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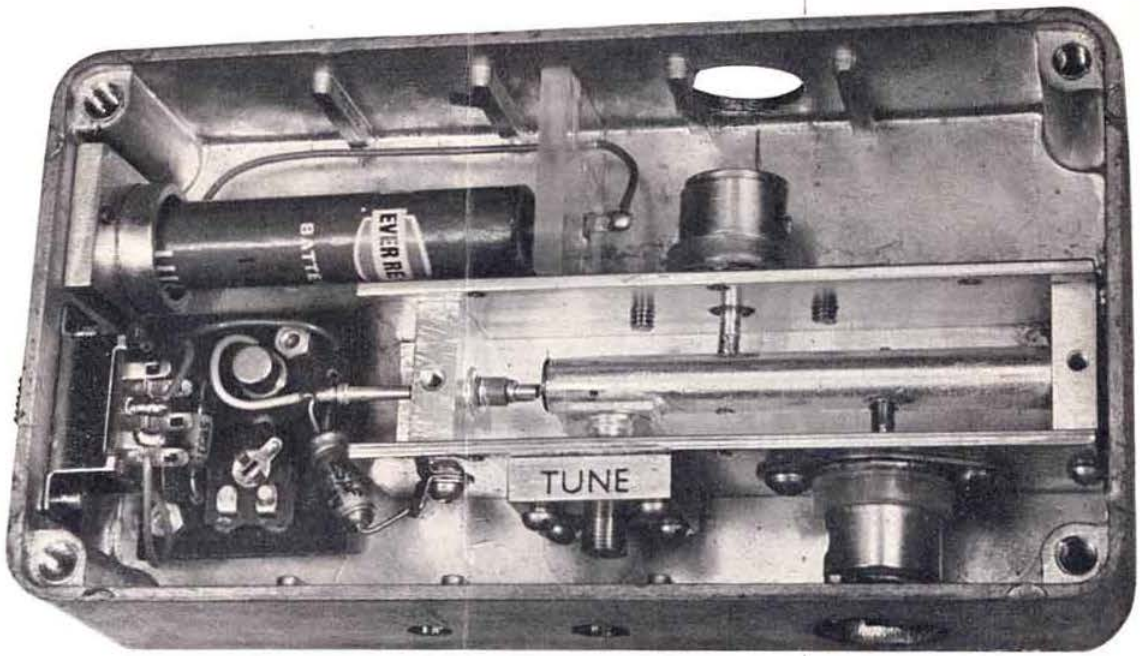

432 MC/S TUNNEL DIODE AMPLIFIER

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

Volume 41 No. 2

February 1965

3/- Monthly

RSGB BULLETIN

CONTENTS

Front Cover: A prototype 432 Mc/s tunnel diode amplifier designed and constructed by Sven F. Weber, G6SFW/T, G8ACC. An article describing the operation, construction and use of these devices starts on page 97 of this issue.

EDITOR:
John A. Rouse, G2AHL

EDITORIAL ASSISTANT:
T. R. Preece, G3TRP

EDITORIAL OFFICE:
RSGB Headquarters, 28 Little Russell Street, London, W.C.1.
Telephones: HOLborn 7373
HOLborn 2444

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Mrs. P. D. Harvey,
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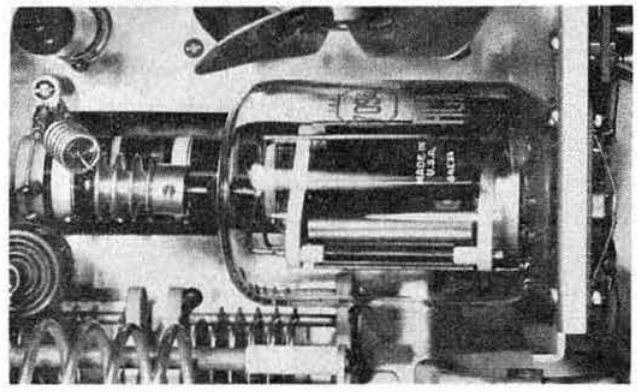

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PROFILE †

Eric W. Yeomanson, G3IIR

ALTHOUGH Eric Yeomanson, the Society's 31st President, seen above in his shack, did not receive the call-sign G3IIR until 1950 he has been interested in Amateur Radio since the early 1920's when, as a student at Hull Technical College, he was instrumental in the formation of a college radio club. Meetings were held on Saturday mornings when a two-valve receiver was used to listen to transmissions from the Eiffel Tower and other exotic stations of the period.

The family moved to London in 1923 at the commencement of the broadcast era. The failure of Eric's first crystal set to operate mystified local experts in South London who only later discovered the coil had been wound on a metal lined cardboard tube!

He soon graduated to bright emitter valves and from 1924 to 1929 built most of the published circuits, including " short wave " receivers on which amateur transmissions were heard. Most of Eric's spare pocket money around this time was spent at Katie Raymond's shop in Lisle Street.

During the slump of the 1930's he took a job in a local wireless shop and spent a certain amount of time repairing receivers and charging huge quantities of glass 2 volt accumulators. Some time was also spent on listening on " short waves " when the boss at the shop was not looking. In February, 1935 he joined Siemens Brothers, later to become AEI, where he is now manager of the Private Telephones Sales Office at Grosvenor Place, S.W.1.

The war years saw Mr Yeomanson in a reserved occupation and in the Civil Defence Corps. With short wave listening pretty dull at that time, he became interested in photography. In 1948 his interest in these two hobbies enabled him to design the first electronic flash unit for the *Amateur Photographer*.

A meeting with G2LW soon after led to his joining the RSGB and attending meetings of the Dulwich and New Cross Group. G6LO helped in working for the amateur ticket which was obtained in 1950.

G3IIR's first work for the Society was as the founder and AR for the Norwood and South London Group. In 1951 he became one of the original members of the Exhibition Committee, becoming chairman on the death of C. H. L. Edwards, G8TL. If Eric had not made his mark in the organizing side of the Exhibitions, it is safe to say he would have done so as an exhibitor, as he is a home constructor of craftsman standard.

In 1957 he was elected Zone C Representative on the Council and was one of the original members of the TVI/BCI Committee. Since then he has served with distinction on the Mobile, RAEN, GPO Liaison and Finance and Staff Committees.

An enthusiastic RTTY operator on the v.h.f. bands, he made the first G/PA radio teleprinter contact and is a committee member of the British Amateur Radio Teleprinter Group. He will shortly be sharing his shack with his son Stuart who hopes to pass the Morse test for his licence in the near future.

G3IIR looks forward to further liberalization of the UK amateur licences and to the granting of permission for overseas visitors to operate in this country. He is keenly interested in obtaining a new Headquarters and in seeing that the Society's financial position is still further strengthened during his presidency.

† The first of a new series featuring members of the Council.

MEMO

To:	From:
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The right man to fill a responsible position on the RSGB Headquarters staff is required immediately.

This man (or woman for that matter) can write quickly and clearly, is painstaking without being pedantic, has a ''feel'' for modern English, has an enquiring mind and a forward-looking attitude to life, has a sympathy for the work of others (as do all editors, of course!) and would like to work on the RSGB Bulletin and associated publications. Almost certainly he is an active radio amateur. He could probably have written this advertisement far better, with shorter sentences, less words and more information during the intervals in a VOX-controlled QSO. He will have had several years' experience in journalism.

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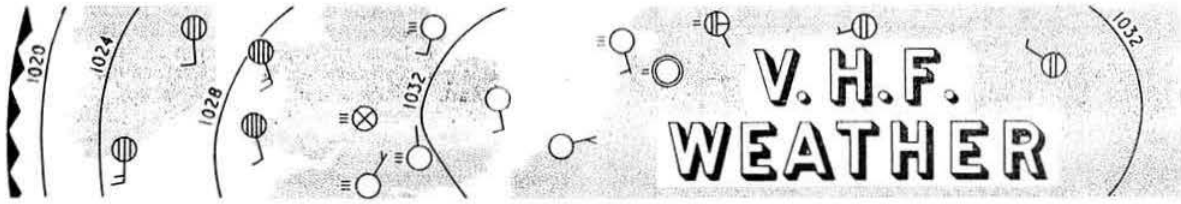
If you are this individual you are invited to write, giving details of education and career to date, to the General Manager, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1.



PART THREE

Propagation · IGY Plans · Amateur Standards · Meteorological Terms · IGY Results
Potential Refractive Index · Forecasting Conditions

By C. E. NEWTON, G2FKZ*

TO undertake a full analysis of the RSGB IGY effort would require an array of statistical recorders, together with about a year's issues of the BULLETIN in which to publish the results. Obviously this is impossible. The compromise in analysing the tropospheric propagation results that has been made is one which, we hope, will provide the amateur with useful information to assist in forecasting conditions and, further, may be of interest to other services.

IGY Plans

It is as well to first review the objects of the IGY Tropospheric Plan.

It sought to compare the anomalous propagation conditions resulting from anticyclones of differing origin:—Polar, Azores and Continental together with surface readings of barometric and vapour pressure. It sought to ascertain if any correlation existed, and if so, whether it was possible to forecast propagation conditions by any of, or a mixture of, these methods. It was also hoped to ascertain if the fading characteristics of signals gave any lead to future propagation conditions.

While the amateur welcomes anomalous propagation conditions, enabling him to work DX, other services, such as TV and sound broadcasting, dislike it due to the interference problems which it creates.

It was to be hoped that during 1958, there would have been a number of anticyclones producing the required improved conditions which could then have been analysed. In fact there were only two of any consequence, one between January 12 and 18, and the other between October 26 and 31. Any other particularly favourable conditions noted were due to minor anticyclones, or pressure ridges.

Unfortunately, the measurements taken of signal fading characteristics were not particularly satisfactory. This was simply due to the fact that very few participants were able to record the changes with sufficient accuracy. It seems likely, however, that the beacon GB3VHF may well supply information on this point in due course.

Mode of Propagation

Nothing will be said about precise modes of propagation operative during the conditions being analysed. This is deliberate, for the average radio amateur is not particularly interested in how his signal gets from *A* to *B*, but rather, whether an extension to his normal operating range may be expected.

To a certain extent, a method of determining possible range extensions is already available. It is common knowledge that anticyclones produce an increase in range, and, of course, such conditions are indicated by a barometer. In fact many v.h.f. operators are known to be "barometer conscious."

The results of this analysis, which covers a frequency range of 50 Mc/s to 146 Mc/s, seems to suggest that the same tendencies occur throughout this spectrum—what differences there are, apparently favouring the lower frequencies of this range.

Amateur Standards

Those who are professionally concerned with evaluating propagation conditions measure signal strength in microvolts per metre, or some other precise units.

While such a measure is obviously desirable, it is beyond the capabilities of the average amateur to take readings in this way for the simple reason that he does not possess the necessary equipment, and we have, therefore, to be content with trends rather than absolute measurements. The accepted standards used by the CCIR are graphs showing how the signal level exceeded the mean level for 50 per cent, 1 per cent and 0·1 per cent of the recorded time. Once again such methods are denied to us for they require the use of automatic recording apparatus.

Since we intend to deal with trends, that is periods when the general signal level is higher than normal, it is not unreasonable to say that this review deals with the 1 per cent and 0·1 per cent levels relative to the CCIR standard. This is, in fact, the most interesting period from the amateur's point of view.

Amateur Meteorological Standards

Before considering the meteorological side of the IGY programme in detail, it should be borne in mind that the purpose, and planning, was directed to proving, or disproving, the value of surface measurements in relation to propagation results and forecasting.

Prior to the IGY it had been observed that during anticyclonic conditions, sharp variations of surface vapour pressure seemed to occur simultaneously with changes in propagation. Had these observations been correct? Was this a common and widespread effect? Did the height of the observer above sea level influence the effect noted? Most problematical of all, now that we had a chance to check these points in an orderly fashion, would the measurements submitted present difficulties in themselves due to the fact that they would have been taken by a large number of observers?

It was of course appreciated right from the start that barometric, humidity and temperature readings would vary in reliability from excellent to poor. One of the factors previously mentioned seemed almost bound to add another variable, namely the location of the observer. Locations varied from hilltops to valleys, busy towns to isolated farms, and from inland to coastal regions. To reduce the readings

* 61 Merriman Road, Blackheath, London, S.E.3.

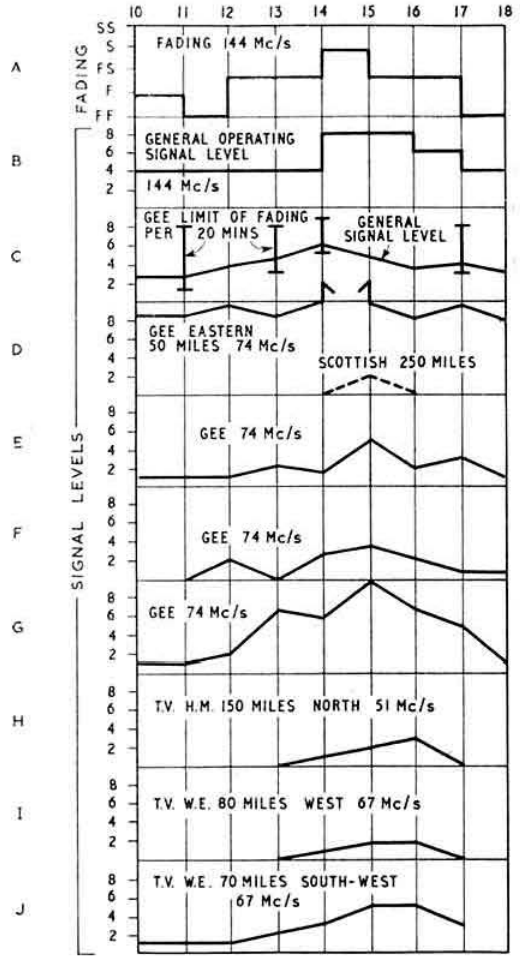


Fig. 1. Fading and signal level histograms. These show signal level and fading variations between 51 and 146 Mc/s, for the period January 10-18, 1958.

to, or relate them with, absolute terms seemed an impossibility. Once again reliance was placed on *trends*, particularly that relating to vapour pressure, and in this the histograms are particularly interesting. All the histograms are to the same scale, and recorded, as near as possible, at the same time. The results show that, in fact, a remarkably good standard was achieved.

The analysis of an anticyclone and its effects on tropospheric propagation can be tackled in many ways. However, since its effects, if any, upon extensions to the normal operating range are of the most interest to the amateur, this aspect has been particularly kept in mind.

Analysis

Reference to the Meteorological Office Charts shows that over the period January 10 to 18 1958, an Azores anticyclone of semi-tropical maritime air mass (Ref: Fig. 5) pushed itself up until its centre was just southwest of Ireland. It attained a barometric level of 1036 mb and influenced most of the British Isles, Northern France and Belgium. A weak frontal system also passed over the country during this period.

Reference to the fading and signal level histograms, Fig. 1, indicates that the fading characteristics may possibly be the first clue to an impending improvement in signals.

Histogram A shows the type of fading recorded on 144 Mc/s and is in fact the average derived from all the information supplied. It clearly indicates that as DX conditions improve so the fading tends to become slower. Unfortunately this has to be qualified by stating that the fading characteristics were not recorded with sufficient reliability by enough 2m observers to give an absolutely positive indication of an unarguable trend.

Histogram C shows the signal level of a GEE signal on 74 Mc/s from 150 miles north of London. The limits shown may have only lasted for a second or so, and indeed may have only occurred once, so they can be taken as the absolute maximum deviations. This clearly demonstrates that as the general level of the signal increases, so the depth of the fading tends to decrease. The overall pattern indicates that as the speed of the fading gets slower, so the troughs appear to become filled in at the same rate as the general signal level increases.

Histogram B shows the general operating signal level measured each day over either the same or similar paths. It is interesting to see that the operating was predominantly North to South or North to South-East, and this correlates very well with the Delta *K* maps of January 14 to 16 (Fig. 2).

The *Histograms C, D, E, F,* and *G* are pulse signals from the GEE Navigation System on 74 Mc/s, and are probably the most accurate of all. Unfortunately, they are all virtually North/South paths and give no other indications.

In *Histogram D*, the solid line shows the signal level of the GEE at a range of 50 miles from a very good location and shows that even with a normally strong signal, variations still occur. The half-arrowed lines represent signal level above the saturation level of the receiving equipment, and in relation to which accurate readings could not be obtained. The dotted line on the other hand is over a 250 mile path to a Scottish GEE station—recorded by the same observer.

Histogram E is a north-easterly path from a poor site at 30 miles, while that of *F* is an easterly path from a poor site at 70 miles, and that of *G* a south-easterly path from a good site at 90 miles. Distances relate to the GEE station on 74 Mc/s.

While all cases show improved conditions on January 15, the better sites secured the greatest advantage. A good site is defined as one having an unobstructed take-off in the required direction.

Histograms H, I, and *J* are based on television signals. That of *H* is between Farnborough, Hants, and Holme Moss (51 Mc/s); *I*, Farnborough to Wenvoe, some 80 miles on a westerly path (67 Mc/s) and *J*, Worksop to Wenvoe, 170 miles on a south-west path (67 Mc/s).

The foregoing indicate that the best conditions prevailed along the path closest to the North/South direction. For example, *Histogram I*, which is a westerly path over 80 miles, did not increase as much as *Histogram H*, a northerly path covering nearly twice the distance. The Delta *K* maps tend to support these findings showing Southern England, East to West, to be poor or marginal.

It is interesting to study the Scottish GEE station at 250 miles and to see that not all observers agreed just when the best conditions occurred. Considering just one observer's readings—even though on a mainly North/South path—there are variations present which can only be explained by fading, as different signals over similar paths vary one to another in most cases. It appears that it is common for fading to be individual to a particular signal, rather than to a particular path, and that each signal in a particular path route has its fading characteristics. Yet overriding all this there is a general increase in the level of signals, and this has the effect of lifting up the individual fading.

Distance does not seem to be the only criterion of band conditions. It seems that signals in the frequency range

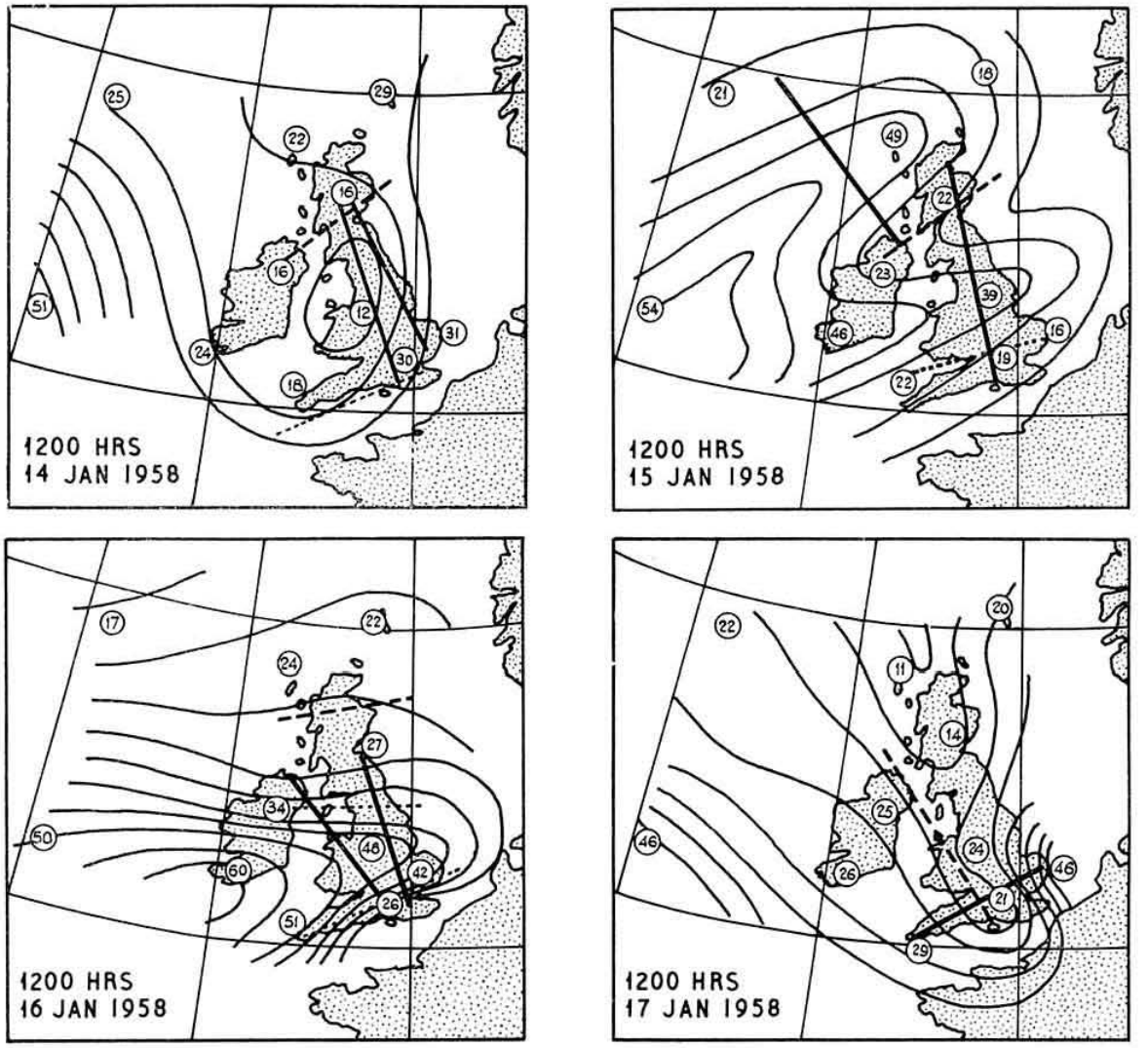


Fig. 2. Calculated Delta *K* maps which are based on the potential refractive index method previously described by R. G. Flavell, GM3LTP. They show excellent correlation with the observed results. The solid lines represent good paths, fine dots represent fair or marginal, and dashes are poor paths. In general, these diagrams indicate that the north/south paths were more favourable for most of the time.

45 Mc/s to 196 Mc/s from relatively close stations over unfavourable paths, undergo considerable variations, and this will be seen in *Histograms E* and *F*.

The fading of *Histogram C* is based on maximum to minimum signal levels during a 20 minute period. The excursion from minimum to maximum may have been for only a few seconds, but it is of particular interest to see that minimum signal levels apparently rise more than the maximum signal levels. These short high signal level bursts can occur even during poor or unsettled conditions. It seems therefore that fading is always with us, but its nature and general mean level seem to be the fundamental parameters which, together, make up what we call the "band conditions."

During the observations, there were times when the conditions were such that either no signal could be recorded at the time scheduled for the observation, or only a burst of a second or so which was too short for positive identification. Conversely, it was also possible that the time scheduled for the observation could have coincided with a point in time just after a maximum burst had occurred, while the slower fading gave the positive signal record.

It could be argued, therefore, that the system of sample spot checks employed could in fact be so unreliable as to be useless. This is, of course, a matter of opinion which must be related to the overall picture. In view of the considerable correlation which resulted from this sampling method, the writer is of the opinion that it was satisfactory; furthermore the potential refractive index system for this period has also tended to confirm the correlation noted.

The Mysteries of Adiabatic Changes

Most people think in terms of a temperature inversion to explain anomalous propagation, but it is much nearer to the

truth if one considers the water vapour content of the air to be the real cause. To understand the mechanics involved, what is meant by an adiabatic change must be first understood.

The compressing of any gas requires the expenditure of energy. So it is with air, for air is a gas. Pumping up a bicycle tyre is a classic example. In accordance with the law of the conservation of energy, the expended energy is not lost or wasted, but rather raises the gas temperature by transforming the energy of compression into molecular energy within the gas. What happenes when we reverse the procedure? If you like, let the air out of the bicycle tyre. The temperature of the compressed air would fall as it was decompressed, and we could regain the energy by making the escaping air do the work. Turn a fan for example.

Fortunately we do not have to suffer the inconvenience of masses of people operating masses of bicycle pumps in order to supply energy to the general air mass. The sun does it for us.

If we convert a change of atmospheric pressure to a change of height, it can be seen that air which is forced to rise will expand and cool—due to the reducing pressure—while on the other hand if it is forced to sink (i.e. anticyclonic subsidence) it will be compressed and its temperature will rise. These changes are termed *adiabatic*. That is, cooling or heating has taken place by pressure changes alone, and without the loss or gain of heat by any other means.

Adiabatic Lapse Rates

If it is dry, rising air cools at about 5·4°F. per 1000 ft. Eventually, due to the cooling, condensation occurs in the rising air; or if you like, the dew point is reached. Due to the latent heat released by the condensing action, although the air cools at 5·4°F per 1000 ft., it retrieves about 2·7°F per 1000 ft. from the latent heat. Generally we refer to the dry adiabatic lapse rate i.e. 5·4°F per 1000 ft., or the wet adiabatic lapse rate, i.e. 2·7°F per 1000 ft.

As we are concerned, however, only with anomalous propagation, the details of precise lapse rates are not as important as is the fundamental fact that vertical movements of air mass causes changes which ultimately give rise to varying propagation conditions.

If we now assume that there is no water vapour in the air, there would be no anomalous propagation because the density of the dry air would be solely a function of its temperature and pressure. This means that a discontinuity could not occur as the warmer air would rise and adiabatically cool until it reached the balance density, at which point the temperature and pressure would be equal all round, hence no inversion.

Humidity

The term density is now used instead of pressure. This is to accommodate the water vapour content. If water vapour is added to air, the mixture will become less dense (lighter). The total amount of water vapour which can be added is a function of temperature and pressure. If the pressure and temperature of dry air and wet air are equal, then the dry air will sink, and the wet air will rise until its density matches that of its surroundings; their temperatures will also change adiabatically.

To try and simplify a very complex subject, let us assume that we have a tin box which we fill with air at sea level, and then take it up to 1000 ft. When we open the lid of our box, the air in it will flow out, due to the reduction in density of the surrounding air caused by the elevation, and further, the temperature of the air in the tin will fall due to its expansion. What happens next depends upon the water vapour content of the air in the tin. For example, if the temperature drop due to its expansion is sufficient, we may well arrive at the dew point, in which case, our own private little cloud may be formed. We could of course reverse our experiment by bringing air vertically down adiabatically from a higher level, so increasing its density and heating it which would dry it out, decreasing the relative humidity.

Subsidences such as occur in an anticyclone do just this by bringing down air from very high levels where it is extremely cold and dry. By adiabatic means we have, therefore, after a time, warm dry air coming down near to the surface of the earth. Since high level cloud will be dried out, the surface temperature during the day will tend to rise causing hot and moist air to rise from the surface and become adiabatically cooled. Eventually there comes a point where

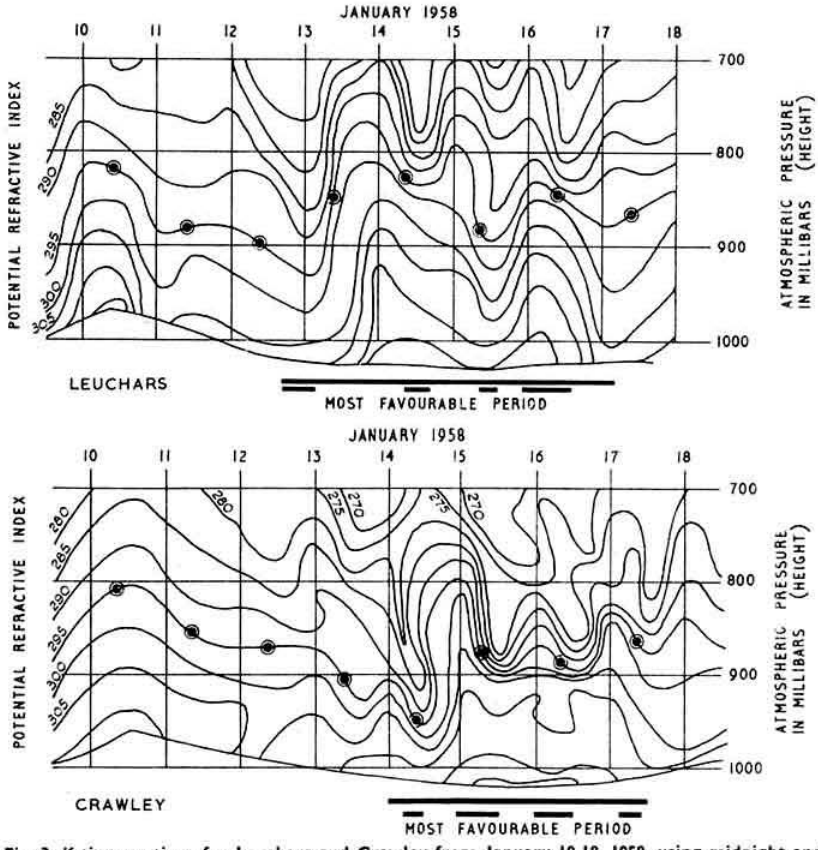


Fig. 3. *K* time sections for Leuchars and Crawley from January 10-18, 1958, using midnight and mid-day ascent data.

the density of the ascending air equals the density of the descending air, and a point of balance is attained.

At the point of balance there is a sharp discontinuity consisting of warm dry air over cooler moist air. The effect on propagation of one millibar of vapour pressure difference at the point of discontinuity is equal to about 9°F of temperature change.

Vapour Pressure Changes

In arranging the IGY programme, it was hoped that by recording the surface vapour pressure reading during periods of subsidence, a trend or pattern of what was happening during the formation of a discontinuity might be indicated.

A large number of observers recorded vapour pressure changes, and so it was possible to select a cross section covering most of the country.

The results shown in the Histograms are encouraging in that the general levels and tendencies have showed considerable agreement. As a matter of interest, the *K* time section potential refractive index is shown (Line 295) at the same daily time as the vapour pressure Histograms, taking the observers nearest to Leuchars (Observer at Edinburgh) and Crawley (Observer at Epsom) (Fig. 3). The Leuchars potential refractive index and Edinburgh vapour pressure plots show remarkable similarity.

The extremes of the recordings, Edinburgh in the North-east, and Guernsey in the South-west, are also similar apart from a displacement in time at Guernsey. Being that much nearer to the anticyclone's centre, the subsidence lasted longer, particularly when the system started to decline as it moved back to the Azores. The level, 12 mb, was the highest recorded, but this was to be expected in view of the higher average surface temperature.

Histogram 1. (Fig. 4). This was recorded at Edinburgh at a site 250 ft. above sea level, and was chosen for its closeness to Leuchars in order to compare it with the *K* time section; line 295 shown dotted.

Histogram 2. This was recorded at Guernsey at 175 ft. above sea level. The slightly higher vapour pressure is due to the higher temperatures. It is interesting to note the delay against Histogram 1 of the vapour pressure rise, and to compare it with the Delta *K* map of January 14 which tends to indicate that the best area was well north of Guernsey.

Histograms 1 and 2 show a fair example of the vapour pressure surface change *vs* anomalous propagation upper air conditions. The vapour pressure graph would be expected to look like a barometric graph inverted—something like the large dotted curve in Histogram 2—but in fact there are large deviations from this expected curve. There is a large rise where a fall should be, and in this case it amounts to double the average reading.

The synoptic chart, Fig. 5, shows that a cold front was passing over Scotland, and this could have accounted for the opening being advanced by approximately a day. The *K* time sections of Leuchars and Crawley also tend to indicate this even though the Leuchars opening for the 13th seems rather weak.

Quite often, wedges of air get trapped and are forced down by advancing cold fronts. In an " off beat " way, this is a form of subsidence and can result in a subsequent discontinuity.

Histogram 3 was recorded at Bridgewater in Somerset some 225 ft. above sea level, and at a site which was, meteorologically speaking, reasonably clear of obstructions to the movement of the air mass. As no actual reading was taken on the 12th, the dotted section was interpolated.

Histogram 4. This was recorded at Chelmsford, Essex, 140 ft. above sea level, and in the clear.

Histogram 5. The solid line represents readings taken at Wokingham, Berkshire, 220 ft. a.s.l. not in the clear. The dotted line represents readings taken at Melton Mowbray, Leicestershire, 300 ft. a.s.l., in the clear.

Histogram 6. The solid line was recorded at Epsom, Surrey, 545 ft. a.s.l. and was taken by our nearest observer to Crawley. The dotted line shown is a plot of the *K* time section of Crawley (line 295) and was included to see whether the day delay noted in Histogram 1, *K* time section, was also present. Although the shapes do not fit particularly well, the delay is certainly there. On the full scale *K* time sections and Histograms this delay is clearly evident. Unfortunately it is not possible to reproduce them in sufficient detail here as space does not permit.

