

Technical Manager's Report

Magellan SAC meeting, April 21-22, 2004, Tucson, AZ

Introduction

Incoming instrumentation and the Baade corrector (ADC) received the most attention this semester. The corrector lenses will be installed next month (May 2004). Instrumentation work included flexure measurements on the telescopes, facility instrument support agreements, and instrument installation plans. Progress was also made on remaining construction tasks and minor, but chronic, problems.

Operations are routine and effective and without significant downtime. However, a wave of second generation Magellan instruments is on the horizon and without careful planning and enhanced resources the observatory will not be able to accept these instruments on their construction schedules.

Operations

Pending tasks

At the previous Magellan Council meeting Mark Phillips presented a list of unfinished construction and minor problems. We have modified and prioritized that list into three (A, B, C) categories.

- A: Items that cause telescope or instrument downtime
- B: Items that can prevent future downtime or are part of basic construction
- C: Things that enhance telescope capabilities

A dozen A-tasks receive constant attention while a somewhat larger number of B-tasks receive opportunity time or wait to be promoted. The C-list, about the size of B, is mostly “nice to have” items and are not normally advanced.

The good news is that the list is not getting bigger. The bad news is that the list is not getting smaller. New tasks arise at the rate old ones are completed. About 1/3 of the current A tasks were not on Mark's list.

Mark also presented operational recommendations:

- *Increased engineering and technical support from Pasadena:* Beginning in FY04/05 we will have an additional 0.5 FTE of electronics engineering support in Pasadena, which will help considerably in areas of instrument and telescope control hardware.
- *Hiring a mechanical engineer to assist Frank Perez in Chile:* We have placed a job advertisement for an engineer or scientist to assist Frank Perez in Chile. We are looking for someone who will work well in the existing organization and complement Frank's skills.
- *Consider ways of providing stronger support in critical areas (e. g., CCD cameras, software):* We have not found an obvious way to satisfy this outside the existing solution, which is to rely on science and technical staff to reply directly. Enhancing scientific and engineering staff at the observatory is a possibility.

Problem reporting and tracking

Observatory staff requested a problem reporting system to track progress on repairs and upgrades. This system would record problems so they wouldn't be forgotten, and keep a work history independent of individual memories.

It turns out that there are few, if any, commercial products with both the feature set and anticipated product lifetime (company longevity) that are up to the task. Free software choices include *Bugzilla* and *gnats*, both used primarily for software development. These are bug reporting databases with web browser interfaces. Gnats is used at observatories and our tests in

Pasadena found it to be potentially useful. It will be installed on the new web server recently shipped to LCO.

Safety

Las Campanas appears to be one of the safest observatories at which to work. It is a relatively modern facility with traditional telescope and dome designs that make unsafe conditions infrequent and obvious. Nevertheless, I thought it worthwhile to have an outside review by experienced personnel to look deliberately for hazards that might not be obvious to a frequent visitor or local worker. The charge to reviewers was:

We request a thorough safety inspection and operations and procedures review for the Magellan telescopes resulting in a written report to the site director. Topics include, but are not limited to, the following:

- Human safety hazards capable of causing serious harm. Examples include pinch points, trip and fall hazards, O₂ displacement or poisoning by gas leaks in confined spaces, and electricity. Do we need gas monitors, etc.?
- Emergency stop function and button placement.
- Lockout and training procedures for dangerous equipment or equipment that might be damaged by improper use (e. g., machine shop, laser cutter, telescope, cranes). Are standard operating procedures, including safety information, posted? Are staff adequately trained in safe operation of equipment? Are equipment test procedure (e.g., cranes, rigging equipment) adequate for safe operation?
- Lockout and training procedures for hazardous materials, including cryogenics.
 - Are materials labeled properly?
 - Are MSDS sheets handy?
 - Are gloves, masks, and hardhats available and used when appropriate?
 - Are hazardous materials stored properly?
 - Are staff adequately trained in safe handling and use procedures and are standard operating procedures posted?
- Is there good communication between employees, visitors, and management on safety issues? If not, how might they be improved?

Items peculiar to astronomical observatories are especially to be noted. Individuals are responsible for their behavior and the intent is not to create a difficult work environment. It is important, however, that dangerous situations be recognized by everyone, including visitors.

Miguel Roth arranged for Oscar Saa (CTIO) to do an observatory safety walk-through at LCO and report on safety hazards and practices. Some procedural problems were noted but on the whole things are indeed as they seem, as safe as one would want and expect. The safety report is appended.

