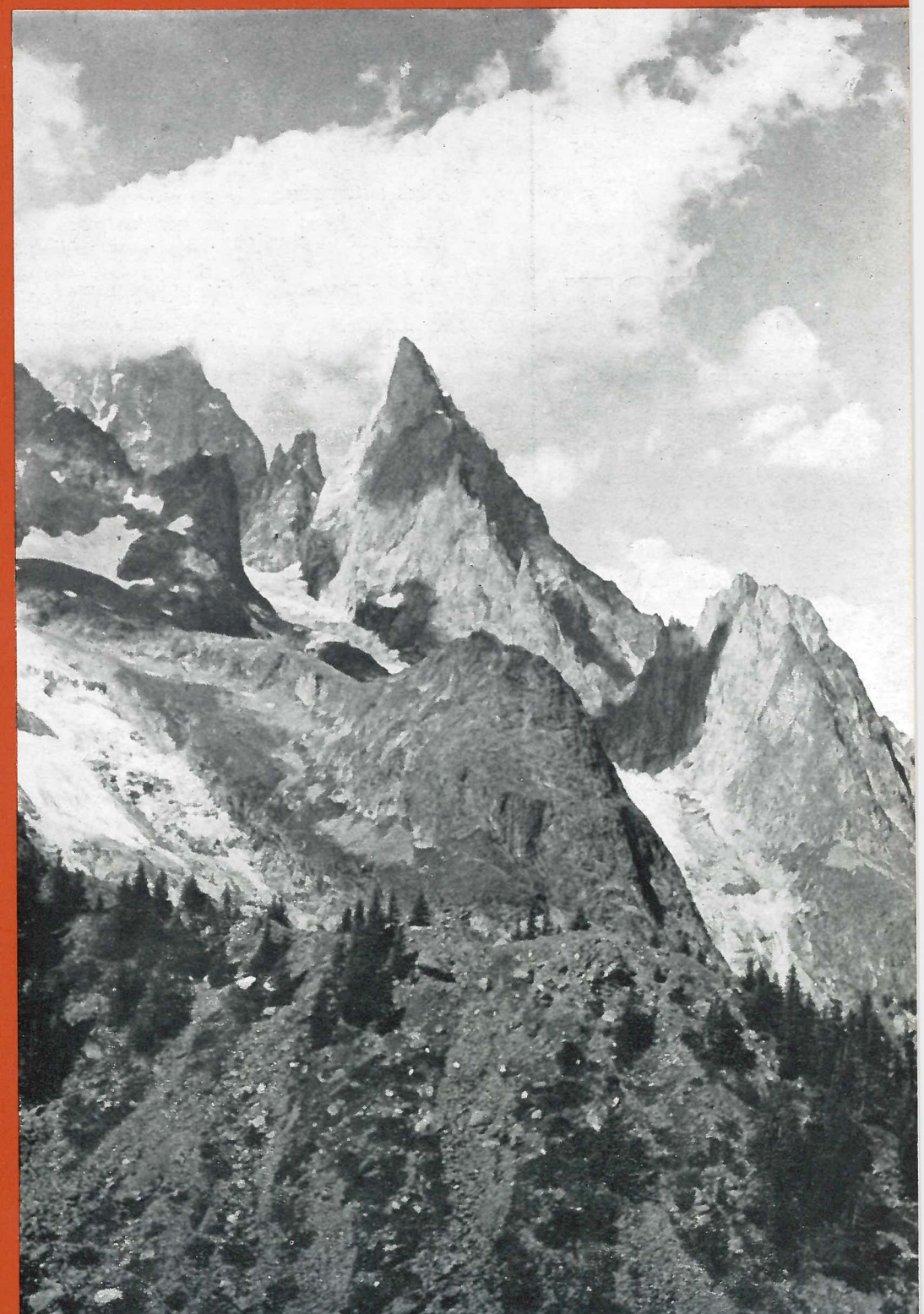
QUEST



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QUEST

House Journal of the

Science Research Council

Vol. 4 No. 1

January 1971

contents

cover picture is a view of the Aiguille Noire de Peuterey on the Italian side of Mont Blanc, photographed by Allan Ridgeley of the Astrophysics Research Unit. An account of his walk around Mont Blanc appears as part of the holiday feature on pages 9–13.

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£1M A YEAR FOR ATOMS MOLECULES AND PLASMAS ++ BEST DATA YET FROM SKYLARK SPACE
PROBE IN SOLAR ULTRA-VIOLET SPECTRUM ++ SYMPOSIUM ON ELECTRON AND PHOTO INTERACT
++ £59,000 HARDWARE FOR MULTI ACCESS COMPUTER SYSTEM ++ BRITISH EXPERIMENT IN OR
ING SOLAR OBSERVATORY OSO-G ++ FIRST LUNAR SAMPLES FOR BRITAIN ARRIVE AT SRC ++
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BER PHOTOGRAPHS BY SWEEPNIK AIDED BY SRC GRANT OF £40,473 ++ SUCCESSFUL LAUNCH O

September

As usual, there were no regular meetings of the Council in August or September but, as last year, a week-end meeting was held at the end of September with representatives of the Boards and of the senior London Office staff. This time the venue was Derwent College on the attractive campus of the University of York. Participants were again invited to bring their wives, for whom York proved to be a popular centre. This was an opportunity to bring the Council and Boards together, to consider the changing circumstances, in particular the coming expansion of higher education and the prospective national requirements for scientifically trained people, and to develop ideas about the kinds of policy for post-graduate training and research support that will guide specific decisions throughout the year.

October

300 GeV. At the October meeting, the Council discussed very fully the new CERN 300 GeV accelerator proposal, 'project B'. Among the many advantages of this proposal, the siting at CERN not only contributes to a substantial reduction in initial cost, but will make it very much easier to find the effort for later increased exploitation by transfer from the present CERN facilities, thus increasing the confidence with which the long-term estimates of the total contributions to CERN can be regarded. Although the UK contribution to the new project would be substantially less than would have been required for the original 300 GeV project of 1968, and although satisfactory limits to any possible escalation had been negotiated, the proposal had to be viewed against the expectation of a much lower rate of growth of the Council's funds than was expected in 1968. Nevertheless, the Council reaffirmed its recommendation that the UK should join the project.

Students. Another topic in October was the proposal to provide short courses for SRC research students to show them something of the interest and challenge of careers which scientists can follow in industry and Government outside research and development laboratories. The Careers Research Advisory Centre, which has run one or two such courses very successfully in conjunction with the SRC in each of the past few years, has now offered to run six one-week courses in 1971. The Council accepted the offer, and also asked for the study of such courses to be continued.

Grants. One large grant recommended by the Engineering Board was approved: a grant of £290K over 4½ years to Dr. J. V. Oldfield of the University of Edinburgh for work on interactive computer graphics applied to electrical and electronic design.

Concerning grants in general, the Council's normal role is to help to initiate new projects, and when the grant comes to an end, support is usually taken over by the University, sometimes with the help of an earmarked UGC grant for the next quinquennium. At the end of the last quinquennium in 1967 the Government implemented a new policy of deducting the totals of these earmarked grants from the budgets of the Research Councils, and it was reported to the Council that in view of the reduction in their ability to initiate new research which this entailed, officials of all the Research Councils and of the UGC had consulted together and were recommending against any 'take-over' with transfer of funds in 1972. The Council accepted this recommendation.

November

Finance. By the November meeting, the Government's financial policies had been announced in outline, and the first major item concerned the matching of programmes to the restricted resources that might be expected under these policies. New draft Estimates

Dr. John A. V. Willis, who writes this column, has left us to become secretary of the British Association for the Advancement of Science (on secondment terms). Quest *is very sorry to lose him as a contributor and he will be much missed at London Office. Previously secretary of NIRNS Dr. Willis became secretary of the Nuclear Physics Board when the SRC was formed in 1965, then he succeeded Miss Morris as head of the Council Secretariat.*

for 1971/72 including provision for entering the 300 GeV project B were considered and endorsed; the total represented an increase of about 4½% in real terms over that of the previous year. Preliminary consideration was also given to the Forward Look for the following five years, and in this connexion the Chairman was invited to discuss with the UGC and the other Research Councils the principles upon which scientific research should be supported in the difficult circumstances of increasing university numbers coupled with restricted financial growth.

The next topic, a closely related one, was a consideration of the criteria for reviewing activities, which were given fresh emphasis in the recent White Paper on the Reorganisation of Central Government:– 'Is it relevant?' and 'must it be done by central government'. Like other public bodies we shall have to justify our activities and our expenditure against these criteria.

Student awards. Next, there was a report on the award of studentships in 1970, a complicated exercise which succeeded in meeting most if not quite all of the aims set by the Council at the beginning of the year. The total number of awards offered and accepted turned out almost exactly as planned although with rather more research studentships and fewer advanced course studentships than had been proposed. It was possible to give awards to all applicants with first-class honours, but the Council's wish to give awards to all fully-qualified candidates in the Engineering Board's field could not be fully met in the case of all who applied for research studentships. They were all offered advanced course studentships however.

Visits. Among other matters at this meeting, the Chairman reported on his recent visit to the USA and Australia, where he had had valuable discussions of science policy with leading national scientific advisers and administrators, and also had the opportunity of consulting leading astronomers on the management of large telescopes. The Council also received a report on a working-level visit to the French Centre National de la Recherche Scientifique (CNRS) by Mr. J. D. Walsh, the Council's newly-appointed Training Officer, who recently spent two weeks working with the CNRS and was able to give a very interesting account of their work and methods.

