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Cover photograph:

The large vertical borer in the Main Workshop, R9, taking a one inch cut from a dural cylinder a foot in diametre. Swarf can be seen swirling round on the five foot table of the borer.

Editor:

B Southworth, Room 40, Building R20
Science Research Council,
Rutherford High Energy Laboratory,
Chilton, Didcot, Berkshire.
Phone: Abingdon 1900, Ext. 6286

The best way to set up engineering workshops at a research establishment is debatable. Engineers usually contend that a large central workshop can be run more efficiently than a number of small laboratory shops ('close support' workshops) to which scientists can go for immediate action. On the other hand, the formalities, planning and "queueing up" for jobs in the central workshops can be frustrating to the eager scientist who wants a small (they are always small) job done - today.

The ideal answer seems to be to have both and this is the aim of the present workshop layout at the Rutherford Laboratory. The central workshop is equipped with the large machine tools and apparatus to make sizeable pieces of scientific plant while the other shops have smaller machines and specialised apparatus to meet more day to day needs.

Main Workshop R9

The Central Engineering Group workshop, occupies a floor space of approximately 10,000 square feet devoted to mechanical fitting and machining operations. The shop provides manufacturing support for the whole Laboratory, with emphasis on development work required by scientists or design engineers. It also handles the minor, urgent jobs which arise during the development and commissioning stages of a project and which cannot always be done by the close support shops because of lack of effort or appropriate machines.

The shop is at present manned by 21 craftsmen, who are deployed roughly as follows: 12 bench fitters, 6 machinists, 1 welder, 1 sheetmetal worker and 1 inspector, and also 2 general workers (although approved complement is 27 craftsmen and 4 general workers). The Foreman is Cyril Daniel and the Shop Manager George Fallon.

The Laboratory Workshops

A large and important part of the Laboratory which is not often brought into the limelight is featured in this issue. The Editor would like to thank all those who helped, at short notice, in the preparation of copy and photographs for this article.

The improvement of facilities in the Main Workshop is obviously largely dependent on the confidence of the Groups prepared to use these facilities. This confidence can be achieved only by a high standard of craftmanship in a wide variety of skills. On the other hand, this skill can be developed and maintained only if suitable work is given to the shop.

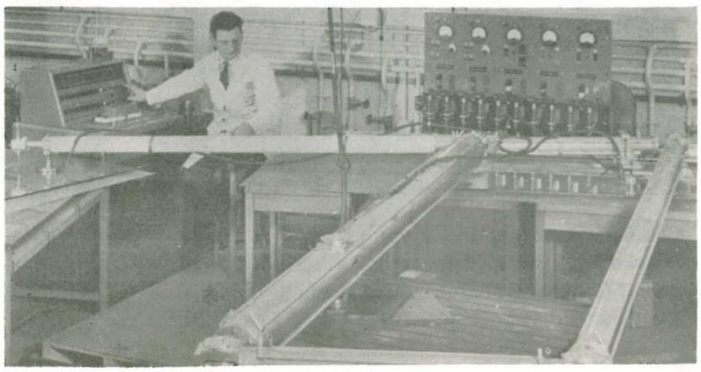
The machines include centre lathes, ranging from the watchmaker's type to one with a 21 inch swing by 48 inch between centres. This capacity will be increased in the near future by an 11 inch hollow bore lathe having a 25 inch swing and 132 inch between centres. Milling capacity, up to 59 inch by 27 inch by 21 inch vertical movement, is available, supported by surface grinding 40 inch by 20 inch and cylindrical grinding 8 inch diametre by 18 inch. Horizontal boring is catered for by a table size 36 inch by 36 inch with overall capacity 84 inch. The most recent addition is a vertical boring machine with 60 inch diametre face plate and 25 inch height under the toolpost. Drilling is covered in a range from sensitive machines to 48 inch radial arm machine.

A wide variety of work has been done in the shop. Spark chambers, light guides and scintillators are manufactured and developed under the guidance of the scientists. A large pantograph made here is shown in the photograph and other jobs include remote handling equipment for NIMROD, polarised targets, and the internal pipework assembly for the helium bubble chamber.

It is policy to make the workshop facilities readily available to all Groups in the Laboratory, with the minimum formality. For example, jobs involving not more than two man-day's labour and less than £5 worth of material are accepted by the Foreman directly from any member of the Laboratory staff. Bigger jobs require an NI 12 but still, up to £50 in value, direct contact with Cyril Daniel is all that is necessary. In order that the shop can be organised for maximum efficiency the Shop Manager is contacted for jobs above this value.

The capacity of the shop is linked with the Central Engineering Group's mechanical outside manufacturing section, under Bill Bosher, and this close association allows work accepted by the shop, to be broken down when necessary and parts subcontracted to outside firms. This method of working allows assemblies to be undertaken in the shop with the co-operation of the scientist or engineer with minimum use of local labour on stereotyped or repetitive operations.

An excellent team spirit exists in the workshop. The craftsmen spend time on different machines in the shop so as to develop and maintain their proficiency in a good range of workshop skills.



Charlie Halliday testing the pantograph used in the magnet survey of the Variable Energy Cyclotron magnet. This large but very accurate instrument was made in the Main Workshop. (See NIRL/M/86 for a detailed description of the pantograph.)

Electrical Services Workshop R18

This workshop also serves the Laboratory as a whole. It has the normal bench area for fitting and maintenance; a machine area with machine tools such as a radial drill, bandsaw, mechanical saw, engraving machine, etc; a test area; a heavy bay covered by a 2 ton crane (for work on heavy items such as fork lift trucks); and a battery room with full charging facilities for all types and sizes of battery.

