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R.R.S. Newsletter No. 16 — 16th August, 1962.

LETTER TO THE EDITOR

21, Tumblewood Road,
Banstead,
Surrey.

The Editor,
R.R.S. News Letter.

The receipt of RRS Newsletter No.15, containing the last of Mr. Gardiner's excellent series of articles on the history of Radio Research at Ditton Park, has reminded me that by the time you read this, I shall have "been in retirement" for nearly two years.

And what a two years it has been! Any ideas that I myself had as to how I might pursue my various interests in a relaxed, if not casual, way were torpedoed at the start by a series of other factors.

In the national field, I was certainly taken by surprise in receiving an invitation in July 1960 to become a member of the Committee appointed under Sir Harry Pilkington to review the future of sound and television broadcasting in this country. This resulted in my attending a large proportion of the 76 full-day meetings - and several week-end conferences - at which over 650 submitted papers were read and discussed: as well as participating in visits to Wales, Scotland and Northern Ireland: to say nothing of a ten-day tour in Canada and the United States

I hope that by now there is a copy of the full published Report in your Library: and I commend the short version of it for your individual purchase. My service in this team of eleven men and women from different walks of life has been a most interesting and rewarding job; and we hope that our recommendations, if adopted, will be for the long-term benefit of the nation.

In the international field, I was partly prepared for the turn of events. Having been immersed in the affairs of the International Scientific Radio Union (URSI) for more than thirty years, I realised that it might fall to my responsibility to be President of the Union for a normal three-year term. The formal election took place at the General Assembly in London, which ended two weeks before I retired from the DSIR on 30th September, 1960.

It was during this meeting also, that I was asked to undertake another job in the international field. Representatives of URSI, the International Astronomical Union (IAU) and the International Committee on Space Research (COSPAR), met during the London meeting of URSI; and decided to form an Inter-Union Committee to negotiate on an international basis for more and better allocations in the radio frequency spectrum for both radio astronomy and space research.

Dr. J.F. Denissee, the French astronomer, was elected Chairman of a committee of 12 (4 each from URSI, IAU & COSPAR); and I was appointed Secretary-General.

This committee has already met in full, or in part, in Brussels, London and Amsterdam; and the Chairman and I have also represented it at meetings of the European Broadcasting Conference in Stockholm, and of the International Radio Consultative Committee (CCIR) in Washington and Geneva

All these negotiations are necessary preliminaries to the presentation of the case for the requirements of the radio astronomer and space scientist to have adequate protection from interference of a number of bands in the radio frequency spectrum. This case will, I hope, be fully supported by CCIR at its Plenary Assembly in New Delhi next January; and so come before the Administrative Radio Conference of the International Telecommunication Union (ITU), which meets in Geneva in October 1963.

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In the meantime, my responsibilities to URSI involve me in the preparations for the XIV General Assembly in Tokyo in September 1963.

Furthermore, thinking that I must have a lot of spare time on my hands, the Institution of Electrical Engineers tells me that, as a Vice-President, it is my duty to relieve the President of some of his visits to the many local centres of the Institution in various parts of the United Kingdom.

Now that Dr. Saxton has returned from the U.S.A., I can say how grateful I am to him for arranging for me to spend a few happy days at Austin, Texas, at the cost of my giving a lecture in the University. This was followed by my third visit to the National Bureau of Standards at Boulder, to give another lecture "on my way home" from Austin to New York!

Looking back over the past two years, I am glad that all these activities bring me into contact with old and new friends both at home and overseas. It is a very satisfying and enjoyable life; and I hope that I remain fit enough to pursue it for many years to come.

R.L. Smith-Rose
6th August 1962.

P.S. I have typed this note with the typewriter so kindly presented to me by the staff at Slough. This has proved a most valuable asset, although I seriously lack the competence of the professional touch.