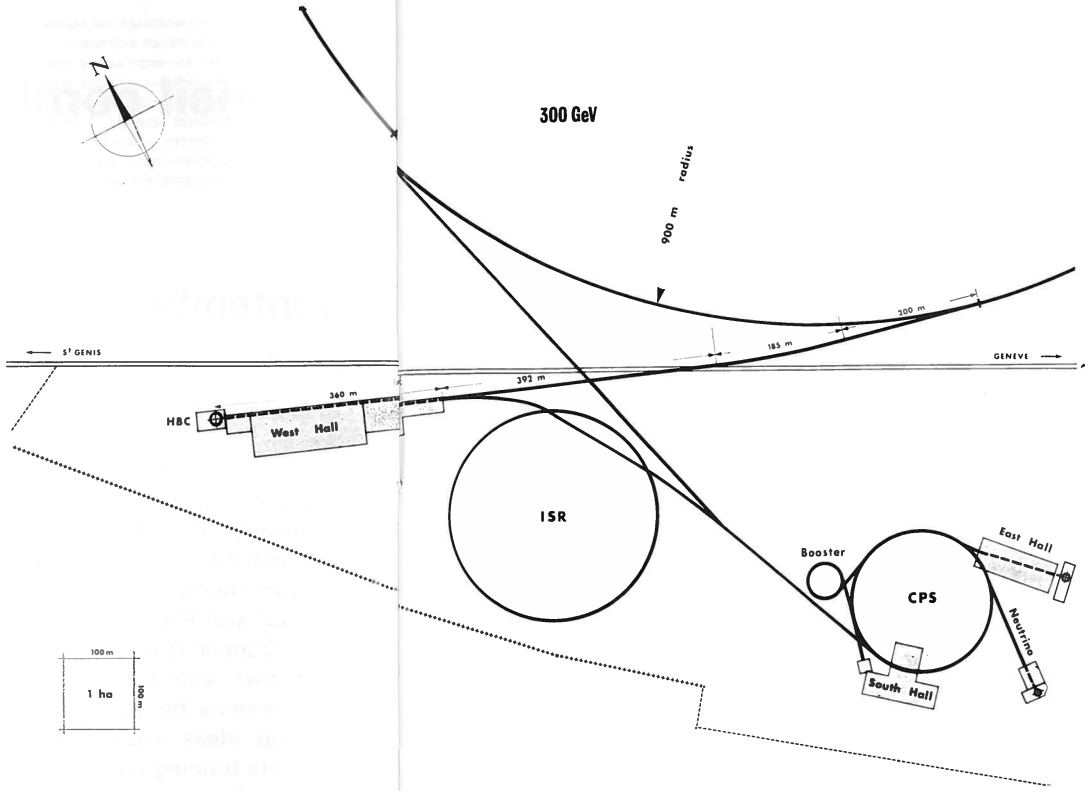
big science

HOUSE OF COMMONS DECEMBER 4 1970

Mrs. Margaret Thatcher, Secretary of State for Education and Science, said 'We have decided that the United Kingdom should participate with the other European countres which are members of the European Organisation for Nuclear Research (CERN) in building a 300 GeV accelerator near the existing CERN site at Geneva. A careful appraisal of priorities within the civil science budget has made it possible to meet the cost of the project without additional public expenditure.'

So CERN's 'missing magnet' design (see *Quest* July 1970) had brought the 300 GeV accelerator proposal within reach of our budget. It will cost only about half as much as the earlier project which the UK declined to join in 1968, and the latest proposal permits savings in the existing CERN programme. The UK share of the cost, spread over eight years, is estimated to rise to an annual figure of some £3.3M. But with the savings in the existing programme this should be reduced to £2.5M. *(For the Council decision see 'Council Commentary'.)*

Joining the project will mean having to make some savings in our own national research programme in high energy physics, as it is current policy that expenditure on nuclear physics should take a diminishing proportion of SRC's total resources. On the credit side, however, access to the new machine would provide for facilities in the forefront of this field for several decades to come.



a plan of the present site, showing the proposed site of the 300 GeV accelerator. HBC indicates the High Field Bubble Chamber; ISR the intersecting storage rings, and CPS the 25 GeV proton synchrotron.

The proposed CERN machine is a proton synchrotron, circular (about 2 Km/1¼ miles diameter), in which hydrogen nuclei will be accelerated to very nearly the speed of light. In machines of this kind, as particles approach the speed of light most of the added energy appears not as speed but as mass. At the same time, as particles gain energy their effective diameter becomes less so they become better tools for exploring in finer detail the fundamental natures of the components of atomic nuclei and of matter itself.

Over an eight year programme, the machine will be built in a tunnel of 2.2Km major diameter, bored some 30m underground and adjacent to the existing CERN Laboratory. The present CERN synchrotron will be used as injector for the new machine while continuing to provide experimental particle beams at the 25 GeV level and, at periodic intervals, filling the Intersecting Storage Rings (another important new facility already under construction). Experimental facilities on the existing site will be used for the first experiments with the new accelerator at intermediate energy levels until the programme is completed by the construction of top energy facilities on the new site.

CERN plans do not end at 300 GeV. At the beginning of the construction programme, sufficient iron cored magnets will be ordered to fill half the available tunnel space so that an accelerator of 200 GeV could be brought into operation in the sixth year of the programme. Within the present budget, further magnets could be added to raise the energy to 300 GeV, the ultimate energy with conventional techniques being limited by the tunnel diameter to 400 GeV.

But if superconducting techniques, which appear promising, turn out to be practical and economic it could be decided to bring the accelerator into operation at 200 GeV and while research proceeds instal superconducting magnets in the spaces left in the ring so that when the high energy experimental facilities become available at the end of the programme, the machine will be capable of accelerating protons to 500 GeV.

It is however impossible to guarantee now that this could be achieved within the present budget, and special provision is made in the CERN agreement for this eventuality. The possible substitution, at a later date, of superconducting magnets for the iron magnets would give an energy of approaching 1000 GeV.

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stop press

At the December meeting of the CERN Council, agreement on the 300 GeV project had to be deferred because only seven out of the twelve member nations were prepard to give the go-ahead. As a result Britain's formal letter of agreement a!so had to be withheld because her participation depends on support and financial commitment from all the other members. The meeting was adjourned until February 19. If not all of the five remaining members have decided by then to join the project the CERN Council will have to decide whether to go ahead with incomplete initial membership. The reduced number of participants would each have to bear a larger proportion of the total cost but the seven member nations which have already agreed include the four largest countries and would contribute over 85% of the total. Britain's present contribution is approximately 22%.

think automated

G. I. Thompson

In 1919 the International Council of Scientific Unions was founded, along with four of its fifteen member unions. These are the organisations that sponsor the (now) mammoth congresses of thousands of participants, which absorb so much scientific energy. Astronomers got in on the ground floor with a vintage year foundation – the International Astronomical Union – whose general assembly at Brighton this year was as big as ever.

One pleasant derivative of the general assembly has been the practice of hiving off small specialised colloquia, which are held near the time and place of the main meeting, so they can be truly international in character. Consequently the colloquium on 'Automation in Optical Astrophysics' held at the Royal Observatory Edinburgh in August this year had representatives from sixteen countries. Edinburgh was a suitable choice – our 'think automated' tradition was established sooner than most.

Naturally, in so dedicated a company it would have been heresy to question the value of automation. A few courageous souls from the back of the hall came up with 'how many extra people do you need to maintain the equipment', or 'how much time do you spend programming' and the like. They were answered politely but firmly, to the apparent satisfaction of the audience. There appeared to be only one acceptable objection to automation. One speaker had automated a process previously done by young ladies who had now disappeared from the observatory. He received much sympathy.

The colloquium was opened by Professor Rösch, an astronomer from the French Pic du Midi Observatory. He defined automation as either saving human labour or doing work which man himself could not do. There is no mention of computers in such a definition; indeed Professor Rösch insisted that they were not necessary and warned against needless sophistication. However 90% of the papers presented described computer-based systems and the meeting was unhappy when the word was not current.

Control of telescopes is a case in point. An observation will, typically, last about an hour. During this time the telescope must be kept aligned on the stars and must therefore be driven to counteract the earth's rotation. No mechanical arrangement has ever been devised to maintain this alignment against atmospheric refraction and instrumental flexures to the accuracy required. There was a time when the astronomer himself had to observe the star image constantly to keep it centred in the field of view, correcting any drift by slow mechanical drives. This was his only function in the dome and a soul-deadening and uncomfortable job it could be. Now there is a wide range of devices to perform this task. This is automation in Rösch's definition. Nevertheless, at the Colloquium it held marginal interest only, and protests were made when the discussion came to the relative merits of worm and friction devices!

More interesting were systems in which the output of photoelectric devices at the focus of the telescope were linked to computers, such as a multiplex recorder at the focus of a spectrograph feeding a computer, which displayed the results on an oscilloscope. The astronomer could watch the record as it slowly built up – in astronomy, if it's interesting it's faint, and integration times are long. Eventually, he could choose to concentrate further observations in those channels which were turning out to be more interesting.

Another device was to store the photomultiplier output in the computer for short integration times. After some time the output was scanned to see whether a significant event, such as a flare on a red dwarf star had taken place. Presumably a gun was fired too to get the astronomer out of bed! The development of computer-controlled systems of this sort should make the role of astronomers in the dome more significant than that of keeping a star on a cross-wire.

Telescopes for observing the sun are a special breed. They incorporate large spectrographs so instrumental control by computer becomes important. The sun is bright enough to allow the use of sophisticated observational devices, and complex enough to require them, and so provides a further field for automated control. A beautiful example is provided by the magnetograph of the Mc Math solar telescope, which can plot the pattern of the sun's magnetic field over the entire solar disc in twenty minutes.

The automation of reduction procedures, rather than observing systems, will probably be more significant for astronomy in the long run. This is particularly true of photographic information. In *Quest*, April 1970, Dr. Pratt described the problem in the case of plates taken with the Schmidt telescopes, namely the sheer volume of data to be reduced and the solution developed at Edinburgh – the 'GALAXY' machine. This machine has now been in use for nearly a year and, as reported at the Colloquium, has exceeded the specification accuracy.

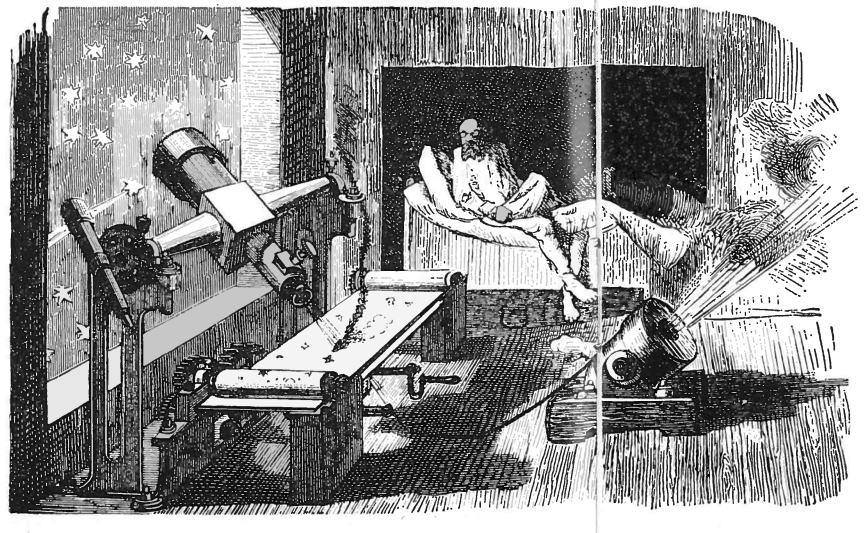
The other major field of data reduction discussed at the meeting concerned stellar spectrophotometry: when digitised microphotometers get the data into machine-readable form. There were descriptions of projects for incorporating on-line control even here, but the advantage gained would hardly stand up to cost-analysis. In the analysis of stellar spectra, unlike the direct photography of star fields, the real problems arise after the data are in the computer. We heard several descriptions of spectrum reduction procedures, ranging all the way from the programming of pencil and paper operations to sophisticated applications of information theory. There is evidently a place for many different attitudes. One of the simpler approaches coupled to an interactive on-line program would be fun to use.

