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100 Years and Still Counting ...

Crane Observatory of Washburn University

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Abstract

The 11-1/2" Warner & Swasey telescope barely survived time and a tornado, but because of the care and hard work of a few individuals it has been restored to continue as the astronomical instrument it was 100 years earlier.

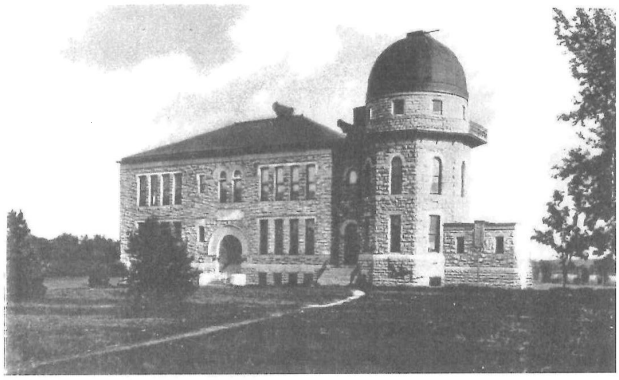


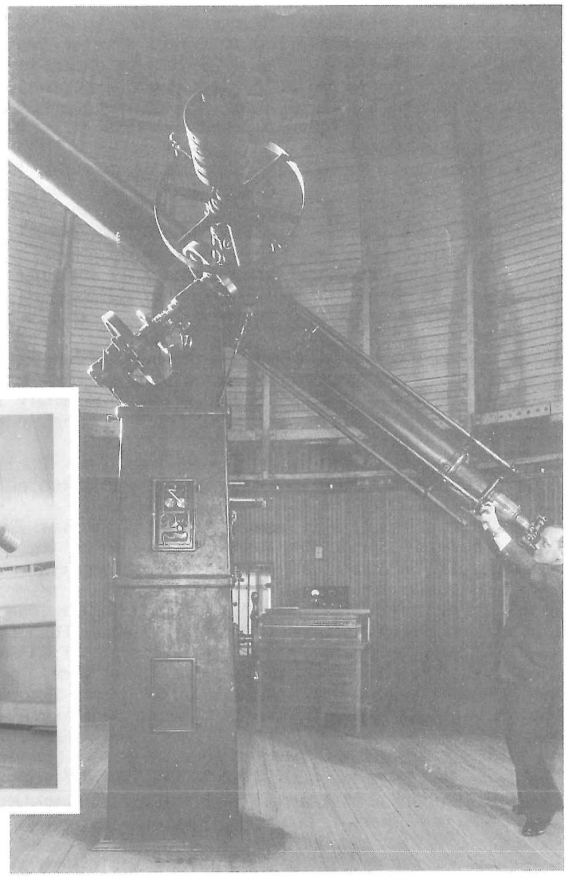
Figure 1: The original Crane Observatory as it stood in 1903 until the 1966 tornado swept through the campus of Washburn University of Topeka. The tornado demolished the observatory and its contents, including original documents pertaining to the telescope. (Photo of postcard taken by Dr. Stan Alexander and furnished by Dr. Darrell Parnell).

A telescope has always stood ready for use on the campus of Washburn College, otherwise known in current times as Washburn University of Topeka, Kansas. Always is a long time for anything, and the beginning of this "always" was in 1903.

The telescope spoken of is a Warner & Swasey refracting telescope with an 11-1/2" Brashear lens. The telescope was built in the late 1800's, most likely 1898, and was state-of-the-art in those times.

Because it was so technologically advanced, the telescope was sent on tour before being permanently mounted in Topeka. The Warner & Swasey telescope was on display at the Paris Exposition of 1900, where it was awarded the Exposition Universelle Internationale medal. It also received honors at the Pan American Exposition in Buffalo, New York in 1901. Then it made its final trek to its permanent home in Crane Observatory on the campus of Washburn University of Topeka.

A publication titled *Washburn College Observatory*, by H.L. Woods, Washburn College, Topeka, described the telescope at the time of purchase. Woods was in charge of the observatory from 1903 to 1915, and conducted visual double star research with a bi-filar micrometer. No publication date was provided in the book, but it is presumed that the information was written soon after the arrival of the telescope on the campus.



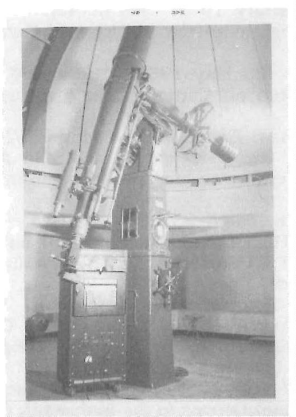


Figure 2: A 1952 photo of Dr. Stan Alexander using the Warner & Swasey refracting telescope. Dr. Alexander helped to rebuild the telescope after the 1966 tornado and during the 1998 refurbishing project, and has donated funds for ongoing maintenance. Photo submitted by Dr. Alexander. (inset. Figure 3: A 1950's photo of the telescope. Photographer unknown).

