QUEST

50 years of Greenwich Mean Time

Comet Kohoutek

Move to Swindon

QUEST

House Journal of the Science Research Council

Vol. 7 No. 1
1974

Cover

Spring comes to the Royal Greenwich Observatory, Herstmonceux, Sussex, oldest of the Council's establishments. A lovely, topical scene taken by RGO staff photographer David Calvert.

The castle grounds are open to the public from Easter until the end of September (Monday to Friday 2–5 pm. Weekends and Public Holidays 10 30 am – 5 pm. Price: Adults 20p. Children 5p. Cars 10p).

Quest will be issued three times this year by the Science Research Council for members of staff only. The Council is not necessarily associated with any individual views expressed.

Published by the Science Research Council, State House, High Holborn, London. Set in *Times* and printed by Bournehall Press Ltd., Welwyn Garden City.

Editorial

Quest enters its seventh year. A new year; a new editor. Miss Carol Rivers (see page 16) takes over from Mrs Anne Walls and looks forward to receiving news, articles, cartoons, light verse, in fact *anything* that will reflect the wide-ranging professional and personal interests of all members of the Council staff.

May we take this opportunity of mentioning once again that *Quest* is an internal publication intended for each member of staff It can only reflect that interest in so far as *you* supply information and participate in its production. Your local correspondents are listed on page 16. They meet after each issue to discuss its success, or otherwise, and to plan future issues. Please contact them or the editor direct on 01–242 1262, extension 255, if you have any contributions to make.

Quest itself has been redesigned—without too much alteration to its well known format—to meet changing circumstances. These include the restructuring of the SRC Central Administration, and we thought that readers would welcome the lay-out of top management (details on pp. 8–9) together with brief details of the main persons involved. Likewise, we report the commencement of the dispersal of the London Office to Swindon. In future issues *Quest* will continue to reflect the changing corporate life of the Council. It will do so successfully with the co-operation of its readers.

Fifty Years of Greenwich Mean Time

C J A PENNY

On 5 February 1924 the Greenwich Time Signal was broadcast for the first time. The practice started quite by chance a year earlier when Mr F Hope-Jones, an authority on electric clocks, was broadcasting a talk on the introduction of Summer Time and concluded by counting down from his watch the last five seconds before the hour. This practice was continued by the announcers for some time until, following a proposal by Mr Hope-Jones to broadcast an accurate time signal, a direct land line was installed between the Royal Observatory at Greenwich and the BBC control room at Savoy Hill. Sir Frank Dyson, Astronomer Royal at the time, gave a talk from 9.15 pm to 9.30 pm on 5 February 1924 to introduce the service. The signals were in the form of six pips at second intervals from second 55 to second 60. Two of the Observatory's Dent clocks were modified to send out the signals on the hour and the half hour. It was not until 1928 that the first fully automatic transmissions were made available every quarter of an hour, and the following year the Dent clocks were further modified to run as synchronised clocks under the control of the Mean Time free pendulum, the Observatory's master clock.

The BBC transmitted an extended service of pips on 29 June 1927 for observers of the total eclipse of the sun which was visible in England. In 1928 the service was extended experimentally and signals were sent from Chelmsford on a wave length of 24 metres for use in Africa by surveyors.

In the early days the BBC six-pips time signal was treated very seriously. For example, the Astronomer

Mrs P Thomas checking the broadcast time signal against the outgoing signal which is advanced to compensate for the delay of the land line and equipment.

Royal for Scotland, Professor R A Sampson, wrote complaining that the BBC was not 'treating signals with respect . . .' 'sometimes we find that they are omitted altogether, and sometimes they are sent through the middle of the performance of a band.' In reply, Mr J C W Reith (later Lord Reith) stated ' . . . a change in temperament on the part of the conductor due to health or weather conditions, may easily make a difference of a minute, in which case the engineers, rather than cut out the musical performance, will so strengthen the Greenwich signals that they will rise above the performance. . . . The time signals will always receive first consideration.'

During the War, the Time Department of the Royal Observatory was evacuated to Abinger in Surrey, with a reserve station at the Royal Observatory, Edinburgh. The six-pips were generated from one or another of these stations until, in 1957, the Time Department was transferred to Herstmonceux, the new home of the renamed Royal Greenwich Observatory. For the past fifty years the six pips have been transmitted 24 hours a day.

The clocks which control the six-pips time signal are, of course, no longer pendulum clocks but are now caesium atomic standards. The signals are transmitted to the BBC over a Post Office land line in the form of breaks in a 1,000 Hz carrier. A local tone is generated by the BBC which is switched by the signal from the Observatory.

Duplicate equipment at RGO and the BBC, together with two land lines, ensures that there is very little likelihood of failure of the system.

The Greenwich time signal consisted of six short pips until 1972 when it was modified to five short pips from second 55 to second 59, followed by a lengthened pip the start of which marks the minute. The introduction of the lengthened pip caused some comment from the public; one lady complained that it upset her dog and she had to switch off quickly before it started to howl!