Unlike several other sciences, optical astronomy has been generally slow to realise the possibilities of automation. Following this very successful conference we expect the 'think automated' habit may well become more widespread.

The author, Dr. G. I. Thompson *who is a principal scientific officer at the Royal Observatory Edinburgh, engaged in the automated reduction of stellar spectra. He is now in charge of the analysis of the astronomical data which it is hoped will be forthcoming from the Edinburgh/Liège S68 satellite experiment due for launch in 1972. At present he is writing the necessary reduction programmes.*

(illustration below is reproduced by courtesy of Faber and Faber Ltd. from 'The System of Minor Planets' by Günter D. Roth, MAG, translated into English and expanded by Alex Helm, FRAS.)

Ein Asteroiden-Selbstentdecker.



An indication of how 'popular' the hunt for asteroids had become by that time is given by this cartoon which appeared during the latter half of the 19th century. Automation in astronomy: the caption points out that, in view of the vast number of possible asteroids between Mars and Jupiter, a salvo every quarter of an hour might well be expected.

Fliegende Blätter, Vol. LIX, No. 1470

the latest in physics

At the 1971 Physics Exhibition, the Science Research Council will be represented by nine exhibits. All are in category 'A' which comprises the most recent and original developments which an exhibitor wishes to show.

The exhibition is organised by the Institute of Physics and the Physics Society who put each entry to a panel of referees to decide whether it merits exhibition. It must qualify both on scientific merit and on its novelty in respect of the application of physical principles and the novelty or superiority of its performance characteristics. Most items accepted are therefore at the stage of research and development or prototype and early production models, although some established production items are accepted as well.

SRC will appear on the stand organised by the Department of Education and Science on behalf of the Research Councils. The nine exhibits are:

from Rutherford Laboratory

Gas purification rig
Mono-energetic electron source
Foil stretching technology
Heat pipe and liquid hydrogen target
Television cameras working in high magnetic fields

from Daresbury Laboratory

Precision magnet measuring system
Data handling and instrumentation techniques for high energy nuclear physics experiments

from the Astrophysics Research Unit

Rocket borne echelle spectrograph for high resolution studies of the solar vaccuum ultra-violet spectrum

from the Radio and Space Research Station

Millimetric radiometry in studies of the sun and troposphere.

diary note

The exhibition will be on view (and open to the general public) on April 19–22 (Monday to Thursday) at the Alexandra Palace, Wood Green, London N.22. It is open till 6 p.m. on Monday and Tuesday, till 7.30 p.m. on Wednesday and closes at 5 p.m. on Thursday.

science research in the universities

These are a few of the major grants announced by the Science Research Council during October and November, 1970. They show some of the variety of research projects supported by SRC outside its own research establishments.

space science
In October SRC made a grant of £690,000 to carry on the programme of geophysical and astrophysical research in space, being undertaken at the Mullard Space Science Laboratory (University of London) under the direction of Professor R. L. F. Boyd FRS. In the last three years the Laboratory has been supported by a grant of £519,000 and has continued its very successful programme of ionosphere and magnetosphere research, and of ultra-violet and *x*-ray astronomy, using experiments flown in rockets and satellites.

Under the new grant, studies of solar and stellar *x*-ray emission and solar ultra-violet emission will continue. Particular emphasis will be placed on the study of cosmic *x*-ray sources, using a reflecting *x*-ray telescope array in a NASA satellite (OAO–C), two new instruments in the cosmic *x*-ray satellite, now being planned as a UK/US co-operative project, and several instruments in UK and ESRO rocket payloads. A large ion probe is being prepared for the ESRO IV satellite (launch date in 1972) also low energy particle detectors intended for a geostationary satellite. Experiments launched in UK and ESRO rockets will study the coupling between the magnetosphere and the polar ionosphere, which involves the same low energy particles.

applications invited
Photochemistry is being supported by sixteen different grants totalling £235,000 over two to five year periods. The applications for grants in this field, which came to £1.1M altogether, were considered by a specially constituted selection panel of the Chemistry Committee.

Applications have been invited for the 1970/71 academic year and if sufficient good proposals are received it is hoped that funds will be available on a similar scale.

The particular topics the Council wishes to support are :

fundamental studies of energy transfer in excited molecule reactions;
investigations of the factors which govern the absorption, transfer and dissipation of energy;
excited state chemistry, particularly of readily available and/or structurally simple materials;
new syntheses based on photoactivation, particularly those involving readily available starting materials.

new balloon studies
Professor P. H. Fowler FRS of Bristol University is to carry out a new series of experiments in continuance of his outstandingly successful balloon-borne cosmic radiation studies, with the aid of an SRC grant of £65,000. A novel 'Venetian blind' arrangement will be used on a detector to be flown from Texas. This allows the launch and exposure of a greatly increased area of detector – possibly up to 100m^2. Additional exposures with thick detector plates which will be capable of slowing down or even stopping some of the slower primary cosmic ray particles are planned for northern USA where slow cosmic ray primaries are able to pass through the earth's magnetic field. The plates will consist of sandwiches of thin plastic detectors, photographic emulsion and brass sheet, of a total thickness of around 1cm.

The balloons will be the latest polyethylene type with a volume in the region of 10^6m^3, capable of carrying a payload of just over a ton to a height of 40km and remaining there for more than 40 hours.

mathematics – applied
Functional analysis, the qualitative theory of partial differential equations and certain advanced numerical methods will be important aspects of study in the research programme to be carried out by Professor T. Brodie Benjamin FRS at the Institute of Fluid Mechanics Research. The Institute is being set up at the University of Essex with the help of an SRC grant to Professor Benjamin of £70,600 over three years.

These subjects, taken together, encompass knowledge that is central to many recent developments in fundamental mathematics and is also useful when mathematics is used to describe physical systems and analyse them quantitatively. Professor Benjamin plans to develop a profitable partnership of modern mathematics with experimentally orientated applied-mathematics research. In order to bring the newest mathematical knowledge in this field to the Institute, distinguished foreign mathematicians will be invited to take up Senior Visiting Fellowships. The subject most likely to form the initial focus of the programme is the general theory of waves in fluid systems that are both non-linear and dispersive. This is a rapidly advancing field that is becoming more important in many practical contexts – in dynamical meteorology and oceanography for instance.

Professor Benjamin, formerly reader in Hydrodynamics at Cambridge, will hold the Augustine Courtauld Research Fellowship at the University of Essex for the three years of the grant.

arc phenomena
His work on electric arc phenomena in industrial devices has gained Professor H. Edels of Liverpool University an SRC grant of £212,420 to supplement an existing grant of £20,000. His aim is to carry out fundamental research on the high current arc under conditions relevant to switchgear and furnaces, initially. This will be concerned with high current arcs at high pressures and in ultra-high vacuum and with arc interaction with high speed gas flow and magnetic fields.

The data obtained should be of assistance in the understanding and development of a wide range of arc and plasma devices in addition to switchgear and furnaces. It should eventually prove of considerable assistance to British manufacturers competing in world markets. The project is therefore being developed in collaboration with several industrial firms and use will be made of their high current test facilities. A Steering panel of senior industrialists under the chairmanship of a senior academic will review progress and give advice and assistance.

problems of enzymes
A group of academic staff and their collaborators from eight different departments of the University of Oxford are to make a combined attack on some major problems in molecular enzymology, using different approaches. They will be supported by an SRC grant of £371,000, which will be mainly spent on developing a high field multi-nuclear NMR spectrometer of the most advanced design, operating at 270MHz for protons. The Group intends to concentrate increasingly on the enzymes of glycolysis which constitute one of the simplest and most important sequential systems of intracellular enzymes.

Other grants made recently for Enzyme Chemistry and Technology are :

£36,905 for work on the synthesis of artificial lysozymes *(Professor G. W. Kenner, Liverpool);*
£15,270 for spectral studies of the mechanism of enzyme action *(Dr. M. R. Holloway, UC London);*
£30,830 for chemical engineering studies basic to the use of enzymes as industrial catalysts *(Dr. B. Atkinson, UC Swansea);*
£15,785 for work on acid-base catalysis in model systems related to enzymes *(Professor R. P. Bell, Stirling);*
£10,451 for a study of the active state of riboflavin synthesase *(Professor H. C. S. Wood, Strathclyde).*

computer program
Professor I. L. Douce of Warwick University is to extend the work at the Inter-University Institute of Engineering control, with an SRC grant of £175,000. Most of the grant will be used to provide a computing system based on the RXDS Sigma 5 computer.

'That's the trouble nowadays – no knowledge of the classics!'

(reproduced by kind permission of 'Punch')

This will be situated at the university to serve as a control research facility for the Institute and will be made available to other universities and colleges in the area as far as possible. The Institute was set up by the University College of North Wales and the Universities of Sussex and Warwick, partly in response to SRC's policy of encouraging collaboration between universities in this field. The post-graduate courses in control engineering at these universities were integrated into one advanced course which has proved very successful and is now being run for a fourth year.

There are four main areas of fundamental control research being developed within the Institute:
mathematical modelling of dynamic systems and parameter estimation;
analysis and control of distributed parameter systems;
analysis and design of control system actuators; and
application of optional and sub-optional strategies to practical systems.

These studies are linked to practical projects being carried out in active collaboration with industry and are mainly concerned with work on internal combustion engines and jet engines.

publications
Reports from Boards and Committees due out this month are:
'The Physics of Surfaces' *(Science Board)*
'Desalination' *(Chemical Engineering and Technology Committee)*
'High Temperature Processes' *(Chemical Engineering and Technology Committee)*

These reports summarise research work carried out to date and plans for future research.

nutcracker no. 2 – tiddleywinks

At the Rutherford / Daresbury tiddleywinks match, the teams in descending order of ability were: Rutherford : Alpher (captain), Bethe, Gamow, and Dirac; Daresbury: Alf (captain), Bose, Gammer, and Nina. There were four rounds, every player meeting each of the opposing team once, and since the four mats were of different quality, it was agreed that each player should use each mat once, and that he should use the best mat when playing the corresponding player in the other team. The two captains were to meet in Round 1, and Bethe and Gammer were to meet in Round 4, using the worst mat (so that they could play in the train going home). Furthermore, Dirac's principles excluded him from playing Bose either in Round 2 or on Mat 2. How were the matches arranged?

