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# NEWSLETTER

No. 87

July, 1968 ✓

## The New Appointments

Staff will by now have seen the notice of senior staff appointments to be made in the near future. We offer our congratulations to Dr. Horner and Mr. Lane and look forward to welcoming Professor F. Graham Smith to Ditton Park.

## The Computer Group

It is now approximately 6 months since the I.C.T. 1905 Computer became operational, and the most satisfying fact that has emerged during this period is that the Station is making good use of its new investment. During May, the computer was switched on for 225 hours, and even after allowing for engineers' time on the machine, almost 200 hours of effective time were used by our scientists and programmers. We are now ready to start 2 shift working on the computer, and will do so as soon as additional staff can be recruited and trained.

Our operating system is working well, and this is almost entirely due to the very hard work put in by our operators, but reception and despatch of work is hampered by our small reception area, and data preparation has become very similar to playing "sardines". However, we hope to have more space shortly.

After trying to give users a good turn around time, probably the most important task of any computer group is to spread information. We do this

- (a) by means of notices on the computer notice board.
- (b) by means of I.C.T. literature which is liberally distributed around the Station, and is constantly being updated.
- (c) by means of computer circulars.
- (d) by members of the computer group answering people's questions.

In order to pass on information we first of all have to gain a certain amount of knowledge, and a large amount of our time during the last 6 months has been spent in exploring the potential of I.C.T. programming packages, and in experimenting with programs to speed up our system. We have also written a wide variety of programs ourselves during this period, the major ones having been concerned with

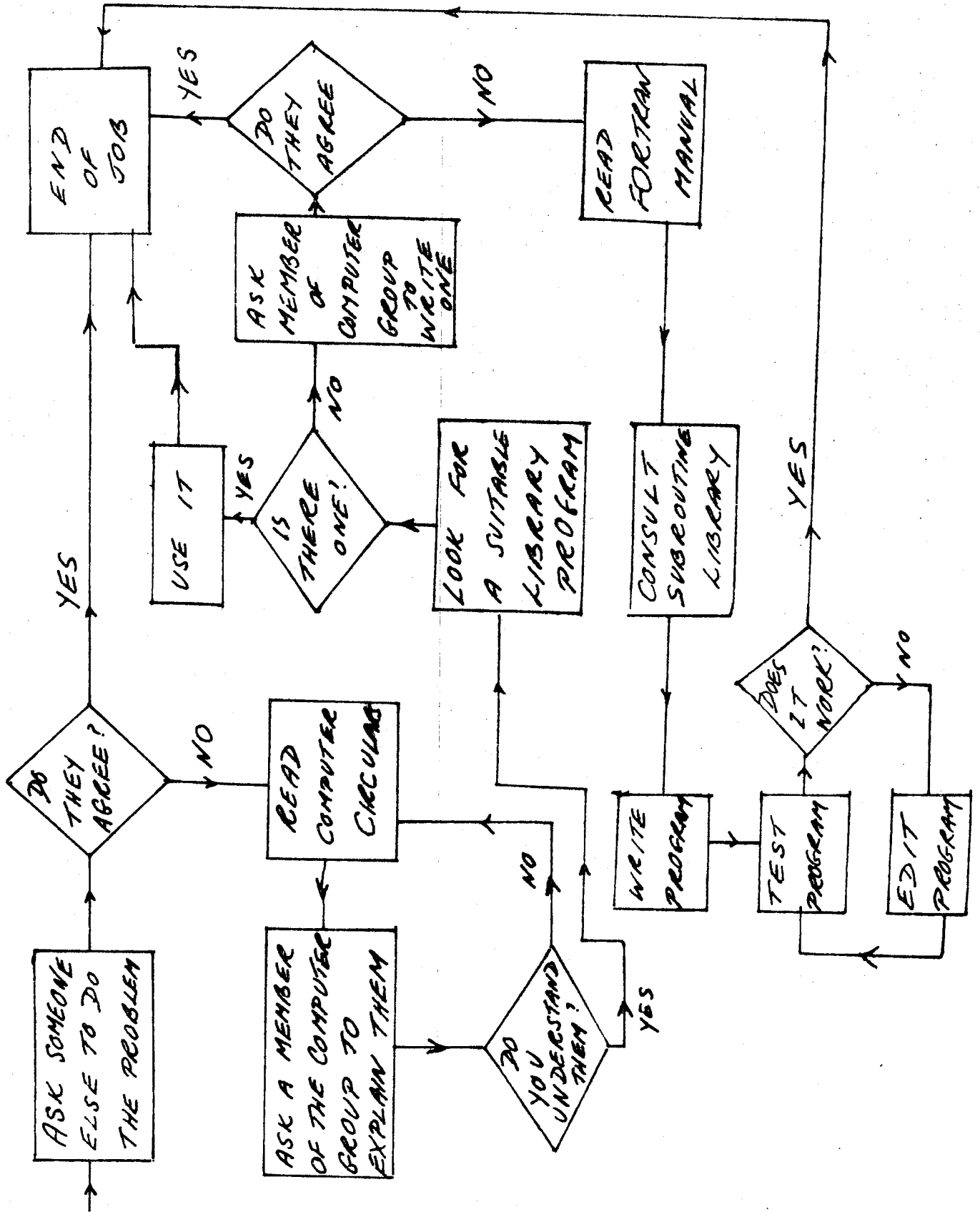
- (a) various code-conversion programs for reading magnetic and paper tape from other installations.
- (b) a Ferranti Argus simulator program to be used by people associated with the Chilbolton project.
- (c) A program to log all the time used on our computer; since time is costing us approximately £60/hour at present and the units used in the program are minutes, group leaders can get an accurate idea of how much their projects are costing the Station.

