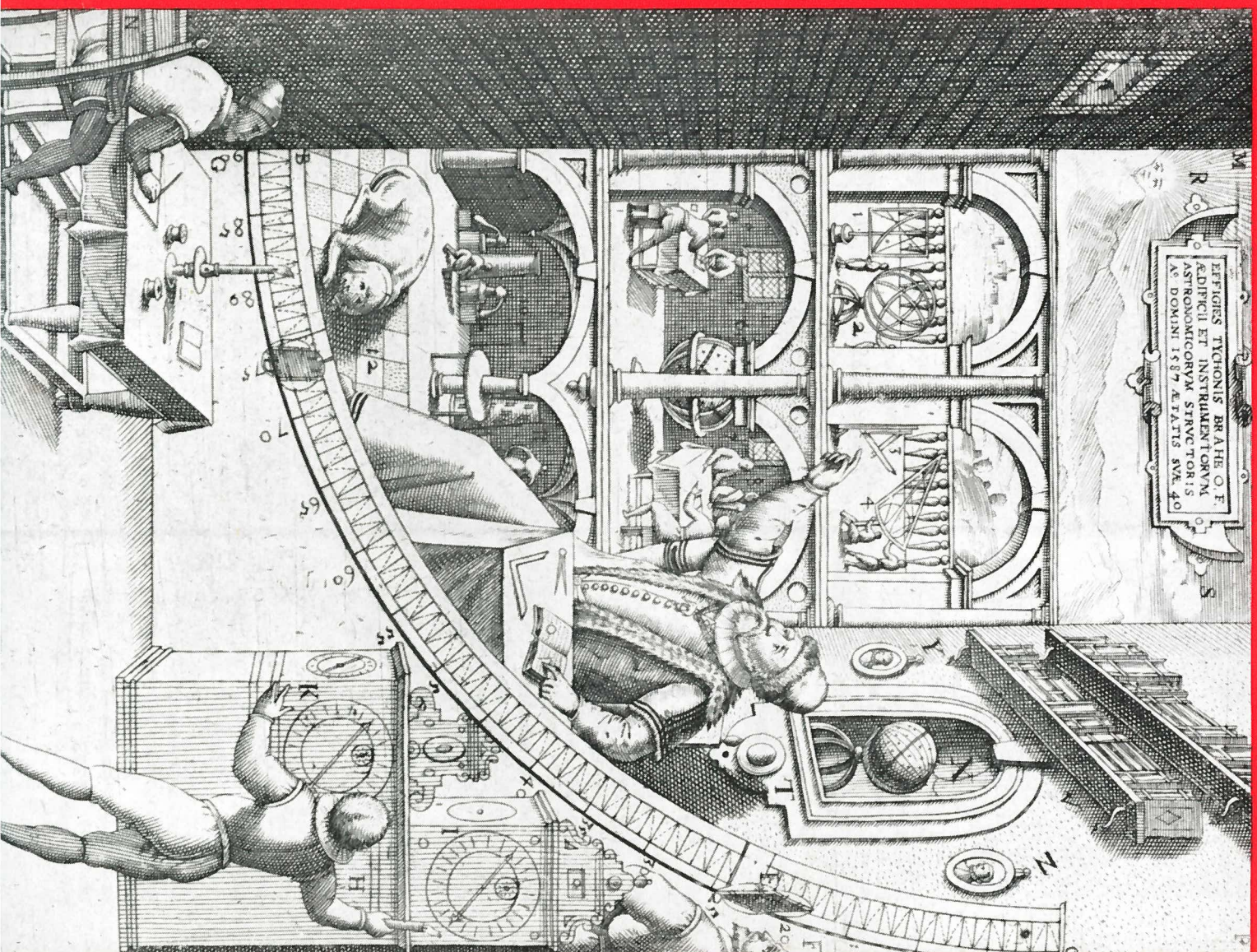


# QUEST



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# QUEST

House Journal of the  
Science Research Council

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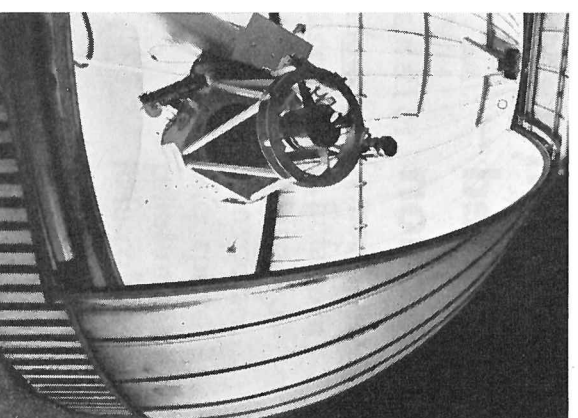
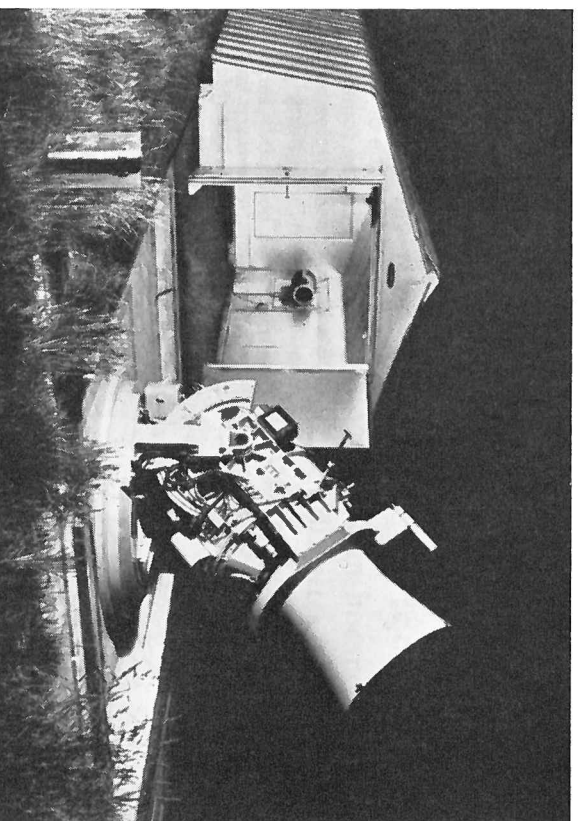
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## our inheritance

Cover picture shows a sixteenth century research instrument used for measuring star positions.

It is an illustration of Tycho Brahe's Mural Quadrant from his book 'Astronomiæ Instauratæ Mechanica' published in 1602, which is just one of the rare and valuable books in the Crawford collection at the Royal Observatory, Edinburgh, see article on p. 2.



## Edinburgh looks up to a bright future

The Royal Observatory Edinburgh celebrated its 150th anniversary on November 3 by opening a new library for its unique and priceless collection of great astronomical literature (see p.2) and by holding a symposium on Infrared Astronomy, one of the newest, fast-growing fields of research. 'In the next few years this will grow into one of the major activities at Edinburgh' said the Director, Professor H A Brück CBE, Astronomer Royal for Scotland, writing in *The Times* about the first century and a half (3.11.72).

The Observatory is perhaps best known in the field of pure research for its work on the physics and chemistry of the diffuse material that floats in space in clouds between the stars; the 'interstellar matter' that stars are made of. It is also known for its development of instruments that make use of current technical developments, such as automatic guidance systems for telescopes, and the automatic measuring machine GALAXY that can locate 10,000 stars an hour on the star-field photographs taken with Schmidt cameras, and can measure their position and brightness with close to absolute accuracy.

GALAXY was designed by the Instrumentation Division of astronomers and engineers. Their job is to bridge technical gaps like the one between the Observatory's 16/24 Schmidt cameras that photograph tens of thousands of

stars and the slowness of measuring them by non-mechanical means.

When I visited the Observatory Dr Neil Pratt, who wrote about GALAXY for *Quest*, was busy on the Mark 2 version that is being developed to match the power of the new 48-inch Schmidt camera in Australia (p.21).

