14th Issue

ORBIT

August 1963

The Journal of the Rutherford High Energy Laboratory

COMPUTERS

A Survey (I)

J Howlett

(The first of two articles by Dr. Howlett, Director of the Atlas Laboratory)

One powerful computer, Orion, has just been installed in the Rutherford Laboratory; next year the Atlas Laboratory will take delivery of one of the most powerful computing systems in the world; C.E.R.N. is putting a great deal of thought and effort into deciding on its next computer, which it recognises will be a major piece of equipment in the Laboratory. Computers have become standard and essential equipment in scientific laboratories and are penetrating into many departments of life. To many people, including myself, they represent one of the greatest achievements of the age; this is perhaps only another way of saying that mathematics is one of the greatest achievements of the human mind, for the computer is a device for putting mathematics, in its widest sense, to work on a grand scale. However, the technical feat is remarkable. Speaking in a very general way we can say that the first machines, produced in the very early 1950's, increased one's power to do arithmetic by a factor of about 1,000 over calculation by hand with a desk machine; the fastest of those now being built like the Atlas give another factor of 1,000, so we have increased our powers in this field by something like a million-fold in about 10 years. In these two articles I want to indicate what this means, how it has been achieved, what it implies for the use of these machines, and what is likely to happen in the next few years. To put the subject in its correct financial perspective, let me say here that the National Institute's Orion, which ranks as a medium sized machine, has cost £350,000: the Atlas will cost £2,800,000.

We tend to think of computers as elaborate calculating machines, implying an exclusive concern with arithmetic. This is much too narrow a view. They have been called "electronic brains", but this smacks too much of sensationalism; the name "information processing machine" which is being used a good deal nowadays has a more respectable sound, and gives a truer picture of what these things do. They operate with information, which can be numbers, symbols or statements; numbers are used in arithmetical calculations, symbols in non-numerical processes such as algebra or symbolic logic, statements can include definitions, relations, rules for carrying out some process. The set of statements which tells how to perform a process is called the programme, the numbers or symbols needed to start this off are the data.

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TO LORD HAILSHAM, OFFICE OF THE MINISTER FOR SCIENCE,
2 RICHMOND TERRACE, WHITEHALL, LONDON S W 1 = =

27TH AUGUST FIRST OPERATION NIMROD STOP MAXIMUM ENERGY
8 GEV STOP INTENSITY AT 7 GEV 10 TO POWER 10 = = =

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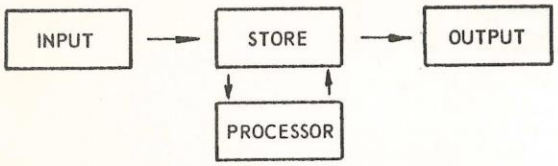
COMPUTERS - A SURVEY (cont'd)

It is convenient to think of the machine as a system in four parts: input mechanism, store, processor and output:



Information for input is punched in code as patterns of holes on cards or paper tape and read by a photo-electric or electro-mechanical device which forms the input mechanism; the output mechanism can be a printer or a card or tape punch or some form of visual display. The input-output devices are certainly important and have themselves been greatly developed from the earlier forms, but the real power of the machine lies in the store and the processor. The store, as the name implies, holds the information put into the machine and the numbers and other information generated by the process it is following; the processor takes from the store one by one the instructions which make up the programme, and obeys each in turn. The power of the machine is determined by the size of the store, the speed with which information can be taken from it and recorded in it, the speed with which the processor can act and the size and richness of the repertory of operations which it can perform.

The fast stores of modern machines are made up of magnetic cores, tiny rings of ceramic material (ferrite) which can be magnetised in one of two directions and switched from one state to the other by a pulse sent through a wire threading the ring. This allows a core to be used to store what is called a binary digit, that is, a number which is either 0 or 1; it is a fundamental law that any piece of information can be represented by a set of binary digits and therefore an assembly of magnetic cores can be used to store information of any kind. In a computer the cores are arranged in groups, each called a word and representing a unit of information in the machine; the Atlas and Orion word is 48 binary digits and represents a number, an instruction or a set of 8 characters any of which can be letters, numbers or other symbols. Stores have got bigger and faster as time has gone by; in the earlier machines, in fact before the invention of the core store, a thousand words was considered large and the access time was of the order of a thousandth of a second (a millisecond); the Rutherford Laboratory Orion has a core store of 16,384 (= 2^{14}) words, and can be consulted every 12 millionths of a second (12 microseconds). Our Atlas will have 49,152 (= 3×2^{14}) words with a corresponding time of 2 microseconds, and IBM have built several Stretch machines with stores of twice the size and about the same speed. A particularly important feature of these core stores is that they allow what is called random access, that is any word in the store can be found within the stated access time, so all numbers are equally available. But they are expensive, £10 per word being quite a usual price, and have to be backed up by cheaper and slower forms. Magnetic tape is now used very widely, a single deck storing from 1 to 3,000,000 words, groups of which can be transferred to or from the fast store at a rate of 10 to 20,000 words per second; a large installation can have quite a number of tape decks; Atlas, for example, will have 18. A more recent development is the magnetic disc file, more like a juke box. These are available with capacities of 1 to 10,000,000 words and transfer rates of 50 to 100,000 words per second. The cost of storage on tape or disc can be as low as a few pence per word.

