By that time it was becoming increasingly clear that the periods of loss of response of the command system corresponded to times at which the average radiation intensity was approaching its maximum value because of the changing satellite orbit. Precession of the orbit changes the percentage of time which the satellite spends in regions of accumulation of high-energy electrons in the Earth's magnetic field, resulting in cyclical changes in the average radiation intensity to which the satellite components are exposed. With the development of data indicating the location and intensity of such concentrations, estimates could be made of the average orbital exposure of the satellite, showing that the two failures occurred at periods approaching the maximum intensity, and the January 2, 1963, recovery occurred as the intensity approached the minimum of the cycle. The indication was thus that the transistor response was partly dependent on the dose rate. The confirmation of this dose-rate dependence in the laboratory, as indicated in Fig. 4, makes plausible such an explanation of the response of the satellite circuits.

The response of the satellite to its environment and to command experiments has, therefore, indicated the characteristic ionizing radiation effects on transistors, the variation of degradation with collector voltage, the recovery with removal of voltage, the sensitivity to dose rate and the eventual effect of total dose. Some of these effects were known sufficiently early to guide the efforts aimed at recovering usefulness of the satellite circuitry and others were deduced from the satellite response, to be confirmed on the ground. Toward this end the ability to compare results in the laboratory with those under actual orbiting conditions has been a significant factor in indicating the appropriate testing techniques and exposure-levels to be used in further studies.

The laboratory tests, however, indicate that, with transistor types of appreciable sensitivity to this phenomenon, the repeatability and predictability of response of individual units is certainly open to question and it becomes obvious that the emphasis in development of radiation-resistant circuits must be in the direction of reducing or eliminating the radiation sensitivity of transistor types.

Some of the early tests indicated the insensitivity of most evacuated types of silicon transistors and further work has confirmed that these types show relatively little degradation even beyond a dose of 10^7 rads. Similarly, many planar types, even gas-filled, suffer only limited degradation in the region of 10^6–10^7 rads dose. Hence the availability has been demonstrated of known production techniques for supplying transistors suitable for long life in satellites exposed to ionizing radiation and use was made of these techniques in supplying transistors for the critical decoder circuits for the second *Telstar* satellite. The different response from samples of various types, even of evacuated or planar processing, warns of the need for evaluation of each type for such environment and, perhaps, of each production lot or of each individual device. At least the recognition of the problem has led also to a recognition of solutions which are at hand.

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NEWS and VIEWS

Physics at Sheffield : Prof. W. Sucksmith, F.R.S.

PROF. SUCKSMITH has now retired from the headship of the Physics Department at the University of Sheffield, after holding this post since 1940. In that year, he arrived from the University of Bristol, having been a reader in magnetism there, to find a small staff, depleted by National Service calls, and very modest experimental facilities. As a measure, albeit a very inadequate one, of his achievement in building up the Department, there are now more than twenty staff members, plus a postgraduate research school of twice this number, and the Department has recently moved into the new Hicks Building, with splendid facilities for research over a wide field.

Without question a brilliant experimentalist, Prof. Sucksmith has built up a research school in experimental magnetism at Sheffield with an international reputation. In the year of his appointment to the chair in Sheffield, he was elected a Fellow of the Royal Society, after successfully completing outstandingly novel and difficult experiments which led to the measurement of the gyromagnetic ratio for paramagnetic substances, and it is a tribute to the precision of these investigations that it is only now that physicists are requiring improved accuracy. His unique achievements in this field led to his visiting the United States in 1961 as a consultant on a project to measure the gyromagnetic ratio for a wide range of paramagnetic materials. His later research work centred primarily around the physical properties of ferromagnetics. In this work, the Sucksmith ring balance, invented initially to measure the susceptibilities of paramagnetic oxides, was developed as a suitable method for measuring the saturation magnetization of ferromagnetic metals and alloys at different temperatures. His outstanding contributions to experimental methods in the field of magnetism were suitably acknowledged in 1953, when he was chosen as Duddell Medallist of the Physical Society. His wider services to the University of Sheffield were recognized by the Council very recently by the conferment on him of the title of emeritus professor. His many friends in Sheffield are delighted that he and Mrs. Sucksmith will remain among them, and will all join in wishing them a long and happy retirement.

The University has decided to experiment with a system in which henceforth the headship of the Department of Physics will be held in turn for a period of three years by each of the two professors concerned. On the retirement of Prof. Sucksmith, Prof. G. E. Bacon becomes head of the Department for the first period (see *Nature*, **196**, 1268; 1962).

Inorganic Chemistry at Bristol : Dr. F. G. A. Stone

DR. F. G. A. STONE, reader in inorganic chemistry at Queen Mary College in the University of London, has been appointed to the new chair of inorganic chemistry in the University of Bristol. He will be in charge of a Department of Inorganic Chemistry formed by the division of the Department of Physical and Inorganic Chemistry for which Prof. D. H. Everett has hitherto been responsible. With Prof. Everett retaining charge of physical chemistry, the School of Chemistry will consist of three Departments, that is, Organic Chemistry (Prof. Wilson Baker), Physical Chemistry, and Inorganic Chemistry. This reorganization is part of a programme of expansion made possible by new buildings now under construction. A Cambridge graduate, whose interest in inorganic chemistry was stimulated by studies on the boron hydrides with Prof. H. J. Emeléus, Dr. Stone has