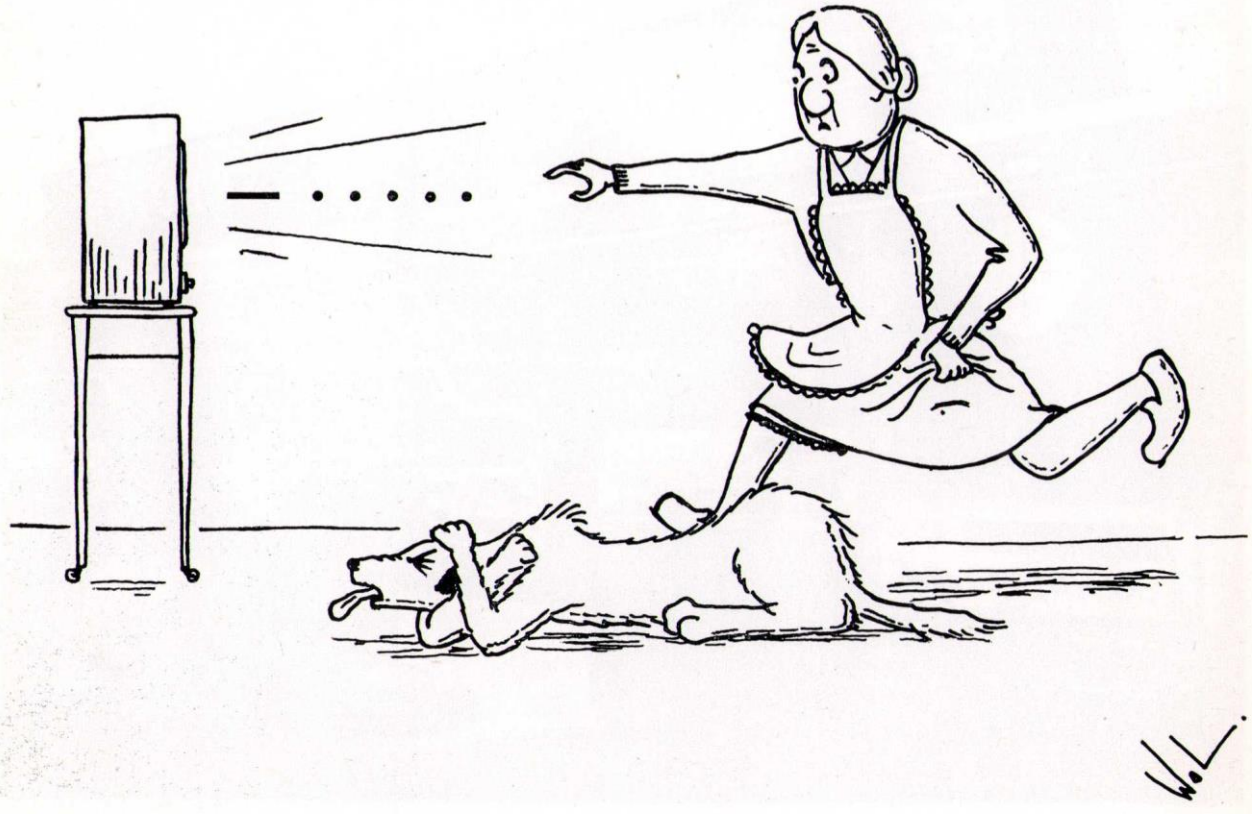
The Greenwich time signal provides accurate time for civil purposes throughout the 24 hours on a world-wide basis. An example of the schedule broadcast by the BBC is as follows:

On the domestic service 16 times daily on 10 frequencies.

On the European service 13 times daily on 12 frequencies.

On the Overseas service 24 times daily on 24 frequencies.

Joy Penny is a senior scientific officer in the Clocks, Time Scales and Time Signals Section at the Royal Greenwich Observatory.



Council Commentary

June 1973 to March 1974

European Science Foundation

As a result of the Paris conference last September of representatives from European Research Councils and academies, a Preparatory Commission has been set up. The Chairman is M Curien, formerly the Director Général of the Centre de la Recherche Scientifique and one of the members of the commission is Mr St J Walker, Secretary of the Council. The Commission's function is to seek offers for the seat of the European Science Foundation and then to make proposals to the meeting of prospective members due to be held in Stockholm in May.

Council Charter

In June the Council passed a resolution amending the Charter to take account of:

—their having agreed that representatives of government departments should be appointed members of Council instead of assessors;

—the decision that SRC staff (except those on Atomic Energy Authority terms (for whom separate arrangements have been made by the United Kingdom Atomic Energy Authority) and in FSSU) should have the same superannuation and related benefits as the Civil Service;

—the transfer of responsibility for Civil Service affairs from the Treasury to the Civil Service Department;

—the removal of the need for Council to pass resolutions amending the Charter on two separate occasions.

The Queen approved the amendments in Council in December.

Change of Name

At the same meeting Council approved the renaming of the Rutherford High Energy Laboratory as the Rutherford Laboratory, the Daresbury Nuclear Physics Laboratory as the Daresbury Laboratory and the Radio and Space Research Laboratory as the Appleton Laboratory (see page 10).

Retiring Members of Council

The Chairman expressed the Council's thanks to Dr Davies and Sir Alastair Pilkington for the service they had given as Council members. The Council also thanked Dr Pickavance, who retired due to ill health, for the vitally important contribution he had made to the work and progress of SRC.

Welcome to New Members

In October, the Chairman welcomed as new members of Council, Sir Hermann Bondi, Dr A T James, Dr I Maddock and Dr A A L Challis. (Dr Challis has subsequently left the Council on taking up a new appointment in the USA.)

Establishment Director on Council

The Council thanked Dr J A Saxton for his contributions to council meetings during the past two years and agreed to invite Professor A Ashmore to attend council meetings as the Establishment Director in attendance for a period of two years.

Polytechnics Working Group Report

The report of the Polytechnics Working Group, set up to look at the special needs of polytechnics in relation to the Council's policies and procedures for the support of research and postgraduate training, has been considered by the council.

The Council accepted the recommendations of the Working Group which were:

- A Committee of Council should be set up, for three years, to try to generate and apply different criteria for the support of postgraduate training in the polytechnics.

- Polytechnics should be encouraged to develop postgraduate training by means of taught advanced courses and collaborative research projects.

- SRC should make a special effort through the existing subject committees to encourage the use of the CASE scheme by the polytechnics.

- A research policy for the polytechnics should be discussed by representatives of the polytechnics, SRC, the other research councils, interested government departments (eg DOE and DTI) and the Department of Education and Science in order to define more closely the research role of the polytechnics. In the meantime research grant applications from the polytechnics would continue to be dealt with by SRC subject committees using established criteria.

A new Committee for Postgraduate Training in the Polytechnics has now been set up.

Estimates 1974/75
The Council agreed the 1974–75 estimates within a net total of £86·3M. These estimates were based on the Forward Look approved by Council in April 1973 but took subsequent developments into account. As a result of fluctuating exchange rates international subscriptions continue to be difficult to estimate.

The Council have been informed that part of the general cuts in public expenditure announced by the Government in December 1973 fell on the Civil Science Budget and the SRC is required to reduce its 1974/75 estimate by some £3M.