The circuits of the processor carry out the arithmetical and logical operations which make up the programme, and these too have got faster. Simple operations like adding or subtracting two numbers, which took 1 to 2 milliseconds in 1955, can now be done in about the same number of microseconds; multiplication on Atlas takes 4½ microseconds. This increase is due primarily to the production of fast components, mostly diodes, transistors and cores, but also to improvements in the logical design of the circuits. An example is the design of fast carry circuits; when two multi-digit numbers are added or subtracted most of the time is taken up by the need to look after the carry, from one digit position to the next; much ingenuity has gone into speeding this.

The fastest machines do a good deal of overlapping of instructions. Obeying an instruction is quite a complicated business: the instruction itself in the form of a group of binary digits has to be taken from the store, the operand or operands taken also, the operation carried out and the result placed where the instruction says it has to go. In Atlas, when one instruction has been extracted the circuits which do this are released and can start on the next, whilst other circuits continue the processing of the first, and so on; there will usually be 4 instructions in different stages of processing. All this, of course, means more circuitry and therefore more cost; as usual one never gets anything for nothing.

The overlapping or parallel operation is an example of a general feature of the newest and most powerful machines. time-sharing. Another is the overlapping of the input-output operations, which are very slow in relation to the speed of the processor with computation so that. for example, the cards for one problem are being read in whilst an earlier one is under way. A third, and the one to which the name is most often applied, is the holding of several jobs in the store at the same time with automatic switching, so that if the one being processed is held up waiting for information - for example, whilst a magnetic tape is being searched - the processing of another is started and carried on

COMPUTERS - A SURVEY (cont'd)

until either it is held up, when a third could be brought in, and so on, or the first is ready to continue. Atlas and Orion have very elaborate time-sharing features. The aim is to keep all parts of the installation working at full speed all the time, and so to get the maximum amount of work through the system in the day.

To get some feeling for the meaning of the speeds I have been quoting, it is instructive to look at the problem of solving large sets of linear algebraic equations - this is logically quite simple and arises very often in actual calculations. Using a desk machine and a well organised method, a good human computer can solve a set of 5 equations in 5 unknowns, keeping 6 decimals throughout and including continuous checks, in about half an hour. The amount of work goes up as the cube of the order, so a set of 100 in 100 unknowns would take 20^3 = 8,000 times as long, or 4,000 hours; if anyone could bring himself to do this, which is very doubtful, it would take about 2 years. The Ferranti Mercury, which was installed in A.E.R.E. in 1958, does it in about 20 minutes, Atlas in about 15 seconds.

The Language of Research

John Maddox

(The following article is a shortened version of an article which appeared in the Rockefeller Institute Review and is reproduced by kind permission of the author).

Though it is fashionable to worry about the preservation of the increasing volume of scientific literature, comparatively little attention has been paid to the more fundamental issue of whether, in its present form, the scientific literature is worth preserving at all. By now, of course, it is well known that the volume of the published literature increases every year. The number of journals current at any time, and the numbers of papers contained in them, as well - no doubt - as the weight of paper used in their production, are exponentially increasing functions of the time and have in this spirit been widely regarded as indices of the continually increasing growth of scientific activity. Because there are more scientists and because the product of a scientist's work is a series of scientific papers, is it not natural that more papers should be published?

This argument conceals a smug indifference to the true condition of the scientific literature. With its aid, too many professional scientists conclude that it is not for scientists but librarians to undertake the management of what has been called the "information crisis." The technical community is much less ready to provide the kind of self-critical domestic help that would soften the edge of the apparent crisis by suiting the scientific literature more properly to what should be its essential purpose of communicating information and understanding between literate people.