Report on the London Conference on the Ionosphere

The conference, which was held at the Imperial College of Science and Technology, London, lasted for a week and was attended by some 200 Physicists from about fifteen different countries. The meetings were divided into four sections and the discussion in each section was led by a main speaker who read an initial survey paper and also a final summarising paper in which the main points which emerged in the discussion were collected. The survey and summarising papers will be published in the Proceedings together with about 70 papers by other authors. The four fields of study and the main speakers were

(A) Ionospheric constitution and ionizing radiations, Dr. H. Friedman.

(B) Geomagnetism and the ionosphere, Dr. C.O. Hines.

(C) Irregularities and drifts in the ionosphere, Dr. K. Rawer.

(D) The Mathematics of wave propagation through the ionosphere, Dr.P.C. Clemmow.

The survey paper in the first section reviewed the progress made in the fields of solar ultra-violet and X-ray spectroscopy, mentioned the new evidence for a helium layer, discussed the information about the variations of upper atmospheric temperature given by satellite drag data, and discussed the positive-ion composition of the ionosphere as measured by rockets.

An important topic in Section A was that of ionizing radiations, both electromagnetic and corpuscular. Amongst results presented were some preliminary data from U.K.1(Ariel). There was a great deal of discussion about photoionization rates derived from rocket data. It is clear that the rates depend very much on the model atmosphere adopted, and that there is still uncertainty about the relative abundance of O and N_2 in the F-region.

The photochemical reactions in the F-region were discussed; laboratory data and theoretical ideas about reaction rates were compared with those suggested by ionospheric observations. There still appear to be order-of-magnitude uncertainties about the rates of some reactions which are likely to play an important role in the ionosphere.

The equatorial F-layer and the ionospheric effects of solar flares were discussed from both the experimental and theoretical viewpoints.

The section on geomagnetism and the ionosphere was concerned largely with the interaction between charged particles and the earth's magnetic field. It

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was shown that the concept of "frozen field lines" simplifies the treatment of some ionospheric and magnetospheric problems. Theoretical studies of hydromagnetic wave propagation in the ionosphere were presented and the possibility of Landau damping of transverse waves was discussed.

Considerable attention was given to the effects of movements of ionization produced by electrodynamic forces and temperature changes: the need to include in future work the frictional drag produced by the neutral gas was emphasised.

Much of the experimental work described was concerned with high latitude observations of magnetic field fluctuations, aurorae, and other ionospheric phenomena. Some of the studies showed close correlations in the effects at magnetically conjugate points in the two hemispheres.

In the sessions on drifts and irregularities observations made by a wide variety of techniques were reported. These included the use of sodium clouds and artificial airglows, the scintillations of V.H.F. waves from radio stars and artificial satellites, the direct recording of ionospheric characteristics, and measurements on Doppler shifts of satellite radiations. The height of the irregularities causing scintillations has been determined with more certainty; only rarely are the irregularities observed to extend down to the E-region, and normally they lie at about 400 km. although they may cover a considerable range of heights. It has become apparent that the existence of "medium-scale irregularities", having sizes of the order of 100 km., needs to be recognised. Such features are present mainly by day, at any rate in middle latitudes.

Important new ionospheric drift results measured by the spaced-receiver fading method from New Zealand, India, Halley Bay (Antarctica), and also from stations in Nigeria and Ghana close to the magnetic equator were presented. The world-wide pattern of drifts is now becoming clearer.

In the fourth section the usual techniques used by authors of papers on wave propagation was to combine Maxwell's equations with the dielectric tensor obtained from the equations of motion of the ionospheric constituents.

The general topics which were discussed included waveguide and ray theory techniques, absorption and dispersion problems, and various treatments of V.L.F. propagation. The impedance of an electrically short antenna in the ionosphere was discussed by several authors, and a group of papers on backscatter theory and techniques was also presented.

J.W.King.

Pacific Nuclear Tests

The much discussed nuclear tests which are being carried out by the United States, in the Johnston Island area of the Pacific, have now been in progress for some months. Whatever the ethics of these experiments it is surely right to make the best possible use of the opportunities which have arisen as a result of them. During the series it was planned to explode devices of various powers, at heights ranging from a few tens of kilometers to several hundreds. It is evident that such disturbances in this part of the earth's environment might be expected to affect the distribution of electric and magnetic forces about the globe, as well as to cause changes in propagation conditions within the medium.