Histogram 7. The solid line was recorded at Mitcham, London, 50 ft. a.s.l. at a site that was far from clear. The dotted line are readings recorded at Bristol. Unfortunately no information was available for the 14th.

Histogram 8. This plot represents the barometer reading taken at Melton Mowbray, approximately central England, the readings being corrected for height.

It was noted that the range of vapour pressures from all observers tended to be on the low side—3 to 12 mb. This was probably due to the low winter temperatures, for, in practice,

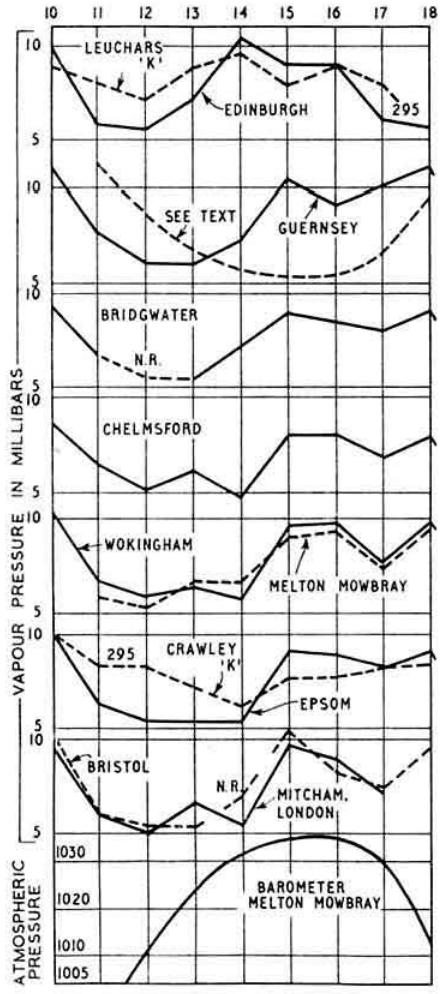


Fig. 4. Atmospheric and vapour pressure histograms for the period January 10-18, 1958.

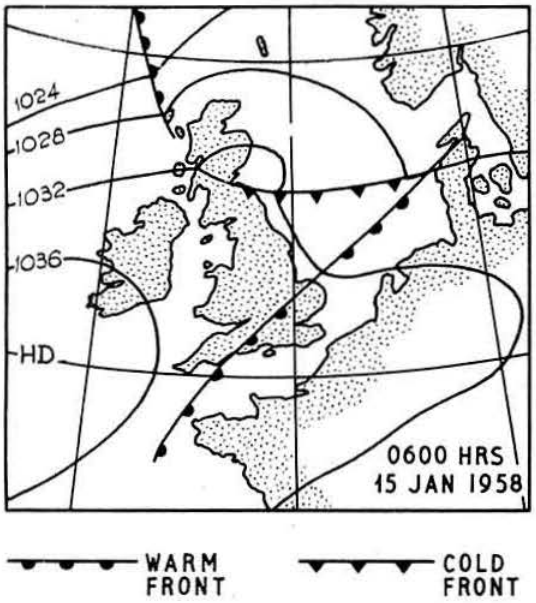


Fig. 5. Synoptic chart showing the surface conditions at 06.00 GMT on January 15, 1958.

the surface evening temperature was around freezing, and this in itself makes vapour pressure recording difficult.

In view of the considerable correlation between observers, however, of the shape and trend shown by the Histograms, the writer feels justified in saying that vapour pressure surface changes do occur under anticyclonic conditions, and that they are indicative of higher level discontinuity.

Considering the general pattern, we would only expect the barometric graph to be an inverted version of our vapour pressure graph. This seems to be true up to the point where vapour pressure trends show small but significant changes contrary to the general downward fall, such changes being associated with simultaneous anomalous propagation. This method is very limited, and by no means as comprehensive as the potential refractive index system described by R. G. Flavell, GM3LTP.

We are faced with a simple question. Are recorded surface vapour pressure graphs worth the time and trouble? The answer is an emphatic " NO." It is quite sufficient to know that what we want is a sharp discontinuity, and that this is a result of a subsidence during an anticyclone. The best indicator of this is a good barometer, coupled with observation of the cloud forms to show drying out at upper levels. Experience must also guide our judgment for it is possible to have cloud with very warm air above at the point of density balance, and in fact this usually gives the best openings.

Potential Refractive Index

In the two previous articles on " V.H.F. Weather,"* R. G. Flavell, GM3LTP, gave a full explanation of the potential refractive index method as applied to tropospheric wave propagation.

Its major advantage is that it enables us to see a vertical section of the atmosphere over a chosen point with, and this is the real crux of the matter, most of the factors that do not affect propagation removed. This is accomplished by taking the radio-sonde ascent information at various heights, and adiabatically bringing these to a standard level—say 1000 mb. These " parcels " of air from various heights can therefore be seen in refractive index comparison.

The method has a limitation. Since the adiabatic lapse rates are different for wet and dry air, if large vertical sections are plotted through regions of condensation, that is through cloud, this would introduce difficulties. Normally, under anticyclonic conditions, medium and high level cloud is dried out by the subsidence, and low level cloud at the point of density balance is relatively thin—between 100 to 200 ft. thick—and so the regions of vertical condensation are usually quite small.

If we plot the p.r.i. as a time section at midnight and midday vertically over the chosen station for a number of days, we would find that as conditions improved, the p.r.i. lines on the time section fall and crowd together indicating the point or layer where the greatest refraction is taking place.

Alternatively, we could plot a Delta *K* map taking a number of radio-sonde ascents at the same time from different stations and noting the p.r.i. number at the 850 mb level, and subtracting this from the surface level reading. We would end up with a series of numbers which could be plotted geographically and linked by isopleths to produce a propagation map. The best paths would be over high or low numbers and these would be shown as solid lines, while marginal or fair paths would be shown as dots, and poor paths as dashes.

Conclusion

Naturally the radio amateur is going to ask how he can tell what conditions are going to be like tomorrow.

A calculated guess can be made—aptly called a guesstimate. First check the barometer each morning, and note readings above 1016 mb. Next refer to the weather map—Atlantic Chart—shown in most daily newspapers. Arrows on these charts indicate the direction of movement of the various systems. We need stability of air and subsidence: little wind and a downward movement of the air mass as in an anticyclone. As a general rule, the best propagation paths are through the regions of the greatest subsidence, and these are normally slightly offset from the system's surface centre, and may in fact become elongated as the system moves. The p.r.i. Delta *K* map shows this well.

It must be recorded that without the generous support of the very many observers during the IGY, together with those who gave many hours of their time to analysing results, this article could never have been written.

It is hoped that, through the information given, you may be able to take greater advantage of v.h.f. openings, and to perhaps forecast them for yourself, in which case it has all been worthwhile.

* *V.H.F. Weather*, Part 1, RSGB BULLETIN, March, 1963; Part 2, March, 1964.

Radio Amateur Old Timers' Association

The Annual Reunion of the Association will take place at The Horse Shoe Hotel, Tottenham Court Road, London, on Friday, May 7, 1965. The Association is open to those who held a United Kingdom amateur transmitting licence for the past 25 years including the war years.

Members pay a life subscription of one guinea which covers also the cost of a special lapel badge. A Benevolent Fund is operated to which members are invited to make donations. There are today about 180 members.

Further details may be obtained from the Founder-Secretary, John Clarricoats, O.B.E., G6CL, 16 Ashridge Gardens, London, N.13.

J-Beam Aerials Ltd.

J-Beam Aerials Ltd. have moved from Weston Favell, Northamptonshire, to Rothersthorpe Crescent, Northampton. Telephone: Northampton 62147/8/9.

Part 2

PANORAMIC RECEPTION

By W. BLANCHARD, G3JKV*

Practical Design and Constructional Details

TO design a panadaptor which will work with *any* receiver is difficult, the complications being introduced by the possible variation in input frequency to the adaptor. Nevertheless for those who are adroit in the art of electronics there should be sufficient information in Part 1† to enable them to design their own adaptor without encountering too many headaches.

Many amateurs will agree with the old tag that "an ounce of practice is often worth a ton of theory," and in this case the best way of illustrating the practical application of the theory is probably by describing the construction of a panadaptor, enumerating the difficulties which were encountered, and detailing how they were overcome. This part, then, is concerned with the construction of a panadaptor suitable for use with any receiver having an i.f. in the range 400 kc/s to 500 kc/s, and which will also function as a transmission monitor.

General Notes

The three major units which together comprise a panadaptor, (i) r.f. section, (ii) wobbulator and (iii) c.r.t. display unit, will be described separately. This course is adopted so that those already having, say, an oscilloscope, or perhaps a wobbulator, or even both, need only be concerned with constructing the "missing" units, and by interconnection, produce a panadaptor with the minimum of constructional effort. While the foregoing is completely possible, there is, nevertheless, much to be said for making the panadaptor as a complete unit in its own right.

Since the APN-4 Loran indicator case is a fairly good match to an AR88—the writer's receiver—the panadaptor was constructed in this, and consists of the separate units already described interconnected within the housing. In this case it was the most convenient way of producing a complete unit from the individual sections which had been developed. In actual fact, the APN-4 indicator would make a good basis for a panadaptor since it already contains a suitable c.r.t., and has sufficient chassis space.

There is nothing very critical in the electronic design, and during the course of development, alternative ways of doing various things were tried, most of which worked fairly well. The final choice was mainly one of practical convenience influenced by the availability of components. For example, the i.f. happens to be 127·5 kc/s only because transformers for this frequency were available, and not because of some esoteric theoretical consideration. Similarly EF91's and EF92's were used for the same reason—availability.

Receiver Output

As we have seen in Part 1, the panadaptor requires an r.f. input which is reasonably level over a fairly wide frequency band; ideally, over the whole bandwidth to be scanned. The normal point to which connection is made is the mixer anode circuit.

* "Hilldean," Furnace Wood, East Grinstead, Sussex.

† Part 1 of this article was published in the January issue of RSGB BULLETIN.

Receivers having only a single r.f. stage have a broader bandwidth than those with two such stages, and as a consequence less compensation will be required in the adaptor's input stage to secure the level response required. Although the unit to be described was designed for a receiver having two r.f. stages, which consequently gives a fairly high level of output at the mixer anode, the adaptor has more than sufficient gain to compensate for the lower output given by a receiver having only a single r.f. stage ahead of its mixer.

When used with an AR88D, up to 100 kc/s may be scanned on Top Band without encountering any great variation in amplitude, and up to 200 kc/s or 300 kc/s on higher frequencies.

The output from the AR88 mixer anode is taken via a 10 pF capacitor through a short length of co-axial cable to a co-axial socket mounted on the rear of the receiver chassis. The capacitor reduces the effect of cable capacity on the tuning of the first i.f. transformer, and with this arrangement, no retuning was found to be required. Its side effect is that it reduces the available signal to the adaptor, and if another receiver is used, some alteration to this value may well be required, and, *inter alia*, retuning of the first i.f. transformer.

The effect of a.g.c. action in the main receiver has already been considered in Part 1 as has the desirability of being able to switch this off when using the panadaptor. In the MAN position of the AR88, the a.g.c. is not removed, but only reduced. The a.g.c. can be removed in the MAN position by placing a shorting link across the 6·8 K ohms resistor running from the r.f. gain control to earth. This modification will be found to have very little noticeable effect on the operation of the AR88.

In the case of other receivers, it will probably be found that the a.g.c. can be removed without undue difficulty or major modification even if an a.g.c. switch is not already fitted. When considering any modification, it should be borne in mind that it only really needs to be removed from the r.f. and mixer stages.

In practice, the presence of a.g.c. may not adversely affect panoramic reception provided that the panadaptor's own a.g.c. is fairly effective. In the last analysis only experience will indicate whether the receiver's a.g.c. can be left in operation or whether it must be removed.

R.F. Circuit

The complete circuit of the r.f. section of the panadaptor is shown in Fig. 4. It consists of a broad-band r.f. amplifier V1, mixer V2, two stages of i.f. amplification V3 and V4, detector and a.g.c. diodes V5, rounded off by video and audio outputs V6. For completeness, each stage will be examined individually.

R.F. Amplifier

The r.f. amplifier has to fulfil two functions:—

(i) To provide adequate isolation between receiver and adaptor in respect of their individual mixers and oscillators.

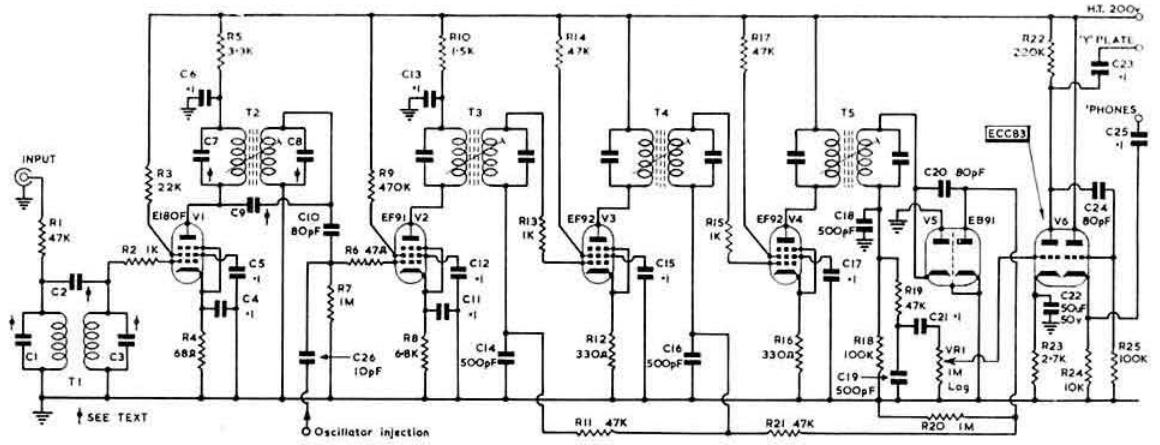


Fig. 4. Circuit of the r.f. stages. See text for details of T1 to T5.

(ii) to give compensatory amplification so that the bandwidth at the adaptor mixer is level over a sufficient range.

If the r.f. stage only had to provide isolation, a cathode follower could be used. However, unless the sweep is to be restricted to 50 kc/s or less, it must also introduce differential compensation, and this means employing amplification of one kind or another. There are several possible circuits which will tend to give the right characteristics, but only two were checked:

(a) An *RC* coupled amplifier with a rejection notch at 455 kc/s (the i.f. of the AR88).

(b) a standard *LC* coupled amplifier with its tuned circuits either overcoupled or stagger tuned.

The *RC* coupled stage was easier to build and align, but it lacked gain and required two stages to provide amplification similar to that of an *LC* coupled amplifier. The circuit of a single *RC* amplifier is shown in Fig. 5 since, where the output available from the receiver is high, such an arrangement may be preferred. The circuit values are adjusted to give a reasonably level response between 300 kc/s and 600 kc/s. A series resonant circuit at 455 kc/s is connected across the output and, in theory, the rejecton notch of this should match the receiver's acceptance curve. However, such ideal conditions could only be achieved for one amateur band in view of the way that the r.f. selectivity curve alters with changes in frequency.

The series resonant circit is constructed from a standard

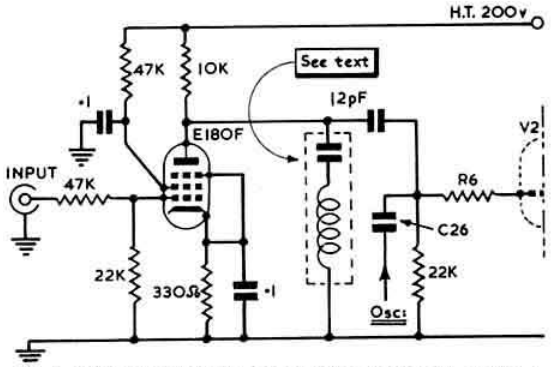


Fig. 5. Alternative RC r.f. amplifier to replace V1 in Fig. 4.

465 kc/s i.f. transformer. The tuning capacitor is removed from across one coil and placed in series with it instead, the other coil being disregarded.

The use of a high slope valve in the *RC* amplifier is essential. An alternative to the E180F specified is the EF184, and under some circumstances, it might just be possible to get away with an EF91—but don't bank on it.

The *LC* amplifier tested is the one finally adopted and shown as V1 in Fig. 4. The circuit is straightforward: the "trick" lies in its adjustment, and this is described in the section dealing with alignment.

The transformers T1 and T2 are ordinary 465 kc/s i.f. transformers, and more or less any type could be used provided that they do not use self-resonant coils, i.e. the coils must be fitted with tuning capacitors. This is because, in this particular case with an i.f. of 450 kc/s or thereabouts, the primaries will have to be tuned to 500 kc/s and the secondaries to 400 kc/s, and since the range of tuning provided by the adjustment of the core is inadequate to allow these frequencies to be reached, the fixed capacitors across each coil will have to be altered in value.

Before mounting, the screening can of the transformer is removed, the fixed capacitor associated with each winding clipped off, and the screening can then replaced. After fixing, the four leads from the transformer are taken to a tag board placed adjacently. The capacitors required to tune the windings are mounted on this tag board. This arrangement makes for easy alteration to the value of these capacitors.

The precise value of the capacitors will, of course, depend upon the inductance of the windings, and if this should be known, then exact values for frequencies of 400 kc/s and 500 kc/s can be calculated or taken from a suitable table.† In the particular case being considered, the original values were 120 pF. It was found that 100 pF on the primary and 160 pF on the secondary, in association with the 10 pF top coupling capacity, resonated the coils to the desired frequencies.

While an E180F has been specified for V1 in Fig. 4, an EF91 may be substituted, although there will be some loss of gain, but in the case of an *LC* amplifier this may not be serious. A revised circuit for V1 using an EF91 is shown in Fig. 6.

Mixer

Both an EF91 and 6BE6 were tried as the mixer V2 in

† See page 85, *Radio Data Reference Book*.

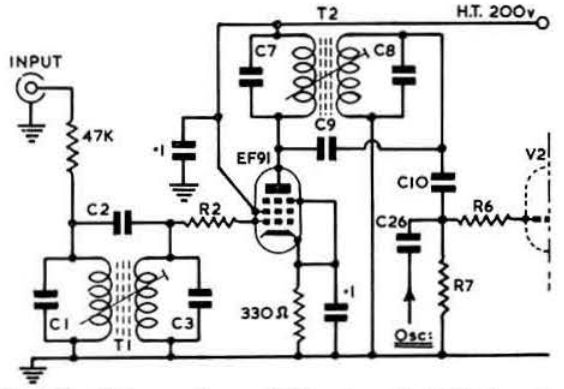


Fig. 6. Circuit for use where an EF91 replaces the E180F shown for V1 in Fig. 4. Items identified by component numbers only have the same value as those given in Fig. 4.

Fig. 4, but little difference was noted. If anything, the EF91 showed slightly superior gain, and this was finally selected.

I.F. Amplifier

The particular intermediate frequency used in the writer's equipment is 127·5 kc/s but this was determined largely by the transformers available. As was stated in Part 1 the i.f. may lie anywhere in the range 100 kc/s to 300 kc/s, but as will have been noted from that part, the higher the frequency, the greater the deviation which can be secured without running into the receiver's fixed i.f.

Certain items of surplus equipment, the MN-26Y radio compass for example, use an i.f. of 210 kc/s, and this would seem to be an almost ideal frequency, so if transformers from these units can be secured they should be used. However, in most cases, it will be necessary to utilize standard 100 kc/s commercial i.f. transformers, and these will be satisfactory provided the maximum sweep deviation can be kept within 200 kc/s. Even with this maximum deviation, it is preferable to alter the transformers to about 150 kc/s. One manufacturer's 100 kc/s i.f. transformers use 540 pF tuning capacitors; replacing these by 242 pF capacitors raises the frequency to 150 kc/s. An alternative is to add capacity to a standard 465 kc/s transformer and so lower its frequency to 300 kc/s. In this case, where the original tuning capacitor was 100 pF, adding a further 126 pF across each winding would do the trick.

When considering intermediate frequencies, it must be borne in mind that the centre frequency of the wobbulated oscillator will have to be adjusted to: *centre signal frequency + the i.f.*

Two stages of i.f. amplification are used to provide adequate selectivity and a.g.c. action, EF92's being employed. If a frame grid pentode were used, such as an EF183, it might be possible, with high *Q* transformers, to dispense with one stage. The a.g.c. circuit would need revision, and quite probably would not be as effective.

Detector and A.G.C.

Although an EB91/6AL5 is specified as V5 in Fig. 4 for the functions of detection and a.g.c. rectification, two semiconductor diodes type OA81 could probably be substituted. However, no attempt should be made to use a single diode for both purposes, as interaction between the circuits becomes almost inevitable.

The detector circuitry is quite standard and requires no particular explanation. The a.g.c. circuit on the other hand is a little unusual, and it is as well to examine the requirements which the a.g.c. action has to satisfy, and so determine why the particular values employed have been selected.

Assume that any signal will occupy 5 kc/s, that the total sweep width is 100 kc/s, and the sweep rate 20 c/s. It follows that the signal will only appear at the detector for 0·006 second, and that during this time the a.g.c. must build up to its maximum and, furthermore, once the signal has passed through the bandpass of the adaptor, drop back to zero before the next signal enters the bandpass. If the a.g.c. release time is not sufficiently quick, succeeding signals may not be displayed at all. Especially is this true of a small signal following a large one. This implies that the a.g.c. rise time should be about one-tenth that of the signal and, ideally, the decay time of the same order. While the rise time requirement may be met fairly easily, that of the decay time can only be satisfied with additional circuitry.

The circuit values given achieve a rise time of the order of 0·00075 second which is about right for the sweep width and sweep speed stated, but too slow for wide sweeps of 200 kc/s and upwards where the effects of desensitization will become apparent due to the fact that the release time is about ten times that of the rise time. At narrow sweep widths such as are used for the examination of one signal—10 kc/s sweep width—the fast acting a.g.c. will distort the modulation, and it is advisable to be able to remove the a.g.c. when such investigations are being undertaken. This can be done quite easily by fitting an earthing switch in the a.g.c. line at the junction of R20 and R21.

The decoupling values are just about the minimum usable without running into regeneration, and if higher gain valves are fitted, it may be that oscillation would occur. Certainly revision of the decoupling values would be needed, and a longer time constant a.g.c. system might have to be accepted.

Video and Audio Outputs

A single 12AX7, V6, Fig. 4, performs both functions, one section acting as a straightforward voltage amplifier for the video output, and the other as a cathode follower to give output for headphones—or additional amplification.

Strictly speaking, the video stage should be d.c. coupled in order to reduce distortion at low sweep speeds, but in practice, and with sweep speeds of the order of 10-20 c/s, little distortion, if any, will be evident. Should an oscilloscope be used for the actual display, the video stage is not strictly necessary, although its inclusion will reduce the chances of hum pick-up on the lead to the 'scope.

With a VCR97 operating at around 2 kV e.h.t., 80 volts will give full deflection. The 12AX7 amplifier will provide about 63 volts, and this is more than adequate since it will be found in practice that if the trace is made too high, one only gets a plethora of vertical lines which are hard to relate to each other. A trace height of about 1 in. seems to be optimum.

A gain control is located in the video stage, and this will be found to give adequate control over display height and headphone volume. If overloading of the adaptor's i.f. stages should occur with very strong signals when the a.g.c. is removed, the r.f. gain control of the receiver should allow this to be corrected. The alternative is to provide the r.f. stage of the adaptor, V1, with its own gain control; if fitted, this would consist of a 10 K ohms potentiometer connected in the cathode circuit of V1. The adjustment of audio volume relative to display height can be made by variation of the value of C24.

Wobbulator

The adaptor's local oscillator, and its reactance modulator are shown in Fig. 7, V7 being the reactance valve, and V8 the oscillator, both of which are EF91's. Practically any other pentode could be used for the oscillator, V8, but the reactance modulator, V7, must be a high slope type.

The theory of operation of a frequency modulated oscillator is covered in the RSGB *Amatuer Radio Handbook*, and will not be repeated in detail here, but the salient features are worth a résumé.

The reactor valve, V7, produces across the tuned circuit of the oscillator, a reactive component which will alter its resonant frequency. This component is determined by the phase shift introduced by the network C28, C29, R28, 29. The magnitude of the phase shift, and hence the reactive component, is controlled by the current flowing through V7, which in turn is dependent on the settings of VR2 and VR3. VR3 adjusts the standing bias on the reactor valve, and therefore controls the centre frequency, while VR2 varies the amplitude of the input voltage—derived from the horizontal scan circuit for the c.r.t.—and hence the sweep width.

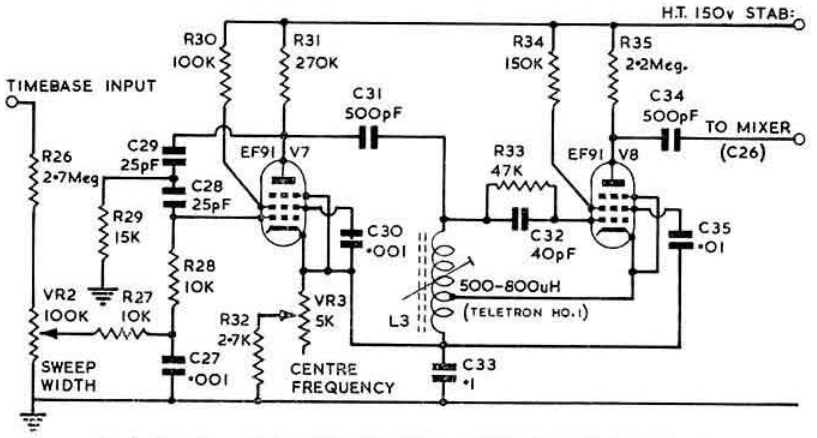


Fig. 7. Wobbulator (frequency modulated oscillator) for use with Fig. 4.

It is usual to find that only one capacitor is used between the anode and grid of a reactance modulator. However, in such cases the phase shift is not 90°, and a resistive component appears across the tuned circuit as well as a reactive one. The effect of this is either to stop oscillation altogether, or to stop oscillation at various points of the sweep, the latter showing as " dead " spots on the trace: a sad state of affairs indeed.

If the phase shift network is split up into two sections, the phase shift becomes practically 90°—although in theory at one frequency only—and the risk of such dead spots is substantially reduced. Another benefit of this arrangement is that variations in oscillator amplitude over the range of the sweep are very much reduced. With suitable equipment, R29 can be adjusted to produce the required 90° phase shift at the centre frequency, but for all practical purposes the value given may be used with the proviso that should dead spots be encountered, a variation in the value of R29 may be required.

Since the centre frequency control shifts the frequency by some 250 kc/s, the operation of VR3 may be found too coarse. If this is the case, either a smaller, and padded out, value can be fitted or, alternatively, a 100-500 ohm control can be placed in series with it to act as a " fine tuning " control. Similarly, VR2, the sweep width control may also be found to be too coarse. If this is so, and since VR2 will probably give more sweep than can be used, its value could be taken down to 50 K ohms when the overall sweep would be reduced to 200 kc/s or so.

One unusual point about the oscillator circuit is the absence of a tuning capacitor across the coil. To obtain maximum deviation, it is essential that there is as little actual capacity across the coil as possible, and so L3 is chosen so that it resonates with the capacity developed by V7 and does not require any other. The coil used is a Teletron type HO.1 which has an inductance variable between 500 μH and 800 μH. Any coil which will resonate between 1200 kc/s and 1300 kc/s with C31 disconnected should be satisfactory. Connecting C31 should reduce the frequency to about 600 kc/s when V7 is operating correctly with VR3 set at about mid-position and VR2 fully " off." The exact centre frequency of the oscillator is set by adjusting the core of L3 in the usual manner.

A stabilized supply is used for the normal reasons, and all the components employed in both the reactance modulator and the oscillator should be above reproach. Particular care must be exercised in the construction of the reactance modulator to prevent hum pick-up in this stage, particularly by the grid, otherwise all signals will appear to have 50 c/s modulation on them. The amount of hum pick-up needed to cause this is remarkably small, and should R27, R28 or C27 be carelessly arranged, it may even occur with the wiper of VR2 earthed.

With 150 volt h.t., and a peak-to-peak voltage at the grid of V7 of 10 volts, the wobbulator will produce a total sweep width of 450 kc/s when centred on 582·5 kc/s or thereabouts, while VR3 will produce a shift in centre frequency of up to some 250 kc/s.

Such a wide frequency sweep is not usable in practice, for, in the case of the AR88, and probably other receivers as well, the r.f. selectivity cannot be compensated over such a bandwidth. The useful range is about 150 kc/s when V1 of the r.f. section of the adaptor is correctly adjusted. The real value of such a sweep lies in the linearity that can be obtained over the centre of the sweep, and the resulting simplification of base line calibration. If a graph is prepared showing sweep *vs* frequency, it will be found that while the centre section is virtually linear, there is pronounced curvature at each end accounting for about one third of the total sweep. For a linear display therefore, the base line amplitude can be adjusted for overscan, and the non-linear sections of the trace positioned " outside " the tube.

There is some shift of the centre frequency with changes in sweep width. This amounts to about 20 kc/s from zero to maximum deviation, and can be corrected by the centre frequency control VR3. In terms of physical displacement on a VCR97 with full width scan, this is of the order of a quarter of an inch.

Timebase and C.R.T.

The timebase must give sufficient output to fully scan the c.r.t. and be fairly linear. A Miller transitron circuit has been found entirely satisfactory, and has the added advantage that it is simple to build and contains no particular " bugs." The circuit is shown in Fig. 8.

While a sweep speed control, VR4, is shown there is no real need for this and it could be omitted and replaced by a fixed potential divider, or alternatively, relegated from a panel control to a pre-set control mounted on the chassis.

Fly-back suppression is achieved by taking the pulse available at the screen grid and applying it to the grid of the c.r.t. It should be particularly noted that C40 *must* be a high voltage working type. The blanking level can be adjusted by varying the value of R40 which, ideally, should be adjusted to a value which *just causes* the fly-back stroke to disappear.

A VCR97 tube was employed for reasons of economy more than anything else. Many other types are suitable. A 5CP1

may be substituted, for example, this being used in the Loran unit mentioned earlier. This tube has post deflection acceleration (p.d.a.) and where a separate supply is used for this, is capable of finer focus than the VCR97. However, for our purpose, it is quite sufficient to join the p.d.a. connection directly to the third anode (A3) and use a common supply.

The VCR97 will work with an e.h.t. supply as low as 800 volts, but the trace is faint, and the focus poor. For use under daylight conditions, about 1·5 kV is needed. The maximum e.h.t. which should be applied to the VCR97 is 2·5 kV. Fig. 9 shows the circuit of a power supply in which the transformer is provided with an e.h.t. winding. Fig. 10 on the other hand illustrates how a standard mains transformer may be utilized, the e.h.t. being derived from a voltage tripler circuit. Further notes on these are given later.

The potentiometers functioning as BRILLIANCE and FOCUS controls operate at a high potential, and must be well insulated types; if possible, designed for this type of operation. Standard types can be used, but it is suggested that they should be mounted on an insulated sub-panel, and linked to the control knob by means of an insulated coupler and shaft. Whatever method is adopted, they should be positioned, or guarded, so that they cannot be touched accidentally.

One final point; R42 and R43 *must not* be replaced by a single resistor. A single resistor would have a potential of the order of 1 kV across it, and there would be a very real danger of its breakdown.

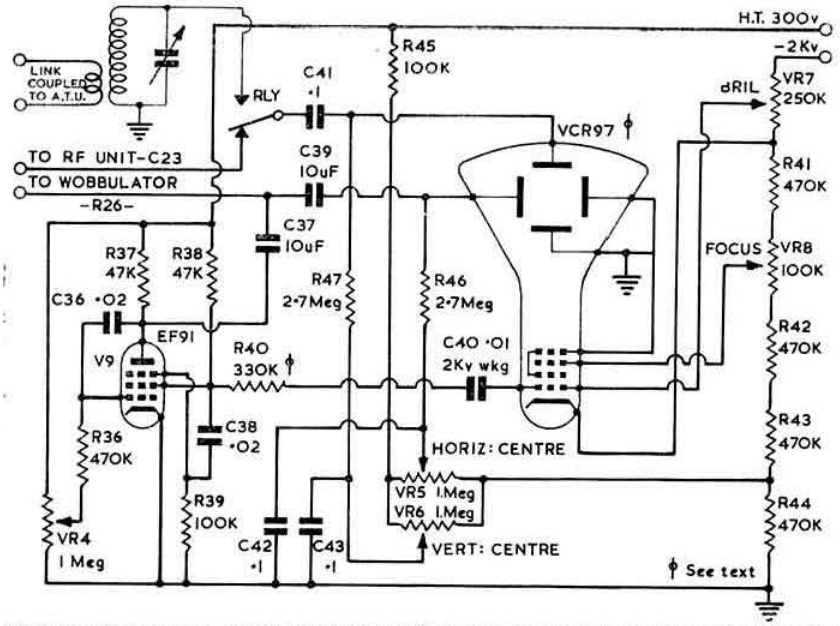


Fig. 8. Timebase and c.r.t. display unit together with relay switching between transmit and receive.