By its meek acceptance of the ponderous accumulation of the current literature, indeed, the scientific community has lent support to the somewhat Freudian view that scientists, collectively as well as separately, have come to regard this mountain of printed paper as their primary product. The joke about the university department in which promotions are determined by the weight of a man's published papers is too true to be very funny. In many laboratories reprints are displayed much as if they were campaign medals on show in a general's drawing-room.

To many of those who spend more time in libraries than laboratories it must often seem that the obscurity of much of the literature rests on a foundation of confusion about the purpose of papers in the scientific journals. All scientific authors seem to be deeply, and properly, convinced that publication is an essential part of scientific activity. To tell from the contents of the journals, however, there is very little evidence that authors actually consider their papers to serve any other purpose than that of a factual record of work accomplished - a kind of superior laboratory notebook.

In this sense the scientific literature occupies a special place among writing; while most kinds of authors write so as to enrich their readers with some information or collection of information considered

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'By a fiction as remarkable as any to be found in law, what has once been published (no matter what the language) is usually spoken of as 'known', as it is often forgotten that the rediscovery in the library may be a more difficult and uncertain process than the first discovery in the laboratory.'

Lord Rayleigh

to be particularly illuminating, or so as to argue the correctness of some cherished opinion or interpretation. Many scientists seem to be moved to write first for themselves and only secondly for their readers.

Writing of this kind leans heavily on the assumption that truth will speak for itself and, indeed, many scientists argue that a paper may be spoiled if its author appends to a sober catalogue of facts anything that smacks of being a tentative attempt to suggest what these facts may mean. It is hard to believe that modesty of this kind, at least in the exaggerated forms in which it is sometimes practised, can be in the best interests of science. Certainly it is a modern development. Traditionally, authors wrote scientific books and papers because they wished to persuade others of the correctness of some understanding of the natural world.

In a period when the pace of scientific activity is quickening and when scientists themselves argue in public and before congress that their goal is to forge some deep understanding of the natural world, it is a paradox that a great part of the scientific literature seems to have been written without much concern for the elementary need to communicate understanding to other people.

Inevitably, a literature which is in general as flaccid as the current scientific literature, must be one in which it is difficult to tell which papers are substantial contributions to understanding, and which are but trivial documents. Indeed, the evolution of stereotyped formulae for the planning of papers, and the growth of a pompous Latinate language to go with it, seem to have made it possible to clothe the results of trivial work in high-sounding trivial language. It is for specialists working in specialised fields to say how serious abuses of this kind may be. The condition of the literature has however made possible another kind of abuse which is, unfortunately, plain for all to see. Nowadays, especially in fields where progress is rapid, there is an unresisted temptation to rush into print before there can have been time to appreciate whether a piece of research has profound importance or no importance at all.

Compared with issues like these, it may seem unimportant that scientific papers are frequently written in a language that is a loose and even misleading imitation of that used in other forms of writing. Even so, it would be wrong to count the literary style, or lack of style, of the scientific literature as a secondary matter. On the contrary, there is every reason to consider that the evil constructions which abound in the pages of the scientific journals are, as it were, the microscopic embodiment of the ill health of the literature as a whole. For though there is no question that the language used to describe what may be, after all, the highest achievements of the twentieth century is matched in inelegance only by the more tedious forms of Civil Service composition, it cannot be inferred from this that most scientists are illiterate. On the contrary, they are people who will read Faulkner for fun, or sit hugging their delight through a performance of Shakespeare, and who will then solemnly scatter bad language through the pages of the "Physical Review". It seems as if the literary style of science is a convention eagerly embraced by the profession, and as if it is a convention which makes possible a great many of the evident defects of the current scientific literature.

Thus scientists will write in the passive for paragraphs on end, with all the flabbiness that that entails. The magisterial (or is it the royal ?)'we' still makes a great many scientific papers read like medieval proclamations. Infinitives are split, not merely without feeling but in ignorance. The tenses are changed for variety, and without care for their meaning. Intransitive verbs are made transitive. Everybody is his own etymologist, and almost overnight the acronym "laser" becomes the noun "laser" and, finally, the verb "to lase."

The most unexpected attribute of the language of the journals is its imprecision. Though authors would be affronted by the suggestion that they might have been guilty of imprecision in the laboratory, they seem not to fear the charge of laxity at the typewriter. At least, only this can explain how some words are seized upon to embrace a whole constellation of different concepts. The noun "level", for example, does service for a number of other words such as "height" ; "degree" (as in "level of competence"); "size" (as in "population-level"); "yield" (as in "harvest-levels"); "intensity" (as in "light-level"). The same word is also used as a kind of grace note in the well worn expressions temperature-level, obesity-level, height-level, and the like. It needs only a little more of this for the strict meanings of the displaced words to become atrophied, and for the English vocabulary of science to shrink still farther.