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Some of the description is as follows:

" ... The objective has a clear aperture of 11-1/2 inches and a focal length of 165 inches. The form of the lens is of the Herschel pattern *[This should read "Hastings form with flint forward." - ed.]*, with no air space except that due to variations in the curvature of the surfaces. The glass was furnished by Mantois of Paris, who also furnished the glass for the Lick and Yerkes objectives. The lens was ground by Brashear, of Allegheny, Pennsylvania. There are five eyepieces, of the following powers: 120, 165, 220, 330, and 715. A helioscopic eyepiece is provided, as well as a wide-angle comet eyepiece of low power. The finder has an aperture of three inches and a power of twenty.

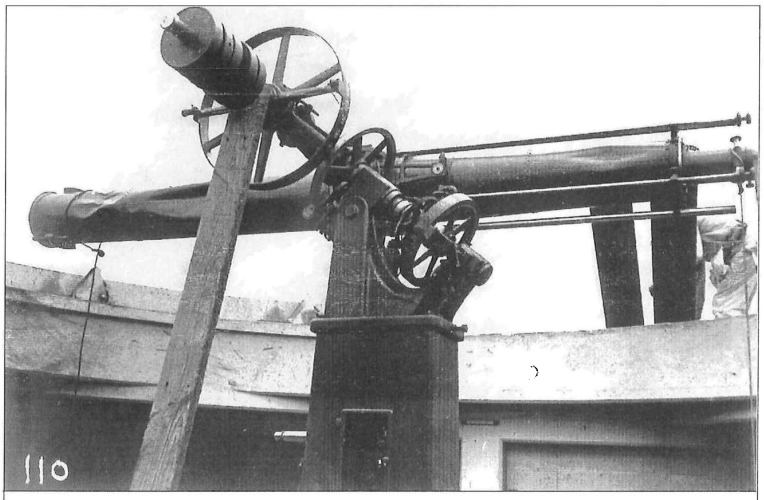

Figure 4: The Warner & Swasey telescope had mostly tube damage after the 1966 tornado. The lens was chipped and covered with mud and debris, but still intact. The tube had a hole so large, a man could put his fist through it. Unknown photographer.

"The column to the top of the declination head is ten feet in height. It is made in three sections, including the declination head. On the inside of the base, near the bottom, are cast lugs to support a floor of wood and concrete, which effectively prevents air currents from passing through the column. This has been found to be a protection to the clock in frosty weather where, as is the case with this instrument, there is an open space below the base. The second section contains the driving clock, and carries on its north side the R.A. dial and reading microscopes for the fine hour circle. The two sections of the column proper and the declination head are rigidly bolted together. Their aggregate weight is 2,350 pounds.

"The thrust at the lower end of the polar axis is taken by ball bearings in phosphor-bronze casings. The upper end of the axis is carried by a phosphor-bronze bearing. The friction at this point is relieved by anti-friction rollers. The polar axis terminates in a head to which is attached by heavy screws the declination sleeve. Through this sleeve runs the declination axis, which in turn contains the rods for operating from the eye end of the telescope tube the clamp and slow motion on the polar axis.

"The tube is of steel sheets closely riveted. The main drawtube for focusing is operated by rack and pinion and carries a smaller draw-tube. Both tubes are provided with scales for locating proper positions for different uses of the instrument. Two weights sliding on rods which are attached by brackets to the eye end of the tube counterpoise the objective. The entire tube is counterpoised by five cylindrical weights which are threaded onto the opposite end of the declination axis. This system of counterpoises admits of very prompt and accurate balancing of the tube, called for by the addition or removal of accessories such as micrometer, spectroscope, or photographic attachments.

"The system of circles for setting and for determining positions is very complete and convenient. The coarse hour circle near the lower end of the polar axis is divided to five minutes of time. Its graduations are easily visible from the floor. Setting in right ascension is, however, much more advantageously effected by a dial set into the north side of the column. The graduations on this dial read by a vernier to single minutes of time. The hand wheel for shifting the telescope rapidly in right ascension is

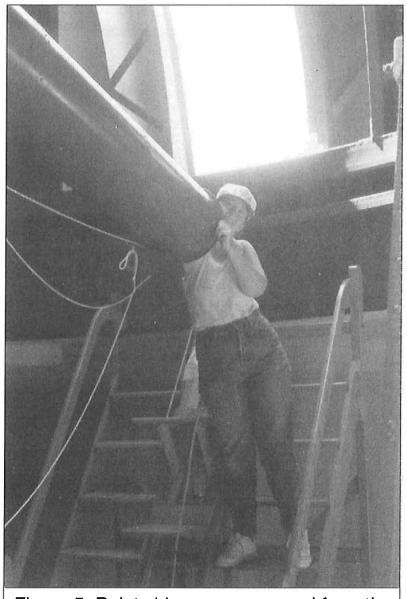

Figure 5: Paint chips were removed from the interior of the tube by Brenda Culbertson during the latest refurbishing project. Mrs. Culbertson spearheaded the refurbishing project fund-raising. Photo by Dr. Ken Ohm.

