signed by staff members of the Cornell Center for Radiophysics and Space Research, which was established at the University in 1959 as an interdisciplinary organization to combine and coordinate the efforts of scientists in various space-related fields and to provide increased opportunities for the training of graduate students in astronomy and the space sciences.

The Arecibo Observatory is intended to be available for research not only to Cornell but also to other qualified research organizations in the United States, with time allocations to be based on the requirements and scientific merits of the programs. A committee of senior radio scientists under the chairmanship of R. N. Bracewell of Stanford University has been established by ARPA to examine the programs and the uses to which the facility is put.

Construction of the Observatory, also financed by ARPA, was carried out with Cornell as the prime contractor, assisted by the Air Force Cambridge Research Laboratories, which provided technical management and support for the program. The Army Corps of Engineers was responsible for constructing the various buildings and facilities associated with the Observatory. The Puerto Rican site (at 18 degrees north latitude and 66 degrees west longitude) was chosen because of its deep natural bowl which minimized construction costs, its hilly terrain which provides some protection against wind and electromagnetic interference, its reasonable proximity to the equator which makes it possible to observe the sun, moon, and planets, and the relatively constant temperature which is an important factor in maintaining the antenna's dimensional stability.

The wire-mesh dish, supported by a network of steel cables, rises as much as forty feet above the ground in some places, and to prevent soil erosion the underlying surface has been densely covered with small trees.

The scientific staff under Professor Gordon's direction includes four senior research workers, four research associates, eight engineers, and four graduate students from Cornell. In addition, Gordon Pettengill serves as the deputy director of the Observatory. Philipp Blacksmith, Jr., was the AFCRL project officer, and Colonel William H. Innes was program director for ARPA. At Cornell's Center for Radiophysics and Space Research, four professors, eight graduate students, and one engineer are associated with the research at Arecibo. The senior research workers and research associates on the Observatory staff are drawn from various universities and laboratories in the United States and abroad. It is estimated that by 1970 the professional staff at Arecibo will total 45, which will be approximately twice the size of the present group.

British Synchrotron

Great Britain's 7-BeV proton synchrotron, Nimrod, is now in operation, according to a report in the October issue of *Atom*, the monthly bulletin of the United Kingdom Atomic Energy Authority. The accelerator, which is located at the Rutherford High Energy Laboratory in Chilton, Berkshire, produced its first fully accelerated beam of protons on August 27. The energy at the time was 6.5 BeV and the intensity 4×10^9 protons per pulse. Before the end of the day, an energy of 8 BeV was reached, and operations continued afterwards at the design energy of 7 BeV with intensities up to 10^{10} protons per pulse. A development program was initiated to bring the intensity up to 10^{12}.

Nimrod, which has cost £11 million, is operated by the National Institute for Research in Nuclear Science, an organization formed in 1957 to provide large and costly research equipment for common use by universities and other institutions. The first design studies for the accelerator were started in 1955 by a group at the Atomic Energy Research Establishment at Harwell. In view of considerable university interest in the project, its administration was transferred to the newly formed NIRNS, and construction was begun in August 1957 on a site adjoining Harwell and subsequently named the Rutherford High Energy Laboratory.

Nimrod's magnet ring is 155 feet in diameter; its preaccelerating linac delivers protons at 15 MeV. The machine is designed to produce up to 10^{12} protons per pulse at a repetition rate of 28 pulses per minute, equalling a current of about 1/16th of a microampere.

Channel 37 Decision

In an order effective November 15, 1963, the Federal Communications Commission has announced that broadcasting stations on the band 608-614 Mc (TV channel 37) will not be authorized anywhere in the United States before January 1, 1974. The order is intended to provide protection from interference by broadcasting stations for radio-astronomy receivers tuned to this waveband. After ten years the question will be reconsidered and it will then be decided whether to continue protection or to begin licensing stations on channel 37.

The decision is the outgrowth of deliberation on a proposed rule change which the Commission made public in March 1963 (see *Physics Today*, June 1963, p. 96), but affords much greater protection to radio astronomy than was proposed at that time. The March proposal was based on the needs of the University of Illinois radio telescope at Danville, Ill., and would have prohibited broadcasting on channel 37 from locations within 600 miles of Danville and would have restricted broadcasting by licensees outside the 600-mile zone to the hours between 7 AM and midnight.

The University had petitioned for protection for its radio telescope in 1960. Later, an immediate conflict arose when applications for broadcasting licenses for channel 37 were received from organizations in New Jersey and Florida. The rule proposed in March was intended to resolve the situation. After the proposal was made public, the Commission received approximately 140 comments on the question, some of which touched upon general policies of frequency allocation. The FCC adopted the present decision on October 4, 1963. In announcing the present rule, the Commission indicated that alternative frequencies would be made available to prospective broadcasters who had sought to use channel 37.