Less frequently castigated faults also abound in the scientific literature. There is, for example, the curious but almost universal practice of starting a scientific paper with a resounding banality.

'Enough scientific and technical literature is produced in the world every 24 hours to fill seven sets of the Encyclopaedia Britannica.'

Report of the South African Council for Scientific and Industrial Research.1962.

According to a recent survey conducted by the British Association of Industrial Editors, more people in Britain read employee house magazines than read Sunday newspapers. The figure is estimated to be in the region of 30 million.

THE LANGUAGE OF RESEARCH - (cont'd)

"The translation of a four-letter nucleotide code into a twenty-word amino-acid dictionary has been the subject of much speculation." This suggests (though not conclusively) that the article that follows has something to do with molecular biology. To molecular biologists it is a statement of the obvious and to others it may have no meaning at all. To be sure, it is a convenient stretch of type upon which to append the little numbers which refer to the bibliography at the end of the articles, but it is also a forbidding foretaste of the weight of unpalatable prose that follows.

It does not, however, follow from this that there is nothing to be done for the journals by properly conceived processes of editing. In other fields, on newspapers or magazines, for example, editing at its most constructive consists of discussion between an author and a person who serves principally as an independent critic, and as a touchstone of what may be intelligible. If there have to be new words, they are the author's and not the editor's. Nuances are not lost, but gained. There is no reason why attempts should not be made to improve the intelligibility of scientific papers by similar means, though equally there is no guarantee that decisive improvements could be achieved with the kinds of resources that the scientific journals have at their disposal.

There is a strong case for asking that some institution, and preferably one of the learned societies, should take the lead in a search for some vastly improved method of presenting scientific information to a scientific readership. The condition of the literature at present is, indeed, so bad that it may well be that most changes would be improvements. Certainly it is ingenuous almost to the point of dishonesty that the scientific community should so persistently badger the librarians for more and more elaborate methods of cataloguing the scientific literature, and for more and more storage space, when it cannot be seen to be doing everything that needs to be done to make the torrent of literature intelligible outside the narrowest of circles.

The Local Administration Organisation

W W Woodall

In the June issue of 'ORBIT' it was reported that Local Administrative Officers had, by working alongside scientists and engineers "gained additional knowledge of how they tick." My first thought was that this paragraph must have been written by an Administrator - with tongue in cheek; who else would accuse scientists and engineers of "ticking". Seriously though, we in the Administration are delighted that the Local Administrative Officers and others have been given the opportunity of assisting in the operation of NIMROD. We are all for the closest possible identification of administrators with projects and programmes and the building up of con fidence and respect among scientists, engineers and administrators.

The Local Administration Organisation is the linchpin of general administration in the Rutherford Laboratory. Through it, we try to provide the Laboratory as a whole and the scientific and engineering staff in particular, with all necessary administrative services, from supplying pens and paper to printing 'ORBIT' or getting you from London Airport at some unearthly hour. Our aim is to do this in an acceptable way, cutting out red tape as much as possible; but we must be logical and economical in our methods and not too unreasonable in our demands on the Administrative Staff themselves - there are those who believe that the LAO's (if not those shadowy central administrators) are human too ! We have tried to assign to duties in the Local Administration Organisation, staff with good administrative experience, common sense and the personal qualities to enable them to get along well with their scientific and engineering colleagues. It is essential to their work that they should be able to interpret regulations sensibly and establish good personal contacts with members of the groups for whose local administration they are responsible.

In the cases of ATLAS, NIMROD and the PLA it has been possible to associate the Local Administration Organisation with definite operational groups. This is the arrangement which works best and is most liked by both administrative and non-administrative staff. The LAO's and their staff associated with these projects have had a good opportunity, which we believe they have taken, to identify themselves with the scientists and engineers in their groups. This is important, because the LAO must think of himself as an integral and not unimportant part of the group. We hope that scientific and engineering staff too are coming to accept the LAO and his staff as group colleagues. There should be no doubt in anyone's mind that the LAO's for ATLAS, NIMROD and the PLA

THE LOCAL ADMINISTRATION ORGANISATION - (cont'd)

are as much a part of the project team as a scientific officer or an engineer. He should be thought of by the group staff as the man who can help them to solve their administrative problems. Often he will be able to do so from resources at his immediate dsiposal; sometimes he will have to call on supporting services - long distance transport or housing, for example. These are administrative services which it would be uneconomical or administratively cumbersome to disperse. Occasionally, the LAO will not be able to satisfy your reasonable demands, but please believe that he tries to do so and if he sometimes asks what appear to be unnecessary questions, don't think too hardly of him. There will be a reason and, we hope, a good one, for the questions.