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situated just below the dial. The coarse declination circle is graduated to degrees and easily read from the floor or observing chair. The fine hour circle reads to five seconds of time, and is read by means of prisms through microscopes which project from the north side of the pier just above the R.A. dial. This arrangement permits the observer to read the fine hour circle and the setting dial and to operate the rapid motion without changing his position. The fine circle in declination is read by verniers to thirty seconds of arc and is read by microscopes at the eye end of the telescope.

"All the circles and the R.A. dial are lighted by small incandescent lamps ...

"The driving clock runs very smoothly and quietly. It is provided with a maintaining device which permits winding without disturbing the motion of the telescope. All the bearings of the clock, the connecting gears and the axes are exceedingly well fitted .... The weight of the movable parts of the telescope is about 1000 pounds ...."

Figure 6: The lens cell was tarnished, pitted and in need of cleaning. The small plaque was difficult to read before being polished; it showed the signature of Brashear, the lens maker. Photo by Brenda Culbertson

The award-winning telescope was quite the prize for the college and many astronomical research projects were conducted with this instrument. Double stars, the Sun, spectroscopy, eclipsing binaries, occultation timings and many other types of study were made over the years. The most recent use is CCD work on variable stars; new technology linked with the old.

It survived a devastating tornado in 1966, which left very little standing after it swept a one-half-mile-wide path through the city. The path went straight through the middle of campus and through the top of Stoffer Science Hall, where the telescope had been relocated shortly before the storm. It has been used by thousands of people seeing such sights as Comets Halley, West, and Hale-Bopp, in addition to the Moon and planets; and the quality of the optics and drive have allowed the use of new technology with accuracy and precision.

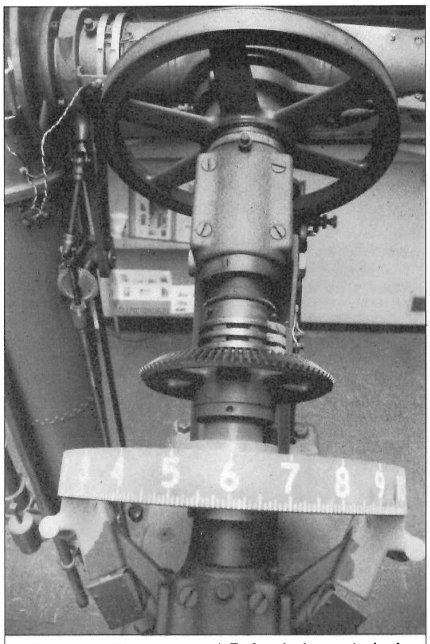

Figure 7: The restored R.A. circle and shaft, complete with dc electrical contacts. Photo courtesy of Chris Ray.

To maintain the precision and accuracy of the telescope after the 1966 tornado, the Wilmot Fleming company of Philadelphia was contracted to do repairs. They made new tube sections to replace the tornado-damaged sections. Wilmot Fleming also made other necessary repairs and had attempted to modernize the telescope at that time. They were prevented from stripping original parts and replacing them with newer components because the desire of the Washburn University staff was to keep the telescope in as original condition as possible. Some of the counterweights were replaced by a strip of lead

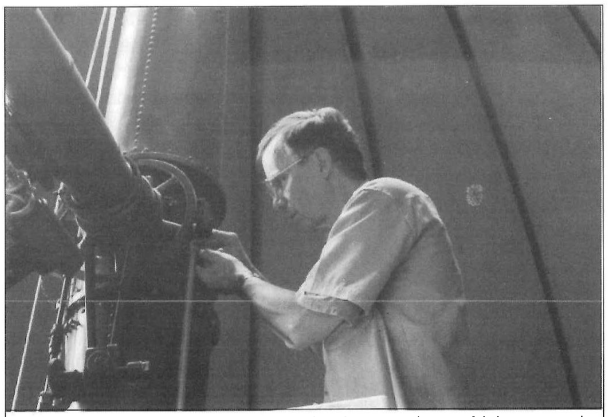

Figure 8: Chris Ray removes the brass tubes which covered adjustment rods. The tubes were cleaned and polished before being re-installed. One of the tubes had to be straightened due to an extreme bow, presumably due to tornado damage.

