8th Issue

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The Journal of the Rutherford High Energy Laboratory

Research Reactors and the National Institute

Geoff Cooper

With all the emphasis on nuclear and high energy physics there is one activity of the Institute which is frequently overlooked. This is the support we give to Universities in aid of research involving the use of nuclear reactors. Although the amount of support, expressed in financial terms, has so far been very small, there have recently been some important developments and the Institute are now making an increasing contribution in this field.

The reactor and the accelerator, the two principal research tools generally associated with nuclear science, are both essentially products of nuclear physics, but their histories have been very different. For whereas the accelerator has remained predominently confined to the fields of nuclear and high energy physics, the reactor has had a much wider range of application. Following the first use of reactors as producers of fissile material for military applications, the possibility of developing them as sources of power was quickly appreciated and during the nineteen fifties enormous sums of money were spent towards this end, particularly in the U.S.A., Russia and the U.K. Today reactor technology is the basis of a whole new industry devoted to the commercial applications of nuclear power.

From the start however the role of the reactor as a research tool had been recognized, principally because it is a prolific source of neutrons, and this has led to the concept of the "research reactor". Since Universities are the natural centres for research there are good arguments for siting research reactors at Universities, particularly as reactors may be used in so many fields of research. In practice it is only feasible in the case of small low power reactors which are relatively cheap to build and easy to operate. Large high power reactors are not suitable as University installations (the position is reminiscent of the factors controlling the siting of small and large accelerators).

The policy of providing Universities with small research reactors has certainly been followed in the United States where the first University reactor began operation as far back as 1953. Since then approximately 150 Universities and other educational centres in the U.S.A. have acquired research reactors or sub-critical reactor assemblies and their research output has been considerable. In addition to research they are also used as training facilities for scientists and engineers needed in the rapidly expanding field of reactor technology. Universities in Europe are also aware of the value of research reactors and there are today approximately 20 on this side of the Iron Curtain. By comparison the United Kingdom has made rather a late start and there are at present no University research reactors in this country, although approval for the first three has recently been given (for the Scottish Universities, London University and Manchester/Liverpool Universities).

The National Institute has from the start maintained a close interest in the needs of Universities for research reactor facilities. This has been done through the Research Reactor Committee of the Institute under the Chairmanship of Sir John Cockcroft. One of the first tasks of the Committee was to renew the requests for the provision of low power reactors for teaching and research which had been made by certain Universities and make appropriate recommendations to the Government. The outcome was the announcement about the first three University reactors referred to above, but it should be emphasized that these reactors are being financed through the D.S.I.R. not the Institute.

Meanwhile the Institute are giving assistance to Universities wishing to undertake irradiation experiments by arranging access to the various research reactors operated by the U.K.A.E.A., principally those at Harwell (Bepo, Dido and Pluto). The costs of such irradiations

(cont'd overleaf)

RESEARCH REACTORS AND THE NATIONAL INSTITUTE - (Cont'd)

are generally bourne by the Institute.

Reactors, regarded simply as neutron sources, now play a vital role in several fields of research. The effect of neutron irradiation on matter is an important aspect of many branches of science (e.g. solid state physics, radiation chemistry, biological sciences etc.) not only because of the practical implications but because such studies frequently throw light on the nature of matter itself. For example structural defects which occur naturally in solids and are responsible for many of their properties can be introduced in a controlled manner under fast neutron bombardment in a reactor and then subsequently examined by observing their effect on a beam of slow neutrons from the same reactor. Furthermore since the energies of slow neutrons are comparable to the energies of atoms in solids and liquids, energy exchanges occur between atoms and neutrons which are detected in the scattered neutrons (the so called inelastic scattering process), and from such measurements valuable information concerning the energies and motions of atoms in solids and liquids can be deduced.

Another important field of research is the neutron diffraction technique which supplements the older X-ray diffraction methods in probing the internal structure of solids. It reveals new information concerning the relative crystallographic positions between clusters of atoms, and the various orientations of the magnetic moments associated with these atoms, (sometimes referred to as the magnetic architecture of solids). The reactor has also made possible a new and very sensitive method, of detecting impurities, a technique known as neutron activation analysis, which is widely applicable. Many more examples of new fields of research opened up by the advent of the research reactor could be given.