Local Administration in the rest of the Laboratory is organised "territorially" in the main buildings, R1 and R20/25 which accommodate staff from a number of groups. The LAO's in these buildings cannot have quite the same close association with a major project as their colleagues in, say, the PLA but they also try to achieve an identity with the staff in their areas. In this respect their task is, perhaps, rather more difficult than that of the LAO's associated with projects.

Staff ought to be able to feel, and we hope that they do feel, that they can go to their LAO with any administrative problem, in the confidence that he will do his best to help them, either directly or by putting them in touch with the right person. Some more personal matters are better discussed with the section concerned. For example, if you have a housing problem, talk to Eric Lindley. (Building R1, Room 2-48, Extension 263). Your LAO will introduce you to him.

Each LAO has at his direct disposal resources to provide the following services (not always, I fear, in the abundance he would like or you consider necessary):-

- Local transport
- Typing Services (in consultation with the Superintendent of Typists)
- Stationery and Office supplies
- Cleaning Services
- Travel Warrants
- Tea/Coffee services
- Messenger Service
- Conference and Meeting Rooms
- Visitors travel and meals
- Casual Purchase Orders
- Medical and First Aid Services (in liaison with Med. Div. AERE when necessary)
- General information about his project or area and the people in it.

He will also help you with the following administrative services by contacting the section concerned or putting you in direct touch with the right person if this seems a better way to deal with your problem:-

- Long distance transport
- Reproduction Services
- Housing and House Purchase Assistance
- Laboratory and Office Accommodation
- Restaurant Services
- Stores
- Telephone and Telex Services
- Hotel and Hostel Bookings.

If you need advice about personnel problems, travelling and other allowances, arrangements for overseas travel, your LAO will put you in touch with the right man (or one of Mr. Jenkins' attractive young ladies) in the Personnel Branch.

Your LAO is at your service. Please make use of the experience, knowledge and resources he has to help you with your administrative problems.

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There appear to be no grounds whatever for regarding as well-authenticated the rumour that there is a connection between the recent improvement in the Laboratory's finances, the mail train robbery and the absence on leave at that time of three members of the Laboratory Management Committee.

'Departments of research, in large firms and in universities, are growing rapidly in size of membership and much is done by teams which have to be led or directed. The 'heads' of such large departments almost always originally research men themselves, no longer do research but are administrators of research. Yet it is doubtful if any one of these heads has ever had any education specifically in administration.'

Prof. T.T. Paterson.
'Administration of Research'
Nature, 11th May, 1963.

'With rare and refreshing exceptions, scientists are hardly the men who run the development councils in our own countries. At present this is the prerogative of our civil administrators - men who are the finest products of the culture of arts, of the culture of law, of the culture of war - but seldom, if ever, of the culture of science.'

Professor Abdus Salam.

EDITORIAL

The Rutherford Laboratory Restaurant served its first meals to the Members of the Governing Board when they met at the Laboratory on Monday 15th July. (An event which led one of our less reverent members to christen the Restaurant 'Clochmerle'). After the meal Lord Bridges, Chairman of the Board of the National Institute, spoke in praise of the Restaurant and the food served.

This praise was echoed by almost everyone when the doors were opened to the Laboratory at large on Tuesday, 27th July. The first meal on this official opening day went to Janet Hoare with the Editor third in the queue. (Who was it spread the rumour that the first dozen meals were to be served free ?)

The fact that the sun was shining brightly on the opening day, after several weeks of rain, put everyone in the mood to be easily pleased but even if the rain had been pouring down we feel that the Restaurant would still have made a great impression We think it is a credit to the imagination of the people who first thought of such an enterprising building, to the architects who designed it, and to the Laboratory who financed it. The Restaurant will probably become firmly established as a pleasing focal point of Laboratory life.

It is fine that in this one building all sides and levels of Laboratory life come together every working day. This should help to foster the 'corporate spirit' which is an important factor in determining the success of any body of people. Outside Laboratory hours generally speaking, we are all for having at least two miles between each one of us (green belts permitting) but inside Laboratory hours we are all working in our different ways, no matter how elevated or how menial our jobs, towards the same ends. We will be all the more aware of one another if we meet over the shepherd's pie occasionally.

