RESEARCH FACILITIES AND PROGRAMS

Saucer Field Antenna

A square array of four 30-foot paraboloidal reflectors, described as a possible new approach to the construction of high-sensitivity radio antennas, has been erected at Ohio State University. Each of the instruments is mechanically independent of the others, but servo mechanisms have been installed to allow them to be locked together when desired. They have been mounted so that all four reflectors can track through 360 degrees of azimuth and through altitudes greater than thirty degrees without aperture blockage. Three of the antennas can be used at altitudes down to the horizon. Arranged around a 60-foot square, the four reflectors are expected to provide the equivalent of a single aperture 60 feet in diameter. Nine such elements would approximate a 90-foot paraboloid, and sixteen would be equivalent to one of 120-foot diameter. If the sensitivity and performance of the new type of array compare favorably in operation with large single dishes, the innovation would permit substantial saving in construction costs.

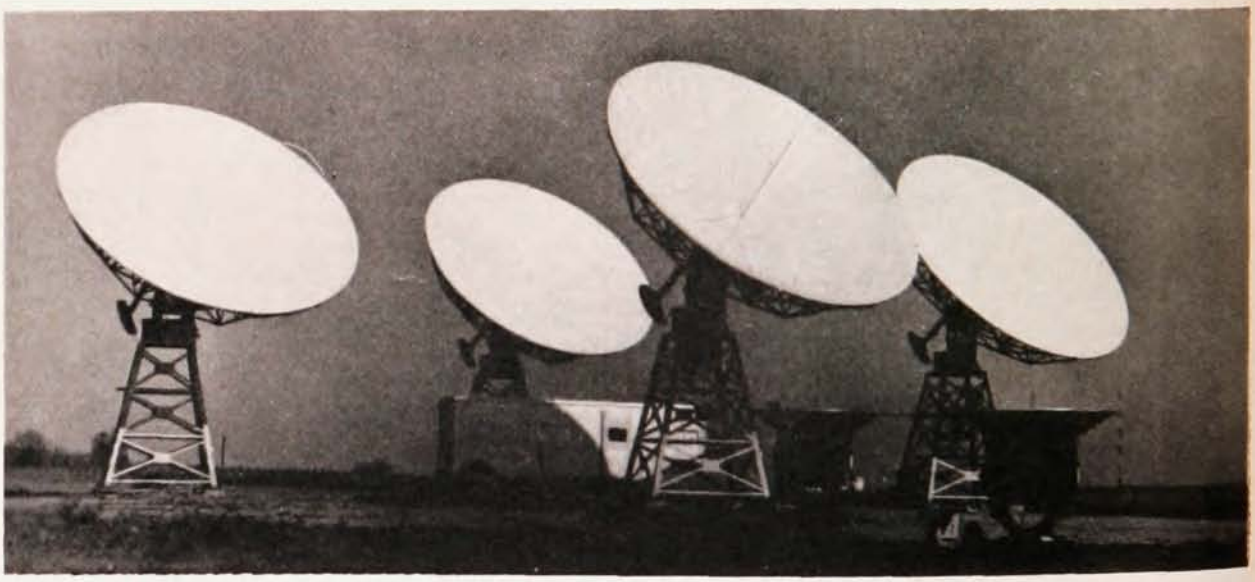
The present installation, operated by the university's Antenna Laboratory, is instrumented for signals in the 2000 mc band, and plans are under way to make the array active by installing a 10-kw transmitter in each element.

Scheduled to be in full operation early in 1962, the "saucer field" antenna first will be used in communications experiments involving an artificial satellite in orbit around the earth. The satellite, Echo II, will be a sphere some 135 feet in diameter and is expected to be placed in orbit this spring. Transmitters in Trinidad, British West Indies, and in Rome, N. Y., will beam signals at the satellite and the reflections will be collected by Ohio State's array. The antennas also have been planned for use in studying the surface characteristics of the moon and planets.

Accelerators

Lawrence Radiation Laboratory recently announced the completion of a new 88-inch cyclotron for low-energy research. The design of the new machine incorporates the new spiral-ridge principle, a configuration of the pole faces which allows greater versatility and precision than is possible with older designs. The 300-ton instrument was built at a cost of $4.85 million, which was supplied by the Atomic Energy Commission, and was developed by a group headed by Elmer Kelly, the physicist in charge of the machine. Construction took more than two years.

At present the cyclotron is undergoing tests using beams of alpha particles. It is expected to be ready for research use by June, when it will be capable of accelerating alpha particles to 120 Mev, deuterons to 60 Mev, and protons to 50 Mev. Later on, it will be used to accelerate heavy nuclei, such as carbon-12 and oxygen-16, to energies of 10 Mev. With the lighter particles, its beam current will be about 10^{15} particles per second, twice that of Berkeley's 60-inch cyclotron. The new accelerator's peak energy is about three times that



The "saucer field" radio antenna above, an array of parabolic reflectors of relatively modest size, will be tested to determine how its performance compares with the more costly giant dishes used in radio astronomy. The installation is located at Ohio State University, where it is a newly completed facility of the Antenna Laboratory.