**A History of the Observatory at Rose-Hulman**

By Richard Ditteon

**Preface**

There are large gaps in the story of the observatory at Rose-Hulman and some unanswered questions. However, one reason for publishing this history, even though it is incomplete, is to encourage alumni and others involved with the observatory to contact me with any information they may have regarding the observatory.

**The Beginning**

After World War II and the development of the atomic bomb, the United States thought it was technologically superior to all other nations. But that changed on October 4, 1957, when the Soviet Union launched Sputnik, the first artificial satellite. This event marked the beginning of the Space Age. It was also an alarming event for the United States. After all, the Soviet Union was a nuclear power and an enemy. The ability to launch objects into orbit gave them the "high ground."

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| history 1 | The Terre Haute Astronomical Society Moonwatch station at Allis-Chalmers circa 1959. The telescopes are pointed at mirrors set at 45 degrees to view the sky through openings in the roof. Various charts and graphs are on the tables in front of the observers. This arrangement made for comfortable viewing. |

While Sputnik was a surprise for most Americans, it was anticipated by American scientists who were working toward launching their own satellite for the 1959 Geophysical Year. The founding of an observatory at Rose-Hulman is closely connected with the effort to launch earth-orbiting satellites.

Simply launching a satellite is not an end in itself. You also need to determine its orbit. When it will pass overhead. Where it will go in the future. How the upper atmosphere is affect by the motion. Methods of tracking satellites had to be invented along with methods for launching them.

There are two basic ways to track satellites: active and passive. Active tracking uses a radio transmitter on the spacecraft. This was the purpose of the famous Sputnik beep. Ground receivers can triangulate on the radio signal to get direction and range. The problem with radio tracking, especially with early satellites, is that eventually the batteries powering the radio would fail. Also, radio tracking doesn't work for boosters or other objects that aren't equipped with radios.



*The Fecker telescope in operation. Photo from the 1978 Modulus.*

Passive tracking methods include radar and optical techniques, such as visual tracking or photography. Radar can give the most precise data, but it requires expensive ground stations manned by trained operators, using telescopes called Schmidt cameras. As an alternative, the early U.S. space program used amateur volunteers to visually track satellites, in a program called Moonwatch that was coordinated by the Smithsonian Astrophysical Observatory.

Moonwatch observers used small telescopes to spot satellites, measuring the position of the satellite and its time of passage. Such observations were not very precise, but the stations were inexpensive to set up and operate. Many observations from many different stations could make up for the lack of precision.



*The Fecker telescope in operation. Photo from the 1978 Modulus.*

Terre Haute was the site of an early and very active Moonwatch station operated by the Terre Haute Astronomical Society. The group was founded in 1957 by Nunz Addabbo who worked for American Brass. When he left Terre Haute, leadership passed to Mr. Leo Deming, a local photographer, and the Rev. George E. Mitchell. As evidence of the quality of observations made by the Terre Haute Astronomical Society, Deming received a letter of commendation from Hugh Odishaw, the executive director of the National Academy of Sciences for his "especially significant scientific contributions to the IGY Moonwatch Satellite Tracking Program."

Initially the Moonwatch station was located in a shack in the parking lot of the Allis-Chalmers Manufacturing Company. Later it was moved to Deming's home. However, the home wasn't the ideal location partly because of light pollution.(5)



*The telescope of the Lynn Reeder Lab on October 21, 1999. The two telescopes in the back are 11 inch Celestrons. The telescope in the center is one of two 12 inch Meade telescopes.*

In early 1960, Deming approached Rose Polytechnic about hosting the Moonwatch program on campus. The proposal was discussed at the April 6, 1960, meeting of the Executive Committee of the Board of Managers. Professor Irv Hooper, who was the head of the Department of Mechanical Engineering, supported the proposal. Members of the ME department wanted to initiate a program in aeronautical engineering. Wilber Shook presented sketches of the proposed building. Estimated costs for the building were between $17,000 and $20,000.(6)

At the April 25, 1960, executive committee meeting, it was announced that a little more than $81,000 had been received from the Lynn Reeder estate.(7) Reeder was a member of the class of 1915 in civil engineering.