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affixed to the inside of the tube, but that was about the only modification made at that time.

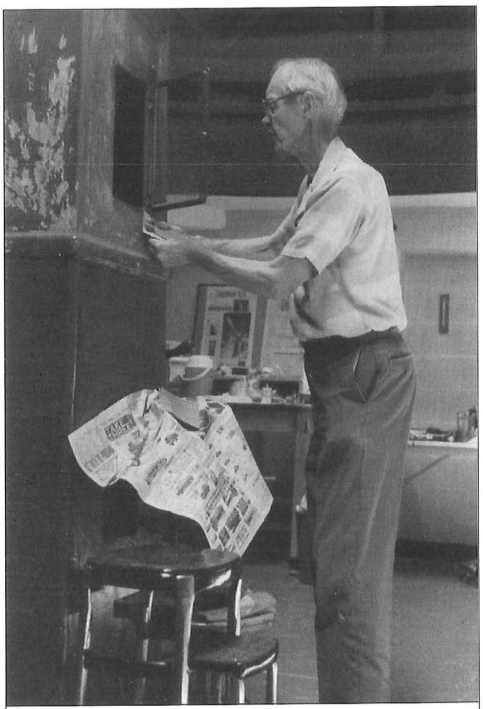

Figure 9: Marvin Kessler sanded the old, flaking paint from the pier. Mr. Kessler is an avid amateur astronomer and was eager to assist with this project. Photo by Brenda Culbertson.

No major work had been done on the telescope since 1966, and it was beginning to show its age. Neglect was unintentional, but it happened, nonetheless. "Washburn College of rural Topeka" had become "Washburn University of downtown Topeka." The dark skies in which research was being done had been eliminated. City lights had reduced the limiting magnitude, and on game nights the lights of the football field make it nearly impossible to use the observatory equipment at all. So, the telescope was not used much and saw minimal maintenance.

The major use the telescope has received in recent years has been for astronomy classes and open houses in Crane Observatory. The occasional clamor of the public to see some celestial phenomenon through the old telescope prompted use of the instrument, but still the overall use was limited as rust and corrosion began to take their toll.

A few individuals had noticed the deterioration of the telescope and decided to restore it to its original condition. A non-profit corporation, the Warner & Swasey Refurbishing Project, was formed and in 1997 began soliciting funds from Washburn graduates of the sciences. The group consisted of Brenda Culbertson, astronomy assistant and observatory and planetarium coordinator; Dr. Darrell Parnell, chairman of the Department of Physics and Astronomy, and Dr. Steven Black, assistant professor of physics, all of Washburn University. Later to join the group were Dr. Stan Alexander, professor emeritus, and Dr. Harry Nagy, professor of physics, both of Washburn University.

The year after the incorporation enough funds were received to contract someone to lead the work detail. The time came to find restoration company and set up a date to do the work. Finding someone to refurbish an antique telescope was not an easy thing to do. One of the members of the refurbishing group had contacted magazines and other groups in the astronomical circles to find names of potential contacts, and many requests went out.

Several members of amateur clubs had volunteered to do the work and help with anything else that was needed, but none had conducted the scale of the work that was required for refurbishing a large Warner & Swasey telescope.

ATS member (new president) John Briggs was contacted and asked to recommend someone who could complete the restoration. He suggested ATS member Christopher Ray, a reputable person, skilled in this type of work.

Chris Ray was contacted and agreed to travel to Topeka to do the work. Arrangements were made for a two-week stay to conduct a thorough cleaning and do minor repairs to the few known broken parts of the telescope.

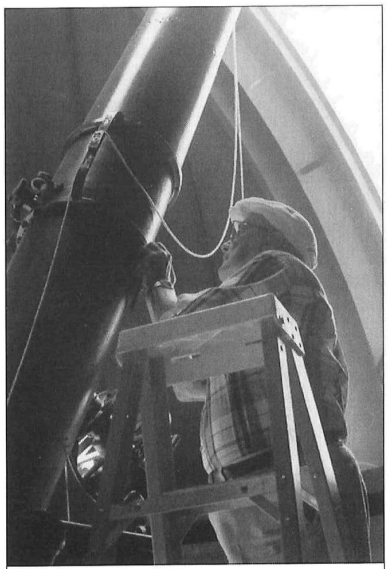

Figure 10: Dr. Stan Alexander replaced iron bolts with stainless steel during the 1998 refurbishing of the telescope. Dr. Alexander turned 90 years old in January 1999. Photo by Brenda Culbertson.

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