Dr Reddish of the Observatory is Project Manager for the 48-inch and responsible for the team who will run the telescope, take plates and rush them to Edinburgh to be measured and sent to university astronomers in a very short time.

The Observatory is also helping with other national projects: the site testing for a new Northern Hemisphere observatory and the 60-inch Infrared flux collector in Tenerife. Dr Reddish described it as 'a move from research into management: a cost dear to pay,' although the Observatory does

also use the 60-inch for research. (His own research has contributed to Edinburgh's studies of interstellar matter.) But he added 'with the 48-inch and GALAXY we [the UK] should end up ahead of California and the European Space Observatory. We will probably scoop the pool'.

Dr Stoy, the Deputy Director, told me he worked mostly with the 16-inch twin telescope, studying the structure of the Milky Way and intergalactic matter. Dr Clube, Head of the Astrophysics Division, is using the GALAXY machine to measure plates that he took at the Cape in 1967-70 to study star positions, their motions and galactic structure.

The Observatory has a 16/24 Schmidt under the clearer skies of Italy at Monte Porzio. It develops experimental equipment for ultra-violet and infrared radiation observations from rockets and



## He represents Scotland in a different way

# hooked for life

John Barrow

One day in the middle of a large wood you might suddenly see a man coming out of the undergrowth. If he's wearing a light tracksuit, holds a compass and stands there rotating a map, scratching his head and muttering '\* \* \* I Where's this \* \* \* control' — don't worry! It might be me (*see picture*) and I won't have time to explain.

Why do I disappear into a forest every Sunday, run round for an hour and a half looking frantically for red and white flags, and emerge completely wrecked and unable to speak for ten minutes? Well, in one word, I'm an 'orienteer'.

To begin at the beginning. The skill of orienteering was developed in Norway and Sweden in the 1914-18 war by resistance members who learnt to elude pursuers by navigating through the dense forests. Later someone thought of making the skill competitive, and set a course consisting of a series of locations on a map, called checkpoints or controls, each to be visited in order with no laid down route in between, using only the map, a compass, and a reasonably fit pair of legs.

That is what orienteering is and, with many refinements, is the way the sport is practised



John Barrow, a bit disorientated — see story below. He is wearing the club colours of Edinburgh University in the Southern Orienteering Championships held in 1969 in Worth Forest, Sussex.

John is a Scientific Officer at the Royal Observatory Edinburgh. He has been working on the Northern Hemisphere Observatory Site Testing Project and is now engaged on work involving the two Iris Photometers and the Schmidt telescope at the Observatory.

throughout Europe and North America. In Britain it is still fairly new. We have held eleven Annual Scottish Championships but the British Orienteering Federation, the governing body in Great Britain, was not formed until 1967.

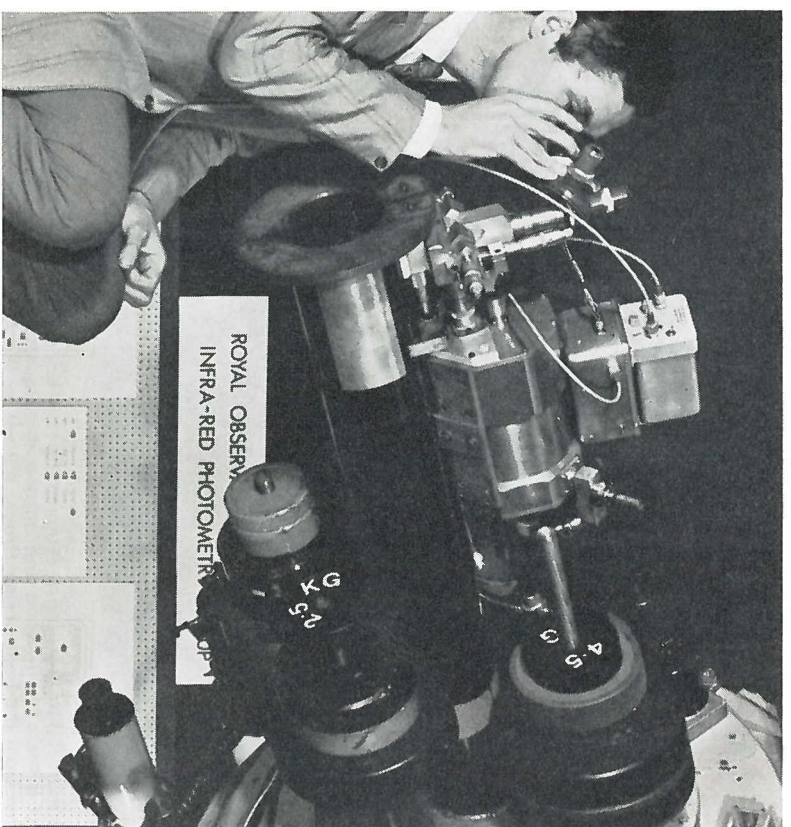
### keeping fit and going places

Orienteers are still struggling for recognition but already a National Standard Event may have 400 competitors, and an international standard event in Staff-ordshire last Easter had nearly 1000. An annual five day meeting held in Sweden attracted 9500 competitors last year and was said to be the largest gathering of competitors at any single-sport meeting. With their vast areas of

forest it is easy for the Scandinavians to choose good areas for competitions.

'What's the great attraction, you may well ask. To me orienteering is the most satisfying sport I've ever taken part in. When I emerge triumphantly with the control card stamped with the right code at each control and find that someone has done it a few seconds faster, that makes me — and many others — determined to try again and win. I also think it is one of the healthiest of leisure activities.'

For five consecutive summers I spent my holiday in Scandinavia. My first visit was in 1967 when the Scottish Association was looking for people to represent Edinburgh in Euro-Meeting, a competition held every two years between European cities. That year it was in central Sweden and



... while at the controls

## star trek

Left: Jim Campbell of the Royal Observatory, Edinburgh, is using the 36 inch optical telescope to measure infra-red light emitted by stars. The telescope has been converted by fitting the photometer that is normally used by ROE's Infra-red Research Group on the 60-inch flux collector in Tenerife.

Jim is in charge of the Infra-red Group and of the Instrumentation Group at the Observatory. He is also local correspondent for *Quest*.

I was in my second year at Edinburgh University. After a swift reckoning I decided I could afford to go: and had a great holiday. The orienteering was of a much higher standard than I had ever experienced, but I got my first chance to see Sweden.

### meeting friendly people

The following summer, I went to the Swedish Five Day Event mentioned earlier. The main centre was at Borås, east of Göteborg, and easily accessible from Britain (regular ferries from Immingham by Tor Line) and the five races were all within easy reach of Borås. One of the reasons I've returned to Norway and Sweden so often is that there one can get well off the beaten track and really see these countries that are so healthy and clean. The Norwegians are the friendliest I have ever met abroad; and in the forests on the south east coast of Norway, between Oslo and Kristiansand, some of the scenery is simply breathtaking.

Nowadays, as a recognised competitor in international teams, my travel is subsidised by the Sports Council. I have been selected for every international event in which Scotland has so far competed and have represented Great Britain (twice). I have competed in events abroad in Sweden, Denmark, the Netherlands, Belgium, France and even England!

### looking for jungles

As it's a new sport, competitors often have to double as administrators: and orienteering seems to need twice as much organising as other sports. Take a simple competition. There are three main officials. The Planner chooses controls from a map and makes them up into a course scaled according to the age, sex and ability of the competitors. The Controller vets the courses, both in theory and in practice, by testing whether one has to cross a 40 foot crag, or a lake, or a piece of dense jungle in order to get from one control to

the next. Finally the Organiser arranges things like start and finish, refreshments, first aid teams, and, possibly, radio links between control points.