Discussion of the Moonwatch program continued at the June meeting of the Board of Managers. The executive committee was given authority to act on the proposal after more information was gathered.(8) Based on recommendations of Mr. Ruel Burns and Dr. Crawford Failey the Executive Committee decided in July to proceed.(9)

The architectural firm of Miller, Vrydagh and Miller was hired in August to make working drawings of the proposed Astronomical Laboratory and Observatory.(10) These drawings and construction estimates totally $14,270 were presented at the October board meeting. The board approved an appropriation of $15,000 for the construction of the Astronautical Laboratory and Observatory.(11) An additional $500 was later authorized so that at least part of the power line to the building could be buried for aesthetics.(12)



*The Reeder Lab and the observatory as they appeared from about 1973 until they were demolished in April 2000.*

At their 45th anniversary dinner, the class of 1915 recommended to the Board of Managers that the Moonwatch building be dedicated as a memorial to Lynn Hadley Reeder. The executive committee accepted this recommendation and officially renamed the Astronautical Laboratory and Observatory the Lynn H. Reeder Laboratory.(13)

The ground breaking was February 23, 1961. C. H. Garmong and Sons was contracted to build the lab for $10,200. Public Service Indiana installed power lines fro $478, Freitag-Weinhardt, Inc. installed water and sewer lines for $642, and the architects fees were $1,132. The $12,452 total was less than the original estimates.(14)

An anonymous donor gave Rose-Hulman an eight-inch telescope and a dome to house the telescope. Deming said the donor was Crawford Failey, president of Wabash Reality, Inc.(3) Terre Haute First National Bank donated an additional $600 for the foundation for the dome. An additional $350 was approved to move the building and the telescope from the donor’s home to campus. The moving expense was considered part of the original $15,000 allocated since the actual cost turned out to be significantly less. The eight-inch telescope was a Fecker style reflecting telescope valued at $9,000.(16)

There is no mention of equipment for the laboratory/observatory in the costs or in any of the board minutes. The plan was for the observatory to be equipped by the Terre Haute Astronomical Society. The club had sixteen small telescopes (50 mm objective lens, 5.5 power) that were standard Moonwatch equipment. These telescopes and other pieces of equipment were purchased by the Terre Haute First National Bank, which served as a sponsor for the local Moonwatch program. The club was also building a 12.5-inch Newtonian reflecting telescope. By the end of 1960, the primary mirror was ground and work was being done on the telescope mount. The Smithsonian Institute loaned the Terre Haute Moonwatch group 10 telescopes with five-inch objectives, 20 power and two degree field of view.(17)



*This shows the setup for the ten Moonwatch telescopes, but the large Newtonian telescope is not yet installed. instead, a small refractor is shown.*

The completed Lynn H. Reeder Laboratory was 40-foot-by-16-foot, located on the hill above the baseball field. The building had redwood walls and a two-piece flat roof. Half of the roof could be rolled back over the other half by means of a cable and hand-cranked wench to expose the telescope bay.(17) The ten, five-inch telescopes were mounted on poles, five along each wall. The 12.5 inch Newtonian was to be mounted in the center of the bay when it was completed.

**The 1960s, ‘70s and ‘80s**

After the May 1961 board meeting, there are no further references to the observatory in the board or executive committee minutes. From this point on my narrative relies on the memories of individuals who were involved with the observatory and events are much less certain. If anyone has information, please contact me.

The Lynn Reeder lab became operational probably near the end of May, 1961. Initially, Jim Matthews, an assistant professor in the Department of Mechanical Engineering, was in charge of the observatory. It is even less certain when the dome and Fecker telescope were installed, but it was shortly after the Reeder lab was completed. The dome shows up in the background of a photo of the baseball team in the 1963 Modulus (page 76), and is mentioned in the 1962-63 Catalog (page 17).

The Moonwatch program was active when the lab was completed, but rapid advances in satellite tracking soon eliminated the need for the program. The last mention of the satellite tracking activity was in the 1964 Modulus' description of the Astronomy club. The 1963-64 Catalog lists Jim Matthews as the adviser for the Astronomical Society. Robert McKnight (class of '64) was the first president of the club.

Mr. Matthews took a leave of absence from June 1963 to June 1966. In his absence, Professor Eckerman and then Professor Garner served as advisers for the Astronomical Society. The 1969-1971 Bulletin lists Professor Rhee as the adviser for the Astronomcial Society. It also lists the astronomy course under the Department of Physics for the first time. Responsibility for the observatory was turned over to Physics. Professor Rhee was a theoretical physicist with an interest in astrophysics, and began at Rose Polytechnic in 1963.