Forward Look 1972/6–1979/80
In November the Council agreed the financial guidelines to the four boards for the preparation of the 1975–80 Forward Look. The Boards views were received by Council in April and a Forward Look was submitted to the Department of Education and Science at the end of April. The guidelines given to the Boards, which vary according to present priorities and policies, are based on a growth rate for SRC of $2\frac{1}{2}\%$ per annum from a 1974/75 baseline. The Boards were asked to indicate the implications for their Forward Look programmes if the reduced 1974/75 estimates were used as the baseline for Forward Look growth rates. The Advisory Board for Research Councils invited the Council to indicate policy and priority changes resulting from considering three widely differing growth rates: $+4\frac{1}{2}\%$ per annum, zero growth and -1% per annum.

Postgraduate Awards
After all qualified candidates who applied in 1973 had been satisfied, there was, for the first time in eight years, a surplus of awards. Two main reasons were advanced for this—the relatively low level of remuneration for students and the state of the employment market.

The Council agreed that 3975 awards should be allocated in 1974—an increase of five for the Astronomy, Space and Radio Board and an additional twenty awards for use on new types of courses in the polytechnics.

Council Meetings
March—the meeting was held at Cosener's House, Abingdon and the main items discussed were the regrouping of SRC activities in the establishments and the Board reviews of scientific programmes.

May—the May meeting will take place at the Royal Observatory, Edinburgh.

September—the Council has accepted an invitation from Professor E J Richards, Vice Chancellor of Loughborough University of Technology, to hold a weekend meeting at Loughborough. The main topic for discussion will be a review of SRC postgraduate training policies.

The Energy Situation and the Council's Programme
In view of the current energy situation and the prospect of a sustained change in the country's energy policy a working party has been set up comprising Professor Edwards and the Board Chairmen. In consultation with representatives of Government departments it will co-ordinate the delination of problems needing solution, guide reviews by the Boards and report back to Council.

New member of Council
In April Mr D J Lyons, CB, was appointed a full member of the Science Research Council to fill the vacancy left by the resignation of Dr A A L Challis.

Part of a photograph of Comet Kohoutek taken at the Royal Greenwich Observatory, when the comet was about 76 million miles from Earth in the constellation Pisces. A tail of gas and dust can be seen emanating from the bright head of the comet.

That Comet

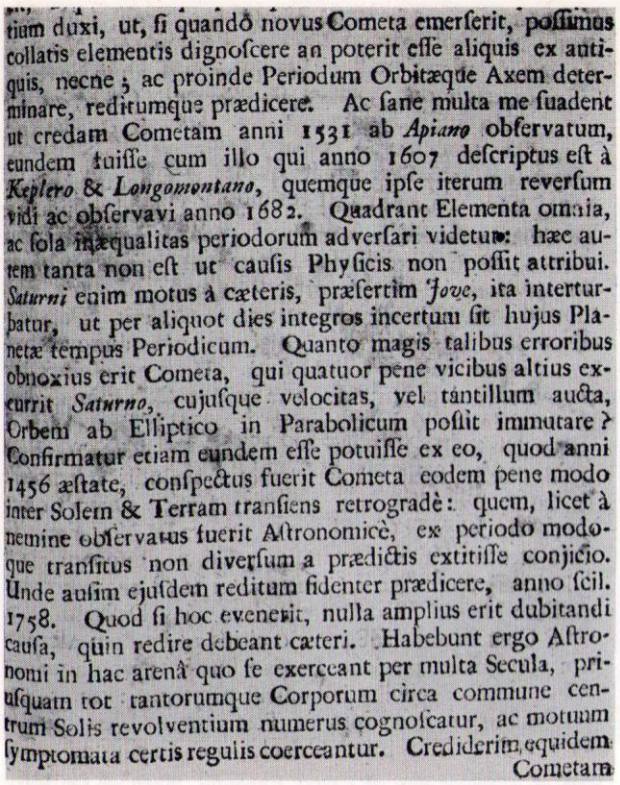
J B ALEXANDER and C M LOWNE

In previous centuries the appearance of a comet was usually regarded as a bad omen, possibly brought about because of the beholder's sins. In 1681, for example, when a very bright comet was seen, the Town Council of Baden in Switzerland forbade the unfortunate inhabitants to play, dance or make merry. They were not allowed to drink after nine o'clock and had to return home soberly without shouting in the street.

Although a few superstitions about comets still persist in Britain to-day, these ideas did not generally survive the scientific revolution. In the seventeenth century it was realised that comets moved in orbits around the Sun obeying the same laws of motion as the Planets.

The English astronomer, Edmund Halley, who studied the motion of the comet that now bears his name, gave a bright boost to cometry science. He conjectured that the comet which he saw in 1682 had been seen several times previously. Halley concluded that this comet moved around the Sun in an orbit within a period of about seventy-six years and he successfully predicted that the same comet would reappear in 1758. (Although Halley lived to the ripe old age of eighty-five as Astronomer Royal and as a pre-SRC Director of the Royal Greenwich Observatory, the return of the comet did not occur until sixteen years after his death.) It is difficult to reconcile these predictional aspects with the old belief that comets bring ill fortune.

Although the motion of a comet can be forecast quite correctly once it has been observed for a reasonable length of time, it is not possible to make reliable predictions of brightness. This is very well illustrated by the behaviour of the much-publicized Comet Kohoutek, which was discovered on March 7 1973 by Lubos Kohoutek at the Hamburg Observatory. The finding of a new comet is not in itself exceptional and about ten comets may be discovered in one year (Kohoutek had himself discovered a new comet only