Jim Lawler is the shop Foreman and at full strength there is a total complement of 21 skilled craftsmen and 6 general workers. They divide with a fair amount of flexibility depending on the work load, between the following three sections:

(i) Manufacture and Laboratory Services Section (Foreman - Ted Gibbs): A general service especially to areas not covered by close support electrical workshops. Work ranges from film projection and tape recording in the Lecture Theatre to the maintenance of highly specialised equipment such as the bubble chamber track measuring and scanning machines. Electrical equipment to be used in research is manufactured and installed in laboratories and experimental areas in close collaboration with the scientists concerned.

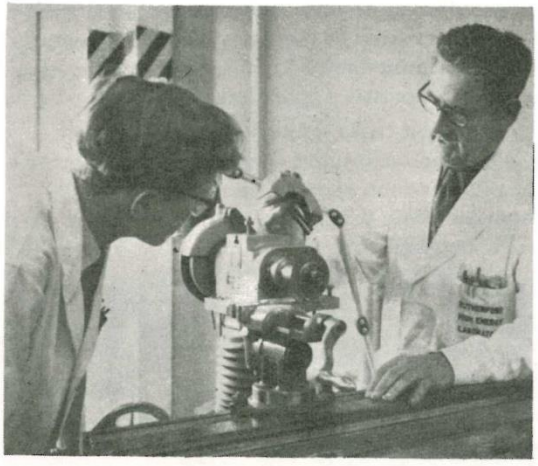
(ii) Maintenance Section, (Foreman - George Robson): Responsible for the electrical maintenance of such things as cranes, lifts, building lighting, fire alarms, etc. Two major responsibilities are the Atlas and Orion air conditioning plants. A shift system is in operation to give 24 hour coverage.

(iii) Site Distribution Section, (Foreman - Roy Price): Maintenance and much of the operation of site electrical distribution equipment. Substations, transformers, switchrooms, batteries, cables, etc., for the various voltages involved i.e. 11,000 volts, 3,300 volts and 415 volts are covered by a comprehensive planned maintenance system to ensure a trouble-free supply. Modifications to the distribution system are also estimated, planned and supervised by this section.

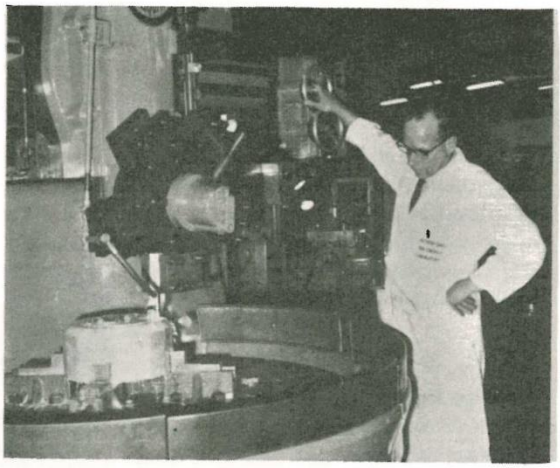
Electronic and Instrument Workshop R18

This shop with 14 men under Foreman John Hunt serves the electronic and instrument needs of the whole Laboratory. Wiring and fitting shops specialise in making one off proto-types, special equipment, and pre-production batches prior to full scale production. They are well endowed with equipment, for, as well as the normal sheet metal working machinery, a power turret punch has been installed. This enables the shop to offer a "while you wait" service to others in the Laboratory who require chassis and panel punching (disposing of the Q max and abra file techniques used in many Laboratories). The shops are also equipped with milling, turning, spot welding and coil winding facilities, and the delivery of a parallel gap welder for microminiature circuits is imminent.

An Instrument and Data Processing repair

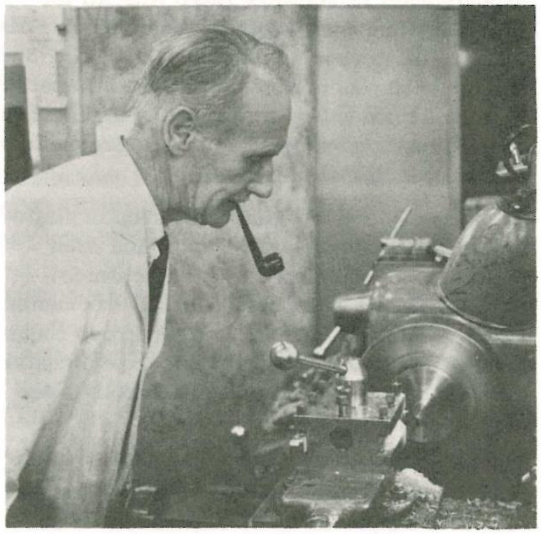


Charlie Gascoigne instructing Colin Mitchell, an AERE apprentice in the use of the tool and cutter grinder in the Main Workshop.

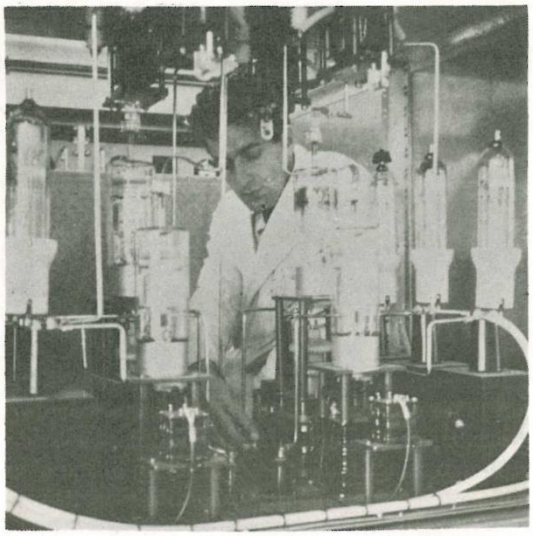


The large vertical borer in the Main Workshop being operated by Fred Dickinson.

Alec Myles at work on a centre lathe in the PLA Mechanical Workshop.