A few examples of University research programmes being supported by the Institute are as follows. One group at Manchester are irradiating inorganic solids to study the chemical consequences of nuclear reactions; another group are using the neutron activation analysis technique to study the geochemical distribution of certain rare elements in different rocks and their constituent minerals. A team from Birkbeck College London are investigating the angular correlation of coincident radiations produced during the decay of short lived isotopes (produced in the Dido reactor); King's College London have a programme involving the irradiation of natural and synthetic diamonds. Perhaps the most unusual case is the assistance we are giving to the Archaeology Department at Oxford in neutron activation analysis of archaeological specimens. Frequently chemical operations are necessary following irradiation in a reactor, and the new Radiochemical Wing which has recently come into operation at the Rutherford Laboratory will be available to University workers for this purpose.

There are some important fields of research which demand very intense beams of neutrons, as produced only in high flux (i.e. high powered) reactors. This is particularly so in the experiments in solid state physics which require beams of slow neutrons and in irradiation damage studies in solids where high doses are required. The Institute are at present very much concerned with the needs of Universities for space in high flux reactors. As a start it has been decided to support three major research programmes requiring such facilities, proposed by groups from Birmingham, Cambridge and Reading.

In view of an offer by Associated Electrical Industries Ltd. of space in their high flux reactor Merlin it had been hoped to accommodate these experiments in this reactor, and detailed preparations were underway. But these plans had to be abandoned last July following A.E.I.'s decision to cease to operate Merlin. Fortunately the Atomic Weapons Research Establishment at Aldermaston were able to offer space in Herald (which is very similar to Merlin) and the experiments began there towards the end of last year. The Institute are hiring approximately one quarter of the total facilities available on this reactor to meet the known University requirements. Since irradiation damage experiments are frequently enhanced if carried out at low temperature (the damage is then "frozen in" and easier to study), a special liquid nitrogen irradiation rig has been ordered for use on Herald.

Summing up, it is clear that the Universities are generally becoming more alive to the possibilities of research reactors. The Institute are responding by keeping in close touch with those interested. A newsletter has recently been circulated round the science and technology departments of the Universities (and Colleges of Advanced Technology) informing them what the Institute are already doing in this field. Even if more Universities acquire their own low power reactors, there will always be a need for high flux reactor facilities (in fact the existance of "home" reactors will probably increase the demand) and the Institute has a central role to play in meeting these requirements.

It is just conceivable that one day the Institute may have their own high flux research reactor operated for the benefit of the Universities as are the accelerators. But there seems very little prospect of this happening in the forseeable future. Nevertheless the support we are giving, even without a reactor of our own is making the influence of the Institute felt over a much wider range of research activities within the Universities. This will have a mutually beneficial effect for both the Universities and the Institute.

Quiet man introducing himself to likely young girl,

"My wife doesn't understand me.
I'm a theoretical physicist."

The Accelerator World

Progress on Nimrod (mid February)

The most important work at the moment is concerned with the Power Supply tests. At the end of January the two complete motor-alternator-flywheel sets operated together for the first time. It was used to power all eight Octants on 1st February and a peak current of 10,500 amps was achieved. The tests generally are going well the plant has operated at 10,500 amps at maximum repetition rate on a twelve hour run. With a peak current of 3,000 amps the magnet has been pulsed at 90 per minute.

The period of intensive installation and modification work on the injector is behind us and 15 MeV beams are due to be run again on 18th February. Ion source troubles now seem under control. The Buncher and Debuncher are in position and installation of the Inflector system is well underway.

The R.F. Cavity is in its position in Straight 8 during the Power Supply pulsing tests and operation of the R.F. system with the Octants powered is being investigated.

Vacuum vessel testing will shortly be moved from Experimental Area to Building R.8. The last of the Outer Vacuum Vessels (No. 10) has been successfully tested and we are nearing the end of Inner Vessel testing. The situation with regard to Header Vessels begins to look more optimistic and No. 2 has been improved to a leak rate of 9½ lusecs.

PLA Running Time

The P.L.A. achieved 3936½ hours running time out of a scheduled 5496 hours in 1962. This represents 72% of the scheduled time. With the polarized beam, 1503½ hours running time out of 2072 hours was achieved which is 73% of the scheduled time.

News from CERN (from CERN Courier)

When operation of the proton synchrotron began again following the long shut down higher average beam intensities than before were achieved and a new peak intensity of $5.9.10^{11}$ protons was recorded on one pulse. Part of the increased intensity is the result of improvements in the performance of the 50 MeV linear injector.

The new m_2 beam has given kaons of momentum 3.5 GeV/c and antiprotons of 5 GeV/c which are the highest values for either particle yet achieved.

