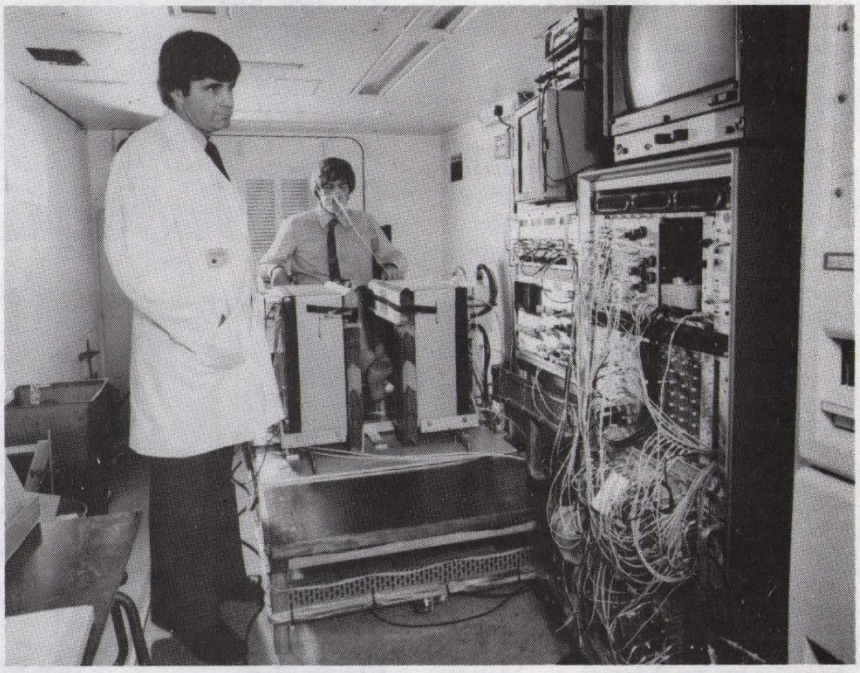
Bulletin
of the Rutherford and Appleton Laboratories 7 Sept. 1981 No.15

Medical Partnership

Tucked away in a dreary quadrangle next to the MRC Cyclotron Building at Hammersmith Hospital is a small caravan. The popular, glamorous image of high power medical research is definitely absent. However, inside the caravan is a device which could revolutionise the understanding of illness and its treatment. The device, called a Positron Camera, can produce a three-dimensional reconstruction of the functions of specific organs within the body - without the need for surgery! This work is the result of a unique collaboration between the Medical Research Council and RAL.



36551

Mr Terry Jones observing a positron camera produced colour image of the circulation of blood to the foot of a test subject.

The Camera

A positron-emitting (radioactive) isotope is introduced into the body by inhalation, injection or orally. As the isotope decays, the positrons combine (annihilate) with electrons in the surrounding tissue, releasing two gamma rays travelling in opposite directions. The Camera detects the two gamma rays and is able to pin-point the position of the positrons' annihilation. Hence a three-dimensional picture of the organ can be recorded. The Camera consists of two large-area multiwire proportional chambers (MWPC) gamma ray detectors (300mm by 300mm) placed on either side of the organ. This device is large enough to take an extremity of the human body, such as an arm, leg or head.

Positrons

Biologically significant elements such as carbon, nitrogen and oxygen (amongst others) can be made into short-lived positron-emitting isotopes. These may be substituted into organic compounds, introduced into the human body and the regional tissue metabolic pathways traced in time and space using the Camera. In particular, oxygen-15 (with a half-life of 2 minutes) can be given to a patient to inhale. The rather short half-life demands that the source of the isotope (in this case the Cyclotron Unit) be close to the detector and patient.

Data Output

The gamma ray data are recorded using the delay-line readout technique. An online computer calculates the corresponding line through the organ and, after about one million events, generates a slice image of the distribution of radioactive material within the patient. At present this process takes about 1 hour, but this could be reduced to a few minutes if a microprocessor were to be used. The spatial accuracy of the device is about 6mm at present (and this too could be improved in principle).

Medical Assesment

The Positron Camera was developed over a four year period at RAL and installed at Hammersmith Hospital in July, for a two months trial period. So far it has been used in research into the functioning of the brain and to study the peripheral flow in patients with poor circulation in the hands and feet.

In detecting symptoms of disease or the effects of medication in an organ it is important to know whether blood is reaching the organ, at what rate, are there areas of zero metabolism and are the cells in that area malfunctioning or dead?

(continued p.3)

New Telephone Exchange

The moment to which we have all looked forward (with differing degrees of frustration) is nigh - well, nearer. A new Telephone Exchange is to be installed at RAL and should be in service by September 1982. The Department of Education and Science has approved its purchase from receipts from the sale of Ditton Park.