Seen through a line of valves, Maurice Oubridge fitting new drive chain equipment for the PLA.



workshop, backed up by a Standards and Calibration room is still in an embryo state, and, though the repair of commercial test gear and some data processing machinery is relatively efficient, there are weaknesses. It is hoped to considerably expand this section to cope with the growing data reduction needs.

The Standards laboratory (also situated in Building R18), though primarily used for calibrating Loan Pool equipment, is available as a service to perform high accuracy voltage, current and resistance measurements. The Development laboratory exists for the development of industrial type electronic equipment and, as much of the work involves servo systems such as large stabilised power supplies, this section runs a small analogue computer and a transfer function analyser.

R16 houses a complimentary organisation - the Electronics Outside Manufacturing and Design sections. With the large volume of work required for the Laboratory, often involving short time scales and difficult-to-get components, the capacity of the R18 shop is not enough, and the O.M. section exists to cover the additional work. Care is taken, however, to ensure that the customer does not lose sight of his job and he is, in fact, encouraged to discuss his work with the outside firm concerned.

It is policy to keep drawing work to a minimum, but certain drawings are obviously necessary, particularly for the ubiquitous printed circuit, and the design side specialises in this type of work.

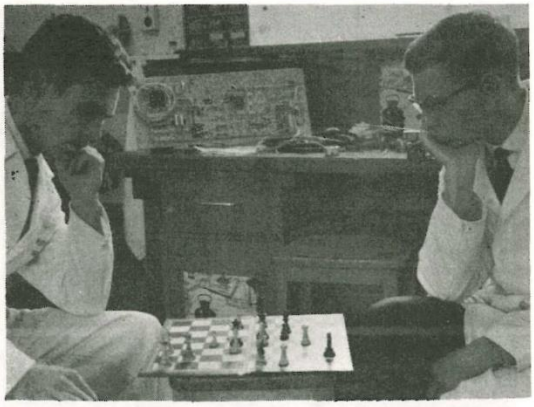
PLA Workshops R12

The staffing of the PLA workshops started about 1954 in Building 154 at AERE when two mecahnics John Macken and Mel Jenkins (now at CERN) were allocated to the Accelerator Group of the General Physics Division. A small group of scientists and engineers under Dr. Pickavance were then starting to design the PLA and the two mechanics were required to produce experimental apparatus.

In 1956, Laurie Philips joined as charge-hand. The Accelerator Group then moved into R12 to build and commission the PLA and the mechanical workshop expanded to meet the increasing demands. At this stage, their function was to build and commission the parts of the machine for which the Accelerator Group were directly responsible, and to provide a service for experimental apparatus. As the building of the machine progressed, it became necessary to have a team of electricians permanently on the work. These men came from the Special Plant Maintenance Section based in Hangar 7 of AERE and in 1957 had Harold Normington as charge-hand. The tempo of the workshps increased as, in addition to the PLA, ideas and design studies for the building of NIMROD developed and the R12 workshop was the only internal shop up to 1959.

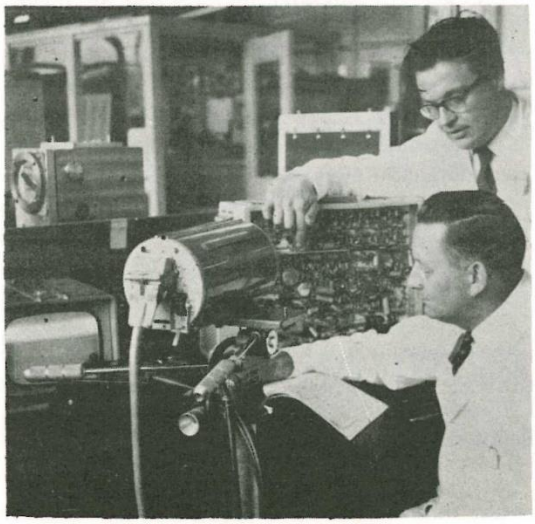
After this the PLA was going through its teething troubles and needed a lot of hard work and long hours in the final stages of commission-

Photographs from the PLA Electrical Workshop.



A thoughtful lunchtime for Mick James and Brian Richardson.

The full team.



Bill Glasgow and Charlie Hawthorne working on closed circuit TV equipment.

ing. In addition the first nuclear physicists were beginning to make requests, as the experimental areas were fitted with all the beam handling and monitoring equipment. Also in 1961, all personnel transferred to NIRNS, and the shop was organised into the new pattern of working necessary to tackle the maintenance, development and experimental requirements of a fully operational machine.

At present the mechanical workshop is staffed by Laurie Phillips, Swan-Taylor and John Macken, ably supported by 12 mechanics. Swan-Taylor is responsible for all mechanical maintenance and manufacture for group requirements, and John Macken for the experimental areas and the day to day requirements of the nuclear physicists.

The electrical workshop is staffed by Harold Normington, Ken Freestone and Bill Glasgow also ably supported by 11 mechanics. Ken Freestone is responsible for vacuum systems, power distribution, ancillary plant and control systems, while Bill Glasgow is responsible for modulators, experimental areas, T.V. equipment and electronic manufacture.

The workshops are of course an integral part of the PLA team, and thus share in the achievement of the successful running and operation of the machine. As far as possible the shops are self contained, and cover all aspects of production, installation, and commissioning of all the parts that go into such a complex piece of machinery as an accelerator, and its nuclear physics equipment. The wide diversity of work over the years, and the many good achievements, have built up a high standard of workmanship, and made the members of the PLA shops proud of their contribution which has stretched from the very start of the Rutherford Laboratory.

NIMROD Electrical Workshop R2

"Will the Duty Electricians please report immediately to the Main Control Room". Such an order is often heard over the NIMROD Tannoy system. It may be only a 2 amp fuse in a minor power supply or a burnt out vacuum pump motor : but it could be a fault leading to the shut down of the entire accelerator. Whatever the fault on the machine, an early man on the scene will be one of the fourteen electricians from the NIMROD Electrical Workshop. This is a close support shop working with the engineers and technicians who operate the accelerator and whose efforts are directed towards steadily increasing the machine efficiency.