Following Terry Walsh's article "On Courses" in the January issue of ORBIT it is interesting to note the attitude of the C.E.R.N. organisation to lecture courses. A series of lectures on subjects of general interest is now underway at C.E.R.N. The first lecture, entitled "Picasso, 20th Century Artist" given by John Berger, was introduced by the Director-General of C.E.R.N., Professor Wersskopf, who pointed out how necessary it was for the staff at C.E.R.N. to have wide interests and praised the Staff Association for its initiative in organising the lectures. The attendance at this lecture was so large that extra seating had to be provided in the main auditorrum.

Another recently inaugurated course, again opened by the Director-General, is a Technical Training Course, organized principally for the technical staff. Professor Wersskopf said that "C.E.R.N. is not just a place for scientific results but a centre where human beings, by working together, can enlarge their outlook and their knowledge". The courses cover such areas as Electrical Engineering, Electronics, Vacuum Techniques and Technology of Materials.

American 1000 GeV Machine

J. P. Blewett of Brookhaven National Laboratory spoke in an address to the American Physical Society in January of the possibility of constructing a 1000 GeV accelerator.

The Atomic Energy Commission in the U.S.A. is now considering the results of a two year design study for such a machine together with other proposals for accelerators all larger and more expensive than the machines now in existence. The 1000 GeV machine, which is a scaled up version of the Brookhaven 33 GeV machine with modifications, would have a circular track some 7 miles in circumference and have an estimated cost of 1000 million dollars.

Seen in a Chemist's Shop Window -

"WE DISPENSE WITH ACCURACY"

Stanford Accelerator

Excavation work on the underground housing for the two mile long Stanford Linear Accelerator began in January, some three months ahead of their tentative schedule.

The project for an electron linear accelerator of 10 to 20 GeV to be built at Stanford University's Research Centre in California, was authorised by U.S. Congress in September 1961 at a cost of about 114 million dollars. It will be by far the highest energy electron machine in the world and, should it prove necessary, the maximum energy could later be doubled. The accelerator is scheduled for full scale research at energies up to 20 GeV in April 1967.

The machine is of the travelling wave type pioneered at Stanford by the late William Webster Hanson. A battery of high power klystron tubes provides a moving electrical field in the form of high frequency radio waves which travel almost at the speed of light along the accelerators long copper pipe. The electrons "ride" these waves like surfboarders on an ocean wave. In the Stanford machine, electrons will be injected in pulses 360 times a second. Driven by the travelling wave from the klystrons they attain almost the speed of light in a few feet and thereafter the power input of the klystrons goes almost entirely to increasing the electron mass until at 20 GeV it is 40,000 times greater than at the start of acceleration.

At present Stanford have a 1 GeV electron linear accelerator known as the Mark III which is the largest of its type in the world. It is powered by 31 klystrons each producing 15 million watt pulses of power. It was with the Mark III that Hafstadter did his work on precise investigations of nucleons which won him the Nobel Prize. The two-mile accelerator will resemble 30 Mark III's laid end to end, using 240 klystrons with 24 million watt pulses each. By quadrupling the number of klystrons the output energy could be doubled at a future date.

Scientists from all parts of the world will be able to work with the big machine. A Scientific Policy Committee of leading U.S. Scientists, including Dr. Panofsky the Director of the Stanford Linear Accelerator Centre, will make the decisions on the research programme. Research planning is already underway and the areas of investigation will include - studies of basic electron produced interactions; study of particle structure; experiments with secondary beams; tests of basic electromagnetic theory and search for new particles.

But since this machine will enter areas never before opened up, the unexpected is expected. Stanford physicists say "The fact that we cannot now set down exactly how the accelerator will be used is one of the best reasons for building it."

Royal Society Meeting

A discussion meeting was called by the Royal Society and held at Burlington House, London on 21st and 22nd February. The discussion concerned recent European contributions to the physics of elementary particles. Several speakers outlined the recent work on the C.E.R.N. accelerators and on cosmic radiation; others talked about new or projected accelerators. Dr. Pickavance spoke on Nimrod.

New 'elementary' particle (from "The Magnet")

A new elementary particle has been discovered at the Lawrence Radiation Laboratory, Berkeley. At the Christmas meeting of the American Physical Society, Glashow and Kalbflersh anounced the identification of the new particle Y^*_1 (1660) in bubble chamber photographs from the Bevatron.

The particle fits nicely into a theory proposed about a year ago by the Cal. Tech. theoretician Gell-Mann and independantly by the Israeli scientist Ne'eman. The theory, known as "the eightfold way" suggests that elementary particles can be arranged in groups or multiplets of particles with the majority arrayed in groups of eight called octets. There are four such octets, one group of ten, decuplet, and several singlets. Other particles are seen as recurrences of these particles in higher energy states.