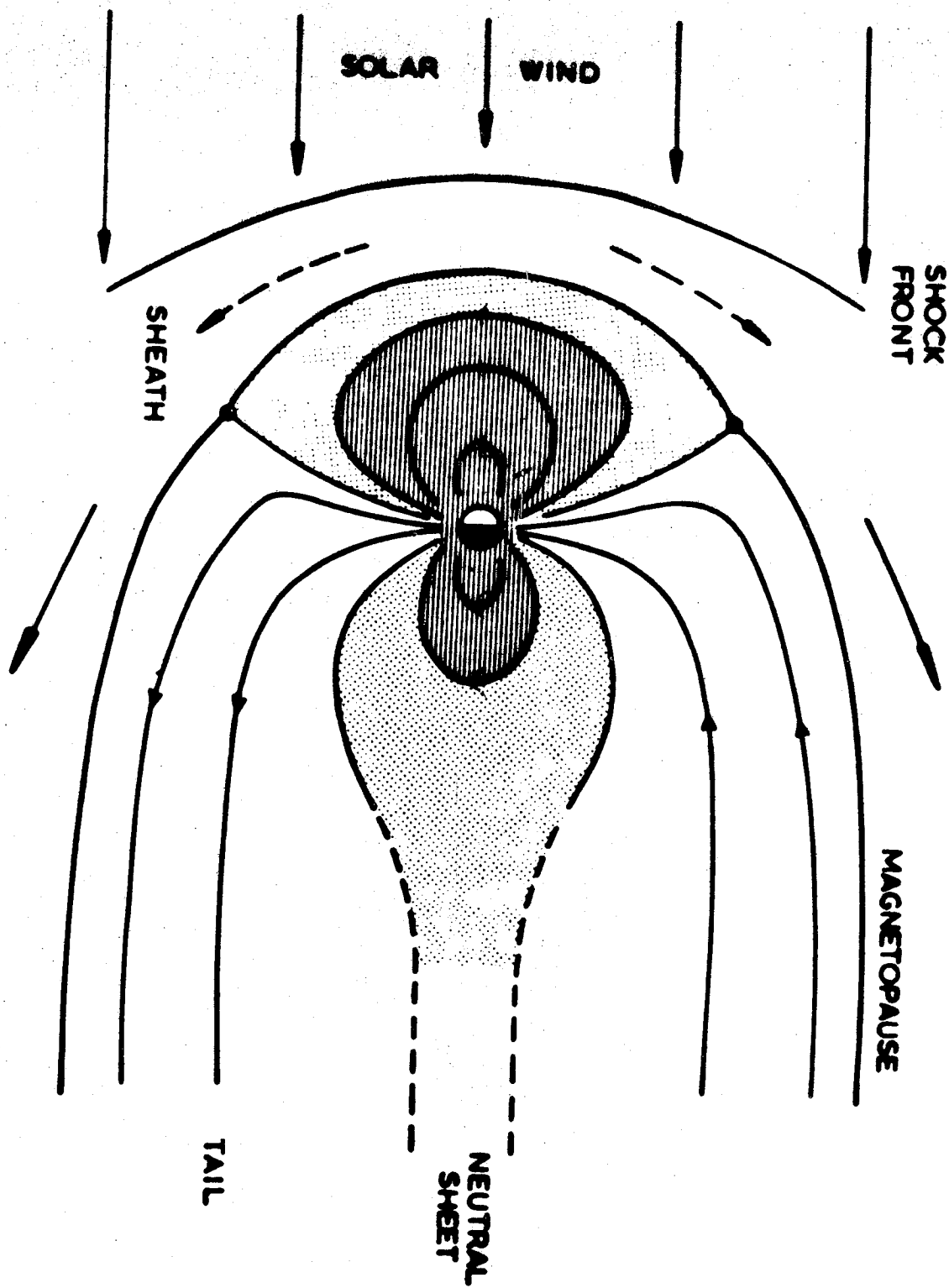
In addition to the programs we have written we have many useful Fortran subroutines available in our program library, we feel that these subroutines could be used more extensively than they are at present.