tium duxi, ut, ſi quandò novus Cometa emerſerit, poſſimus collatis elementis dignoſcere an poterit eſſe aliquis ex antiquis, necne; ac proinde Periodum Orbitæque Axem determinare, reditumque prædicere. Ac ſane multa me ſuadent ut credam Cometam anni 1531 ab *Apiano* obſervatum, eundem fuiſſe cum illo qui anno 1607 deſcriptus eſt à *Keplero* & *Longomontano*, quemque ipſe iterum reverſum vidi ac obſervavi anno 1682. Quadrant Elementa omnia, ac ſola inæqualitas periodorum adverſari videtur: hæc autem tanta non eſt ut cauſis Phyſicis non poſſit attribui. *Saturni* enim motus à cæteris, præſertim *Jove*, ita interturbatur, ut per aliquot dies integros incertum ſit hujus Planetæ tempus Periodicum. Quanto magis talibus erroribus obnoxius erit Cometa, qui quatuor pene vicibus altius excurrit *Saturno*, cujuſque velocitas, vel tantillum aucta, Orbem ab Elliptico in Parabolicum poſſit immutare? Confirmatur etiam eundem eſſe potuiſſe ex eo, quod anni 1456 æſtate, conſpectus fuerit Cometa eodem pene modo inter Solem & Terram tranſiens retrogradè: quem, licet à nemine obſervatus fuerit Aſtronomicè, ex periodo modoque tranſitus non diverſum a prædictis extitiſſe conjicio. Unde auſim ejuſdem reditum fidenter prædicere, anno ſcil. 1758. Quod ſi hoc evenerit, nulla amplius erit dubitandi cauſa, quin redire debeant cæteri. Habebunt ergo Aſtronomi in hac arenâ quo ſe exerceant per multa Secula, priuſquam tot tantorumque Corporum circa commune centrum Solis revolventium numerus cognoſcatur, ac motuum ſymptomata certis regulis coerceantur. Crediderim equidem Cometam

An extract from the Philosophical Transactions of 1705 in which Edmund Halley announces that the comet of 1682 was moving around the sun in an orbit with a period of about seventy-six years. Noting that the same comet had been seen previously in 1531 and 1607, Halley predicted its reappearance in 1758.

eight days before he found the well-known 'Comet Kohoutek').

Individual comets differ greatly in the manner in which they vary in brightness as they change their distance from the Sun. Two comets in similar orbits having the same brightness when at large distances may differ in brightness by a factor of several thousand when they are close to the Sun. The nucleus of a comet is composed of solid material which emits the gas and dust to form the brightest part of the comet. The total brightness therefore depends on the rate at which this gas and dust is liberated under the action of solar radiation. Astronomers do not know enough at present about the composition and the structure of the nucleus of a comet to be able to predict its behaviour in detail. Predictions of brightness can only be made empirically. Preliminary estimates indicated that if Comet Kohoutek varied its brightness at the same rate as exceptional comets, then it would become extraordinarily bright. On the other hand, if it behaved like a typical comet, it would still be bright enough to be seen with the naked eye. Such comets are of reasonable interest since naked eye comets occur only every three or four years on average.

Unfortunately, the optimistic predications were given great publicity in the popular press without their enormous uncertainty being emphasized. Some astronomers were also guilty in this respect.

As it happened, Comet Kohoutek behaved in rather an unexceptional manner. Its brightness increased as it drew nearer to the Sun at a rate typical of an average comet. When the comet was not the spectacle that some journalists were expecting, interest was renewed when reports were received that the comet had disappeared. Deaths make headline news. Although it was not possible to trace the exact source of the reports of disappearance, it seems that some inexperienced observers had underestimated the difficulty of seeing diffuse objects very low down in the sky at dawn. The phrase 'fairly bright comet brightens gradually' aptly describes the behaviour of Comet Kohoutek in late November and early December of last year, but it was not a suitable one for newspaper headlines.

Although Comet Kohoutek was not the 'Comet of the Century' it became bright enough to be seen with the naked eye even in Britain. In the first three weeks of January when the comet was most favourably placed for observation, the relevant part of the sky was completely clear of cloud on only one night at Herstmonceux. However, several exposures were taken from November onwards which revealed the general development of the comet. Elsewhere the comet was studied intensively at a variety of wavelengths. Because Comet Kohoutek was the brightest one since Comet Bennett in 1970, it was practicable to try some instrumental techniques for the first time.

Our ideas about comets have changed remarkably in the past three or four hundred years. We were even allowed to make merry as much as we liked—as long as we did not use too much electricity! The final word goes, however, to two teenage girls who were overheard discussing their horoscopes. Said one: 'I don't believe my horoscope anymore; not after the way them astrologers were wrong about the comet.'

John Alexander is a senior scientific officer in the Astrometry Department and Michael Lownes is a senior scientific officer in the Instrument Development Department at the Royal Greenwich Observatory.

Spots before the eyes

The Atlas microdensitometer in use

M ELDER

The measurement of photographic intensities usually involves weeks of tedious visual estimation but a microdensitometer—a machine recently installed at the Atlas Computer Laboratory—will do the job in a day. This machine will provide a service for the many groups throughout the country using X-ray crystal structure techniques to determine molecular structure.

The technique of X-ray crystallography involves exposing a suitable crystal to a narrow beam of X-rays. The wavelength of the X-radiation is around 0·1 nanometers which is very close to the spacing between adjacent atoms in the molecules of which the crystal is composed. This means a diffraction effect occurs—the beam of X-rays interacts with the electrons in the crystal and a number of diffracted beams result, emerging from the crystal at various angles. The intensities of the various diffracted beams vary widely and depend upon the distribution of electrons in the crystal. If the crystallographer can measure these intensities then it is possible to work backwards, using rather complicated mathematical techniques, to derive the positions of the electrons, and hence the atoms, in the crystal. Such results are quite accurate—the distances between atoms in a molecule may be calculated to within a few parts in ten thousand and molecular geometries can be accurately determined. Within the limitations imposed by the need for a crystalline sample the technique is of general application. Simple structures such as diamond have been studied in great detail and workers have recently determined the structures of biologically significant molecules such as RNA and haemoglobin, with thousands of atoms to one molecule.

The Atlas microdensitometer will play its part in the collection of the data needed for a crystal structure analysis. In a typical experiment a crystal is mounted at the centre of a cylindrical cassette containing a pack of 3–5 pieces of X-ray film. The crystal is rotated in a beam of X-rays and the resulting diffracted beams are recorded as small black spots on the films when they are developed. A set of ten film packs, each containing 200–1,000 spots, makes up the initial data for the crystal structure determination. After digitization it is necessary to estimate the relative intensity (blackness) of each spot.

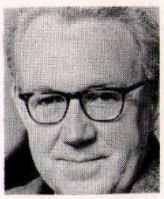
It used to be a crystallographer's nightmare estimating these intensities by visual comparison with a set of calibrated intensities. Now it can be done automatically with the aid of the computer controlled microdensitometer. Each film is mounted on the drum of the machine and the drum then rotates at 4 revolutions per second. During each revolution an optical system measures the intensity of the light transmitted through the film at points every 0·1 mm around the drum. After each revolution the optical system is moved at 0·1 mm intervals along the axis of the drum and in this way the whole film is covered in the steps of 0·1 mm in each direction.