Construction

F/5 secondary

Carnegie and the University of Arizona have signed a \$592K contract to polish and figure the Magellan F/5 secondary mirror. The projected finish date is October 28, 2005.

Mirror mounting hardware will be designed and built by at Carnegie, borrowing heavily

from the MMT F/5 experience. We plan to have the mounting system built and tested before Steward starts work in September, 2004, allowing us to deliver the complete system immediately after the mirror is figured.

F/5 corrector and instruments

The planned F/5 Cassegrain focus at Clay will receive a wide-field imaging corrector and atmospheric dispersion compensator, a 36-CCD imager with a 24 arc minute field of view (MegaCam), and a multi-object near infrared spectrograph (MMIRS). Earliest delivery dates to LCO are:

- August 2005 wide field corrector
- September 2005 MegaCam
- June 2007 MMIRS

The pacing item is the F/5 secondary mirror which will not arrive until the end of 2005 and then require considerable testing. The elapsed testing time depends largely on the how much science time can be traded for engineering, but three to twelve months is probably the range to consider.

Charlie Hull, Frank Perez, and Alan Uomoto have met with the SAO engineering group (in various combinations including Tim Norton, Mark Ordway, Andy Szentgyorgi, Mark Muller, Bob Fata, Roger Eng, and Henry Bergner) to clarify telescope-instrument interfaces. The major topics have been mechanical flexure in the telescope rotator and as-built dimensions of the telescope. Because the SAO instruments are larger and heavier than the largest anticipated for Magellan, flexure performance has received lots of attention (there is no danger of instruments falling off the telescope or damaging the telescope with their weight). We have, for example, built fixtures to measure flexure under actual load conditions.

Magellan 1 Atmospheric Dispersion Compensator

The Atmospheric Dispersion Compensator (ADC) lenses are a pair of doublets, each with an internal wedge, designed to correct wide-field aberrations and atmospheric dispersion. They have been at Denton Vacuum waiting for a hard antireflection coating.

Since the last SAC meeting, we decided to apply a sol-gel¹ coating instead of Denton's vapor deposited hard coating. This choice was made primarily for schedule reasons. The lenses were shipped to Cleveland Crystals, Inc., and sol-gel coated late in February 2004 (see the cover photo). The coating performance is as expected.

The lenses were shipped to Brashear and installed in their cells by Charlie Hull. Optical testing showed no obvious problems and at this writing the lenses are scheduled to ship out of Brashear (Pittsburgh) directly to Las Campanas on April 16, 2004. Installation in the telescope is scheduled for May 2-9, 2004.

Improvements

Magellan 2 Tertiary Positioner

Work on the Magellan 2 locking positioner for the tertiary mirror continues. The last of the hardware was installed in April 2004 and some straightforward software work is needed to implement basic functions. Automated fast port switching requires more complex software and is expected to take a few more months of programming effort.

¹ The lens is dipped in a liquid suspension of an interesting material and allowed to dry. The deposited material acts an antireflection coating.

Magellan 1 Dome Trucks

All but one of the additional dome trucks on Magellan 1 have been installed.

Problems

Rotators

Instrument rotators have been a chronic cause of telescope downtime. Some potential design flaws and performance glitches were found and repaired but failures continued.

We decided to replace marginal components with better designs. The obvious first candidate is the rotator drive amplifier, which from our repair and testing experience seemed fragile and erratic. We are testing a modern replacement at one rotator location with encouraging results. If further testing is successful, we will replace all the drive amplifiers.

Guiders

A variety of significant but not crippling guider problems have been noted. Motor control occasionally fails, guider images are occasionally noisy, slow camera motion is not slow enough for moving object guiding, and camera windows sometimes ice over.

These problems, combined with desired new features like slit-accurate offsets, suggests revising the guider performance requirements and upgrading the guiders. I suggest committing improvements fund to engineer and implement one guider upgrade to remove the above problems and to enable moving object guiding.

Mirror supports

The pneumatic cylinders on the primary mirror support system leak, requiring extra air compressor capacity. The leaks are getting worse. The solution is to seal the leaks with silicone caulk, a tedious process but one that does not require telescope downtime. Sealant has been shipped and work will begin in the next month or so.

New instruments

Magellan partners have been unusually successful and imaginative in proposing and funding new instrumentation. This is good; discoveries are often made with new capabilities.

