For the use of R.R.S. Staff only

R.R.S. Newsletter No. 10 — 15th ~~March~~ February 1962

RADIO RESEARCH AT DITTON PARK - II

1922 - 1927

The work on direction finding and associated problems continued throughout 1922. Results entitled Discussion of the Practical Systems of Radio Direction Finding by Reception, were published in the first of a series of Special Reports. This together with work by Smith-Rose and Barfield on various local effects in such reception helped to clarify many problems. Further studies were made of screening, and 'Experiments which are likely to lead to valuable results have also been made with a coil rotatable about a horizontal axis.' This was work on the angle of arrival of R.F. energy, a type of investigation shortly to yield results of fundamental importance. Another directional experiment at this time was the simultaneous location by receivers at Ditton Park and Orfordness of a sender installed on 'a vessel of the Great Eastern Railway Company'. The Radio Research Board had by now five sub-committees, a further one (E) having been formed to consider problems in wireless telephony. The wisdom of their decisions was reflected in the adoption of their programme as suitable for international research at the International Conference on Scientific Wireless Telegraphy.

Directional work and screening having resulted in a large amount of reliable data, the report of the Board for 1923-24 went on to say 'Progress would therefore seem now to be in the direction of a better understanding of problems of the propagation of radio waves through space' - a statement of policy that was to affect work at Slough for decades to come.

About this time, the War Department gave notice that they wished to re-occupy the Atmospherics research site at Aldershot. The Admiralty, presumably approached by Jackson, offered facilities for transfer of the station to the North Park of the A.C.O. grounds. This move, it was said, would not interfere greatly with the progress of the work in hand. Past work was summarised in a lecture to the Radio Society of Great Britain by the officer in charge of the station, R.A. Watson-Watt. By July 1924 the move was completed, automatic recorders were installed and a start made on studies of atmospheric potential in co-operation with Professor Appleton, Watson-Watt continuing to supervise these branches of research at the new site.

Some traces of these days still exist. The now dilapidated building at Ditton Corner which narrowly escaped the scythe of the motor-way, and the old canteen, still used as a store, were formerly part of the caravan which set out from Aldershot to North Park.

Ditton Park was now the scene of three main spheres of research; Atmospherics, Field Strength Measurements and Direction Finding Investigations. It was found that, at the long wavelengths in use, the effective R.F. conductivity of the soil at Slough caused difficulties in distinguishing horizontal from downcoming radiation fields. A search was made for sites of lower conductivity; but without success and since it was as good as any place in England, the site remained unchanged. An improvement in resolution of angle of arrival was sought by studying the behaviour of shorter wavelengths. The conductivity work, however, was of such interest that the investigators, Smith-Rose and Barfield, published the results. (Proc. Roy. Soc. 1925).

The same workers also noted that the Adcock system of direction finding, neglected since 1919, was worthy of fuller investigation, and finding it to be very effective, made this known in 1926. The description of their apparatus is interesting; the aerials were supported on poles 44 feet high at the corners of a 20 foot square, and the system required that the receiver, and

/operator

operator should be at the centre. The receiving hut was therefore suspended 20 ft above ground by insulated steel ropes from cross beams attached to the poles.

The field strength work proceeded at Slough, among other sites, and an investigation by Hollingworth and Naismith led to a survey of the field produced in various parts of the country by certain fixed transmitters. Results from this agreed with observations of Smith-Rose and Barfield all noting anomalies which could be explained by reflection from a region in the upper atmosphere.

Concurrent work in North Park was the study of energy distribution, from atmospherics, in certain parts of the radio frequency spectrum. Samples made of 25 c/s 'slices' centred on four selected frequencies; 14, 33, 63 and 79 Kc/s were examined. It was initially noted that diurnal variation of atmospheric noise was greatest in the 14 Kc/s band, and that the fine structure of the disturbances varied widely from band to band.

The year 1926 also saw the continued development of the Cathode Ray direction finder. Originally conceived during the first World War, and produced at Aldershot, the Ditton Park model operated with two loops 2m. square, and on frequencies of 10 and 80 Kc/s. A further commitment of this group was the study of changes in atmospheric electric field; this was achieved by an apparatus consisting of an exposed spherical conductor together with an electrometer. This method, due to Wilson, was modified by Appleton, Herd and Watson-Watt to include an amplifier and cathode ray oscillograph. It may interest readers to know that it is very probably one of these spheres which has survived that rotates, twinkling and somewhat modified, above the heads of dancers at R.R.S. parties; does it measure romantic potential now?

