



NEWSLETTER

No. 122

July 1971

THE R.S.R.S. REVIEW PANEL

The Report of the RSRS Review Panel has now been considered by the Science Research Council, together with comments on it by the ASR Board, the SPGC and the Station Committee, and the recommendations of the Report have been approved. Copies of the report, already seen by a number of I.P.C.S. members, will be found in the library.

The main outcome will be some shifts in emphasis of the Station's work and the assumption of new responsibilities. The Director intends to take an early opportunity of discussing the implication of the new policies with the Station Whitley Committee.

In general terms it is expected that effort at RSRS on ionospheric research will be significantly reduced, though some work in this field will continue; that the Station will become more active in space science in association with and in support of Universities; and that research on radio wave propagation relevant to space and terrestrial communications at millimetre wavelengths and shorter will continue at about its present level.

The recognised ability of the Station to fulfill an advisory function, nationally and internationally, in matters relating to radio communications - particularly wave propagation - has been strongly commended and will be maintained, with such basic research as is necessary to support this work.

The Space Research Management Unit (excluding its London Office Committee and Secretarial functions) is to be transferred to RSRS and is expected to become part of the Station by January 1972.

Microwave Reflections from Tall Buildings

The increasing number of tall buildings being erected in cities and large towns is causing the Post Office concern because of possible interference to their radio microwave relay links. The microwave links, operating on the 2, 4, 6 and 11 GHz bands, are used in a chain to communicate between major cities and towns e.g. London, Birmingham, Manchester etc. and carry telephone, television and data information.

The transmission of microwaves between Post Office radio stations is ideally a straight line-of-sight path, typically over a distance of 20 miles. If the link occurs along any other path than the direct one, then as the indirect path is longer, it will produce a delayed signal. If the delay is sufficiently long and the delayed signal strong enough, interference will occur between the direct and delayed signals degrading the quality of the link. The degradation appears as noise on the signals and similar situations can be seen on the domestic T.V. set as 'ghosting'. Another form of interference can occur if a microwave transmission intended for one P.O. radio station is 'deflected' into the path of another link so mixing two signals of different origin, again degrading the quality of the link. In some cases an interfering signal of 4 or 5 millionths of the power of the wanted signal can produce an unacceptable degradation. Tall buildings which may be at a similar height above ground to the microwave link path (a few hundred feet) are capable, by the scattering of microwaves, of producing delayed and 'deflected' paths in the way described above. The amount of scattering from buildings and its dependence on angles, ranges from the building, frequency, polarization and type of building is little known.

To help understand and, hopefully, to predict the scattering properties of buildings an experiment has been devised to measure scattering when varying the beam angles, ranges, polarizations and the type of building. The experiment uses a radar technique of transmitting very short pulses ($.05 \mu\text{s}$) of 3 cm. microwaves near (200 m to 1 km) the building under investigation. Microwaves direct from the transmitter and microwaves scattered from the building are picked up by a receiving station a few miles away. Because the pulses are short and because of the time delay effect mentioned above the pulses arrive at the receiver separately in time and can be identified. This makes the comparison of direct and scattered amplitudes simple and from this the required scattering coefficients can be determined. To get a wide variation of angle and range and to get a large number of measurement points it was decided to mount the transmitter in a helicopter which would fly at the height of the building and hover at the required measurement points.

The use of the helicopter while solving the major problem of covering a large area posed a number of technical and legal problems. The technical problems were those of fitting the radar transmitter and suitable antennae to the helicopter which were both acceptable to us, technically, and to the Department of Trade and Industry (old Board of Trade) from the air regulations safety point of view. Also for reasons of nuisance value and safety a special dispensation was required from the D.T.I. to fly the helicopter at a dangerous height near tall buildings over an acceptable area. Acceptable areas must not include any buildings or places to which the public have easy access and the dispensation does not bend these rules. As can be imagined suitable tall buildings with adjacent wide open spaces are not common and much time and effort has been applied by the P.O. and R.S.R.S. searching for these rare occurrences.

However, three buildings have been found and helicopter tests completed at Luton, Romford and Bracknell. At Luton the building was a 16-storey block of flats and the receiving station located about 2 miles away at P.O. Radio Station, Dunstable. The receiving antennae (two 3ft dishes) were mounted on the roof of a 10 ft. square hut acting as our receiver laboratory which was on top of a 130 ft. tower. At Romford the building was again a block of flats and the receiving station $1\frac{3}{4}$ miles away, at Romford telephone exchange. The antennae were mounted on the roof and our laboratory was in the luxury of the exchange's fan room. At Bracknell the first office type building was investigated in the form of I.C.L.'s new computer complex. This time the receiving site, just under a mile away, was in the grounds of the Berkshire College of Education. The receiver laboratory being a 20 ft. trailer and our mains supplied by a 3 kw diesel generator. The variation in receiver sites shows that having found a site suitable for helicopter flying to be so rare, considerations for receiver sites are necessarily minimal. The next receiver site is to be in a domestic block of flats and the receiver laboratory in the tank room!

