AJ, **138**, 305

09-42 Imaging the Cool Hypergiant NML Cygni's Dusty Circumstellar Envelope with Adaptive Optics
M.T. Schuster, et al.
ApJ, **699**, 1423

09-43 Galaxy Clusters in the IRAC Dark Field. II. Mid-Infrared Sources
J.E. Krick, et al.
ApJ, **700**, 123

09-44 Mid-IR Luminosities and UV/Optical Star Formation Rates at $z < 1.4$
S. Salim, et al.
ApJ, **700**, 161

09-45 SN 2008ha: An Extremely Low Luminosity and Exceptionally Low Energy Supernova
R.J. Foley, et al.
AJ, **138**, 376

09-46 A Search for Occultations of Bright Stars by Small Kuiper Belt Objects Using Megacam on the MMT
F.B. Bianco, et al.
AJ, **138**, 568

09-47 E/S0 Galaxies on the Blue Color-Stellar Mass Sequence at $z = 0$: Fading Mergers or Future Spirals?
S.J. Kannappan, J.M. Guie, A.J. Baker
AJ, **138**, 579

09-48 Mass Outflow from Red Giant Stars in M13, M15, and M92
Sz. Meszaros, E.H. Avrett, A.K. Dupree
AJ, **138**, 615

09-49 AEGIS: The Clustering of X-Ray Active Galactic Nucleus Relative to Galaxies at $z \sim 1$
A.L. Coil, et al.
ApJ, **701**, 1484

09-50 An Investigation of the Luminosity-Metallicity Relation for a Large Sample of Low-Metallicity Emission-Line Galaxies
N.G. Guseva, et al.
A&A, **505**, 63

09-51 A Direct Measurement of Atmospheric Dispersion in *N*-band Spectra: Implications for Mid-IR Systems on ELTs
A.J. Skemer, et al.
PASP, **121**, 897

Non-MMT Scientific Publications by MMT Staff

None

Observing Reports

Copies of these publications are available from the MMTO office. We remind MMT observers to submit observers' reports, as well as preprints of publications based on MMT research, to the MMTO office. Such publications should have the standard MMTO credit line: "Observations reported here were obtained at the MMT Observatory, a facility operated jointly by the Smithsonian Institution and the University of Arizona."

Submit publication preprints to *mguengerich@mmto.org* or to the following address:

MMT Observatory
P.O. Box 210065
University of Arizona
Tucson, AZ 85721-0065

MMTO in the Media

5/18/09 – University of Arizona website "UA in the News", article entitled "MMTO Confirms Ultra-faint Object in Milky Way Halo is Dwarf Galaxy". The article can be found at: http://uanews.org/node/25687

7/8/09 – The MMTO made it to Andrew Sullivan's "The Daily Dish". A photograph taken from the control room at the MMT was posted to "The View From Your Window". http://andrewsullivan.theatlantic.com/the_daily_dish/2009/07/the-view-1.html

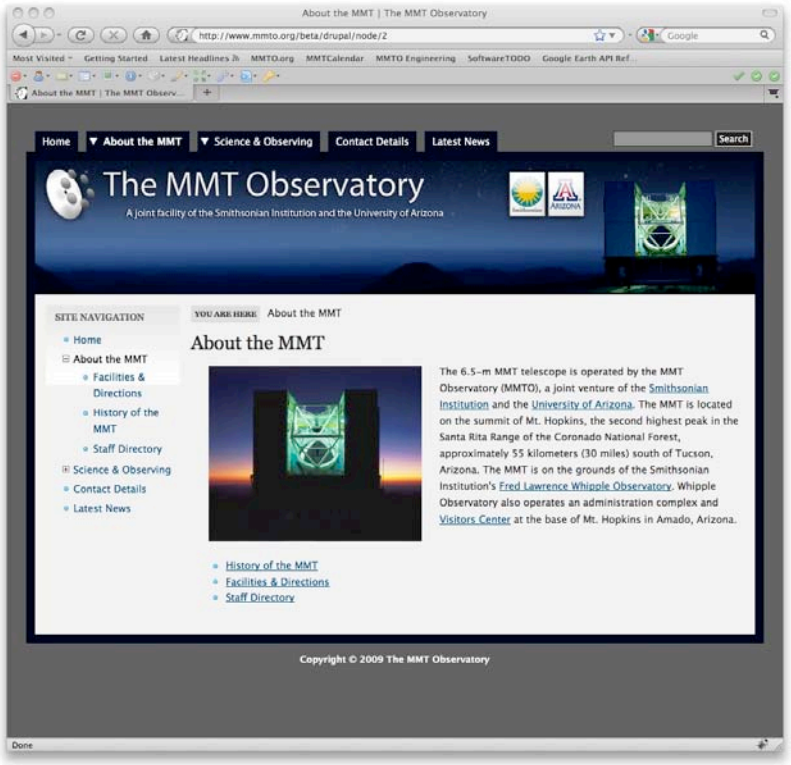
7/23/09 – The MMTO and its Director, F. Vilas, were part of an article in the online Christian Science Monitor, discussing contributions by amateur observers to astronomy. They might play a role making observations of the LCROSS mission, one which will be observed at the MMTO by

Vilas and others. The article can be found at:
http://www.csmonitor.com/2009/0723/p02s05.usgn.html

MMTO Home Page

Special Note: On June 22, an amateur astronomer from the Benson area called the MMT main office to express how much he appreciated the MMT's all-sky camera on our web site. He had seen a bright object the previous night and looked online for an all-sky camera and found the MMT cam. He was able to download the images for the time interval that had the object (which illuminated the MMT building). He called to say "thanks" and to say that he found the MMT all-sky cam very useful, interesting, and educational and he planned to tell his group of fellow amateur astronomers about the MMT web site. The object was later determined to be a meteor.