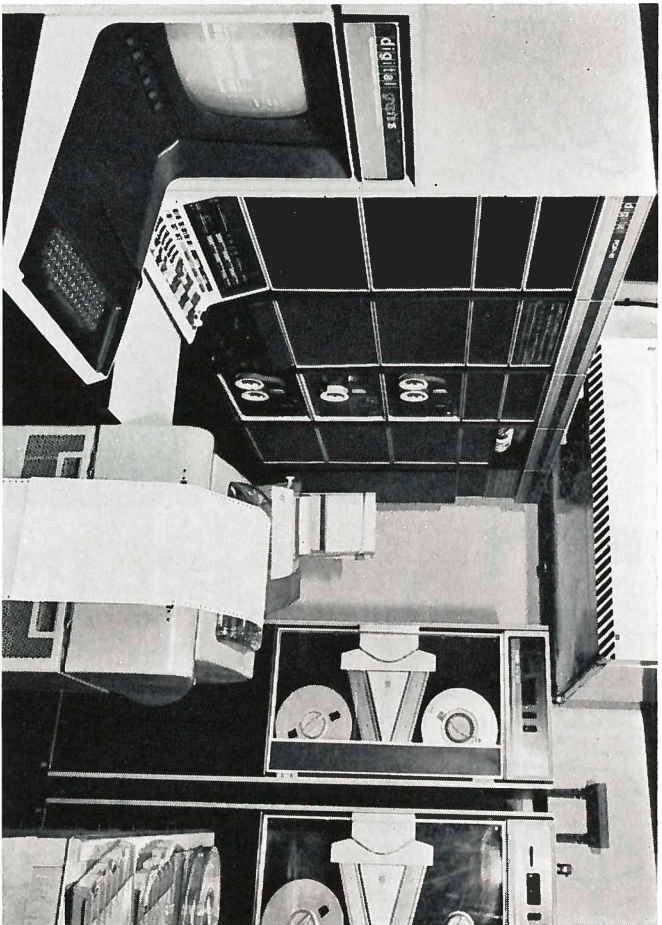
In addition, a new area will need a new map. Recently orienteers have begun to resurvey competition areas and redraw maps (based on the Ordnance Survey 6 inch series), to show as much detail as possible without unnecessary obscuring detail like tree symbols. Orienteering maps are at 1:20000 (about 3 inch to a mile), and the International Orienteering Federation has drawn up its own list of map symbols so that competitors will be sure to find maps they can understand wherever they go in Europe.

The more one helps to organise it, the more the sport threatens to become a full time occupation. It is easy to become hooked on orienteering as I was, and I don't think I'm going to get off for a long time yet. If this hastily written screed has encouraged you to try it, I will be only too happy to tell you how and where to begin.





# the computer laboratory is changing



In the picture is the Atlas Laboratory's PDP 15 interactive graphics display machine which is used for generating animated films.

J Howlett

All the Council's Establishments have computers. With the exception of the Atlas Laboratory, however, computing is not their main business but just one of a number of means by which they attain their real objectives. The computer is such a powerful and versatile device, and possibilities for applying its powers so wide, that it rapidly becomes indispensable wherever it is installed.

At the Atlas Laboratory our business is computing. Of course, the computing is still only a means to an end, but the ends are outside the Laboratory — in other parts of the Council, in other Research Councils and Government organisations and, most of all, in universities. We exist to give computational support, in its widest sense, to research and development projects carried on outside the Laboratory. We also have our own research and development projects whose aim is to improve and widen the scope of this support. Recently the Laboratory has been reassessing its role and, as a result, has embarked on a change of policy. To explain this a little history is necessary. We were set up in late 1961 as part of the NIRNS group: at the time the universities were badly under-

provided with computing resources and many research workers had a near-desperate need for some real power. The Laboratory's terms of reference were such that we could give computing support without charge, and with very little formality, in pretty well any field. All we looked for was an assurance that the work could not be done on the university's own computer and that it had been planned and programmed with reasonable efficiency.

## 'We set a new standard . . .'

We started a regular service in October 1964 with this very open style and, to put it mildly, we have never been short of business. The Atlas computer was far more advanced and powerful than any machine then available to university people in Britain — or in Europe, for that matter. The staffing, equipment and organisation of the Laboratory were equally far beyond anything in the universities.

I don't see any reason to be coy about this; we set a new

standard, and we have had the satisfaction of seeing it followed by the universities when re-equipping their own computer centres since.

The climate now is very different from what it was when we started. In 1966 a Joint Working Group on Computers for Research published a report (the "Flowers Report") that displayed the university situation very clearly and set out a programme of re-equipment. As a result the Computer Board was set up, and to date has put about £28M's worth of machinery into university computing centres. British universities, taken as a whole, are now as well equipped as any in the world. In these new circumstances it is natural — and necessary — to ask if there is still a need for a central service of the kind which we have been providing. The conclusion which we (and our masters) have come to is that there is most certainly a need but for a different kind of service: one that the Atlas Laboratory is well designed to provide.

There are several parts to the argument. Take first the need. In many important but difficult theo-

retical problems — the study of atomic and molecular structures or the prediction of observable properties of substances from atomic data, to name two examples — progress can only be made with the help of computers. There are many research groups with ideas for tackling such problems. They need great computing power, special ancillary hardware (such as visual displays of output) and special software. Most important of all they need to know that they can use the resources for quite long periods if their project is going to take two or three years or more to complete. It is this kind of support that university computer centres find difficult to provide. People from all over the university want their services and they must respond to them.

When we put all these arguments together, the right rôle for the Laboratory becomes obvious. We should support research workers whose needs cannot be met by their own university; but because we are committing scarce and expensive resources, perhaps for a long period, the project must be able to stand up to the scrutiny of Council's experts. What this means is that applications for computing support are treated in just the same way as any others made to the Council but the grant, if given, is not one of money but of time on one of our computers and, perhaps, other resources.

## freedom to choose . . . a new style

Here the Atlas Laboratory has two great advantages. One is that we are not tied to any single institution, discipline or project, and therefore have freedom to choose

what we shall use our resources for; the other is that we are part of an organisation — the SRC — which has powerful machinery, in the form of its Boards and subject committees, for assessing research projects in the whole field of pure and applied science.

When we put all these arguments together, the right rôle for the Laboratory becomes obvious. We should support research workers whose needs cannot be met by their own university; but because we are committing scarce and expensive resources, perhaps for a long period, the project must be able to stand up to the scrutiny of Council's experts. What this means is that applications for computing support are treated in just the same way as any others made to the Council but the grant, if given, is not one of money but of time on one of our computers and, perhaps, other resources.

An applicant might be awarded an input/output terminal so that he can use the computer from a distance. We have several

Dr J Howlett CBE is the Director of the Atlas Computer Laboratory.

## Daresbury runs faster with IBM 370/165

Trevor Daniels

After four years of service, the IBM 360/65 main computer at Daresbury Laboratory has been replaced by a system based on the much more powerful IBM 370/165. In addition to a much faster processor, this system includes new tape drives, new disk drives and a new fixed-head file, all of which are faster and hold more data than their predecessors. The new tape drives are self-loading, which makes tape mounting faster and gives the operators more time to attend to their many other pressing duties. The new disks and the fixed-head file give the system about 850 million bytes

already, such as the card-reader/line-printer in Professor Burke's Department of Applied Mathematics in Belfast, through which he and his colleagues use about ten hours a week on the ICL 1906A.

If the application has got through the Council's mill we can be assured that our resources are being used on work of good scientific quality. And the research worker can plan his project with the assurance that he will get the support he has been promised, and will not have to worry about being squeezed out when he is only half way through.

This is all quite simply stated, but it describes a really important change in our method of working. It should mean that the resources of the Laboratory are used in a more positive way in support of scientific research. One cannot of course switch to a new style of working overnight, and the transition is bound to be gradual. But we are already very much into the swing of it and everything seems to indicate that we are providing what is wanted, just as we did in 1964.

controlled by the same number of operators the volume of card and paper handled had to be reduced before we could make full use of the power of the new system.