Mrs Lorna Claringbold operating the Photoscan machine.

The measured intensity values are pathed to the computer, which has sufficient time between readings to compute the intensities of all the spots on the film, despite the fact that readings are taken at the rate of 14,000 per second. The use of a pack of films in the cassette enables a greater intensity range to be covered

continued on page 10

Present organisation of SRC London Office



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ENGINEERING
DCSO Dr W G Potter

Mr Anthony Egginton became Director of the Engineering and Nuclear Physics Divisions of the Council at the beginning of this year in succession to Dr Albert Lines (see below) who has retired.

Mr Egginton was educated at University College, London. While working for the college he went to Harwell to work on accelerator projects at the beginning of the development of big particle accelerators in the United Kingdom.

From 1956–1965, first at Harwell and then Rutherford Laboratory, he worked on the design of Nimrod and the Beam Transport equipment needed for the experimental programme. Then he became Head of the Accelerator Group at Daresbury where he was responsible for the development of Nina. In 1972 he joined the London office as Head of the Engineering Division.

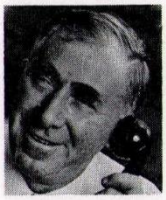
His wide knowledge of both engineering and physics will, it is felt, be widely appreciated in the divisions he controls.

Retirement

Dr Albert Lines retired in December 1973 after five years as Director of the Engineering and Nuclear Physics Divisions.

Dr Lines was educated at Birmingham University and began his career as a lecturer at Northampton Polytechnic. He spent thirty years in the public service

administration



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FINANCE
DCSO L S Smith

at the Royal Radar Establishment and the Royal Aeronautical Establishment, where he became Head of the Space Department in 1960. From 1961–68 he was Director of the European Space Research Organisation and its early success was due in large measure to his efforts.

Since joining the Science Research Council, Dr Lines played a major part in the development of the Engineering Board and in recent years made a real contribution to the work of the Nuclear Physics Board.

His retirement will be a great loss to the Science Research Council.

Mr M O Robins became Director, ASR Division and Science Division, in September 1972. This was a return to State House after an absence of four years with the Ministry of Technology, later Department of Trade and Industry, because he had been a founder member of the SRC London Office in 1965 when he took up the new post of Head of ASR Division.

Mr James Hosie CBE has been Director of Administration of the Council since 1972. Previously he was Director of Astronomy, Space and Radio and earlier of the Nuclear Physics Divisions of the Council.

continued from page 7

than would be possible with one film, since intensities fall off by a factor of about 3 when the diffracted X-rays pass through each piece of film.

The machine requires one operator and can process a pack of films in an hour, extracting up to a thousand spot intensities. The complete data for a crystal structure can thus be collected in a day. The accuracy is limited by the experimental conditions and the quality of the films, rather than by the machine, which should certainly be sufficient for the average structure determination.

The microdensitometer is not of course limited to processing X-ray films although it will spend most of its time doing so. There are a wide number of applications which require accurate density measurements from photographic films on transparencies. For example, the machine has occasionally been used to digitize X-rays of miners' lungs for pneumoconiosis studies, or photographs of handwriting for optical character recognition work.

Michael Elder is a senior scientific officer in the Applications Software Group at the Atlas Computer Laboratory.

Appleton Laboratory

Lady Appleton at the unveiling ceremony

The renaming of the Radio and Space Research Station as the Appleton Laboratory—after the late physicist Sir Edward Appleton, CBE, KCB, FRS, who was connected with the Station's work for many years—was celebrated late last year by the unveiling of a plaque to commemorate the change of name.

Former Secretary of State for Education and Science Margaret Thatcher and Lady Appleton participated in the unveiling ceremony.

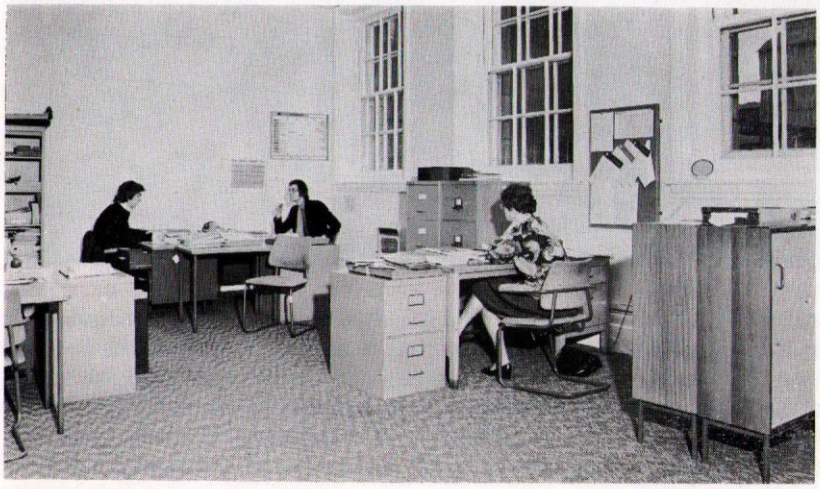
The Council has also decided that the names of the Rutherford High Energy Laboratory and of the Daresbury Nuclear Physics Laboratory be changed to the Rutherford Laboratory and to the Daresbury Laboratory respectively. These changes are in line with the Council's policy of encouraging the widest possible use of expertise available in the laboratories.

No changes in name are contemplated for the Royal Greenwich Observatory, the Royal Observatory, Edinburgh, or the Atlas Computer Laboratory.

Our nearest neighbour...

Our neighbour galaxy the Small Magellanic Cloud, photographed by the Science Research Council's 48-inch Schmidt Telescope at Siding Spring, Australia. One of the largest telescopes of its kind in the world, it was designed and built by Grubb Parsons of Newcastle-upon-Tyne in only two years. Since it came into operation on July 2, 1973, a technique for sensitising photographic emulsions developed by the Schmidt Telescope Project Unit's staff, has enabled it to photograph objects as faint as magnitude 23 in an hour—six times fainter than was previously possible. More than a hundred photographs of various kinds, each covering 40 square degrees of sky, are now available at the Unit at Edinburgh for loan to British research astronomers.