Hint Consider whom Gammer plays while Dirac is playing Bose. In which round?

Peter Casey

(answer on page 14)

why bother with contracts?

The Editor of Quest

Dear Sir,

Reading the letter in the October '70 issue of *Quest* and recognising myself as a typical Amateur Buyer, (probably in common with more than a few engineers), I must take up my pen in defence of people in a similar position to mine who are sometimes forced to short circuit the system.

I hasten to say that I do try to make use of the normal buying channels and the excellent Contracts Branch and I am the first to agree (well maybe the second to agree) that the provision and use of a recognised system of paperwork is necessary to ensure the smooth running of dealings with outside manufacturers.

For my part as a reluctant AB it is normal for me to want my goods yesterday. Unfortunately real work cannot be put into tidy piles or filed away for attention some other time like stores requisitions or expenses claims, it tends to demand attention because of sudden failures which do awkward things like putting the lights out or causing the heating to go off. I do admit to an occasional preoccupation with 'getting the job done' and the secondary task of pulling the paperwork system, with all its hangers on, along with me receives less of my attention than it might.

You see I am the recipient of the kicks if the job target is not met, and whilst A Buying may throw the system into confusion (more confusion that is), one normally gets the goods quicker. I find that in the normal purchasing procedure there are at least eight people who must progress my order though it says something for the success of the method in that it is not unknown for a supplier to receive the order in only a little over a week since I raised it. In my amateurish way I have had goods from almost anywhere in the country in my hands *on the same day* that I telephoned the order through. (How long it then takes the firm to get paid I don't know.)

There is unfortunately no standard procedure for dealing with the 'rush job' probably because the army of administrators do not wish to recognise the existence of such an inconvenient event. I once went to the lengths of physically carrying the papers from person to person in an attempt to hurry the system up but even this took me all afternoon and I was subjected to a few raised eyebrows when I explained my purpose.

On another occasion when an urgent order was not received by the supplier in 10 days I found that the clerk whose job it was to note my order number in a large book was on two weeks leave. These things happen in any large buying organisation simply because my orders receive the same priority as all the others whereas I can give them top priority.

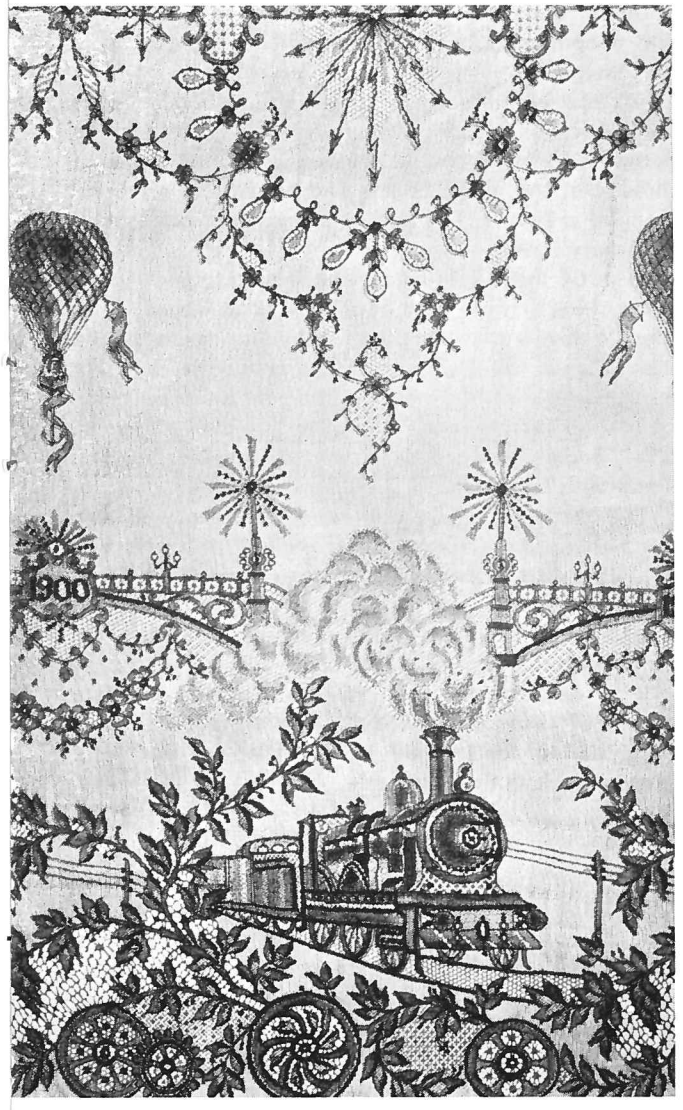
I see that one of the comments in the letter refers to A Buyers never attempting to enter into price negotiations or cost saving, as it is inferred Contracts Branch of course would. Contracts have never initiated any reduction in the price paid for my jobs. On the contrary they are only too eager to pay up, even if a cost reduction is likely to be negotiated for some reason. One of my difficulties has been trying to hold up payment – anyone who has had a largish bill in the offing near the end of the financial year knows how difficult it is to interfere in the payment process. I have had to insist on money being returned from a firm before now because of the 'never before seen' enthusiasm of a bill payer trying to get his yard arm clear before an inspection by his chief. Engineers are of course renowned for their cunning in the field of negotiating a lower initial price or in obtaining a reduction after ordering.

Incidently one of the reasons that I have replied to the original letter and tried to put the other point of view is that I am the buyer for whom the Lost Hopper in Offices Services Section was intended. This went astray three months ago since which time the firm has sent me another. I find that in this case I followed, fortunately, the correct contract procedure but that the item was not sufficiently well addressed by the sender. (Undoubtedly another office type.)

There is another part of that order which never did appear, it is a screw conveyor complete with motor. If *Quest* can find this for me as well the Ed might consider starting a Lost Property column. This would be of great use to all AB's and maybe even to Contracts Branch. It might also be a further justification for the chosen name of the magazine.

Anon.

(name and address supplied)



J. G. Hartshorn

When I was asked to write an article about my life in France before I joined SRC I thought that instead of the usual scientific subject for the house journal, members, especially the lady members, would be interested in the history of the manufacture of lace.

I wonder how many people passing through the town of Calais, rushing along to find the hot and sunny weather of the South of France or Spain, realize that for a great many years this town was the main centre of machine-made lace. These machines were able to reproduce the finest and most delicate designs of the old hand-made laces to perfection.

Nottingham until 1816 was the birthplace of the trade, where the first lace is supposed to have been produced by a certain Roger Clarke, a bone lace weaver who invented a simple lace in 1597. But it was not until 1800 with the invention of the Pusher machine (so called as the bars moving the threads had to be pushed by hand) that the square net used for mitts and especially for the foundation of wigs was produced. Later Heathcoat brought out the bobbin net, which reduced the price and made it possible for the ordinary person to buy it.

The trade suffered from the embargo Napoleon I imposed on English nets by prohibiting the import of them into France. To overcome this, bales of nets were smuggled across the Channel by special fast sailing boats known as 'smugglers'. To retaliate, the English Government made stringent laws against the export of English machinery. Strict vigilance was kept not only at the Channel ports, but also on the Nottingham factories.

To overcome these drastic measures a mechanic from Nottingham, James Clarke, introduced the first lace machine into Calais in 1816, by smuggling the various parts of the loom under the fish and nets of a fishing boat with the help of French sailors. He was quickly followed by two of his friends Bonington and Webster (Bonington was the father of Richard

holiday special

'Staff are eligible for annual leave with pay to an extent which varies according to the class or grade in which they are employed and, generally, to their length of service.' CEM 4A2

So how do we spend it when we get it? In the next five articles some of our readers recall places and pursuits which interest them. Perhaps they will help you to choose between the glossy ads which thump through our letterboxes through Christmas until Lent with the message 'Spend ye for the end of the booking season is at hand'.

Appropriately enough our first port of call is Calais – its historical background. The article is written by Mr. J. G. Hartshorn who retired from the Council Secretariat last May – *(see Quest, July 1970).* He was the British Pro-Consul of Calais, then Vice-Consul, from 1930 until 1940 when he had to evacuate the English colony under the fire of enemy planes and the advance of German troops.

Calais and the lace trade

'Train'. Lace produced by the firm of Davenière 1900. Photo by courtesy of the Musée de Calais.

Calais and the lace trade continued

Parkes Bonington, the celebrated water-colour artist). To embellish their net, they embroidered flowers by hand over it very quickly with a thicker thread. These were the first efforts to produce a pattern on net. A few years later in 1821 over 38 looms were in full production, all manned by English lacemakers.

The father of the hand-made lace in France was Colbert the minister of Louis XIV, who in 1665 asked a certain Madame Gilbert to set up a lace work-shop at Lonray near Alençon with 30 needlewomen from Venice. Other work-shops were opened in various parts of France, but the most important one was at the Château de Madrid in the Bois de Boulogne of Paris where the well known Point de France was made. In 1692 at the battle of Steinkirk, some French officers wore lace on their uniforms and collars. This was such a success that the fashion took on, and was known as the 'Steinkirk' style. At the same time 'The Fontange' was worn by the ladies – a high head-dress of lace which took its name from the Duchess of Fontage a favourite of Louis XIV. One day when out hunting, she had lost her hat and covered her head with a square piece of white lace.

Naturally the Flemish laces made in the 'beguinages' such as Bruges, Malines, Brussels and Louvain were considered the best handmade laces, and the lucky person who still has a piece at the present day has a priceless article.

When France tried to impose a rather high duty on these goods, and put up a strong cordon of custom posts along the Belgian frontier, a great increase of smuggling started as the demand for hand-made lace was considerable. The lace was smuggled across the frontier by specially trained dogs, who carried the merchandise wrapped round their bodies. A great many houses were built right on the frontier line, half in Belgium and half in France. The dogs would enter the house by the back door in Belgium and go out by the front door in France, when the French custom patrols had passed and all was clear. They travelled by night and kept to the fields and woods and delivered their loads as far down as St. Omer. The traffic was so great that between the years 1820 and 1836 as many as 40,278 dogs were destroyed, as per the statistics of the French Custom House.