Together with their Foreman, Geoff Hackett, these electricians represent a rich source of local machine knowledge and specialised experience, which has accumulated over the past five years. Working in pairs, on a seven week shift cycle, a round the clock, round the year coverage is given.

The prime responsibility is the electrical maintenance and modification of NIMROD and its ancilliary plant (such as the air conditioning plant, water treatment plant and vacuum system). There is close co-operation with the NIMROD Mechanical Workshop. During machine operation, considerable effort is devoted to the manufacture of special equipment to be installed during the maintenance periods. The standard of this work compares fairly with that turned out by the other specialist manufacturing groups, who give invaluable assistance when extra effort is required.

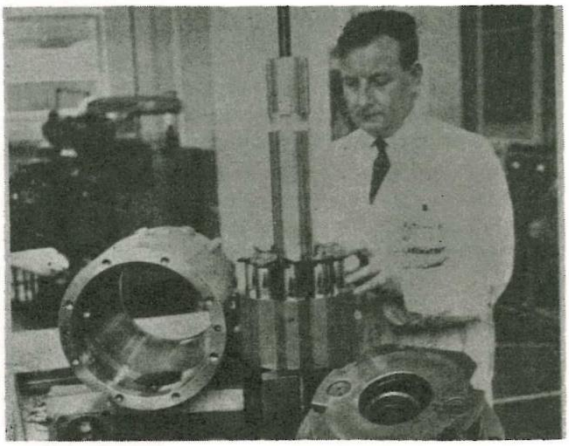
NIMROD Mechanical Workshop R2

This section, consisting of 20 men under Foreman Alf Brown, provides a quick service for detail maintenance and modification and for detail development of NIMROD plant. The more complex manufacturing is left to the central workshop or outside contractor and only the routine machining operations (turning, milling, drilling and surface grinding) are catered for. Experience has shown that it is necessary to have good welding equipment capable of welding aluminium and stainless steel. Simple sheet metal working equipment (bending rolls, break press and guillotine) is available. A certain amount of metrology equipment is available but recent experience has shown the need for better inspection facilities in the workshop.

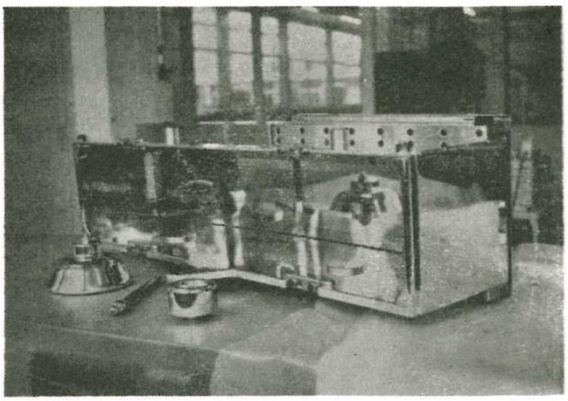
Set off from the main workshop is a room reserved for fitting and assembly of equipment under clean conditions. A small amount of work on radioactive equipment is also done in this room, until other facilities are available. A glove box provides a polishing facility for mildly radioactive equipment.

An interesting feature of this shop itself is that the floor is finished with polished hard wood blocks. These are showing little wear and can easily be replaced. The machine tools cannot be attached rigidly to the suspended floor and, apart from a radial drill which is bolted through, all the machines are mounted on patent fibre anti-vibration mounts. These have proved successful except for one large

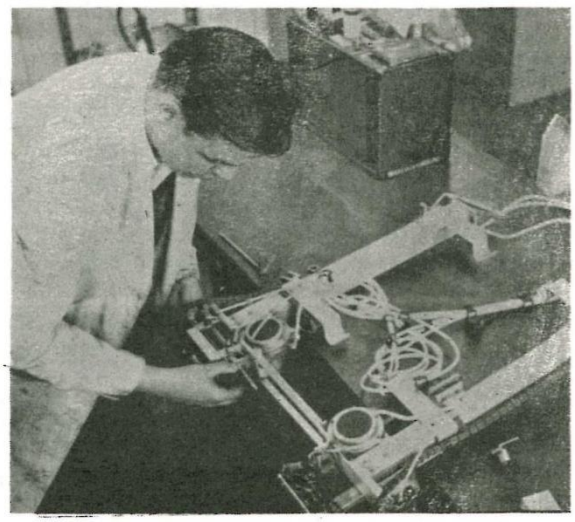
Photographs from the R2 Workshops.



Stan Watson working on the plunging mechanism swash pump.

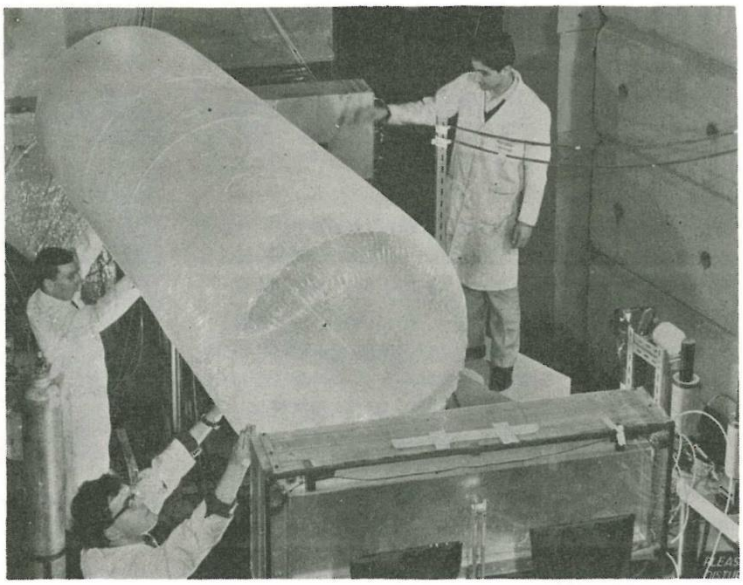


Highly polished components of the electrostatic inflector.