It will take time for the Restaurant to acquire a definite atmosphere of its own but it has an excellent start towards establishing a distinctive character in the unusual construction of the huge circular dining hall. The large windows, giving an all round visibility that would be envied by the car manufacturers and the vastness of that one room, give a sense of freshness and spaciousness that is exhilarating. Maybe it is the contrast to the small square boxes, at home and at work, in which most of us spend the biggest part of our lives, that produces this effect. It would have been easier and cheaper to repeat that same box on a bigger scale to provide us with somewhere to eat. All credit to those who had the courage and imagination not to.

We have received something more than the standard works canteen. Is it worth the extra trouble and expense ? This sort of question can be asked about all sorts of other things we have heard referred to as 'the frills of the Laboratory' - the rose beds in our grounds, the flowers in our entrance halls, the production of ORBIT. And why stop there ? We could pare the Laboratory down to its 'essentials' at a tremendous saving. Why bother to provide as pleasant an environment for people to work in, or to eat in, as possible ?

The direct product of efforts to brighten the atmosphere in which people live their lives is not easily measured, although the social psychologists are confident that it is worthwhile from the point of view of 'output' alone. To talk about great work emerging from primitive conditions, for example the recent unravelling of the genetic code in the wooden huts of Cambridge, is to ignore the probability that the great work emerged 'in spite of' and not 'because of' the conditions. Very few people are so intensely absorbed in their work that, given the bare essentials needed to pursue that work, everything else is by the way. Most people do not have such enthusiasm, especially if it is not effectively communicated, and for them a pleasing, invigorating environment seems certain to result in better work and happier people.

Up to the time this issue of ORBIT goes to press (19th August), beams have been accelerated up to 50 MeV in NIMROD. Some improvement of the field in the magnet ring is needed before beams can be taken to much higher energies and, by means of adjustments to the pole face windings, this is now underway. At present commissioning work on accelerating beams takes place into the early hours of the morning four times a week. Injection, timing, RF switch-on etc. . . .are all being investigated and with any luck the next issue should carry news of 7 GeV beams

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Letters to the Editor

Letters may be addressed to 'The Editor, ORBIT, Building R.1' Pseudonyms are accepted provided the authors name is known to the Editor.

Sir,

Since lunching in the very elegant cafeteria / canteen I have, from time to time, suffered mild indigestion, and feel that this is due, not to the excellent standard of cooking therein, but to the seating arrangements, and I feel that some improvements could be made in this direction.

You will be aware that tables are arranged in concentric circles, co-axial with the tea-urn, the line of vision being approximately tangential. Since one's fellow diners are distributed in this manner, one's

LETTERS TO THE EDITOR - (cont'd)

attention is drawn in a circular direction, this imparting a screwing action to the neck and upper trunk, and hence also to the digestive tract. This motion has a left-hand or right-hand thread according to whether one faces clockwise or anticlockwise in the "rotunda". By adopting a clockwise attitude, I have successfully eliminated my digestive disorder.

The explanation of this is, of course, abundantly clear. It is a well known fact that in the northern hemisphere, bath-water flows from the plug with a clockwise motion, when viewed from within the bath, or anticlockwise when viewed from the drain pipe. There is every reason to believe that food and drink traverses the gullet in a like manner, and it is therefore necessary to ensure that rotation of the neck is in sympathy with this motion to eliminate digestive disorders. The flow should be laminar and not turbulent. Had this building been erected on the equator, these precautions would have been unnecessary.

A radial pattern is suggested for the seating geometry, the attention being held by the revolving orange squash dispenser.

Such an arrangement has the added advantage of permitting discreet observations of the entrances and exits to the "rotunda" of the numerous delightful young ladies now finely sprinkled about the Rutherford Laboratory.

R.C. Hazell.

Something Even Odder

(Being a sequel to 'Something Odd' – ORBIT. April 1963)

"Why hello old man, didn't expect to see you back so soon! I thought your case would be a long one – how was the nursing home – treat you alright did they? I say that was quite a fracas we had that day, what, -ha ha ha -about the canteen -er -restaurant – being an accelerator eh, --ha ha --- ha ----. I say you do remember me old chap don't you?"

"Oh yes."

"Well good! Shall we get our trays and join the queue? Quite nice isn't it? – no need for all that fuss was there?"

"Wasn't there?"

"Er -well no -I mean it's clear to you now that this is a perfectly ordinary cant -- restaurant isn't it?"