Despite the problems of helicopter working the results are quite rewarding and some 150 to 200 transmitter positions can be measured for scattering in 10 hours flying time over about 4 days. While the results have not yet been fully analysed it has been noticed that reflections vary from -8 db in the classic reflected and incident angles equal, to -55 db to -60 db for large scattering angles at distances of 500 m between building and transmitter. While it is unlikely that results from these experiments will lead to a plug-in formulae for the P.O. to use, it should give a good idea what variations to expect between different buildings, and give an understanding of the nature of the scattering, allowing some generalisations to be made about scattering from buildings not investigated but in a position to cause the P.O. problems.

S. Cherry

Obituary

Mr. J. W. Hopley

Staff will be very sorry to learn of the death, from a heart attack, of Mr. J. W. Hopley, former Station Secretary.

John Walter Hopley first joined government service in 1935 at the age of eighteen. He was firstly a member of Customs and Excise staff then later moved to the National Engineering Laboratory from where he was appointed head of administration at R.S.R.S. in 1962, a post which later became Station Secretary. In 1967 he transferred to Finance Division, London Office, in which he was serving at the time of his death.

Hopley came at an important time in the Station's history. The administrative problems created by our increasing involvement with space science and the transfer of our responsibilities in 1965 to the newly created Science Research Council were many. We were fortunate indeed to have had so conscientious, industrious and amiable a pilot through such difficult waters.

The Director and Station were represented at the funeral by the Secretary, a wreath being sent on behalf of present staff. To Mrs Hopley and family we offer our sincere condolences.

Staff News

Congratulations to:

Graham and Brenda Mills who were married on 10th July in the Falkland Islands.

Peter Allies on his marriage to Shiela Ray on 10th July at St. Laurence's Church, Upton.

Mike Lawden on his marriage to Yvonne Wilkes on 17th July at Birmingham.

Dr. M. J. S. Quigley	now P.S.O.
Mr. M. C. W. Sandford	" S.S.O.
Mr. M. I. Dick	" E.O.
Mr. T. Edwards	" E.O.
Mr. R. J. Pratt	" E.O.
Mr. M. F. Reid	" E.O.
Mrs A. J. Slater	" E.O.
Miss A. M. Wasik	" E.O.
Mr. U. M Yilmaz	" E.O.
Mr. A. J. Lucas	" A.E.O.
Mr. J. A. Crawford	" A.E.O.
Mr. D. John	" A.E.O.

Welcome to:

Miss S. E. Bain

Vacation Worker

Resignations:

V. D. P. Foley

H.Ex.O Transferred to London Office

Mrs J. White

Typist I

Other Changes:

A. F. Thomas

Photoprinter I. Became permanent

E.S.R.O.

D. W. Hardy

A.E.O. Left U.K. for F.Is.

News of Former Staff:

Congratulations to Dorothy and Bill Bellchambers on the birth of their second son, Simon Edward, on 9th July.

Don Madden has joined E.S.R.O. as an engineer at ESTEC at Noordwijk, Holland.

Station News

Professor Bolgiano of Cornell University has joined the Station as a Principal Research Fellow, for a period of approximately 6 months. He will be taking part in joint studies in radio meteorology.

Also visiting the Station for about six months is Dr. Dana K. Bailey, who is on sabbatical leave from the U.S. National Oceanic and Atmospheric Administration. Dr. Bailey has visited the Station frequently over many years and is well known to senior members of the Staff, particularly those interested in upper atmospheric physics, with whom he will be consulting.

Sports and Social Club News

In view of the success of last year's barbecue the Sports and Social Club anticipate holding another this year on August 21st. Please watch the notice board for further details!

A visit to Herstmonceux, on September 19th, has been proposed.

The bar representatives would like to thank all those who returned their questionnaires so promptly. Points raised are being considered now.

Return matches will be played at A.C.O. on September 1st.

Table-tennis

The competitive table-tennis will soon be with us and it is proposed to enter two teams in the Slough League. The first team will play in the second division and the second team will start in the fourth division. Any players interested are invited to contact the Hon. Sec. so that a practise/trials evening may be arranged.

P. Muzlish Hon. Sec.

R.S.R.S. Motor Club

C.S.M.A. motor oil sells well at R.S.R.S. Previous purchasers need not be put off by the fact that some containers are labelled C.S.M.A. and not Royal Snowdrift. It all comes from the same supplier. To assist those who are searching for extreme economy without loss of quality, I suggest that prospective customers get together to buy a 5 gallon drum of 20/50 Multigrade. This works out at 64p. per gallon. There is a measuring jug available but customers have to supply their own containers, and one person will have to be responsible for payment. I will assist in collecting names and quantities from individuals.