An important period in Geophysics was marked by the years 1925-1927; remarkable progress was made in identifying and investigating the Ionosphere. In 1925, when a reputable engineer could still speak of the 'academic myth' of Heaviside, Appleton and his co-workers at Oxford, using their frequency sweep technique, reached important conclusions soon to be upheld by the results from Ditton Park, mentioned earlier.

All the investigations pointed to the existence of an ionised reflecting layer at a height of about 80 km. Within two years Appleton and Ratcliffe, working between N.P.L. and Peterborough provided strong evidence for the existence of a further layer at a height of 250 km. The ionosphere not only existed, but clearly would suffice to occupy research workers for many years to come. Ditton Park although admittedly not the scene of the crucial experiments, had provided a great deal of valuable substantiating evidence, so that in time to come it would be possible to invert the 1924 statement of the Board to read '..... a better understanding of the problems of space through the propagation of radio waves'.

G. GARDINER

THE PROGRAMME OF WORK

The following alterations are needed to the Director's article in Newsletter No. 9:

Under I. Ionosphere Research, add
(A) Minnis - LF & VLF Experiments

The ionsphere below 100 km will be studied by recording the field strength and phase changes in radiation received from LF and VLF transmitters.

Under Radio Noise: for "Haxton" read "Bradley". (Mr. Haxton is now working in the Component Store).

Under Multipath Propagation : "135 miles" should be "35 miles".

Ed.

DECEMBER ON THE RIVIERA

There are no ionospheric observatories on the French Riviera and the nearest ones are in Italy and Spain. In spite of this and of the rigours of winter travel in Europe, about 60 people arrived in Nice in mid-December for a one-week symposium on ionospheric soundings made during the IGY/IGC period. Besides the four RRS delegates (Messrs. King, Piggott, Wilkins and Minnis), others came from faraway places in Greece, Russia, Turkey, Ghana, India and even Australia, and also from the nearer and more familiar European countries. The symposium proper ran from 11th-15th December but the World Wide Soundings Committee and some of its advisers stayed on for two more days. During this period about 70 quarter-hour summaries of work in progress were presented and discussed.

More than half the papers were based on the data which can be obtained from ordinary ionograms: electron density distributions, vertical and horizontal; ionospheric disturbances in low latitudes and in high; the peculiar behaviour of the abnormal types of layer, spread-F and sporadic-E. A good deal of attention was given to the measurements made during the IGY in the Antarctic where many new stations were opened and are still in operation. Other subjects which took up several sessions were the horizontal movements of irregularities in the E and F layers, ionospheric "winds", and the attenuation of radio waves as they pass through the lower layers. Members of R.R.S. who spent many hours reducing ionograms and tabulating data during the IGY can take credit for having provided some of the points which have since been plotted on maps, charts, graphs and diagrams of all kinds by research workers in many parts of the world.

Not the least of the attractions of a conference such as this is the opportunity of meeting people who have previously been merely names in a list of references and to talk about mutual problems and interests. Small groups often met during the evening in the vast rotunda of the Negresco Hotel where we stayed, or even in the bar; others met in restaurants and exchanged points of view while they ate bouillabaisse or pissaladière. On the other hand, the working groups of the WWSC tended to prefer bedrooms at the Negresco where it was easier to concentrate on writing the draft reports, resolutions and recommendations which were discussed later by the full Committee. One outcome of the WWSC meetings will be the plans for the observations to be made during the International Quiet Sun Year in 1964-65 which will be complementary to the IGY programme which coincided with the unparalleled peak in solar activity five years ago.

The French Committee provided us with plastic red zip folders which helped us to keep the many reprints, papers and abstracts together, and also to recognize other delegates on the Promenade during the first day or two. Later this year the papers will be published in a special volume which will be a permanent record of the official proceedings. There will be no printed record of unofficial activities, but many of us will remember, if not the Provencal wines, the Riesling at the Taverne Alsacienne, and the champagne at the receptions, given by the Mayor and the French Committee, with which the conference began and ended. Those with an eye for colour will remember the brilliant saris worn by the ladies of the Indian delegation, the red breeches and black buckled shoes of the footmen at the Negresco and last, but not least, the blue sea and sky of the Cote d'Azur in December.