The study of such changes forms a proper part of the range of investigations at R.R.S., and arrangements were duly made for this purpose. The state of the ionosphere has been intensively examined during appropriate periods, soundings being made continuously at about the explosion time and for some hours afterwards. Atmospheric noise records were taken in attempts

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to observe the generation of noise, or any enhancement or attenuation of the general noise level, phase and amplitude changes in radio signals at various frequencies and path lengths have been noted, in short any phenomenon noticed was carefully examined to see if it could be attributed to the nuclear explosion.

The first undertaking was the explosion of a device 'in the sub-megaton range at a height of some tens of kilometers' This was scheduled to take place in early June, but after several postponements the attempt finally came to nought when the rocket carrying the bomb went off course and had to be destroyed. There was no nuclear explosion, the warhead having fallen harmlessly into the Pacific.

For the next attempt it was planned to explode a warhead in the megaton range at a height of some hundreds of kilometers. After several postponements this suffered the same fate as the preceding test, the rocket developed a fault and was destroyed in flight. Some weeks later the attempt was repeated, and after undergoing the now familiar pattern of holds and postponements, was successfully completed.

The visible effects over an area within a few thousand miles of the detonation were striking, and have been well reported by the press. Marked changes were seen in the transmission characteristics of radio links in the Pacific area, whilst in the U.K., observations of magnetic micro-pulsations and earth currents indicated that a geomagnetic disturbance had taken place.

At R.R.S., no marked effect was noticed in the atmospheric noise observations, and no noticeable disturbance occurred in the records of the Butterworth magnetograph, (only a slight change was visible on the more sensitive flux-gate magnetograph at the A.C.O. nearby). The vertical incidence ionosondes revealed little except a possible slight increase in absorption. Amplitude records of the 16 Kc/s transmission from Rugby, and the 191 Kc/s transmission from Motala (Sweden) did, however, show a marked decrease in signal strength shortly after the explosion. Surface pressure effects were too small to be detected at Slough. Other observers in Britain reported the complete fade out of W.W.V., the H.F. standard transmission from Washington, and also of the II Mc/s signal from Shepparton, Australia.

Some days ago a second attempt was made to explode a bomb in the sub-megaton range at a low ionospheric height. This eventually failed in a somewhat dramatic manner. The usual postponements and holds being past, lift-off was announced, but the rocket failed to comply, and burnt itself out on the launching site. There were, fortunately no casualties and, of course, no nuclear explosion; but according to press reports some damage had to be made good before any further tests could be considered.

This is the present state of the tests. Those of us concerned at Slough have had our moments of exasperation when, after using many feet of film and recording paper, yet another hold is announced, postponing the firing time first half an hour, then a further hour, and finally putting the whole business off until the next day. This has been the pattern of events on several days for each test; however, the hours of waiting probably add up to much less total discomfort than the seconds experienced by the team at Johnston Island. They were uncomfortably close to a rocket full of highly combustible material, burning away merrily, and failing to rise. The bomb on top is bound to fail safe, of course; but that, too, is the work of men.....

G.W. Gardiner.

STAFF NEWS

Congratulations to

Mr. & Mrs. Tyler on the birth of their son on 4th August.

Mr. & Mrs. C. Hale on the birth of their son on 6th August.

Dr. & Mrs. D.L. Croom on the birth of their daughter Katherine Fiona, on 26th July.

Mr. & Mrs. P.A. Smith on the birth of their daughter Janine Hazel, on 2nd August.

Cpl. John Brook R.A.F., on his engagement to Miss Marion Camp of FIDS, Port Stanley.

Mr. D.E. Smith on his gaining the degree of M.Sc. Lond.

Welcome to:

Mr. G.W. Beckett	Temporary S.S.A
Mr. J.T. Eaton	" A.E.O.
Mr. J.M. Goddard	Sandwich Course Student
Mr. A.G. Golding	Temporary A.E O.
Mr. A.B Lowe	" A.E.O.
Mr. F.K. Williams	Sandwich Course Student.