Harvey Taylor modifying the Type IV target mechanism.

A large helium bag developed and made in the NIMROD HEPE Workshop being installed in the N2 beam (April 1964) in Experimental Hall No. 1.



lathe for which knitted and crushed metallic wire mounts are being tried.

A certain amount of manufacturing development is always necessary on a machine like NIMROD. For example most of the work on the overhaul and development of the huge plunging mechanisms for the NIMROD extraction system is being done in this shop. Another current problem is that of producing a polished surface, free from pits and blemishes suitable for equipment such as the electrostatic inflector electrodes. Polishing methods are being investigated and a recent visit to the Royal Mint indicated various methods of approach, including polishing with borax powder applied with the ends of cherry or pear tree sticks!

HEPE Workshop R2

The NIMROD High Energy Physics Engineering Group workshop is a close support shop providing an engineering and manufacturing facility direct to the physicists in the Experimental Halls and to the supporting engineers. It has the standard workshop machine tools on a small scale and a complement of 5 skilled craftsmen under the Foreman Norman Ferguson.

In addition to work on beam line equipment, a considerable volume of small urgent jobs arise from visiting physicists who, whilst specifying the functional requirements, rely on the shop and its staff to determine detailed design and means of manufacture. A frequent task for the craftsmen is to devise from verbal instructions means of mounting scintillators, spark chambers or photomultiplier tubes in beams. Other typical development jobs are, machining tests on titanium and scintillator plastics; manufacture of a digitiser head for the microscope used in emulsion track measurements, and the manufacture of a beam camera for beam profile measurements. Most significant of the development jobs taken on by the workshop is the manufacture of helium bags some of which have been 3 feet in diameter and 20 feet long. These are made from PVC sheet, 0.004 inch thick, welded to form a long balloon. When filled with helium, they provide a less dense medium than air for the beam to travel in.

The success of the shop has depended on the ability of its staff to work with the maximum of initiative from the minimum of information.

Power Supplies Workshop R4

A small workshop, of 6 skilled craftsmen with Geoff Lewis as Technician in charge, has been set up to be primarily concerned with the maintenance and development of the NIMROD magnet power supply and the beam handling power supplies. The shop is in process of being moved to R3. The work includes motor-alternator-flywheel alignment, overhaul of mercury arc convectors and associated vacuum equipment, overhaul of transformers, switchgear, heat exchangers, etc., and also work on electronic equipment. Special facilities to avoid mercury vapour hazards are available for servicing mutators and diffusion pumps. Some of the

special test gear and equipment which is needed for plant modification is also built here.

Strain gauge techniques are used to check misalignment and other stresses on the rotating plant. Ultrasonic flaw detection equipment has been developed to check the shaft system, including bearing white metal adhesion, and intrascopes are used for visual checks of parts of the plant where access is difficult. These strain gauging, ultrasonic and intrascope facilities have all been used by other sections of the Laboratory in addition to the power supplies team.

THE Accelerator WORLD

News and views from the world of high energy physics, accelerators, and computers.

Bubble Chamber Accident

On 5 July a very serious accident, involving a hydrogen bubble chamber, occurred at the Cambridge Electron Accelerator in Massachusetts, USA. No detailed information has come from the Laboratory itself yet and the following description is taken from a report in The Times on 6 July.

The chamber, with a capacity of 100 gallons, was being filled with liquid hydrogen and the filling was almost complete when two successive explosions occurred. The roof was torn off the building housing the chamber and all the windows were smashed. About twenty people were in the building at the time of the accident: seven were badly burnt and four men were on the danger list in the Massachusetts General Hospital at Boston. The damage is estimated at $1 million.

The deep sympathy and concern of our Laboratory have been conveyed to the Director at Cambridge, Dr. Stanley Livingston.

Director General for CERN

On 17 June, the CERN Council Meeting unanimously approved the appointment of Professor Bernard Gregory as the next Director General of CERN. The appointment is for a period of five years and will take effect from 1 January 1966 when Professor Weisskopf, who has been Director General since August 1961, returns to his post as Professor of Nuclear Physics at the Massachusetts Institute of Technology (M.I.T.)

Professor Gregory was born at Bergerac in France, in 1919. In the late 1940's he spent three years at M.I.T. where he began his career in experimental physics in cosmic ray research. He returned to France in 1950 to work for seven years in Professor Leprince-Ringuet's Laboratory still studying cosmic rays, chiefly using equipment set up near the Observatory at the top of the Pic du Midi.

After a year at Brookhaven, Professor Gregory became associated with bubble chamber research, having scientific responsibility for the first 81 centimetre hydrogen chamber to be used at CERN from May 1961. He has been involved in the CERN experimental programme ever since and is at present Directorate Member for Research.

Dr J B Adams

It was announced on 2 July that Dr. John Adams has been appointed Controller at the Ministry of Technology, in addition to his position as Director of the Culham Laboratory. The Financial Times commented on the appointment as follows: "Adams seems now to be essentially Lord High Research, at any rate on the civilian side. He becomes Director of the Ministry's own laboratories (an eminent collection taken from the old DSIR) and overseer of a huge range of effort - the industrial research associations, Government research and development contracts, and a good deal more".

Dr. Adams is well known in the accelerator world. He was Director General of CERN when the 28 GeV proton synchrotron was commissioned and continues to take an active part in planning the future of high energy physics in Europe. He was on the NIRNS/DSIR working party chaired by Professor Wilkinson, which considered the future (1965-1975) U.K. programme in high energy physics, earlier this year.