C. M. MINNIS

GEOPHYSICS IN THE U.S.A.

The rapidity with which papers are produced and published in the U.S.A. makes it unnecessary and undesirable to review the current work at the different institutes in detail. In fact it is easier to keep abreast by staying at home and reading the literature than by travelling! Nevertheless, short visits to several universities and institutions permit fairly detailed discussions which can be profitable.

On this visit I was asked to try to promote interdisciplinary studies, partly using IGY data, and to show how particular local studies could be fitted into a wider approach. In the time allowed I discovered that the job needed doing and explored some ways of doing it.

I had some limited successes in exploring "ways and means", but I left with the feeling that the project could not easily be grafted onto the programmes of existing groups. The facilities and data are fairly easily available but it is difficult to find staff with a suitable background and the desire to study large quantities of data.

In general, the American temperament favours short-term, intensive studies of new data and the career prospects of young scientists are greatly influenced by the choice of subject. It is very advantageous to work in a glamourous or rapidly progressing field. In addition, few U.S. workers have much experience in using data of varying reliability or examining post-mortem experiments so that the risks in this type of study are too great for university post-graduate students to accept.

An interesting feature of the U.S. IGY effort is the large amount of data reduction and mapping they have done. Large parts of the ionospheric and auroral data are available on punched cards and can be analysed by computers. I was particularly interested in the detailed maps of visible aurorae prepared by Gartlein. These cover the whole width of North America and give a very clear indication of where the activity lies on particular occasions. Similar maps for the more interesting ionospheric parameters have been made by Penndorf's group for every day of the first six months of the IGY.

Both types of map bring out very clearly the complexities of the phenomena and, in particular, the care needed to note both local and world-wide activity. Suprisingly little use has been made of these analyses and, unfortunately, time did not allow me to make any detailed studies. However, they greatly clarified the significance of our discovery that the latitude at which magnetic, ionospheric and auroral activity is most likely to be found depends on the general level of magnetic activity.

Despite the large number of active workers much of the data cannot be studied even when obtained from expensive rockets and satellites. Computers are a great help where the form of probable relations can be foreseen but no computer can compete with a human brain when the problem is one of detecting unexpected relations. It seems that future progress may well depend on the development of techniques which can summarise data and present it in different forms quickly.

An important point to emerge from this visit was the undesirability of using either theoretical techniques or experimental data which are more complicated than the accuracy of the observations justify. I encountered a number of cases where information was lost by using 'the most complete method of analysis' when simpler methods clearly indicated its presence. Sometimes attempts to correct for known sources of error only make the data statistically inhomogeneous and increase its variability!

The most satisfying discussions from my point of view were those involving small groups of experts who had been thinking about the particular subject. However, probably the most effective use of time in the future, now that we know the scope and location of particular types of data, will be to test particular hypotheses using data which are already in a form suitable for use in a computer.

W. R. PIGGOTT

MOROCCAN ADVENTURE

This Summer a party consisting of three Patrols of Senior Scouts of the 1st Egham (St. John's) Group set out for a fortnight's expedition to the Kingdom of Morocco. The plan was to travel by train to Algeciras, the nearest railway station in Europe to Africa, then to cross the Mediterranean Sea to Tangier and to travel down through the Atlas Mountains to Erfoud on the Northern tip of the Sahara Desert. Here they were going to hire camels and trek across the top of the desert to Ouarzazate and then travel up the Atlantic coast via Marrakech, Casablanca, Rabat, the capital, and return to Tangier.

As our ship drew into the harbour at Tangier we could make out the minarets of mosques mixed with the outlines of the quayside cranes and as we drew still closer figures in Jellabas (the native cloak) and Fez waiting to greet ourselves and the other passengers. We knew that Ahmed, a Moroccan Scout leader was to meet us and we eagerly watched every face for some sign that we were expected. Once down the gangplank one Scout approached the nearest likely person and asked if he was Ahmed. "Ah yes", came the reply, "I am expecting you", and everyone followed him through the Customs and into the town. Only when we found ourselves approaching a hostel instead of the campsite which was to have been arranged did we suspect any possibility of mistake.