The following chart lists new instrument work. Each item is assigned a 20-day block only to provide a visual indication of when observatory staff might need to pay attention to that instrument. For the next few years, times without new instrumentation arriving are rare. Since we are currently understaffed for routine operations and maintenance, and since each new instrument brings a continuing support requirement, the need for additional resources at both the observatory and SBS is clear. There is probably no reason that all incoming instruments cannot be accommodated, but doing so will require a combination of new resources (people and money), early retirement for viable instrumentation, throttling the arrival rate, and trading science time for instrument development.

Staffing

Augmenting technical staff will be discussed separately at this meeting. We point out that increasing mountain staff has the side effect of requiring more office and dormitory space.

Engineering time allocations

Magellan engineering time is scheduled around full moon. Two or three nights per month per telescope are allocated except that one 7 or 9 night run per year per telescope is used for mirror washing or aluminizing. This time is intended for work that requires a telescope be unusable at night or when nighttime observing is needed for maintenance. Some of this time has been allocated to instrument engineering if telescope maintenance can be deferred.

With the increasing rate of incoming instruments it makes sense to consider the impact of allocating instrument engineering time from the total pool of nights. While many benefit from each new instrument, commissioning a few new instruments per year cuts into science time.

On the short term, I have encouraged instrument teams to request supplemental engineering nights from the science schedule at the rate of about 1:1 with Magellan engineering time. This provides incentive to plan and execute instrument commissioning efficiently. Longer term, I suggest that a formal policy be adopted. Perhaps a 1:1 scheme (one Magellan night for each institutional night) with a maximum of three Magellan nights per semester (they could use more institutional time if they can get it) along with an equivalent increase in Magellan engineering time.

User instrument policies

At the previous SAC meeting I promised to generate a policy document for *user instruments*, that is, systems not intended to be generally available to the Magellan community. Not too far into thinking about this, one finds that the practical impact of user instruments on observatory staff is not much different from a facility instrument. Observatory support of similar scope is needed for installation and testing; only the requirement of knowing how to operate the instrument is removed since one might reasonably require the PI or a representative to be present for all observing runs.

Questions: Should SAC approval be required before installing a user instrument? Should Magellan engineering time be allocated for user instrument support? Do the answers change depending on whether the user classification was chosen by the PI or representative imposed by the SAC (facility instrument rejection, perhaps for non-scientific reasons)? We continue to work on this.

Visiting instrument policies

A related question is that of visiting instruments. This topic will be included in the user instrument policy document.