Between 1963-1973, there were several changes in the observatory. A photo in the 1973 Modulus shows that the redwood walls of the telescope bay in the Reeder Lab had been covered or replaced with aluminum siding. The 1976 Modulus shows a photo of the interior of the telescope bay with the 12.5 inch Newtonian installed, and the poles for mounting the five-inch telescopes had been removed and the walls of the telescope bay were concrete block. I remember using the 12.5-inch telescope and there were no poles for mounting the small telescopes. In addition, the 1979 Modulus shows that the flat roof that covered the warm room had been replaced with a pitched roof. The roll-off roof of the telescope bay now rolled off underneath the roof of the warm room rather than above it.

During this period, it appears that Lance Wallace taught also astronomy in 1974. In 1977, Professor Rhee and his wife died in an accident. Professor William A Deutschman taught the astronomy course in 1978 until the fall of 1982. Don Hutter taught took over teaching the course. At this point, the Physics department adopted the practice of teaching the Observational Astronomy course every other year, alternating with PH322 Celestial Mechanics. Professor Michael F. McInerney taught the course in 1984 (11 students), 1986 (12 students), and in 1988 (nine students).(18)

In 1990, Professor Arthur Western taught the astronomy course to 14 students. At this time, the course number and description were changed to PH230 Observational Astronomy. The lecture content of the course became more rigorous. This change was made so that other departments at the Institute would accept the course as a technical elective and to increase the enrollment in the course.

In 1990 (I believe), Hans Eppinger of Hughes Optical Products, Inc., donated a six-inch Clark telescope to Rose-Hulman. The donation consisted of the optical tube assembly for the telescope, but not the mount. Since we couldn't easily mount the telescope, it was hung on a wall in Moench Hall as a decoration.

**Back from the Brink**

In 1988, the architects of Howard, Needles, Tammen and Bergendoff developed a campus master plan for Rose-Hulman.(19) This plan was important in the history of the observatory because it completely eliminated the observatory. In the observatory's place was a parking lot for the new residence hall and chapel. At the time, Rose-Hulman did not own any land that would be suitable for building a new observatory. As a faculty representative advising the architects in the development of the plan, I lobbied strongly for retaining the observatory, but to no avail.

In 1992, I was assigned to teach PH230 Observational Astronomy (10 students) and, by default, I was put in charge of the observatory. This assignment was made, at least in part, because of my vocal opposition to the elimination of the observatory. I wanted to do something about it and now I was in a position to act.

I felt very strongly, that to save the observatory students needed to use the observatory. And students were much more likely to use the observatory if the equipment was easy to operate. We did not have any modern equipment in the observatory and I thought that was our most pressing need.

There was only one, minor difficulty. I had no idea what I was doing. Like most of my predecessors in teaching the astronomy course, I had no formal training as an astronomer. I had taken Professor Rhee's astronomy course in 1973, but Rhee was a theoretical physicist. We hardly used the telescopes at all. I needed practical, hands-on experience with modern equipment to determine what we needed.

During the summer of 1992, the Harvard-Smithsonian Center for Astrophysics offered the Research Techniques for Undergraduate Faculty Summer Institute, which I attended. I began to learn about real observational astronomy. I met Vincent A. DiNoto Jr. from Jefferson Community College. The Harvard Observatory had several Clark telescopes that Vince was extremely interested in. He nearly fainted when I told him that Rose-Hulman owned a Clark telescope that was hanging on the wall as a decoration. I resolved, then to find a way to use the Clark we owned.

At the 1992 homecoming, I was introduced to Gene Glass, class of November, 1949. He is a very enthusiastic amateur astronomer from Corpus Christi, Texas. Of course, Rose-Hulman did not have an observatory while Glass was a student. He wanted to see the observatory. While touring the facility I explained to him how dim the future of the observatory appeared. He agreed that to save the observatory we needed new equipment that would easier to use. He donated money for a CCD camera (a very sensitive digital camera) designed for astronomy. Glass has remained a consistent supporter of the observatory. His donations have provided much needed general operating funds, which have been used to buy software and numerous accessories for the telescopes.

In the spring of 1994 the Student Government Association announced that it had a surplus in the general fund. I asked the president of the astronomy club, David Borzillo, to go before SGA and request money to purchase a new telescope for the observatory. SGA approved the request and we purchased a Celestron 11 inch Schmidt-Cassegrain telescope for about $2,000. Soon after, Dean Eifert approved the purchase of a second, identical telescope.