Finally I would like to thank the Director for the efforts he made (after devaluation) to obtain the money for our fast line printer which was delivered at the end of February and which has greatly increased the power and efficiency of our machine.

B. R. MARTIN

How to deal with a problem involving the computer





Theoretical Magnetospheric Research at R.S.R.S.

The work of the R.S.R.S. Theory Group on upper atmosphere and space physics can be divided into two main fields : the magnetosphere and the ionosphere. Originally distinct, these fields have begun to overlap and it is probable that some of the most interesting future developments will be concerned with relationships between the two regions. This article, however, is concerned only with magnetospheric research.

Perhaps the easiest way to explain the present research topics is to present a picture of the magnetosphere, which is based on the results of space experiments (though some of its features are still controversial). The diagram is a "side view" of the magnetosphere, in which the evening side of the earth is viewed from far out in the equatorial plane; the sun is on the left.

The earth's magnetic field presents an obstacle to the "solar wind", a supersonic stream of charged particles from the sun. The impact of the solar wind causes the earth's field to be confined within a surface, the "magnetopause", which is situated at roughly 10 earth radii (64,000 km) from the earth on the day side but is drawn out into a "tail" on the night side, at least 100 earth radii in length. Ahead of the magnetopause is a "shock front", in some way resembling the "bow wave" of a ship, at which the solar wind is abruptly retarded to subsonic speed. One Theory Group investigation is concerned with the physical conditions existing within the shock front, which is only a few tens of kilometres in thickness. Behind the "shock front" lies the "sheath" of the magnetosphere, in which the flow of solar wind is turbulent and subsonic (indicated by dashed arrows); further downstream the flow again becomes supersonic.

The diagram shows a few "lines of force" of the earth's magnetic field within the magnetosphere. Two lines of force go from the earth to the vicinity of the "neutral points" on the magnetopause, shown by black spots. Near the neutral points the magnetic field is weak, and solar wind particles may enter the magnetosphere; calculations of this influx of particles are being made at present. At times the solar wind becomes stronger, and the increased flow of particles into the magnetosphere may cause some of the phenomena of the "magnetic storm" which accompanies the strengthening of the solar wind.