Monitoring Modulation

In order to monitor the modulation of the transmitted signal, the vertical deflection plates of the c.r.t. are switched from the output of the r.f. unit of the adaptor to a tuned circuit operating at the transmitted frequency. This changeover is accomplished by a relay which is linked into the station control system, and therefore becomes automatic. The tuned circuit is provided with either a short aerial, or alternatively wound with a link winding, the other end of which is positioned near to the transmitter a.t.u.

The arrangement could be further elaborated to provide a trapezoidal pattern on the lines suggested by G3NRZ in the March 1964 edition of the RSGB BULLETIN.

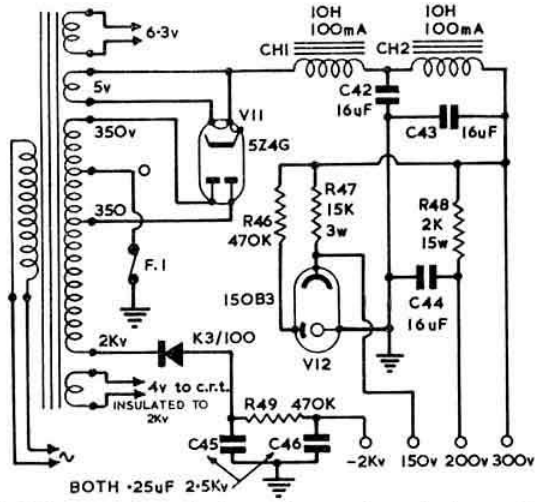


Fig. 9. Power supply employing a mains transformer having an e.h.t. winding together with an adequately insulated heater supply for the c.r.t. (See text.)

Power Supplies

First, a warning: the high voltages used in this equipment ARE LETHAL. *Let there be no mistake about this.* It is essential that all the components associated with the e.h.t. circuit are positioned so that accidental contact with them is impossible. For preference, they should be grouped together and fitted with an earthed guard cover.

As e.h.t. derived from a special winding on a mains transformer is the most dangerous of all, it is not recommended that such a transformer be used. Since the current drain on the e.h.t. is only about 1 mA, a voltage tripler may be employed, which, with its relatively high source impedance, may not be quite so dangerous. This is not to be taken as an invitation to be careless.

Despite the foregoing, and for the sake of thoroughness, a power supply using a transformer deriving its e.h.t. directly from a special winding is shown in Fig. 9.

The power requirements are (a) 6·3 volts at 2·5 amps, (b) 350 volts at 45 mA, (c) 4 volts/5 volts/6·3 volts at 2-3 amps depending upon the h.t. rectifier, (d) 2 kV at 1 mA, and (e) 4 volts at 2 amps for the c.r.t. heater supply. In respect of the c.r.t. heater supply it should be noted that this must be insulated to withstand at least 2 kV in view of the fact that the cathode and heater in the c.r.t. are connected together.

All the supplies except that in (e) above can be derived from a single transformer by using the circuit shown in Fig. 10. A suitable transformer for the heater supply of the c.r.t. is available in the Radiospares† range—ostensibly for

† Radiospares components may be ordered through radio dealers.

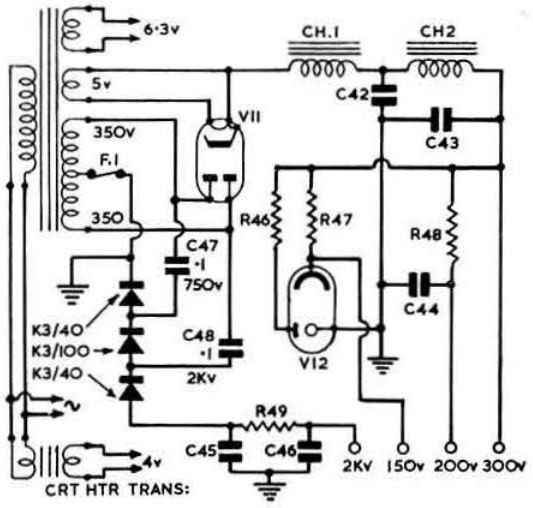


Fig. 10. Power supply using a standard mains transformer, the e.h.t. supply being derived from a voltage tripler. A separate transformer with suitable insulation provides the heater supply for the c.r.t. (See text.)

TV tube booster purposes. The e.h.t. given by the tripler is of the order of 1·8 kV when a 350-0-350 volt transformer is used.

Preliminary Checks

The first essential is to secure correct operation of the c.r.t., and this resolves itself into checking voltages, and ensuring that the brightness and focus controls operate as they should. With 2 kV e.h.t. the trace should just extinguish with the grid 58 volts negative to the cathode, while optimum focus should be secured with the anode 300 volts positive. If measurements are made, due allowance must be made for the error likely to be introduced by the loading imposed by the meter, if it is other than a 20,000 ohms per volt type.

Any horizontal deflection on the tube will indicate that the timebase is operating. It has, however, to be set to the correct speed and width. The amplitude can be altered by varying the h.t. applied to V9, and this should be adjusted to produce the desired width. After this, about 50 volts of 50 c/s mains voltage are put on the *Y* (vertical) plates, and the potentiometer VR4 adjusted until three cycles are displayed over the scan. The timebase speed is now 16·6 c/s. These adjustments will be found to interact to some extent.

Alignment

If a receiver tuning over the range 350 kc/s to 850 kc/s is available, the correct functioning of the wobbulator may be checked directly. If this is not so, it will be sufficient to adjust the wobbulator to the required centre frequency, the extent of the deviation being checked later. The centre frequency control should be set to its mid position, and the sweep width control turned fully off. A receiver should now be tuned to either the fundamental or second harmonic of the desired frequency—which is the intermediate frequency of the receiver which will be working with the adaptor *plus* the i.f. of the adaptor itself—and the core of L3 adjusted until the oscillator is heard in the receiver.

The sweep width control is most easily calibrated once the r.f. unit is operating. Nevertheless, if a receiver has been used to set the frequency of the wobbulated oscillator, there is no reason why provisional calibration should not be undertaken at this stage. Tune the receiver 25 kc/s away from the centre frequency—or 50 kc/s away if the second harmonic of the wobbulated oscillator is being used—and adjust the SWEEP WIDTH control until the wobbulation "buzz" is *just heard*. Mark this point 50 kc/s deviation. Remember that the modulated oscillator is being swung 25 kc/s *either side* of the centre frequency, and therefore, although the receiver has only been shifted 25 kc/s, the actual total deviation is 50 kc/s. Shift the receiver to 50 kc/s (100 kc/s deviation), 75 kc/s (150 kc/s deviation), 100 kc/s (200 kc/s deviation) and mark the positions of the SWEEP WIDTH control accordingly. Life becomes a little more complicated if the second harmonic of the modulated oscillator is being checked, for in this case, any shift in the basic oscillator frequency will be multiplied by a factor of two. Thus, an oscillator shift of 25 kc/s will show as a change of 50 kc/s and will correspond to a deviation of 50 kc/s—and so on.

The best method of aligning the i.f. stages of the adaptor is by using the adaptor's own display facilities, and while the system to be described pre-supposes that the modulated oscillator of the adaptor has been set to the correct centre frequency, this is no great disadvantage.

The output from a signal generator is fed into the mixer of the adaptor at *precisely* the frequency of the i.f. of the receiver with which it is to work. The SWEEP WIDTH control is set to give about 20 kc/s sweep, and then the adaptor's i.f. transformers are aligned for the best shaped curve. If the centre of this curve is away from the centre of the sweep this means that either the signal generator is incorrectly set, or that the modulated oscillator of the adaptor is off frequency. As the adaptor's oscillator coil L3 will receive a final little "tickle" once the whole system is operating with a receiver, this does not matter at this stage.

If it has been necessary to modify i.f. transformers from some other frequency, and these are used in the adaptor's i.f. system, then the method of visual alignment given above may not be possible immediately. Initially, it may be necessary to use a "brute-force" output from the signal generator in association with the audio output system of the adaptor, and then, once some signal is getting through, convert to the visual method.

If the receiver output is now fed to the grid of the mixer of the adaptor, it should be possible to see signals. Initially a strong local signal should be selected and tuned in until it is precisely on the "nose." With the SWEEP WIDTH set to about 50 kc/s, check by how much this signal is off the centre of the trace length, ensuring that the CENTRE FREQUENCY control is in its mid-position. Carefully adjust the core of L3 until the display is exactly central. Actually, one could "cheat" a little here and correct the error manually by use of the CENTRE FREQUENCY control—and then reset the position of the knob in a crafty manner!

Examination of the signals now displayed will show that they fall off in amplitude quite rapidly on either side of centre. It is this that the r.f. stage has to correct. In the case of an AR88 tuned to 3·5 Mc/s, and a sweep deviation of 100 kc/s, the values of capacity specified for T1 and T2 will allow these transformers to be tuned to correct this effect. However, neither these values, nor the settings of the transformers will hold good for other frequencies to the same degree; or for that matter, for other receivers. The reasons were considered in Part 1.

The ideal method of adjusting T1 and T2 is by feeding into the receiver on the most commonly used frequency, the output from a 10 kc/s multivibrator locked by a 100 kc/s crystal, and examining the resulting trace at the most used sweep width. In the writer's opinion 100 kc/s deviation is the most useful with 50 kc/s running a close second. The trace will consist of a string of pulses of varying height—probably decreasing towards each edge—and the object is to adjust the cores of T1 and T2 until all the pulses are of the same

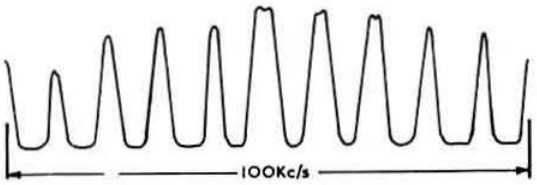


Fig. 11. Overall r.f. bandwidth of a compensated system. This was produced in the same way as Fig. 2 in Part 1 with which it should be compared.

height. When this is achieved, the overall gain will be constant.

Where receivers other than the AR88 are to be used, one must be prepared to experiment with the values of C1, C3, C7 and C8, as well as the settings of the cores. With a visual display, this is not quite such a formidable task as it may sound.

An alternative method of adjusting T1 and T2 is by the use of a standard signal generator manually swept over the scanning range. However, as adjustments to the cores of T1 and T2 produce amplitude changes at all points of the sweep, and since the generator will only produce one " blip," after each adjustment the generator will have to be swung through the sweep range in order to determine the effect. Alignment by this method is not impossible, but it can be rather time consuming. Better by far to construct a 10 kc/s multivibrator, for this will also find use when calibration is undertaken.

Fig. 11 is a tracing of a 100 kc/s sweep width at 2 Mc/s on an AR88, the input being derived from a 10 kc/s multivibrator.

Calibration

Calibration of the SWEEP WIDTH control may now be undertaken, either directly on the face of the tube using a Chinagraph pencil, or on a piece of clear plastic fitted over the front of the tube. Start by marking the baseline, divide this into ten equal parts, and make each alternate line slightly longer. This will then give a scale of five, and a scale of ten, permitting direct reading of 10 kc/s, 50 kc/s and 100 kc/s deviations.

Feed in the output from the multivibrator and rotate the SWEEP WIDTH control until the required number of markers are displayed. Remember that there will be *one extra* marker in each case, this representing " zero." (See Fig. 11 where the sweep width is 100 kc/s, and there are not just ten 10 kc/s " pips," but eleven of them.)

At 10 kc/s sweep width, two markers will be displayed, one at each end of the base line; at 50 kc/s six markers will be displayed, and at 100 kc/s eleven markers. At the points on the SWEEP WIDTH control rotation where these markers appear, calibrate the control accordingly, i.e. 10 kc/s, 50 kc/s and 100 kc/s. Other points may be calibrated using the same method.

Calibration may be undertaken with a signal generator. In this case, it has to be determined by how many 10 kc/s " units " the generator frequency has to be changed to move the single marker which it will produce from one end of the scale to the other. Through this the 10 kc/s, 50 kc/s and 100 kc/s positions of the SWEEP WIDTH control can be found.

Using the Adaptor

The most obvious use of the adaptor is as a band activity monitor. Particularly is this so in the case of the 70 Mc/s, 144 Mc/s and 420 Mc/s bands, and in its present state, perhaps of the 28 Mc/s band also. With the adaptor running, there is no longer any need to tune over the band, nor for that matter to have the receiver giving forth audio. As soon as there is any activity on the band, this will show as a

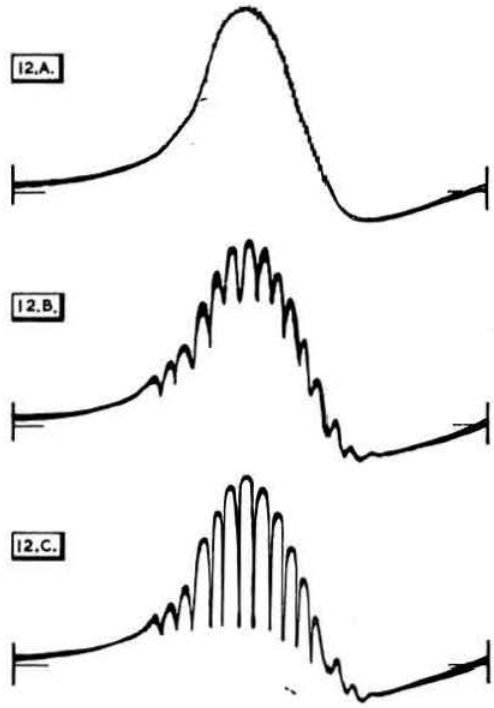


Fig. 12. Modulation depth. (a) an unmodulated carrier; (b) a carrier modulated to a depth of 30 per cent, and (c) a carrier modulated to a depth of 95 per cent.

" blip " on the base line scan of the tube, and the receiver may then be tuned to the station.

For reasons which have already been covered in detail, the amount of frequency scan which may be attained is usually limited by the selectivity prior to the adaptor. However, despite this, the adaptor can monitor the section in which there is the greatest interest. On the lower frequency bands in particular, the adaptor is useful in locating a reasonably vacant frequency in the general hubbub.

Subject to the strength of the incoming signal, interference caused by adjacent signals, and the selectivity of the adaptor, a certain amount of signal analysis may be undertaken. The adaptor's scan is adjusted until only the required signal is displayed. An unmodulated carrier will appear as shown in Fig. 12(a). At 30 per cent modulation the signal will appear as shown in Fig. 12(b), and at 95 per cent modulation, as in Fig. 12(c). For the purpose of these illustrations, the carriers are shown modulated by a 300 c/s tone.

Overmodulation produces intermittent " blips " on either side of the carrier. Key-clicks produce the same effect, and in very bad cases they may even be seen as a train of " blips " extending right across the width of the scan.

Subject again to the conditions under which the signal is being received, s.s.b. signals may be readily checked for sideband rejection, and residual carrier.

Conclusion

The construction of the panadaptor is a worthwhile and satisfying project. The reward is a most useful piece of equipment which will take pride of place in any shack—for the more it is used, the greater its use will seem to be.

References

1. RSGB BULLETIN, September and October, 1950.
2. *CQ*, February 1960, August 1962, and December 1963.

The Mini-Halo Capacity Loaded Aerial

By H. P. DADD, G3MCG *

THIS aerial, christened by the writer the " Mini-Halo," has been used continuously for some months and has proved to be equal in all respects to the full size halo, with the added advantage of almost perfect circular radiation without nulls, together with less flutter than that experienced with the normal type in a moving vehicle, and of course is less conspicuous, due to its small size.

The drawing, Fig. 1, is self-explanatory, but it is essential that the aerial should be of robust construction to avoid any whip. The construction is all brass; the elements and gamma match are made of $\frac{5}{16}$ in. external diameter brass tubing, while the main junction tube is $\frac{1}{2}$ in. internal diameter and the shorting bar $\frac{3}{8}$ in. $\times$ $\frac{1}{4}$ in. solid brass drilled and tapped 6BA. The $\frac{1}{2}$ in. tube is surmounted with a $\frac{1}{2}$ in. Perspex rod which should be a tight fit. The rod is drilled to take the centre core of the feeder, and a hole drilled at right angles takes the end of the gamma $\frac{3}{16}$ in. tube; this is drilled and tapped to anchor the feeder core. The screen is soldered to the inside of the $\frac{1}{2}$ in. tube. Regarding the tubular capacitor, the inside sleeve is $\frac{9}{32}$ in. internal diameter filled for part of its length with polythene or p.t.f.e. The writer used the polythene core of thick ex-government co-axial cable, which needs to be tapped to take one end of the element which has been threaded to suit $\frac{7}{32}$ in. or possibly 2BA. The external tube would have to suit the external diameter of the inside tube depending on its gauge—possibly about $\frac{3}{8}$ in. internal size. The drain hole is important as this prevents moisture collecting, and should be positioned at the bottom. The collar holding the other end of the element should be soldered in position. The element end (which has been tapped) is held in position with a 6BA screw and is a twisting fit. Before assembling, spring the elements apart to ensure that good contact is made between the capacitor and anchored end of the element. To give a professional finish the aerial should be chromium plated. Although this is a fairly costly process, the final result is then in keeping with the car.

* 32 Keswick Road, Bexleyheath, Kent.

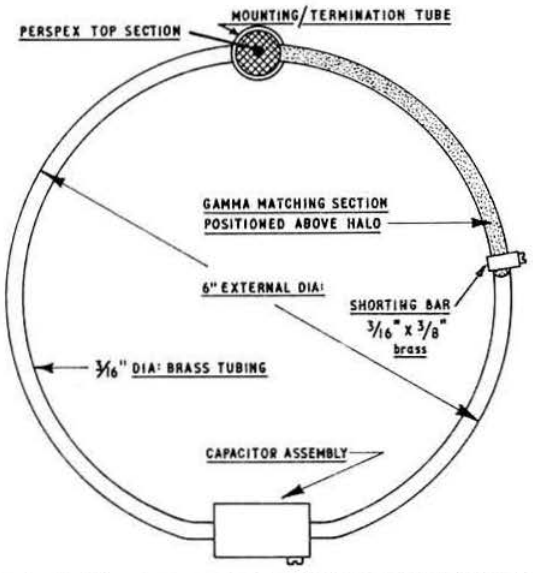


Fig. 1. Looking down on the top of the completed Mini-Halo.

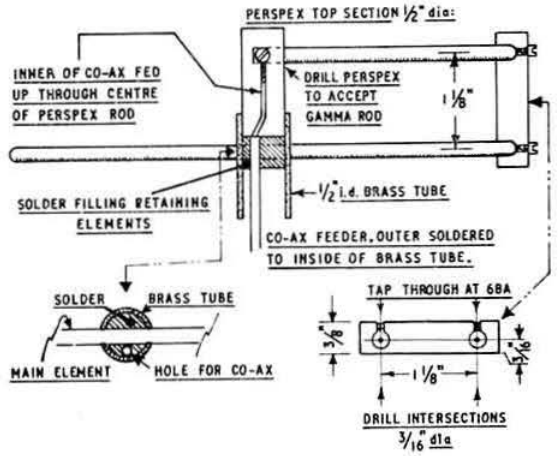


Fig. 2. Side elevation of the completed halo, with drilling details of the gamma match support and perspex mounting rod.

Tuning is accomplished by twisting the sleeve and is fairly critical, but once set it can be locked and forgotten. The value is between 2 and 3 pF. It will be found convenient to tune for maximum signal using GB3VHF if the location is suitable, or other steady carriers. The use of a signal strength meter is essential.

Contrary to what may be expected, the aerial is not very frequency conscious and tuning 2m does not show any falling away in signal strength at either end of the band.

The importance of keeping moisture out of the capacitor was the reason for the particular form of construction and this was found to be quite satisfactory in rainy weather. The gamma match is of the same dimensions as would be used on the full size version, approximately 4½ in. in length, and should be adjusted with a reflectometer for minimum standing waves. The reflectometer used by the writer was the short version (5 in. long) of the Monimatch, details of which can be obtained from the ARRL *Handbook*. Equally suitable would be the reflectometer described on page 482 of the RSGB *Amateur Radio Handbook*. The position of the halo relative to the vehicle will also affect the s.w.r.

The writer would like to thank G2AOX for his co-operation in checking the radiation pattern, G3OUT for first suggesting the idea of the Mini-Halo, and G3FRF for co-operating in carrying out field strength comparative tests.

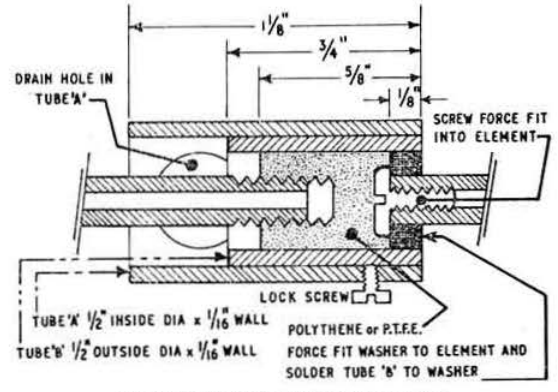


Fig. 3. Cut-away view of the capacitor.

WELL . . . DO YOU KNOW?

By R. F. STEVENS, G2BVN*

DURING the past two or three years the writer has taken part in many discussions on the international aspect of Amateur Radio, and, rather sadly, has come to the conclusion that the majority of amateurs have very little interest in or knowledge of this side of our hobby. Listening recently to a QSO during which such organizations as ITU, IARU and IARC were being " explained " by a self-styled expert produced a state of near apoplexy and as a safety valve this article has been written in the hope that thereby a little light may fall in some dark corners, and facts, vital to our very existence, become known.

THE PAST

One hundred years ago on May 17, 1865, the International Telegraph Union was formed in Paris by the representatives of 20 states. In 1932 this title was changed to the present International Telecommunications Union, which in November, 1947, became a specialized agency of the United Nations, and now boasts a membership of 125 nations. Amongst the aims of the ITU, as originally laid down, are: " To maintain and extend international co-operation for the improvement and rational use of telecommunications . . . to develop technical facilities and to improve efficiency . . . to harmonize the actions of nations in the attainment of these common ends."

The ITU regulates telephonic and telegraphic communications, but it is with radio that we are primarily concerned as members of the Amateur Service. In 1927 at Washington the first agreed allocation of radio frequencies took place, and this was followed by conferences at Madrid (1932), Cairo (1938), Atlantic City (1947) and Geneva (1959). The ITU has two instruments by which the regulation of international radio affairs is effected: these are the Plenipotentiary Conference and the Administrative Radio Conference. Basically, the former consists of the responsible ministers and their advisers from the member nations who lay down matters of policy, whilst the ARC consists of delegations from the nations who proceed to the detailed work which, in 1959, led to the Geneva Radio Regulations.

The International Amateur Radio Union was formed in 1925 as a union of societies, one of which was appointed as a Headquarters Society. The ARRL assumed this task in 1925 and continues to act as such at the present time. The officers of IARU are appointed from the Headquarters Society which also distributes a biannual publication known as the *IARU Calendar*.

Any Amateur Radio society without commercial affiliations and which has substantial representation in its own territory can be elected to IARU, but only one society from each nation can be admitted. The Constitution of the IARU makes no provision for the allocation of funds to the Headquarters, and as a result the Union has no teeth except those that might be provided by the Headquarters Society. This, in the opinion of the writer, may, in the light of modern events, be classified as a major omission.

Surprisingly the IARU did not meet after its inaugural session in 1925 until the twenty-fifth Anniversary Congress at Paris in May, 1950, business in the intervening period being conducted on a postal basis. The 1950 Congress, which elected W. A. Scarr, G2WS, as President, agreed to a recommendation that another meeting should be called within three years in order that the IARU might keep a closer watch on the changing problems of Amateur Radio. At the same time it was agreed that the Headquarters Society could be assisted in the task of Administration of IARU by the formation of a Bureau of Societies in Region I, of which Arthur O. Milne, G2MI, was the first Honorary Secretary.

In explanation of the term " Region I " it should be explained that the Geneva Radio Regulations define three Regions when making frequency allocations. Broadly these are: Region I, Europe and Africa; Region II, North, Central and South America, and Region III, Asia and Australia.

The first meeting of the Region I societies took place in Lausanne in 1953, followed by conferences at Stresa, Bad Godesberg, Folkestone and the latest at Malmö in 1963. It is noteworthy that the present Secretary of Region I, John Clarricoats, G6CL, attended that 1950 Paris Congress and has been present at each conference since that date.

THE PRESENT

The latest edition of the *Calendar* shows that there are 62 subscribing member societies of the IARU; further applications are known to have been made, or are imminent, and generally the amount and quality of co-operation between member societies has never been excelled.

In April, 1962, a club, not being a national organization but rather one having extra-territorial status, made its appearance under the title International Amateur Radio Club. This club was originally composed of amateurs connected with ITU Headquarters in Geneva who met weekly at ITU HQ at the Place des Nations. The scope of the Club has now been widened and membership is world wide. Members are encouraged to visit Geneva and operate the Club station operating under the call 4U1ITU. The Visitors' Book in the station records the signatures of visitors from more than 120 countries. The Club does not seek to compete with existing organizations but rather to complement their activities, and indeed the first purpose of the Club, as set out in the Rules, is to further, through Amateur Radio, international friendship and understanding. With its unique position at the HQ of the ITU the IARC is probably better placed than any other organization to achieve this object. Its Conventions, held in September, 1963 and 1964, were outstanding successes.

THE FUTURE

The first question that requires an answer is " When will the next Administrative Radio Conference take place? "

Without going into the reasoning behind this statement it is the opinion of the writer that this may not take place before 1968-1970. Why, then, may demand the reader, is there any urgency, there's at least two to three years to go, so there's no hurry. And that, unfortunately, is just where you are wrong, for the Amateur Radio movement should be glad that it has at least a breathing space in which to make some, but not necessarily adequate, preparations for the next ARC. There is much to be done, and all of this cannot be accomplished without a great deal of sustained effort; the time that we have available is not a day too long.

The amateur case for the next Administrative Radio

*51 Pettits Lane, Romford, Essex.

Conference can, it is believed, only be effectively prepared within the framework of the IARU and with the wholehearted co-operation of all the member societies. With the ever-increasing number of emergent nations all demanding frequencies, partly for useless prestige broadcasting, the h.f. amateur bands will be eyed with jealousy, but what of the increase in the number of amateurs, now more than 350,000 world wide. Obviously increased amateur bands are needed despite the modern techniques that have been adopted to make the best use of the existing frequencies. The case to support thinking of this kind should be in course of preparation now, and must be a major agenda item at the next IARU Region I Conference in 1966.

In 1950, the then Secretary of IARU and General Manager of ARRL, A. L. Budlong, W1BUD, stated that the ARRL view was that representation should be on a purely national basis and that representation in the name of the IARU would be infinitely less effective. After the disastrous conference at Atlantic City in 1947 when precious frequencies were lost to the amateur service, it is a source of amazement to the writer that such muddled thinking could prevail. The lack of any meetings between 1925 and 1950 comes as no great surprise when IARU HQ Officers held the views expressed above, but how much has been lost through the attitude of the Headquarters Society? It was only in 1964 that any attempt was made to form an effective organization covering North and South America, and one hears that this has not been an unqualified success. Better late than never, however.

The RSGB has taken the initiative in suggesting to the Region I societies that at the right time a band occupancy check should be undertaken on our amateur frequencies in order to produce some hard facts. This proposal has received general support and the task is something in which the society member will be able to participate. The RSGB Intruder Watch is both unique and valuable, its members have rendered yeoman service both to the RSGB and to the cause of Amateur Radio, but skilled members are now needed to replace those who can no longer afford the time and effort. Will you be among those who will come forward? Those responsible for governing the RSGB are well aware of the vital necessity of maintaining contact with our own telecommunications authorities at a high level. This is now being done and the effort will continue.

On the International scene we are fortunate in having an efficient Region I Division secretariat under the guidance of G6CL, but what of Region 3 where no organization exists? This Region includes the Commonwealth countries of Australia and New Zealand where surely there could be National and International co-operation. IARU Headquarters needs teeth in the shape of funds to enable it to undertake the duties which are vital in this day and age, and, above all, needs representation, not in Newington nor in London, but at Geneva at the Headquarters of the ITU, where the operative decisions will be made.

This article tells only a fraction of the whole story, but attempts to set the scene as seen through the eyes of one RSGB member whose views may, or may not, coincide with those of the Council of the Society. Be this as it may, there is one inescapable conclusion, your National Society, and through it the IARU, needs your support and understanding if the heritage of the Amateur Radio movement accumulated through knowledge and friendship, is to survive.

PROJECT OSCAR

Telemetry Transmissions

THE primary objective of the translator satellite *Oscar III*, which it is anticipated will be placed in orbit in the middle of February, will be to provide two-way communication between amateur stations operating within the band 144·075 to 144·125 Mc/s over ranges greatly in excess of those possible by normal modes of propagation. This will be effected by translating all signals received in this 50 kc/s wide band and retransmitting them in the 50 kc/s between 145·875 and 145·925 Mc/s. This was explained in greater detail in *A Guide to the Use of Oscar III*, by P. K. Blair, G3LTF, in the August, 1964 issue of the BULLETIN.

Oscar III is expected to be put into a near polar orbit similar to *Oscar I* and *II*, but the exact inclination angle and period will not be known until after launching. As a guide to the maximum communication distance possible, (i.e., ground station 1—satellite—ground station 2), the following table gives a rough approximation of its height, assuming a near circular orbit, once the period is known.

Satellite Height in Miles	Orbit Period in Minutes	Max. Communication Distance in Miles
100	87·5	1400
200	90·8	1900
300	94·2	2400
400	97·5	2750
500	100·8	3100
600	104·2	3400
700	107·5	3750
800	110·8	4100
900	114·2	4350
1000	117·5	4600

The satellite will transmit telemetry signals on 144·85 Mc/s consisting of a pair of " HI's " in Morse code followed by two bursts of pulses having a repetition rate of 64 pulses per second, each burst indicating a temperature measurement made at a specific point in the satellite. The repetition rate of the complete telemetry sequence (two HI's plus two bursts of pulses) is related to the battery voltage; as the voltage falls the time taken to transmit a sequence will increase within the range 6 to 12 seconds.

The temperature readings will be indicated by the ratio of pulse width to pulse repetition frequency and to ascertain this it will be necessary to have available a simple oscilloscope on the screen of which the width of a pulse and the distance between the leading edges of two successive pulses may be marked with a chinagraph pencil. The required ratio could then be determined at leisure.

Project Oscar Inc. are particularly anxious to have reports of the pulse duty cycle ratios and battery voltage indications received by amateurs, as the only clue to any malfunction of the equipment will be contained in this information. Reports may be sent direct to Project Oscar Inc., PO Box 183, Sunnyvale, Cal., or to W. H. Allen, G2UJ, who will be pleased to forward all reports in bulk.

SECOND LONDON S.S.B. DINNER

Waldorf Hotel, Aldwych, W.C.2

SUNDAY, MAY 29, 1965

There will be a comprehensive trade show by British and American manufacturers in the afternoon, and cabaret and dancing after the dinner. It is anticipated that several amateurs from America and other countries will be present.

Tickets, price 3 guineas per person, will be available shortly from Mr N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10.

Transistorized Charging System for Cars

By R. H. HAMMANS, G2IG*

POSSIBLY the chief obstacle to mobile radio communication is noise generated by the electrical system of the vehicle in which the equipment is carried. In usual order of severity the sources of noise are:

(i) Ignition
(ii) Generator
(iii) Voltage regulator
(iv) Other accessory electrical equipment

There may be some differences of opinion as to the order of severity in the above cases, because the prominence of these various noises may differ from car to car and from frequency to frequency, and even in some cases from installation to installation. Nevertheless, the ignition system is completely separate from all the others, and ways and means of treating this section are dealt with exhaustively elsewhere. There is little that can be done to the dynamo apart from fitting a standard filter, and in the writer's experience this treatment is effective. This leaves the voltage regulator which, at the higher frequencies at any rate, can cause catastrophic interference, which is often very difficult to eliminate by any of the well tried methods.