The boom for machine-made lace really started when the machines were adapted to the Jacquard system of working the bars automatically. The Binche, Alençon, Malines and Valenciennes cotton laces were generally produced on 9 point Leavers machines with 18 bobbins to the inch, but the fine Chantilly silk lace was made on a 16 point Leavers machine with 32 bobbins to the inch. This was the fine quality article using two kinds of silk yarn which produced a beautiful and delicate open-work effect outlining the pattern filling round the vases, baskets and a combination of flowers, sprays and leaves in the design.

All the workers were extremely skilled artisans with years of practice and eyesight keen enough to notice a broken thread among the thousands of threads of the warp, beams and bobbins. They commanded a high salary, and liked moving from factory to factory for experience.

In 1854 the whole lace trade moved to the village of St. Pierre (now part of Calais) 2 miles south of the old town, on account of a by-law made by the then Mayor of Calais prohibitng the working of machines during the night, as it disturbed the sleep of the inhabitants. St. Pierre, from a small village of 933 people, grew to a large size town of 33,390 inhabitants with over 2,722 large machines.

The trade passed through many difficult times: the 1886 and 1929 slumps in prices, the world war of 1914, and especially the second world war of 1939 which with the bombing of the factories and smashing up of most of the machines, reduced the production to practically nothing.

It is sad to add that this famous and delicate article of dress is practically out of favour and is disappearing fast, killed by the modern trends of fashion such as the mini-style.

a walk around mont blanc

Allan Ridgeley

Have you heard of the Tour of Mont Blanc – a walking tour round the Mont Blanc Massif? Apparently it is very famous on the continent, and can probably be compared favourably in quality although not in distance with our own Pennine Way. The route, which passes through France, Italy and Switzerland, has many variations and this is one of its chief attractions. The tour can be completed in six days but there is sufficient interest to fill in a fortnight's holiday easily. My fiancée and I had not organised our holiday when we read about the tour in an *Observer* article. It seemed an interesting proposition so we wrote off for details, and finally arranged a fortnight's walking holiday of which the tour proper took up nine days.

Our route was 80 miles long with about 28,000 feet of ascent and descent. We must confess, however, that nearly 25 miles of distance and 13,200 feet of ascent were accomplished by mechanised means – chair-lift, rack-and-pinion railway and 'bus. On the other hand, we did have to carry rucksacs weighing 25–30 lbs all the time.

'Swan'. Lace produced by the firm of Georges Elie and shown at the Exhibition of 1900. Photo by courtesy of the Musée de Calais.

We did the route in a clockwise direction following the *Observer* example, but it is more usual to go anti-clockwise. We soon found it was necessary to speak in French to people encountered walking anti-clockwise but those walking clockwise spoke English and would have the green *Observer* pamphlet somewhere about their person.

We stayed in hotels or pensions except for one night in a mountain hut. It is possible to stay at several mountain huts on the route but it seems difficult to make an appreciable saving that way so one might as well have the comforts of the valley.

The most accessible starting point for the tour is Chamonix, reached by train from Paris or from Geneva airport. Alternative starting points are Courmayeur, Orsière or Champex. We started from Champex having walked there from Martigny but in fact there is a daily 'bus service and walking is not recommended.

The best map for the tour is the 'Gruppo Del Monte Bianco' published by the Italian Touring Club but the Swiss maps of Martigny and Courmayeur are also useful. The guide 'Chamonix–Mont Blanc' published by Constable provides a very good companion for the tour. Finally, for those who prefer to have their holidays organised for them, the Ramblers' Association is arranging the Tour of Mont Blanc as one of their walking holidays in 1971.

summer in autumn

One year finding ourselves in late August with no summer holiday arrangements and the prospects of sunshine in the UK growing dimmer, my wife suggested a Mediterranean cruise. Overcoming some suspicions of being a bad sailor I agreed, with the result that on October 5 we joined the s.s. 'Reina Del Mar' at Southampton for a fifteen-day voyage to the Med.

The weather got warmer during our first day out. We started on Thursday evening and arrived at Malaga, just inside the Med, early on the following Monday. We next tied up at Genoa (Thursday) leaving the same night for Leghorn (for Pisa) where we spent Friday. That night we left for Lisbon on the homeward trip, arriving on the Tuesday after passing Gib in bright sunlight. Leaving Lisbon that night we arrived back at Southampton on the sixteenth day. Over the cruise the ship covered 4079 nautical miles (equal to 4697 land miles) at an average speed of 16.18 knots.

At the four ports of call shore visits and excursions were arranged through Thomas Cook at reasonable rates (about £8 per full day including meals). Otherwise one could just stroll ashore, returning for lunch and dinner on the ship.

The meals were as we have come to associate with luxury cruises – a menu card that I have lists over 50 items: fruits/soups, fish/entrées, choices of main course, sweets, cheese and biscuits, fruit and coffee. We sat eight to a table, having the complete attention of one waiter, who, like most of his colleagues, was Spanish.

The preparation, cooking and serving of the food was of first class hotel standard and the portions generous. On the second day we found that we could manage only the entrée for dinner, with lunch and breakfast scaled down to home proportions, although on the first day we had attempted the full card. Tea was a rushed affair and not worth leaving a comfortable deck chair for.

The ship had a main lounge, the 'Coral', for the principal social events, including 'Bingo' in the afternoons, dancing lessons, fancy dress balls and ship games, such as horse racing without horses. The games were quite a feature of ship life and there was a tote for those seeking their fortunes.

Allan Ridgeley is an Experimental Officer at ARU Culham, working in solar physics experiments launched on Skylark rockets.

summer in autumn continued

The cinema was on two levels and, owing to the projector beam having to miss the edge of the galley, the screen was too near the ceiling which produced a curiously narrow picture. Current films were shown in the afternoon and late evening and changed every two or three days. On Sunday mornings the Captain held a dignified naval-type service there, with the officers in their white uniforms in the front row. It was also used by the Cruise Purser for an illustrated lecture on places worth visiting which he gave before each port of call.

The Cruise Purser was the master of ceremonies for all social activities. Ours was a cheerful young extrovert who conveyed the impression at all times that everything was fun – including the safety drill which he conducted on the first day at sea.

Excluding the first evening and the last day, the October weather ranged from English spring to high summer, reaching about 80°F between Malaga and Genoa on the outward voyage. The ship had two swimming baths and on the way out we had the traditional Neptune ceremony. One was shallow and reserved for children under supervision of a stewardess. The larger was crowded on hot days – and hogged by the inevitable show-offs. In high summer I imagine the pools would be uncomfortably full.

When we went it was outside the school holidays, which may account for the small number of children aboard – around 40, mostly toddlers. It was also outside the main holiday period, which may be why the middle-aged were in the majority among the 851 passengers. Cruising is a lazy life and I would recommend it only for someone who feels the need to r-e-l-a-x – spelled out slowly – or who is recovering from illness. It is not for the energetic, nor for those whose prime concern is to visit foreign parts. The one-day stops give insufficient time to see much and first you have to get clear of the port area. You see more of the sea than anything else: It is certainly a dark blue in the Mediterranean and, we learned, well over a mile deep in parts.

Our ship was fitted with anti-roll stabilizers and behaved well even through the Bay of Biscay. I did take some of the proprietary pills as an insurance and never came near sea-sickness, but frankly I saw few heaving up their hearts.

Altogether the cruise for the fortnight worked out about 50% more than I would expect to pay for a fortnight at a good hotel in Europe with some travelling thrown in. At no time on board did one get the impression – experienced so often with package tours – that things were cut down to a price, nor was any attempt made to sell us anything that we did not want.

As for the prospects of romance, the proverbial raison d'être of many young ladies who cruise, I can only speculate; but the handsome Medical Officer announced his engagement to one of the lady Assistant Pursers during one of the fancy dress balls!

all at sea

I recall Sunday morning vividly. It was almost seven thirty, the sun was not beaming brightly, no one was up, and despite a night of near subconscious sleep, my bunk seemed as hard and vicious as it had the night before. I opened first one eye then the other, grunted 'Good Morning' and waited – no reaction. Though by now accustomed to the smell of Calor gas, even at that hour, I was in no doubt who slept closest to the stove. Slowly I eased my buckled frame out onto the galley floor, filled the kettle and after lighting the gas slowly summed up the effort to bellow to the sleeping huddles 'It's morning'.

This activity had the desired effect; even the clouds took fright and let a little more sun come through, and the sleeping bags extended out hands to grab the deep brown tea, by now brewed and distributed in assorted mugs. My efforts at tea making normally leave much to be desired, but especially so that morning if you include the lumps of Marvel that floated like dried peas on the muddy liquid that filled the cups. The result was instantaneous, the crew was everywhere, anxious at any cost to be up and dressed and prevent me doing similar injury to the sausage, bacon and egg set aside for breakfast. The sudden rush of activity prompted me to go on deck. Here a high level conference was developing between the Skipper and Bill, should we go around the island? The final decision was left to Bill; Harry had explained the wind, tide and weather were just right but it might get a little rough.

William, a glutton for punishment, leapt at the chance and we set sail and rolling gently ventured into the unknown. Breakfast was more usual that morning, everyone tempted by the smell of fine cooking, and close to starvation after the efforts of the day before, filled themselves with sausage, bacon, egg, bread and lashings of sauce. After breakfast the wind freshened and the journey began to get more interesting, but perhaps a little more uncomfortable. It was at this point that one of the mast stays gave way at its anchorage to the deck. Bob and I scrambled forward, Bob reaching the stay, myself reaching the bow of the leeward hull just in time to waste a good breakfast over the side. Acting on the philosophy that once physically sick, mal-de-mer can be forgotten, I threw myself deeper into the task of sailing the boat. On reflection it would have been simpler and considerably less painful to fling myself into the sea. The wind became stronger, the waves higher, and the shore began oscillating even more violently. Oh to be on dry land again . . .

In case you are still wondering . . .This (sea) sick tale comes from 'Chunky' Lepine and relates to a weekend cruise from Hayling Island to Cowes and back, made in a borrowed yacht by a group from RSRS. The full harrowing story first appeared in two exciting instalments in the RSRS Newsletter. Chunky is an SO in the D-region physics rocket group, working on the analysis of x-ray experiments and the effect of x-rays on the D-region of the ionosphere.

adventure courier

Or if you want a holiday which gets you to places off the usual tourist routes, you could join Dennis Fogerty of F Division's Internal Audit Section.