At this point we discovered that firstly Ahmed is one of the most common Moorish names in the Tangier area and that secondly this was the wrong Ahmed. Some hurried telephoning by myself, fortunately in French and not Arabic, soon brought the right Ahmed to our side, and we found ourselves camped by the side of the sea not far from the city.

Next day we set out for Moulay Idris, the holy city of the Moslem faith in Morocco. The Moslems pay three visits to Moulay Idris during their life and are then called "Hadj" in the same way as pilgrims to Mecca. Christians are not allowed to be inside the city walls after sunset so this night we camped at the side of a lemon grove not far away. The pleasantly warm night meant that we did not need to erect our tents, but were able to sleep with our eyes on the heavens and note the different positions of the constellations compared with the sky in Britain.

Our daily routine of awake at 5 o'clock, and ready to leave camp by 7-8 was by this time already established and we continued to climb along the winding track until upon turning a corner we saw the Holy City, with the Mosque of the Prophet Mahomet and the tomb of Moulay Idris, prophet, and founder of the City over fifteen hundred years ago, glowing white in the early morning sun. Not long afterwards we were walking along its narrow streets, and climbing to the top of the city wall amongst the prickly pears. It was here that two members of the party decided to pick and eat prickly pears, which are the fruit of a cactus, and had to spend the rest of the day picking the prickles from their hands and mouths. The majority of us preferred to pay a native boy the equivalent of a halfpenny to peel the pear for us with one deft movement of a vicious looking knife.

We found that at the middle of the day the heat was so overpowering that we had to rest and take a siesta along with the Moroccans themselves. Arming ourselves with grapes or melons we would find some suitable shade and spend from mid-day till about 4 o'clock lazing and chattering. Sometimes we would choose the same place for our siesta as the natives themselves and they would tell us some of their folk tales and the stories that are told by the travelling storytellers. It became so hot that we bought ourselves large brimmed straw hats of the same type that they themselves wore and found that under the shadow of the wide brim we could walk in the sun during the afternoon for short periods.

/After

After Moulay Idris we went on to Fes, the oldest of the Imperial Cities of Morocco, much more of a commercial city, still the Moorish tradition, with narrow streets, teeming with donkeys. Out shopping here was done in a covered Souk or market and the boys were able to barter for huge water melons, over a foot in diameter, and pay less than a shilling each for them. A student of Fes university, whom we met by chance showed us around the university and guided us about the many markets and Souks where carpets, leatherwork, pewter and basketwork, together with many other crafts could be seen being executed.

However our timetable required that we move on through the High Atlas Mountains, via Midelt to Erfoud, amongst the sand dunes on the very edge of the Sahara Desert. The Caid, or military governor here made us camp in the military installations. Unfortunately, in spite of correspondence with the Caid, before we left Egham, our thirteen camels were not available. One of the reasons given was that it was too hot for camels in the middle of August and they had all been sent to the coast for their health. Accordingly we had to set out across the desert in hired motor vehicles. For the next three days water was rationed to one pint each per day, although salt water from artesian wells at military posts was freely available for cooking, washing, etc. At Boulamane, a fort in the desert the Caid made us camp inside the fort which was at one time staffed by the Foreign Legion.

Eventually we arrived at Rabat via Marrakech, and were given an official reception at the "Office de Service de la Jeunesse et des Sports", by Moulay Ben Sulaman, the brother of the King of Morocco. It was not long before we were back in Tangier for a last glimpse of the Moorish way of life when Ahmed took us to the Kasbah on our last evening in Morocco.

I am sure that as we reluctantly turned our backs to the Kasbah we were all deeply conscious of having been privileged for a fortnight to have a glimpse of an ancient civilisation unchanged for centuries past.

(reprinted from "The Scout".)

D. S. FROOME

STAFF NEWS

Congratulations to: Joyce and Les Brackstone on the birth of a daughter, Hazel Angela, on 18th December, 1961.

Geoff Fooks on his Ph.D.

Farewell to: Mr. G. H. Bazzard, who transferred to Air Ministry on 1st February, after 16 years service, and congratulations to him on his promotion to S.E.O. on appointment.