Conventional Control Units

Before looking at the design for an alternative voltage regulator system, an explanation of the operation of standard electro-mechanical regulators will be given so as to clarify the requirements for those who are not completely familiar with these units.

Voltage regulators fitted to most cars contain a relay, the winding of which is supplied with current from the battery and is critically adjusted to operate at a predetermined battery voltage. As soon as this voltage is reached, the relay will open a pair of contacts which, until this moment, had been short-circuiting a series resistance in the field supply of the dynamo. When the field resistance appears in the circuit, the dynamo voltage drops and the relay opens again, thus short-circuiting the series resistance once more and causing a rise in dynamo voltage. The sequence is repeated rapidly, depending upon various mechanical and electrical constants and adjustments, thus effectively keeping the battery voltage from rising above the pre-determined value.

Some regulators, or "control units" as they are often called, include a further relay, which is made to operate at a critical maximum current. This also opens the short-circuit across the field resistance, and brings the dynamo voltage down to such a value that the current does not exceed the safe limit. A third relay, usually known as the "cut-out," is always to be found in these control units, and this ensures that the dynamo and battery are not connected together until the dynamo voltage is at least as great as that of the battery. This precaution is obviously essential to stop the battery from discharging back through the dynamo when the car is idling. Without a cut-out, the battery would try to drive the dynamo, and hence the car, as a battery operated vehicle!

The noise generated in radio equipment is due to the r.f. energy developed at the contacts in the field supply, and because an inductive circuit is being interrupted, a spark with its attendant interference is inevitably caused. Such sparks occur at a rate up to 10 or 15 times a second, and the result is a somewhat irregular clatter which is extremely difficult to eliminate.

Semi-conductor Unit—Circuit and Operation

The following description is of a home constructed device designed to carry out all three of the afore-mentioned functions, i.e., voltage regulation; current regulation; and cut-out. In Fig. 1, the complete circuit, the dynamo negative terminal is connected to terminal *D*, while the positive dynamo terminal goes to *E* and the chassis of the car (this is for the more common positive earth systems). The field terminal of

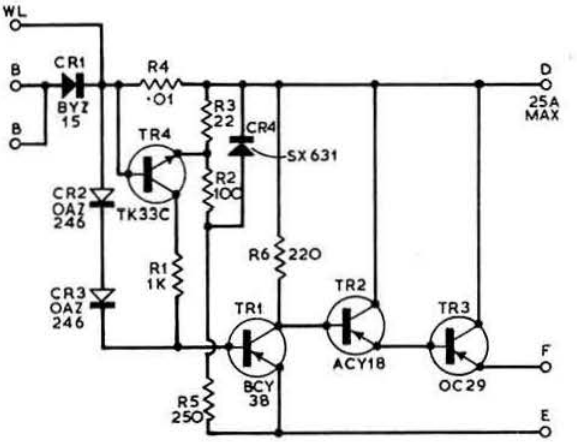


Fig. 1. Semiconductor voltage regulator and current limiter designed for a Series IV Humber Super-Snipe.

the dynamo goes to *F*. On the left of Fig. 1 are two terminals marked *B*, to which the battery is connected; this duplication is merely to simplify wiring the electrical installation of the car. Only one terminal is for the battery connection, in fact, the other being a convenient anchorage for other parts of the electrical installation which have to go direct to the negative supply. Terminal *WL* is connected to the ignition warning light which glows red as soon as the ignition is switched on, and remains visible until the engine speed has raised the dynamo voltage to that of the battery.

TR2 and TR3 form a compound emitter follower; collectors go to the negative dynamo terminal whilst the emitter of the output transistor TR3 goes to the dynamo field winding. They thus constitute a low impedance connection which may be varied in resistance to control the amount of field current. This particular unit was designed to work with a field winding of resistance 6 ohms, which will draw a current of nearly 2½ A from the armature winding when the latter is delivering about 14 volts. Thus TR3 has to be rated for 2½ A. With a current gain of 50, the base drive current for TR3 and the emitter current for TR2 must be capable of rising to 50 mA. A further current gain of 50 in TR2 requires a base drive current of 1 mA into the latter, and this is drawn through R6 from the negative supply line. R6 also normally carries a much larger current to the collector of TR1.

Reverting to first principles for a moment, it should be

* "Shirley," Bramhall Park Road, Bramhall, Stockport, Cheshire.

realised that to a reasonable approximation, the dynamo voltage is proportional to engine speed and to field current. Engine speed for obvious reasons has to be capable of varying over very wide limits without the dynamo voltage being permitted to alter. If, however, the field winding were connected across the armature output with no controlling series resistance, the field current would rise in direct proportion to the dynamo terminal voltage which in turn would rise in proportion to engine speed. The controlling circuit therefore has to be arranged so that the faster the engine rotates, the smaller the field current becomes so as to compensate almost exactly for the tendency of output voltage to rise. Referring again to Fig. 1, there are two OAZ246 Zener diodes connected in series between the dynamo negative line and the base of TR1. At voltages below the Zener point of these two diodes, virtually no current passes, and it follows that TR1 draws negligible collector current through R6. Thus the base potential of TR2 is practically the same as that of the negative dynamo terminal, and the compound emitter follower connection of TR2 and TR3 will ensure that the field winding is across almost the full dynamo output. So long as the dynamo output is less than the Zener voltage therefore, the field current will be enough to allow the dynamo output to rise to the maximum value permitted by the speed of the engine, which in all cars is only just above idling speed. As soon as the dynamo voltage rises very slightly above the Zener voltage, there is a sudden increase in Zener current flowing in the base of TR1, which causes a substantial voltage drop across R6 as the collector current increases. As soon as the collector potential of TR1 falls nearer to the positive or earth line, however, the base of TR2 to which it is connected has to follow, and again, by emitter follower action, the voltage across the field winding is reduced. The voltage reduction, and hence the field current will be held at a balance point which will keep the Zener current down to only a few milliamps, whereas if the dynamo output voltage were allowed to rise by as little as $\frac{1}{2}$ volt the Zener current would be large. By this process, below the critical voltage the field is effectively connected across the dynamo without series resistance while above the critical voltage the field series resistance formed by TR3 increases so as automatically to ensure that the dynamo voltage cannot rise further.

So far only the voltage control part of the circuit has been described; the voltage across the Zener diodes has been stabilized to a predetermined value irrespective of engine speed, but the current limiter and cut-out functions remain to be dealt with. The latter function is fulfilled by a high current silicon diode in series with the line from dynamo negative to the battery, polarity being arranged so that the dynamo has to be more negative than the battery in order that charging current can flow. When the dynamo voltage is less negative than the battery negative terminal, the diode will behave as a very high resistance. Effectively, therefore, we have an automatic cut-out which achieves with semiconductor methods the same task as the cut-out relay.

The BYZ15 rectifier shown in Fig. 1 is rated at 40A continuously, and is necessary for this particular unit, because the car to which it is fitted, namely a Humber Super-Snipe, requires a maximum charging current of 25 A. If 20 A maximum charging current is sufficient, then a smaller and cheaper silicon rectifier can be used, for instance the BYX13. Neither terminal of this silicon rectifier is at ground potential, so it is necessary to mount it on a mica washer to provide electrical insulation from the case, whilst at the same time permitting the case to behave as a heat sink. It must be remembered that the whole of the circuit between terminal *D* and terminal *B*, including the rectifier connections, has to carry a very large current of up to 25 A, and both the connecting wire and terminals must be large enough to carry this current without overheating. Terminals of the flat square-ended spade type suitable for push-on connection as used in many modern cars can be obtained from the car dealer or the manufacturer of the electrical equipment in the vehicle.

For current limiting an extra transistor TR4 of the *n-p-n* type has been included in the circuit. A very low value resistor R4—approximately 0·01 ohms—is placed in series with the main negative line between dynamo and battery. This value produces a drop across it of 0·25 V when 25 A are being drawn by the load. TR4 has its emitter biased to cut-off by just under 0·25 V by means of the potential divider R2 and R3. The voltage feeding this potential divider is derived from the forward voltage drop across silicon diode CR4, which remains constant over a fairly wide range of current. The diode and the potential divider are supplied with current through R5. When the current in the negative line from the dynamo rises to 25 A, TR4 is just about to start conducting, because the emitter cut-off bias is counterbalanced by the drop across R4 when 25 A are being drawn. As soon as TR4 conducts, current is drawn through R1 via the base of TR1 in exactly the same way as the Zener current when the dynamo voltage exceeds the pre-set value. TR4 therefore behaves, in respect of current overloads, in the same way as the Zener diodes CR2 and CR3 behave when the voltage limit is reached. The action after TR4 is precisely the same on TR1, TR2 and TR3, and the net result is that the field current reduces, dropping the dynamo voltage to such a value that not more than 25 A can flow even into a short-circuit. Possible damage to the dynamo by overheating is therefore eliminated.

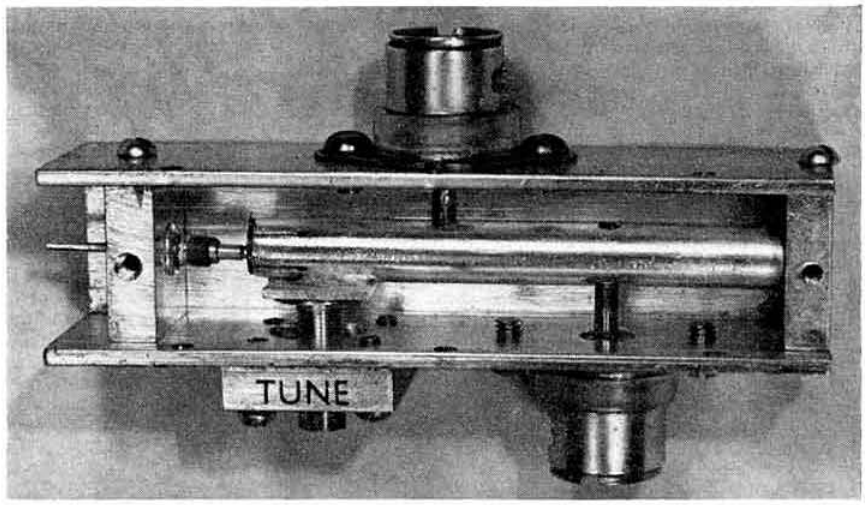
R4 was constructed from about 3 in. of resistance wire having a large enough cross section to carry the full current without overheating. The correct length for 0·01 ohm can be readily calculated from any standard wire tables once the gauge and composition of the wire are known.

No other values in the circuit shown in Fig. 1 are critical, with the possible exception of the choice of Zener diodes CR2 and CR3. The voltage at which these two diodes conduct is the sum of the Zener voltage of each, and the total must amount to about a volt in excess of the required battery voltage when the latter is on full charge. The maker's maintenance manual for the car in question can be consulted for this information, but generally a combined Zener voltage for CR2 and CR3 should be close to 16 V. The manufacturers of Zener diodes do not usually make these components with tolerances better than 5 per cent, and therefore in 15 V a discrepancy of $\pm$ 0·7 V could easily occur with a random choice of specimens. Using two in series tends to minimize the statistical error, and a further advantage is that the slope resistance of two 8 V Zener diodes in series is always lower than that of a single 16 V component. Nevertheless, it is possible that some degree of selection may have to be resorted to in order to find two Zener diodes which provide a combined voltage close enough to the required value.

Construction

There is no particularly critical way of constructing this unit. There is no r.f. noise generated, and therefore there is strictly no need for any screening, but it will probably be found most convenient to use a metal box, and the type used in the writer's model was the small Eddystone diecast box measuring $2\frac{3}{8}$ in. $\times$ $4\frac{1}{4}$ in. $\times$ $1\frac{1}{4}$ in. Some ingenuity had to be adopted to fit all the components and circuitry within a box of this size, but there is really no need to attempt such miniaturisation. Probably the medium-sized diecast box of the same type would generally be more suitable. Because of the standard procedures adopted in car electrical installations, it is essential to have the box at car chassis potential, i.e., connected electrically to the positive end of the electrical system, and it follows that all the components attached to the

(Continued on page 111)



Tunnel Diode Amplifiers

With a practical design for a parallel amplifier on 70cm

By SVEN F. WEBER, B.Mus, LRAM, G6SFW/T, G8ACC*

TUNNEL diodes have been available at a reasonable price for some years. They have been talked about for even longer, but the fact remains that the average amateur has very little idea of the potentiality of these most extraordinary products of semi-conductor research; and this in spite of the fact that tunnel diode circuits are almost ridiculously simple

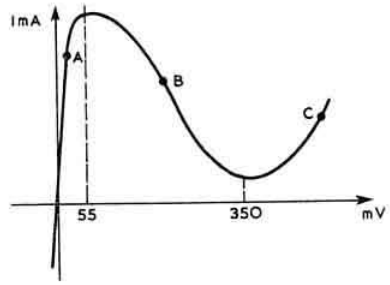


Fig. 1. Plotting current against applied voltage to a tunnel diode.

(at least on paper) and that results are very easy to achieve.

One of the factors which has the largest effect on semi-conductor action is impurity content. By and large, if the impurity content in the semi-conductors forming a junction diode is reduced, the reverse voltage capability of the diode is increased. Equally, if the impurity content is increased, the reverse voltage possible is reduced. So far so good—and taken for granted by most amateurs. If, however, the impurity content is made sufficiently high, around 2×10^{19} atoms per cc in Germanium, the reverse breakdown voltage is reduced to zero and the diode becomes almost an ordinary conductor in the reverse direction. This degree of " doping " is said to make the semi-conductor " degenerate."

The fact that the reverse breakdown voltage drops to zero is not by any means all that happens. If degenerate *p* and *n* semi-conductor materials are brought together under very carefully controlled manufacturing conditions to make an extremely abrupt junction, of the order of 150 Å in thickness, the forward characteristic is also affected. Drawing a graph of current against voltage, one obtains a curve similar to Fig. 1. Starting from zero volts across the diode, the current at first increases more or less linearly in the forward direction. At about 55 mV though, the current levels off and then starts to decrease until at 350 mV (for Germanium) it reaches a minimum and again starts to climb—more as one would have expected from a semi-conductor diode.

Looking at this graph a bit more closely, the slope of the curve at any point is a measure of the diode a.c. resistance, and this can again be plotted against voltage as in Fig. 2.

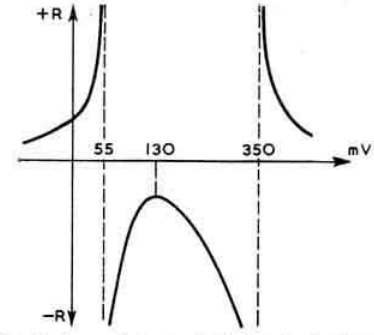


Fig. 2. A.c. resistance plotted against voltage.

* 65 Combemartin Road, Southfields, London, S.W.18.

The really interesting part of this graph is the central portion where the curve is negative. What does this mean or imply? By definition, any ordinary resistor dissipates power when current flows through it. It follows then, that a negative resistance will generate power; in fact, current flowing into it will be out of phase with current leaving it. Impossible? Remember that this is not a resistance in the d.c. sense: it is an a.c. resistance such as the anode resistance of a valve; a negative incremental resistance. Put this negative resistance in series with or in parallel with a load and the possibility of power gain will become more evident. Let us take the series case first. If a voltage V is applied to R_1 and R_2 in Fig. 3, and the voltage across R_2 is measured, it will be found to be IR_2, where I is the current due to V through both resistors. V equals $I(R_1 + R_2)$, and therefore the "gain," that is,

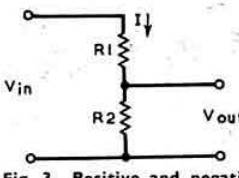


Fig. 3. Positive and negative resistances in series.

$$\frac{V_{out}}{V_{in}} = \frac{R_2}{R_1 + R_2}$$

and, if R_2 is negative, the result can be greater than 1. It can even approach infinity if the two Rs are equal. The parallel case is just as obvious though in this case it is better to work with conductances (reciprocal resistances) as in

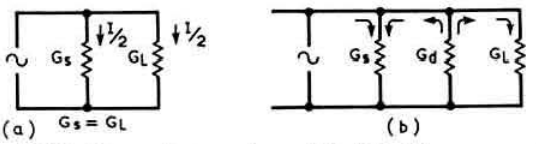


Fig. 4. (a) Positive conductances in parallel. (b) Positive source and load conductances in parallel with a negative conductance.

Fig. 4. If source and load conductances are equal then the source current splits equally between the two halves of the circuit, the power in the load is $\frac{I^2}{4g_L}$ and the power gain cannot be greater than 1. If the load is paralleled by a negative conductance, then current in this section will be out of phase with the driving current. That is, the negative conductance acts as an additional source and supplies additional current to the circuit. Load current can now be greater than $\frac{I}{2}$ and power gain exceeds 1. The power gain will be seen to be

$$\frac{P_{out}}{P_{in}} = \frac{4g_S\, g_L}{(g_S + g_L - g_D)^2}$$

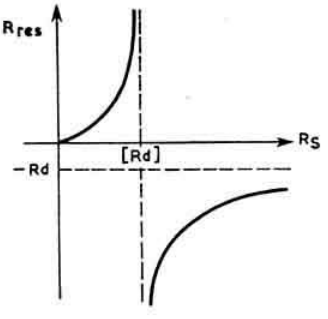


Fig. 5. Resultant resistance for negative (diode) and positive resistances in parallel.

which can again approach infinity, as can be seen by making the source and load conductances together equal the diode conductance.

Drawing a curve for the parallel case, plotting "resultant" impedance against source impedance, all other things being equal, leads to the odd-looking curve in Fig. 5. As the source resistance is increased towards the value of the diode resistance, the resultant increases and shoots off towards infinity. That is, any current I that may be flowing through the source is equally flowing through the resultant, giving rise to a much higher voltage than would appear across the source. Increase the source resistance above that of the diode and the resultant immediately reappears from negative infinity and drops towards a value equal to the diode negative resistance. But, and this is important, the resultant here is always negative, and the device will oscillate (or switch).

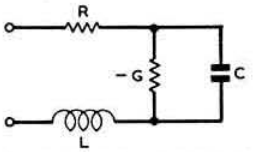


Fig. 6. Equivalent circuit of tunnel diode for a.c.

Let us now look at the diode itself a bit more closely. There are many good explanations of its physical operation [1, 2, 3], but these are by no means necessary for an understanding of its circuit function. In purely practical terms, the diode is a negative conductance in parallel with a small capacitance, with the whole lot in series with an inductance and some residual resistance of the more normal kind. We will play with these for a start (see Fig. 6).

Total impedance across the terminals:

$$Z_{tot} = j\omega L + \frac{1}{j\omega C + |-g|} + R \qquad \ldots . (1)$$

$$= j\omega L - \left[\frac{j\omega C + g}{(\omega C)^2 + g^2}\right] + R$$

Equating real and imaginary parts:

$$Z_r = \frac{-g}{(\omega C)^2 + g^2} + R \qquad \ldots . (2a)$$

$$Z_j = j\omega \left[L - \frac{C}{(\omega C)^2 + g^2} \right] \qquad \ldots . (2b)$$

At frequencies we can call "resistive cut-off" and "self-resonant" respectively, these will become zero:

i.e. $$R = \frac{g}{(\omega C)^2 + g^2} \text{ or } f_r = \frac{g}{2\pi C}\sqrt{\frac{1}{Rg} - 1} \qquad \ldots . (3a)$$

and: $$L = \frac{C}{(\omega C)^2 + g^2} \text{ or } f_j = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \left(\frac{g}{C}\right)^2} \qquad \ldots . (3b)$$

The implications of the two equations we have ended with are quite simple. The resistive cut-off frequency, f_r, is the frequency above which the diode will not amplify because its negative resistance has been effectively reduced to zero, and the self-resonant frequency f_j decides the normal maximum frequency of oscillation. Let us put in some values. The 1N2940 diode is suitable, and the published characteristics are as follows:

g = 6·6 mmho
C = 5 pF nominal
L = 1 mμH with leads clipped very short
R = 1·5 ohm

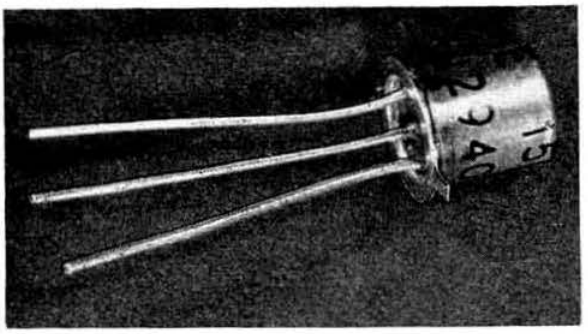
which gives f_r as 2100 Mc/s, and f_j as 1300 Mc/s. So there is obviously some u.h.f. possibility in these devices.

Looking a little more closely at the two equations and remembering that L, C and R can be added externally, if f_j is lower than f_r then the device will want to oscillate. If it is higher, then it will amplify, so:

$$\frac{1}{2\pi}\sqrt{\frac{1}{LC} - \left(\frac{g}{C}\right)^2} > \frac{g}{2\pi C}\sqrt{\frac{1}{Rg} - 1}$$

$$\therefore\ Lg < RC$$

$$\text{or}\quad R > Lg/C \qquad \ldots . (4)$$



The IN2940 tunnel diode.

Also for real values of f_r: $\frac{1}{Rg} > 1$

$$\therefore \quad \frac{1}{g} > R \qquad \ldots . (5)$$

Combining these two results gives: $\frac{1}{g} > R > Lg/C \ldots . (6)$

and any successful amplifier must satisfy these conditions. Actual gain is determined by matching source and load conductances to that of the diode.

Take a practical case: a series amplifier for 145 Mc/s (see Fig. 7). Here the source, diode and load resistances are cascaded and the total of source and load resistance should again approach the value of diode resistance. The diode with the highest available value of negative resistance (at the inflection point) is the 1N2939, and it is 150 ohms. This is only just twice 75 ohms—a usual aerial and receiver impedance value—so, for the sake of argument, we will assume that impedances of the order of 40 ohms are available (actually it would not matter, as will be explained later), and that the shunt capacity across the diode is 5 pF. Considering the external source and load impedances as part of the diode

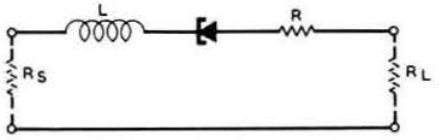


Fig. 7. A.c. circuit of series amplifier.

residual impedance R, we can calculate the total permissible value of R from equation 3a:

$$R = \frac{g}{(\omega C)^2 + g^2} =$$

$$\frac{6{\cdot}6 \times 10^{-3}}{(2\pi \times 145 \times 10^6 \times 5 \times 10^{-12})^2 + (6{\cdot}6 \times 10^{-3})^2} =$$

103 ohms.

Impedances external to the diode will account for 80 ohms, the diode for 1·5 ohms, leaving 21·5 ohms to be supplied in the form of a non-inductive resistor. Now for the series inductance. Lg/C must be just less than R (at all frequencies), and working this out gives a figure of 78 mμH, of which up to 12 mμH can be accounted for in the diode leads.

So the design is simply 40 ohms source and load, 21·5 ohms series resistance and 0·078 μH series inductance. If the source and load also happen to have a d.c. resistance of 40 ohms each, biasing conditions (the same in essence) will have been met, or the diode can be supplied as shown. This kind of amplifier can give a steady 30db gain at 145 Mc/s with no trouble at all, which can be increased to over 40db at the expense of bandwidth by increasing L towards its limit of 78 mμH.

It may, of course, be objected that the aerial and receiver impedances are not known accurately enough. This really does not matter much: a commercially built aerial will usually be near its design impedance, and providing it is matched to its cable, one can assume that the impedance at the bottom end is what one thinks it is. In this design there is a total of 103 ohms to play with, so if the aerial is of 75 ohms impedance, 28 ohms would have to be found elsewhere: in the receiver. It would be just a matter of tapping down on the receiver input coil until a suitable point was found. The only possible cause of trouble would be if the impedances were substantially higher at some other frequency, which could cause oscillation.

Now, a parallel amplifier. At u.h.f. the parallel amplifier is by far the easier to manipulate (the series amplifier becomes rather awkward, as will be seen if figures for a higher frequency are tried in the equations above), and is conveniently in the form of a loaded quarter-wave co-axial line. Several designs have been published, most of which are noteworthy for their impracticability as far as the amateur is concerned. One beautiful design uses two diodes across a strip-line coupled hybrid to give a gain of up to 10db—with a

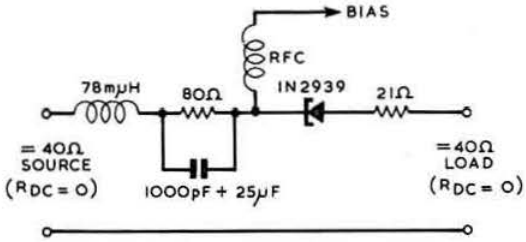


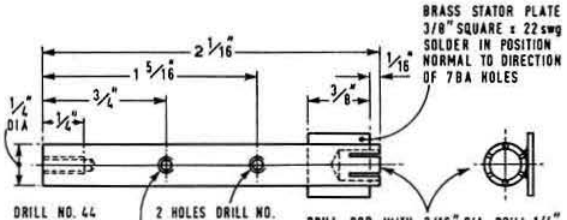
Fig. 8. A practical tunnel diode amplifier circuit for 145 Mc/s.

noise factor 1·9db—over a bandwidth of from 210 to 625 Mc/s [4], which is all very well until one discovers the price of a strip-line coupled hybrid. The writer has a rooted objection both to paying more and doing more work than is necessary on any project, so after finding out current circulator prices he came down to earth rather rapidly and decided to make life as easy for himself as he could. For this reason, the unit to be described was made with no more tools than a fine hacksaw, a drill, some taps and dies, a precision file and a screwdriver. Plus, well, some elbow grease. Cost? Not more than 10s, excluding the diode.

Designing a Typical Amplifier

The centre frequency of this unit is to be 435 Mc/s (a wavelength of 68·98cm). Tunnel diodes usually have a capacitance of around 5 to 10 pF, and this varies between samples, so for a parallel amplifier of reasonable length, a low impedance trough line would appear the best. Using commercially available $\frac{3}{4}$ in. equal brass channel of 16 s.w.g., with a $\frac{1}{4}$ in. lid and a $\frac{1}{4}$ in. diameter centre rod, the line impedance is getting on for 60 ohms. With a line length of 5cm, the Z_oC product* is 800, so about 13 pF will be needed to tune to resonance. This gives a choice of diodes. The 1N2939 and 1N2940 have a design capacity of about 5 pF; the 1N2969A has about 8 pF. All three have the necessary frequency capabilities. However, the conductance of the first two is 6·6 mmho (150 ohms), which might be difficult to match, while the 1N2969A is 16 mmho (63 ohms) which seems a better proposition (remember that the source and load conductances are in parallel).

* RSGB *Amateur Radio Handbook*, p. 145.



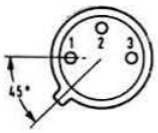


Fig. 9. (*a*) **Details of the $\frac{1}{4}$in. diam. centre line.** (*b*) **A TO-18 tunnel diode base. Pins 1 and 2 are the positive electrode, connected together internally. Cut these leads to $\frac{1}{4}$ in., and clip both to the feed-through capacitor. Pin 3, the negative electrode, is connected internally to the housing, and the lead should be clipped short.**

The 1N2969A diode will want to see an admittance of 16 mmho at its end of the line. This will be made up of two parts: that of the aerial and that of the receiver, both transformed by their respective positions on the line. From considerations of noise, the receiver output should be " undermatched," so its tapping point will be further down the line than the aerial point. We shall allow a bit over 5 mmhos for the receiver and 10 mmhos for the aerial as seen at the diode. If each has an actual conductance of 13·3 mmhos (75 ohms impedance) it is now easy to calculate where the tapping points should be. The line admittance at any point is directly proportional to the cotangent of the phase angle at that point (this sounds awful: all it means is that the line impedance follows a tangent curve), but for a length of line so short in relation to a quarter wavelength, the change can be taken as approximately linear. The receiver point will be at $\frac{5}{13{\cdot}3} \times 5\text{cm} =$ 1·9cm, and the aerial at $\frac{10}{13{\cdot}3} \times 5\text{cm} = 3{\cdot}8\text{cm}$.

That completes the theory. We now have a 60 ohms trough line made of $\frac{3}{4}$ in. square channel and $\frac{1}{4}$ in. rod centre conductor, tapped at 1·9 and 3·8cm from the shorted end, and with a 1N2969A diode doing all the work.

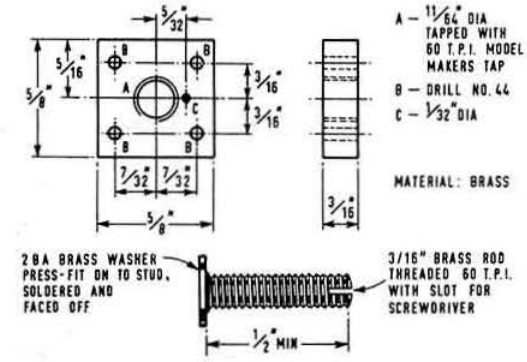


Fig. 10. (*a*) **The tuning capacitor side plate, formed from $\frac{3}{4}$ in. × $\frac{3}{16}$ in. brass strip. The rotor shaft spring clip is $\frac{1}{2}$ in. of 22 s.w.g. piano wire shaped to a " U " form, and bent at one end to fit in the $\frac{1}{32}$ in. diam. hole C. The other end clips under one of the 8BA screws: either top or bottom left.** (*b*) **The capacitor rotor assembly.**

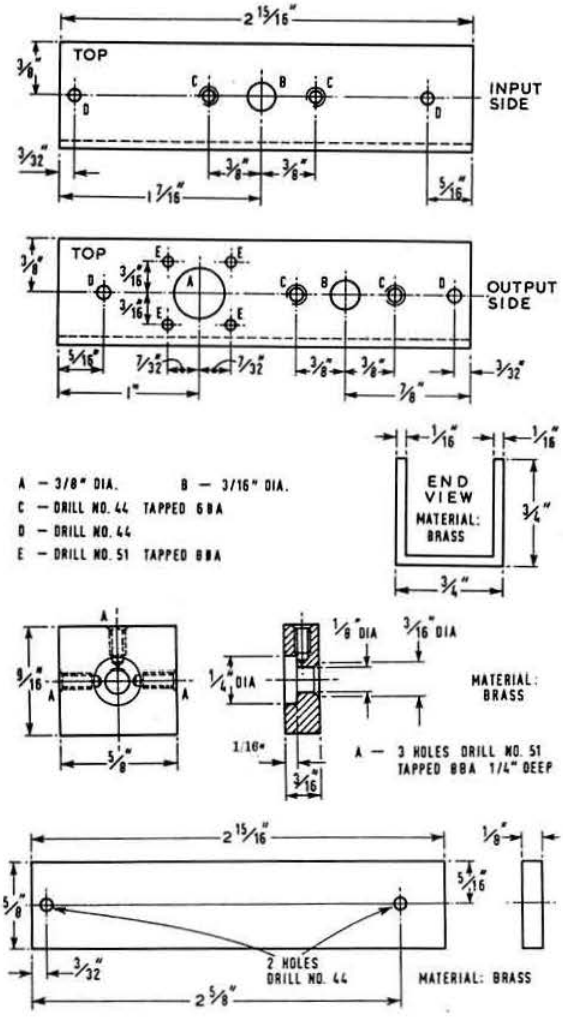


Fig. 11. (*a*) **The tunnel diode amplifier line main body, cut from $\frac{3}{4}$ in. × $\frac{3}{16}$ in. equal sided brass channel.** (*b*) **Centre line end support plate, which should be brazed into position in trough. The dimensions and drilling for the capacitor (feed-through) plate are the same, with the exception that the centre hole is $\frac{1}{4}$ in. diam. drilled right through. The 1000 pF feed-through capacitor, preferably the type having a slot in one end to accept the diode leads, is soldered into the hole. This end plate must not be soldered into the trough.** (*c*) **Cover.**

Constructional Details

The materials required consist of 3 in. of square section 16 s.w.g. $\frac{3}{4}$ in. brass channel, lengths of $\frac{5}{8}$ in. × $\frac{3}{16}$ in. and $\frac{5}{8}$ in. × $\frac{1}{4}$ in. brass strip, 3 in. of $\frac{1}{4}$ in. brass rod, and a few inches of $\frac{3}{16}$ in. brass rod. Also needed are a 2 BA brass washer and a 1000 pF feed-through condenser, plus, of course, screws, etc. Drilling details are given in the diagrams. To tap 8 BA threads, use a number 51 drill, for 7 BA a number 48, for 6 BA a number 44 and for the $\frac{3}{16}$ in. × 60 t.p.i. model engineer's tap, an $\frac{11}{64}$ in. drill. A number 44 drill can be used for a hole to clear 8 BA.