In 1970 he took a party – on a 'share and share alike' basis – to Turkey in a minibus. They stayed at camp sites and he showed them a lot of places which he had 'discovered' for himself in previous years (on family holidays – he has three children). This was such a success that he is organising no less than four expeditions to Turkey in 1971, although he will of course only have enough leave allowance (he has completed his 20 years and more in the public service!) to drive one himself. Each party contains 13 passengers and 2 drivers. The holidays are named 'Topkapi Safari', after the famous palace in Istanbul, and take from 16 to 24 days. Turkey is very hot then – the holidays run from June to September – and is ideal for sun lovers.

All you need to take with you is a minimum of camping gear, a willingness to take the rough with the smooth (*ie* the 'camping spirit') and an adventurous outlook. If you would like to go or to find out more, ring Dennis at home on 01-883 0915 or drop him a line at 99 Elmshurst Crescent, East Finchley, London N2. Armchair travellers can hear more about it in our next issue.

words across the sea

Ian Arnison

It is difficult for a person engaged in the field of communications to visit the information services of official and public institutions in North America without some preconceived ideas. Firstly that the methods employed are more modern and faster than ours (not true and the Americans would be the first to agree); secondly that the market for public information through newspapers, television and radio is much larger (well, that's plain hard fact) and finally that they have new answers to old communications problems (a debatable proposition). Of course there are some most interesting innovations taking place.

All the major American scientific bodies I visited have well organised public relations services run on highly professional lines. They deal with press and public, films, exhibitions and sometimes publications. Quite often the organisation, both of the departments concerned and the work they carry out, is similar – as might be expected – to our own practices.

It is when we get down to the broader issues of disseminating information (especially through the printed word) that a difference begins to appear, for the simple incontrovertible fact of distance in an area as large as North America.

In Britain we have a handful of national daily papers available throughout the British Isles each morning. In addition, there is the regional daily and evening press and local radio and regional TV services. But in California alone there are about one hundred and forty daily and evening papers (some surviving on a circulation of less than ten thousand) and dozens of local commercial radio stations. Hence the syndicated feature article sent to many papers and read simultaneously by a multitude of readers in different parts of a State, or the country as a whole. Such features can often give an "in depth" description of a subject to a very wide audience.

What of the issues involved? Pollution of the environment, student unrest, an unfavourable image of science and technology, are high on the agenda. Good communications can play a vital role but the issues are that much deeper.

Canadian experience is probably a good example of the concern being shown with the explosion of information in science and technology. In recent years a number of studies have been carried out in

Canada on various aspects of communicating information on these subjects. As a result the Science Council has recommended that at the present time, information should be collected and disseminated by 'a decentralised system . . . but collaborating together under the guidance of some coordinating body to constitute a network of services'.

The National Research Council of Canada – a body with many similarities to the former DSIR – has been given the job and it is a priority aspect of the Council's work to co-ordinate this expanding and important area. Now technical information services both for Ottawa, where the NDC headquarters is situated, and in the field come under a vice-president for scientific research, one of the four vice-presidents who form the senior staff of the Council.

The Council is concerned not only with technical information services but good lay public relations as well. In the last two years it has developed a popular style magazine called *Science Dimension* which is sent to a wide public. It is clearly and attractively illustrated with photographs supplied by the audio visual section of the Office of Information Services. (The Canadians have always had a strong tradition in this respect led by the pioneering work of the National Film Board of Canada.)

In addition the Council publishes a number of learned journals covering fields such as Biochemistry, Botany, Chemistry, Earth Sciences, Physics and Physiology. These are the responsibility of a vice-president who has responsibility also for the National Science Library.

If NRC is an example of the small well organised public information side of an official organisation, NASA is its counterpart on a much larger scale. In fact, during a manned space flight, no fewer than two hundred and fifty public information people are involved in the operation. A thesis could, and probably will, be written on their information services!

One aspect, perhaps little known here but a success in the USA, is NASA's series of popular science handbooks intended for schools and the lay public. Publications such as 'How Far a Star', 'The Shapes of Tomorrow' and 'Beyond the Solar System' have been developed by the agency in co-operation with the Office of Education. They are intended as textbooks yet written in a popular fashion and extremely well illustrated. Schools working on projects can apply for them through local education systems.

This relationship between a scientific, technological venture and schools maths and physics programmes must be unique.

next column

In a different context – scientists themselves endeavouring to satisfy the community's need for authoritative scientific information – they have the Scientists' Institute for Public Information.

The Institute was founded in 1963 and is incorporated as a non-profit educational corporation. It now has a small full-time staff in New York and local committees in many parts of the States. The President is Margaret Mead.

SIPI does not provide information directly to the public; this is the job of its local committees. What it does directly is to convene conferences and workshops on technical aspects of social issues for scientists to exchange information and ideas, to evaluate data, indicate and develop other areas where information is needed.

The Institute's fundamental aim is to bring information to the community in understandable terms and with scientific objectivity. Once the evidence has been presented, it is up to the community to resolve the issues which arise, through the normal processes.

The primary issues with which SIPI concerns itself are environmental conservation (air, water and soil pollution), population control, biology and sociology of race and the non-military uses of nuclear energy. Its principal publication *Environment* (well, if inexpensively, produced) is issued ten times a year on subscription. Its other publication is a quarterly free newsletter to its members and local committees. Members of all the committees serve without remuneration. The preponderance are natural scientists, as we might expect, but social scientists and laymen also participate. They do not express opinions on social policy or political programmes.

A speakers' bureau handles requests from community and student organisations while local committees testify before legislative bodies, appear on television and radio and prepare articles for publication.

Many committees develop their own information programmes; the New York committee conducted a study on the use and siting of nuclear reactors; Rochester monitored local waters for pollution and Chicago, Rochester and New York conducted case-finding programmes in lead poisoning among pre-school children in the slums.

In one way the SIPI – in its desire to make the maximum authoritative information available to a wide public – typifies the whole American approach to information work.

The author is the Council's Public Relations Officer.

solution to nutcracker on page 8

	Rnd. 1	Rnd. 2	Rnd. 3	Rnd. 4
Mat 1	A v a	B v b	G v g	D v n
Mat 2	D v g	G v n	B v a	A v b
Mat 3	B v n	A v g	D v b	G v a
Mat 4	G v b	D v a	A v n	B v g

Key

A–Alpher, B–Bethe, G–Gamow, D–Dirac.
a–Alf, b–Bose, g–Gammer, n–Nina.

operation 'synchran'

(Synchronisation Atlantique Nord)

The DC-7C flying over the West Building of the Royal Greenwich Observatory in September.

Following the co-ordination of the national time services of the UK aud USA in January 1961, radio time signals have been co-ordinated on a world-wide basis.

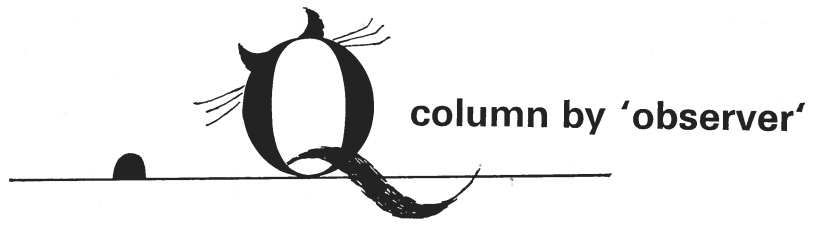
From intercomparisons of national time scales, the Bureau International de l'Heure computes and maintains an international scale of atomic time, which is at present based on the atomic clocks at Braunschweig, Boulder, Hamburg, Herstmonceux, Neuchatel, Ottawa, Paris, Stockholm and Washington.

The atomic clocks at the Royal Greenwich Observatory at Herstmonceux, which provide the time standard for the United Kingdom, are regularly compared with similar clocks in the USA, in Canada and in continental Europe, by means of precise measures of the signals of the radio navigational system Loran-C. Under normal conditions synchronisation to an accuracy of the order of one microsecond (one millionth of a second) can be maintained.

Periodical checks are made using an atomic clock which is carried from one station to another. For example, a clock may be compared with those at the US Naval Observatory in Washington, USA, then brought by air on a scheduled air flight (the clock occupies a first-class seat) to Heathrow, then by road to Herstmonceux. It is compared with the clocks of the Observatory, then taken back to the airport and by air to establishments in France, Germany or elsewhere. After a few days the clock returns to the USA where is is again checked against the clocks of the US Naval Observatory. In general, the 'flying' clock will agree with the clocks which have remained undisturbed to within 0.5 microsecond.

In September the Royal Greenwich Observatory co-operated in an experiment to evaluate a new method of precise time comparisons between different countries. A French organisation, the Office National d'Etudes et de Recherches Aerospatiales, have been carrying out tests on comparing land-based clocks with an atomic clock carried by an aircraft while the aircraft is actually in flight. In September they flew one in a DC-75 from the Centre d'Essais en Vol over the Paris Observatory, then to England to make 2 or 3 passes over the Royal Greenwich Observatory. The clock was then flown on to Ottawa, where the Canadian National Research Council clocks are situated, then to Washington, passing over the US Naval Observatory. It was landed and remained in the USA for a few days and was flown back over the same course.

Some equipment was made available by the French authorities, and the RAF and the Royal Aircraft Establishment co-operated on the provision of specialist equipment. The Hewlett-Packard Company made available one of their high speed printers for automatic recording of the results.



someone somewhere . . .
We always understood that junior administrative grades were told, strictly off the record, that if they were ever landed with the buck – irreversibly – the last resort was to address it to 'Mr. Smith, (by bag) Bombay', or 'Singapore' or anywhere that seemed far enough off. They would thus fulfil their prime function of referring the matter with the added advantage that one problem at least was unlikely to reappear on anyone's desk to cause further embarrassment. Nowadays we imagine a new Independence with an embryo civil service would be top choice.

That there were reciprocities had not occurred to us until this appeared in a recent Rutherford Laboratory bulletin:
'UNDELIVERABLE MAIL. Letters for Mr. Bohumul, Mr. B. J. Dropesky, Emesic John Simbo and A. Abdullah'.

To our no great surprise, the next bulletin announced the following: 'Thirty-two Assistant Principals of the Administrative Class on a course at the Civil Service College, will visit the Laboratory on Friday, 20 November'.

We wonder if they went to learn the latest reprisal techniques or to teach them . . .? We were not able to find out but believe that the matter has been referred.

pollution solution
One of the ways to get rid of the waste disposal problem we are told is to use the by-products of everything for something else. Not being adept to explore the chemical breakdown, we have confined our research to objects in the state of initial discard. An analysis was carried out on the contents from a random selection of the waste bins left under people's desks to be filled in those idle moments that follow a brief hour's excessive industry. ...