The theory predicts several as yet undiscovered particles and the Y^*_1 recently identified was one of these predicted particles. Two more particles, both with mass 1600 MeV are predicted to complete this particular Octet and these will be searched for at Berkeley in the coming months.

The following Memo was received by Salaries Section from Stationery Stores, Grove -

"These overtime Claim Sheets for a N.I.R.N.S. S.A.
were received here from R.12 in an envelope addressed to us.
Very sorry but we can't do anything about them - much
as we would like to !"

EDITORIAL

The exhibition of the sculpture model of "Nimrod" in the Main Entrance Hall of R.1 has brought the following response: A total of 52 people have made direct comment to the Editor - 40 were impressed by the model and were mostly in favour of Jim Dixon being encouraged to carry out his conception of a large sculpture; 11 did not like the model and would not like to meet a magnified version everyday at the Laboratory. 1 person "did not understand it". In addition there is the collection of letters following in the correspondence columns. This represents a considerable response to the suggestion that people voice their opinion.

Since the letters below are not a balanced representation of the majority view, we will relay some of the thoughts of those who offered their opinions informally -

FOR The model is liked because it is immediately visually pleasing. It says something about Nimrod the machine and the Laboratory generally. It conveys something about the effort that has gone into building Nimrod and is a good representation of the abstract idea of man striving to understand and master his environment. The prospect of the large sculpture being a dominating feature in the Laboratory grounds has great appeal. It will be a most impressive representation of what the Laboratory is and what its aims are.

AGAINST The model is pleasing enough in itself but it would not fit in here. It should only be seen in a Scandanavian park. The symbolism is very obvious and forced.

Many of the people "for" make a point of their pleasure that this comes from inside the Laboratory and not from someone commissioned from outside, no matter how eminent, who would perhaps project some concept, albeit professionally executed, incomprehensible to the majority of Laboratory personnel and unrepresentative of the atmosphere of the Laboratory.

The professional sculptor (see correspondence below) who said "Oh my God", we feel is stretching praise of the sculpture rather far. We do not wish to encourage the lighting of candles before the model as it could affect the plasticine.

It is understandable that a professional should run down the work of an amateur who may after all be removing his bread and butter. It is also very hard to admit that it is possible for someone without years of training to have a better idea. But to suggest that the Union card of an art school certificate is essential to producing art is very dubious. Art schools and professionalism are no substitute for ideas or to use the more high flown word "inspiration". Technique can be taught, an atmosphere conducive to "inspiration" can be provided but the sensitivity which yields the inspiration can neither be taught nor bought. Art schools abound now and the professionals they produce fill our advertisement hoardings with technically polished works. But I doubt if any advertisement hoarding will ever draw the hundreds of thousands of people that queue to see the Mona Lisa and similar works of amateurs.

However let us not put "Nimrod" in such elevated company. Suffice it to say that he was provoked a great deal of comment and that mainly favourable.

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,

May I congratulate Jim Dixon on his interpretation of the "Nimrod" idea?

Without recourse to the unassessable antics of pure "abstractionists", he has, in my opinion, produced a work sensitively withdrawn from the complications of pure representation, with its inevitable and, in this case, irrelevant overtones.

The figure has a satisfying striving quality with an interesting vertical "line". If the sculptor is satisfied that this small figure will scale with advantage to the intended size, it would certainly grace the bleak approach to the Rutherford Laboratory.

A final comment. I believe the head on the model may have been moved, when I last saw it, the head was not looking upward towards the apex, but seemed to have drooped to a more horizontal and less meaningful aspect.

H. C. Whitby

Sir,

A professional sculptor living in Oxford agreed to come and see the piece of sculpture now standing in the entrance hall of Building R.1. His comment was "Oh my God". Unfortunately this would be the comment of any professional sculptor or critic of art.

The idea of celebrating the Nimrod project with a piece of sculpture is an excellent one, but do scientists really think that they should be the ones to carry this out without any serious professional advice? Surely the practice of offering such an opportunity to open competition judged by experts would be more likely to result in a worthwhile and lasting piece of art.

For a piece of sculpture to be offered ready made, free and designed by someone who understands the scientific background of Nimrod is not enough - it should also be good.