The centre rod is cut to 5·2cm, and will be recessed in its end plate by 1mm. To make the socket for the diode at the end of the rod, first drill with a number 44 for a short distance, making certain that it is dead centre. Then re-drill with a

$\frac{3}{16}$ in. drill to a depth of $\frac{1}{4}$ in. Assuming that the drill has gone in centrally, then make three cross-cut slots with a saw and clean up the edges.

The tuning condenser is a little more difficult. Cut a $\frac{5}{8}$ in. square section from the strip and after marking out the centre, drill a $\frac{11}{64}$ in. hole and tap with the $\frac{3}{16}$ in. × 60 t.p.i. taper tap (gently does it!). The four mounting holes are drilled as shown. Drill also a $\frac{1}{32}$ in. hole a little to one side of the central threaded hole to take the locking clip, made of 22 s.w.g. piano wire. Now tap an inch section of the $\frac{3}{16}$ in. rod with the 60 t.p.i. die, saw off the end, clean up with a fine file and carefully make a cross-cut for screwdriver adjustment. Tap the 2 BA washer with the 60 t.p.i. tap, fit on, braze (do not use too much solder) and file flat. With a little care it is quite possible to get a good-as-perfect right-angled fit, which is very necessary. The stator is made of a $\frac{5}{8}$ in. flat square of 16 s.w.g. brass brazed on to the end of the centre rod—be careful that its plane is exactly at right angles to that of the two 7 BA holes further down the line.

When all the parts are ready and clean, fit them together and braze the centre rod assembly and channel, but *not* with the sockets in position. All the other parts screw on. Finish off with a fine file and fit on the sockets and tuning condenser assembly. Having soldered in the feed-through condenser on the end plate, fit the tunnel diode into its socket on the rod, clip lead 3 very short, then leads 1 and 2 to about $\frac{1}{4}$ in., pinch together and fit into bypass condenser and screw everything together.

Power Supply

Tunnel diodes work at very low voltages, and also, as they are majority-current devices, the junction cross-sectional area is very, very small (about 0·0001 in. diameter). So one overload and you go out and buy a new one. An absolute maximum of 10 mA, which represents about 4 mW, is quoted for the 1N2969A, and this really is an absolute maximum if you want to keep the diode intact. Actually, however, with the voltages in use, there is not much danger of passing too much current unless the polarity is accidentally reversed. A supply is therefore needed to give up to 350 mV, and it should be apparent from our equations that the diode bias supply must also be of equal or lower impedance than the diode, which is 63 ohms in this case. If it is not, the diode will simply switch itself permanently (or bi-stably, depending on circuit inductance) into a high or low voltage state (points *C* or *A* in Fig. 1). To get stable operation at point *B*, the bias supply load line must cross the curve at one point only; in other words, be of lower impedance than the diode. It may also be noticed that stray inductance, even when bypassed by 1000 pF (remember $L < Rg/C$), could prove troublesome. For this reason use a 25 μF decoupling electrolytic immediately across the 1000 pF bypass. The bias supply can be obtained in many ways: from batteries or other voltage sources via Zener diodes, from forward biased junction diodes or even series regulating *n-p-n* transistors. The last method has the slight advantages of lower current drain from the battery and a higher value variable resistor for control—low resistance carbon track pot's are rather difficult to obtain. Against this must be set increased cost and complexity. Still, providing that, in this case, the tunnel diode sees a source of no more than 60 ohms, all will be well as far as biasing is concerned. Drain is very low: at the optimum setting the diode will use only about 1 mA and maybe the bias supply can afford to lose a few more to get the required low impedance.

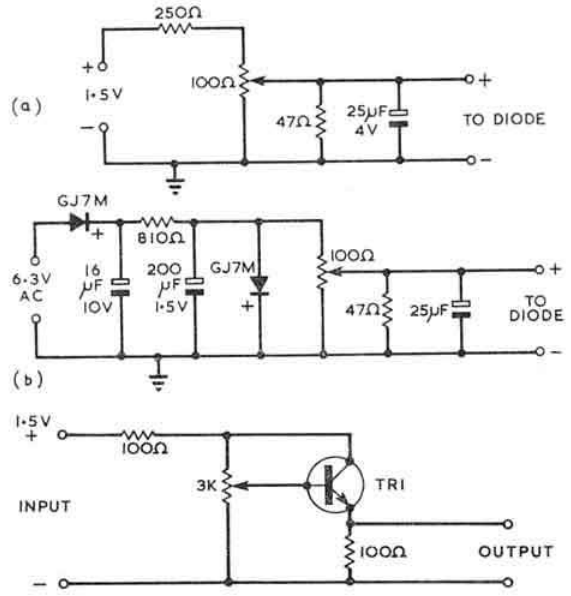


Fig. 12. (*a*) **A simple battery operated bias supply.** (*b*) **An a.c. fed bias supply using a forward biased diode to stabilize the voltage.** (*c*) **A series regulated transistor supply which was used in the prototype amplifier illustrated on the front cover of this issue. TR1 may be any** *n-p-n* **transistor having a reasonable gain. A 25 μF electrolytic capacitor must be connected across the output close to the 1000 pF feed-through capacitor.**

Alignment

Alignment is simple. Using a sensitive voltmeter to measure the voltage across the diode, increase this to about 200 mV. Plug in aerial and receiver and search for a medium-strength signal. Tune up the amplifier whilst gradually reducing the bias. The signal will increase considerably in strength without, in most cases, much increase in background noise. In all probability the unit will oscillate before 130 mV (the point of maximum conductance) is reached: this only means that aerial and receiver impedances are not quite what you thought they would be. It does not matter though: pretty high gain will be available before it goes off the deep end, as the diode, on some part of its characteristic, can match anything provided it is of lower conductance than the diode maximum. It will thus oscillate when it over-matches. If the gain goes through a maximum and then drops off, the aerial and receiver impedances are less than 75 ohms. However, even with 50 ohms source and load, the maximum available gain would still be of the order of 13db.

Noise, Gain and Other Points

The tunnel diode negative resistance shows shot noise as does any resistance, but the noise temperature is of the order of 300° K only, which is much better than either a valve or a transistor, though not as good as a parametric amplifier or a maser. The noise is also frequency dependent to the extent that as one approaches the cut-off frequency, the noise figure gets worse. However, even at a frequency of $1/\sqrt{2}$ of f_r, the noise figure is still only 6db. At medium frequencies (in the 400 Mc/s range), a noise figure between 3 and 4db can quite easily be obtained [5].

For the particular circuit configuration shown, the calculated gain-bandwidth product is around 300 × 10^6 c/s and this appears to agree quite well with results obtained in its use, as does the calculated noise figure mentioned above. One can literally choose the value of gain to suit one's own convenience, the limit being set by what bandwidth is required and the difficulty in holding it stable with very high values. 30db is possibly an effective limit.

As mentioned before, tunnel diodes do not like being overloaded in any way. Up to a point they have a built-in

(*Continued on page 102*)

Mobile Column

By E. ARNOLD MATTHEWS, G3FZW *

NEARLY ten years ago, the Oxford and District Radio Society organized a new venture; new for them, new for all of us. This gathering they called a " mobile rally." The event was successful, and so much so that the idea was repeated by many other societies with the increasing success to which we are now accustomed.

It is small wonder then that the Society, in conjunction with the Oxford & DRS, is to hold a Commemoration Rally in Oxford during the summer.

Rally Programmes

About now, club committees are probably getting down to the task of organizing the summer's events. From conversations that the writer has had with various organizers, it appears that this is neither an easy nor much-sought-after job. Most will tell you that they would always welcome more help, and it is always the same old tale of the usual few willing hands getting lumbered with all of the work. When one considers the amount of pleasure the annual summer round of rallies gives us, remember that your local rally could always do with more helpers, both beforehand and on the day.

This lack of help is probably responsible for the apparent staleness we observe in many programmes. Organizers found a good formula and more or less flogged it to death. We find the same old attractions at the same old sites year after year. Why? It is easier, and far less risky to do it the well-tried way! New ideas do not always come along!

The writer feels that most amateurs are neglecting the opportunity that rallies offer of presenting Amateur Radio in a very favourable light to the public. How many rallies have a prominent information bureau? How many rallies have tried running a few lecturettes, repeated throughout the day, on amateur radio subjects? When one considers the number of subjects germane to the mobile stream of the art alone, which would be suitable for this treatment, it would not be very difficult to organize, for instance, three 10 minute talks, repeated in rotation with 10 or 15 minute intervals during the peak attendance period. These would not be difficult to organize, or make too great demands on the lecturers.

Perhaps the problem is one of finance? Does the " Grand Swindle " occupy too much of the organizer's time for too little reward? A visit to a rally is cheaper than a day at the seaside. Perhaps we get too good value for our money? Whatever the reasons for the sameness of rallies, a new angle is required if the present popularity is to be retained.

Interference Suppression

Some years ago in this feature G5CP reviewed a pamphlet published by Bosch Ltd., entitled *Radio Interference Suppression*. We make no apology for bringing it to notice again. It is much more informative than equivalent publications and a great deal more practical. Although it concentrates on broadcast and v.h.f. needs, it is more helpful as regards h.f. requirements. It also contains a comparison table of the various terminal codes used by motor electrical equipment manufacturers. The pamphlet is Bosch Handbook No. A2/1, and is obtainable, free of charge, from Bosch Ltd., 20 Carlisle Road, The Hyde, Hendon, London, N.W.9.

With nearly 2000 mobile licences issued in Great Britain alone, one would have thought that by now manufacturers would have issued a pamphlet specifically for Amateur Radio applications. There might not be much financial gain, but what goodwill would accrue!

North Midlands Mobile Rally

It is understood that this event is to be held at Trentham Gardens on April 11, 1965.

* 1 Shortbutts Lane, Lichfield, Staffs.

Operation Janus

Kent and Sussex Senior Scouts' Expedition to Snowdonia

Kent and Sussex Senior Scouts are mounting an expedition to the Snowdonia region between July 31 and August 14, 1965, inclusive. A base camp will be established at Nant Gwynant (MR O.S. 1 in., Sheet 107, 635515) from which several smaller expeditions will be staged. Licensed radio amateurs who are also members of the scout movement are invited to join the expedition, with the object of establishing a fixed station at the base camp and operating portable with the expeditions. There would be every opportunity to try out equipment under rugged conditions and from high and unusual locations. Interested amateurs are, however, warned that conditions will be pretty tough and a lot of walking is naturally involved.

Amateurs resident in and around the Snowdonia area are invited to help by arranging schedules with the base camp station to give comparative reports on transmissions from the portable stations. The organizers would also be interested to receive offers from firms manufacturing portable equipment wishing to have their products tested in the field.

Patrick Moore, the well-known astronomer, will be one of the expedition staff and he will be setting up a weather station for meteorological observations. A qualified geologist will also be present as will instructors in canoeing and sailing.

The cost of food for the fortnight will be about £3 per head. Enquiries should be addressed to: L. R. Mitchell, G3BHK, " Katoomba," Tyneham Close, Sandford, Wareham, Dorset.

Tunnel Diode Amplifiers (Continued from page 101)

a.g.c. action (this follows from Fig. 1), and this non-linearity can produce some most curious spurious responses from out-of-band local TV transmitters. But it will *not* cope with a transmitter feeding it with a few watts: both input and output sides must be well shielded from strong r.f. fields, and it is a good idea to place a 75 ohm dummy load across the input when the aerial is removed. So be careful!

Other than this they are very useful and reliable little devices which work with the minimum of fuss, provided a few simple precautions are observed (i.e., series inductance and bias impedance, stray r.f., etc.). It is quite possible to extend the operation of a parallel amplifier to 1290 Mc/s with an *S*-band diode, where its noise figure would still make it worthwhile. Their main disadvantage, that they cannot readily be cascaded, is of no consequence to the amateur. Try one and see how easy it is.

Acknowledgment

The writer wishes to express his thanks to Mr Dudley Hosking for checking the manuscript.

REFERENCES

[1] *GE Tunnel Diode Manual*, (GE, New York, 1961).
[2] *Radio Constructor*, November, 1960.
[3] *Tunnel Diode and Semiconductor Circuits* (Carroll: McGraw-Hill).
[4] *Proc. IRE*, July, 1960, p. 1321.
[5] NEC Convention Record, 1960.

QUA Associates

conducted by "JIX"

AS I mentioned last month, Alan Shepherd, **G3RKK**, wrote me a giant letter containing his notes and views on the difficulties facing young beginners and on his own experiences at that stage. Although Alan says that he nearly gave up a number of times, I'm sure he won't mind me saying that I think with the kind of enthusiasm he shows winning through becomes in the end a matter of course! Alan isn't in the ancient class of OTs, in fact he left school only a short time ago.

He says, " My own opinion is that the main problem is not so much to interest young people in radio in the first place, but to keep them interested and direct their interest in the right directions. There are a vast number of boys who take up radio, but for the want of the right sort of direction never proceed beyond the broadcast receiver stage. Even if they do, there are many trials and tribulations along the way and as I see it, one of the main tasks of the Education Committee is to steer young people over these hurdles." Mind you, I would say, one must watch ' spoon feeding ' which always seems to result in producing passive and lazy members of a movement. Alan's analysis goes on, " At the time all this was happening I was about 12 and made my first attempt to learn the theory of the RAE . . . I knew nothing of Amateur Radio and regarded the RSGB in much the same way that I now regard the Royal Society. This was partly due to the failure of RSGB publicity to penetrate to my position, and partly due to lack of suitable books on the subject."

I must say that the material in Alan's letter certainly goes deep into our problems as they touch idealistically minded young beginners. Our discussion has of course, become very fundamental, because of this and we are straight into the " melting pot " of endeavour and purpose in these things, before we know where we are.

In discussing School Radio Clubs G3RKK says, . . . School Radio Clubs . . . The real task here is to educate the staff rather than the pupils, for if a club is to be really successful over any period of time, a keen master to organize it is a first requirement. Any effective radio club needs a headquarters, money, members and sympathetic consideration over such matters as aerials and loan of equipment from labs. Unfortunately the attitude of the authorities, and science masters in particular, is frequently far from enlightened . . . I have heard several express the view that " little boys shouldn't play with things they don't understand and then expect me to unlearn all their wrong ideas when I come to teach them the O-Level Physics Electricity Syllabus (such as it is, or rather isn't). This particular comment arose when one small boy asked why, if electricity flows from positive to negative, the anode of a valve is connected to the positive supply, but I have heard other members of staff making similar comments. Clearly we are not going to get anywhere as long as this attitude persists."

I too have found that there are difficulties with radio clubs in schools, and believe that independent clubs open to all boys in a given area are superior. Teachers who have a great interest in Amateur Radio for boys (and girls for that matter) could set up a group under the Youth Service, and I would exhort any interested reader to consider this. The great advantages are the freedom for any lad to give his services as a member, and the stability and independence. The increased difficulties in regard to premises and equipment is a challenge and therefore can be an advantage. Industry and commerce will help greatly with surplus, when the bona-fide nature of the work is understood. It is of course impossible to expect the leader to purchase with his own resources, *and* give his time as well, to help the very lads that will no doubt serve the industries. Further discussions will follow in *QUA* . . . about clubs for boys, especially after your views are heard. Now listen to Alan's more recent experiences, " The Oxford University Radio Society (where he is now) has a membership of about 30 in a University of about 7000; the average meeting attendance is about 15. The dons nominally in charge have no interest at all and the society encounters opposition from everyone from Proctors to Bursars."

Finally, Alan's comments round off with the following, and I just can't see a solution, it is probably just part of the pattern, and G3RKK has just unearthed his generation's reactions to finding things more-or-less in a mess, which seems to be the fate of the world of men. Amateur Radio is just a pin prick in many ways, but I think the moral to be drawn is clear, you just have to fit in . . . and help to surmount these problems, by friendship, and courtesy on the air, and doing a bit of work for your club, the Society, and in what you have chosen to advance in general. So with G3RKK's words we move on from this topic, " Unfortunately there seems to be an attitude amongst some Youth Leaders I have met, and apparently among many more that I have not, that young people are either mods or rockers, or else mad on sport; the general idea of youth service being to try to move the contents of the first group into the second. Much as I admire these people, I really can't go along with this point of view. In fact these classes are anything but exclusive, and there are a large number of lads who do not fall into either. What is more (as the few who notice them seem to think), they are not all a lot of introvert swots—not to start with at any rate. With youth service, as you must know yourself, the problems are even more acute than with the school clubs . . . In the USA, these things seem to be organized on a grand scale. Only the other week, I saw that an American organization would pay Oxford students to go over during the summer vacation to teach American children about Amateur Radio during their Summer Camps. You were mentioning . . . that there seemed little support for an Amateur Radio camp in England. I think the trouble is boys have to be pushed into doing something like that, and the more eyeball QSO's that can be arranged between interested parties and Associates the better . . . What is really needed is radio amateurs with experience in Youth Leadership, or vice-versa. Alas, they seem to be very few and far between. . . ." So that's it. A critical report by a keen member who is still a " Teenager " himself. What can be done? The " push " suggested by G3RKK? Who is to give it?

Your News and Views

We have a number of new " A " members to welcome into the Society this month. Among them is **A4346**, Glyn. Cooke, of South Woodford. **A4347**, Andrew Janas, joined at the same time as Glyn., and lives in Wanstead. I have met both lads and they are keenly working for their licences. A letter from **A4265**, Chris. Topping, of Leyton, said that since he

joined the Society, SWL activity is more interesting than ever for him.

Another newcomer is **A4324,** Richard Barnes, who lives in Halifax. A4324 is another member going ahead with a converter, this time for an R1155.

Two letters have arrived from **A4205,** Steve Gall, and he has also attempted to analyse a facet or two of the problems which face us. Steve says at one point that he is sure that many of the younger " A " members look upon licensed amateurs as " idols " that cannot be approached. A bit of false status symbolism going on if that is true. A4205 says that he would be pleased to meet any " A " members in his area; his address is 175 Coulsdon Road, Old Coulsdon, Surrey.

A3969, Mike Johns, chides me about my remarks concerning his " lack of time," but then goes on to say that with all his exam. studying he has to *work*. Well yes, but what does, " . . . exam. is over I can devote more time to more pleasurable activity, such as passing RAE " mean? I must say that *all* my studies were for pleasurable reasons, and advancement; and RAE etc. was all part of the same thing. In fact I should think Amateur Radio has a greater effect than most things on the lives of its participants. It certainly did on my scientific interests. One has no time for lazy types, but I always tell any lad who asks me, that, in my experience, voluntary working and work for enjoyment is vastly superior to any forcing, because people who are not lazy always win through with flying colours in the end.

Dave Cotter, A4228, writes in as a new A-member; welcome to the Society, Dave. Dave says that in his opinion the " Bull " is the best magazine of all. He is very keen on news of other Associates, pictures, etc. (How about a photo from you—and any other member, of course.) With the aerial on top of a block of flats and feeding a BC348, Dave just says, FB.

As I was getting ready to post the last *QUA Associates* off to HQ, a letter came from **C. R. Shaw, A4156,** who has been a member since May. Plenty of fellows seem to get a kick out of Amateur Radio—just as it should be. A4156 says, ". . . I have enjoyed every minute of it," being in the Society, that is. He has managed to replace the crystal in the 46 Rx/Tx with a tuned circuit so obtaining variable tuning in the receiver section. One suggestion in this letter from A4156 was that the Communications Exhibition could move about the country so that outlying districts might have a chance, but with a fairly small affair like ours, the attendance might be very low—with resultant failure, so the problem remains with us.

Two Stage " Card " Amplifier

There may be a number of beginners and many of our youngest readers who may have found ploughing through transistor theory a bit much, so we start this month with a practical item. Therefore all should find the card circuit now described an easy project. This is the first of a number of designs, and you can " file " them away after building. The

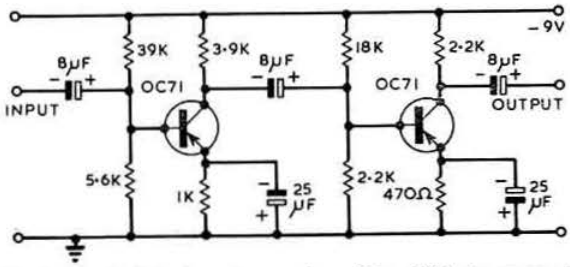
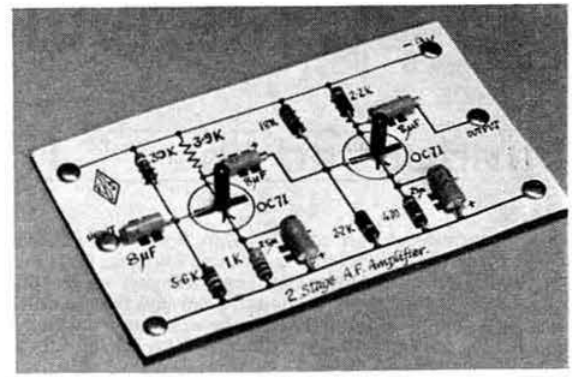


Fig. 1. Circuit of the two-stage card amplifier. With the postcard system, the layout of components can be an exact replica of the theoretical circuit.



The two-stage card amplifier. The collector load resistor of the first transistor has been left out to show how the card was prepared.

idea for this delightfully simple yet very instructive method of experimenting, filtered down from a boy in Scotland via G3FZL, the 1964 RSGB president, and caused a small commotion at the exhibition, with teachers, apprentice training officers, etc. all enthusiastic about taking it up. Mr Stone (G3FZL) is very keen on the idea and if you bump into him in your district, whip him away and show him your results!

A few British Standard Postcards, (without stamps, unless you want to post a Colpitts oscillator somewhere!) are required, plus one or two brass paper fasteners, and the components. Draw out the circuit using ordinary symbols, but space it out so that the actual components will fit neatly on the card. Bend the wires of the resistors, capacitors etc. so that they will pass through holes pricked through the card with a large needle. Place paper fasteners through slots punched in the card with a pocket screwdriver at the " terminal " positions. Wire up behind according to the circuit, connect batteries, etc., and switch on!

A TV Programme for Radio Enthusiasts?

A4035, Paul Gaskell, sends a report about the school radio club, saying that it is building up successfully. That is good news. Paul has written to the BBC suggesting a TV programme on Amateur Radio type subjects for young people. It could be similar to the other amateur scientific programme which is put on for a minority group, " The Night Sky." I am very much in favour of this possibility, and I should think the vast majority of young enthusiasts are also. Any BBC readers are cordially invited to contact me in case *QUA* . . . can co-operate in any way.

The Certificate Hunter's Club

A letter from Charles Emary, **G5GH,** outlined an organization called Certificate Hunter's Club. This is a world wide activity, and the group in the UK is known as Chapter 8, and is the first separate group outside the USA. Any SWL can join the CHC by holding twelve awards and be chasing, in the first instance, twenty-five. Most of the awards available to transmitting amateurs are available to SWLs as well. A very keen SWL and one who is actively engaged in CHC work, is David Grey, **A2498.** David says that he will be very pleased to deal with any correspondence in connection with CHC and letters can be sent to him or G5GH at 133 Fairlands Avenue, Thornton Heath, Surrey.

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This *QUA* . . . has turned out a bit more " meaty " than last month, mainly because no article was due in January, when I managed to talk the Editor into just a word or two considering that it was the New Year.

Once again, it is time to go QRT for this month. So 73 to all readers until the next time.

Annual General Meeting

Minutes of the 38th Annual General Meeting of the Radio Society of Great Britain held at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, at 6.30 p.m. on Friday, December 18, 1964.

Present: The President (Mr G. M. C. Stone, A.M.I.E.E., A.M.I.E.R.E., in the Chair), the Immediate Past President and Honorary Treasurer (Mr N. Caws, F.C.A.), the Executive Vice-President (Mr E. W. Yeomanson), Messrs J. C. Foster, R. C. Hills, B.Sc.(Eng), A.M.I.E.E., A.M.I.E.R.E., J. C. Graham, E. G. Ingram, A. O. Milne, L. E. Newnham, R. F. Stevens, J. W. Swinnerton, T.D., B.Sc. (Econ.) (Hons.), A.I.L. (Members of Council), Mr John A. Rouse (General Manager and Secretary), Miss Janet Akehurst, Mr. T. R. Preece, Mr. P. C. M. Smee (Headquarters Staff), Mr John Clarricoats, O.B.E. (Honorary Member) and 50 Corporate members.

Notice Convening the Meeting

The Secretary read the notice convening the meeting.

Minutes

Mr T. Lyell Herdman moved, Mr J. W. Mathews seconded and it was RESOLVED that the Minutes of the 37th Annual General Meeting, as published in the February, 1964 issue of the RSGB BULLETIN be taken as read, confirmed and signed as a correct record.

Annual Report

The President moved the adoption of the Annual Report of the Council as published in the December, 1964 issue of the RSGB BULLETIN.

The President stated that Mr Judd wished to raise a question on the new mobile licence and after dealing with this he would invite any other questions from the floor.

Mr Judd was then invited to speak by the President and expressed the opinion that there was some difficulty in interpreting the requirements of the Amateur (Sound Mobile) Licence for operation on inland waterways, estuaries and in docks and harbours. Mr Newnham replied in his capacity as Chairman of the GPO Liaison Committee and stated that there could be no doubt as to the meaning of these terms. Mr Judd explained that he had had certain difficulties and mentioned operation on the Norfolk Broads. Mr Newnham replied that in his original letter to the Society Mr Judd had made no mention of this particular problem to which Mr Judd agreed. The President therefore asked Mr Judd to make the facts known for consideration by the GPO Liaison Committee and assured him that any appropriate action would be taken.

Supplementary Report

The President read a Supplementary Report of the Council covering the period from July 1, 1964 to early December 1964.

In connection with the work of the Scientific Studies Committee Mr Clarricoats was very pleased to read a copy of the first progress report rendered to the Royal Society by the President. He felt that the work being done by radio amateurs in connection with the IQSY programme was of outstanding importance and urged that the report should be published in the BULLETIN and that consideration should be given to publish the report or related material in certain scientific journals. The President thanked Mr Clarricoats for his remarks and assured him that due consideration would be given to his suggestion.

Report of the Honorary Treasurer and Audited Accounts for the year to June 30, 1964

Before moving the adoption of his Report and the Audited Accounts the Honorary Treasurer (Mr N. Caws, F.C.A.) referred to the various items of income and expenditure, and explained the reasons for any major variations compared with the previous year.

Mr Caws then moved, Mr J. D. Kingston seconded and it was RESOLVED that the Report of the Honorary Treasurer and the Audited Accounts of the Society for the year ended June 30, 1964, be approved and adopted.

Election of Council

The President announced that the following members had been elected unopposed to fill the vacancies in the Council which would occur in the respective offices on December 31, 1964.

Ordinary Members

Mr E. G. Ingram, GM6IZ
Mr J. C. Foster, G2JF
Mr R. F. Stevens, G2BVN
Mr J. W. Swinnerton, G2YS

Zonal Representatives

Mr L. N. Goldsbrough, G3ERB, for Zone A
Mr J. Fraser Shepherd, GM3EGW, for the new Zone G

The President also announced that the following members of the 1964 Council were not required to stand for election in their respective offices:

Retiring President

Mr G. M. C. Stone, G3FZL

Honorary Treasurer

Mr N. Caws, G3BVG

Ordinary Members of the Council

Mr R. C. Hills, G3HRH
Mr A. O. Milne, G2MI
Mr L. E. Newnham, G6NZ
Mr Louis Varney, G5RV

Zonal Representatives

Mr H. A. Bartlett, G5QA
Mr J. C. Graham, G3TR
Mr R. H. James, GW3BFH
Mr A. D. Patterson, GI3KYP
Mr F. K. Parker, G3FUR

The President then reported with great pleasure that, in accordance with Article 10 of the Articles of Association, the Council had appointed Mr E. W. Yeomanson, G3IIR, to the office of President for 1965.

Auditors

Mr Caws moved, Mr S. J. Heard seconded, and it was RESOLVED that Edward Moore & Sons be re-appointed Auditors for the year to June 30, 1965, at an increased fee of 125 guineas.

Other Business

The President formally announced that the Council had unanimously elected Mr Arthur Milne, G2MI, a Vice-President of the Society in recognition of his outstanding service to the Society as Manager of the RSGB QSL Bureau for the past 25 years.

Mr Stone then presented to Mr Milne a Silver QSL Card as a permanent token of members' appreciation for his outstanding service.

Mr Milne thanked the Council most sincerely for this gesture.

The President then announced that in accordance with

Article 58, it was necessary to appoint a panel of *TEN* Corporate Members from whom the scrutineers for the 1965 ballot for Council would be drawn.

The following members volunteered their services:

Mr John Clarricoats, O.B.E., G6CL
Mr D. A. Findlay, D.F.C., G3BZG
Mr A. J. Gibbs, G3PHG
Mr W. D. Gilmour, G2VB
Mr J. D. Kingston, G3VK
Mr D. A. R. Naylor, G3GHI
Mr P. A. Thorogood, G4KD
Mr S. F. Weber, G6SFW/T, G8ACC
Mrs E. P. Vaughan, BRS26612
Mr R. G. B. Vaughan, G3FRV

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The Meeting terminated at 7.40 p.m.

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Informal Proceedings

The President invited questions from members concerning the work of the Society.

Bulletin Readership

Mr P. A. Thorogood enquired as to the results of the BULLETIN Readership Survey.

Mr Rouse replied that these were not yet complete, but they would be published in the BULLETIN.

Headquarters Fund

Mr G. N. Roberts, G3EWY, asked if any further progress had been made towards a new Society Headquarters since the property in the Victoria area, London, had fallen through.

Mr Stevens, G2BVN, replied that another property had been considered which would have only been suitable for demolition and rebuilding at the right price. Also there was a possibility that on building the British Museum extension, the Ministry of Works would offer accommodation to the Society. Mr Stone then asked Mr Caws to explain briefly the current proposal under discussion to form a property holding company.

Mr Caws explained that the proposal was to set up a holding company in which both the Society and members would invest. The property purchased would then be let to the Society and investing members would receive from the rent dividends or interest.

Mr Arthur O. Milne, G2MI, receiving the silver QSL card from the President at the AGM on December 18, 1964.

Mr Roberts then enquired if any further consideration had been given to moving out of London.

The President replied that this was always under consideration, but the Regional Representatives at their Birmingham conference in November 1963, unanimously agreed that Headquarters should remain in London which coincided with Council's view.

Mr Milne made a plea for further donations to the Headquarters Fund. But Mr Clarricoats considered that the poor response to the Fund appeal was due to members having insufficient information on the type of Headquarters envisaged by Council. He went on to point out that at the present rent levels in Central London, an increase in the subscription to £2 10s. p.a. would be essential to obtain suitable premises.

Mr Wilberforce said that The Little Ships Club had had considerable success in raising funds for a new Headquarters by interest-free loans.

Mr Shears suggested having a new form of life membership to raise capital. Mr Caws said this had been considered where, say, a member took 100 shares in the holding company that he should be given a special form of life membership.

The meeting then took an informal vote on the ideas put forward with the following result:

Interest-free loans:
15 per cent of members present.
Small interest (say 2½%) loans:
65 per cent of members present.
Increase in subscription:
20 per cent of members present.

Mr Thorogood pointed out that in his opinion the Society needed to raise at least £25,000 in order to purchase a suitable Headquarters.

The informal proceedings then terminated and the presentation of trophies and awards followed.

Trophy winners with the President, Mr G. M. C. Stone, G3FZL, at the AGM on December 18, 1964.

THE MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS, G2BVN*

INFORMATION now available indicates that we are definitely launched on the new sunspot cycle. During 1964 sunspots of both the old and the new cycles have occurred, but during the last three months most of them belonged to the new cycle. It is possible to differentiate between these two classes by observing the solar latitude on which the spots occur. Provisionally, therefore, October 1964 has been named as the month of the sunspot minimum. With the increase of solar activity the occurrence of flare producing regions will soon be on the increase and in due course we may expect the short wave fadeouts which have been noted only rarely during recent months. Radio communication may be interrupted for periods varying from 20 minutes up to three or four hours by a sudden increase in absorption.