## getting things done . . . on the spot

To achieve this we have made two important changes. The first was to provide a Users' area within the main computer hall, containing a card reader and card punch machine. This is separated from the main computer mach-

continued on next page

# London Office joins in

There is still perhaps a tendency for those in the "outside" world to regard administration in government bodies with faint amusement: thoughts, no doubt, of rigid hierarchies, high wing collars and quill pens spring to mind. Ridiculous of course but it is as well for us to remember these days that those who don't adapt tend to slide backwards at a faster and faster pace. Clearly, as administrators concerned with the business of research, we in SRC cannot afford to foster an image of old world charm.

Computers are modern tools that, used intelligently, can assist the administrative task enormously. A project is now under way in London Office to provide a data processing service for the staff dealing with research grant applications. It will also be capable of dealing with the vetting and payment of claims under the grants after they are made.

We have the use of time on ICL 1906A computer at the Atlas Laboratory through a remote ter-

minal installed in an office on the fifteenth floor of State House.

Plans and specifications prepared during the last year were tested with a pilot run in the past few months and now the 'parallel running' stage (the new and the existing systems operating together) has started. Student awards work will be the next area to receive attention.

It is worthwhile to try to remove the drudgery associated with any repetitive process. In large administrative systems most transactions are perfectly straightforward — cheques in a bank, proposal forms in an insurance company, orders and invoices in private companies, and so on. They offer no challenge to the people processing them, other than to get through them as quickly as possible, and are the ones best handled by computers. The more unusual cases, those that are rejected by the computer because they do not conform to the sets of rules that the computer applies in each case, are the ones

best handled by people. And because the cases are unusual, and therefore more interesting, there is greater satisfaction in dealing with them.

The idea that large numbers of staff can be replaced by computers has not much currency these days. Most suitable work for computers (usually large volume processing) has been mechanised in some way or other over the years to a point where the introduction of computer processing is merely the next logical step. And now that there are data-processing machines sophisticated enough for smaller scale operations, they may be used to increase operating efficiency and capacity, rather than just to make savings.

Staff in London Office will find that their jobs change as the potential of the computer system makes itself felt. I think that the change will be for the better.

**Lawrie Wright is a London Office O and M Officer assigned to the 'computerisation' team.**

**Lawrie Wright**

## Daresbury's IBM 370/165

*continued from p. 11*

inery and the operators by a job reception and output desk. If a job has to be corrected it can now be passed quickly to the user who can correct it on the spot and return it over the desk or through the users' card reader. The main card reader and line-printers are close to the reception desk so that movement of cards and output is kept to a minimum.

The second change will have a more widespread effect. This is to encourage the greater use of interactive terminals in developing programs and feeding in jobs. The 65 had only a few terminals and their use was limited by the power

of the central processing unit (CPU) and the capacity of main storage. The capacity of the larger and more powerful 165 makes it possible to have more terminals

and allow them to be driven by the IBM Time Sharing Option. This is a set of programs designed to assist the terminal user in carrying out much of his normal interactive work such as file interrogation and editing, program development and compiling, and job submittal/retrieval, as well as helping to debug programs by providing interactive aids which may be used while the user's program is running.

The user has a choice of terminal, either an IBM typewriter (for typed output) or a TV-like display

which is more useful for file interrogation and editing.

The users found the installation of the new system almost painless. The 65 was in operation right up to the time the new hardware was ready and this was installed and the computing service reopened within a short time. Since the operating systems and programming languages of the two computers are compatible, most users have been affected only by the dramatic improvement in the service.

**Dr Trevor Daniels is in the Computer and Electronics Division of the Daresbury Nuclear Physics Laboratory.**

## ... and improves the estimates

This year, for the first time, the SRC's Estimates for the coming financial year have been produced by computer. A FORTRAN program was specially written for the purpose and has been successfully run on Atlas via the remote terminal in State House.

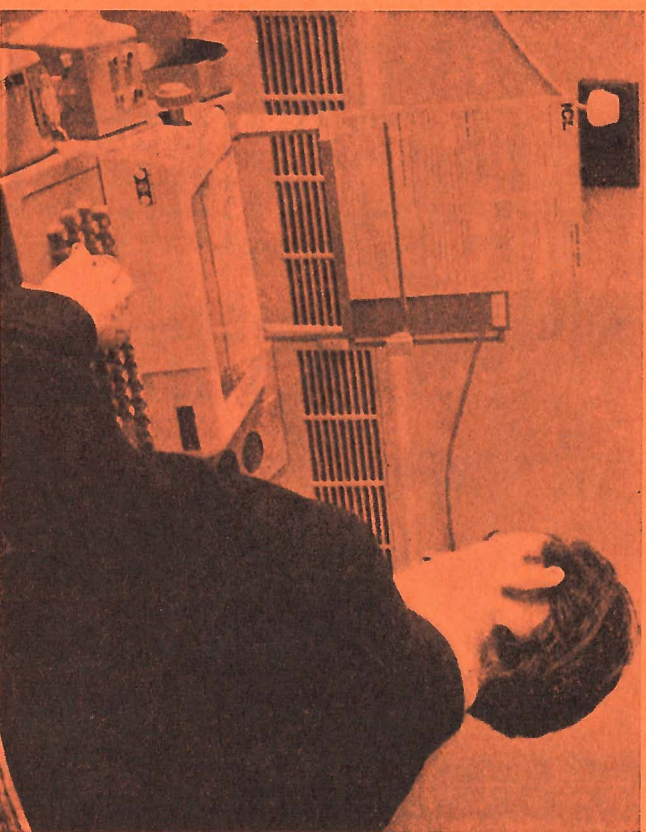
The aim of using a computer for this job was to eliminate as far as possible the tedious and error-prone manual reworking of the Estimates which goes on from the beginning of November, when the first draft is submitted to DES, until some time in December: in 1971 six versions of the Estimates were submitted during this period. When work like this is done under severe time pressure it is all too easy for small errors to occur which are extremely difficult to track down, if indeed they are discovered at all. The worst situation which can arise is that an error is overlooked by Finance Division's Estimates Section but spotted by DES: then it's back to square one!

Interestingly, when the program

was tried out using last year's figures it could not reproduce the 1972/73 estimates: some errors had crept in which nobody had spotted, and some of the figures had to be amended to persuade Atlas to produce the "right" result. What Atlas unfortunately cannot be persuaded to do, and

nor can the 1906A for which the program is now being adapted, is to knock up a set of Estimates from the crude data submitted by the Establishments. So there is no prospect at present of replacing the bulky wads of estimates forms with a couple of punched cards.

**J A F**



### Plugged in

Picture shows Dr Eric Dunford at the Radio and Space Research Station using one of the typewriters connected to the Station's ICL 1904A computer in multi-access mode. By this means he can develop his own programs on line to the computer at the same time as it is running other jobs in batch mode. See Barry Martin's article below.

## GEORGE handles the data

**Barry Martin**

The ICL 1905 computer installed at the Radio and Space Research Station in 1967 was the Station's first large computer. Its prime task was to calculate the orbits of artificial satellites, but once the computer was operational research workers at RSRS began to find out how it could be used to solve other problems; in particular those associated with radio wave propagation in the troposphere and ionosphere. Later, as more experiments were flown both by rockets and the new artificial satellites, they were faced with an enormous number of results to analyse.

In 1970 because of an all round demand for more power the 1905 was upgraded to a 1904A. It was one of the first 1904A systems to be delivered and probably the first on which the GEORGE 3 operating system was used for an entire workload.

GEORGE 3 is a system that allocates jobs to the computer in such a way as to make the most efficient use of the computer time and facilities. It took a lot of thought and hard work to prepare; many special programs had to be written to tailor it to suit users and operators. Most of the programs are commands, known as 'macros', written in GEORGE 3 language. The macros do away with the need for users to learn the command language and some of them have been written with the operators in mind — some written by the operators themselves — to simplify the operation of the computer. They have saved a lot of time and effort.

On the satellite side the Station



## GEORGE continued

has become more involved with many large scale computer projects and has now formed a new division under its Space Science Services and computing for space analysis and computing for space science. The division's work opened with the processing of data from the Ariel 4 (UK) satellite (launched by NASA in December 1971): work that was shared with the Atlas Computer Laboratory.

