effort in two world wars was massive. He expected a great deal from his subordinates and demanded more from himself. For all this he will be long remembered, but those who were privileged to share his friendship will greatly miss the loyalty and warm human understanding of a man of sterling character. In his busy life he had not much time for taking part in formal activities outside his work, but he had a sound knowledge of art and a keen interest in the world around him. He at one time prepared to take up architecture as a career, and must have derived satisfaction from the fact that one of his sons became an architect and the other an engineer.

D. H. Alexander

NEWS and VIEWS

Orbit of the Artificial Earth Satellite

The artificial Earth satellite was launched from the U.S.S.R. on October 4. By a considerable feat of improvization, Mr. Martin Ryle and his team at the Mullard Radio Astronomy Observatory near Cambridge have been able to record the radio signals transmitted by the artificial satellite from October 5. Improvement of the technique has provided results from which a preliminary orbit has been calculated (*Brit. Astron. Assoc. Circular*, No. 390; October 15, 1957):

Epoch		October 8–9, 1957
Inclination	i	64·9° (from two methods)
Eccentricity	e	0·06
Period	P	96m. 2s.; − 1·5s. a day
Maximum height		970 km. (630 mi.), at latitude − 45° approx.
Minimum height		190 km. (118 mi.), at latitude + 45° approx.
Precession of node		3° 40′ a day.

A report from the United States gives the maximum height of the orbit above the Earth as 583 miles and the minimum as 143 miles, and states that the carrier rocket was travelling three minutes ahead of the satellite on October 12. An important feature of the elliptical path, which will enable valuable information of the outer atmosphere to be obtained, is that it runs into and then out of the ionosphere.

A telegram from the Bureau of the International Astronomical Union gives particulars of an equatorial ellipse for the artificial satellite computed by Lautman, Slowey and McCrosky at the Smithsonian Institute, namely:

Epoch, October 9·405 U.T. 1957

v	266° 24′	(True anomaly)
ω'	61 47	Equator 1957·0
Ω'	327 20	Equator 1957·0
i'	64 16	Equator 1957·0
φ	2 56	(e = 0·0512)
a'	1·08908	(in equatorial radii of Earth)

Mr. D. H. Sadler reports, following observations at the Royal Greenwich Observatory by K. C. Blackwell and W. A. Scott, that the carrier rocket is now visible in the British Isles in the morning twilight, the magnitude varying between about − 1 and + 3, moving at a height of about 430 km. from north-west to south-east. On October 13 it was approximately over Bournemouth at 5h. 26m. U.T., the track moving south-west, parallel to itself, about 200 km. a day. The time will be earlier by about two or three min. a day. The satellite itself follows behind the rocket, at present by about five minutes.

New Atomic Patents

The specifications of three patents developed within the United Kingdom Atomic Energy Authority are about to become generally available. They are all connected with the design of the graphite structure used in the building of Calder Hall nuclear power station. A number of factors influence the design of graphite moderators, one of the most important being the phenomenon of growth under irradiation (generally referred to as Wigner growth) and this is affected by the quality of graphite, the direction of grain, neutron bombardment and temperature, and in turn led to careful consideration of the design of individual blocks. The production of the graphite itself was the subject of intensive study, and quality varies between the outer perimeter and the centre. The patents involved, which also include details of fuel element support, are: No. 784,291, open for inspection on October 9; No. 784,292, open for inspection on October 9; No. 785,876, open for inspection on November 6. Specifications may be obtained from the Patent Office (Sales Branch), 25 Southampton Buildings, London, W.C.2, price 3*s.* 6*d.*, including postage.

Proton-Synchrotron at Harwell

The Governing Board of the National Institute for Research in Nuclear Science announces that a contract has now been signed for the supply of the magnet yoke which is a major component of the 7,000 million eV. proton-synchrotron being built for it on a site adjacent to the Atomic Energy Research Establishment at Harwell. The contract has been signed with Messrs. Joseph Sankey and Sons, Ltd., who have undertaken to supply the 340 steel blocks required, each weighing twenty tons, at a total cost of more than £1,250,000. The special steel required will be supplied by the Steel Company of Wales.

Thermionic Valves

On October 3, Mr. T. E. Goldup delivered his inaugural address as president of the Institution of Electrical Engineers for the session 1957–58, his main subject being thermionic valves. After briefly tracing the history of the great strides made in this field over the past fifty years, he dealt in some detail with several examples of modern developments, and with the new manufacturing processes it has been necessary to devise for the successful and economic exploitation of the results of research; these processes were illustrated by means of a short film. From the simple beginnings of Fleming's diode and de Forest's triode the field of thermionic valves has extended to include microwave valves, television camera tubes, transistors and 'masers', and a whole family of related devices which have become an all-important factor in every branch of engineering and science—a factor which more than any other has not only shaped but determined the progress in electrical engineering as it is known to-day. Mr. Goldup also referred in his address to the urgent need for a great increase in the number of adequately trained engineers and scientists, and discussed some of the associated

problems of technological education. He concluded by directing attention to the moral responsibility which, in his opinion, scientists and engineers should assume for the manner in which their work is used.