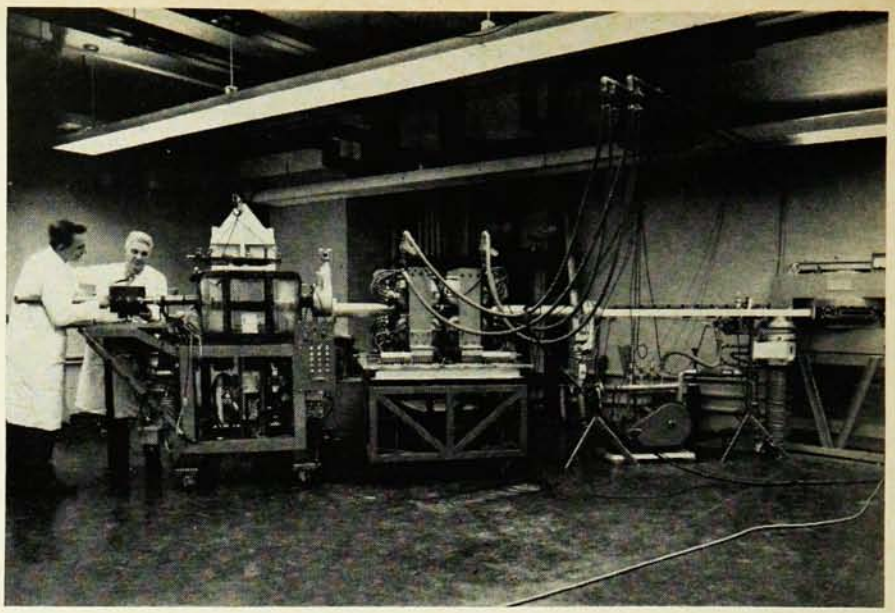
Channel 37 is the first portion of the UHF-TV band (470-890 Mc) to

be assigned, even temporarily, to the radio-astronomy service. Other frequency bands which the FCC has allocated exclusively to radio astronomy on a nation-wide basis are:

40.66-40.70 Mc	10680-10700 Mc
73.0 -74.6	15350-15400
1400 -1427	19300-19400
2690 -2700	31300-31500.
4990 -5000	

In addition, other bands have been allocated to radio astronomy on a secondary basis. They include:

2495-2505 kc	14990-15010 kc
4995-5005	19990-20010
9995-10005	24.09-25.01 Mc
	404-406 Mc.



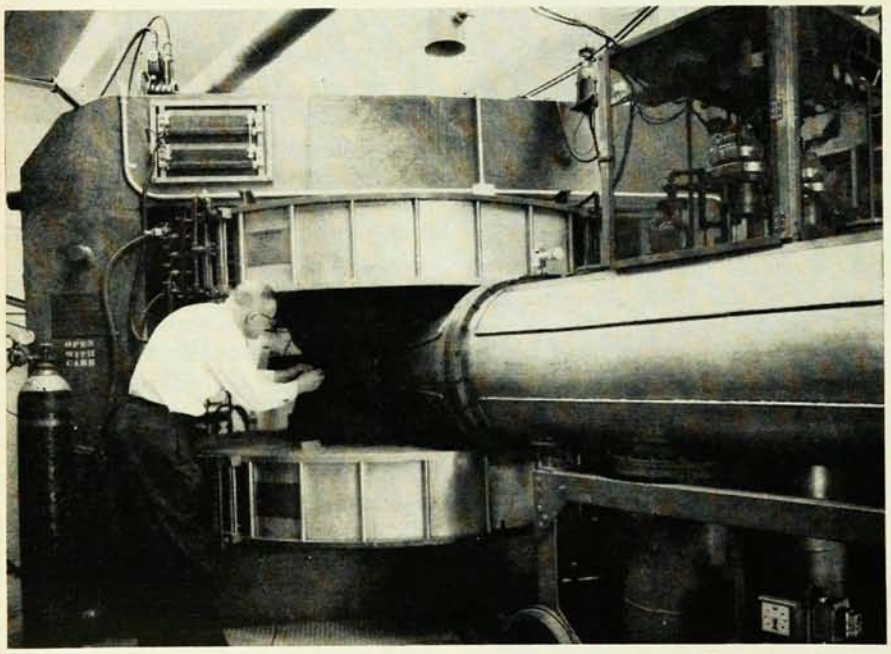
A portion of the experimental area in the new cyclotron building at the Massachusetts Institute of Technology. Scattering chamber is being installed, above, for one of three simultaneous experiments that can be performed with the rebuilt cyclotron.

MIT Cyclotron Improved

A year-long, half-million-dollar program of improvement and reconstruction has renewed and enlarged the capabilities of the cyclotron at the Massachusetts Institute of Technology. When it was designed in 1940, the cyclotron was one of the most powerful and advanced accelerators in the world. The passage of time had rendered it less and less useful, however, and four basic improvements were included in the renewal project: larger target areas, better focusing of the beam, the addition of a modern radiochemistry laboratory, and expanded general research laboratories. To provide the needed space, the entire building, except for the one-story vault around the cyclotron itself, was torn down and a new building, almost five times as large, was erected.

The machine now ranks as a low-energy device. It can produce protons up to 7.5 MeV, deuterons up to 15 MeV, and alpha particles up to 30 MeV and will be useful mainly in studies of nuclear structure and the production of radioisotopes.

Originally designed by a team headed by Robley D. Evans and M. Stanley Livingston, the cyclotron is now part of MIT's Laboratory for Nuclear Science, directed by Peter T. Demos. Funds for the reconstruction included a grant of $333 000 from the US Atomic Energy Commission, with the balance from MIT.



A view of the magnet coils and dee line of MIT's reconstructed cyclotron. Chief operator Earl White is shown adjusting the accelerator's particle deflector.

Monitoring Jupiter

The National Aeronautics and Space Administration's Goddard Space Flight Center has awarded a contract to Yale University to design and develop a world-wide system for monitoring radio emissions from the planet Jupiter. The network will be set up to maintain 24-hour observation of the planet at the frequencies of 16.5 and 22.2 Mc and will consist of four stations, separated from each other by about a quadrant of longitude. One of the stations will be located near the Goddard Center in Greenbelt, Md. The other three will be located at US satellite-tracking stations at Hartesbeesthoek, South Africa; Carnavon, Australia; and South Point, Hawaii.

Since only one of the four stations will have Jupiter in view during a given time period, the others will be free for other studies. A secondary