## commanding attitude

The satellite is carrying four experiments to measure waves and particles in the ionosphere, to be used in studies of their interactions. The data are telemetered from the satellite to NASA ground stations, recorded on analogue tapes (as continuous signals) and sent to RSRS. RSRS then convert them to digital form for the computer to analyse, to remove spurious errors and take out faults that have arisen while digitising. The cleaned-up tape is then sent to ACL for scientific analysis on the larger 1906A computer.

At present RSRS are setting up a Satellite Control Centre for UK 5, which should be launched in April 1974. (for details see J F Smith's article in Quest 5, 2 p. 11). The Centre will control the vehicle and the experiments it carries, and will collect and process the data for the experimenters. Since the experimenters will need to have a 'quick look' at their results within an hour from the time they are telemetered from the satellite, about a quarter of the information will be processed in near real time. The rest will be processed and sent to them within 48 hours.

The Control Centre will contain three PDP8 computers and peripheral equipment. One of them will be used solely to send commands to the satellite, through NASA data links, and to collect data. This one will be linked to the 1904A computer so that complicated calculations such as attitude reconstruction can be made almost immediately. The second PDP8 will transmit data to the

experimenters, including information on the satellite's orbit and attitude, through the Post Office Data1 600 Service. The third computer will provide a back-up service to the first two and will be available for post-launch program development, as required. It is hoped that the complete system will be ready by this April.

For another large project: the International Ultra-violet Explorer (IUE) Satellite, RSRS is associated with the Astrophysics Research Unit (now administered by RSRS) and University College London (UCL) in providing the camera systems for an echelle spectrograph. The satellite is due to be launched in December 1976 and will measure the ultra-violet spectrum from Stellar sources.

RSRS have installed an Inter-data 70 computer at UCL, and will write computer programs to calibrate the camera system (before launch) and to process the spectra information as it is telemetered to earth. Our main software task however is to write complete programs for post-launch data reduction which will, in effect, clean up the 'picture' received. These will be on the VICAR (Video Image Communication and Retrieval) System which

was written by the Jet Propulsion Laboratory at Pasadena for processing pictures of Mars sent back by the Mariner spacecraft. The main object of these programs is to remove noise, enhance the image and generally clean up the 'picture'. The program was originally written for the IBM 300 range of computers so RSRS have installed a link to the IBM 360/195 at Rutherford Laboratory in order to speed up program development.

## the pattern changes

The growth of computer applications to the work at RSRS has added a lot of interest; and the large collaborative projects that we have become involved with have presented new challenges. Since our first large computer arrived, the applications have been continually changing. Initially emphasis was laid on solving theoretical problems in mathematics and physics. Then the data analysis side grew and we had to cope with the problem of doing it on a large scale. Now the emphasis is on handling and transmitting data in near real time. We look forward to dealing with even more interesting and varied applications in the future.

## nutcracker 11 — quorum

When the members of the Civil Service Institute had voted for their new Committee, they found (naturally enough) that they had simply elected each member of the old Committee to a new post. Thus Redbreast had been elected as Committee Member, having been nominated by the outgoing Treasurer, while the outgoing Committee Member had been elected *answer on p. 6*

to the post vacated by Gideon. The outgoing Secretary had been elected Whitley Representative, while Courts had been elected to the post vacated by the man who took the post vacated by Hartree. Ferguson had moved to the post vacated by the man who moved to the post vacated by the man who had been elected Chairman. Who is the new Secretary? **PC**

## Crossword solution — maxim 1

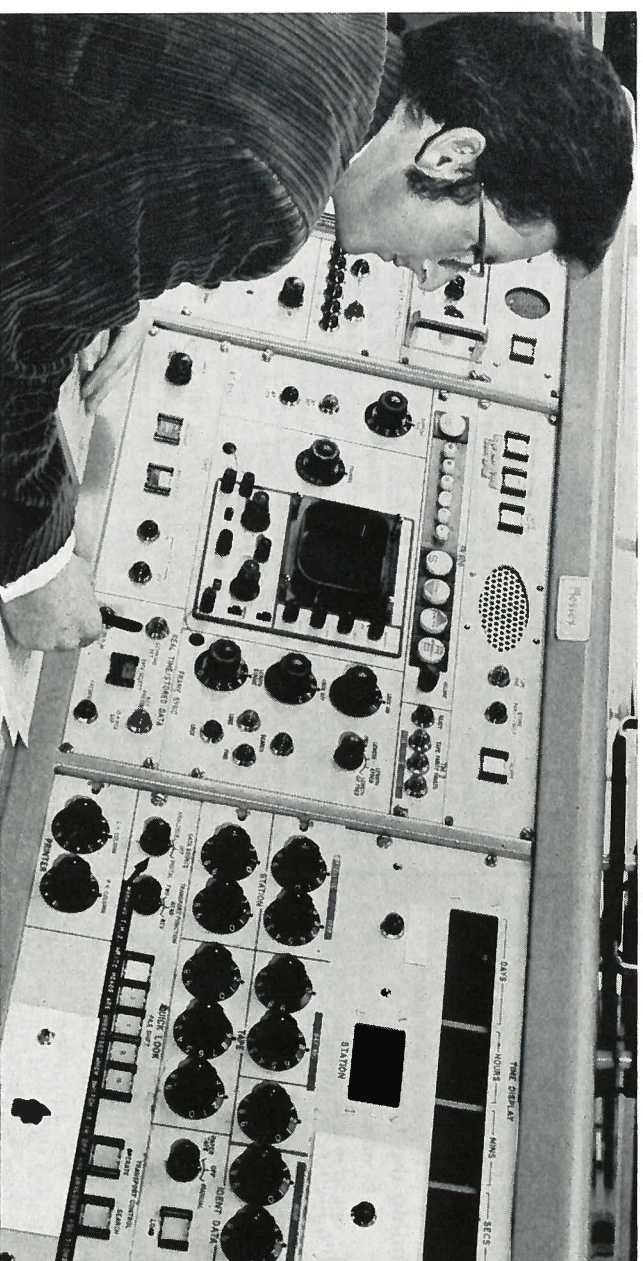
(Vol. 5, 4 p16)

**Across**  
1 Solar eclipses  
7 Indisposition  
8 NASA  
9 PUNCH  
13 Elated  
14 Galaxy  
16 Sunny

**Down**  
17 Pair  
19 Inner Mongolia  
20 Young's Modulus

**Down**  
1 Science Policy  
2 Lodestar  
3 Risk  
4 Chorus

**Prizewinner** and **maxim 2** are on page 17.



## Name dropping doesn't help

Both Arthur Clarke and Stanley Kubrick are said to have expressed surprise when it was pointed out to them that the name HAL given to the computer in the film "2001" could be obtained by a mild encipherment of the letters IBM. I don't suppose that anyone asked them if HAL might stand for Howlett's Atlas Laboratory, but that would have been wrong as well. HAL was in fact an acronym for Heuristic and Algorithmic, which is supposed to mean something to people who know about things like that.

The trouble with using acronyms as widely as we do is that one begins to see them where they don't exist. When the Sigma/Atlas Multi-access System breaks down and one is advised by one of the old hands to "Ring SAM" one automatically sees the con-nexion. (I hasten to add that the System in fact rarely breaks down, at least not without good

reason. The usual good reasons are:

- 1 Sigma is not working.
- 2 Atlas is not working.
- 3 The telephone lines are not working.
- 4 The modems are not working.
- 5 The remote console is not working.
- 6 Somebody pulls a plug out while you are working.)

Only that isn't the connexion. SAM — sorry — Sam is a person I mean a real person who is very helpful to people using the multi-access systems. I must confess that even after talking to him I did just wonder whether Atlas had perfected a Turing machine (Sigma Android Manipulator?) and given it a Berkshire accent but reliable sources assure me that he's Sam Harris and he is really real.

HAL's name wasn't really HAL at all, of course. He/It was actually HAL 9000. The days when computers had proper names

seem to have gone. MERCURY, TITAN, and ATLAS are from a bygone age. And what of Joe Lyons' computer LEO?