AVF Cyclotrons

The information concerning the University of Milan cyclotron in the June issue of ORBIT was incorrect. The correct figures for this machine and news of two other recently commissioned cyclotrons is as follows (internal beams only):

The University of Milan cyclotron is a fixed energy machine, 45 MeV protons, for nuclear physics research. It operated at full energy for the first time in January, 1965. At Michigan State University a variable energy cyclotron which can accelerate various ions (maximum proton energy 50 MeV) for use in nuclear structure studies, reached design energy in February, 1965. A heavy ion cyclotron (CEVIL) at Orsay, Laboratoire Joliot-Curie, operated for the first time in April, 1965. It can accelerate various ions (N^{4+} has been accelerated) and is a variable energy machine.

Cornell Synchrotron

The USA National Science Foundation has allocated $11 million for the building of a 10 GeV electron synchrotron at Cornell University. The machine is expected to be completed in two to three years time and will take over from the Cambridge Electron Accelerator (USA) and DESY (Hamburg), which both have a peak energy of about 6 GeV, as the highest energy electron synchrotron in the world. A higher energy electron linear machine, 20 GeV, is under construction at Stanford University in the USA.

A 250 MeV linear injector will feed into a strong focusing ring of 96 magnets, $11\frac{1}{2}$ inches by 8 inches in cross-section with a peak field of about 5 kilogauss. The diameter of the ring will be 800 feet. The design intensity is 10^{11} electrons per pulse at a pulse rate of 60 per second.

'A synchrotron can be regarded as a giant microscope which affords insights into the sub-nuclear structure of matter. The resolution so far achieved is only just enough to reveal a hint of structures smaller than a proton. But there are good reasons to believe that the next step - the study of structures even smaller than the proton - may be the final one; that the very idea of spatial structure much finer that protons is meaningless. It is very important that this step should be taken, if only to confirm (as I think it will) that it is the last one.'

Nuclear Structure Research

Brookhaven National Laboratory, USA, is to install two tandem 20 MeV Van de Graaff machines to be ready for nuclear structure research in about three years time. They will be capable of independent operation, or one machine, with a terminal ion source, can serve as an injector for the second to form a 30 MeV accelerator (with an energy spread of about 2 keV) for protons, deuterons and tritons. Helium ions and heavy ions may also be accelerated. The maximum beam current is expected to be 10 microamps.

In addition, the 60 inch cyclotron at BNL is to be converted into an AVF machine also for nuclear structure research. The modifications are expected to be complete in September, 1966. Maximum energy for protons will be 40 MeV, with an energy spread of about 60 KeV, and a beam current of about 40 microamps.

Letters to the Editor

(Pseudonyms are accepted provided the author's name is known to the Editor.)

Sir,

Your editorial in the June issue of ORBIT clearly asks a number of relevent questions concerning the formation of a Recreational Society at the Rutherford Laboratory and indeed provides many of the answers. I will attempt to answer some of these questions and account for some of the delays; but I am mindful of your observations on apathy in remarking that , whereas the launching of this venture may depend on the existing temporary committee, it's continuing success and growth is entirely dependent upon the support of it's membership. With this thought constantly in mind, the committee has been reluctant to make any deeply committing step without a reasonable prospect of success.

The two essential ingredients for a Recreational Society, on any scale, are a membership, and recreational facilities. Sufficient evidence of possible membership was shown by the questionnaire circulated last summer, and at the general meeting which followed, the often repeated question was - "What are you offering?" The temporary committee recognised from the outset that it must offer at the very least both recreational and social facilities, and that these requirements can only be met by providing adequate accommodation. After prolonged negotiations, which were indeed delayed seriously by the transition from NIRNS to SRC, the management have offered building R14 as it stands, as the accommodation in which to found our Recreational Society. I do not suggest that this is adequate accommodation for our twofold objectives but it represents the best we are likely to get at the present time and there is a good prospect of considerably better accommodation in the not too distant future - always provided that we can demonstrate an urgent need for something better, and on this basis I am suggesting that we go ahead.

There has, understandably, been considerable loss of momentum in the past year, but the matter is still very much alive. It is my personal hope that, within the interval between the writing and the publication of this letter, the Rutherford Laboratory Recreational Society will have made its painful emergence into the life of the Laboratory, albeit into a rather humbler home than was hoped.

Are we going to have a Recreational Society? Yes, we are, and soon. Will it be successful? With a Laboratory strength in excess of 1000 it certainly should be, but the final answer to this question must come from the many, not from the few.

R. HAZELL

Outside Hours

In the early days of ORBIT (and incidentally this issue is the first of the fourth year of publication) we had a series of articles, under the heading 'Outside Hours', where people from their Laboratory wrote about their interests and hobbies. With this article we hope to take the series up again as a regular feature.