Janet Robertson

LETTERS TO THE EDITOR - (cont'd)

Sir,

No, Jim Dixon's Statue will not do; it is alien to the Victorian character of Nimrod and its buildings. Victorian is not the right word - our language does not possess a word which expresses exactly the feeling of solidity allied with economy which pervades most British buildings - but as it is descriptive of a time when this feeling was admired, and as Nimrod itself is so obviously a direct descendant of the engineering of the great railway age, it will suffice.

Such statuary, by itself, may be well worth looking at, and when allied with buildings of other nations with other temperaments often harmonizes extremely well. When allied with buildings in this country its effect is to embarrass; observation of sundry examples in London will prove this. We cannot help building as we do, our building is decided by our character, but just because these ornaments look so attractive in countries with different characters, please let us not attempt to fix them to our own buildings.

Designer

Sir,

As you invite comment in respect of the model of Nimrod by Jim Dixon, may I suggest that the offices of the Royal Society for the Prevention of Accidents might provide a suitable site for the exhibition of a figure which so clearly shows the inherent dangers of the practice of riding monocycles over muddy terrain. The folly of this hazardous pastime is apparent to all in the figure's battered concave face and the broken and twisted handlebars being waved overhead in impotent fury.

D. G. J. Rose

Sir,

The name Nimrod, meaning rebel, occurs three times in the Bible. The original mention in Genesis 10, v.8 is repeated in I Chronicles 1, v.10. The opening chapter of I Chronicles, written around 400-340 B.C. confirms in a condensed form the genealogy contained in Chapters 10 and 11 of Genesis. It is, however, no mere repeat although a knowledge of Genesis is assumed. It's purpose was to emphasize the Davidic line and the descendants of Levi (note the pointed omission of the house of Eli, which did not serve the Jerusalem temple).

Finally Micale, who prophesied sometime between the years 751 and 687 B.C., refers to the "land of Nimrod" in Chapter 5, v.6.

L. J. Herbst

Sir,

Having just found time to read your excellent magazine's December issue, may I suggest a name for the Electron Synchroton?

In September of last year I tentatively put forward the name of "NINA", standing for "National Institute Northern Accelerator", which seems to have caught on up here and is now in general usage. I therefore, equally tentatively, suggest the name to you for what it's worth.

B. J. Couchman
University of Liverpool

Sir,

Everyone here has been following with some interest the most imaginative attempts on the part of the RHEL-ians to help our poor little nameless one. I am afraid, grateful as we are for their efforts, they labour in ignorance and in vain. Doubtful though the parentage of our little one may be, she has a name - NINA, the National Institute Northern Accelerator - christened by Mr. Brian Couchman. The name seems to me altogether appropriate. Nina has already, you will remember, been characterised in song by Mr. Noel Coward as "a most degenerate bambina".

I wonder if I can interest your readers in the competition we are running here to find a name for the proton synchrotron which you, we believe, are building. Here are some of the suggestions I have received

DORMIN, Dilapidated Old Rusty Machine In Nirns.

MARCH 'ARE, Machine for the Acceleration of the Right Charge Having All the Required Energy.

PHANTOM 7, People Have Always Named Their Own Machines.

I have a number of others, which I am afraid, would bring nothing but disgrace to your pages and a blush to your cheek. However, I should be happy to communicate them privately to your readers; in a plain envelope, of course.

Yours acronymously,
A. W. MERRISON
Director, Electron Laboratory

Sir,

We have noticed that the revolving door at R.1 entrance, rotates in a clockwise manner extracting valuable warm air from the building, at the same time drawing in obnoxious cold air. It will be appreciated that this state of affairs is intolerable.

Our humble suggestion is that the door be made to rotate in an anti-clockwise direction drawing the warm air back into the building and expelling the cold air from the interior, thus restoring thermodynamic equilibrium.

No doubt, the practical details of such as scheme could be well handled by our engineers.

The Theorists

Sir,

1. In replying to "Humanist", Ken Smith mentions the "large dose of metaphysics which the ORBIT readers have sustained". Isn't this precisely what Humanist was trying to alleviate?

2. Jim Reader is shaken that Nimrod should be assigned to mythology and then quotes Genesis. Well?

Confused

SAFETY at the Rutherford Laboratory

K C Myers

It is frequently stated that the safest place for a person to be is at work. Last year the number of fatalities at work were one tenth of those on the roads of this country and one twelfth of those in the home.

All accidents and dangerous occurrences which were reported at the Rutherford Laboratory during 1962 were investigated by the Safety Section, irrespective of the extent of injury or whether Rutherford Laboratory staff, visitors or contractors were involved. Recommendations were made where, upon investigation, it was found that the hazard or method of working would allow repetition, or where there was a likelihood of a similar occurrence in another part of the Laboratory.