Perhaps it is only natural justice that computers should be depersonalised and known only by numbers but it can be very confusing for mere humans. I don't find it hard to imagine the Council discussing one of those tortuous schemes put up by the nuclear physicists for saving themselves money whereby they take an old computer from RHEL and trade it in against a new one for DNPL, then give the old DNPL computer to University A, thereby saving rental which they capitalise and use to purchase peripherals to replace the rented ones at University B, then use the Green Shield stamps they got on the last deal to buy more peripherals for RHEL. After about ten minutes of this no one will be quite sure whether the new DNPL machine is a 360/175 or a 370/165 or

whether the alternative proposal to buy replacement machines for universities involves four 125's or two 145's. It doesn't really matter though: the Council Secretariat will sort it out when they write the minutes.

### finding the formula

The ability to write a coherent account of an incoherent discussion is one of the skills which staff at LO have to develop. It may seem a small thing compared with knowing how to work a particle accelerator, a telescope or a computer, but it is probably more fundamental than any of these to the work of the Council as a whole. The following anecdote illustrates one of the pitfalls which may be encountered in exercising it:

When Council discussed the Five Year Forward Look last year a good deal of time was spent in considering when provision should be included for the third large computer at Atlas Laboratory. Afterwards, there was some disagreement among senior officers as to what the decision was. One view was that Council had said "as early as possible" while another argued for "in 1974". The minutes record the Secretariat's compromise solution: they read "as early as possible in 1974".

J A F

### nil desperandum

The heart of the layman and taxpayer is gladdened when he reads of all that the Sciences are doing on his behalf in the line of extensive researches. It is a little disappointing therefore to see that that worthy publication entitled "List of Research Grants Current on 1/10/71" slid into circulation without so much as a bleep from our public relations hierarchy.

Let us therefore correct this omission and allow our non-scientists such satisfaction as is open to them from knowing that after random selection from some thousands of others, such researches as the following are actively going ahead on our behalf. (We commend the accuracy in estimating costs to the nearest £ unit but why not to the nearest 1p?)

- Road behaviour of a car in response to steering* £23,321
  - Determination of Susceptibility of Passengers to Vibration* £14,474
  - Behaviour of Anchors in Clay* £16,679
  - Noise and vibration on board ship* £23,508
  - Fluid Mechanics of Wet Steam* £9,907
  - Effect on Passengers of fast long distant rail travel* £11,080
- Are these classic examples of "passing the buck" in that neither Admiral Nelson, George Stephenson or Henry Ford appear to have done their homework properly? Fortunately, its never too late and perhaps these deficiencies can be put right before those new tangled mediums of air and space travel catch up with us.

However, in case you should fear that the animal and bird kingdoms are left out in the cold, let us commend to you current valuable researches such as:—

- Neural basis of classical conditioning in the Turtle* £8,629
- Genetics and sex behaviour of the Mouse* £9,724
- Mechanical design of a Frog's leg* £5,104
- Endocrine control of Canary reproduction* £4,110
- Drought resistance in Eggs of Chirocephalus Diaphanous* £4,771
- Monograph of Fleas of the World* £2,000
- Control of feeding and drinking in the Barbary Dove* £21,992
- Control of the Cat's Sex Life (2 researches)* £30,567

There are no prizes offered as to winners in the above contest, but we can only presume that the Barbary Dove and Domestic Cat are hot favourites as they carry highest stakes. Perhaps we shall soon know what 'Cats on a Hot Tin Roof' really get up to.

The biggest slice of the cake goes to Computer Research and Development. One day it might even happen that this very costly and much misused Caliban will eventually be tamed and put in its rightful place, but perhaps not until the slice of cake is considerably cut down.

Finally, let us spur on to greater efforts and support for such causes as:—

- "22 Paracyclophary Radicals and Homolytic substitution of mono-substituted 22 Paracyclophanes"* £4,671

because we may need to learn to ride a bicycle one day — unless all that verbiage means something entirely different.

Phyllis Time

### blow that for a lark

When Peter and John saw QUEST's birthday cake with 21 candles they couldn't resist using it as the basis for a competition.

"We'll take turns at blowing the candles out," said John. "Whoever blows out the last one loses and will have to explain to the Editor why her cake is covered in grease."

"But how many can we blow out at a time?" asked Peter. "If it's as many as twenty the game will be over rather quickly."

John replied John, "We can blow out less if we like, but not less than one. I think the maximum should be more than two or I may run out of breath before we've finished."

So they picked a suitable number at random: Peter had first go and blew out the maximum number of candles. John had to apologise to the Editor.

Assuming that each of them used the best possible strategy, how many candles were put out by Peter's first blow?

Answer on p. 6

### ties to tie

Why don't we have an SRC tie? Competitors are asked to design one in a serious vein or satirical or say why we want one. Drawings should be black on white (suitable for publication) and descriptions or comments must not exceed 100 words — of prose or verse. The Prize is a £1 book token but a good design might also be taken up as a good idea — so it's up to you.

Assuming that each of them used the best possible strategy, how many candles were put out by Peter's first blow?

1	2	3	4	5	6	7
8						
9						
10		11		12	13	
			14		15	16
			17			
18	19	20			21	
	22			23	24	
25					26	
		28				27
29		30				
		31			33	
			35			
36						

### Crossword

maxim 2

The first correct answer opened gains a £1 book token. Send entries to Quest at London Office not later than April 16 marked 'CROSSWORD'.

The winner of maxim 1 was J H Richards of LO. Quest apologises to those who were caught by the early entry date.

- Across**
- 1 Encountered half a light-quantum in a code that's to change (12)
  - 9 What's drunk in Bordeaux (3)
  - 10 Bring forth (dog-eared) SOS for tungsten (5)
  - 12 Photos of a kip on board (5)
  - 15 Sir Robert's skin (4)
  - 17 (7)\*

- 18 Given for a while before Easter (4)
- 21 Rueful to worry without alternative (3)
- 22 Fake's real? A ruby, maybe (5)
- 23 (5)\*
- 25 Urge that goes with chips (3)
- 26 Ted's vortex (4)
- 28 They appear in spring, disappearing in October (7)

- 29 Dash that could be written with Biro (4)
  - 31 Sugar sometimes goes with a pop (5)
  - 33 Give help to a good chap, though stuffy (5)
  - 35 Upset French bird (3)
  - 36 Rent-payers make irregular holes in Heath and Wilson (12)
- Down**
- 2 Found in every woman (3)
  - 3 Current value of steam-power (3)
  - 4 One of twins when in pod (3)
  - 5 (5)\*
  - 6 Nothing oriental about American river (4)
  - 7 Vile sort of characteristic (4)
  - 8 It's dreadful and illegal to be beheaded (5)
  - 11 They help to make footwear that endures, presumably (5)
  - 13 (8)\*
  - 14 It's too much to bear, but distraught lover takes zero notice (8)
  - 16 Half-underterred, went wrong (5)
  - 19 Regal variation (of Nimrod?) (5)
  - 20 Continually criticise a horse (3)
  - 21 A rising condensate is joined (3)
  - 24 Uproot trees, and put back again (5)
  - 27 Lots say R & D is in a mess (5)
  - 28 Comes back in a miasma of bubbles (5)
  - 29 Evaporate a seat of infection (4)
  - 30 One with nearly costly notion (4)
  - 32 Owing tax (3)
  - 33 Poor 33 Ac., losing its titanium (3)
  - 34 Song of O<sub>2</sub> and N<sub>2</sub> mostly (3)

\* The answers to 5, 13, 17, 23 spell out a message.

### What's in a name

by our Etymological Correspondent

Many newcomers to State House have speculated on the origin of its name. It derives from the Old English word 'stede' or 'stead' meaning a farm. It is on record that in the 14th century the present site of State House was a farm lying just outside the western extremity of the City and no doubt providing the wealthy burghers who lived there with fresh milk and other country produce. At this time it was ecclesiastical property and quite possibly was deeded to the Church by some local minor noble who wished to escape his feudal duties to the King.