From the outset it was decided that only modern stored program controlled systems should be considered. The system must also be Post Office approved and have the flexibility to provide the enhanced capacity and variation of facilities to meet the changing needs of the Laboratory until the year 2000.

Having identified the range of facilities required a specification has been formulated and an exhaustive survey of all likely systems made.

The long-term trend in Private Automatic Switchboard Exchange (PABX) design is towards a combination of centralised control with localised micro-processors to provide the flexible stored program control, switching and transmission being handled by time-division of digital streams. This minimises physical size, power consumption and manufacturing costs because it allows the extensive use of large scale integrated circuits.

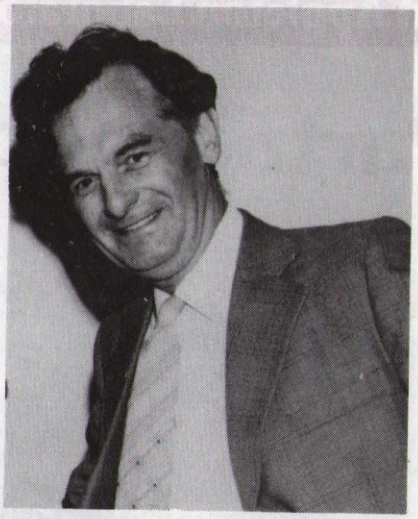
The new exchange, will of course, cover all the functions of the old system, but in addition will have the ability to log all external calls, recording extension number, called number, time and duration of the call, and meter pulses from the local exchange. Never again will one have to change extension numbers. These will be transferred simply by software instructions. External calls, where the caller has the extension number, will no longer have to pass via the switchboard. Facilities for data transmission may also be incorporated.

A feature which may or may not fill you with enthusiasm is the group working of extensions. It will, however, certainly be more efficient. The proposal is for flexible working amongst members of designated groups of extensions. There will be abbreviated dialling amongst members of the group, automatic diversion of unsuccessful incoming calls to a chain of alternatives, and within a group, any extension to be able to pick-up an unanswered call.

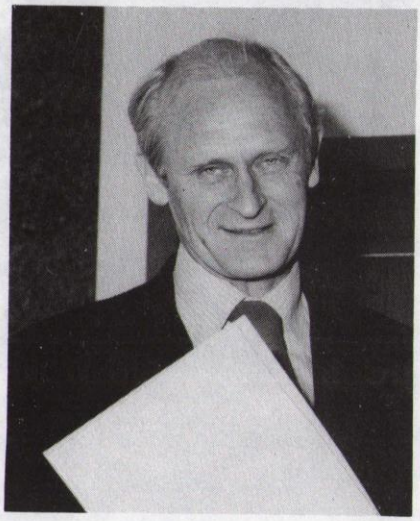
Tenders have been invited and a supplier will be selected in the near future. We hope to make the change-over from the present exchange to the new one during August 1982.

New Management Structure

As promised in our last issue we introduce you to the other members of our new "Board of Directors".



Dr D B Thomas, 50, Associate Director: Engineering, graduated in 1952 and gained his PhD in 1956. After a year with Elliott Bros Ltd, he was seconded to tne instrumentation laboratory of Massachusetts Institute of Technology returning after two years to join the Physics Department at Imperial College in 1959. He joined the staff of the applied physics division (now the technology division) of Rutherford in 1964 and was promoted to head the division in 1969.



Dr J J Thresher, 52, Associate Director:Nuclear Physics, gained his BSc at Capetown University in ~~1948~~ 1951 and was Rhodes Scholar for the Cape Province at University College, Oxford, 1952-55 where he gained his DPhil in nuclear physics. He was a research fellow at Harwell 1955-58 and then joined the staff of UKAEA. In 1962, he joined the National Institute for Research in Nuclear Science at Rutherford Laboratory. In 1975 he became head of the Rutherford Laboratory's high energy physics division.

Dr J M Valentine, 55, Laboratory Secretary, gained his BSc in mathematics and natural philosophy at St Andrews University in 1946. After two years in research at RAE and the Wool Industries Research Association, he returned to St Andrews, gaining a first class honours degree in natural philosophy in 1949. He then went to Glasgow University and was awarded his PhD in 1953. For the next two years he was senior physicist, Regional Physics Department, Western Regional Hospital Board and deputy regional physicist 1955-62. Dr Valentine joined the Rutherford Laboratory as deputy Secretary in 1962, and has been Secretary of the Rutherford and Appleton Laboratories from September 1979.

INTERNAL Events

NIMROD LECTURES
R61 CONF RM - 1400hrs

7 Sept	Prof P Higgs/Edinburgh "Axions" (theoretical)
21 Sept	Prof H Faissner/Aachen "Axions" (experimental)
28 Sept	Cosener's Weak Interaction Meeting.