1965 is the second year of the *IQSY* and the Society's programme of auroral and sporadic *E* research continues at an increased tempo. However, as the season for sporadic *E* approaches we would welcome co-operation from some of our h.f. band operators (both SWL and transmitting) who may be active on 28 Mc/s. Full information and log sheets can be obtained from the Scientific Studies Committee at Headquarters. Interest in l.f. propagation at the period of sunspot minimum is considerable and, as reported last month, a beacon station on 1801·5 kc/s is now operating under the call ZE1AZD. W1BB is co-ordinating reports of unusual Top Band QSOs and reports and these will be published in his *160m DX Bulletin*. A special IQSY QSL card will be issued in acknowledgement of reports for the *Bulletin*.

No apology is made for returning to two aspects of DXing which apparently infuriate other operators as much as they do the writer, and to cover the first point we can do no better than quote G2CUZ who says "stations should only call DX they can *hear* and not just join in the fun." The recent expedition to Easter Island has produced some examples of the second form of "lidism" which is the making of repeat QSOs with a rare station. Stations with beams and maximum power have made several contacts with the rare DX obviously to the exclusion of the operator without a beam and probably running considerably less power. As G2CUZ comments "if stations have worked some particular DX a couple of times, leave him alone and let the other lads have a go."

The *Commonwealth Call Areas Table* has attracted a small number of entries this month and it is hoped that more scores will be coming in for reproduction next month.

News from Overseas

VP8HJ, Port Stanley, writes to say that as from December 1, 1964, all his QSL duties will be undertaken by W2CTN. All previous contacts have been QSLd 100 per cent, but anyone lacking a card for a QSO before that date should get in touch with VP8HJ at PO Box 89, Port Stanley. VP8HJ is still using the DX40 tx with AR88 and Eddystone 750 receivers, and a 7 Mc/s Windom aerial. Several stations will be leaving Antarctica by early March, amongst them VP8HK, VP8CW and VP8HU, leaving only VP8s HD and HJ active from the Falklands, where there are several licensed operators who are not now on the air, i.e., VP8s GK, HW, IE and IF. VP8HJ laments poor conditions saying that during the *CQ* C.W. Contest he only managed to QSO 12 European stations with G3FKM as the only UK representative. It is hoped that an s.s.b. exciter may be available in the not too distant future.

Following the comments in the December issue of the BULLETIN the confusion regarding the prefix to be used for **Swaziland** has been resolved by the allocation of **ZD5** which took effect from January 1, 1965. Former ZS7R, now ZD5R, mentions that if there are a number of UK stations wishing to contact ZD5 for a new prefix he will be happy to set aside a weekend for some intensive operating and may be able to arrange for all three modes to be represented.

5N2AAF is the call disguising Mike Dransfield, formerly 5N2JKO. Nigerian operators have had the option of changing their calls now or waiting until the end of 1965. 5N2AAF will be home on leave on March 22 for five weeks followed by a further five-week period on business, after which he may be going to Thailand. It seems that amateur radio licences are unobtainable in that country, except for US citizens, and G3JKO will not be taking along any transmitting equipment. **5N2CKH** has left Nigeria and is once again operating as G3OPJ. **5N2JRM** will not be returning to Nigeria after his leave but is expected to arrive in Sierra Leone in the middle of February, from where he hopes to be active. It appears that Top Band conditions in Nigeria are now excellent with a good sprinkling of DX to be heard. The accent is on the *heard* as the 1965 licences do not permit operation on 1·8 Mc/s.

Members of the International Radio Club in Geneva congratulate John Gayer, HB9AEQ, on his election as a Fellow of the American Institute of Electrical and Electronic Engineers.
(Photo via W2GHK)

* Please send all news items and reports to RSGB Headquarters to arrive not later than **February 10** for the **March** issue and **March 17** for the **April** issue.

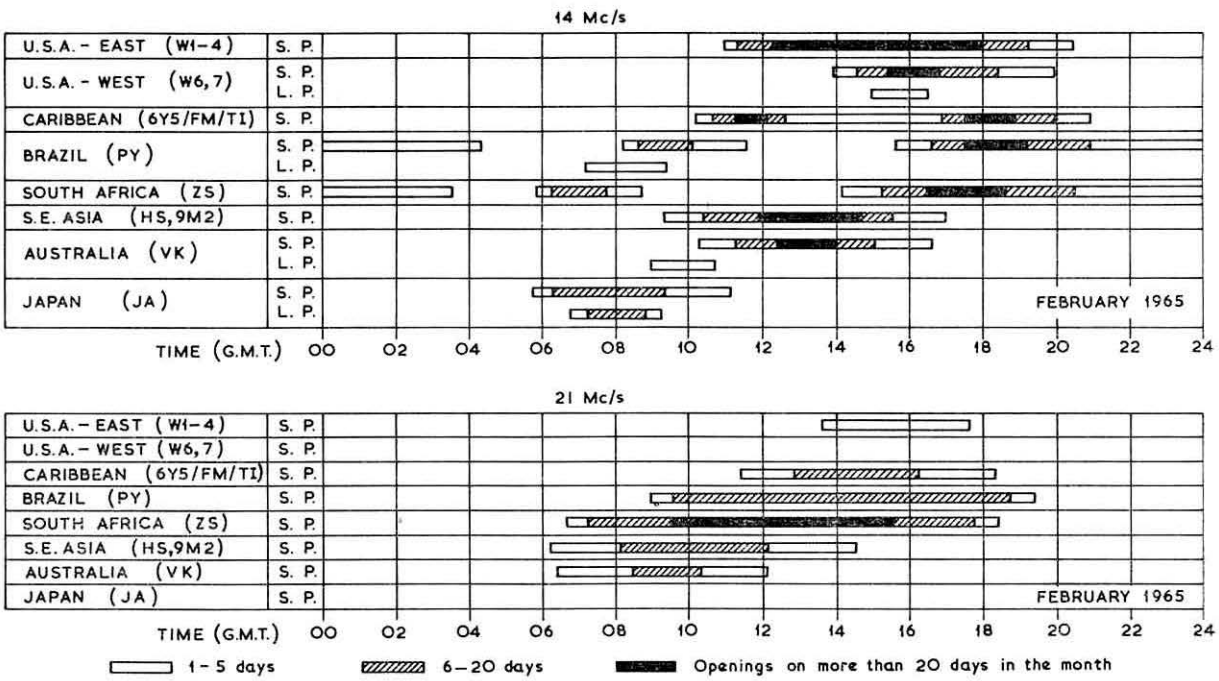
Top Band News

VO1FB reports the band in poor shape until the beginning of the year when propagation allowed UK contacts. On January 9, UK stations were heard from 20.30, and G8RQ was contacted at 20.49 for the earliest crossing from VO1FB. A number of G and GM stations were worked until going QRT at 02.45, but a further session at 08.00 produced G3OQT, GM3TMK, G3PU, G3LIQ, and at 08.51, GI3PDN, after which the band closed, having been open to the UK for probably 12 hours. The equipment at VO1FB comprises a DX100 running 150 watts to a 700 ft. end fed wire aerial with an earth system of five 140 ft. radials. So far 78 different UK stations in 32 counties have been worked, rather more than VO1FB was able to work from G3LMD! The transmitting frequency is 1805 kc/s, listening for European stations between 1823 and 1826 kc/s. VO1FB is also active on 14 Mc/s s.s.b. and a Viceroy has accounted for a goodly share of the DX. QSLs may be sent via the RSGB or direct c/o General Hospital, St Johns, Newfoundland.

The Trans-Atlantic DX Tests that have so far taken place have produced good but not startling results. Conditions, whilst not poor, have not been outstanding. A large number of stations outside North America took part and **9L1TL** was much in demand. DL1FF worked **JA6AK** on December 16, and the JA has been heard by several G stations. Other outstanding QSOs were those between W1BU and VK3ATN and between KR6BQ and W6GTI. The first G/9L1 QSO is believed to have been on December 12 when G3RFS made contact with **9L1HX.** Confirmation please? The *160 meter DX Bulletin* of W1BB lists many unusual QSOs and also the appearance of DHJ58 on 1819 kc/s apparently running 10 kW output from a site near Kiel! This station is causing heavy QRM to North American DXers.

The next *Trans-Atlantic Tests* are on February 7 and 21, and the writer would be pleased to have details of any unusual QSOs.

PROPAGATION PREDICTIONS



During the month of February the winter conditions gradually come to an end. The days slowly become longer, so that the 14 and 21 Mc/s bands remain open longer in the evenings. Solar activity is, however, still very low, and 28 Mc/s will be of little practical use for DX working. Between 10.00 and 15.30 GMT on this band Africa may be workable in very exceptional cases, and with even less likelihood South America may come through between 13.00 and 16.00 GMT. On 21 Mc/s too, the low solar activity will continue to affect conditions, so that only Africa will be workable with any degree of certainty. On days with far above average F2 m.u.f's Eastern North America may be heard. Western North America, Hawaii, Alaska and Japan will probably not be heard. For the forthcoming ARRL DX Contest, the prospects are far from cheerful. 14 Mc/s will show an improvement over the preceding months, especially towards the end of the month, as the days become noticeably longer and the band remains open a few hours after sunset. Only from May onwards for the remainder of the summer will this band remain open for DX during the whole of the night. With the approach of the equinoxes (March and September), with day and night of equal duration, opportunities for DX contacts via the long path will diminish. In the ARRL DX Contest the more favourable DX situation of South European stations, compared with North European stations, for contacts with North America will be very evident. From this it is clear that a North European station in equal competition can never win an ARRL Contest. Under very favourable conditions on 14 Mc/s between 17.00 and 18.30 GMT contacts may be made via the short path with Hawaii and Alaska, the former being slightly more likely. Under the existing winter conditions the noise level on 7·0 and 3·5 Mc/s is still low, so that 7·0 Mc/s will regularly, and 3·5 Mc/s will frequently be open for DX working, and on 7 Mc/s from about 21.00 GMT Eastern North America will be heard. In the latter half of the night on this band North American contacts will frequently be interrupted by a fall in the m.u.f. Likewise on 3·5 Mc/s contacts with North America may, in the latter half of the night, be interrupted occasionally by other causes. Local traffic (outside the ground wave zone) will not be possible in the latter half of the night on 3·5 Mc/s (sometimes even earlier) because of the dead zone.

The provisional sunspot number for December was 14·6, with the period of greatest activity lying between the 16th and 31st of that month. The predicted figures for March, April and May are 9, 10 and 11 respectively.

DXpeditions

The activity from Easter Island by VE3DGX under the call **CE0AG** will continue until the middle of February. Signals have been heard in the UK between 13.00 and 16.00 on 14 Mc/s. Generally, the short path has been best between 13.00 and until around 14.30, from which time the propagation favours the long path, over which the signal has been noted to be considerably stronger until fade out usually between 15.30 and 16.00. *QTH Corner* last month gave the QSL address.

Rumours of **Rodriguez** operation by VE8CO and a partner are abundant but unconfirmed. If information should come to hand too late for publication details will be given in the Sunday News Bulletins from GB2RS.

9M4LX will be going to the Maldives again around February 7/8 for a further period of operation as **VS9MG.** It is hoped that this will be followed in March by a stint at Sabah under the call **9M6LX.** (Tks G3FKM). If this visit does not materialize the equipment will be loaned to 9M6AB, ex-ZC5AL, who has a QTH 9000 ft. up on Mount Kinaalau. At the time of writing the **Nicobar** trip is still in abeyance, but it is hoped that this will eventually take place.

DXpeditions now QRT but which have been worked by many UK stations during the past month have included VK9TL (Norfolk Is.), K2JGG/JY, ZS8E/G/H, VP2DAA (Dominica), HZ3TYQ/8Z4 (Saudi Arabia/Iraq Neutral Zone), and TU2AU/5U7.

It is hoped that activity from **Trinidade Is.** will take place in February followed by **Fernando de Noronha** in March. PY4ND is supplying s.s.b. operation, with PY4OD active on c.w. 6O6BW and TU2AU have aspirations to activate **FL8,** but nothing definite has yet been heard. **7G1H** operates spasmodically from Conakry and has had site difficulties, although some UK stations report good signals.

The latest news of **VU2NRA** comes via G3MVV and is that Raju, VU2NR, will leave Calcutta on January 25, and hopes to be on the air by January 30. He will be at the **Andaman Is.** for about eight weeks and will be joined by VU2RM about February 15. QSLs should go via W4ANE, who is handling the DXpedition cards only. All other cards should go, as before, to G3MVV.

Band Activities

This has been a pretty hectic month on the h.f. bands with well above average DXpeditionary activity. CE0AG and HZ3TYQ/8Z4 caused the biggest pile-ups, the former because of its unavailability for nearly a decade and the latter for two reasons: firstly, c.w. operation from this country and secondly the mystery still shrouding the ARRL's refusal to give credit for the previous activity from there. Also well to the fore were DXpeditions in JY and ZS8. On the debit side 28 Mc/s remains unproductive, while the central Pacific area continues inaudible on any band.

The following composite listing comprises the pick of DX heard or worked by G3AAE, G3FKM, G3HCT, G3HDA, G3KSK, G3RWQ, G8JM, GM3ITN, BRS20317, BRS25945, A2340, A2498, A3560, A3699, A3942, A4038, A4134, A4254 and A4311 to whom our thanks are extended.

1·8 Mc/s C.W.: K2CHQ (05.30), K2GAL (06.15), SV0WZ (00.35), UA1KBR (18.30), VE2ATU, VE2LI, VE2UQ, VE3AGX, VE3BWY, VE3DDR, VE3QU, VO1FB, W1BB/1, W1BHQ, W1BU, W1HCH, W1NCK, W1UOT, W1WY, W2DYR, W2FYT, W2GGL, W2IU, W2UWD, W3EIS, W3GQF, W3MFW, W8GDQ, W8HRV, W0GDH, WA1CAG (all 05.15-07.15), and 9L1TL (05.15-06.45).

3·5 Mc/s C.W.: HI8XAL (23.15), JA6AK (23.05), KV4CI (00.30), UA9CM (00.30), and UA0KKB (23.00).

3·5 Mc/s S.S.B.: EP2BQ (19.00), HI8XAL (07.30), KP4BL (03.20), KP4RK (04.15), DJ3JC/LX (07.50), OX3JV (21.00), TI2SS (06.20), VK2AVA (19.10), VK3AHO (19.00), YS1IM (07.10), 3A2CT (20.30), 4X4DK (19.45) and 5Z4AA (19.00).

7 Mc/s C.W.: AC5SQ (18.40), BV1US (18.45), BY1PK (21.50), CM2QN (23.10), CR6AI (19.45), CR7BC (18.50), EA9AP (17.10), EL2AD (22.40), EL3C (18.20), EP2BQ (16.40), EP2RC (19.00), ET3USA (01.55), FG7XC (23.30), HC1AX (06.05), HI8XAL (00.10), JAs (08.10-09.50), K2JGG/JY (21.50), KG4BQ (21.00), KR6BQ (16.35), KV4AA (23.05), KV4CI (22.05), LA2NG/P (23.20), MP4BEQ (01.10), M1B (01.10), OR4VN (23.15), OX3AY (19.10), VE1AGT/SU (18.00), VK2EO (19.30), VK2NS (08.20), VK4SS (18.30), VK5NO (19.50), VP3YG (21.40), VP4VU (21.35), VP6AT (21.10), VP6PJ (00.05), VP7BG (00.10), VP9WB (19.15), VS9SJF Socotra (20.15), VU2FB (19.15), VU2JA (16.25), ZE1BF (18.30), ZE2JS (18.50), ZL2AIR (08.20), ZS5K1 (18.30), ZS8E (18.30), ZS8G (20.15), ZS8H (18.40), 3A2BT (23.40), 5R8AB (18.25), 5R8AN (18.25), 5X5FS (19.30), 5X5IU (19.00), 6W8BF (19.00), 6Y5XG (00.10), HZ3TYQ/8Z4 (23.15), 9G1FK (22.30), 9G1MR (21.30), 9J2BC (18.35), 9J2MI (18.40), 9J2W (18.25) and 9M4LP (16.45).

7 Mc/s S.S.B.: EP2BQ (19.30), JA1INJ (19.20), MP4BBW (19.30), OX3JV (19.30), VK2ADC (19.15), VK2AVA (18.55), VK3AHO (17.10), ZS1BK (18.45), ZS1YX (19.30), ZS2MI Marion Island (19.35), ZS8E (19.30), ZS8G (19.30), 5X5IU (22.10), 5Z4AA (18.00), 7Q7PBD (19.00), 9G1FK (19.00) and 9J2MI (18.55).

14 Mc/s A.M.: EA6BC (14.10), EA8ER (13.05), SU1KH (15.00) and VP6FO (11.00).

QTH Corner

FK8AZ	BP 40, Noumea, New Caledonia.
FY7YL	BP 267, Cayenne, French Guiana.
HI8XAL	PO Box 1087, San Domingo, Dominican Republic.
KC6BU	USCG Station, W. Caroline Is., US Pacific Trust Territory.
KR6JZ	via WA8ECH, M. H. Kwiatkowski, 2601 Collingwood, Saginaw, Michigan, USA.
KG6SE	via KG6AIG, PO Box 42, Agana, Guam.
OK3EA	PO Box 200, Bratislava, Czecho-Slovakia.
TL8SW	via W1BPM, R. Dunn, Old Blue Point Rd., West Scarboro', Maine, USA.
VK4TE	via VK2AGH, G. Hall, 74 Kyle Pde., S. Hurstville, NSW, Australia.
DL9HF/TN	via DL3BK, H. G. Scholz, Ackermannstr. 31, 7 Stuttgart-Vaihingen, W. Germany.
VP2LS	via K1IMP, H. D. Cline, 51 Gulliver St., Milton,
VP2DAA	Mass., USA.
VP8HJ	via W2CTN, J. M. Cummings, 159 Ketcham Ave., Amityville, NY, USA.
ex-VR5AR	O. Okleshen, W9EXE, 22637, Ridgeway, Richton Park, Illinois, 60471, USA.
VQ1GDW	via W2CTN.
ZB1DD	Sub-Lieut. D. Davies, RN, Staff of the C in C Mediterranean, Lascaria, BFPO 51.
ZB2AK	W. Stephens, c/o Cable Co., Gibraltar.
ZD8RH	R. L. Hyland, Ascension AAFB, c/o GMRD, PO Box 4187, Patrick AFB, Florida 32925, USA.
ZD8TV	via G3SNN, 7 Wayside Cottages, Staplehay, Taunton, Somerset.
ZS8G	via W2CTN.
ZS8H	PO Box 1729, Johannesburg, Rep. of S. Africa.
4W1H	via HB9ACD, H. Blaser, Papiermuehle 8, Berne, Switzerland.
5T5AB	A. Dubois, PO Box 30, Port Etienne, Mauretania, W. Africa.
TU2AU/5U7	F. Smith, c/o American Embassy, Mogadiscio, Somali Republic.
5R8AN	via W3KVQ, 2308 Branch Pike, Riverton, NJ, USA.
6W8DO	C. Gillot, Cie Gle des Eaux du Senegal, BP 521, Dakar, Senegal.
6Y5AH	via W1BPM.
HZ3TYQ/8Z4	V. Crawford, Aramco, Box 1721, Dhahran, Saudi Arabia.
9A1UV	via DL4UV.

* * *

RSGB QSL Bureau, G2MI, Bromley, Kent.

14 Mc/s C.W.: AP5HQ (11.25), CE0AG Easter Island (15.00), CP5EZ (11.35), CR4BB (09.30), CT3AE (10.35), DU1OR (10.15), ET3USA (12.40), FB8WW Crozet (16.25), FB8YY Adelieland (16.00), FG7XX (12.25), FK8AH (09.15), FR7ZI (15.55), HK0AI San Andreas (14.55), JT4KAA (09.45), K2JGG/JY (11.15-13.00), KG6AIG (09.35), KR6JZ (08.10), LA4EJ/P Jan Mayen (15.45), OD5LX (23.10), OR4VN (19.20), ON4VL Sahara (08.40), PY1BCR/0 Trinidade Island (19.30), PZ1CP (10.30), SU1IM (12.40), TN8AF (18.15), VK9RB Norfolk Island (09.30), VK9TL Norfolk Island (09.45), VK0FB (16.45), VP4NY (18.50), VP8CW (00.45), VP8HJ (10.15), VQ8AI (16.20), VQ8BY (17.25), VS6EN (12.00), VS6EY (12.02), VS9OC Masirah Island (15.35), VS9SJF (16.25), XE1OE (17.50), ZB2AE (11.50), ZB2AK (10.15), ZD8BB (21.00), ZS8E (19.00), 4W1G (10.00-15.00), 5R8AB (17.05), 5R8AN (17.05), TU2AU/5U7 (15.35), 6Y5XG (13.10), 7Z3AB (13.30) and HZ3TYQ/8Z4 (07.00-13.00).

14 Mc/s S.S.B.: AP5KC West Pakistan (19.05), BV1USG (09.30), CE0AG (12.45-14.30), CO8BO (14.30), CR4AJ (15.35), CR7GF (16.35), DU1AP (11.45), DU1BSP (10.30), DU1EH (12.05), DU9FB (12.45), FG7XP (16.50), FG7XT (12.10), FH8CD (15.15), FK8AC (08.20), FK8BD (08.45), FM7WQ (11.45), FY7YL (10.10), HC1MX (12.30), HC2YT (12.55), HC8FN Galapagos Island (13.10), HK0AI (12.50), HL9KY (09.20), HL9US (08.25), HM2BD (08.30), HM5BF (08.35), K2JGG/JY (07.55-13.10), KC6BU Western Caroline Islands (08.40), KG6IF Marcus Island (08.00), KG6IG Iwo Jima (08.10), KG6AAY (08.20), KG6APJ (09.10), KG6AKZ (09.00), WA4VIC/KG6 (09.10), KH6BFZ/KG6 (09.00), KL7MZ (23.10), KR6BD (09.35), KR6FJ (09.35), KR6GO (09.40), KR6MU (08.15), KR6RN (08.50), KV4CF (11.30), KX6BQ (07.50), MP4MAH (13.35), OH0NE (12.05), OH0NI (12.25), PZ1BW (17.25), TG9AD (13.15), TG9EL (12.50), TG9SC (14.10), TI2HP (12.15), DL9PF/TN8 (16.30), VK9DR Christmas Island (12.05), VK9NT New Guinea (09.30), VK9TL Norfolk Island (08.40), VK9XI Christmas Island (14.30), VK0DS Mawson (17.15), VP4VP (12.40), VP7MG (13.00), VP7NS (12.40), VP8HK (08.30), VP9FK (13.00), VP9FR (16.35), VQ1GDW (16.20), VQ8AM (17.55), VS9ADD (15.25), XE1AB (13.10), XE1CE (14.05), XE1CCW (14.30), XE1NI (14.30), XE2BM (14.10), XE2MO (14.00), XT2HV (08.20), XW8AL (11.15), XW8AZ (14.30), YA3TNC (12.20), YN3FP (18.45), YN6AQ (12.55), YS1AGM (13.10), YS1ITN (12.15), YS1O (13.00), ZB2AK (10.35), ZD5R Swaziland (17.15), ZP5CF (19.40), ZS2MI (16.30), ZS7R (17.30), ZS8G (17.00), ZS8H (18.55), 3A2BF (11.25), 4U1SU (09.50), 4W1G (14.30), 4W1H (14.50), 5H3JJ (16.15), 5T5AB (09.45), 5U7AC (09.55), 5U7AG (09.45), TU2AU/5U7 (22.10), 5X5FS (15.25), 5X5IU (15.50), 6Y5YC (14.15), 7G1H (10.40), W8BZB/7G1 (16.10), 7Q7GB (07.20), 7Q7PBD (16.30), 7X2BB (16.00), HZ3TYQ/8Z4 (07.30-13.00), 9J2MI (10.30) and 9J2VB (16.10).

21 Mc/s C.W.: CR6AI (14.35), CR7BC (11.15), ET3USA (10.25), PJ2MI Sint Maartin (12.15), VK7SM (10.35), YA3TNC (11.00), ZS8E (11.00-14.45), ZS8G (12.10), 4W1H (12.50), 5R8AN (12.10), 5R8CB (13.10), 5R8CQ (10.40), 7Q7RM (12.20) and 9J2BC (14.40).

21 Mc/s A.M.: CR4AD (11.05), CR4AJ (10.55), CR7FC (15.45), EA8CR (11.20), ET3USA (14.30), HZ1AT (11.00), KV4CX (13.10), KZ5BT (14.50), M1B (13.40), VQ8AR (14.40), 7Q7RM (13.55), 9J2BK (10.30) and 9J2MI (12.15).

21 Mc/s S.S.B.: CR4AJ (11.00), KV4CX (12.10), MP4TBJ (10.10), VQ1GDW (10.50), XE1FSV (15.20), ZS7R (15.35), ZS8H (14.30), ZS9G (10.45), 5U7AC (10.35), and 6W8AG (11.35).

Lighter evenings indicate later openings on the higher frequency bands, but higher noise levels on the lower frequency ones. Swings and roundabouts!

DXCC News

It is now reported that **HZ2AMS/8Z4** QSLs for operation from the Saudi Arabia/Iraqi Neutral Zone are acceptable for DXCC credit.

Newly independent **Malta** has been allocated the prefix **9H1**, and 9M4LX reports the intention of the Maldives government to use the prefix **4S9** at some future date. It is doubted if this will affect the VS9M stations operating from Gan which is leased from the Maldives authorities.

Contests

The **Goose Bay ARC QSO Party** will take place between 00.01 on April 1 and 23.59 on April 15, 1965. All bands and all modes may be used, and operators submitting a list showing that they have worked three GBARC members will receive a **WAG** certificate. Active stations are: VO2s AH, AW, DP, GA, HA, JJ, NA, VE1MW/VO2, VE2JJ/VO2, VE2BSM/VO2, W5FIG/VO2, K6QYK/VO2 and K7SFL/VO2. Lists should be sent to GBARC, Box 232, Goose Airport, Labrador, Canada.

The following are *claimed* scores for RSGB contests held recently.

7 Mc/s DX (c.w. section)		**7 Mc/s DX (phone section)**	
G2KSH	3,485 points	G5HZ	2,100 points
G8FC	3,080 ,,	GI3CDF	1,615 ,,
G3PEK	2,915 ,,	G3DYY	930 ,,
G3DYY	2,810 ,,	G3KSH	925 ,,
GW3GHC	2,775 ,,	DJ2YE	865 ,,

7 Mc/s DX (Receiving Section)

c.w.		**phone**	
BRS24775	2,210 points	BRS22844	1,490 points
A3633	2,050 ,,	A2111	1,470 ,,
A3470	1,735 ,,	A1798	1,145 ,,

21/28 Mc/s Telephony		**21/28 Mc/s Telephony (Receiving Section)**	
5A1TK	1,660 points	A3470	1,655 points
G3KGY	1,475 ,,	A2111	1,575 ,,
GW3NWV	1,455 ,,	BRS26444	1,390 ,,
G3KFT	1,445 ,,	A2498	1,360 ,,
G3CIO	1,415 ,,	BRS19682	1,335 ,,
G2QT	1,410 ,,	BRS24733	1,315 ,,

Second 1·8 Mc/s

GI6TK	838 points	G6BQ	735 points
G3MXJ	825 ,,	GM3AVA	731 ,,
G3KLH	751 ,,	G3RQX	721 ,,

The results of the **1964 PACC Contest** show G3EYN with 2672 points and G3JFY with 561 points as the only UK entrants.

Results of the **FOC DX Marathon Contest 1964** give the six leading places to:
G3KMO (128), F2MA (86), G8VG (62), G2GM (54), G3CHN (54) and DJ3HW (53).

The **CHC/FHC/HTH Annual QSO Party** will take place between 23.00 on June 4 and 06.00 on June 6, 1965. Copies of the rules and details of the log form are shown on a leaflet which is available from G2BVN by sending an s.a.s.e. It is worthy of note that the CHC QSO Party is one of the few contests which specify frequencies around which operation should take place, thus freeing the remainder of the bands for normal QSOs.

Awards

In connection with the **British Counties Award,** announced in the December issue of *MOTA* and sponsored by Chapter 8 of the CHC, G5GH points out that many UK amateurs

applying for this award are providing only the date, call and county on their check list. Whilst this does not invalidate the claim it is pointed out that by putting the mode the award may provide more than one credit for CHC purposes. Note that 'phone is *not* a mode, it is either a.m. or s.s.b.

In connection with the WABC award, now believed to be defunct, a number of members have enquired if the Society can assist in obtaining the return of their QSL cards. Unfortunately this award was issued by a commercial publication over which, of course, the RSGB has no control. Approaches by individuals have met with little response.

SWL CHC Chapter Number 3 has been formed and the President is Barry Curnow, A2340, and the Secretary, David Gray, A2498. The qualification for membership is the possession of 12 awards and advice on this may be obtained from David Gray who can be reached through the QTH of G5GH. There are no charges involved in membership and an s.a.s.e. with enquiries would be appreciated. SWL CHC Chapter 3 is the first outside North America and the organizers are to be congratulated on their initiative.

Several enquiries have been received as to the existence of a revised edition of the RSGB Awards Book compiled several years ago by G4CP. This publication is long out of print and it is not intended to produce a revised volume. Up-to-date information on awards can be obtained from the *Directory of Certificates and Awards* published by K6BX and mentioned many times in this column.

DX Briefs

It is learnt from G4MJ that Marcia, **WA4SBK,** is to shortly undergo an eye operation. Marcia is probably better known under her Californian call of WA6MAZ, and her valuable assistance as the QSL manager for VR3O and others made for her many friends who we are sure will wish her a speedy recovery.

The Dutch National Society, VERON, transmits a bulletin of DX news each Friday evening at 19.15 and 21.15 on 3600 kc/s, 14·1 Mc/s and 145·14 Mc/s from the Society station **PA0AA.**

MP4MAH is now active on s.s.b. and his country score is mounting. The rig consists of a B & W 51SB exciter driving a pair of 6145s, a 75A-3 rx and a dipole aerial. Tom is usually active from 12.30 to 15.00 daily.

VS9SJF, who operated with the RAF/Army expedition to Socotra Island will be returning to the UK during February and will then collect his incoming QSLs from the RSGB Bureau.

Active on 14 Mc/s c.w. from **Jan Mayen Is.** are LA's 2AJ, 2QJ, 3IJ, 3P, 4EJ, 5AJ and 8FI. QSLs should go to the Norwegian Bureau. (LA5HE via PA0FX).

CR6GO, QSL manager of the Angola Society, offers to endeavour to obtain outstanding CR6 QSLs. His QTH is Box 484, Luanda.

G3SJQ, ex-ZD8RN, is now in Malta and will be operating as **ZB1DD,** which will become 9H1DD at some future date. His tour on the island will be one of two years, and his address will be found in QTH Corner.

W1BPM, who is the QSL manager for **TL8SW** and **6Y5AH,** asks for QSLs to be sent direct enclosing two IRC for air mail return. Please do not send cards via the bureau. (G5GH).

Countries on the **US Banned List** are Cambodia, Indonesia, Viet Nam and Thailand, i.e., XU, PK, JZ0, 3W8 and HS.

QSLs for contacts with **7G1L** have been received from the Hammarlund DXpedition of the Month QTH (G3MWG).

VK4TE is active from **Willis Island** on 14 Mc/s c.w., usually around 06.00 on Saturdays and Sundays.

VK9s DR, MV and XI are all on the air from **Christmas Island** on s.s.b. and c.w. VK9XI is a club station and QSLs for 'XI and 'DR are handled by Hammarlund.

CR4AJ has been very active on 14 Mc/s s.s.b. during the afternoons but so far no QSLs have been seen.

* * *

Correspondents are thanked for their co-operation and acknowledgement is made to the West Gulf DX Club *Bulletin* (W5IGJ), the LIDXA *Bulletin* (W2FGD/W2MES), *DX'press* (PA0FX) and *The DX'er* (N. Californian DX Club). Please send all items to RSGB Headquarters to arrive not later than **February 10** for the March issue and **March 17** for the April issue.

Commonwealth Call Areas Table

	1·8	3·5	7	14	21	28 Mc/s	Total
G3AAE	—	—	1	16	7	—	24
G3LHJ	1	1	1	3	4	1	11
		*	*	*			
A2340	4	6	4	34	2	—	50
A2498	2	6	—	16	3	—	27
A3699	2	2	1	3	1	—	9

Transistorized Charging System for Cars

(Continued from page 96)

dynamo/battery line within the unit have to be insulated from the box. Furthermore, a heat sink is needed not only for the silicon rectifier CR1, but for the high current transistor TR3 which is an OC29. In both cases these components have to be insulated from the case by means of mica washers or similar thin insulating material which provide the necessary insulation without obstructing the conduction of heat. Even when using the small Eddystone box, however, sufficient heat sink for both CR1 and TR3 has been provided by mounting both components with mica washers direct on to the box. The temperature rise is within the manufacturers' tolerance for the devices concerned.

