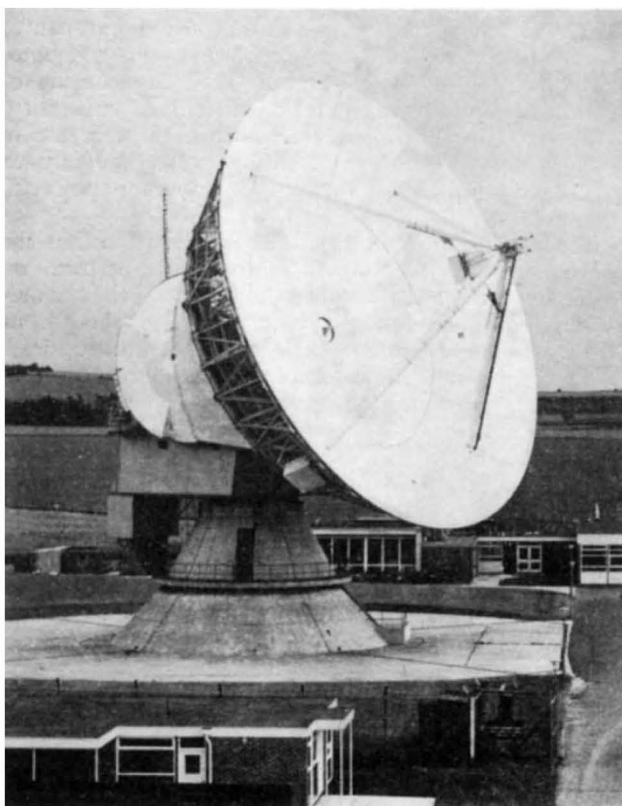


of the atmosphere becomes important. Radio links operating at slightly less than one centimetre wavelength are already coming into use in Britain, and the Radio and Space Research Station is intending to keep one jump ahead by investigating the effect of rain on transmissions at 3 millimetres and less. At 3 millimetres, for example, each millimetre of rain per hour attenuates the signal by between 0.5 and 1 dB per kilometre, but the station says that useful reliabilities can still be achieved over path lengths of a few



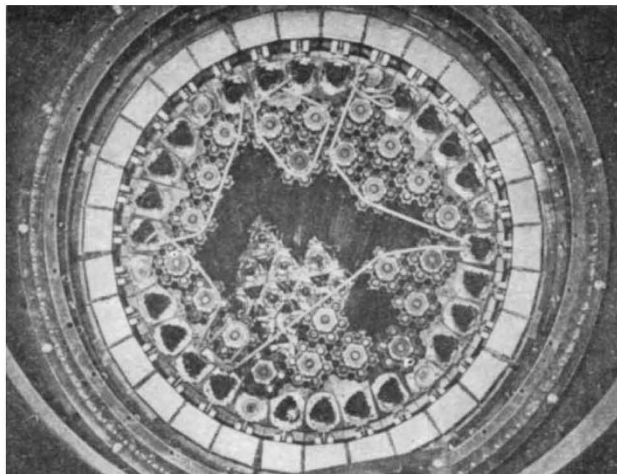
The Radio and Space Research Station operates a 25 m dish aerial at Chilbolton, Hampshire, which is used to investigate tropospheric and ionospheric effects on the transmission of radio waves. The aerial can be used down to 3 cm.

kilometres. But it looks as if radio links at millimetre wavelengths are going to be limited to short paths or dry climates. The Radio and Space Research Station is also looking at the applications of short wavelengths to satellite communications by observing how centimetre waves from the Sun are affected by the atmosphere. Conversely, the station has been trying to interest the Meteorological Office in the use of short radio waves as an aid to meteorology, and there is a programme of laser sounding of the atmosphere.

NUCLEAR REACTORS

Higher Temperatures Pay

THE partiality of Sir Stanley Brown, chairman of the Central Electricity Generating Board, for high temperature gas cooled reactors has been a source of some controversy over the past year or so, both at the CEGB itself and among various factions of the nuclear



Partly loaded core of the Dragon reactor.

power industry. It was therefore no surprise that in a speech at the recent UNIPEDE conference in Zurich he had seized the opportunity of drawing attention to the advantages there would be if the Central Electricity Generating Board were to build high temperature reactors in the next few years.

Sir Stanley also had some kind words for the AEA's steam generating heavy water reactor. It is an attractive system, he said, with particular advantages in the lower megawatt ranges. The detailed engineering of the SGHWR is also better defined than that of the HTR. Nevertheless, for the CEGB, Sir Stanley said, high temperature reactors are likely to be economically superior, especially in large sizes. There was also the prospect of further saving from the use of still higher temperatures and even from the introduction of direct cycle gas turbines.

The widespread interest in the development of high temperature reactors in Europe seems to have created something of a bottleneck for testing facilities on the Dragon reactor. A meeting in London last week to plan the technical aspects of the future programme for the Dragon project was apparently overloaded with requests for irradiation space in the reactor for the testing of fuels up to full burn-up. The Dragon HTR reactor, with prismatic cores rather than sphere (or pebble) beds, is the only facility available for these tests. The 15 MW reactor built by Brown Boveri at Jülich in Germany is currently operational, but it is impossible to put test facilities into the pebble bed.