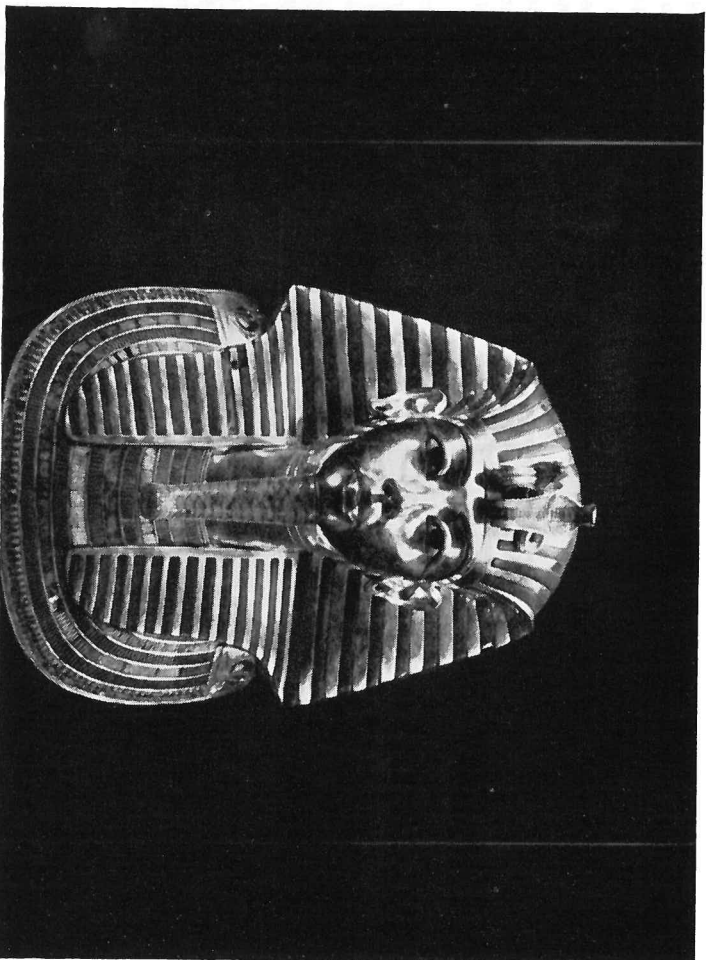
This must have occurred before the passing of the Statute of Mortmain in 1279. On the dissolution of the monasteries the property was bought by John

Worthing, at that time Alderman of the Ward of Cheap skate and later in turn Master of the Worshipful Company of Whoremasters and three times Lord Mayor of London. In his will, which is still preserved at Stationers' Hall, he left the farm to his heirs on condition that 'there shall forever be pasture for sheep and cows'.

This condition remains in force even today and it is for this reason that, although a large building has been erected on part of the site and most of the rest has been paved, a number of plots of grass are still preserved and hurdles are kept in readiness to pen in any stray animals which might some day appear to take advantage of good John Worthing's 400-year old benefaction.

# the great exhibition -1972

Seen right the solid gold mask that covered the head of the mummy of King Tutankhamun  
Photo by courtesy of the British Museum



F V Bale

I suppose that we started queueing about 9.30 am, after following a signed detour from Tottenham Court Road station presumably intended to get you to the end of the queue — with hindsight we would ignore it. In the road outside several shabby little men were selling the *Evening Standard's* Tutankhamun Supplement, a collection of "historic" pictures and headlines, such as "Tomb Sensation!" One had visions of the mummy having changed its sex, or a compromising cartouche found on the catafalque, but no — it continued: "Mummy Stuck when Removed from Tomb". How kinky can you get? We didn't buy one.

We expected a repetition of the business of going to see the Crown Jewels — a three hour wait in rows of ten followed by a quick glimpse as one passed by them at a sort of rough jog-trot — so we were relieved to get inside after only one and three-quarter hours, spent mostly in the yard and under cover. We were quite happy to keep moving and to read the handbook, which was just as well, because inside there were crowds, poor light, and constant exhortations to "move on slowly ladies and gentlemen, that's all

we ask, remember the people waitin' behind!" It took another hour and three quarters to get through; often one was waiting to be admitted into the next room. There was plenty of time to look around.

The handbook was a superb production at 75p, with magnificent photographs that sometimes did the exhibits more than justice. One could buy a short catalogue little more than a list — which was more useful inside. I thought the lighting in some cases could be improved: mostly it was overhead and sometimes the sides were poorly lit, although there were mirrors in one or two. Each case had a thermometer/humidity meter, and perhaps too much lighting was not desirable. It was very hot.

## the man from Texas

The crowds were a real problem; one Texan gentleman wanted to get out because he "felt the call o' nature" — I suppose it's all those open spaces he was used to — and announced that if he

couldn't get out forwards he'd just have to go backwards. I suggested that he was just making difficulties for himself, and he did offer "if you jest stay right there" to tell me a thing or two when he got back.

Room one had many small exhibits, in cases rather too close together for the number of people wanting to see them. For us it was made more difficult by two different queues going in opposite directions under the mis-guidance of two uncorrelated custodians. "It'd be easier to look after a battalion!" said one and I believed him. I wouldn't have his job for £10K a year!

There was a striking figure just at the entrance: a wooden statue of Tutankhamun in black and gold, about life-size (1.73m). Then a number of exquisite small items — a model of a typical ceremonial barge, alabaster unguent vases, a painted alabaster casket, a model of the canopic coffin of beaten gold inlaid with glass and carnelian — (really beautifully done in miniature) — an effigy of the king on a bier with a falcon and the human headed bird (Ba) — wooden effigies of the king and of the god Ptah standing (apparently) on a bootblack's box, which

turned out to be a plinth of the shape of the sign for "Truth". It was the precision of the miniature work which we found most surprising — it would be hard to beat even today.

One moved on to a black-and-gilt head of the sacred cow, and the "bed of the divine cow" supported by two beasts whose length suggested inter-breeding with a dachshund, but not apparently intended for sleeping in, being purely ceremonial. Then the furniture: beautifully decorated stools and chests, a gaming board, a gold staff with a miniature effigy of the king surmounting it, a fan and a standing "emblem of Anubis" of strangely modern design. The state of preservation is truly remarkable, superior to that of much extant furniture of the seventeen and eighteen hundreds. Then there was a small golden shrine with most beautiful

relief work on all its sides. These had been photographed, and were shown in panels about five feet high on the surrounding walls, and even with this degree of magnification were still of remarkable clarity and precision. This was workmanship of the highest order by any standards, artistic or technical.

## ... and a boomerang

Some beautiful golden effigies of the king in action, one of which is curiously feminine (tomb sensation?), came next and some truly magnificent jewellery, a trumpet, the crook and flail, a bow and a boomerang. Then finally, there was the pièce de résistance of the exhibition, the mask of solid gold, beaten and burnished, painted and inlaid,

which had been placed over the head and shoulders after mummification. One could spend a good time examining this, and indeed we did, because by now most people had had enough and didn't stay in the last room for very long.

A superb exhibition if one is interested in antiquities, and particularly if one is interested in this period, and we felt that it was well worth it, exhausting as it could undoubtedly be. It was a pity that there were no special facilities for old people who found it all much too much.

After lunch my wife went shopping and I went to see the Wallace Collection. It is also a superb exhibition. It is free. There is so much to see that one could easily spend several days in it if one really paid attention to every item; I used most of my time looking at the pictures. There was nobody there at all. Curious, isn't it!

## mottoes competition result

The number of entries and the standard were about normal for a Quest competition. The range of languages employed was small and we were particularly disappointed that NP Division did not produce its expected contribution in Sanskrit. Perhaps the examples we gave to start things off were of too high a standard, and deterred potential entrants.

## Quest's BIG PRIZE competition

Quest thanks authors who have sent in articles recently. Since some of them will not appear until the next issue (for lack of space) — and in case they were written with the prize in mind — the winner will be picked from three issues instead of two (Vol 5, 4 and Vol 6, 1 and 2) and announced in the one after.