Other topics being studied concern the motions of energetic charged particles in the earth's magnetic field, especially in the "neutral sheet", a region of weak magnetic field embedded in the "tail". The region shown stippled in the diagram, part of which is connected by field lines to the tail, is permeated by various kinds of wave motions and populated by energetic particles. Now and again an instability develops in the tail, resulting in a disturbance known as a "polar substorm", during which particles are precipitated into the upper atmosphere and produce auroral displays. Just how these auroral particles gain their energy is not known, though it has been suggested that the pattern of magnetic field lines in the neutral sheet changes in a substorm, lines being "broken" and "reconnected" with a release of magnetic energy.

The shaded part of the diagram shows the region where charged particles can be trapped in the earth's magnetic field, making many circuits of the earth before eventually being removed by collisions with other particles. The "outer" and "inner" Van Allen radiation belts occupy part of this space. Again, particle motions in the belts have been investigated in the Theory Group.

This review has proceeded inwards from the shock front to the radiation belts, say from  $10^5$  km to  $10^3$  km above the earth's surface. A further step through the ionosphere, down to  $10^2$  km, must await a further article.

HENRY RISHBETH

Station News

Arrival of Dr. Yonezawa.

We are pleased to welcome Dr. Toshiyuki Yonezawa on the occasion of his second visit to R.S.R.S. Dr. Yonezawa, an authority on the theory of the E and F regions of the ionosphere, is from the Japanese Ministry of Posts and Telegraphs, Radio Research Laboratories at Kokubunji. He has been appointed a Principal Research Fellow for a period of one year.

Staff News

Congratulations to :

Dorothy Preece and Bill Bellchambers on their marriage on 29th June at Gosport.

Welcome to :

Miss A. M. Wasik	A.E.O.
D. Onwukwe	Visiting scientist
T. P. Wigley	Sandwich Course Student
R. C. Mills	A.E.O.
T. R. Hougham	Craftsman I
R. L. Halton	Craftsman II
J. E. Newbury	Vacation worker
P. R. Dare	" "
D. M. Kelley	" "
A. Coupland	" "
A. Hillyer	" "
Miss H. Mason	" "

Resignations :

Mrs. W. M. Bryson	Personal Secretary
I. G. Mackinlay	S.A.
A. S. Navaratnam	A.E.O.
S. J. Baker	Craftsman II
F. Coleman	Handyman F.I.'s P/T
Mrs. M. E. Richards	Canteen Assistant
B. M. James	Craftsman II

Sports and Social Club News

Cricket Section

Summary of results since the last 'Newsletter'.

- Smith-Rose Cup : South beat North by 44 runs  
South 126 for 5 (Hussain 52, Moosajee 24, Hale 23)  
North 82 for 8 (Meswani 21, Dickinson 19, Hall 4 for 26)
- v. London Office : lost by 43 runs  
London Office 136 for 5 (Briscoe 34, Amman 40, Hussain 5 for 67)  
R.S.R.S. 93 for 3 (Hussain 38 n.o., Martin 26 n.o.)
- v. Howard Humphries & Partners : won by 5 runs  
R.S.R.S. 55 for 9 (Bramley 11, Dunford 10)  
H. H. & P. 50 (Eccles 4 for 19)

S.R.C. Sports Day

R.S.R.S. lost to R.G.O. by 10 wickets in the preliminary round. Eric Dunford (11) was the only R.S.R.S. batsman to distinguish himself, and R.G.O. had no difficulty in passing our score of 34 without loss. In the consolation match with Atlas our weakness in bowling was evident, Atlas making 97 off 15 overs, despite some keen fielding. In the R.S.R.S. innings Dunford (16) again distinguished himself but a total of 64 runs left us well short of the Atlas total. Moosajee (15) and Johnson (11 n.o.) were the other main contributors to the R.S.R.S. score.