Recent Arrivals: Welcome to Mr. D. R. Madden, T./E.O., who arrived on 1st February, 1962, and also to Mr. Thrane, visitor from Norway who arrived on 29th January, 1962, and will be staying for about six months.

Staff Changes: Mr. A. Baber, A.E.O. commenced sandwich course
Mr. A. A. Rowse, A.E.O. (Hydraulics) commenced sandwich course
Mr. J. C. Read T./Sen. Photographer, established.
Mrs. E. R. Clarke Regraded as T./Clerk (special)

Movements: Mr. McGivney returned from the Falkland Islands and is now on leave.

Projected visits overseas by R.R.S. Staff

Dr. Bain: : to N.B.S. from early June to the end of September

D. E. Mortimer : Airborne Instruments Ltd., New York, February 4th-19th.

Dr. Pitteway) to Copenhagen, for Symposium on Electromagnetic Theory and
and Mr. Hughes): Antennas, in June.

The Director : to U.S.S.R. August/September, 1962 or April/May, 1963.

Dr. Pitteway : to D.R.T.E. Ottawa, August 31st to 2nd October.

The Director : to U.S.A. April to May

B. R. May : to Paris for Symposium on Dynamics of Satellites 28th-31st May.

G. E. Ashwell : to Singapore 15th February, for approximately six weeks.

E. Golton : to Corfu for N.A.T.O. Advanced Studies Institute 16th-30th June.

SPORTS AND SOCIAL CLUB

Car rally

Calling all motorists!

At the request of the Sports and Social Club Committee the 1st Egham Senior Scouts are organising an all-day car rally for Sunday, April 8th.

The rally will start from Datchet at a reasonable hour (not too early) and will finish in the early evening at a point of interest. Provision will be made for those who wish to buy their meals, and for those who wish to picnic.

Entry fee will be 2/6d per head (children half price), map required and other information will be given later.

BOOK THIS DATE NOW

The musically minded will note with interest that the Sports and Social Club now has its own piano.

We would like to thank Dr. Hopkins and Mr. Horner for having helped in the past by lending us a piano for use at our functions.

Eileen Adams

CAMERA CLUB

The subject of the Camera Club exhibition for January should have been "Table Top" photography, but owing to inadequate support we decided to cancel the show. To fill the gap W.S. Newman and S.J. Baker each produced six prints of pictures they had taken in France.

Members also produced 50 good quality colour slides of interesting subjects. These were displayed in the Canteen during the last week of January. Staff were asked to vote for those they wished to see projected and the top 20 were shown during a Wednesday lunch break to as many people as could crowd into the room. As this projection of slides was so popular we hope to arrange for colour slides to be shown more often in future.

S.J. BAKER

AMATEUR RADIO SOCIETY

New Member

Welcome to Miss J.M. Trumper, our 25th member.

Meetings

We have been meeting each week to work on the construction of Apparatus and now have a VFO, PA, power supply and modulator ready for top band. Tests should begin on February 12th. Response to appeals for assistance has been disappointing, making us all the more grateful to Miss Tucker and Miss Trumper, and to Messrs Appleton, Clough, Jones and Weedon, for their valuable assistance.

Overseas News

John Juleff, now VP8GO, is hoping for contacts with the U.K. on 21 Mc/s, mornings or evenings. Reports of anyone hearing him would be appreciated by the Secretary.

R.G. FLAVELL

BRIDGE CLUB

The R.R.S. Bridge Club played a match against the M.C.L. on the 2nd February, and lost by 2260 aggregate points. The R.R.S. team was as follows:-
W.C. and K. Bain; E.N. Bramley and J. Harwood; G.F. Fooks and A.J. Legg; C. Nicolson and M. Smith.

W.C. BAIN

LETTER TO THE OUTSTATIONS

Dear Colleagues, 15th February, 1962

In the small space available I think you would like me to give you some news of George Bazzard, whose departure for Bomber Command is briefly announced on another page. He has taken a job as an S.E.O. at High Wycombe, where he is in charge of a computer group working on various problems. He tells me that he finds his new surroundings very pleasant and his new journey slightly quicker than the old one. His appointment was confirmed only a short while before he left here, and we hope he will be returning to this Station soon for an official farewell and presentation. I know you will want me to give him your best wishes for success in his new job.

Yours sincerely,

The Editor

15th February, 1962