An interesting view of the SRC's temporary accommodation, which shows something of Swindon's history with its display of the bogey wheels still resting in the railway yard.



Picture shows the Training Section's office. From left to right Jim Sadlier, Terry Dawson and Miss Deidre Ackland

Swindon Advance Office

On 1 March the SRC opened its advance office in temporary accommodation in Swindon. At the time of going to press Training, Contracts, Manpower, LOA, SUGA Accounts and Ledger and Salaries sections have staff there. Other staff involved in this year's move (Biological Science Committee, Control Engineering Committee and the Computing Science Committee) will follow in August.

The SRC aims to open its main office in Swindon at the beginning of 1977.

The address of the advance Office is:

Science Research Council,

c/o British Rail Engineering Ltd.,

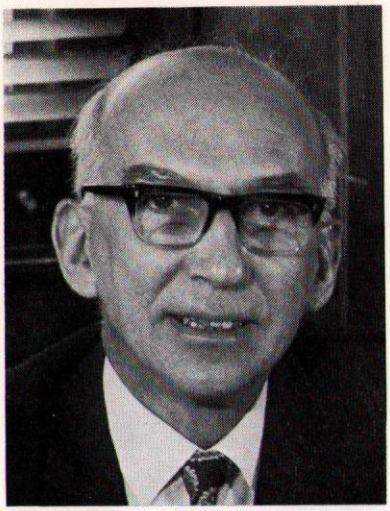
Swindon Works,

Swindon SN1 5BW.

Tel: Direct Line or Swindon (0793) 26222;

Telex No: 449466

Entrance to SRC's offices.



Dr Alan Hunter

Dr Alan Hunter, formerly Deputy Director of the Royal Greenwich Observatory has been appointed its new Director.

Dr Hunter was educated at Imperial College, University of London. He studied for his PhD in Alfred Fowler's Laboratory at Imperial College and it was here that his interest in astronomical spectroscopy began.

His career at the Royal Greenwich Observatory began in 1937 and until the outbreak of war he contributed to observing programmes on colour temperatures of stars and on trigonometrical parallaxes.

In 1939 it was decided to move the Greenwich Observatory to a site in the south away from the man-made smog which dimmed the light of the stars but the move was deferred until after the war.

Dr Hunter who had spent the war years at the Royal Naval College, Greenwich, carrying out research into the mechanical properties of metals, returned to help with the move to Sussex, which was completed in 1957.

At Herstmonceux Castle he headed the Astrometry Department until 1961 when he was made Senior Principal Scientific Officer and Chief Assistant to the Astronomer Royal. His interest then turned to scientific administration. In 1967 Dr Hunter was made Deputy Chief Scientific Officer and Deputy Director.

Dr Hunter has been President of the British Astronomical Association and Vice-President of the Royal Astronomical Society. He is presently Treasurer of the latter. He is married with four grown-up sons and enjoys gardening in his spare time.

Farewell to Dr Margaret Burbidge, FRS, who until November last year was Director of the Royal Greenwich Observatory.

Dr Burbidge joined the RGO on secondment from her post as Professor of Astronomy at the University of California, where her husband is also a professor, and she has returned to this post.

New Year Honours

Our congratulations to Dr A W Lines and Professor B C L Weedon, who received the CBE and Mr R L Taylor who received an OBE.

Dr Lines was, until his retirement in December last year, Director of Engineering and Nuclear Physics Divisions.

Professor B C L Weedon is a member of the Science Board and Chairman of the Enzyme Chemistry and Technology Committee.

Mr Taylor is a Principal at the London Office.

Institute of Physics Awards for 1974

The following awards have been made to colleagues associated with the SRC:

Maxwell Medal and Prize to Professor S F Edwards, Chairman of the SRC, for his work on the application of functional integration to a wide variety of problems in statistical mechanics.

Guthrie Medal and Prize to Professor R L Mössbauer, Director of the Institut Laue-Langevin, Grenoble, for his outstanding contributions to the study of condensed matter and in particular to the discovery of the effect which bears his name.

Holweck Medal and Prize is given for distinguished work in experimental physics, or in theoretical physics if closely related to experimental work. This year it has been jointly awarded to a French physicist and a British physicist. Professor A Hewish, a member of the Royal Observatory Edinburgh Committee, is the British award winner.

Professor Sir Rudolf Peierls, formerly Chairman of the Atlas Computer Committee, has been made an Honorary Fellow of the Institute of Physics.

Promotions

Mr H Hurst has been promoted to Computer Manager, Senior Principal Scientific Officer, at the Rutherford Laboratory.

Mr M W Message is now Senior Principal, Establishment Division.

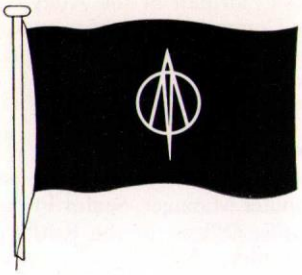
Finite Elements at Abingdon

Finite element methods are a computational technique widely used in structural engineering which have been applied more recently to problems of fluid dynamics. In March this year The Cosener's House, Abingdon—the hostel of the Rutherford and Atlas Laboratories—was the pleasant setting for a symposium on the subject organised by the Atlas Laboratory.

About thirty engineers and scientists attended the three day meeting. Papers were presented on various applications of the method, computer program packages, numerical techniques and computing requirements of finite element calculations. An "Any Questions" session concluded the occasion with Tony Egginton of London Office chairing a panel of SRC Committee members who answered participants questions about SRC policy in the field of engineering computing.

A social programme and symposium dinner was held at which Professor Sam Edwards, FRS, Chairman of the Council, gave a down-to-earth address.

Summing up, Jean Crow, Symposium organiser, discussed increased collaboration between Universities and the Atlas Computer Laboratory in engineering computing. Dr Jack Howlett, Director of the Atlas Computer Laboratory, concluded with the vote of thanks. All agreed on the success of the occasion.



SRC Racing Flag

The SRC have now been represented in all three of the annual inter-departmental offshore races (see *Quest* Vol. 6 No. 2 1973 and Vol. 5 No. 1 1971). The next will be held on October 11–13 and anyone interested in crewing should contact Martin Hall at the Appleton Laboratory. The Chairman, Professor Edwards, has kindly agreed that from now on we may race under the SRC motif. We expect to be the first crew to do this and hope that it will not be the only respect in which others follow our lead.