In the Fall of 1994, 36 students signed up for the astronomy course—the largest number ever. The 1994 proposal to the National Science Foundation (NSF) mentioned the student purchase of the telescope.

The reviewers were so impressed that the students were supporting astronomy with their own money that it approved my request for $18,000 matching grant, for a total of $36,000 for new equipment. The NSF money allowed us to purchase two Meade 12-inch Schmidt-Cassegrain telescopes for about $4,000 each.

The Meade telescopes are on computer-controlled mounts. The computers in the mounts contain a database of thousands of stars, nebulae. and galaxies. Once these telescopes are synchronized with the real sky, a few keystrokes can be used to move the telescope to any desired object. These telescopes represented the ultimate in ease of use at the time. Also included in the NSF proposal were upgrades for the two Celestron telescopes to make them computer controlled, three new CCD cameras, and four laptop computers to run everything.

The new equipment made the observatory easy to use. The tedious procedure of manually moving the telescope from one star to the next to find the target object was replaced by a simple press of a few buttons and the telescope would move on its own to the correct spot in the sky. Now, with just a little training, anyone could use the telescopes to find interesting objects. With little more training, anyone could also make digital images of those objects.

All of this success did not go unnoticed. By December of 1995 the observatory was back on the campus master plan. Rose-Hulman had acquired more land on the east side of campus and the plan was to locate a new observatory on this land.



*The second Meade telescope, which was normally set up in the lower left corner, was temporarily stored away when the photo was taken.*

A new problem arose. With all of this new equipment, we were out of space. To make room, I chose to sell the 12.5-inch Newtonian. The Newtonian took up a lot of space and was difficult to use. When this telescope was pointing toward Zenith, the eyepiece could be as much as 9 feet above the floor. To use the telescope, the observer would often have to stand on a moveable ladder. Observers often grabbed the telescope to steady themselves and moved the telescope as a result. The picture to the right shows the telescope bay of the Lynn Reeder Lab with the new telescopes installed in place of the Newtonian.

In the fall of 1996, 20 students took the astronomy course. Also, during that fall, Gary Burgess, the physics department technician, built an adapter that would allow the Clark refractor to be mounted on the mount for the Fecker telescope. I hadn't forgotten about this telescope and I wanted to see for myself how good the optics were. It was immediately apparent that the optics were superb, probably better than any of the new telescopes or the Fecker. During the spring of 1997, Burgess and I completely disassembled the Clark, cleaned it and reassembled it. Burgess polished all of the brass and coated it with varnish to protect it from the elements. Donations from Gene Glass were used to purchase a computer controlled mount (Meade LX-750) to replace the Fecker mount. The optical tube assembly for the Fecker and its mount were put into storage. I didn't have to sell the Fecker, because by this time it was clear that we would eventually get a new observatory. On October 12, 1997, we held a dedication ceremony for the Clark telescope.

Twenty-nine students took astronomy in the fall of 1997. The next issue was how to fund the new observatory. Plans were being developed for a new residence hall. The planned location for the new hall was to the northeast of the Reeder lab and observatory. Lights from the hall would certainly interfere with the observatory. More importantly, the observatory was in the planned parking area. It was clear that the observatory needed to be moved. Wayne Spary, vice president of facilities, proposed a line item for moving the observatory in the new residence hall budget. The Board of Trustees approved this.

Darrell Loyless began is job as vice president of development in July, 1998, and I approached him about fund raising for the observatory. The development office approached the Oakley Foundation with a list of several items in need of funding, and the observatory was on the list. The Oakley Foundation was very enthusiastic about the observatory. The foundation pledged $500,000 towards construction and equipment. The new facility would be called the Oakley Observatory.

During fall quarter in 1998, I took a sabbatical leave to develop a research program in astronomy. The equipment we had by that time was good enough to allow us to do any number of different research projects, including variable star photometry and super novae searches. I chose to work on asteroid astrometry. By the end of my leave, I had submitted 69 asteroid observations to the Minor Planet Center at the Harvard Smithsonian Center for Astrophysics. This work earned the Lynn Reeder Lab an official observing site designation as observatory 731. As far as I know, this was the first astronomy related research done at Rose-Hulman since the days of the Moonwatch program.

