

National Radio Astronomy Observatory

300-foot Telescope Fact Sheet

The 300-foot telescope was located at the National Radio Astronomy Observatory in Green Bank, West Virginia. This site, in a sparsely populated area shielded by mountains from most forms of radio interference, enabled the telescope to pick up the faint radio signals emitted naturally by objects throughout the universe.

The 300-foot telescope was first used for astronomical observations on September 21, 1962. It had been designed and built in two years for a total cost of about \$900,000. The telescope structure was improved in several ways over the years, the most notable being when a totally new, more accurate surface was put on in 1970 at a cost of \$500,000.

The telescope was a parabolic-shaped bowl 300 feet in diameter with an aluminium mesh surface supported by a steel backup structure on two 87-foot tall steel towers. The surface of the telescope had an area of 78,000 square feet (1.8 acres). The total moving weight was about 500 tons.

The telescope was controlled by computers under the direct supervision of a telescope operator located in a nearby building. The building also housed electronic receiving equipment, computers to analyze the data, offices for visiting astronomers, and a small machine shop.

The surface of the telescope reflected radio waves and focussed them to a point 225 feet above the ground, where they were caught and amplified by very sensitive radio receivers. The signals were then sent down cables into the control building where they were analyzed using additional sophisticated electronic equipment and several computer systems.

The telescope was operated 24 hours a day, 365 days a year, except for a regular eight-hour maintenance period each week, a few longer maintenance periods scheduled throughout the year for upgrading equipment, painting, etc., and holidays. A trained telescope operator, working one of three eight-hour shifts, was on duty at all times.

The telescope was open for use by any qualified scientist. Time was allocated competitively, based on the excellence of the proposed research. To use the telescope a scientist (or team of scientists) would submit a formal request accompanied by a detailed technical description of the observations to be made, and the astronomical discoveries that were hoped for. The proposal was then reviewed by a group of expert scientists from outside the Observatory, and, based on their recommendations, the project might be given time on the telescope. The National Radio Astronomy Observatory is operated by Associated Universities, Inc., from funds provided by the National Science Foundation. Astronomers who used the 300-foot telescope were not charged to do so.

In a typical year about 50 astronomers from all over the US and abroad (Canada, W. Germany, The Netherlands, India) used the 300-foot telescope for projects that ranged from study of relatively nearby clouds of interstellar gas, to delineation of the distribution of quasars on the sky.

One of the most famous discoveries of the telescope was that the gas in a galaxy like the Milky Way could occupy a much larger volume than the stars, and even form a bridge through intergalactic space to connect it with another galaxy. The telescope also discovered that at the heart of an exploded star (the Crab nebula) was a very young pulsating radio source (a pulsar). This showed that the hitherto mysterious pulsars were a natural product of the endpoint of stellar evolution.

At the time of its collapse the 300-foot telescope was just finishing a project to map the northern sky in search of quasars and other energetic sources of extraterrestrial radio waves. It was soon to begin a project studying the magnetic field in the Milky Way.

A description of the construction of the telescope can be found in an article in the February 1963 issue of *Sky and Telescope*.

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