The device at present standing on the cricket field might be thought by the uninitiated to be for raising chickens or growing hops. It is in fact a net for practicing the gentle art of cricket. May we cordially invite anyone interested to make full use of it?

C. R. BOULTON

Tennis

Despite the weather - dull, cold and windy - twenty three teams turned out to compete in American tournaments.

R.S.R.S. entered three pairs in the mixed doubles. The thirteen pairs were split into two groups, one playing six matches and the other five. Bob Fitchew and Mrs. Horner won the maximum of 30 points from their matches, while in the other half, Gus and Kitty Gordon-Smith had the maximum score of 36. The all Radio final resulted in a win for the Gordon-Smith's by 6-1, and for this achievement they received a silver cup. Richard Smith and Pat Martin also played well to score 30 points out of a possible 36.

The men's doubles competition was also split into two groups, but played on hard courts, as opposed to the mixed doubles which was played on grass. Our two pairs each came midway in their sections, Peter Smith and Harry Meswani scoring 16 out of a possible 24, and Duncan Bryant and Graham Horner 14 out of 24. In the final George Wilkins and Bob Dickens of R.G.O., Herstmonceux beat a pair from Rutherford, to win the cup.

Several competitors remarked on the good organisation of the competition and expressed the hope that it would become an annual event.

VERONICA LOVELL

#### Camera Club

The Annual General Meeting was held on 15th May 1968. A satisfactory financial situation was reported and plans for the coming year were discussed. Henry Rishbeth and Paul Dickinson remain in the offices of Secretary and Treasurer respectively; Simon Newman and Norman Reece are members of the committee.

HENRY RISHBETH

#### Coming Events in August

Tuesday 6th Rowing Evening  
Tuesday 13th A.C.O. Return Evening  
Tuesday 20th Ten-pin Bowling Evening

BOB FITCHEW

### Rowing Evening

The next Sports and Social Club activity will be an evening's rowing on the Thames on Tuesday 6th August. We will be hiring 4-seater rowing boats at Cookham, and proceeding at a leisurely pace for about two miles upstream to the riverside Quarry Hotel at Bourne End, where a period ashore will provide an opportunity for rowers to fortify themselves and replenish their strength for the row back to Cookham. At Cookham refreshments may again be obtained at the Ferry Inn. Boats will depart from Cookham at 6 p.m., and arrive back about 8.30 p.m. Cost per person for hire of boats: about 3s. -d.

BOB FITCHEW

### Letter to the Outstations

Dear Colleagues,

Two names in this month's list of resignations and retirements command special interest. To all who have had need of the instrument making skills of the workshop, over the last twenty or so years, the name of Mr. S. J. Baker is well known. As a skilled craftsman and tutor, both at R.S.R.S. and in extra-mural classes, his abilities have been a most valuable asset to engineering. Stan must be the authority on the electro-mechanics of that prime example of the uncertainty principle incorporate, the Ionosonde. Freed at last from its clutches, may a long and happy retirement await him.

Among all of us who have enjoyed a tour of duty in Port Stanley, Fred Coleman has long been known as the Station's own familiar incarnation of Kelper genius. In a treeless land the people cried out for huts, wooden masts, extensions to buildings and occasional help operating the Ionosonde. Fred appeared and all was right. I suppose he probably couldn't build a linear accelerator for fourpence, but I wouldn't put money on his not being able so to do. Good luck Che, in your retirement from R.S.R.S. Surely a multitude of fresh enterprises await your many skills.

Recently the post has delivered a number of pleasing poems to the Editorial desk, they are most gratefully received; but, bearing in mind the need to avoid unduly fostering the personality cult, it seems best to keep them in the file marked 'Personal'.

Rest assured, though, they do much to prop up the sometimes sagging confidence of,

Yours sincerely,

The Editor