• Major airports are already overtaxed in handling traffic at busy periods because of lack of channels. Only one two-way conversation can be held at a time on one channel.

• Signaling applications, as distinct from message communications, are limited for lack of frequencies. These include automatic electric power outage reporting, emergency call boxes for highway accident and breakdown and numerous remote control applications, such as circuit breakers, cranes, locomotives and hazardous industrial processes.

In addition to current pressures for additional uses of the spectrum, the IEEE-EIA report points out that new communications techniques will soon be clamoring for spectrum space. Systems for improved highway safety, for instance, will include automatic guidance and control, in-car visual and audible hazard warnings, highway sign control, and computerized traffic flow control, all requiring radio communications.

According to the report, "High density urban living, increased mobility of people, and our natural desire to keep in touch have brought us to the point where there are unsatisfied demands, conflicts and constraints in further utilization of the electromagnetic spectrum."

Says Richard P. Gifford, chairman of the study committee and general manager of General Electric's Communications Products Division in Lynchburg, Va.: "Through the application of spectrum engineering, the economic and social yields from the electromagnetic spectrum (estimated at $17 billion a year) can be quadrupled over the next 20 years by increasing the use of the spectrum."

The report, titled "Spectrum Engineering—The Key to Progress," avoids such political considerations as what type of Government organization or body is needed to do the required job of spectrum management. Instead, the report deals primarily with how the radio spectrum is now being utilized and with the technical aspects of maximizing the effective use of the spectrum.

It recommends increased research to find ways to better utilize those parts of the electromagnetic spectrum that are now largely unused—the ultra high and very low frequencies. The report also indicates a need for increasing our knowledge of man-made radio noise and side effects.

The report calls for the establishment of a central information clearing house on ways in which the spectrum is or can be used, and recommends the formation of a pilot project which would put its frequency selection concept into experimental operation in a trial region.

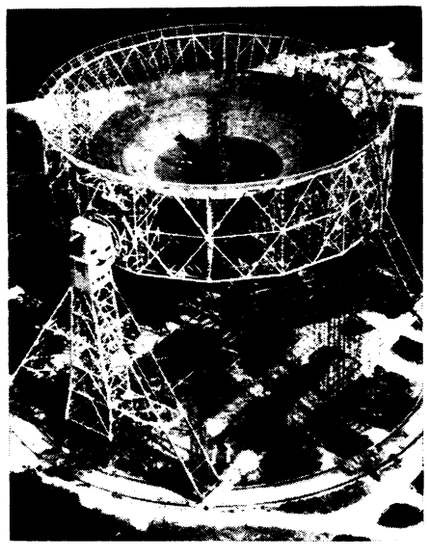
RADIO ASTRONOMY

Shutdown at Jodrell Bank

Modifications are expected to start next summer on the 250-foot radio-telescope at England's Jodrell Bank. They have been planned for several years.

The modifications, which will take not more than nine months, come after 11 years of virtually continuous operation of the University of Manchester's Mark I antenna. Nearly a million dollars has been allocated by the Science Research Council to cover the cost of repairs and engineering changes.

Besides relieving the stresses on the tracks and towers, engineering modifications are planned to improve the performance of the telescope at shorter wavelengths, particularly the 21 centimeter range, important in determining the distribution of hydrogen in the universe.



Jodrell Bank as it neared completion

Fatigue cracks that appeared in 1967 in the towers carrying the 800-ton bowl have already been repaired; some of the modifications are aimed at preventing new trouble by taking up some of the weight.

During the nine months the 250-foot is down for modifications, many of its programs will be carried on by other Jodrell Bank instruments, especially the Mark II and Mark III radio telescopes, each 125 feet in diameter. Although the international interferometry program to determine the size of quasars will definitely be continued, Sir Bernard Lovell, director of the experimental station, says, exactly which other programs will have to be curtailed has not yet been decided.

"We still have a year before shutdown to decide that," he says.

Dr. Lovell says he hopes some of the foundation work for an additional railway track will be started this fall, but that this should not interfere with the telescope's operation. The two 180-foot cone-shaped towers supporting the 250-foot dish at present roll on a track 350 feet in diameter. The new track will be 76 feet in diameter, and the steel structures on it will relieve about 100 tons of the existing weight.

FOOD IRRADIATION

Throwing out the bacon with the ham

Two years ago the Food and Drug Administration gave its blessings to the Army's use of radiation to preserve canned bacon. The Army and the Air Force then fed irradiated bacon to troops at 12 military bases twice during December 1966.

Dr. James L. Goddard, then FDA commissioner, ate some irradiated bacon at Oak Ridge in February 1967, and later in the year ate it again in the office of the then Secretary of Health, Education and Welfare John W. Gardner. Dr. Goddard liked it.

Now ham has queered the bacon. This April FDA told the Army that the data provided in its petition for the high-dose gamma processing of canned ham, which had been under evaluation for over a year, did not establish the ham's safety. The petition was contained in 31 loose-leaf notebooks holding some 10,000 pages of data.

As a consequence of the FDA decision, the Army has announced that it will stop serving irradiated bacon. The FDA has let it be known that it plans to rescind the permission it issued earlier on irradiated bacon.

The turndown of the ham precipitated hearings by the Joint Committee on Atomic Energy on the entire subject of irradiated foods. The committee wants to know, among other things, why the FDA had earlier approved irradiated bacon and now rejects the irradiated ham.

Dr. Daniel Banes, associate commissioner for science of the FDA, explains the shift in attitude as the result of better data. "We apply our best judgment based on the facts available to us at any given time," he says. "We always bear in mind that we may have to change our conclusions in the light of later information."

The later information is the data supplied with the petition on ham which

was not included in the petition on bacon.