Meanwhile please keep writing; and you might encourage us to award another.

## PS from Quest to authors

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"the strain is showing") is multipurpose.

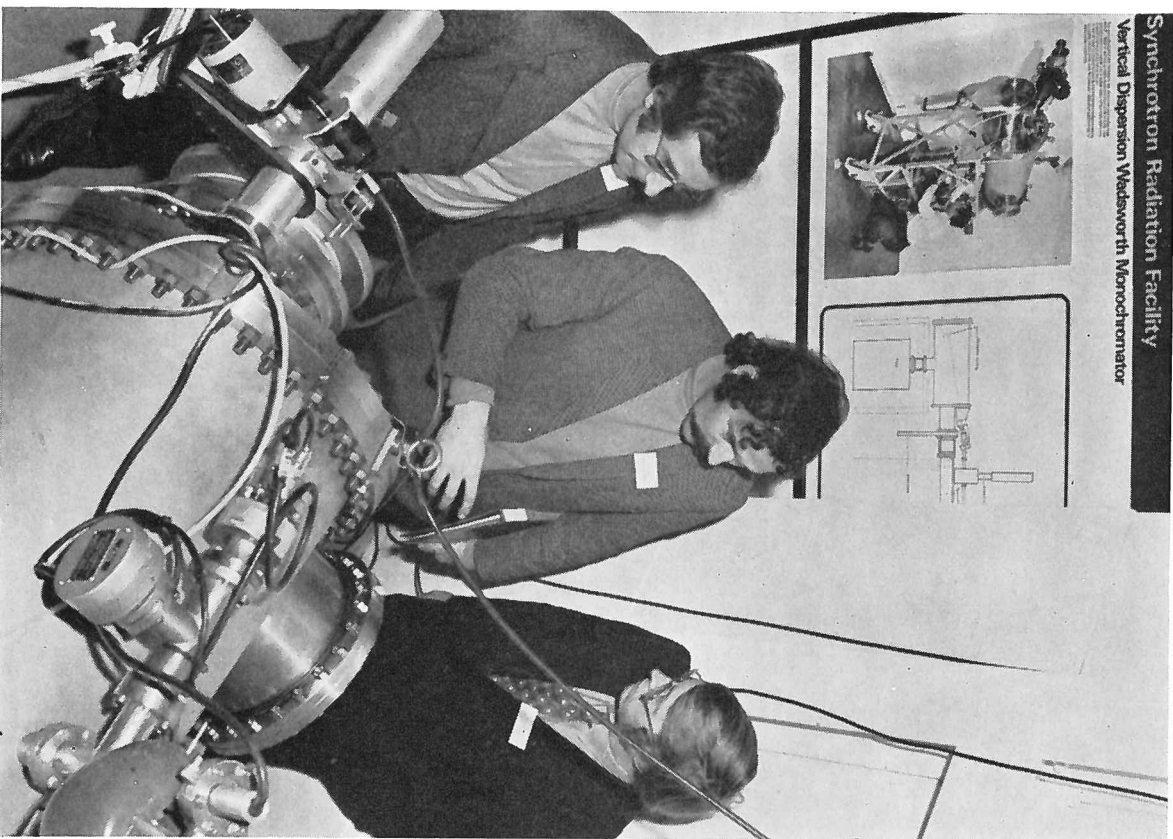
Although it was strictly outside the terms of the competition we felt we had to accept the suggestion that the Civil Service Commission adopt the motto "Many are called but few are chosen"; it clearly represents a cry from the heart.

Honourable mentions to all the above, but no prizewinners this time.

you are Angler-of-the-year, etc. or known who in SRC is.

## PS to picture-makers

Quest wants more pictures of people at work or off and more illustrations (diagrams) of experiments and results. We are also interested in comment expressed in cartoon drawings and in art for art's sake in the form of photographs or line drawings. We can use anything black and white and can make b & w prints from colour photos. So if you are handy with camera, felt pen or set square and compasses, please consider Quest as an outlet for your talents.



### the light at the end of the tunnel

Seen left, three of the hundred scientists who came to Daresbury from all over the world to see and discuss the Synchrotron Radiation Facility ('SRF'). Beside the Wadsworth monochromator, l to r, are: Dr C Kunz from DESY, Hamburg; Dr M Lynch from Perth University, Australia; and Dr D Lynch from Iowa State Univ., USA. Daresbury's SRF is one of only ten in the world and the only one in operation in this Country.

The meeting, held in January, was the first in Europe held specially for people interested in 'synchrotron radiation': the light emitted as a by-product from high energy electron accelerators. Light is produced at all wavelengths, including the visible and a high intensity of x-rays.

It has many research applications in atomic, molecular and solid state physics and Medical Research Council physicists will use it for x-ray studies of crystal structures.

### Is your Computer on fire?

We hope not, but just in case it happens you might be interested to go to the Conference on Fire Protection of Computer Establishments on Thursday March 29. The conference will be held at Rutherford Laboratory and is organised by the Atlas Laboratory and the Fire Protection Association.

Speakers will talk about case histories and protection devices. Visitors are expected from other SRC establishments, from university computer centres and fire brigades.

Seen (left) at the opening of the Crawford Library at the Royal Observatory Edinburgh are: (l to r) Professor H A Brück CBE, Director of the Observatory; Sir Michael Swann FRS who has just retired from our Council on appointment as Chairman at the BBC; Board of Governors; Lord Crawford whose grandfather created the library and gave it to ROE (see p. 2); and our Chairman, Sir Brian Flowers, FRS.

Looking at the books (see caption right and p. 2)



## newsfront

### new honours

We add Quest's congratulations to the three members of staff who received Honours.

H M Smith, OBE, Head of the Time Department at the Royal Greenwich Observatory.

C L Roberts, MBE, Head of Administration at the Atlas Computer Laboratory (seen far right).

A L Jefferies, BEM, Telephone Operator at the Royal Greenwich Observatory.

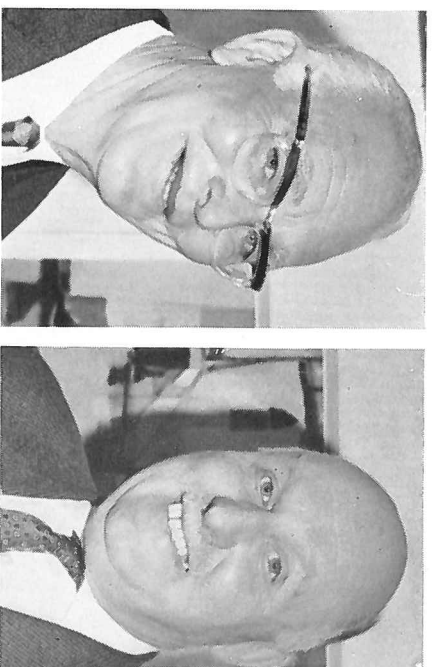
### getting ready to sail

Seen right is the 48 inch Schmidt telescope that Sir Howard Grubb Parsons and Co Ltd have just built for the Science Research Council. It is undergoing final factory trials before being shipped to Australia where it will be put on the same site as the 150 inch Anglo-Australian telescope.

One of the first jobs for the telescope is to complete the sky survey that has been made for the Northern Hemisphere with the instrument of the same type and size at the Mount Wilson and Palomar Observatories. More advanced in design, the power of the new telescope will be extended by the latest automatic measuring machines like GALAXY at the Royal Observatory, Edinburgh.

Dr Vincent Reddish of ROE is the project officer and will be in charge of the whole operation from data collection at the telescope to reduction at ROE and distribution to UK astronomers.

Since each photograph taken on the 14-inch-square plates may record up to a million stars and galaxies, the project team will have a busy time ahead of them.



### We are sorry

Quest apologises to W J Parmenter (l) and C L Roberts (r) who got a personality switch in the last issue. It was Mr Parmenter who retired and Mr Roberts who made the presentation (and is also mentioned left).