RACAL Electronics Ltd. held a special competition during the 1964 RSGB Radio Communications Exhibition in the Seymour Hall, London ; competitors were asked to judge the number of soldered joints in a RACAL h.f. communications receiver Type RA.17. For his very creditable effort in guessing 1,911 against the actual 1,910, Mr R. A. Buckby, of Corby, Northants, won a RACAL h.f. receiver Type RA.71, the amateur version of the RA.17. The receiver presented to Mr Buckby was the 9,999th production model in the RA.17 series, and the proceeds of the competition were handed over to Cancer Research. Mr Buckby is 20 and has been interested in radio since boyhood. He is currently engaged as a Technical Assistant with the BBC at Wooferton near Ludlow.

FOUR METRES AND DOWN

Eleventh International V.H.F./U.H.F. Convention, April 10, 1965

By F. G. LAMBETH, G2AIW*

FEW bodies are as gregarious as v.h.f. bodies, and if you went so far as to hold their annual convention on Christmas Day you would still probably find a couple of hundred of them turning up. Last year's *did* take place at a public holiday weekend—Whitsun—and nobody seemed to mind a bit.

Even so, the Society's V.H.F. Committee are well aware that it is a good idea to dodge holidays if at all possible—and this year it *will* be possible. The Eleventh International V.H.F./U.H.F. Convention is to take place on Saturday, April 10, which is the Saturday before the Easter weekend. Once again the venue will be Bloomsbury's Kingsley Hotel, centre of so many Society functions, v.h.f. and otherwise, for many years.

The date is nearer than you think. Get it into your diary *now*.

There is something equally important to do besides: bring that half constructed piece of v.h.f./u.h.f. equipment to a conclusion as quickly as possible. You have a bare two months left in which to finish it. *Somebody* has got to win that special trophy presented every year for the best piece of self-constructed equipment appearing in the exhibition at The Kingsley: it might be you!

Meteor Scatter for All?

G3DIV (Polegate) has possibly opened up a new line for the average v.h.f. listener, if not for the average transmitter. During the Geminids (December 10-14) he was only able to listen for part of the time, but during that period was able to identify OH1NL (on sked with W6DNG), and probably UC2AA, although the latter station was sending at a fantastic speed and was identified only by frequency position. The pings, and sometimes bursts, were quite sufficient at times for c.w. at reasonable speeds to be identified, which explains the identification of OH1NL. G3DIV supposes that the "fast" copy was for recording and subsequent reduced speed playback. The receiver used was a very old 6J6 crystal controlled converter with a 6CW4 preamplifier feeding into an AR88LF, with a rather poor half-lattice crystal filter. The surprising part was how strong the signals were when they did appear, and showed that a relatively drift-free receiver possessing accurate calibration, goes a long way to success in the m.s. sphere. All this activity and interest was engendered by a recent QSO with G3LTF.

G3DIV's present activities include s.s.b. and c.w., running about 150 watts p.e.p. to a QQV06/40A and a 9 element long Yagi. Sideband is produced by a modified G2DAF crystal filter exciter, with a low output from a 6CH6 on 25 Mc/s. The transverter uses a QQV03-10 mixer and a QQV03-10 buffer with 120 Mc/s injection; this was, in fact, used as far back as 1960.

There is a little more news of work by **PA0OKH** during the Geminids, when he worked UA1MC and UP2OM. The UP2OM (Kaunas, Lithuania) QSO was on December 13 and the one with UA1MC (Leningrad) was on December 14. During a preliminary test with UA1MC there was slight interference with OH1NL who was trying to raise W6DNG at the time!

We also learn from the VERON *V.H.F. Bulletin* that **F8DO** has worked SP5FM, YU1EXY, HG5KBP and UP2ON by m.s. in recent months, the last being during the Ursids on December 23 last. Also, UP2ON was worked by ON4TQ during the Geminids.

Expedition to Co. Fermanagh

During October, 1964, an expedition to Co. Fermanagh was made by members of the Belfast and District RSGB Group. Unfortunately, bad v.h.f. conditions prevailed, which meant that the expedition was not as successful as it might have been.

On Top Band, operation was perfectly satisfactory, and about 80 QSOs were made. Four metres was only a limited success, in that only one contact outside GI and EI was made; this was with GD. About 30 QSOs were made, and three G stations, G3BJD, G3OHH and G3PJK were heard. The 4m rig ran 25 watts to a 4 element Yagi. Only one G station was worked on 2m, although several reports were later received of Gs having called, but were apparently not heard

Members of the expedition to Co. Fermanagh during October (left to right): GI3KYP, GI3CDF, GI6TK, Tony Roberts, and GI3ILV.

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports for the March issue to arrive by February 5, and for the April issue by March 12.

by the expedition station. The rig ran 25 watts to an 8-over-8 slot aerial.

The location, 1300 ft. a.s.l., was excellent, with a clear take-off in all directions. Some valuable lessons were learned from this, the group's first expedition, and it is planned to repeat the exercise again this year.

Four Metres

Thinking that the band needed a little stimulus **G3KXA** decided to enter the 70 Mc/s C.W. Contest on December 13 and put Brecknockshire on the air for the county chasers. He operated from his usual 2m site on Waun Fach (2660 ft. a.s.l.). Bad weather, together with the need to shift a 40 ft. pine tree which had fallen across the approach road, delayed their operations for three hours, but eventually GW3RUF/P was put on the air at 13.20. The summit had to be used as a windbreak and consequently the north-west and EI chances were lost. Twenty-nine stations were raised and the average distance was 109 miles per QSO, the best being with G3JQI (190, Norwich), G3FIJ (175, Colchester) and G3CLW (150, Bromley, Kent). Another interesting QSO was with G3RWC (65, Birmingham) who was keying a g.d.o. at a fraction of a watt input yet received a report of RST547. The effort closed early because of heavy rain and later snow; the two most outstanding signals at a 91-95 miles range were G6NB and G8DT/A who were well over S9. The call-sign G(W)3RUF/P is that of the Midlands Contest Club, which is not to be confused with the Midlands Radio Contest Club, G3RSR.

G2BJY (Walsall) says that he cannot give a very good report of the contest during the periods of operation (10.00/12.00, 18.00/20.00) for most of the regulars, e.g., G8PD/A and G3JHM/A were all very much below normal strengths. An exception was G3NEO (Sheffield) who was S8/9 and GW3RUF/P (Brecknock), was S9. The average scores at 19.00 were around 35 to 40. Only ten contacts were made by G2BJY.

G3HBW remarks with regret about the fact that G3RAN, the original organizer of the Field Day to Rutland (reported last time) was injured in a car accident on the previous Friday, but tells us that the accident was nothing whatever to do with the Field Day itself. Apparently there have been some rumours connecting it with the Field Day, which are quite without foundation. G3RAN is happily out of hospital and well on the way to recovery. During the Field Day, in poorish conditions, 23 stations were worked. The call-sign was G3MLS/P, with operators G3MLS and G3HBW. G3HBW also accompanied the G8PD/A expedition to Woodcote (Oxon) for the 70 Mc/s C.W. Contest.

G3BJD (Seascale) says that it is impossible to operate 70 Mc/s at home owing to TVI on Channel 5, and so G3BJD/P, using G3FDW's gear, was operated in the Cumbrian Mountains. The four element Yagi was hoisted to 20 ft. in a howling gale with rain and sleet and frozen fingers delaying the start until 10.12 GMT. Only 25 contacts were made in poor conditions, the best DX being G8PD/A (Oxford) and G3SKR (nr. Harrow), both at around 200 miles. G3THH, G3IMV, G6OX, G3OXD/A, G3EHY and G3ORD were heard but not raised.

G2DHV (Sidcup) is now active on 70·20 Mc/s with a QQV03-20A at 25 watts to a dipole in the roof space. The receiver is an R216.

Two Metre News and Views

A belated report from **G3BJD** (Seascale) mentions that **G3RHE** and himself worked across to the continent in the September 8 opening. It is believed to be the first time that PA and ON have been worked from Cumberland. A strong French c.w. station did not respond.

GW3KYT is in a new QTH, still at Colwyn Bay, but now 500 ft. a.s.l., instead of below sea-level! There is a good take off to the south and 2m operation will commence very soon after an absence of two years.

G2CUZ (Ainsdale, Lancs) asks if we could try to encourage a little less loftiness from the " types who scoff at the DX Bands and revile c.w." and a little more activity at all times, even if it comes down to working only G stations. G2CUZ says that apart from Sunday mornings, 2m and 4m seem more like a cemetery, and only come alive when there is an opening. After having spent many months building high-performance converters and transmitters, he begins to think the time would have been better spent on 15m or 160m. We can't have this, can we?

G2JF reports that during the four weeks ending January 10 there were two periods when propagation in the south was slightly above average. These were December 20-21 and January 5-6. During the former period a few contacts around 250 miles were made with DL and during the latter period contacts were made with GI3GXP and EI2A by G3SHK (Ruislip), and G3EKM (Truro, Cornwall) made his first contact with G2JF (Kent).

F3NB (Orly Airport) has been off the band for the past two months but has now returned with a 14 ft. long Yagi aerial for which he claims a forward gain of 18db. His signal in the south-east is certainly very conspicuous.

ON4HU (Brussels) is another continental station who regularly works into the UK. Quite recently he has installed a 13-over-13 Yagi system with a boom length of 20 ft. at an elevation of 100 ft. (presumably to the uppermost elements). He claims a gain of 20db! One feels that the experts in our midst will probably raise their eyebrows and proceed to disprove these high gain figures, but be that as it may, his signal is very loud in the south-east.

GB3VHF. The impression is formed that operators who use this beacon are very pleased with the quality of the signal now that the new system has been installed. It is felt that f.s.k. is a step in the right direction. Some operators have expressed the opinion that GB3VHF should be fitted with an aerial which would give a greater coverage, i.e., a wider beam width.

The **GB3LER** (Lerwick) experimental station was logged at 13.04 GMT on December 21; signals were down in the noise region but were easily discernible. This was the only occasion noted on which the signal percolated into Kent.

G3BK (March, Cambridge) has quite recently returned to the 2m band after an absence of many years. G3BK will be remembered by his contemporaries as one of the first stations regularly to be heard on two, as soon as the band was made available. His impressions on activity and conditions as heard from his location then and now are interesting. He is running a QQV03-20A into a 6-over-6 aerial system. His receiver is a Green and Davis converter working into a KW77 receiver.

G3EDD (Cambridge) reports QRM from a recently

V.H.F./U.H.F. BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3CTC	Redruth, Cornwall	144·10 Mc/s	A1	North-East
GB3VHF	Wrotham, Kent	144·50 Mc/s	A1	North-West
GB3GEC	Hammersmith, London	431·5 Mc/s	A1	East

RSGB V.H.F. BEACON STATION GB3VHF

The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144·50 Mc/s):

Date	Time	Error
December 29	16.29 GMT	4330 c/s high
January 5	13.47 GMT	4390 c/s high
January 12	18.01 GMT	4150 c/s high

S.S.B. Operation on 2m

The RSGB V.H.F. Committee hopes that s.s.b. operators on 2m will co-operate by keeping operation between 145·1 and 145·2 Mc/s in accordance with the latest recommendations.

energized 400 kV power line. This is very unfortunate for Brian as it is possible that this particular QRM will probably be most difficult to eliminate.

G3TAQ (Stowmarket) has recently put out his first signal on 2m using a 15 watt transmitter and dipole with reflector at 26 ft. He hopes to improve his equipment soon.

G3RND (Pontefract) reports plenty of activity and recently had first contacts with G6RH (Kent), G5XB and G5NF (Farnham, Surrey). A new tower is scheduled to be erected before long.

GW3MFY (Bridgend) was heard cranking up his new electronic bug key in readiness for the c.w. contest at the end of the month. He remarks on the strength of GB3CTC, whereas GB3VHF is often not discernible.

G3KHA (Bristol) has found the weather too cold for 2m work recently, which accounts for his inactivity; he also remarks on the poor signals from GB3VHF which are invariably not audible at his station.

Seventy Centimetres

OH4HN (Zomergen) has sent a very detailed and interesting list of skeds with G3LQR (160 miles), F3LQ (44), F8VN (206), F9FT (143), and PA0COB (75) for the period from June 28, 1963, until December, 23 1965. Best results were with PA0COB and F3LQ as might have been expected, but all the others show a fair to good quota of QSOs. A remarkable thing is the high incidence of good reports (S7/9) over this quite extensive period, many of these being for phone QSOs. These skeds must have been very interesting to all participants and will doubtless be continued. We shall be glad to hear of their further progress.

GW3KYT (Colwyn Bay) is building equiment for 70cm. No commercial gear here, he says!

Midland Night on the Air (Thursday) is becoming even more popular according to **G3NBQ** (Coventry). The following stations are on regularly: G2WS, G2CIK/T, G2CIW, G2FNW, G3BNL, G3CKQ, G3GWL, G3GTN, G3KEF, G3KEQ, G3KFD, G3LHA, G3MCS, G3NOC, G3NWA/T, G3PTM, G3RMB, G3RYB/T, G3SLG, G6FK, G6MXW/T, G6MXY/T, G6MYD/T, G8ABB, G8ABP.

On January 7, 22 of the above were heard or worked. The 70cm band often sounds more active than 2m on Thursday evenings in the Midlands, and it is realized that this conflicts with Saturday nights, but Thursday seems to suit the Midlands better, and in any case, unless there is a lift in conditions the Midlands cannot hear Home Counties stations very often.

Mid-Herts Net opens on 70cm

On the evening of Monday, January 4, a Mid-Herts Net was opened in the 70cm band, supplementing the 2m net which has operated for the last 10 years. Participants in the " launching ceremony " were G8ACE, G3HRH and G5UM.

The frequency chosen for the Mid-Herts U.H.F. Net is 433·1 Mc/s, or right on the edge of the London and Home Counties zone. This corresponds with the position of the 2m Mid-Herts Net on 145·1 Mc/s.

The 70cm frequency is derived from a crystal at 8021 kc/s, of which a quantity has been laid in by the Welwyn Garden City Group at 5s. a time. This, when multiplied by 54, inevitably results in some scatter around the terminal frequency of 433·1 Mc/s. However, capacity loading of the crystal is expected to pull any " highs " down to the desired spot.

Several other Mid-Herts members have been supplied with crystals and will be joining the net any moment now at the scheduled times of Mondays and Saturdays at 9 p.m. clock time.

While the net is in progress the band will be scanned frequently to check if others wish to join in. They will be welcome indeed, whether they are on 433·1 or not.

If their net acts as a stimulus to further activity on 70cm, the Mid-Herts members will be more than pleased.

Twenty-three Centimetres

G3NBQ (Coventry) recently received the following stations for the first time: G3NNG/P, RST549, at 60 miles on 1296·48 Mc/s and G3FP, RST549, at 90 miles on 1298·23 Mc/s.

Contests Reminder

The First 70 Mc/s Contest (Open) will take place on February 14, and the Second 144 Mc/s Contest (Open) will be on March 6 and 7. The Contests Committee hopes for bumper entries in both these events.

70 Mc/s C.W. Contest 1964

The following are the leading claimed scores for the 70 Mc/s C.W. Contest, 1964. They are, of course, subject to checking.

1	G8PD/A	3845	7	G3JU	1477
2	G3SKR	3026	8	G3OHH	1379
3	GW3RUF/P	3000	9	G3JQI	1164
4	G3OXD/A	2846	10	G3JEQ	1126
5	G3BJD/P	2213	11	G5CP	1093
6	G3PLX	1881			

Miscellaneous News

A note of **DARC special activities for 1965** has been received from DL1PS. These include contests on the following dates: March 6-7, May 1-2, May 29-30 (U.H.F.), July 3-4, September 4-5 (IARU Open) and December 6-12 (Winter Contest). A number of meetings will also be held: May 5-7 (Berlin), May 15-16 (Ramlingen), June 26-27 (Konstanz), September 18-19 (Weinheim), and a camp from June 19 to September 4 at Bad Zwischenahn (Oldenburg).

YU1SM has asked us to mention the **International SRKB V.H.F. Contest 1965** to be held on April 3-4. Further details may be obtained from SRKB, Dimitrija Tucovica 28a, Belgrade.

I1GO of Via Tevere 16, Rome, will be ready to operate on 144·090 Mc/s (c.w.), which will be translated by **Oscar III** to 145·910 Mc/s each time that the satellite is audible in Europe.

VP8AI (Falkland Islands) is building a 12 ft. dish for possible Moonbounce experiments.

The **Coventry Sausage and Mash Supper** will probably take place in March. Everyone on the mailing list will be notified, but any other interested persons are invited to write to G3KEF, or to G3NBQ at his new address, 54 Brookford Avenue, Keresley, Coventry.

Transistorized S.S.B. on 2m

G3NNG and G2HIF have succeeded in holding, over a distance of six miles, what is believed to be the first amateur s.s.b. QSO on 144 Mc/s using only silicon planar epitaxial transistors. Although the transmitter used by G3NNG rejoiced in the absolute peak power of four microwatts, signals were R4. They would have been R5 had not Des misaligned his crystal filter to boost up the power. Further tests using the G2HIF silicon transistor transverter unit at 400 mW p.e.p. are now proceeding.

Supplementary Report of the Council†

THE Council has pleasure in submitting a brief supplementary report to that published in the December, 1964 issue of the BULLETIN. It covers the period from June 30 to early December, 1964.†

RSGB Exhibition

The Society's annual exhibition at the Seymour Hall in London from October 28-31 attracted record attendances on every day.

The Exhibition Stations assumed particular importance this year as the Post Office gave special permission for visiting foreign licensed amateurs to operate the stations for the first time. The Society is grateful to the Post Office for this permission and hopes that it will become a feature of future exhibitions.

The income on the Society's stands reached a very satisfactory level.

A special feature this year was the excellent models built by Mr S. Jones, BRS23442, and Mr L. E. Newnham, G6NZ, illustrating the work and activities of the Society and its committees.

On the Friday evening the Council and Exhibition Committee held a reception for overseas amateurs visiting the show.

Region 12 Meeting

A very successful Regional Meeting was held in John O' Groats on August 29. Members travelled to the meeting from all parts of Scotland.

The Council records its thanks to the Regional Representative, Mr Woffinden, GM3COV, and the members who assisted him, for the excellence of the arrangements.

RSGB National Mobile Rally

The Society's annual mobile rally at Woburn Abbey in Bedfordshire was held this year on September 13 and attracted one of the largest attendances so far.

Region 10 Lecture

There was an excellent attendance when Professor Emrys Williams addressed members in Region 10 on September 19 at University College, Cardiff. Professor Williams' subject was " A Philosophy of Oscillators."

Mullard Award

Members travelled from all over the country for the presentation of the Mullard Award for 1963 to Mr James Illingworth, G3EPL, on November 7. The ceremony was held at the Abbotts Court Hotel, St. Bees, Cumberland.

The Council records its thanks to Mr M. Gibbings, G3FDW, and other local members for making the arrangements.

RSGB Publications

Volume 40 of the RSGB BULLETIN covering the year from January to December, 1964 totalled 832 pages—by far the largest Society volume ever published.

The Council again records its grateful thanks to all contributors. The Council is particularly pleased to note the good reception given to the new feature for younger members, *QUA Associates*.

The 1965 edition of the RSGB *Amateur Radio Call Book* was published on the opening day of the Society's Exhibition and within four days almost 2500 copies had been sold.

This edition reflected more than 3000 changes since the previous issue and was compiled by Mr John Clarricoats, G6CL.

Two new publications were issued in time for the Exhibition: the *Amateur Radio Circuits Book* compiled by Mr George Jessop, G6JP, and *S.S.B. Equipment*, a reprint of Mr G. R. B. Thornley's articles describing the design and construction of the G2DAF Single Sideband Transmitter Mark 2.

New Members

The Council is pleased to report that the upward trend in total membership noted in its Annual Report has continued.

At last month's meeting of the Council nearly 350 applicants were elected to membership—the highest total for many years. Last night a further 176 applications were approved.

London Lecture Meeting

The only lecture meeting to be held in London this winter was given on November 27 by Mr P. K. Blair, G3LTF, whose subject was " Moonbounce."

The Council was disappointed that the attendance at this meeting fell much below what might have been expected for so interesting a subject.

Claims for RSGB Certificates

Members are reminded that claims for RSGB Certificates should be sent direct to Headquarters. Claims are acknowledged on arrival and passed to the Honorary Certificates Manager for attention.

Area Representatives Badges

Badges for Area Representatives are now available from RSGB Headquarters, price 10s. each including postage.

Rowley Shears, G8KW, receiving the NFD Shield on behalf of the KW Electronics Radio Club from Mr G. M. C. Stone.

† Read to the members present at the Annual General Meeting of the Society held in London on December 18, 1964.

News from Headquarters

Representation

The following is an addition to the list of Area Representatives published in the December, 1963 issue of the RSGB BULLETIN.

REGION 7

Enfield & District,

J. Gazeley, BRS20533, 192 Haselbury Road, Edmonton, London, N.9.

Harlow & District,

J. D. Belcher, BRS26364, Leaside, Sedgegreen, Nazeing, Essex.

REGION 17

Reading & District,

Lt.-Col. N. I. Bower, O.B.E., G5HZ, Little Priory, Peppard Common, Nr. Reading, Berkshire.

Affiliated Society Representative

REGION 3

CANNOCK CHASE AMATEUR RADIO SOCIETY,

C. R. Perks, G4CP, 74 Long Lane, Newtown, nr. Walsall, Staffs.

Radio Amateurs' Examination

Applications to sit the Radio Amateurs' Examination to be held on May 7, 1965, may be made at any technical college in the British Isles before February 24. The fee of 30s. is payable to the college authorities, who will make the necessary arrangements for the examination to be taken on the college premises.

The closing date for the November examination, which will be held at only a limited number of technical colleges, is November 1.

Radio Amateurs' Examination Courses

Members who have experienced difficulty in persuading their local authorities to run courses in preparation for the RAE or to arrange examination facilities are invited to write to the Society's Education Committee at Headquarters.

GPO Morse Tests

Provided that there are sufficient applications, Post Office Morse Tests will be held during the week beginning March 8 at the Birmingham, Derby, Manchester, Leeds and Cambridge Head Post Offices. Application forms may be obtained from the Radio Services Department, Radio Branch, GPO Headquarters Building, St. Martins-le-Grand, London, E.C.1. The completed application forms, to which the entrance fee of 10s. should be affixed in stamps, must be posted to the Wireless Telegraphy Section to arrive not later than February 12, 1965.

Insurance for Field Day Events

Mr W. G. Mott, BRS18308, has informed Headquarters that Grieve and Irwin (Insurance) Ltd., Minster House, Arthur Street, London, E.C.4, have arranged suitable Field Day insurance for some years.

Receipts

Receipts for subscriptions paid by cheque, bankers' order or postal order are not now issued unless specially requested.

Silent Keys

We record with sorrow the passing of the following:

G. Keyworth, G2JI, of Chesterfield, Derbyshire.

M. R. D. Shaw, G3SDP, of Northwood, Middlesex.

D. G. Killock, A3921, of Oxted, Surrey.

Obituaries

T. A. St. Johnston, G6UT

Amateur Radio lost one of its outstanding characters with the passing on December 19, 1964, of Uncle Tom, G6UT.

He first took up transmitting in the early '20s at the age of about 40, and he soon became well known in his locality for his work on Top Band. He taught himself the code as was usual in those days, and all his gear was home-constructed. Later he turned to 40 and 20m DX and became equally well known the world over. In 1928 he became East London Representative, then served on the Council for a year or two, finally to become Vice-President of the Society in 1942.

It was during his leadership of East London that he organized his famous " country weekends " in a cottage in a farmyard in rural Essex. These were supported by a great many amateurs at various times and as a result the idea of NFD was born. More recently, he had become even more well known as a result of his annual " Ham Party " which he held every year from 1947 to the time of his death. Each year his garden and shack were invaded by more than 100 people and his visitors book must bear the signatures of a great many British and Overseas Amateurs. He had a wonderful collection of certificates which had been awarded him from time to time.

He was also well known to many old-timers, through the loyal support he gave to RAOTA. His loss from the Amateur movement will be felt for years to come and he will be mourned the world over.

The funeral of G6UT took place on December 23, 1964, at St. Giles Church, Great Hallingbury, Herts. The RSGB Council was represented by R. C. Hills, G3HRH, and Louis Varney, G5RV. Bill Brigden, G6WU, G3ERN, G3TLJ, G3KPJ and Mrs Butcher, BRS22988 were also present.

We extend our deepest sympathy to his son, daughters, his numerous grandchildren and great-grandchildren all of whom helped so splendidly at his parties.

N. H. F. Waring, EI8J

The passing of Canon N. H. F. Waring, EI8J, will be keenly felt by his many friends not only in Ireland, but throughout the world. His enthusiasm for a hobby that gave him so much pleasure was boundless, and his kindly words of wisdom and advice helped many a young amateur to improve his technique. Noel Waring, however, had other work to do, for he was known and loved throughout Ireland for his work for the Ministry of Divine healing. The packed church, with many of his fellow amateurs among the congregation, was a final tribute to a good man, much loved and now sadly missed.

EI2W

C. S. Franklin

The death occurred on December 14, 1964, of wireless pioneer Charles Samuel Franklin at the age of 85 years. Charles Franklin joined Marconi's Wireless Telegraph Company in the last year of the 19th century and he was closely associated with Marconi in his early transatlantic experiments. He was responsible for the design of 2LO, the first station of the British Broadcasting Company to go into service in November, 1922, and he devised the Marconi Short Wave Beam System in 1923. A granite column now stands at Poldhu, Cornwall, to commemorate his achievements in connection with beam transmissions.

Franklin contributed many important papers to technical journals and lectured on many occasions to the professional institutions. He was also author of a number of books on radio subjects. When he retired from the Marconi Company just before the war he settled down in Poldhu to carry out private research work.

J. C.

MULLARD AWARD FOR 1964. NOMINATIONS INVITED

In accordance with Rule 5, the Council invites nominations for consideration for the Mullard Award for 1964. Such nominations should be sent in writing to the General Manager at RSGB Headquarters to arrive not later than February 28, 1965.

The terms and conditions governing the Mullard Award, are as follows:

(i) *The Award is offered annually by Mullard Limited during the pleasure of the Directors of that Company.*

(ii) *The Award will take the form of a gift in kind (preferably electronic or electrical apparatus and/or books) to the value of £25, and a plaque.*

(iii) *The Award will be made to the member of the Radio Society of Great Britain resident in the United Kingdom who, in the opinion of a Committee consisting of three representatives of Mullard Limited and three representatives of the Council of the Radio Society of Great Britain, has, through the medium of Amateur Radio during the preceding calendar year, rendered outstanding personal service to the community by his own endeavour or by his own example of fortitude and courage.*

(iv) *The presentation of the Award will take place during the month of April each year on a date and at a place to be decided by the Committee.*

(v) *In January of each year, the Radio Society of Great Britain shall, through its official journal, invite nominations for the Award. Each such nomination shall be supported by at least three Corporate Members of the Society and shall be accompanied by a brief factual account of the personal service rendered by the nominee.*

Red Cross Test Transmissions

A series of International Red Cross Test Transmissions from Geneva will take place at 06.30, 12.00, 15.30 and 21.30 GMT on the following dates: March 22, 24, 26; May 10, 12, 14; July 5, 7, 9; September 21, 23, 25; and November 22, 24, 26. The frequency will be 7·21 Mc/s, with a radiated power of 100 kW during the first two transmissions, and 25 kW for the remaining times on each day.

Reports, which will be QSLd direct from Geneva, should be addressed to Mr E. G. Gregory, The British Red Cross Society, 14-15 Grosvenor Crescent, London, S.W.1, and the envelope marked "Radio Report." The following information should be included: date, time, signal strength, intelligibility, fading, interference (high or low side of signal, and nature), receiver, aerial, and a general indication of how other stations in the band are received. The name and address of the person submitting the report should be printed clearly.

Copies of the schedule are available from the Honorary Organizer, G. A. Allcock, G3ION, 71 Bassett Green Close, Southampton, Hants, on receipt of an s.a.e.

SAID LONG AGO

"A Society with a relatively small number of members, by which I mean anything from a few hundreds even to some few scores of thousands, if it is national in its character and operates in Great Britain, is almost certain to have its Headquarters in London. This is principally because one-sixth or one-seventh of the population of Great Britain lives in and around the Metropolis. Every society of this kind, no matter what its objects, suffers from certain disadvantages. The Radio Society of Great Britain is no exception. The executive is almost certain to be composed mainly of persons who live in London. This is not because London wants to "run the show" but because those who live at a great distance cannot afford the time, and possibly the cost involved by regular service on an executive committee. Londoners must not be blamed for this. Rather ought they to be thanked for bearing the burden of office, which is often very onerous."

Capt. Ian Fraser, M.P., C.B.E. (G5SU), now Lord Fraser of Lonsdale, in a Presidential Address to Members, 1928.

J. C.

London Members' Luncheon Club Christmas Meeting

FOG, that menace to most forms of communication, came close to disrupting the London Members' Luncheon Club Dinner Dance on Friday, December 11. Most members however, struggled through to the Horse Shoe Hotel in Tottenham Court Road and proceeded to make the function a most convivial one.

Clem Jardine, G5DJ, proposed the toast to the Ladies in his usual inimitable manner, and Beryl Fletcher, despite the fact that she forget the end of one of her stories, replied with a very witty speech.

Replying to John Graham, G3TR, who proposed the toast to the club, the Chairman, Bill Corsham, G2UV, said how sorry he was that other members of Council could not be present and suggested that perhaps this function could in future years become an annual Society occasion, run on their behalf by the Luncheon Club and that in order to benefit both, could be held in the evening following the Society's Annual General Meeting. This would give members residing further afield but who are present for the AGM the opportunity to join London members at the Dinner as well.

Thanks are due to Frank Turner who put in a great deal of hard work not only in organizing the games, but also directing the Arcadians in music for dancing.

The thanks of the committee are also due to all members who supported the "Luncheon Club Swindle," which enabled the evening to pay its way. The committee expressed the hope that the fog which had cleared from Central London had also disappeared from the outskirts to enable a reasonable journey home.

Clem Jardine, G5DJ, proposing a toast to the Ladies at the London Members' Luncheon Club Dinner on December 11, 1964.

Society Affairs

A digest of the business discussed at the November, 1964, meeting of the Council

THE November meeting of the Council was held on November 16, 1964, and was attended by Messrs. G. M. C. Stone (President), N. Caws, J. C. Foster, J. C. Graham, R. C. Hills, E. G. Ingram, R. H. James, A. O. Milne, L. E. Newnham, F. K. Parker, A. D. Patterson, R. F. Stevens, J. W. Swinnerton, L. Varney, E. W. Yeomanson (Members of the Council), John A. Rouse (General Manager and Secretary) and P. C. M. Smee (Minuting Secretary).

Apologies for absence were submitted on behalf of Mr H. A. Bartlett and L. N. Goldsbrough.

Additional Editorial Staff

It was agreed that the Society should advertise for an experienced Assistant Editor for RSGB Publications. (The advertisement appeared in the RSGB BULLETIN, *Electronics Weekly* and *The Short Wave Magazine*—EDITOR.)

Complaints against an Advertiser

Consideration was given to reports of complaints by members regarding delivery dates promised but not met by an advertiser in the RSGB BULLETIN. In addition, consideration was given to the case of a member's dissatisfaction with a transmitter supplied by the same firm. (The latter case has now been settled.—EDITOR.)

RSGB International Radio Communications Exhibition

The Council's attention was drawn to the excellent sales of RSGB publications at the recent exhibition. It was anticipated that the profits from these sales would more than cover the expenses involved in mounting the Society's own exhibits.

Membership and Affiliation

The Council approved 344 applications for membership (266 corporate and 78 Associate). The total was the highest for a single month for many years and included 158 applications received at the 1964 RSGB International Radio Communications Exhibition.

In addition, 28 applications for transfer from Associate to Corporate grade were approved.

Affiliation was granted to Newark Short Wave Club, Signal House Amateur Radio Society, RAF Muharraq Amateur Radio Club, and University College of London Amateur Radio Society.