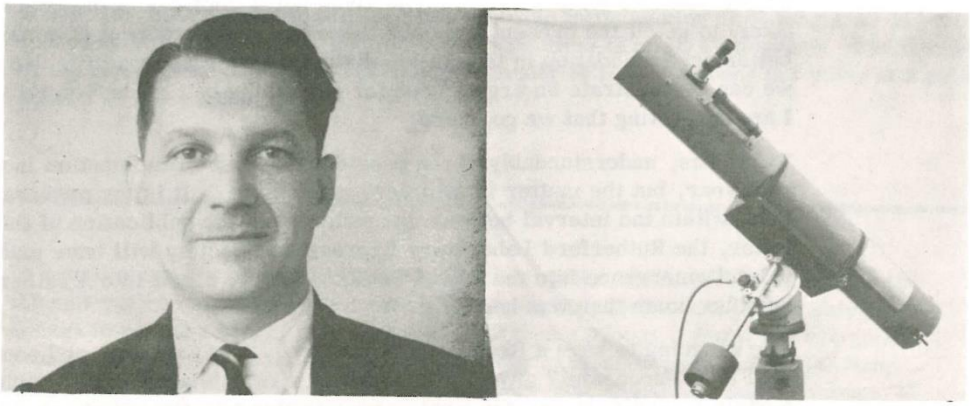
Seeing Stars

Peter Wroath

Who'd be an amateur astronomer? Many of my friends I fear think it is a cranky hobby. After all, who would venture out on a freezing cold night dressed like the abominable snowman to observe that eclipse of the Moon, marked many months earlier in one's diary, only to be frustrated at the last minute by clouds drifting suddenly across the sky. (It is quite remarkable how quickly this occurs sometimes on a clear night.) Then again, there is the ordeal of the visitor who comes to view the Moon. The possessor of a telescope will always invite his friends to observe the Moon first, as it is undoubtedly the most impressive object to see, drifting like a majestic ship in the black ocean. Even so, disappointment often follows from the friends reaction to these wonders in space. The most curious descriptions of what is seen in the eyepiece often occur instead of the astonishment and awe one has been hopefully expecting.

It is worth mentioning here to any prospective telescope maker that if he sinks a pier in his garden to mount his telescope, it is most expedient to do so in such a position that it is possible to glimpse some distant street lamps. This again is for the benefit of visitors on those occasions when it clouds over, as it usually will in our climate. The alternative view of the street lamp then proferred, will often impress far more than any heavenly body, especially if an unsuspecting spider is spinning a web about it. (This readily happens if the lamp is close to trees, so a lamp so placed is to be preferred.)

To qualify as a real amateur astronomer one really is expected to have made one's own mirror. That is to say a good attempt should be made, resulting in a usable mirror of some sort. After this usually traumatic experience, it is in order to purchase one. Many people do in fact produce a good mirror at the first



The author and his telescope.

attempt. It is a very satisfying experience as it is probably one of the most perfect things it is possible to make by hand. With care and experience a parabolic surface correct to within a few millionths of an inch over a glass disc six inches in diameter can be achieved. This is possible because of the great sensitivity of the simple Foucault or knife edge light test apparatus. The gifted in this art will probably find themselves breaking out in ever increasing apertures thereafter.

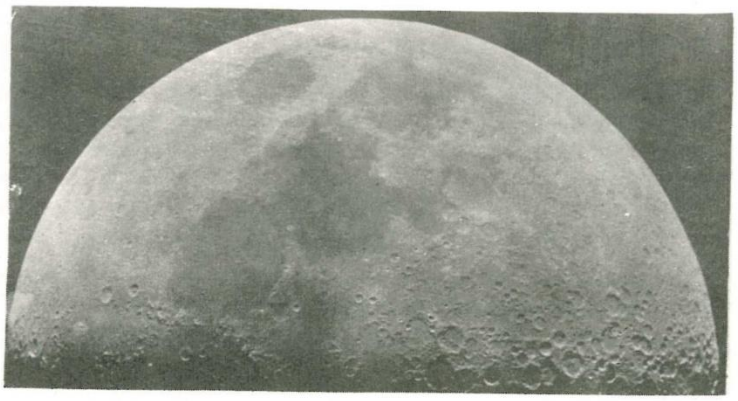
To make a mirror, a suitable workroom is required which is comparitively dust free. My own first mirror was made in the spare room of a flat and the frequent washing's down in the grinding and polishing stages carried out in the adjoining bathroom. The wife is apt not to appreciate the abrasive action of carborundum No. 80 whilst she takes a bath but in the first year of married life it is incredible what one can get away with. However, to anyone contemplating working under such conditions much later than the first year, from experience I can save you the trouble - its just not on - you will have to find working space elsewhere.

Many amateurs get as much pleasure making their telescopes as they do using them and the variety of homemade telescopes is vast - mounted on anything from simple pipe fittings, old motor car axles to the most sophisticated types, lathe turned, which resemble the professional telescopes in all but size.

What can one see when the telescope is made? Well there is really a great variety of things to observe. Just to gaze up at the vault of the heavens on a dark, transparent night and to try to count the myriads of stars as they silently move overhead is a moving experience. In a strange way one begins to feel a part of this eternal, never ending procession. If one is a variable-star enthusiast, the stars that begin to set in the West can be left and the telescope swing around to find others on ones list as they rise over the chimney pots in the Eastern sky. In this way the brightness of many stars may be measured in one evening.

The planets are always fascinating to observe, especially around opposition (that is, when the sun, earth and planet are in line) and many amateurs, after their initial sightseeing of the skies, settle down as serious observers of one or more of them. (Regular observing programmes are carried out by the members of the British Astronomical Association and contributions from new members are always welcomed by the directors of the various observing sections). Also these days, it is not rare to see one or more of the Earth satellites during an evening's observing and it is quite fun to "chase" one of these across the sky using the lowest power eyepiece one has.

To the photographically minded, astrophotography opens up a large field and a big variety of lenses, homemade box cameras, as well as modern 35mm cameras may be pressed into service.
One could go on to mention double stars, coloured stars, nebulae and star clusters. Also, from time to time comets, which are always exciting events to the amateur, but space will not permit. To answer my initial question, "Who'd be an amateur astronomer?" - Well, I would for one.



A photograph of the moon taken using the telescope.

Orbiting Around

Editor: H F Norris
Building R20, Ext.484.

Cricket Lovely Cricket

Golf has often been described as a disease and cricket must surely rate it a close second. Certainly the number of teams which have been formed at the Laboratory this year indicate an epidemic. The one thing which unfortunately prevents our cricket enthusiasts from really going to town is the total lack of facilities at the Laboratory. This is all the more frustrating to our budding Truemans and Dexters when they are aware that even M.R.C. have their own pitch.

After prolonged negotiations, AERE have agreed to the use of their now unused second pitch on each Wednesday evening providing the cutting and marking out of the pitch is done by the Rutherford cricketers.