Planning for the Oakley Observatory began as soon as we learned of the Oakley Foundation pledge. The principle design decision was the number of telescopes. We could build an observatory with one large, research-grade telescope, or with several small telescopes. Since we already had several good, small telescopes (two 12-inch Meade LX-200's, two 11-inch Celestrons, the Fecker, and the Clark), the multiple telescope option was appealing. Another consideration is that the planned site, while relatively dark for the Terre Haute area, was probably not dark enough to justify a large aperture telescope. The limit of faint objects that we can see is not set by telescope size, but rather by the brightness of the sky. Most importantly, the mission of the observatory could be better served by several small telescopes.

I decided on eight telescopes as the optimum number. Eight telescopes would allow 24 students to work in groups of three. Any more telescopes (or students) would be too difficult for one professor to monitor during an observing session. Fewer wouldn't be economical. All of the telescopes had to be under one roof so that one professor could monitor their use. These requirements dictated the use of a roll-off roof.

I wanted each telescope to be permanently mounted. Each mount had to be on a separate foundation, isolated from the rest of the building to reduce vibration. I also, planned for computer control of each telescope, and Internet access.

Vickrey, Ovresat and Awsumb Associates Incorporated Architects, Chicago, Illinois, handled the project. In March 1999, Wayne Spary and I went with the architects to visit observatories in Arizona. Particularly helpful was a visit to the Winer Mobile Observatory built and operated by Mark Trueblood. This observatory incorporated many of the features we needed in our observatory, including some of the same equipment.

In the Fall of 1999, 27 students took astronomy.



*Groundbreaking for the Oakley Observatory. Dr. Hulbert is on the left. Representing the Oakley Foundation are (from left to right): Jeff Perry, Steve Heck, Julie Perry Heck, Ann Perry and Bud Perry.*

Groundbreaking ceremonies were held on November 9, 1999. Construction continued throughout the winter. The building was substantially complete by April 11, 2000, when a dedication ceremony was held. By this time, the telescopes had been moved into the new observatory and set up, but they were not yet polar aligned. Two new 14-inch Celestron telescopes had also been purchased and installed.

After the dedication, the real work of polar aligning the eight telescopes began. The astronomy club hosted several polar alignment parties, but the vast majority of this very tedious, but necessary work was done by Susan Hare. She worked on polar alignment through the spring, summer and fall of 2000.

By the beginning of the summer, the 14-inch Celestron on the east side of the observatory was working well enough to be used by Operation Catapult students. During the first session, J. D. Mendez and John Kostrzewski fine-tuned the telescope and made several asteroid observations. However, they did not report their data. Linda Burns, Joe Ferdon, Steve Kramb and Bryan Roberts reported their asteroid observations made during the second Catapult session and earned a new observatory code (916).

In August 2000, Chris Wolfe, Susan Hare and Emanul Bettelheim made dozens of asteroid obseravtions. They received designations (discovery credit) on three asteroids. The asteroids are 2000 QL6, 2000 QG9 and 2000 QF25. Of the 185 different observatories that reported asteroid data in 2000, the Oakley Observatory ranked 37th based on the number of observations made.

The first astronomy class to use the new observatory (fall 2000) had only nine students.

**The Future**

The Oakley Observatory is a wonderful facility with great equipment. We could operate very well for a very long time with only minimal operating funds. But new hardware and new software are being developed all of the time. I will try to continually upgrade equipment to keep the observatory current.

I would also like to expand our research into new areas. There are many useful projects that can be undertaken with small telescopes and CCD cameras. Examples of these include asteroid photometry, variable star photometry, and searching for super novae.

I would also like to have more visitors from off of campus. We regularly host school groups and scout troops. I would like to have more star parties for the general public.

And finally, I would like to establish an observatory in the southwest (New Mexico or Arizona) that can be operated remotely. The biggest limitation we have in Terre Haute is the weather. We now have the technology to operate a telescope remotely and we should take advantage of the available technology to overcome are limitations.

After 40 years of operation, the fun is just beginning for the observatory at Rose-Hulman.

**Acknowledgments**

I want to thank Leo Deming for spending a delightful afternoon reminiscing about the early days of the Moonwatch program and the Lynn Reeder Lab. I am grateful to John Robson for making the Rose-Hulman archives available for my research. Jan Jerrell helped me track down copies of the Modulus year book. Albert McGarvey scanned the photographs. Lou Harmening, Dale Oexman, and Don Dekker tried to identify the individuals in the 1961 groundbreaking photograph.

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