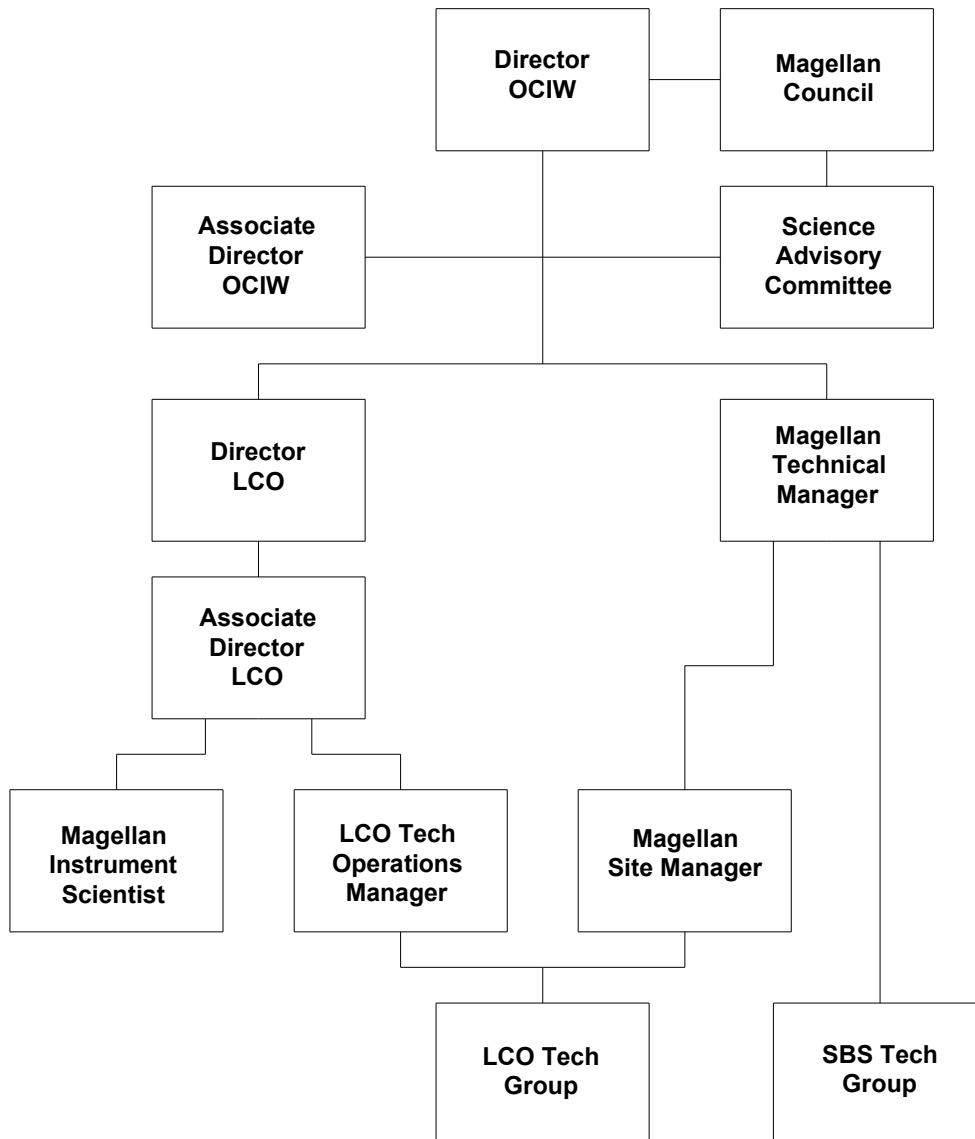
Magellan organization

Following suggestions at the previous SAC meeting, an amended organization chart for Magellan operations is shown. The Magellan Council and SAC are called out in separate entries.

The chart does not answer the practical question of whom to contact for information and service requests. For Magellan telescope issues, it is generally correct to contact the Magellan Technical Manager who will provide information directly or contact the appropriate person. This should not discourage anyone from contacting other personnel directly, however.

The Technical Manager oversees Magellan work and service flow in the sense of setting

global priorities and facilitating medium to large scale projects. On-site day-to-day work flow is handled by the Magellan Site Manager who also serves as the primary contact for observatory support provided to instrument teams.



Title	Magellan Responsibilities
Director OCIW	Overall vision for Magellan, particularly in the context of LCO, the small telescopes, and GMT; chairs Magellan Council (Freedman)
Magellan Council	Reviews and approves budgets, proposals, and scientific initiatives.
Magellan SAC	Recommends to the Council major scientific proposals and actions such as instrument commissioning. Members act as telescope user representatives for their home institutions.
Associate Director OCIW	Advice and information store for Magellan; interface with GMT experiments affecting Magellan (mostly AO; Johns)
Director LCO	LCO administration affecting Magellan (Roth)
Magellan Technical Manager	Specific vision for Magellan telescopes and instrumentation, operations management, new instrument development (Uomoto)
Associate Director LCO	Scientific analysis and management of telescope and instrument performance, technical approval for new instruments (Phillips)
Magellan Instrument Scientist	Information store and support for Magellan instruments (Sip)
LCO Tech Operations Manager	Manage LCO Tech Group work on Magellan and small telescopes (Perez)
Magellan Site Manager	Manage on-site Magellan-specific work, operations approval for new instruments (Perez)
LCO Tech Group	Technical staff stationed at LCO (many)
SBS Tech Group	Technical staff stationed in Pasadena (many)

Appendix: Oscar Saa's safety review

Safety review topics (Oscar Saa, December 2003)

What follows, is just a few comments on safety aspects observed during a visit to the Magellan telescopes at Las Campanas Observatory on December 17th, 2004.

The visit was hosted mainly by Mr. Frank Perez, and Dr. Miguel Roth.

First, I want to thank Miguel and Frank for their fine hospitality, and want to say that it was very, very nice to be at that observatory and find so many friends. The atmosphere is real nice, and it is obvious that people are happy to work for this observatory. (very important). Please, keep it that way.

Based on my experience in an Observatory like Cerro Tololo, and given that I have actively participated in safety activities for years, I will comment some things I could observe, some of which might be influenced by the fact that it was a long time since my last visit to Las Campanas.