"Is it?"

"Ha ha – pulling my leg again eh! I must say you had me worried for a moment there."

"That's good."

"Look, they did cure you didn't they – I mean you became quite violent that day you know – broke my umbrella as a matter of fact, not that I'm expecting you to pay for it old boy. I happen to know you're out of a job at the moment – – you got the old shock treatment and all that eh -ha ha- I mean they wouldn't have let you out otherwise eh --ha ha --ha --er look let me pay for your lunch, I do feel a bit responsible for what happened to you actually."

"What about Kennedy's Science Advisory Committee?"

"I beg your pardon?"

"I smuggled the June issue of Orbit into That Place and read about it – I outwitted Them! – doesn't that enormous new accelerator programme convince you that I'm right? You see the epidemic is more advanced in America."

"Take my advice dear boy – be like me! – don't worry about these things. Chaps like Kennedy and Kruschev and Macmillan, why they're all clever chaps with the best advice – they know what's best."

"Best for whom?"

"I'm doing my best to help you, why can't you co-operate?"

"What's that trap door?"

"Trap door?"

"You're standing on it. There, where that faint crack is in the wood blocks."

"Well bless my soul! I must say I hadn't noticed that before!"

"Where does it lead to?"

"Er -well -er -I expect it leads to the foundations -er -drains and all that you know."

"Drains! Look at the roof!"

"The roof? I – oops – steady on old man, you'll have me dropping my tray – I've got my umbrella and hat to cope with as well you know. What about the roof anyway?"

"Why are those steel beams so heavy? The roof seems to be a particularly light structure and yet it's supported by twelve fourteen inch R S J's – why?"

"Perhaps it's in case of heavy snow or something I – "

"It's to support a crane so that They can lower heavy equipment through that trap door!"

"Oh really! For goodness' sake don't get excited again – sit down at this table. Now then – – is it still your contention that this ca -- restaurant, with all these ordinary people in it eating their lunches, is in reality an accelerator?"

"It is."

"Well where is the money coming from then? You're always saying how expensive these machines are, why, if somebody were building a secret accelerator, the Laboratory would get into serious financial dif ---------- my God --------."

Protecting the Ganglionic Mass of the C N S

E. EATON
Safety Section.

Greek coins struck in 450 B.C. portray the goddess Athena wearing a helmet of gold and Athena being a woman, it was adorned with precious stones and plumage.

Ever since men started fighting each other, armies have been equipped with helmets. Improvements and modifications began probably as a result of damage to the helmet of Alexander the Great. He was struck down in the battle of the River Grancia in 334 B.C. and although his helmet undoubtedly saved his life, it did not give him the full protection he required. He instructed Theophilus, a celebrated armourer of that time, to produce a helmet that would be proof against any of the existing weapons likely to be aimed in his direction.

This Theophilus did, with remarkable success and the 'Protective Helmet, Mark I, soldiers for the use of' became standard issue to his armies. The average weight of this helmet and its successors for many generations was about 8 lbs. Alterations in style, material and ornamentation continued but when gunpowder and mightier weapons took the place of broad swords, pikes and axes, helmets virtually disappeared.

They returned to favour during the First World War when the 'tin hat' saved the lives of many thousands of soldiers on both sides. They were brought to a higher standard of perfection and comfort by means of a leather liner containing a six point suspension. Further improvements were made during the last war.

Industry has benefited from these many years of research and experience. Industrial firms operating mines, quarries, construction works and factories now issue helmets as a standard part of their safety equipment. The combined experience and knowledge of many private firms, employers federations, the British Standards Institute, etc... has resulted in the modern safety helmet. This is strong, durable, adjustable, fireproof, electrically insulated and weighs only about 12 ounces.

The Federation of Civil Engineering Contractors report that of 5,500 accidents recorded in their firms during the past two years, 20% were due to materials falling on people working below. That is an awful lot of heads to protect.

If you are working in tunnels, ducting or wherever things can fall on you – wear a safety helmet and don't lose <u>your</u> head.

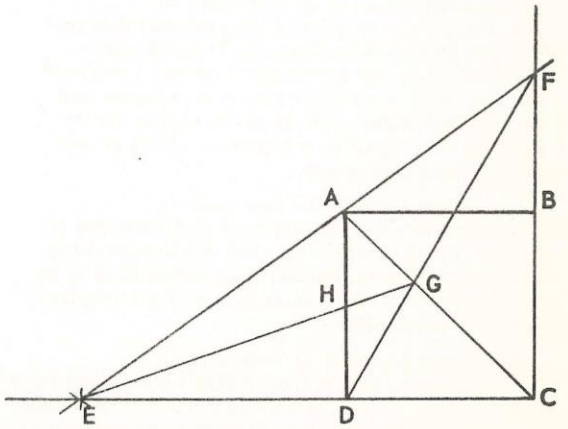
Oh yes – 'the ganglionic mass of the central nervous system' is usually referred to as 'the brain.'