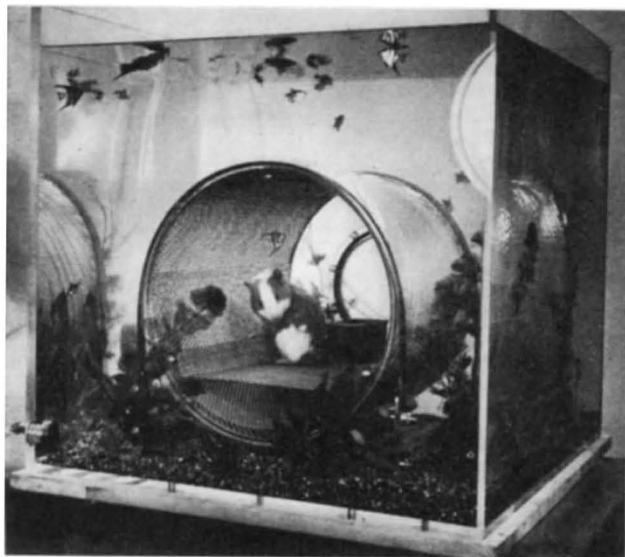
BIOENGINEERING

Silicone Rubber for Membrane Lung

THE development of safer and more compact heart-lung machines is in sight as a result of the first production on a large scale of silicone rubber membranes. These "Silastofilm" membranes, said to be thinner and stronger than other types, were developed by Professor Denis Melrose and Dr Nora Burns at the Royal Post-graduate Medical School at Hammersmith with the help of a grant from the National Research and Development Corporation.

Membranes offer the ideal solution to the problem of oxygenating blood in heart-lung machines without

contamination or damage. Existing membranes are too weak and too small to use but 'Silastofilm' is said to be strong enough to be used at thicknesses down to $3\ \mu\text{m}$. Combined with its high permeability to gases and vapours, this means that compact oxygenators can be designed needing priming volumes of less than half a litre. Selective permeability to carbon dioxide in solution, twelve times greater than for oxygen, is especially suitable for oxygenators where the rate of exchange of gases is limited by the partial pressure of carbon dioxide in the blood. All silicone rubbers are relatively inert in the body and can be sterilized.



This guinea-pig was able to breathe quite normally in an underwater cage made of metal mesh covered with silicone rubber film.

'Silastofilm' is now being produced continuously at Hammersmith by the process developed by Dr Burns. So that it can be made sufficiently cheap to be disposable, production on a much larger scale is being undertaken by Midland Silicone Ltd. The main demand may be from the petrochemical industry, where selective permeability makes the membrane particularly attractive for recovering useful products from waste gases.

Other potential applications include underwater breathing apparatus and water desalination apparatus. Here the membranes allow the passage of oxygen from the water and the return of carbon dioxide to the water, or the diffusion of fresh water vapour. Possible scientific applications are breeding germ-free cultures for biological research, and detecting and analysing trace quantities of a gas in a gas or liquid mixture.

COMPUTER BOARD

To Pay or Not to Pay

AN appeal for a clearer realization by university research workers of the costs of their computing facilities was made by Professor Sir Brian Flowers, chairman of the Computer Board, at the opening of the new computer centre at King's College, London, last week. He said that the controversial question of whether or not to introduce a system of charging for

university computing was now being urgently considered by the Computer Board; though it seems clear that there will be a toughening of the board's attitude, there is no sign of what it will be.

The path towards the creation of the three regional computing centres envisaged in the Flowers report seems also to be strewn with administrative stumbling blocks. London and Manchester were chosen as major regional centres and Edinburgh as a special centre based on a multi-access system, but for various reasons the scheme has not materialized. Professor Flowers said that the Computer Board was having to reconsider some of the basic points in the regional centre idea. One snag, he said, was that the machines available at present could not offer the surplus of power over and above the needs of the host university, as assumed in the report. Moreover, the increase in demand foreseen for the coming years is likely to overshadow progress in developing extremely powerful computers.

In this context, Professor Flowers admitted that the board may have to adopt a more flexible attitude on regional centres. "It is one thing to say that a university equipped with a large machine should, as far as possible, provide facilities for other universities," he said, "but it is another thing to see how this obligation can be formalized to give satisfactory definition of a regional centre." He thought that the new centre at King's College, in which there is a small CDC 1700 computer and a link to the huge CDC 6600 computer, has particular significance, both as a prototype of what may become the general pattern of computing facilities and as Britain's guide to how the compromise plans for the University of London itself are working out. The CDC 1700 was installed for the joint use of King's College and the London School of Economics.

GLASS TECHNOLOGY

Making and Breaking

THE way in which glassware can be damaged in a domestic dish-washing machine is one of the investigations at the British Glass Industry Research Association described in its latest annual report, now published. A review of the year's activities by the director of research, Dr R. G. Newton, points out that in spite of manufacturers' claims that the washing machines will not cause trouble if there is no gritty material trapped between articles being washed, abrasions still occur, and this implies that glasses rotate against each other in jets of detergent.

Other topics include a study of heat transfer in the formation of glassware which reveals how temperatures vary within a newly moulded article and how the cooling process is related to the production of deformed glass. Nothing conclusive can be reported about new ways of saving money, but when a better understanding emerges of the manner in which deformities arise, it will clearly be seized on to improve the efficiency of an industry with a high wastage rate.

The association has had a successful year in other respects. The membership has risen to ninety-eight companies, including for the first time four from overseas, so that the association's influence is becoming international. The income of £195,000 included a capital grant of £25,000 from the Ministry of Tech-