And I want to also thank Miguel and Frank for the opportunity, because I have learned or realized a few things that are very useful to me at Tololo, too. A reciprocal visit is welcome.

If I may, I want to answer some of Miguel questions, instead of tick marking his sample form sent by email.

1.- The access, unpaved road, look ok but, it can take a few repairs and improvements in some points, it is obvious that some maintenance is performed, but for an unfamiliar driver, as I was, requires to go very carefully. (which I did !). Due to normal traffic, at some points, the good part to drive on, is too narrow, and there is much loose gravel/dirt.

I am sure you agree that at some points it would be very good to have some more guardrails. It was very good to see the “**Curva Muy Peligrosa**” signs, they do help!

Since I visited a few years ago, my tendency was to arrive to the dinning room, of course! But, is there a checkpoint for those arriving on the mountain, you know, like the round office building on Tololo, which is the mountain reception office?

When arriving up to almost the top, still on the unpaved road, there is a joint where it would be nice to see a sign showing where the top is, or reception, or the Magellan telescopes, (I took the right hand, by instinct).

2.- On the outside of the telescopes building, when you are familiar with the risks, you got no problem but, the unfamiliar persons, can possibly hit their head or face at some points on the legs and cross (X) beams, possibly you can paint them with yellow and black stripes, or put some barrier that does not let you go under/between them, specially near the main entrance door (Walter Baade Telescope ?)

3.- Other than the elevators, I did not see possible pinch points, may be I should see the telescope in regular operation. Or a major maintenance operation, certainly I know, because we also do it, that when major operations, we (and you) take special attention and measures are taken in order to avoid any accidents.

3.- Gas leaks in confined spaces, I did not detect. You could establish ways/rules to check these situations, with some commercial detectors.

4.- Electrical wiring, look ok, I did not see something horrible, certainly, as in any place, there are things that could be better (ducts covers on, where they should, cables caught between metal plates).

5.- Lockout and training procedures for dangerous or delicate equipment. Frank showed me a good example of a situation, where the same guy who installed a safety lockout, was not using it (“ we know what we are doing and we are careful” was the comment/reply) so, this is mainly training and education. It takes time and a very persistent supervisor, and at times, this produces difficulties if we do not use all the psychology needed in order to get a positive understanding and acceptance.

6.-We did not talk enough on the “lockout and training procedures for hazardous materials, including cryogenics, but, we found some improperly stored gas bottles.

At places with liquid nitrogen containers (30 or 40 liter dewars) I did not see gloves or goggles, do you have them? When someone is operating with these, should use gloves and at minimum, goggles, best would be to use a face protection.

Training is very important, on how to operate these materials, once, even with gloves on, a young astronomer burned his hand with liquid nitrogen.

7.- There is a lot of improvement possible to do in the sense of storing materials like gas bottles, glass bottles with flammable liquids, and tools in general. I did not ask or try to find out about what kinds of training had been done or planned about things like these. (I would be glad to help, if you want).

8.- I am sure you can make a stand, bench or something better than just a wooden crate to put the guider module you showed me. (without mentioning that the wooden crate was full of garbage and if you do work in the guider, you can drop a screw or something into the garbage, and will have a good time finding it).

9.- Something we did not touch either, is work in high places, do you have safety harnesses, helmets, gloves, goggles, etc and some kind of training for people who would do that work ? This is something one has to attend very carefully because the effect of a failure can be catastrophic.

10.- I think communication can be very easy because I noticed a good attitude in most people I met. Perhaps one good thing to do is to incentivate people to look for themselves at potential hazards and propose solutions; then, you can induce them to respect the rules.

11.- Console rooms look nice, I like them but, if you want me to point at some problem, or risk, please see how bad it would be if one of those monitors happen to fall on someone’s arms, lap, or head. If you can, the best would be to install, the modern flat screens, which are lightweight and can be fastened to the wall or the rack/stand. We got similar problems here, and it takes time and money to make the change. We have talked about this problem, and my comment is always that, in case of earthquake, people should pay much attention to these equipments, and stay out of their reach, as a first precaution.

12.- I understand you got a safety committee, I did not ask if this is similar to ours ... nor I asked if you got advisory from the Mutual or ACHS or other (?). Perhaps this is something that can be discussed and studied. If you want, this visit of mine, can be just the start of a series of working sessions among us, and I can be sure it would be beneficial to both sites.

Maybe we can meet in La Serena for a working session, or you can come up to Tololo for a day, as you judge is best.