How is your Geometry?

(A problem brought to our attention by W.M. Evans)

Given a square, A B C D, we are to bisect the side A D using a straight edge and pencil only.

Continue the line C D to any point E and draw the line through E and A to cut the continuation of C B at F.



Join F D; Draw the diagonal A C cutting F D at G; Join G E.

G E bisects the side A D at H.

Prove it.

One method of solution will be given in the next issue.

Personnel News

Suggestion Awards

The eleventh meeting of the Rutherford Laboratory Suggestions Awards Committee was held on Thursday, 15th July, 1963 and awards totalling £36 were made.

An Award of £3 was made to Mr. R.W. Roberts for his proposed rearrangement of the Nimrod telephone system. As some confusion could have previously been occasioned to persons trying to contact the Water Treatment Plant, the Water Pump House or the Convertor House, this system has now been suitably modified.

An Award of £3 was made to Mr. E. Kirby in respect of his suggested modification to the switch gear of the Bandsaw in R.9 Electrical Workshop. The Safety Officer had commented that this suggestion had drawn attention to a definite hazard in connection with this machine and that replacement of the existing switch gear was recommended.

An Award of £10 was made to Mr. J. Crawford and Mr. R. Axford for their idea for a Locating Jig for cementing scintillators to Perspex "fish tails". This suggestion has already been adopted and has proved to be practicable and has made a definite contribution to productivity.

An Award of £5 was made to Mr. C. Humphrey for his suggested installation of warning lights to indicate when the bending magnets of the Inflector system were energised. This proposal has now been adopted and was considered to make a necessary contribution to the safety of personnel working in this area.

An Interim Award of £5 was made to Mr. K. Feakins in respect of his proposal that terminal blocks should be fitted to Transductors as an alternative to the soldering of wires in awkward positions. This suggestion has been adopted and further consideration will be given to this matter on receipt of a detailed assessment of the actual savings which may result.

An Interim Award of £5 was made to Mr. C. Humphrey for his proposed modifications to facilitate the accurate alignment of components in the Inflector System. Further consideration is to be given to this idea when an estimate of the resultant savings is available.

An Interim Award of £1 was made to Mr. C.D. Moreton who proposed that waste paper from the Laboratory should be sold to a dealer rather than be burned in an incinerator. Further consideration of this matter will be given when a contract has been placed with a suitable dealer.

The following suggestors were given £1 Encouragement Awards in respect of their ideas which were considered by the Committee to merit recognition, although these suggestions may not be adopted in their present form:-

Mr H. Webb & Mr. W.C.J. Smith (Joint suggestion)	- Site Road signs.
Mr. W.C.J. Smith & Mr. H. Webb (Joint suggestion)	- Electric Truck Modifications.
Mr. E. Angell	- 10 ton Crane Modifications.
Dr. N.D. West	- Scaffolding Safety Precautions.

D.G.J. ROSE.

(P.S. If anyone has any queries in respect of the £10 award please don't refer them to me – – the thought of Perspex fish with their tails scintillating madly is far too surrealistic for my simple mind)

Comings and Goings

R.B. Abdarabbani and D.R. Jones join Electrostatic Generator Group.

Mrs. J. Scholes joins Administration.

Miss S.A. Tilley and Miss J.A. Hughes join the Atlas Laboratory.

R. J. B. Hadden, T. G. Hunt, D. G. Barrow, Mrs. E. E. Williams, Mrs. J. A. Layton-Mathews, R. J. E. P. Axford, D. R. W. Coleman, G. Deanes, R. D. Druce, J. A. Gardner, S. R. Nash, D. J. Peaple and E. A. Shaw have left us.

Congratulations to –

Eric Hartley, Nimrod Operations, and his wife Betty, on the birth of a daughter, Louise Mary, on 9th July.

Sylvia Child, Magnet Group, and John Timmis, Radiation Protection, on their marriage on the 27th July.

Trevor Mason, Magnet Group, on his marriage on 17th August.

P. S. Rodgers
has succeeded G. L. Cooper
on the ORBIT Editorial
Advisory Panel.