P. Muzlish Hon. Sec.

Cricket

Scores S.R.C. Sports Day

1st Round	R.S.R.S. 71 (Martin 24)	Atlas Laboratory	71-9 (Davies 3-20)
2nd Round	R.S.R.S. 62-8 (Moosajee 25)	Rutherford Laboratory	64-1
vs I.C.I. Jealotts Hill (A)	: R.S.R.S. 106-6 (Moosajee 21, Kitt 20) I.C.I. 107-6		
vs Lilly Research Centre (H)	: Lilly 82-7 (Davies 4-6), R.S.R.S. 47		
vs Wilkinson Sword	: R.S.R.S. 92-5 (Kitt 33, Moosajee 32), Wilkinson Sword 36 (Felix 4-6, Dunford 3-1)		
Smith-Rose Cup	: Smith 117-4 (Hopkins 45 retired, Kitt 26, Bevan 20) North 69 (Bramley 23)		

Single Wicket Competition: Winner B. Moosajee, runner up T. J. Bevan.

After a close match against Atlas last year, this year's match proved even closer. Needing three to win off the last over Atlas only managed two, a catch off the last ball depriving them of the winning run. We moved into the second round drawn we had scored faster over the first ten overs, but then came up against the eventual winners Rutherford. Against very accurate bowling we struggled to 62-8 with Moosajee the back bone of the innings but this was not enough against a side of Rutherford's class. We appeared to be heading for our first victory over Jealotts Hill after some good aggressive batting, but in the

end Jealotts Hill's batting proved to be even more aggressive and they won with two runs to spare. Against Lilly Research it was the turn of the batting to fail after some good bowling by Davies had helped keep the target down to 83. We proved too strong for Wilkinson Sword, with Kitt and Moosajee putting on 54 for the first wicket. When the Swordsmen batted Felix removed the early batsmen while Dunford polished off the tail giving us a convincing win.

South won the Smith-Rose Match again after a very good knock by Dr. Hopkins and Ali Moosajee won the Single Wicket Competition without ever being extended.

Another Triumph of Decoding

Congratulations to the Post Office on delivering to the following address given in a letter from Japan.

Mr. W. R. Piggott
21 Hirrenngton Rd.
UX VILLIGE
MIDDLE SIX ENGLAND

LETTER TO THE OUTSTATIONS

The past two months or so have seen a marked increase in activity in the buildings and walls dept. of our Station. Not only has a new hut been added to the ranks which stand neatly lined up at the rear of the main building but we have been given a good example of what might be called the amoebal paradox - we multiply by division.

In this instance the multiplication has been that of rooms and it has been accomplished by mural division of some main laboratories and one or two side rooms. A risk to be guarded against, during all this rapid reconstruction, is that some member of staff, absorbed in work, may start up from his desk with a great truth ready to offer to the world only to find he has been immured, like a medieval nun suffering from chastity slippage.

In any case, the general clangour of construction, though it stifles great thoughts, does at least keep possible victims awake and on the qui vive. It is the efforts of the M.P.B.W. contractors, now well launched into making a new two-story building at the far end of the car park, which give rise to the most shattering sounds.

The mind-blowing din of their concrete drill o'ertops all other noise and is propagated with all-too-little loss around the corridors. It tails off in the open air, though, so that's something. It means, that apart from sounds rural, such as the lowing of cattle and twitter of birds heard at brief intervals between the roar of aircraft and motorway, scholastic calm still reigns in the office of,

Yours sincerely,

The Editor

Reprint List July 1971

- D. A. Byrant
G. M. Courtier and
G. Bennett
Equatorial modulation of electrons in a pulsating aurora
J.A.T.P., 1971, 33, 859-867
- G. M. Courtier
G. Bennett and
D. A. Bryant
Pitch angle diffusion of electrons in a glow aurora
J.A.T.P., 1971, 33, 847-858
- H. Rishbeth
The F-layer dynamo
Planetary and Space Science, 1971, 19, 263-267
- K. L. Jones and
H. Rishbeth
The origin of storm increases of mid-latitude F-layer
electron concentration
J.A.T.P., 1971, 33, 391-401
- J. W. King and
J. Sayers
A study of the ionization crests detected by means of
the Ariel I satellite
J.A.T.P., 1971, 33, 355-361
- R. A. Challinor
Neutral-air winds in the ionospheric F-region for an
asymmetric global pressure system.
Planetary and Space Science, 1970, 18, 1485-1487

Internal Memoranda - nil