Keen dustbin pickers may be interested to know that our selection – taken from under the desks of high and low, male and female alike – had certain basic similarities. It did not appear, in general, that the single cells of the highly paid would yield the best bargains. We therefore suggest that you shop around and indeed you might find a wider variety for less expense of time and energy if you search in the multi-bodied departments.

The sort of collection most commonly found contained:

1 *Lots of paper (torn or crumpled)*
2 *100 (or more) holes ¼in dia, centres only (scattered in and around the bin)*
3 *Several 'action here' labels*
4 *2 yoghurt cartons (empty)*
5 *A wrapper from low starch biscuits (quite empty – not a crumb left)*
6 *2 doll's size metal hats in Spanish style*
7 *A banana skin (empty)*

All of them ruthlessly given the chuck without a thought for their future: not one that didn't have a further usefulness. Next time do think before you throw and one day you might hit on the final solution to the whole problem. If you do – let us know. Meanwhile here are some simple answers:

1 *Paper, torn, crumpled – use for stuffing windows/winter overcoats against draughts, ears against noise or cushions against hard seats.*
2 *holes, small, centres of – use to make a small bag of confetti go a long way. The disposal problem is thus passed to the churchwarden.*
3 *'action here' never stops here unless you're the President of the United States. If a lot of these labels appear on work in the 'in' tray, do not unpin but transfer both the work and the label immediately to the 'out' tray, addressed to anyone with a different name from yours.*
4 *yoghurt cartons are, of course, cactus pots and will help to solve the nurseryman's disposal problem.*
5 *wrapper, biscuits, low starch, from – should be pinned on the notice board, or circulated, to boost the morale of fellow inmates. For it would appear that the most endowed feel just the right size when they hear of others going on a diet: conversely those with smaller surroundings have exactly the same reaction.*
6 *Spanish hats, metal, doll's size (that come in the ends of rolls of photographic paper) can be put on a doll dressed* olé *or worn as a minimus hat by a dolly in a maximus coat.*
7 *finally the empty banana skin. Never discard. Keep it oiled and ready for one more throw and it may well be one of the last things you will ever laugh at.*

vacancy at Rutherford?
Mr. R. M. Jenkins, the Chief Personnel Officer at RL, has a large circle of friends, acquaintances and enemies. He is curious to know which of them told the recruitment officer of the Royal Navy that he was interested in making a career in one of Her Majesty's ships.

By an odd coincidence there happens to be a naval recruiting office at the foot of State House – underneath London Office and close to the SRC training room on the ground floor.

King of the road
The animal kingdom is never far removed from us at RSRS. Its representatives are, for the most part, bovine, with the occasional rabbit or sheep calling on behalf of minority interests. And now, the silver swan has seen fit to drop out from the *Lohengrin* image and, like many another, hit the road in response to hard times at home. The cupboard is bare – or rather the moat is dry – and a-begging it must go.

The decision made, the plan has been executed with professional skill. The bird, accompanied by a suitably beguiling and fluffy offspring, parades round the building accepting charity from all. It fills in the slack time like Nebuchadnezzar – it eats grass – the very epitome of fallen majesty.

Wise enough not to degrade the noble image too much, all talking is delegated to the cygnet which cheeps continuously in the true begging cant. The mendicant pair succeed well enough. One supposes they would, for they apparently apply the aristocratic precept that it doesn't really matter what you do so long as it has style.

another side
Among all the officialese abbreviations which sometimes make life so hard to follow – to say nothing of the new style typing which leaves out stops, indentations and anything else that might help the hasty reader – here is one which fell on our desk recently. We think (having looked at it twice) that this one indicates a silver lining:
'APPROVED MILEAGE RATES
Permissive (Pub Transport Rate)...
5d pm'

(from an office note on travel claims)

decimalisation

As our own reminder we reproduce the contents of a Training Notice issued last October :

The National Press and Television services will be giving Decimalisation good coverage but nevertheless we hope the following brief summary will be of assistance to you.

D-day is 15 February 1971.

The value of the pound will not be changed by decimalisation.

The pound will equal 100 new pence.

New penny is indicated by the letter p; thus £1 = 100p.

Decimal coins in use now (silver)
50p (present equivalent 10s)
10p (present equivalent 2s)
5p (present equivalent 1s)

Decimal coins in use from D-day (bronze)
2p (equivalent to 4.8d)
1p (equivalent to 2.4d)
½p (equivalent to 1.2d)

The banks (and the Council) will conduct business in £sd before D-day and in decimal from that day. **The ½p** will not be used in accounting by the banks (or by this Council).

Changeover period. D-day will be followed by a period not exceeding 18 months, in which it will be legal to conduct business (except banking) in either £sd or £-p. After this period, our present penny and threepenny piece will cease to be legal tender.
A final decision about the sixpence has yet to be made.

Conversion of £sd to Decimal.
There will be two conversion tables:

The whole new penny table

£sd	new pence	£sd	new pence
1d	—	1s 1d	= **5p**
2d	= **1p**	1s 2d	= **6p**
3d	= **1p**	1s 3d	= **6p**
4d	= **2p**	1s 4d	= **7p**
5d	= **2p**	1s 5d	= **7p**
6d	= **3p**	1s 6d	= **7p**
7d	= **3p**	1s 7d	= **8p**
8d	= **3p**	1s 8d	= **8p**
9d	= **4p**	1s 9d	= **9p**
10d	= **4p**	1s 10d	= **9p**
11d	= **5p**	1s 11d	= **10p**
1s	= **5p**	2s	= **10p**

The whole new penny table is provided in the Second Decimal Currency Act as the official table according to which for example bank balances and all £sd dealings with the banks shall be converted to decimal. All whole two shillings are to be converted to 10p.

The new halfpenny table

£sd	new pence	£sd	new pence
1d	= **½p**	7d	= **3p**
2d	= **1p**	8d	= **3½p**
3d	= **1p**	9d	= **4p**
4d	= **1½p**	10d	= **4p**
5d	= **2p**	11d	= **4½p**
6d	= **2½p**	1s	= **5p**

The new halfpenny table of conversions is not a statutory table but manufacturers, retailers and service industries are expected to use it wherever possible. The table applies to amounts under one shilling. Amounts of one shilling are to be converted to 5p.

from TN 11/70

measure for measure

Tony Wilson

Metrication is putting on speed. By 1975 most of Britain will be operating as a metric country. Soon the rickety old British imperial system of weights and measures will have been overtaken by the SYSTEME INTERNATIONAL d'UNITES – SI Units. Industry will be cheering. The Government will be cheering – export sales will increase due to our competitiveness in overseas markets. Scientists, engineers and technicians will be cheering – having dispensed with the ambiguous poundals, and mixture of inches, feet, yards, chains, furlongs and miles, and so for that matter will the majority of the general public.

The unique opportunity to rationalise, and harmonise with the remainder of the metric countries (nine-tenths of the world is already metricated or going metric) is now being seized. But it all could have happened 100 years ago. A Bill that would have made the metric system compulsory for all purposes in 1871 was rejected by a majority of only five votes in the House of Commons. So if only three more MP's had seen the light, we would now be approaching the metrication centenary.

Scientists, naturally, had already seen the advantages of having a rational, coherent system of international units of measurements as long ago as 1864, and there was a Metric Act which allowed the use of the system for scientific and some other purposes, but not for trade or commerce. It was not until 101 years later that Britain finally decided to go all metric when the Government accepted in 1965 an approach from the Federation of British Industries and set the 1975 target date.

industrial scene

The Metrication Board, set up in 1969, have in close conjunction with the BSI prepared basic programmes for the most important sectors, *ie* agriculture, engineering, forestry, fisheries and land distribution, food and consumer goods, education and industrial training, fuel and power, transport and communication, and information policy. Table 1 shows the basic programme for engineering.

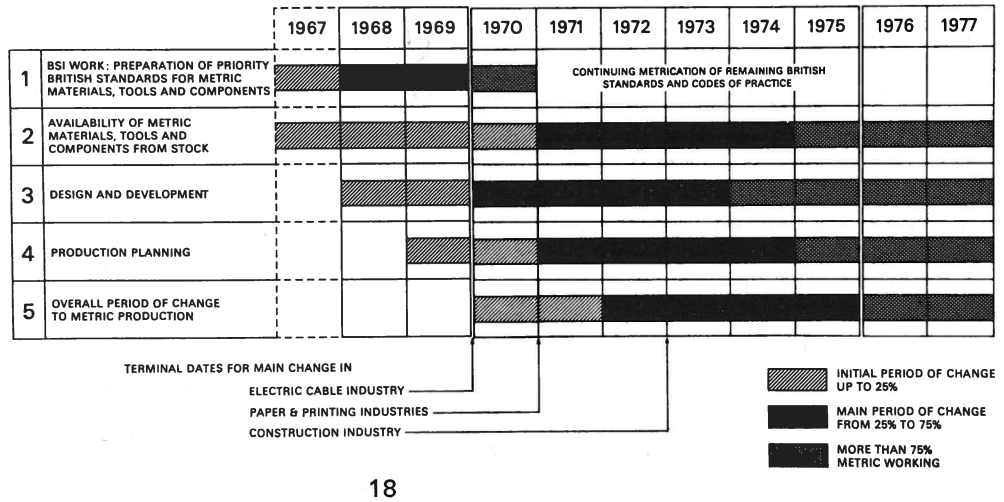
During 1970 real progress will be made in these sectors. All important metric standards relating to construction, industrial materials, engineering components and equipment will be available. Over 1600 metric standards were issued by BSI up to December 1969. Metric materials will be on the market and most metals – aluminium, lead, copper, zinc, steel bars, flat steel products and wire mesh – will be available in 1970, as will electric cables.

domestic

People will sleep more comfortably during 1971, for the bedding industry will be going metric, and metric beds are bigger. The new beds will be slightly larger than the old, with two metre beds about four inches longer than the present six foot two inches. This is good because people are coming in bigger sizes! Bed linen will be standardised to fit. 'Jumbo', 'giant' and everything deceptive in the way of packaging will be eliminated. Cost comparisons will be made easier between electricity, gas, oil and solid fuel and in the autumn of 1972 it will be easier to choose our clothes. An international standards committee is now working on a metric marking system. Imagine the ease of buying beach footwear in busy Lloret de Mar on a hot summer afternoon – instead of the time-consuming and tedious shoe-horn method – just state your metric size. It will be as simple as that.

Table 1

THE ADOPTION OF THE METRIC SYSTEM IN ENGINEERING: BASIC PROGRAMME



The writer, Dr. Tony Wilson is an Engineer I at the Daresbury Laboratory.