Dr. Banes said that animal experimentation data in the ham petition show: "highly significant effects on reproductive process; apparent production of anti-nutrient factors; apparent effects on mortality, body weight gain, red blood cell count and hemoglobin; and the possibility of increased risk of cataracts and tumors."

Dr. Edward S. Josephson, associate director for food irradiation at the Army's Natick, (Mass.) Laboratories, says the Army will conduct additional experiments on irradiated ham in order to answer all the questions raised by the FDA.

According to Dr. Josephson, "The really significant question raised by FDA has to do with the data provided on reproductive process. In order to show the safety of irradiated ham, the Army will conduct new animal feeding studies which will cover four generations of weaned rats and take two years. Approval of the experimental design will be obtained in advance, and we'll conduct periodic reviews with FDA."

Dr. Josephson predicts it will take about a year to get ready to begin the two-year studies, and that a new petition will therefore not be submitted to the FDA on irradiated ham for at least three years. Also held up is the commercial use of these irradiated meats.

ACCELERATOR

Possible new partner for Weston

When the 200-400 billion electron volt (GeV) accelerator now about to begin construction at Weston, Ill., was still in the planning stage, it was touted as being "more than a national accelerator."

What the planners seem to have meant by the phrase was large-scale use of the machine by foreign scientists. They did not envision capital investment in the project by foreign countries, but such an investment may soon happen.

A committee of Canadian physicists is studying how Canadian capital, possibly $20 million or $25 million, might be invested in the Weston project.

Canada is not the only nation interested in Weston, but is the only one where pocketbook interest is being shown so far.

Although a memorandum on scientific exchanges between the United States and the Soviet Union is ready for signature by each government, the kind of financial collaboration that might be possible with Canada is, apparently, out of the question with the Soviet Union.

The British recently pulled out of a consortium of European nations that plans a 300 GeV accelerator (SN: 7/13, p. 30). But Great Britain has been mentioned as another possible candidate for collaboration at Weston; participation in the American project could come cheaper than the share Britain was expected to pay in Europe.

The Canadian study was begun last fall by five members of the Canadian Association of Physicists: Profs. Bernard Margolis and D. G. Stairs of McGill University in Montreal, J. D. Prentice and W. T. Sharp of the University of Toronto and E. P. Hincks of Carleton University in Ottawa.

Acting independently of the association but with the endorsement of their universities, they applied to the Canadian National Research Council and received a grant of $35,000 to finance the study. In November they visited the National Accelerator Laboratory's offices in Oak Brook, Ill., and discussed matters with NAL Director Robert R. Wilson and with Prof. Norman Ramsey of Harvard, president of Universities' Research Association, which manages the Weston project for the Atomic Energy Commission.

In June during a congress of Canadian physicists at Calgary, Alberta, a 20-member committee was set up to aid the five-man study group and serve as its liaison to physicists in Canadian universities.

The study group does not wish Canada simply to take over part of the present $225 million capital budget for Weston. It hopes to be able to add something to it that is not in present plans, something that would be a distinct Canadian contribution. The study group feels that, in order to interest their Government, they have to come up with a very specific suggestion.

Prof. Hincks gives examples of the sort of contribution the Canadians have in mind. They might construct an experimental area in addition to those already planned. This would be an important addition since it would allow more experiments to be done simultaneously than would be possible under present plans. Or the Canadian contribution could be a particular kind of experimental technology—nature not yet specified.

Canadian physicists have always been welcome as users at United States accelerators, but the present proposal grows out of a desire for a stronger sense of participation and identification in a field where Canadian interest and numbers are growing. The time is past when Canada alone could build a machine to operate at the forefront of high energy physics, and so the feeling is that a piece of the action at Weston might be the best buy.

The $25 million figure was determined by comparing the gross national products of the United States and Canada, which have a ratio of about 10 to one.

POVERTY PROGRAM

A body blow for Headstart

Despite the fact that the results have been difficult to gauge, Project Headstart has long been regarded as one of the more productive efforts in the war against poverty.

Nevertheless it is finding itself caught in the crossfire of two other Governmental battles: one over the running effort to dismember the parent Office of Economic Opportunity and another to limit expansion of Federal programs by distribution of control over them among the states. As a consequence, Headstart's advocates fear that it may be in process of being damaged beyond repair.

The body blow to the preschool Headstart program came from the floor of the Senate during consideration of the Vocational Education Act. In a move led by Senator Peter H. Dominick (R-Colo.) the Senate gave Headstart to the Office of Education and a large measure of authority over program design to the states. An identical effort was blocked in committee last year; the amendment from the floor, to an otherwise unrelated bill, bypassed that barrier.

The amendment returns Headstart to the same state educators "who have been failing those children for the past 20 years," says Dr. Edward Zigler, Yale psychologist and an architect of the program. ". . . this is a political move . . . the death knell for Headstart . . . I can't tell you how disturbed I am. . . ."

Control by state educational agencies, he explains, would turn Headstart centers into typical nursery schools. "There is nothing wrong with nursery schools," says Dr. Zigler, "but they are a far cry from Headstart."

A major source of difficulty is the fact that much of Congress—and the public as well—has never grasped the distinction.

Actually Headstart more closely resembles the classical poverty program than traditional education. It depends largely on program flexibility and local participation.

Parents have a voice in the program and are often as much a target of education as the child himself. Mothers, for instance, perform as aides in the classroom, and may receive training in child-rearing, on nutrition and dental habits.

The Office of Economic Opportunity is planning moves to preserve Headstart when the Senate changes go to a House-Senate conference. If OEO cannot hold the program, it will ask that control along with funding responsibility go to a non-education arm of the Department of Health, Education and Welfare, rather than to state educators through the Office of Education.