Accident frequency rates for 1962 showed an improvement over the previous year as follows:-

Industrial accident frequency rate	1.03	(2.3)
Non-industrial accident frequency rate	0.33	(0.21)
Overall accident frequency rate	0.56	(0.88)

The figures in brackets refer to 1961.

The frequency rate is calculated as follows:-

$$\frac{\text{No. of lost time accidents} \times 100{,}000}{\text{Total man hours worked}}$$

(The figure 100,000 is the estimated working hours of a man during his life).

For comparison purposes, the Royal Society for the Prevention of Accidents published national average for industrial staff during 1961 was 1.7.

Although there was some improvement over the previous year, there is no reason for complacency, as all the lost time accidents and the majority of the other reported minor injuries and potentially dangerous incidents at the Rutherford Laboratory were preventable. Each individual is responsible for his own safety - do you act safely at all times?

Extract from "Einstein and the role of theory in contemporary physics."

In our enlightened times, there is no place for mystical emotions, at least not in science. The increased demands of industry and technology have put new obligations on the scientist, apart from a truly frightening increase in their number. The scientist has to solve certain problems, delineated in contracts from industry or military establishments. The scientist has to do a job. He has to do research. He has to write papers and progress reports. He has to discover something at least once every year. In Einstein's time, this "has to" did not exist. One did not "have to" do anything. One was fascinated by the mysteries of the universe and tried to find an answer to them. Science was not a career, not a social position, not a job, but an inner obsession, which enslaved one's mind and fixed it with a fanatical one-sidedness on one particular aspect of thinking.

Cornelius Lanczos
"American Scientist" March 1959

Outside Hours

Along the Right Lines

Arthur Shackleford

It is a fine evening and Wantage station is slightly less deserted than usual, a dozen or so intending passengers stand about on the "up" platform, waiting for one of the rare, local trains that are scheduled to stop there, a ticket collector has taken up a strategic position near to the footbridge and "Jane" stands serenely in her little cage on the "down" platform.

The Home signal goes off for the "down fast" road and a distant rumble heralds the approach of a train, travelling at a fair speed, but as it gets nearer the sound is slightly abated, the steam regulator has been shut and the locomotive is coasting, suggesting perhaps that its driver is not sure of his road, despite the "all clear" signal. This may well be the case, for when the train clears the road bridge and comes into full view, it is revealed, by its proudly borne headboard, as "The Royal Scot", headed by a Coronation Class, Pacific Locomotive, resplendant in sedate maroon livery with L.M.S. in large letters on the side of her tender. However, full power is restored as soon as she is clear of the platforms and the train bears on through Challow cutting, around a gentle curve, crosses a bridge over the A.6. and rolls into Penrith where it makes an unscheduled stop to take on water, having missed the troughs at Dilcarr, due, no doubt, to the unusual route over which it has travelled.

Meanwhile, the passengers on Wantage "up" platform are still waiting, their train has been delayed to give way to a long, heavily laden mineral train, headed by a grimy, but business-like loco. of class 8.F. which lumbers endlessly past the platform. However, this is followed, at a safe distance, by a diminutive "Collett" Tank engine, spotlessly clean in Great Western livery with handrails and brasses gleaming, quite obviously the pride and joy of its driver who slows it down and comes to rest, gently, at the centre of the platform and takes a well deserved swig of tea from his blue tea can.

This sounds rather more like Wantage station perhaps, but that slight whine, approaching from the east does not; moreover the "down fast" signal has gone off again, soon a long train glides into view, with a very modern electric locomotive with two Faveley pantographs riding the overhead catenery, it passes the junction signal at "caution" and smoothly eases its way over the points onto the platform, in obedience to the starter signal.

This is obviously too much for the driver of the little Collett Tank engine, who, in his anxiety to get away from this "modern monstrosity", almost jumps his starter signal and accelerates away at a spanking pace, without even bothering to put his tea can down.

This improbable little scene takes place, entirely automatically, on our 4.mm./ to one foot scale system, controlled by what must surely be the most "Heath-Robinson" equipment that ever got beyond the rough sketch stage, the majority of its raw materials started life as newspapers, cardboard boxes, food cans, a bird cage, and, inevitably, a few plastic kits, but it has provided endless amusement to its constructors, on many rainy days and has intrigued hosts of visitors, quite a few of whom come again, often bringing their own locomotives and rolling stock to run on our routes. It was in this way that on one occasion, the Orient Express, headed by a large electric locomotive of the Austrian State Railways, drew into a loop line to permit a Bristol Express train of the 1880s, hauled by a very stately G.W.R. "single" engine of the same period, to continue, urgently, on its way, presumably seventy-odd years late.