HEP SEMINARS
R61 CONF RM - 1100hrs

9 Sept	Dr J C Thompson & Dr A M Cooper /RAL "Report on the Bonn Conference"
23 Sept	Dr N Booth/Oxford "The Solar Neutrino Puzzle - Can it be Solved?"

Library Notice

ITEM RECEIVED IN LIBRARY ORDERED FROM ECOLE POLYTECHNIQUE. WHOSE IS IT?

We have received in the library in an envelope just addressed to the Labs without an individual's name - a set of papers (in french) from this polytechnique which we did not order. The papers are dated 1975/77 and are on theoretical physics. If someone has ordered these perhaps they would like to come to the library and claim their property.

Trade Exhibition

There will be a one-day exhibition by Spectron Ltd of their new range of endoscopes on Tuesday 29 September in the Conference Room in Building R12 from 10.00 to 16.00hrs.

Speed Limit

THERE IS A SPEED LIMIT OF 20 M.P.H. ON THE CHILTON SITE. THIS INCLUDES THE OUTSIDE CAR PARKS AND ROADS LEADING TO THEM.

Missing

The following items have disappeared from R1. Is anyone harbouring them under the mistaken impression they are lost?

Philips Transcribing Machine
RAL X004728

Indola Electric Fan. RAL/X005101.

Philips Dictating Machine. RAL/X004052.

Please contact Mrs S Williams, R20, Ext 570.

Lost in the move from Ditton Park to Chilton:

Hewlett Packard Calculator HP35 No 7260
Matrix Hole Tolerance Indicator No 12713
Drawing Board Lamp No 8085

together with various other components in a large cardboard box. Anyone knowing the whereabouts of these items, please contact B G Purser, R25, Ext 6474.

Medical Partnership

(continued from p.1)

Other devices for monitoring blood flow-rate and metabolism are at present in use, but the Positron Camera has an intrinsically high spacial resolution and is more potentially versatile than any existing commercially available device. There is an important task ahead of performing several measurements on different diseases and conditions and hence gain practical experience with the Camera. Mr Terry Jones of the Cyclotron Unit points out "the need is to put numbers to the findings".

The Editor wishes to thank Mr Terry Jones of the MRC Cyclotron Unit and Dr Eddie Bateman of RAL for this interesting news of the Positron Camera. We look forward to the results of its assessment in the near future.

Goodluck Louise

Friends and well wishers gathered together in the R20 Boardroom on Friday 28 August to say farewell to Louise Dunmore and to present her with a beautiful crystal vase accompanied by the appropriate bouquet of flowers.

The occassion was a sad one for all present marking, as it did, Louise's retirement from RAL.

Jack Wyatt making the presentation thanked Louise for her work in the Personnel Group which had been carried out in spite of personal difficulties which he hoped were now behind her. She had joined us in 1977 from Harwell where she had returned to work after many years abroad as an RAF wife.

"We hope you will remember us by this token," he said, "and we wish you every happiness in the future."

Louise said she felt overwhelmed by everyone's kindness to an extent she had not expected and thanked everyone very sincerely for the beautiful presents.

'Sports Days' Prizes

A grand presentation of all the prizes won by RAL competitors at the 1981 Sports Days will be held on Monday 21 September at 11.30pm in the Colloquium R27.

Dr Stafford has kindly agreed to make the presentations.

"All are welcome - though, as the Colloquium hasn't elastic walls we would be grateful it you would contact Eric Thomas Ext 6219 so that he has some idea of the numbers involved.

Coffee at Cosener's

All wives of Rutherford & Appleton Laboratories staff are invited to a Coffee Morning at the home of Mrs Goldy Stafford, Ferry Cottage, North Hinksey, Oxford on Thursday 24 September between 10.30am and 12 noon (go via the Botley roundabout - the house is near the Church and next door to the pub).

This is the first of this season's monthly coffee mornings, usually held at Cosener's House, for RAL wives to meet each other and make new friends. Wives of visiting scientists are especially welcome.

HortSoc Annual Show

Everyone is welcome to the Annual Show which will be held in the Harwell Social Club on *Thursday 10 September 12.30 - 7.00pm* and *Friday 11 September from 12.00pm* with Prize Giving at 1.00pm.

Schedules and entry forms are available from Mrs H Pattle, Post Room, AERE Building 328. Ext 3050.

There will be a plant and pot stall at the show.

Bulletin

Editor: Jean Banford
Building R20
Rutherford and Appleton Laboratories
Chilton, Didcot, Oxon OX11 0QX
Abingdon (0235) 21900 ext 484

Deadline for insertions: