RRS Newsletter

(For the Use of R.R.S. Staff Only)

No. 27 JULY, 1963

A ROYAL OCCASION AT WINKFIELD

On Thursday, 11th July, Winkfield was honoured by a visit from the Queen of the Hellenes. She was accompanied by Madam Mary Carolou, Monsieur Paul Leloudas, the Countess of Leicester, the Earl of Leicester, Air Chief Marshall Sir Walter Merton and Brigadier E. J. D. Snowball. The Queen and her party arrived just after 3 p.m. with a police escort such as may never be seen at Winkfield again, and left again at 4.30 p.m. after being shown the work of the field station and taking tea.

Those responsible for arranging the programme for Queen Frederika's visit were beforehand more than a little concerned as to whether they could successfully engage her interest for all of the time she was to be at Winkfield; but in the event Her Majesty proved so well versed in scientific matters in general, and so keenly interested in space research, that there was scarcely time to satisfy her lively curiosity.

It was fortunate that two satellite passes occurred whilst Queen Frederika was at Winkfield and it was possible to show her the techniques for both tracking and telemetry reception.

J. A. Saxton

DR. SAXTON

The news of the Deputy Director's appointment as Scientific Attache to the U.K. Embassy in the U.S.A. has been received with feelings well summed up by the Director in his notice telling us of the fact. Dr. Saxton will indeed be missed from R.R.S.; but we are very sensible of the honour done to him.

International activities have occupied a good deal of Dr. Saxton's time. He has been prominent in the affairs of the International Scientific Radio Union (U.R.S.I.) and the International Radio Consultative Committee (C.C.I.R.) and has on three occasions worked in the United States. In 1945 and again in 1950 he undertook a tour of duty in the U.K. Scientific Mission as radio physics liaison officer and in 1961, at the invitation of the University of Texas, he spent a year there as Visiting Professor of Electrical Engineering.

Dr. Saxton graduated in physics at Imperial College and remained there as one of Sir George Thomson's team carrying out research on artificial radio-activity. He first joined D.S.I.R. in 1938 as a member of the staff of the Radio Division N.P.L.; in 1945 he obtained a Ph.D. and in 1950 a D.Sc. Ten years later he was appointed Deputy Director of R.R.S.

His work on the dielectric properties of the atmosphere and on studies of V.H.F. radio wave propagation has gained him an international reputation.

The Attache is, ex officio, Director of the U.K. Scientific Mission in Washington, and is required from time to time to provide scientific advice to the U.K. Delegation to the United Nations. He is responsible for liaison with Central America when the need arises.

The main duties of the scientific representatives have been broadly laid down as follows:-

1. To advise H.M. Ambassasors, British High Commissioners and other official representatives on scientific and technological matters.

2. To promote scientific contacts between the U.K. and the countries to which they are accredited.

3. To report to the U.K. on trends and developments in science and technology within their territories.

The specific ways in which the representatives carry out these duties vary from time to time in accordance with local circumstances and resources. In performing their second duty, however, they may be called upon to represent British official and semi-official scientific interests, provide information about British science, assist British scientists who visit their territories and stimulate the exchange of scientific information, and maintain widespread personal contacts with scientists, scientific institutions and industry.

This summary gives some hint of the complexity of the tasks awaiting him, and this Newsletter is, we feel, a suitable medium to convey our general congratulations and hopes that he may prosper in this work

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A SPUR 'D' REPORT

A previous article has appeared in this Newsletter describing the work now in progress in Spur 'D'. Written by Paul Dickinson it was entitled "Plasma Physics and Radio Research". It set out the justification for our existence within this research station. Perhaps this contribution, written one and a half years later, should provide further justification. However, in this period many strange constructions have been assembled within the Spur. Much has gone into the laboratory. What, save countless visitors, can be expected to emerge?

In this short note I shall describe briefly one of our projects.

Photoabsorption and photoionization mechanisms partly control the formation of the ionosphere and the ozone layer of the earth's upper atmosphere. In order to understand these phenomena, the photoabsorption and photoionization cross sections for all important atmospheric constituent gases must be measured. Furthermore it is necessary to know whether the absorption process causes fragmentation of complex molecules, dissociation of diatomic molecules, excitation or ionization of both atoms and molecules.

Due to difficulties of technique no systematic measurement of the photoionization cross sections of atomic hydrogen, oxygen and nitrogen have been made. We propose to make these measurements starting with hydrogen. Theoretical calculation of this cross section should be exact and, therefore, an early assessment of the accuracy of the method will be possible.

Protons with energy greater than 13.6 electron volts, that is with a wavelength less than 912 Angströms, will ionize atomic hydrogen. The first requirement is therefore a light source which can emit strongly in the extreme ultra violet. The light source being used is a high voltage, short duration, electric spark made to operate with a peak current approaching 5×10^4 amperes. Light from this source is dispersed by a diffraction grating. The grating is mounted in a vacuum monochromator kindly manufactured for this station in Professor Ditchburn's machine shop at Reading University. Monochromatic radiation of a chosen wavelength will then be allowed to pass through the absorbing gas. If the intensities of the light incident upon and transmitted through the gas are measured, and if the gas pressure and its absorption length are known, the absorption cross section can be simply calculated using Lambert-Beer's Law.

As previously mentioned, the absorbing gas used in our first experiment is to be atomic hydrogen. This is produced in an intense radio-frequency gas discharge. The dissociated molecular hydrogen flows through an absorption tube at a speed great enough that atom loss due to the reformation of molecular hydrogen within the volume of the gas and on the walls of the tube is sufficiently reduced. As it is not possible to dissociate molecular hydrogen completely, the percentage dissociation must be accurately measured. For this purpose a small hole, two thousandths of an inch in diameter, has been

made in the wall of the flow tube. Atoms and molecules flow out through this hole into a small cavity where the atoms are encouraged to associate rapidly on a silver surface. Thus only molecular hydrogen can flow in the reverse direction through the hole. Simple considerations of the mass of gas flowing through the hole when equilibrium conditions prevail show that a pressure difference develops across the hole. This pressure difference must be measured. It is small, approximately one hundred thousandth of one atmosphere, and should be known to an accuracy of one per cent. An instrument has been made in our workshop which has been shown to be capable of such a performance.

The present state of the experiment is that the equipment is all available and some of it is now fully operative. In a future article of this nature it is hoped that results will be available for discussion.

R. B. Cairns

RECOLLECTIONS OF ASCENSION ISLAND

The M.V. 'Blomfontein Castle' left London docks on 18th June, 1959, at about 10 p.m. Fifteen days later we had arrived at Ascension Island, South Atlantic. As I lay on my bunk that morning the throbbing of the engines had stopped and all that could be heard was the lapping of the waves on the side of the ship. I gazed out of the port hole and watched some Gannets fly past and beyond them, a half mile away, - there it was - this sun drenched island of Ascension. I stared with fascination. The big 2,800 ft. Green Mountain was shrouded in mist; the rest of the island appeared to be a multitude of shades from red to black and the sandy beaches were almost snow like.

After a hasty breakfast, we went down the gang plank where we jumped into the Cable and Wireless launch which took us ashore. This in itself was quite a procedure since at the jetty one had to grab hold of a 10 ft. hanging rope and do a Tarzan-type swing on to the steps - and then scramble up the steps before a big wave caught up with one: good fun - especially when one of our number succumbed to this fate.

Those first couple of days were spent selecting sites for the vertical incidence recorder, trailer and back scatter aerials. Later we installed the recorder on the beach some ten yards from the high tide mark since the beach was one of the few flat areas in our vicinity. Here we erected two vertical delta aerials with help from two St. Helenian riggers lent by Cable and Wireless. One fellow, a cheerful dark-skinned chap, had a permanent grin and seemed a happy worker. The other fellow wore a battered cowboy hat and had bare feet upon the soles of which he would nonchalantly stub his cigarettes. They did quite well in erecting our posts and spent hours digging in the hot sun.

The day of the arrival of the trailer was drawing near. We had selected its site on the slopes of Cross Hill just outside Georgetown. Cable and Wireless had the 'Wrecker' standing by for the towing job. The 'Wrecker' was a massive mobile crane which the Americans left on Ascension after the war and was usually manned by a motley crowd of St. Helenian boys shouting and waving as they drove this monstrosity through the town. At last the 'Clan Mackintosh' arrived and later in the afternoon a cumbersome trailer was lifted from the deck and plonked in a rather undignified manner on the pontoon. It was instantly set upon by a gang of St. Helenians who, with much arm waving and gesticulation, lashed it down to the pontoon and chocked the wheels. Even when it is on the road the trailer looks unstable with its high centre of gravity, but now it was on a small pontoon held down with ropes and was bobbing about on the Atlantic waves. By the time the whole thing had been towed to the pier head, the sea was rougher and it was decided that it would be too risky to unload it. The pontoon was bobbing about and it was necessary to lift the load quickly; but the 100 year old steam crane on the pier head could only lift at a slow speed, even with its heavy flywheel spinning as fast as it would go. So the trailer was towed out 400 yds. or so where it remained rocking and rolling overnight. Next day the sea was calm and it was successfully landed with more gesticulating and shouting from the St.Helenian stevedores. It took quite a time for it to be manoeuvred on to the site, where it remained for nearly two years.

The climate on Ascension is like continual summer - a pleasant 85°F most of the year and pleasantly fanned by the cool south-east Trades. In the rainy season, such as it is, we used to get a few showers during the day; but in 1961 we had a phenomenal downpour lasting two days. Dried up river beds became full, waterfalls appeared and the mountain road was breached at one point. An old St. Helenian told me this had not happened for many years.

Ascension is a place of contrasts, from the dry sultry barren plains at sea level to the lush cool green country on the mountain. On the mountain cows would graze, exotic flowers bloom, flocks of canaries fly and date and coconut palms and bananas grow. On the low lands nothing would grow save sparse outcrops of tussock grass or one might see a large centipede or scorpion scamper under a stone. Otherwise it was a desert, absolutely barren, the cinder you walk on scorching your feet and the dry dust and hot air almost stifling.

This was Ascension, but its real beauty was revealed on a full moon night when one stood on the white sandy beach and listened to the gentle Atlantic waves rolling along the beach and gazed at the sea reflecting the bluish white light from the full tropical moon.

R. Aria

MORE NEWS OF SKYLARK ROCKETS

Skylark 126 was fired successfully from Woomera to a height of 209 km. at 1456 on 18th June. This was the second of a pair of rockets each of which carried two R.R.S. experiments, the first, SL 127, having been fired on the 29th May.

One experiment, to measure electron density in the D region, was similar to that flown in the earlier Skylarks 108 and 109 except that ferrite loop aerials under a glass-fibre nose cone replaced the system of extending rod aerials previously used. The other experiment using resonance probes, was to determine the electron density and temperature at altitudes from about 100 km. to apogee. 'Quick-look' records from both SL 126 and SL 127 indicate successful results.

The firing of SL 126 had been delayed because, as 'our man in Woomera', Mr. J. W. Smith, reported during the final ground instrumentation check, "the moment when the supplies were switched off, happened to be the moment chosen for the programme motor cams to be set for head-separation. The result was smoke pouring out of the rocket in the region of the igniter - with consequent upset among those in attendance on the launcher! Actually it was only the head-separator solenoid and its associated wiring in the programme motor burning up, but a few people had some anxious moments.

Normally the trouble would have held us up for no more than a day but in the meantime the wheels had been slowly turning somewhere and pressure from above was expected to withdraw the rocket from firing until complete checks of the launching system had been made to ascertain why the last five Skylarks had been falling shorter and shorter than intended." (Skylark 127 went only 22 miles downrange instead of 40.)

His next report, referring to the launching of SL 126, reads:
"The count-down was not without some small drama. On the first attempt, Stop! Stop! Stop! was called at -10 secs. from our monitor room, because correct operation of the extractor arms was not indicated. Actually it was found that the extractors had operated correctly, but without proper indication of this the rocket literally can't be fired.

After a 10 minute delay while the programme motor was cycled to 'reset', we entered the sequence again at -6 minutes and the count-down proceeded without further hitch.

This time the rocket fell within 10 miles or so of its aiming point - well within the predicted dispersion - so the last two weeks' work on the launcher was not in vain."

B. N. Harden

STAFF NEWS

Congratulations to:

Miss Maureen Armstrong and Mr. M. Bethell,
Miss Maureen Long, of New Delhi, and Mr. R. Aria
on their recent engagements
Mr. R. A. J. Savage on his promotion to Charge-Hand.
Mr. R. Barnett on his promotion to Carpenter's Mate.

Welcome to:

New Staff

Mr. W. D.'Souza	T/Specialist Teleprinter Operator
Mr. A. H. Manners	T/Labourer Messenger
Mr. B. E. Platt	T/Clerical Officer

Vacation Students

Miss B. Nicholls
Mr. M. Wallington
Mr. R. M. Dunnett
who will be at R.R.S. for about six weeks.

Sandwich Course Student

Mr. W. G. Williams from Brunel College who will be at R.R.S. for six months.

Resignations

Mr. M. Jeganathan	T/A.E.O.
Mr. W. Thompson	T/Specialist Teleprinter Operator
Mr. J. R. S. Lyth	T/A.E.O.
Mr. S. C. Douglas	Laboratory Mechanic

Other Changes:

Mr. H. H. V. Owen has transferred to D.S.I.R. Headquarters.
Mr. G. Webb has returned from Sandwich Course.

Overseas Transfer:

Mr. A. F. Smith leaves for Port Stanley, Falkland Islands, on 25th August.

British Antarctic Survey

Mr. L. W. Dicken has joined the Halley Bay Ionospheric Group now preparing for the high latitude programme to be carried out during the International Years of the Quiet Sun.

Mr. E. W. Grimshaw has recently returned from the Argentine Islands. In addition to carrying out a vertical incidence ionosonde programme, he was responsible for the transfer of the ionospheric station from Port Lockroy to the Argentine Islands. He is at present completing the reduction of ionospheric data.

SPORTS AND SOCIAL CLUB

Summer Dance

Keen dancers had an opportunity to exhibit their skill at the R.R.S. Summer Dance on 22nd June since, with an attendance of about 70, there was ample room to "dance properly" rather than perform the "cosy Christmas Party Shuffle". Refreshments were eagerly consumed in vast quantities and greatly appreciated by those whose stamina had been tried by "Crossing the River": surely all the men should have received a prize?

Anon.

Camera Club

At a meeting on 3rd July, it was agreed that the subscription for the year should be 5s. Would members please pay this to the Treasurer as soon as possible.

The next meeting will be on 10th July, when members should bring along their results of the Southampton outing; arrangements for the outing to Oxford on 27th July will also be discussed.

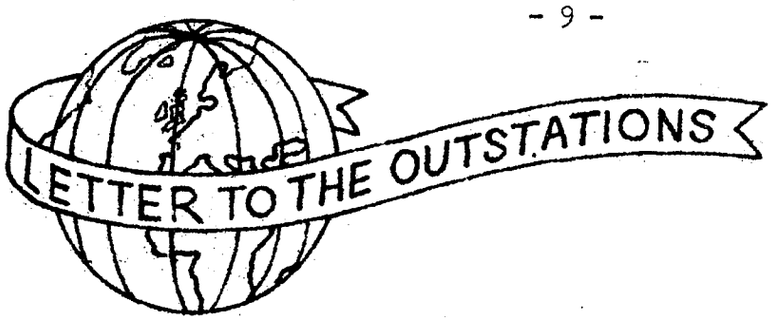
J. N. Tyler.

Cricket

The game arranged between 'Doctors' and 'Rest' was postponed because of rain and cancelled a week later since sufficient 'Rest' was not available on the station.

It is still hoped to play the Smith-Rose matches and it would help considerably if anybody who is willing to hold a bat would write his name on the notice board. Do not be deterred by the eleven names already there - ten of these will not be available on any selected day.

D. E. Page



Dear Colleagues,

During the past month the Radio Society of Great Britain has been celebrating its Golden Jubilee. Part of these proceedings has been a two-day visit to R.R.S. Interested amateurs (some of them professionals off duty) wandered at will among the displays. There was plenty of chance for discussion, and among the 'hams' interested in V.H.F. propagation, the work of Ray Flavell (G3LTP) was well known.

You will see that several people have left the Station this month, among them two who may be classed as 'old hands'. Vic. Owen joined the staff at Teddington in 1949 and has now transferred to Headquarters D.S.I.R. and Stan. Douglas, who has been a familiar figure in the workshop since 1946, has now taken up a post at the Slough College of Technology.

Best wishes for the future go to these old friends, and to all who have left R.R.S.

Yours sincerely,
The Editor

Mr. A. F. Wilkins

A late news item which we hope to cover more fully in the next issue is that Mr. Wilkins has been appointed with the acting grade of D.C.S.O. to act as Deputy Director from the time when Dr. Saxton leaves to take up his appointment in Washington. We all offer our best wishes and congratulations to him.

Euler

Euler was great in his own sort of way
The results that he found were quite good for his day
But among all his work lies one gem that excels
That plucks at the heart strings, the proud spirit quells
To the mystic, the prophet, the thinker, the sage
To the white bearded hermit bent double with age
Inexpressible solace one formula brought
Namely

$$e^{i\pi} + 1 = 0$$

If his spirit is weary, his soul is oppressed
If he wanders and seeks and cannot find rest
If his braces give way and his trousers fall down
If he misses his train when he's going to Town
If a dreadful catastrophe thus should befall
Why, the mathematician will not mind at all
For the thought will console (as it jolly well ought)
That's it's

$$e^{i\pi} + 1 = 0$$

With acknowledgements to "Eureka", the Archimedeans Journal.