Extract from "Accommodation"
A.E.R.E. News 31st January

ROOM WANTED to rent for elderly relative, April to June, Fitzharrys' Estate or vicinity.
Wanklyn,
73 Bath Street,
Abingdon.

GARAGE AVAILABLE
Wanklyn,
73 Bath Street,
Abingdon.

Mr. Wanklyn informs us that the advertisements still stand.

With the coming of ORION may we bring to the attention of sightseers the following Warning Notice (reproduced from the "G. K. Magazine" George Kent, Luton).

ACHTUNG
ALLES LOOKENSPEEPERS

DAS COMPUTENMACHINE IS NICHT FUR GEFINGERPOKEN UND MITTENGRABBEN. IST EASY SCHNAPPEN DER SPRINGENWERK, BLOWENFUSEN, UND POPPENCORKEN MIT SPITTZENSPARKEN. IST NICHT FUR GEWERKEN BY DAS DUMMKOPFEN. DAS RUBBER-NECKEN SIGHTSEEREN KEEPEN HANDS IN DAS POCKEN - RELAXEN UND WATCH DAS BLINKENLIGHTS.

Personnel News

Suggestion Awards

At the fifth meeting of the Rutherford Laboratory Suggestion Awards Committee held on Monday, 11th February 1963, twelve suggestions were considered.

Encouragement Awards were made to the following in respect of their suggestions which, although they may not be adopted, were considered by the Committee to be merit-worthy:-

D. A. Hutchings	£1
D. G. J. Rose	£1
J. E. Sissons	£1
E. W. Bergin	£1

An award in recognition of his suggestion that rubber buffers should be fitted to the tea trolleys in use in R.1 Link was made to the following member of the Staff as this idea is now to be adopted:-

J. R. Stokoe £2

The Committee also noted that so far only one entry has been received in respect of the Safety Section's "Poster Competition". They wish to emphasise that no particular artistic or technical ability is necessary for this competition as the basic requirement is for ideas only - original and effective ideas for a Safety Poster.

C. J. E. Macdonald
Secretary,
Suggestion Awards Committee

Comings and Goings

W. A. Mathews joins Nimrod Magnet Group; J. L. Thomas joins Injector Group.

P. J. Finney, P. J. Coleman, R. Mackenzie and Miss M. K. Taylor join High Energy Physics.

Dr. K. Smith joins Theoretical Physics Group.

S. J. Crawford and J. E. Purling join Nimrod Engineering; I. W. Salter joins the S.A. Training School.

W. H. Cleverley, D. Hudson and W. C. S. Razey join Central Engineering.

D H. Collett, E. J. Sewell and A. D. Wood join High Energy Physics Engineering.

A. W. Carroll and D. J. Cunningham have left us.

Congratulations to

Miss Julia Haines

of Reproduction Section and Peter Mace of

Magnet Group on their recent engagement.

Conflicting views of science :

Two stories (via "The Magnet") concerning personnel from the Lawrence Radiation Laboratory, Berkeley.

When Howard Shugart made a guest appearance on the "Science in Action" TV show he showed the world what stern stuff physicists are made of. Casting about for a vivid, eye-catching demonstration of the principle of conservation of energy, Howard rigged up a heavy bowling ball on a rope, attached the rope to a ceiling beam and pulled it taut, raised the ball to his nose, and let fly. The ball swung out in an arc, reached the end of its swing, and pendulum-like, headed back - right for Howard's nose. As the audience gasped, strong men fainted, and women wept in the aisles, on hurtled the bowling ball - and immovable, unflinching, stood Our Hero, rather like the early John Wayne. The ball, of course, stopped where it had to - a six-teenth of an inch from Howard's nose. The demonstration was too much for one studio hand, who tried it himself, ducked at the last minute, and asked Howard how he could stand there so serenely with the ball zeroing in on him. Howard drew himself up to his full 6' 1". "I believe", he replied with dignity, "in the laws of physics."

On the other hand, we have the new and sweeping theory of scientific progress being put forward by Jim LeCuyer. Jim, unlike most of the scientific world, was unimpressed by the recent discovery that xenon, long thought to be chemically inert, just isn't so - can, in fact, combine with a number of elements to form a number of compounds. Physicist Philip Abelson, writing in Science, called the discovery "a sobering lesson" in the value of questioning "respectable and entrenched dogma," and scientists, in general, have been taking the lesson much to heart. But Jim sees the matter in a different light, and (if LeCuyer's Law turns out to have any validity) scientists can stop blaming themselves for past "mistakes."