The Australian Journal of Science

COMMENCING with Vol. 20 (July 1957), the *Australian Journal of Science*, the organ of the Australian and New Zealand Association for the Advancement of Science, will be published nine, instead of six, times a year. The *Journal* is issued free to Fellows and annual members of the Association; for non-members the annual subscription, formerly 25*s.*, is increased to £A2; but the cost per issue remains unchanged at 4*s.* 6*d.* Meetings of the Association are held every eighteen months and the report of each meeting is published in three special issues of the *Journal* so that two out of every three volumes of the *Journal* contain twelve numbers. The report of the proceedings of the thirty-second meeting of the Association, which was held at Dunedin during January 16–23, 1957, is published in the three special issues of Vol. 19. The first (19, No. 3*a*; January 1957) contains a list of the officers of the meeting; details of the general programme; the presidential address, "Biology and Medicine", delivered by Sir Macfarlane Burnet; the Liversidge Lecture, "Molecular Hydrodynamics: the Diffusion of Molecules and Ions through Liquids", by Prof. R. H. Stokes; and the addresses of the presidents of the Sections: A (Astronomy, Mathematics and Physics), B (Chemistry), C (Geology) and D (Zoology). The titles and authors of the other papers delivered in these four sections are also included, in addition to an appreciation of Prof. A. P. Elkin, the recipient of the Mueller Medal for 1957.

Research for Industry

THE London and Home Counties Regional Advisory Council for Higher Technological Education has issued a further survey of industrial research in progress in technical colleges in the region in 1956 under the title "Research for Industry" (Pp. 20. 1*s.* 6*d.*). The survey shows that since the previous report was issued in 1954, covering the period 1947–52, there has been a marked development of collaboration between industry and the technical colleges. The report lists the investigations in progress, their sponsors and the technical college where they were undertaken. Besides work sponsored directly from industry, numerous investigations are being carried out for research associations, for Government departments, particularly the Ministry of Supply, for the Atomic Energy Authority, and for the Central Electricity Authority, while others are financed by grants from the Department of Scientific and Industrial Research. At Chelsea Polytechnic, the Medical Research Council is supporting an investigation on the preparation of substituted triazaphenanthrenes of potential chemotherapeutic value, the British Empire Cancer Campaign is paying for electro-kinetic studies of bacterial surfaces, while at Acton Technical College studies in the flow between management and industry are being conducted for the Tavistock Institute of Human Relations.

Economic Developments in the Middle East

"ECONOMIC Developments in the Middle East, 1955–56" (London: H.M.S.O. 11*s.*), is part of the survey of the world economic situation prepared by the Secretariat of the United Nations, and issued as a supplement to *World Economic Survey*, 1956. Besides chapters on agriculture, industry, petroleum, foreign trade, and on monetary and fiscal charges and the price-level, it includes a preliminary review of the economic impact of the Suez Canal crisis on the Middle East. During the period, demand for Middle East exports maintained its upward trend, chiefly for petroleum, but also notably for cotton, the share of the U.S.S.R. and eastern Europe rising and that of Western Europe declining. There were comparable increases and shifts in imports and their sources of supply. There was little change in the inflow of capital, and among development projects the major emphasis was on agriculture, irrigation and transport. Two major dams were completed in Iraq and two others in Turkey, and also the railroad from Tehran to Meshed in north-east Iran. The annual rate of increase in production of crude petroleum rose from 12·8 per cent in 1954 to 18·3 per cent in 1955 but decreased in 1956, mainly owing to the sharp decline in the last two months of the year. Expansion of refining capacity in 1955 raised the crude annual charging capacity of the region to more than 66 million tons, and in the autumn of 1956 the twenty refineries and topping plants were operating at 50 million tons per annum, an increase of about 35 per cent over the average for 1955, when the region processed 23 per cent of its production or 5·6 per cent of the world's refined products; the figure for 1956 is probably higher. Industrial output increased sharply in 1955, but the overall increase in 1956 was probably less.

The Pacific Science Board

THE tenth annual report of the Pacific Science Board (pp. 50. Washington, D.C.: National Academy of Sciences) records that the principal scientific activity in Micronesia has been the coral atoll programme, involving an ecological approach to the study of environmental factors affecting life on coral atolls. H. J. Wiens continued his interpretive study of man and Nature in the atoll environment, and besides visiting thirteen atolls in the Marshall Islands to study the individual features of different coral atolls, he was able to obtain comparative information on the human ecology of the Marshallese to relate to his findings in the Caroline Islands. F. R. Fosberg obtained comparative information in a visit to the Maldive Islands. Three numbers of the *Atoll Research Bulletin* were issued and twelve volumes on insects of Micronesia. Field-work continued in the three-year study of the biology and ecology of Pacific island rats at Ponape, Eastern Carolines, where valuable information is being acquired on the natural history and ecology of rats, and the field team co-operated with the Trust Territory's biennial training programme for sanitary officers by conducting a programme on rodent control. A study of sea turtles by J. R. Hendrickson has special reference to measures to assure the conservation of the turtle, and support was again given to the marine biological programme of the George Vanderbilt Foundation at Stanford University, which included investigations on the relations of fishes to their environment, the study of the estuarine-mangroves and fresh-water fishes of the Palau Islands, an entomological survey of scale insects and a study of sea currents about the Palau Islands.