In 1973, road speed limits will be in kilometres per hour and the Ministry of Transport is working on a vast programme to change the 280,000 speed-limit signs in one week-end. The distance signs will be converted gradually over a longer time period. Of course, there is always the cynic who will suggest an interesting puzzle like 'If a van four metres high, weighing 5,025 kilos, is travelling at 65 kph towards a bridge 12' 9'' high, 300 yards ahead, how long has the driver got to decide whether he would be safer plunging into a 4-hectare field?' But speed and distance signs cannot, for economy reasons, be done together and a gradual phase-in is programmed.

education

Metrication is making rapid progress in education. Mathematics in metric units becomes a less formidable and discouraging subject for the young. The imperial system was evolved out of a biological measuring kit based literally on a rule of thumb. Units derived from the average size of barleycorns and the amount of work a team of oxen could do in a day served agrarian societies reasonably well.

Today we are living in a climate of internationalism and the International System of Units (SI) is the international language of dimensions. It is a coherent decimal system with 6 basic units (*illustrated in Table 2*).

Some exasperated metrologist might be quick to point out that the kilogramme is a unit of mass, not weight. A shop cannot weigh out for you one SI kilogramme of apples, as shop scales do not show the weight of apples; they show the force exercised by the apples in that particular gravitational environment. In the SI the force is measured not in kilogrammes, but in newtons. So might we get at the supermarket cash desk 'Make up your mind, love. Do you want a kilogramme or ten newtons?' The answer is an emphatic 'No!' The Metrication Board has made it quite clear that in common usage no distinction is made between weight and mass.

Some commonly used units which are derived from basic units are given special names, *ie* unit of force = Newton; unit of energy = Joule; unit of power = Watt; but all units are interchangeable in SI, whether they are mechanical, electrical or heat energy. For example, the old horse-power of your car will be measured in watts, like the electric light bulb glowing in your home. It will be interesting, initially, to hear the comments of the cool second-hand car dealer, when a prospective client asks 'And how many watts is it?'

international scene

Everybody, even the United States, worries about the balance of trade. We in Britain are looking outwards for markets. If we, the sellers, use the same units and standards as they, the buyers, our chances in the international markets must be improved. Multi-nation projects are fashionable – how much better they would work if the basis of measurement were the same in all participating countries. One wonders whether the fact that Britain's aircraft industry worked in inches, while France used the millimetre, added to the difficulties and cost of that super plane *Concorde*.

An internatonal language for speech and writing is still a pipe dream, but an international language of dimensions is within our grasp. Adoption of the SI system of units is a reality in the UK. Some industries are well advanced and we in the Science Research Council are playing our part of that advancement. By the end of the metrication decade the entire world could be using, talking and thinking metric. Just think of Miss World 940–560–940 mm!

Table 2

THE BASE UNITS

Quantity	Unit	Symbol	Multiples			Unit	Submultiples			Supplementary Information
			G GIGA 10^9	M MEGA 10^6	k KILO 10^3		m MILLI 10^{-3}	μ MICRO 10^{-6}	n NANO 10^{-9}	
Length	metre	m			km	m	mm	μm	nm	
Mass	kilogramme	kg	megagramme (Mg), or tonne (t) = 1000 kg			kg	gramme (g) milligramme (mg) microgramme (μg)			Consideration is being given to devise a new name for the kilogramme
Time	second	s	for multiples of seconds use) Minute (min)) Hour (h)) Day (day)) Year (year)			s	ms	μs	ns	
Electric Current	ampere	A			kA	A	mA	μA	nA	
Absolute Temperature	kelvin	K				K				0 K = -273.15°C 273.15K = 0°C
Luminous Intensity	candela	cd		Mcd	kcd	cd				

new year honours

We are pleased to congratulate two members of London Office: Mr. Christopher Jolliffe, Director of the Science Division who receives a CBE, and Mr. John Down, Executive Officer in the Service Unit for Grants and Awards (SUGA) who receives an MBE.

Also Sir Richard Woolley, OBE FRS, the Astronomer Royal, who has just been awarded the Gold Medal of the Royal Astronomical Society for his contribution to observational and theoretical astrophysics, particularly in the field of stellar dynamics. *(For his Profile see Quest, July 1970).*

Atmospheric pollution is still one of the problems of the 70's but Christopher Jolliffe was Secretary to the DSIR Atmospheric Pollution Research Committee in the late 30's and to the 'Standing Conference of Co-operating Bodies in the Investigation of Atmospheric Pollution'. Combined total expenditure: £300 a year! Having joined DSIR in 1937 as a junior administrative officer (salary £247–£347) he reckons that he must be one of the two longest serving DSIR/SRC members now left – the other being Alec Gillinder (HEO) of the Astronomy, Space and Radio Division.

He read physics at University College London where he collected a degree and met his wife – 'both first class' he says. Then he trained as a teacher and became physics master at Stowe School for two years until he decided he was not cut out for teaching and joined DSIR.

From 1940–45 he was secretary to Sir Edward Appleton, when DSIR was concerned with 'Tube Alloys' (the atomic bomb project). Then he spent a few years in exhibitions and publicity, about 5 in the division concerned with the DSIR research stations and then went into Establishment Division. But after less than 2 years he was put in charge of the Grants Division and has been its Director ever since.

He has enjoyed it because he feels it is worthwhile and rewarding work. DSIR – and SRC – is what Appleton called a 'do' not a 'don't' department. He considers that the CBE awarded to himself is just as much for the Staff of the Science (and former UST) division in recognition of all they have done to help good science in universities.

John ('Dickie') Down has been in the Training Awards Section at London Office (now SUGA) for 11 years, since he joined DSIR in 1959 through the executive officer exam. for members of HM forces. Up till then he had served as an officer in the Royal Air Force. Commissioned in 1942, having joined in 1925 as an aircraft apprentice at Halton, Bucks, he had completed 33 years' service on his retirement as a Flight Lieutenant in 1958. Keen on sport – he played hockey, cricket, squash and tennis in the RAF – he is now more active as a 'follower', particularly of soccer and athletics. Dickie and his wife live at Eynsford in Kent and have a son and daughter, both married.

learning all about

The Council's Central Training Section has continued over the year to organise induction courses for new recruits. The courses are held at establishments, in turn, and in April ROE will be the venue for the first time: a group of people lucky enough to have joined us at the right moment will be spending two days in Edinburgh just before Easter, finding out about SRC. ROE reports that by then, although it may not have all melted, the snow should at least have stopped falling.

Another training 'first' in April will be the holding of an experimental one-week middle management course, which part of the CSD college at Sunningdale has been hired to accommodate. Course members will include five people from the other Research Councils as part of a current investigation into the feasibility of collaboration between the Councils in middle and senior management training.

John Walsh
Training Officer

newsfront

social research

Andrew Shonfield, Chairman of the Social Science Research Council, gave a short talk to SRC Headquarters staff at State House on 23 October.

His chief aim was to explain to natural scientists the methodological difficulties of the social sciences and to outline the most effective contribution which social scientists could make. He said that the raw material of the social sciences was social life, which offered very limited possibility of experimentation that could be controlled and repeated at will.

There were three major techniques available to social scientists; analysis of historical data, the use of survey methods, and simulation techniques. None of these approached the methods of the other sciences for precision of measurement; and judgement necessarily played a considerable part in social science activities.

The social sciences had, however, had some real successes to its credit – e.g. in prediction of short-term movements of national income, although even here there were significant margins of error which affected the conduct of public policy. The basic difficulties inherent in forecasting were illustrated by the performance of the public opinion surveys at the general election, where the majority of polls had failed to take account of people's views on certain key issues.

The talk was followed by questions from the SRC audience. A number of issues were raised, in particular the SSRC's policies for selecting research projects for support. Jeremy Mitchell, the SSRC's Secretary, replied that until quite recently the Council had played a largely responsive role, waiting for applications to come in from universities which were then judged on individual merit. It was now becoming more active in stimulating research in particular fields, and three new SSRC research units – in Race Relations, Industrial Relations and Survey methods – had been established early in 1970.

The success of the Knutsford Plains Rally each October owes a lot to Leslie Naylor from Daresbury Laboratory. He leads the results team who keep track of the rally as it covers 200 miles from Welshpool to Llangollen by picking up result cards from the control points and computing the result in the quickest possible time. Members of the team – David Hughes, Colin Horrabin, John Lowe, Alan White, Ron Gallop, who all come from the Laboratory – pride themselves on their speed and accuracy. In 1968 they helped to gain the rally, which is run by the Knutsford Motor Club, a second place in the Rally of the Year Championship.

They start two hours before the drivers, at 8 p.m. on Saturday evening, when they synchronise the 75 watches used at the course control points. From then on it's non stop through the small hours until the finish on Sunday morning.

picture shows Leslie Naylor (centre) with Alan White (at back) and Ron Gallop, checking and setting the 75 watches.

Photo by courtesy of the Knutsford Guardian.

to the tune of . . .

A musical evening held in December at Herstmonceux Castle raised £150 for the Sussex Churches Campaign. The Choir of Chichester Cathedral sang anthems and motets followed by carols both traditional and modern. They were directed by the Organist and Master of Choristers, John Birch, who also performed a movement from a Bach concerto and movements from the *Scaramouche* suite by Milhaud, set for two pianos. The second pianist was the assistant organist, Michael Davey. (The two pianos being the ones which are featured in the SRC film *'Insight'*).

Fred Hatton (l) and Brian Mellor

civil service

Another of the pioneers of the Rutherford Laboratory has retired (See Quest, *October 1970, newsfront). Fred Hatton joined AERE on June 21, 1948, to work in one of the stores and in 1961 he transferred to the Rutherford Laboratory as one of the three storemen in the only store at the new Laboratory. Later when it was expanded he moved into the newly built central building, to help organise a main store.*

A presentation was made by Brian Mellor, Head of the General Administration Group, who said that the Laboratory was judged to a large degree by the service it gives to outside people working there, including university members, and Fred in his job had certainly made a big contribution to this service. He also read out a letter from Sir Brian Flowers, the Chairman of SRC, which expressed thanks and appreciation of Fred's service.

We join the Laboratory in wishing Fred Hatton all the best for the future.

retirement from space

The retirement of Mr. A. G. Wilson, Senior Scientific Assistant, last year lost the space section of the Radio and Space Research Station an expert. Known most recently for his work on the design and construction of experimental rocket payloads – he received the MBE in 1966 – Arch Wilson's work at RSRS dated back more than forty years. During that time he was given charge of the workshops and made valuable contributions to the instrumentation of the pioneer radar installations. In 1955 he left for a few years for a spell in industry but returned to apply his talents to Space Experimentation. We join RSRS in sending him good wishes for the future.