The offshore race is organised by the Civil Service Sailing Association, who have monthly meetings discussing sailing topics at the Civil Service Recreational Centre in Monk Street, S.W.1. They also have twenty-five associated sailing clubs and organise offshore cruising and racing in their two 6-berth boats throughout the season. At the time of going to press crewing opportunities are still available.

The SRC crew in *Shar* during the CSSA Interdepartmental Offshore Races last October. Unfortunately gale warnings forced the crews to abandon the Cross-Channel race in favour of three races in the Solent. Twelve boats took part in the races and the SRC crew, which came in fifth place, missed a prize by just 107 seconds over eleven hours of racing. Anyone interested in entering an SRC team of three Enterprise dinghys for the Portcullis trophy this month, should contact Martin Hall at the Appleton Laboratory. The SRC crew shown from bottom left to right are: Richard Hilken (ACL); Tony Damerell (RL); Alan Bishop (RL) at helm; Ken Somerville (ROE); and Martin Hall (AL) skipper.

Rutherford and Atlas Chess Tournament

This year the title has been won jointly by Bill Turner of the Applied Physics Division and Peter Hemmings of the Computer and Automation Division. Both players scored eight points out of a possible nine and were undefeated in the tournament rounds.

The tournament which was first held in 1967 is run on the Swiss system (usually nine rounds). More than thirty of the sixty odd players at the laboratory take part.

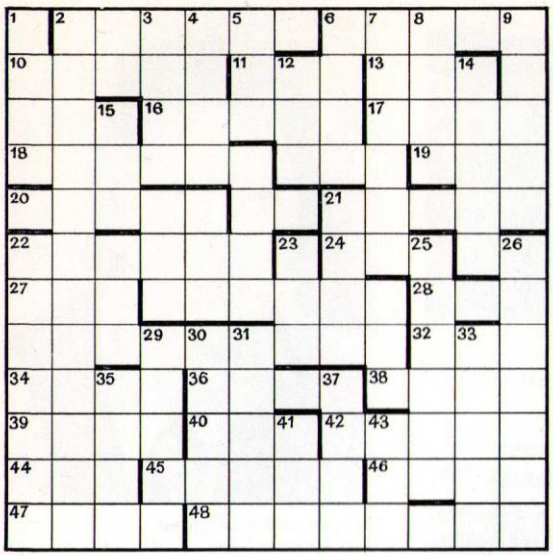
Although there is a high standard of chess played at the laboratory, which boasts a few county players, Bill Turner has stood out through the consistency of his game. He has won the tournament every year, sharing the title on only three occasions.

The Rutherford and Atlas chess players meet local teams for friendly matches. There is also a "lightening" tournament held on the annual SRC Sports Day and providing there is enough support there is likely to be an annual SRC Tournament.

One of the games at this year's tournament: Players V J Riddle (Black) and W Turner (White). Bill moves first each time:

1 P – Q4, N – KB3
2 P – QB4, P – K3
3 N – QB3, B – N5
4 Q – B2, P – B4
5 P – K3, N – B3
6 N – B3, O – O
7 B – Q3, P – KR3
8 O – O, Q – N3
9 P – QR3, P x P
10 P x P, B x N
11 P x B, Q – B2
12 R – K1, P – QN3
13 N – K5, P – Q3
14 N x N, Q x N
15 B – B4, B – N2
16 P – B3, KR – Q1
16 P – B3, KR – Q1
17 Q – Q2, Q – Q2
18 B x P, P x B
19 Q x P, Q – K2 (to protect knight)
20 P – Q5, P – K4
21 P – N4, P – K5
22 P – N5, N – R2 (if . . Q – B1, Q x N, P x B, R – K7 followed by P – N6 wins)
23 R x P, Q – B1
24 R – K8, Q x R
25 B x N(CH), K – R1
26 B – B5(CH), K – N1
27 Q – R7(CH), K – B1
28 Q – R8(CH), K – KZ
29 R – K1 (Checkmate)

Peter Hemming (left) and Bill Turner contemplate their next move.



Crossword

Maxim 5

To compensate for the scarcity of clues, crossword fans are invited to take a trip from the top left-hand corner of the central block of 8 x 8 squares (i.e. from the first letter of 15 down) and proceeding clockwise and inwards, to discover the members of a group, in the order in which one would expect to find them.

ACROSS

2. Shy about small volume of liquid before ten—that can be seen when bottom's up (6)
6. Play a ukelele in "*Last Rumba*" (5)
10. Good place for a meal, the LO? Well, not exactly! (5)
11. I go after Freud-centred concept (3)
13. Guzzle brew of what's brewed (3)
16. Town in England's centre, nigh unto Bedford (5)
17. Descriptive of de Mille picture? (4)
18. Author of legal document set before the queen (6)
19. One who's on a ship, and one who leaves it in retrospect (3)
20. What you might get out of backward, tight pedagogues (5)
21. Brain surgeon's predecessor in Western Europe (5)
22. Sort of coat worn by rich women about fifty in a sudden bout of activity (6)
24. Run out for a jar (3)
27. Imperial rule depicted in upturned urn (3)
28. Essential in hearing (3)
32. Object that is heard, and may be seen, in euphoria (3)
34. Men I take on board (4)
36. Animal life found in Mars! (4)
38. Dame's gear, her first clothing (4)
39. Completely French type of spiv (4)
40. It's foolish to start assuming (3)
42. Take guns off a girl joining the Marines (5)
44. The disappearance of a friend (3)
45. Knock-out juice, an article swallowed by the queen (5)
46. Goal-getter from Russian ladies' team? (4)
47. Something to play back for guest at stag party (4)
48. Begins to come in, laddie (6, 2)

DOWN

1. Melt, what? Melt (4)
2. Link provided by change of relocation to SRC's centre (11)
3. About to allow untidy ancient Briton (4)
4. What's this, coloured alternators? (4)
5. Three-quarters of snowman still remains (3)
6. Boys drop note in songs (4)
7. See-saw between finite and eternal (6)
8. Captivated by a sort of trap (4)
9. Small beginning—or a hundred I'm raising (5)
12. Site of Indian summers sometime ago (3)
14. Put it upside-down on an artist, or the right way up on a duchess (5)
15. Seed that raises twin (3)
22. Temperature scale sorted out what's below freezing (7)
23. She starts like sugar and ends like saccharine—sweet (3)
25. Rule an assemblage of nervous things (6)
26. Wooer, a chap who likes jumping in the deep end (7)
29. Girl loses hydrogen, combines alcohol with acid (5)
30. Veteran car spoils RAC team's start (5)
31. Spots what's risky (4)
33. Wells went with him—a long journey? (5)
35. Regret about part of old money system—knickers, for instance (4)
37. I'm certain our ruse will fail (4)
41. Scenery's in position (3)
43. Air's two gases—take neither (3)

(Solution will appear in the next issue. £1 book token prize for first correct solution received).