Resignations:

Mrs. V.M. Smith	Temporary Tracer.
Mr. L.C. Lawrence	" A.E.O.

Other Changes:

Mr. A.F. Wilkins	Temporary promotion to D.C.S.O. ceased 2.7.62.
Mr. A. Baber	Returned from Sandwich course.
Mr. G. Webb	" " " "
Miss B.K. Chaplin	Retired 8.7 62. reappointed as disestablished C.O. at Headquarters 9.7.62.
Dr. F.H.G.M. Minnis	P.S.O. seconded to I.C.S.U. 1.8 62.

Visits:

The Director is visiting the U.S.S.R. from Monday 13th August, to Thursday 23rd August.

SPORTS AND SOCIAL CLUB

Dear Members,

The plans for the proposed sports afternoon have been shelved for the time being because many members feel that an afternoon and evening of this kind would be more suitable in early June next year.

The 'Smith-Rose Cup" competition is proceeding smoothly; the cricket matches are finished and the tennis matches arranged. We hope the tennis will be played off soon, before the weather breaks up. After the tennis we have the car rally and then the winter activities of table tennis, bridge and Badminton.

A friendly cricket match between Dr. Cairns' eleven and Dr. Hopkins' eleven ended in victory for Dr. Cairns. Lunch time cricket is still attracting a good crowd even though three of the practice bats have been broken.

We hope that the billiard table will be ready soon. The committee thanks those many members who helped in moving the slates. The table tennis table is available for those wet lunch times when cricket cannot be played.

We have now bought some curtain material for the billiard room and the men's changing room. For the billiard room, the pattern is an abstract design coloured with emerald green, bottle green, lemon and white, while the changing room curtains are of dark blue rep.

Soft drinks are now on sale both in the old building and the canteen. Do please support this venture as all profits will help to improve the club's facilities.

For your future entertainment the following dates have been reserved. Please note them in your diaries!

To start the season there will be an Autumn Dance on Saturday, 6th October. Then on November 5th, comes the bonfire, hot dogs and firework night followed by a 'Hop' in the club rooms. We will need your lunch-time help during October to collect wood from the park for the bonfire. Finally, the Christmas celebrations will be held on Saturday, 15th December.

R.J. Weston.

R.R.S. Amateur Radio Society

New Members

The Society is pleased to welcome Mr. W.R. Piggot.

The Recent Meeting

The Society met on the evening of July 30th for the showing of two new releases in the Mullard Technical Film series. The first, "The Electroneers" dealt with the production of a new device, in this case a Travelling Wave Tube Amplifier and traced its progress from the initial concept to the finished production model. The second film, "Fuel for the Future", gave an outline of the processes involved in obtaining power from nuclear energy. Several visitors attended. We are indebted to Mr. Reed for his help during the meeting.

Future Meeting

It is hoped to hold a demonstration of the new E.M.I. transistorised TV camera. The manufacturers have been asked to help in this matter, and the membership will be notified as soon as more information becomes available.

G.G. pp. R.G.F.

LETTER TO THE OUTSTATIONS

Dear Colleagues,

On 31st July Dr. Minnis was given his official farewell in the canteen in front of a large audience. The Director, in presenting Dr. Minnis with a cheque, spoke of his international reputation in at least two fields of enquiry and wished him well in his new and important job. I know you will want me to add your own good wishes to ours for his success in the future.

We have given "Letters to the Editor" temporary front-page status in this issue because of the obvious interest of our ex-Director's letter to all R.R.S. staff. Despite Dr. Smith-Rose's modest P.S., the original was in fact not far from showing the "professional touch" of the trained typist.

Ted Golton is leaving for Singapore by sea on 20th August and has a full programme of work ahead of him. We wish him well at his new job.

Our best wishes also go with Veronica Smith, who has recently left us.

Yours sincerely,

The Editor

15th August, 1962.