"Of course xenon used to be inert," Jim says, bending forward and dropping his voice to a conspiratorial whisper, "and the world used to be flat, too...it's just that Somebody Up There keeps changing the rules!"

PERSONNEL
NEWS
Contd.

Our First Craft Apprentices

C J E Macdonald

Friday 1st February, 1963 will be a day to remember in the careers of Michael Byford, Raymond Cross, Trevor Edmonds and Duncan James, the first four craft apprentices selected for the Rutherford Laboratory. On that day their Indentures were signed and witnessed in their presence by Dr. Pickavance and Dr. Willis in the Main Conference Room, R.1.

The boys, who had joined the Laboratory in September, 1961 spent their first year at the Research Group Apprentice Training School, Winfrith and were undergoing training at both the Laboratory and A.E.R.E.

They were introduced by Mr. Jenkins, Head of Personnel Section, and welcomed by Dr. Pickavance who expressed his pleasure at meeting the boys under these circumstances, commenting that if ever they found themselves in such company again they might well consider themselves in dire trouble. Seriously, he hoped that they would make good use of the opportunities offered them to train under one of the finest Apprenticeship Schemes in the country and would take their places in due course among the Laboratory's craftsmen.

Mr. Bowles delved into the history of Apprenticeships and brought to light the interesting fact that the term "Indenture" derived from the Medieval practice of writing formal Deeds on parchments which were then divided by a toothed or "indented" line thus enabling the two parties to prove their contract by matching the two halves.

He reminisced briefly on his Apprenticeship, commenting upon some of the conditions which had changed since that time; not least of which was the size of apprentices - in his day it was common for the legs of work benches to be sawn off so that the boys could use them. He said that apprentices were by nature and tradition rebellious; in some parts they still rebelled against their masters every Shrove Tuesday, but he hoped the boys would gain great profit from the training they were receiving.

Dr. Pickavance then signed the Indentures which were witnessed by Dr. Willis who explained that they would later be sealed with the Common Seal of the Institute in the presence of Lord Bridges or one of the members of the Governing Board and carefully kept until the end of the Apprenticeship.

To the accompaniment of the official photographer's flashlight the boys each received from the Director a signed quarter-size copy of their Indentures.

Mr. John Short thanked the Director, Secretary and Chief Engineer on behalf of the Trade Unions saying that he knew the Laboratory's craftsmen would willingly teach the boys the "mysteries" of their crafts as had craftsmen in all ages. He commented that the Indentures apparently did not forbid the boys to frequent taverns, ale houses, coffee houses or other places - this also was a sign of the times.

The introduction of coffee and biscuits quickly dispelled the formality of the occasion and those present, including Messrs. A. G. Hewitt C. J. E. McDonald, F. M. Telling and J. Wallace (A.E.R.E. Apprentice Supervisor), joined in general conversation before retiring discreetly, leaving the boys in full possession of the remains of the coffee and biscuits.

It was unfortunate that two student apprentices, Antony Howard and Alan Lockwood, who are both at College, could not attend, but it is hoped to give them individual attention in the near future.

Much has been said and written recently about the Nation's obligation to train young people to take their place in the economic life of the country. Those interested might like to know that the Laboratory accepts an average of two students and four craft apprentices each year. The boys are trained under the Authority's Research Group Apprentice Scheme, spending the first year at the Apprentice Training School (now at Winfrith). The students then go up to University or College to read for an engineering degree or Dip. Tech., spending periods at the Laboratory or at A.E.R.E. on practical engineering work. The craft apprentices spend the rest of their time on practical engineering work in various sections of the Laboratory and at A.E.R.E. In addition to our own apprentices a continuous trickle of A.E.R.E. apprentices also pass through our workshops. At the end of their training as apprentices they may receive and accept offers of employment from either ourselves or establishments in the Research Group.

As a National concern we are aware of our moral obligations regarding apprentice training and we feel that as a relatively new organisation we have done well to make a not inconsiderable contribution in this respect.

What a chance for a misprint -

"On that day their dentures were signed and witnessed in their presence by Dr. Pickavance and Dr. Willis in the Main Conference Room R.1..... they would later be sealed with the Common Seal of the Institute in the presence of Lord Bridges and carefully kept until the end of the Apprenticeship".