Friendlies

Nimrod Engineering - 66 (Colin Gourlay 21, Bob McClure 12)
Technical Design and Tool Co. (Reading) - 16 (Harry Spicer 4-6, Bob McClure 2-1 and Colin Gourlay 2-1)

Nimrod Engineering - 57-9 (Peter Craske 22, Bill Buller 11)
M.R.C. - 58-9 (Don Bance 29, D. Gourley 4-16)

This match proved to be very exciting, MRC's winning run coming off the fifth ball of the last over.

Evening League Cricket at the Rutherford Laboratory

NIMROD ELEVEN. The Nimrod XI are still in the running for the Championship of the League, the record to date being, won two, lost one and one to play. The last match will be against the AERE Design Office and, weather permitting, should be played on 4 August.

We were very unfortunate to lose against Chemical Engineering. Having lost the toss we were put in to bat and in going for the runs were all out in 16 overs for 81, Ray Smith being the top scorer with 34. Chemical Engineering in reply needed two runs to win with only two balls left to play. They did this with one ball to spare.

In the game against Health Physics we were much more successful. Health Physics who batted first made 84 runs, and the Nimrod XI in reply passed this score with six overs to spare, Ray Smith with 36 not out and Reg Youthed with 34 being top scorers.

B. Goodenough

P.L.A. ELEVEN. The PLA team after their success last year in winning the championship have had an unlucky season so far. We lost the first match against Nimrod and recently have lost again to Chemical Engineering and Research Reactors Division. In the match with Chemical Engineering, PLA scored 64 runs in 18 overs but this total was reached by our opponents in 16 overs.

The last match resulted in a win by RRD by 94 runs to 64. The PLA team did not have a good "fielding" day and dropped about seven catches. We still have to play Health Physics and are hoping to break our duck.

P. Alderman.

ATLAS LABORATORY ELEVEN

The epidemic has spread to the Atlas Lab. and the captain of their very successful team, Tim Glover, has provided some interesting details of their efforts to date.

"The team was formed at the beginning of this season, to play in Division II of the AERE Evening Cricket League. Practice was undertaken during lunch hours, that is, until the bat broke. So far the tea fund can't stretch to providing us with a new one. Our aims are to obtain promotion to Division I and to win the Goodway Cup.

(With the record to date of 3 matches played - 3 matches won, the first aim seems very possible. Ed.)

It is felt that success to date has largely been due to our secret weapon, i.e. the number of players who turn out to play in grey trousers. These are chaps who have not played in the game since they were at school, and have therefore either sold or outgrown their kits but who have nevertheless not forgotten how to wield the willow. They have often been taken for granted as "easy meat" but have supressed opponents with their big hitting and scintillating fielding."

Hawaii Bound

Grass skirts, glorious sunshine and High Energy Physics - this is the future prospect for Brian Jones. Brian, who has been at the Laboratory for the past 18 months is a member of the Bristol University team who collaborated in the N2 experiment and the celebrated K_2^0 experiment which followed it.

In August, he leaves for Hawaii to take up a post with the University of Honolulu. He will be travelling half way round the world to continue the same sort of research he has been doing at the Laboratory. Honolulu University is involved in an experiment at the Lawrence Radiation Laboratory, Berkeley in California, looking at the decay of the K_2^0 into $2\pi^0$ (an experiment which is also being done at CERN by a Rutherford team. In addition to his research he will be lecturing.

His reasons for making the change are many but a prominent one he gives is both honest and simple - the climate. Many readers who have suffered our present summer will, no doubt, be very envious. His appointment is nominally for one year and what will develope after that is uncertain. He may stay in the USA at the mecca of high energy physics, Berkeley, or he could move on. Brian doesn't know, but there is always the chance he may re-appear at the Rutherford again one day. Our best wishes and those of his present colleagues go with him.

Table Tennis

With the almost certain formation of a Recreational Society in the very near future and the management offer of R14 in which to found the society, the table tennis enthusiasts have great hopes for the coming season.

A new table has been built and with the present thoughts of entering two teams in Division II of the Didcot and District League, table tennis would seem to have a happy future. We look forward to publishing more news about this venture.

Comings and Goings

V H Jones, B L Thompson and R M Green join Central Engineering Group:
K W Goodchild joins HEP Electronics Group;
P S Adams joins HEP Counter (Visiting) Group .
R W Thompson and T J Pointer join Nimrod Machine Engineering Group; R D Ockwell joins Nimrod Machine Physics; L Meers, W Taylor and F H Workboys join General Administration

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Dr. D McMullan E H England A L Lintern K Mitchell J Pilcher C J Rosier and Mrs H New have left us.

Congratulations to:

Phil Bridle, R9 Workshops, and his wife Susan, on the birth of a son, Robert, on 8 April.

Roy Church, Nimrod Ops Group, and his wife Doreen, on the birth of a daughter, Paula on 13 June.

Don Russell, Atlas Laboratory, on his marriage to Jane Cartwright, Culham Laboratory, on 20 June.

Jack Mills, Nimrod Ops Group, and his wife Gloria on the birth of a son, Andrew, on 5 July.

David Wooton, Nimrod Ops Group, and his wife Christine, on the birth of a daughter Caryline Helen on 5 July.

Margaret Taylor, HEP Counter Group, (Visiting Teams), on her marriage to Brian Toms, Ministry of Supply, on 17 July.

Dorothy Pyrah, General Administration Division, on her marriage to Peter Jeffries on 17 July.

Suggestion Awards

At the Twenty Eigth meeting of the Rutherford Laboratory Suggestion Awards Committee held on Wednesday 14th July 1965, the following awards were made:

£10 to E.T. Gourley whose proposal to introduce "UNI-LABELS" to identify electric circuits had been adopted, resulting in increased efficiency and a great saving in cost.

An encouragement award of £2 was made to A. Richards, and one of £1 to W.G. Black.

B. Briscoe, Secretary.

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