Work is well underway on the new MMT website by D. Porter and M. Hastie. The site will be powered by Drupal (an open source content management system). We hope to 'go live' in early November. Below is a snapshot of the new website look.



The MMTO web site (*http://www.mmto.org*) includes a diverse set of information about the MMT and its use. Documents that are linked include:

- MMTO Latest News and Blog
- General information about the MMT and Mt. Hopkins.
- Telescope schedule.
- User documentation, including instrument manuals, detector specifications, and observer's almanac.
- Scientific and technical publications

- A photo gallery of the Conversion Project as well as specifications related to the Conversion.
- Information for visiting astronomers, including maps to the site.
- The MMTO staff directory.

Observing Database

The MMTO maintains a database containing relevant information pertaining to the operation of the telescope, facility instruments, and the weather. Details are given in the June 1985 monthly summary. The data attached to the back of this report are taken from that database.

Use of MMT Scientific Observing Time

May 2009

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	*Lost to Telescope	Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	4.00	34.60	11.25	0.00	0.00	0.00	0.00	11.25
PI Instr	27.00	221.50	34.20	7.60	4.00	0.00	0.00	45.80
Engr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**31.00**	**256.10**	**45.45**	**7.60**	**4.00**	**0.00**	**0.00**	**57.05**

Time Summary

Percentage of time scheduled for observing	100.0
Percentage of time scheduled for engineering	0.0
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	17.7
Percentage of time lost to instrument	3.0
Percentage of time lost to telescope	1.6
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	22.3

* Breakdown of hours lost to telescope

1.0	WFS camera issues
2.0	Gap contamination in DM
1.0	Mirror contamination

June 2009

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	* Lost to Telescope	**Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	16.00	123.20	39.80	0.00	0.00	0.00	0.00	39.80
PI Instr	12.00	93.80	28.30	0.00	0.00	0.00	0.00	28.30
Engr	2.00	15.50	1.00	0.00	0.00	0.00	0.00	1.00
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**30.00**	**232.50**	**69.10**	**0.00**	**0.00**	**0.00**	**0.00**	**69.10**

Time Summary

Percentage of time scheduled for observing	93.3
Percentage of time scheduled for engineering	6.7
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	29.7
Percentage of time lost to instrument	0.0
Percentage of time lost to telescope	0.0
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	29.7

July 1-24, 2009

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	*Lost to Telescope	Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	4.00	32.20	29.80	0.00	0.30	0.00	0.00	30.10
PI Instr	20.00	158.40	82.05	0.00	34.35	0.00	0.00	116.40
Engr	1.00	7.80	7.80	0.00	0.00	0.00	0.00	7.80
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	25.00	198.40	119.65	0.00	34.65	0.00	0.00	154.30

Time Summary Exclusive of Summer Shutdown

Percentage of time scheduled for observing	96.1
Percentage of time scheduled for engineering	3.9
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	60.3
Percentage of time lost to instrument	0.0
Percentage of time lost to telescope	17.5
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	77.8

* Breakdown of hours lost to telescope
1.0 WFS camera issues
2.0 Gap contamination in DM
1.0 Mirror contamination

August 25-31, 2009

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	* Lost to Telescope	**Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	4.00	37.00	5.50	0.00	0.25	0.00	0.00	5.75
PI Instr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Engr	2.00	18.50	14.10	0.00	0.00	0.00	0.00	14.10
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	6.00	55.50	19.60	0.00	0.25	0.00	0.00	19.85

Time Summary Exclusive of Summer Shutdown

Percentage of time scheduled for observing	66.7
Percentage of time scheduled for engineering	33.3
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	35.3
Percentage of time lost to instrument	0.0
Percentage of time lost to telescope	0.5
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	35.8

* Breakdown of hours lost to telescope
.25 M1 panic

Year to Date August 2009

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	Lost to Telescope	Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	51.00	467.80	179.20	0.00	10.70	0.00	0.00	189.90
PI Instr	148.00	1420.10	472.00	10.60	50.65	0.50	0.00	533.75
Engr	13.00	126.90	43.90	0.00	0.00	0.00	0.00	43.90
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	212.00	2014.80	695.10	10.60	61.35	0.50	0.00	767.55

Time Summary Exclusive of Summer Shutdown

Percentage of time scheduled for observing	93.7
Percentage of time scheduled for engineering	6.3
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	34.5
Percentage of time lost to instrument	0.5
Percentage of time lost to telescope	3.0
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	38.1