Nutcracker

'How went t'annual Canal Fishing Championship?' said Ebenezer Eelworthy, propping up the bar of the Daresbury Arms. 'Was you four t'only entrants?' 'That we was,' replied Albert Anglepike, 'and Dicky Dogfish won it again. He caught more than old Charlie Carp here and Charlie caught more than Ben Bream and I ended up bringing up the rear as usual.' 'Never mind, Albert,' said Charlie, 'at least you caught more fish than last year.' 'Aye ' replied Albert, 'but all I caught last year was one undersized roach and twelve reports on new accelerators—whatever they be.' 'So how many did you each catch?' asked Ebenezer. 'Ah, well,' said Dicky, who always was too clever by half, 'the product of our catches is 2, 100 and their sum is precisely my winning score in the Merrison Memorial Trophy last year.' 'But I don't remember your winning score ' said Ebenezer. 'No matter ' replied Dicky, 'because you wouldn't know all the catches if you did. However, if I tell you that my own score was even better than my score in the Warrington Canal Competition that should tell you everything.' What were the catches?

Send answers to *Quest*. First correct answer opened gets £1 book token.

Nutcracker 13 Solution

Simon Capers found 14 fingers at the end of the robot's arm.

Explanation

It is clearly not possible to increase the grant of £****7 by a factor of *4 to £*00,000 in normal base ten arithmetic. The robot must therefore be working in a different number base which is presumably the same as the number of his fingers.

The winner of the £1 book token was James E Hall of the Appleton Laboratory.

Nota Bene

Your local correspondents who would be delighted to receive your articles/cartoons/comments are:

Mr Bill Burton
Astrophysics Research Division
Appleton Laboratory,
c/o Culham Laboratory (ext. 6184)

Mr Jim Campbell
Royal Observatory Edinburgh
(ext. 100)

Mr Geoff Gardiner
Appleton Laboratory (ext. 330)

Mr Doug House
Atlas Computer Laboratory
(ext 515)

Mr Harry Norris
Rutherford Laboratory (ext. 484)

Mrs Shirley Lowndes
Daresbury Laboratory (ext. 305)

Mr John Alexander
Royal Greenwich Observatory
(ext. 214)

Balloon stops rays

With regard to the last issue's cover picture showing the skeleton of a gas scintillation counter which is to be flown under a helium-filled balloon twenty-five miles up to measure abundances of heavy elements in primary cosmic rays, it should be made plain that the equipment was designed and constructed in its entirety by members of the Physics Department of Bristol University under an SRC grant.

Construction was made easier for the Department by the excellent facilities put at their disposal by the British Aircraft Corporation where the assembly of the detector took place in the spacecraft assembly building at BAC, Filton.

The new editor of Quest, Miss Carol Rivers

Dr W G Potter

Dr W G Potter has been appointed Head of Engineering Division.

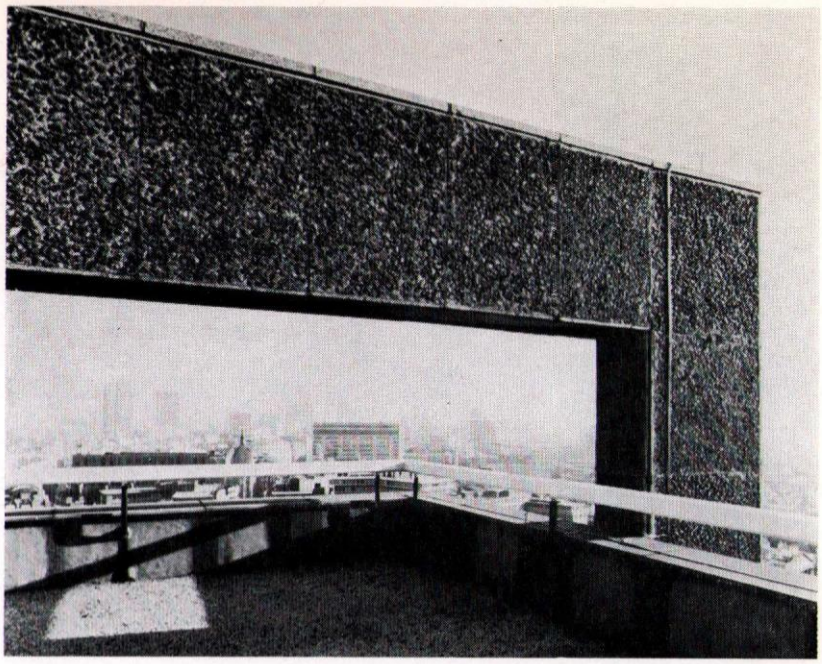
Dr Potter was educated at London University and then joined the Armament Research Establishment of the Ministry of Supply. After ten years with Shell he joined the SRC in 1965. For the last three years he has been Deputy Head of the Science Division.

Suggestions Scheme

In 1973 the number of suggestions received by the management totalled 166 and £384 was paid out in prize money (highest award: £30) for the 45 suggestions accepted.

Farewell

Jill Peatfield, formerly librarian at Daresbury and a local correspondent for *Quest*, married Phil Ditchfield last October and left Daresbury for Scunthorpe at Christmas. Jill is now branch supervisor of the Scunthorpe branch of Swan National Car Rentals.



View from the top

On a recent assignment at State House staff photographer Peter Hicks of the Appleton Laboratory took a series of studies from the roof. The picture shows a view looking towards the city with the *Daily Mirror* building and St Paul's in the background. The main structure shown in the foreground is part of the support system used in the body of the building.