V.H.F. National Field Day 1964

The Council approved the award of trophies in connection with V.H.F. National Field Day and placed on record its thanks to the V.H.F. Contests Committee for making the results available in time for the AGM.

Braaten and Milne Trophies

The Braaten Trophy for 1964 was awarded to Mr C. R. Perks, G4CP, operator of the Leading G Station in the ARRL DX Telegraphy Contest, 1964, and the Milne Trophy to Mr R. Jones, GW3JI, operator of the leading UK station other than G in the same contest.

Visit to Brussels

It was agreed to investigate the cost of a party of RSGB members visiting Brussels at the time of the UBA Annual General Meeting in May, 1965. (It is anticipated that the cost would be of the order of £15 per person.—EDITOR.)

RSGB Mobile Tour of Europe

The Mobile Committee was authorized to proceed with plans for a mobile tour of Europe during 1965.

Reports of Committees

The H.F. Contests Committee met on September 3, 1964, to deal with the final results of NFD 1964, the Contests Programme for 1965 and the D/F Final. On October 1, the Committee considered the rules for NFD 1965 and the General Rules for RSGB contests.

On September 7, the V.H.F. Committee met to deal with applications for v.h.f. operating awards and to consider information on the polarization of 4m aerials and reactions to the proposed 4m band plan, most of which had been hostile. The Committee also considered matters relating to GB3VHF, the proposed Scottish and Northern Ireland beacon stations, and the European satellite project.

The Mobile Committee discussed the final plans for the Woburn Rally on September 10, 1964.

On October 8, the Committee discussed plans for the tenth anniversary mobile rally to be held by the Oxford and District Amateur Radio Society during 1965.

At the meeting of the Finance and Staff Committee, insurance matters, the cost of meals for members attending Council and Committee meetings and a number of staff problems were dealt with.

The Scientific Studies Committee met on September 21, 1964, to discuss communication by sporadic *E*, the v.h.f. and h.f. transmissions from GB3LER and BULLETIN articles.

The Education and Training Committee met on September 23, 1964, to discuss arrangements for the Committee's stand at the RSGB Radio Communications Exhibition and the replies to a questionnaire sent to affiliated societies.

At its meeting on September 24, 1964, the V.H.F. Contests Committee discussed 70 and 144 Mc/s Contests, and the v.h.f. contests programme for 1965. On October 8, the Committee discussed the checking of entries received for V.H.F. NFD and the General Rules for RSGB Contests.

The RAEN Committee, on September 26, 1964, dealt with plans for a regional meeting in Surrey, correspondence with members and the RAEN Rally.

The Exhibition Committee devoted the whole of its meeting on October 2 to arrangements for the Society's participation in the RSGB Radio Communications Exhibition.

The Membership and Representation Committee met on October 12 and discussed the circularization of new licensees as a part of the membership drive and the production of a quarterly newsletter for Regional Representatives.

The Council was in session for just over four hours.

GB2RS SCHEDULE

RSGB News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.15 a.m.	Belfast
	10.30 a.m.	North Midlands
	11 a.m.	North West England
	11.30 a.m.	South West Scotland
	12 noon	North East Scotland
145·10 Mc/s	9.30 a.m.	Beaming north from London
	10.00 a.m.	Beaming west from London
145·8 Mc/s	10.15 a.m.	Beaming south from Belfast
145·30 Mc/s	10.30 a.m.	Beaming north west from Sutton Coldfield
	11.00 a.m.	Beaming south west from Sutton Coldfield
145·50 Mc/s	11.30 a.m.	Beaming north from Leeds
	12 noon	Beaming east from Leeds

News items for inclusion in the bulletins should reach Headquarters not later than first post on the Thursday preceding transmission. Reports from Affiliated Societies and from non-affiliated societies in process of formation will be welcome.

Rules for National Field Day 1965

Complete rules for NFD 1965 are as follows (RSGB General Rules do *not* apply):

1. **Duration.** The contest will commence at 17.00 GMT on Saturday, June 12, and end at 17.00 GMT on Sunday, June 13, 1965.

2. **Eligible Entrants.** Any group of members within the British Isles, which for the purposes of the contest comprise the prefix zones G, GC, GD, GI, GM and GW, may enter. The group may be a local RSGB group, a group of RSGB members, a club or an Affiliated Society. Entrants must operate within the terms of their licences.

3. **Operators.** Operators of portable stations competing in the contest must each hold a current British Isles (GPO) Amateur (Sound) Licence A or a valid PO Amateur Radio Certificate and must be fully paid-up Corporate Members of the RSGB at the time of the contest.

4. **Stations.** Each competing group will be permitted to place two stations ("A" and "B") in operation. The station operating on the lowest frequency employed shall be designated the "A" station. Such stations must operate in not more than three of the bands 1·8, 3·5, 7, 14, 21 and 28 Mc/s; the other three frequency bands will be allocated to the "B" station, i.e., no group may operate two stations on any one frequency band. Both stations may operate from the same site or from different sites, provided that they are located within the agreed limits of the area covered by their Regional Representative. It will be permissible for two groups within a Region, or adjoining Regions, each operating a single station, to amalgamate for the purpose of scoring; if this is done, frequency bands must be allocated between the two stations as detailed above.

5. **Licences.** Each station must be licensed to use a different call-sign.

6. **Applications.** Each group intending to compete must notify the RSGB Contests Committee, 28-30 Little Russell Street, London, W.C.1, of the name of the group, location and the name and full postal address (in **BLOCK LETTERS** please) of the AR, ASR, or member, responsible for their entry, not later than **WEDNESDAY, MAY 5, 1965.** Stationery and the latest information on the contest will be sent to this member.

Details should be set out as follows:
Call-sign station "A" .....Call-sign station "B" .....
The bands to be used by these stations are:

Band	1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s	28 Mc/s
Call-sign						

7. **Tents.** Stations must be operated from tents.

8 **Apparatus.** No apparatus may be erected on the site prior to 12.00 GMT on June 12, 1965. This rule includes aerials and aerial fittings as well as tented accommodation for the stations. A tent to be used for storage purposes only may, however, be erected prior to 12.00 GMT.

9. **Aerials.** Any aerials may be used, subject to the following limitations:
   (*a*) All aerials must be constructed from wire of total cross-sectional area not greater than 14 s.w.g. with the exception, however, that vertical radiators of any construction may be used.
   (*b*) No part of the aerials shall exceed a height of 45 ft. above ground level.

10. **Transmitters and Receivers.** Equipment at any "A" or "B" station must not exceed three transmitters and one receiver. Reserve equipment may be kept available, but not connected.

11. **Power Input.** Total d.c. input power to the valve, valves or other devices energizing the aerial, or to any previous stage of the transmitter, **shall not exceed 10 watts.**

12. **Power Supply.** Power for any part of the station must not be derived directly from supply mains.

13. **Type of Emission.** The contest is restricted to the use of c.w. (A 1) only.

14. **Contest Exchanges.** An exchange of reports must be made and acknowledged before points may be claimed. In contacts made by competing stations the report must include a rising serial number commencing with 001 and increasing by one with each successive contact, irrespective of band, made by the station (e.g. RST579001, etc.), and such serial numbers, both incoming and outgoing, together with signal reports, must be entered on the log sheets. Only the signal report from a non-competing station need be logged. Proof of contacts may be required.

15. **Contacts.** Only one contact with each station, as defined by its basic call-sign, may count for points on each band during the contest. Duplicate contracts must be logged without claim for points.

16. **Group Contacts.** Points must not be claimed for contacts made by a competing station with members of its own group, whether fixed, portable or mobile.

17. **Scoring.** Points will be scored on the following basis:

(*a*)	Fixed stations in the British Isles	1 point
(*b*)	Fixed stations in the rest of Europe including Eire	2 points
(*c*)	Fixed stations outside Europe	3 points
(*d*)	Fixed stations in the British Commonwealth	6 points
(*e*)	Portable and mobile stations in the British Isles	*3 points
(*f*)	Portable and mobile stations in the rest of Europe including Eire	4 points
(*g*)	Portable and mobile stations outside Europe	6 points
(*h*)	Portable and mobile stations in the British Commonwealth	12 points

* An additional **2 points** may be claimed on **1·8 Mc/s ONLY** for contacts with a portable or mobile station in any other British Isles prefix zone (e.g., GM-G, GM-GD, G-GI, GW-GC contacts on 1·8 Mc/s score 5 points). The six British Isles prefix zones are listed in Rule 2.

18. **Summary Sheets.** An entry will be accepted as valid only if the complete summary sheet has been signed by the member solely responsible for the conduct of the event within his group, however constituted.

19. **Operators' Signatures.** Contacts made by an operator whose name and call-sign does not appear on the cover sheet(s) of the appropriate log(s) will be disallowed. **Operators' call-signs must be shown on the logs against all contacts made by them.**

20. **Entries.** Each station's entry shall consist of a copy of the station log on the printed log sheet, **a separate sheet being submitted for each band worked,** together with a cover sheet for each band, and a summary sheet. The points claimed must be totalled for each band. Forms for this purpose will be supplied by Headquarters. Entries must be addressed to the RSGB Contests Committee, 28-30 Little Russell Street, London, W.C.1, **postmarked not later than June 28, 1965. LOGS MUST BE KEPT AND ENTRIES SUBMITTED IN GMT.**
In the event of any dispute the ruling of the Council of the RSGB shall be final.

21. In addition to the **National Field Day Trophy** and miniature replica, which will be awarded to the group obtaining the highest combined score, the **Gravesend Trophy** will be awarded to the runner-up.

22. **Miniature replicas** and certificates will be awarded to the groups with the highest score on each frequency band.

23. The **Scottish NFD Trophy** will be awarded to the Scottish group scoring the highest number of points.

24. The **Bristol Trophy** will be awarded to the group which, having entered only one station, shall obtain the highest number of points in comparison with other groups entering on a similar basis.

25. A **certificate** will be awarded to each of the following:
   (*a*) The chief operator of the overseas station whose check log shows that he contributed the most points to competitors.
   (*b*) The non-transmitting British Isles member whose check log is adjudged the most useful by the Contests Committee. This log should show: Date/Time (GMT); call-sign of station heard; call-sign of station worked; report and serial number sent by station heard. Where both sides of a contact are heard they should be recorded on separate lines.

Care of Trophies. The Trophies will be handed to the representatives of the groups concerned, who will be responsible for their safe keeping and their return when requested by RSGB Headquarters.

Writing to Headquarters?

When writing to Headquarters please use separate sheets of paper for:

Changes of Address (return a wrapper from the *Bulletin* if possible)
Orders for Publications
Queries
Bulletin Items

When paying your subscription please return the reminder card sent to you by Headquarters or quote the date on which your subscription falls due.

Whenever you write to Headquarters please write your name in block letters and quote your call-sign, BRS or A number.

CONTEST NEWS

— RESULTS — REPORTS — RULES —

Second 420 Mc/s Contest 1964

The second 420 Mc/s Contest for 1964 took place on October 17/18, and it seems to have been notable more for the excellent weather than for the activity. During the first hour of the contest the top 10 stations had an average of just under five contacts each. In the second hour the average had fallen to just over four and thereafter the highest average was for the hour between 22.00 and 23.00 when the figure was 2·7. There were practically no contacts between midnight and 07.30; everyone had probably gone to bed as there was no sign of peak conditions similar to those that prevailed in the early hours of the morning in the first contest at the end of May.

Conditions did improve slightly around 10.00 on Sunday when the leading stations all had contacts over 100 miles. G3ILD in Darlington was in evidence at this time and the best DX recorded were contacts with G3EGV (225 miles), G3LTF (212 miles) and G2XV (188 miles). G3LTF worked ON4HN and ON4LP, both in Ghent (150 miles).

Results

The winner this time is again G3EGV/P, operated by G3EGV and G3NIL, with the single operator station of G3LTF again second, although officially unplaced because of his late entry. G3NNG/P, operated by G3NNG and G3SJP in the next position, displaces ON4HN who drops to tenth position. The leading scores are a reflection on the conditions as they are only about one half of those for the earlier contest and the average number of miles for each contact is much less.

Comments

Very interesting comments and suggestions have been made by G3OXD/A, the station of the Albright and Wilson ARS, and these will be considered by the Committee. The gist of the comment is that the present form of 70cm contests is unsatisfactory! This seems to be confirmed by G3EGV who points out that by Sunday afternoon only one or two stations that had not been contacted were on and most stations were carrying out tests on 23cm. G3EGV comments on the enthusiasm of the newly licensed G8--- stations: at least 11 were active during the contest. G8ADM found the contest conditions good and somewhat like the General Election: interesting right up to the last minute! G3YH asks that more stations beam on the few in the west for longer periods; he remarks that he hears weak carriers all day and calls in vain, but when the beams are turned to the west the signals peak to S6. After about one contact, however, the beams are pointed elsewhere.

Equipment

There are not many descriptions of the equipment in use, but from the summaries it seems that the QQV06-40 and QQV03-20 are the popular p.a. valves. Receiver line-up is much more varied and it will be seen from the attached table that more than half the stations use transistor r.f. stages. One very complete description was received from G3NNG and it is worthy of reporting in full. The equipment is entirely home-built and includes a fully-transistorized triple superhet with a 2N2398/GM0290 cascode r.f. amplifier, 2N2398 mixer and three 2N976s in the local oscillator chain. The i.f. is tunable from 22 to 24 Mc/s. The transmitter uses valves throughout, with a DET24 as p.a. in grounded grid with a $\frac{1}{4}\lambda$ anode cavity. The modulator is, however, all transistorized using two OC35s in class B. Power supplies are from a 12 volt battery charged by a 32cc two-stroke engine giving 90 watts and 18 hours to the gallon!

Committee Comments

The standard of logs in this contest is very good and the Committee would have no objection if more logs were received; more than 72 call-signs appeared in the logs this time, including ON4, PA0, F, and GW.

Very useful check-logs were received from the following: G2OI, G2WS, BRS20533, A3770, and BRS15744 who receives a certificate of merit.

RESULTS

Position	Call-sign	Operators	Score	Contacts	Power (watts)
1	G3EGV/P	M	2720	41	6/100
*	G3LTF	S	2545	40	150
2	G3NNG/P	M	2466	41	10
3	G2XV	S	2285	33	100
4	G3OXD/A	M	2094	31	24
5	G2CIW	S	2025	29	70
6	G8ADM	S	1609	38	80
7	G2RD	S	1434	36	30
8	G3ORL	S	1278	22	25
9	GW3ATM/A	S	987	14	25
10	ON4HN	S	718	8	120
11	G8AAZ	S	582	24	20
12	ON4LP	S	529	6	40
13	G3RPE	S	501	17	25
14	G8ACI	S	496	9	11
15	G3YH	S	119	5	30
16	G3TKQ	S	86	5	25

* Late entry M Multi-operator S Single operator

Contacts over 100 Miles

Call-sign	Time	Call-sign of Station Worked	Distance (miles)
G3EGV	10.15	G2OI	152
	10.22	G3ILD	225
	10.34	G3BNL	105
	13.50	G3LQR	112
G3LTF	18.45	G2CIW	114
	19.09	ON4HN	150
	19.15	ON4LP	150
	20.20	GW3ATM/A	131
	22.15	G3BNL	105
	22.47	G3OXD/A	118
	09.51	G3ILD	212
	10.33	G3MPS	145
	14.56	G6GN	129
G3NNG/P	22.35	G3LQR	112
	10.22	G2OI	134
G2XV	22.39	G3OXD/A	102
	22.54	GW3ATM/A	140
	23.05	G3OGK/P	136
	10.03	G3ILD	188
	14.48	G6GN	136
	15.12	G3IOO	150
G3OXD/A	21.27	G3KEQ	118
	21.33	G3MCS	101
	22.39	G2XV	102
	22.47	G3LTF	118
	00.35	G8AAI	110
	00.39	G8AAZ	103
	08.53	G2RD	119
	09.14	G3FP	114
	16.58	G3LQR	136

Receiving Equipment

G3EGV	A2521 pre-amplifier-crystal mixer
G3LTF	2N2415 r.f.-A2521-G3BKQ type converter
G3NNG	2N2398/GM0290 cascode r.f. amplifier
G2XV	EC88-EC88-GEX66
G3OXD/A	AF139-6CW4-1N21 mixer
G2CIW	EC88-crystal mixer
G8ADM	AF139 pre-amplifier-crystal controlled converter
G2RD	EC88-crystal mixer
G3ORL	AF139-2N1742-crystal controlled converter
GW3ATM/A	A2521-A2521 (G6JP type converter)
ON4HN	AF139-AF139-EC88-EC86 mixer
G8AAZ	AF139-AF139-crystal controlled converter
ON4LP	AF139-AF139-crystal controlled converter
G3RPE	A2521-GEX66 mixer
G8ACI	AF186 pre-amplifier-AF139-AF139
G3YH	6CW4-6CW4-6CW4 mixer
G3TKQ	2N1742 pre-amplifier-PC88 r.f.-PC86 mixer

V.H.F. National Field Day 1964

THE third V.H.F. National Field Day was held on September 5-6, 1964, and attracted 56 entries from five countries of the British Isles. As was to be expected, the greatest number of entrants were portable in England, but an entry of 12 from outside that country is a good augury for the future.

The winners of the Surrey Trophy were the Wolverhampton Group and the Severn Valley Amateur Radio Club combined (under Rule 5). The Wolverhampton Group's second place on 144 Mc/s combined with the Severn Valley Club's steady scoring on three bands put them a clear 5000 points ahead of their nearest rivals, the North West V.H.F. Group. This Manchester group will receive a miniature cup for overall second and for being the leading 144 Mc/s station. They may be able to improve their position this year as their "B" station closed down at 14.00 leaving them with only thirteenth place on 70 Mc/s.

Results by Countries

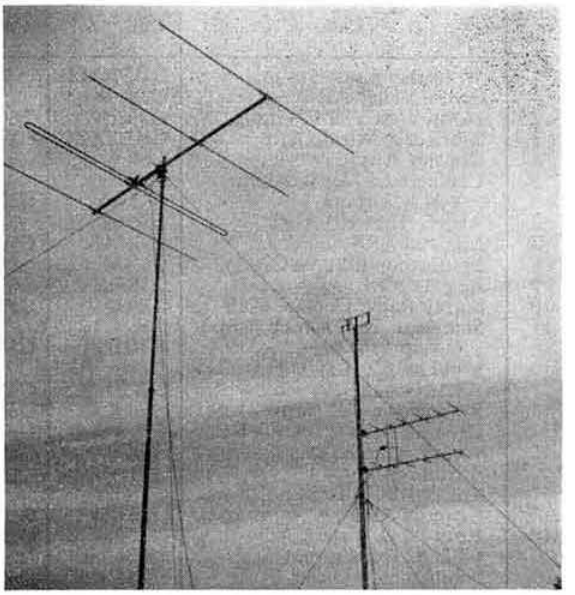
As noted above, the North West V.H.F. Group was the leading English station, followed by the Crawley Amateur Radio Society. The Albright and Wilson Amateur Radio Society operating as GW3OXD/P and GW3PXZ/P were leading GW, with the Wolverhampton Group second on the strength of their 144 Mc/s score only! There were at least 11 Welsh portable teams out, of which six entered.

The leading GM was the Dunfermline Radio Society with last year's leader, the Stirlingshire V.H.F. Group, second. There were 16 Scottish portable teams of which three entered. A few more entries might convince the Sassenachs that there is activity up north!

The only GI station to enter was set up by the Belfast and District V.H.F. Group. Two other portable stations made a brief appearance on 144 Mc/s but GI3HXV/P was the only Ulster representative on 70 Mc/s.

Three members of the Radio Society of Harrow formed the GB2GC Group who put the Channel Islands on the map. This round trip of over 350 miles by sea and air is probably the longest for this event and shows that a portable station can really be moved around. The award of a miniature cup for the leading GC station is merely a token of their enthusiasm.

The Bristol Amateur Radio Club's 430 Mc/s receiving station. The members are, from left to right, G3OUK, G3SJI, G3NOO, David, the youngest member, and G3JMY.



The display of 70, 432 and 1296 Mc/s aerials at G8RW/P, the Crawley Amateur Radio Club station.

It is intended to continue to award these miniature cups to sole entries from particular countries where there is evidence of enthusiasm, even when other portable stations known to be operating in the area do not enter for the event.

There was no entry from the Isle of Man this year, now the last country of the six.

Results by Bands

70 Mc/s. The Cumberland and Westmorland V.H.F. Group led by a clear 2000 points from the Crawley Amateur Radio Club. Apart from one local, the Northern Group's shortest contact was 50 km and 20 of their 67 contacts were over 300 km, including three over 400 km. At an average of 327 points per contact they have every right to be proud of themselves; most important, they have smashed the myth that only stations in populous areas can do well in v.h.f. contests. There is a miniature cup for the band leader and a certificate of merit for the runner-up. Crawley made 128 scoring contacts at an average of 155 points per contact.

144 Mc/s. It is obvious that a really big score on 144 Mc/s is a prerequisite for leaders in this field day. The leading station was the North West V.H.F. Group and the runner-up the Wolverhampton Group. Both these stations will receive other more important awards for their total scores so in effect there will be no separate awards for 144 Mc/s this year. The Cumberland and Westmorland Group's performance on 70 Mc/s has been commented upon; sufficient to say they came third on 144 Mc/s as well!

430 Mc/s. The leading station on this band was the A.E.R.E. (Harwell) Amateur Radio Club. This club has built up an enviable reputation for operation in the u.h.f. bands and has now won this event for the second time. Second came the Mid-Essex V.H.F./U.H.F. Contest Group.

1296 Mc/s. The leaders were the Radio Society of Harrow No. 1 station, with the mid-Essex boys second. With scores multiplied by 10 on this band, the difference of 130 points represents less than 13 km difference in distances and this result must be considered very close. The call-signs used

Position	Club	Call "A"	Call "B"	Operators	70 Mc/s	144 Mc/s	432 Mc/s	1296 Mc/s	Total
1	Wolverhampton Group ..	GW3KMT	—	3	—	**42,391**	—	—	**68,790**
	Severn Valley ARC	G3SVR	—	4	19,738	—	5,341	1,320	
2	North West V.H.F. Group ..	G3BAK	G3OHF	12	10,498	**47,300**	5,860	—	**63,658**
3	Albright & Wilson ARS ..	GW3PXZ	GW3OXD	12	**18,723**	38,361	**5,136**	—	**62,220**
4	Crawley ARC	G8RW	G3FRV	8	**19,818**	34,780	6,271	—	60,869
5	Cumberland & Westmorland V.H.F. Group	G3FDW	G3BJD	6	**21,922**	38,426	—	—	60,348
6	AERE (Harwell) ARC ..	G3PIA	G2HIF	8	15,320	26,872	**13,400**	920	56,512
7	Midland ARS	G3MAR	GW4LU	7	14,273	35,153	3,459	2,890	55,865
8	Bournemouth/Poole Group ..	G6XM	G3OBD	10	12,301	30,983	6,130	Nil	49,414
9	Reigate ATS	G3REI	G3BBR	17	15,167	31,365	2,226	—	48,758
10	Surrey Radio Contact Club ..	G2RD	G3SRC	7	7,728	27,836	7,911	2,400	45,875
11	Stamford & District RSGB Group	G3HES	G3FUR	10	7,377	35,485	2,457	—	45,319
12	Mid-Essex V.H.F./U.H.F. Contest Group	G3LTF	G3ORL	4	9,136	18,455	**11,200**	**3,290**	42,081
13	Radio Society of Harrow No. 1	G3HBW	G3EFX	7	9,105	19,852	6,789	**3,420**	39,166
14	Crystal Palace & District RC..	G3GIM	G3IIR	7	12,358	22,290	—	—	34,648
15	Welwyn Garden City Group ..	G5UM	G8LM	17	10,030	20,033	2,749	—	32,812
16	Bristol ARS	G3TAD	—	3	—	15,536	2,679	Nil	32,539
	Bristol RSGB Group	G3KUJ	—	5	14,324	—	—	—	
17	Grimsby ARS	G3SND	G3NJF	2	4,825	27,249	—	—	32,074
18	Norwich & District RC ..	G3JQI	G2YU	9	8,578	20,856	1,735	—	31,169
19	GB2GC Expedition Group ..	GC3OUF	GC3PSH	3	**9,467**	**19,387**	Nil	—	**28,864**
20	Southampton Group	G3KEU	G3SOU	6	10,985	15,715	2,022	—	28,722
21	Colchester Group	G3FIJ	G3SJO	6	10,299	14,488	2,541	170	27,498
22	East Cheam Wireless Society..	G3OJE	G3OSC	11	9,129	13,995	4,224	—	27,348
23	North London Group ..	G3FD	—	2	7,232	11,834	7,908	—	26,974
24	Loughborough ARC ..	G3BNL	G3RAL	13	7,436	14,557	4,671	—	26,664
25	Newbury & District ARS ..	G3TEK	—	3	—	25,537	—	—	25,537
26	South Dorset RS	G3EAT	G3SDS	6	10,058	12,240	1,704	380	24,382
27	Cray Valley Radio Society ..	G3OYZ	G3RCV	11	7,751	16,017	—	—	23,768
28	Port Talbot Group	GW4CG	GW3REQ	7	8,906	12,492	2,271	—	23,669
29	Lichfield ARS	G3NLY	—	5	—	20,038	—	—	20,038
30	Dorking & District RS ..	G3IAM	G3CZU	9	5,422	7,040	7,380	—	19,846
31	G3NEL/G3JUG	G3NEL	—	2	—	19,684	—	—	19,684
32	Basingstoke ARC	G3CBU	G3TCR	10	9,943	8,343	—	—	18,286
33	Belfast & District V.H.F. Group	GI3HXV	GI3OFT	5	**11,800**	**6,080**	—	—	**17,880**
†	*Sussex*	G3MZO	G2DSP	2	3,458	14,135	—	—	17,593
34	Clifton ARS	G3JKY	G3GHN	10	3,092	10,298	3,884	—	17,274
35	Purley & District RC ..	G3KVC	G3GKF	8	4,678	8,500	2,022	—	15,200
‡	Peterborough & District ARS	G3RED	—	7	—	14,121	—	—	14,121
36	Cornish ARC No. 1	G2BHW	G3XC	6	5,922	8,041	—	—	13,963
37	Battersea College & Tech. ARS	G3IGQ	—	2	—	13,826	—	—	13,826
38	*Monmouth*	GW2HIN	—	2	—	13,489	—	—	13,489
39	Sheffield ARC	G8NN	—	4	12,060	—	1,212	—	13,272
40	Accrington District Group ..	G3PUO	G3EKP	3	6,250	5,930	* 165	—	12,345
41	Midlands Contest Club ..	GW3RUF	—	3	1,866	10,202	—	—	12,068
42	Dunfermline Radio Society V.H.F. Group	GM3EGW	GM3IQL	4	**4,493**	**6,299**	* Nil	—	**10,792**
43	Chingford Group	G4GA	—	3	—	10,563	—	—	10,563
44	Reading RSGB Group ..	G5HZ	—	3	—	10,530	—	—	10,530
45	*Kent*	G4IB	—	7	—	9,705	—	—	9,705
46	Berkhamsted Group ..	G2CZM	G3PV	2	2,013	6,511	—	—	8,524
47	Bagshot & District Group ..	G2BB	—	4	5,786	1,589	—	—	7,375
48	Silverthorn RC	G3SRA	—	5	—	6,957	—	—	6,957
49	Stirlingshire V.H.F. Group ..	GM6XW	—	2	1,980	1,812	—	—	3,792
50	Edgware & District RS ..	G3ASR	—	3	2,880	—	—	—	2,880
51	Loughton & District RC ..	G8AB	—	4	838	1,369	—	—	2,207
52	*Dundee*	GM3KYI	—	1	—	1,749	—	—	1,749
53	Ravensbourne ARC	G2DHV	—	1	—	1,593	—	—	1,593
54	Cornish Radio Amateur Club No. 2..	G3OCB	—	1	—	—	784	—	784

† Late entry. ‡ Incomplete log.

All entrants except those marked * operated the "A" station on 70 Mc/s, 432 Mc/s and 1296 Mc/s. Those marked * operated the same station on 144 Mc/s and 432 Mc/s. Award winning scores are in bold type.

by these groups' " A " stations are noted; further comment on their success is hardly needed. Certificates of merit are also awarded to the band leaders in each country: these in fact go to the overall country winners in GC, GI and GM and are shared between the two leading GWs. The Contests Committee hopes that when activity builds up in these countries the prizes will be spread around. In all, seven G stations have won prizes this year.

In the columns for 432 and 1296 Mc/s, several stations are credited with a " nil " score. These are clubs who set up equipment on the site for these bands but failed to obtain contacts either due to bad conditions or a last minute indisposition of the equipment. Not shown in the table is another " nil " score for the Severn Valley Amateur Radio Society on 2300 Mc/s. So far as is known this is the only group equipped for this or any higher band, and is the first recorded five band entry.

The Contests Committee concedes that it is not worthwhile a small club tackling the s.h.f.'s as well as the lower frequencies, but an interesting device has been suggested which is quite within both the spirit and letter of the rules. This is for a club with an enthusiastic u.h.f. membership to make two separate entries, one covering the bands (say, 70 to 1296 Mc/s) on which significant scores can be made quickly, and the other specializing in the higher frequencies with only relatively primitive equipment for communication on the v.h.f.'s. The second group would come well down in the total scores but could do very well on the bands selected.

IARU Region I Contest

One result of the September date which was hoped for was an increase in entry to the IARU V.H.F./U.H.F. Contest, particularly in the u.h.f. sections. All that entrants had to do was add up the distance column (instead of the points column) and send a copy of the log to the V.H.F. Manager. Only three clubs did this; the UK entry to the European Contest has always been low but this is ludicrous, and puts the UK clearly among the also rans.

Minor changes to the rules will be made next year, the most important being that the " two times " bonus for contacts with portable stations will be dropped so that the total distance will be the total score. The band bonus will be a multiplier applied to the total and not to the individual contacts.

Comments from Entrants and the Contests Committee

Five clubs commented favourably on the " points per km " system, three want a reversion to " points per mile," while MARS requests that v.h.f. contests be made one or the other but not both. This last point is well taken. Perhaps it is not appreciated that the grids printed on Ordnance Survey maps are metric and in particular the squares on the 10 mile map are of 10 km side. The scale is also metric 1 to 625,000 (4cm = 25 km) and the secondary scale of 10 miles to the inch gives contests results about 1 per cent high. This of course does not matter for UK events as all are scored alike, but entrants to European contests should bear it in mind. The main reason for the points per km scoring system was to encourage IARU entries.

G3OJE/P and G3OSC/P: the East Cheam Group's contribution to V.H.F. NFD. *(Photo by G3OJE)*

Various bonus schemes were suggested, and these all had a strong geographical bias and included bonuses for continentals, number of countries worked and for contacts over 200 km (200 points?).

There were many requests which would amount to abandoning the IARU event, including changes to the times (mainly an early close), tents only and restrictions on the amount of equipment either by weight or power consumption. Two clubs specifically requested that the date be changed back to the original date of the first weekend in July; the objection to this was its close proximity to National Field Day, but opinions on this point are solicited.

Inevitably some entrants steer as close to the wind as they can in interpreting the rules (this of course leads to long complicated sets of rules as the Contests Committee plugs the gaps) but one trick tried this year strikes us as particularly cheap. The station called CQ with location given " X miles west of ——— in ———shire," a rather rare county. In fact, the station (not the town) was in the next (much more common) county and the name of the rare county was just dangled for bait.

Another point that is exercising the mind is the growing practice of using two receivers to tune the band after a CQ call, and there have been dark hints about using two transmitters to call a wanted station. Any entrant caught up to the second trick will undoubtedly be disqualified completely, but the first device is not so easily dealt with. No action is to be taken in the 1965 rules, but the views of members will be noted on this point. One possible solution would be for the bigger clubs with a superfluity of operators to make two (or more) entries.

Comment was received on both sides of the question of setting up contacts on the u.h.f. bands by first establishing contact on a v.h.f. band. As things stand, skeds (i.e., an agreement to contact at a later time or date) are out, but a quick band change is quite in order; it appears that u.h.f. contacts, particularly on 1296 Mc/s, were lost due to some stations' inability to change bands at will. No change in the rules is intended at present.

Several entrants commented on the QRA locator system. A map of Western Europe and all but the extreme north of the British Isles to a scale of 1 : 2,500,000 is now available from RSGB Headquarters, and this should resolve many members' difficulties.

A number of complaints have been received concerning the unhelpful descriptions many entrants give for the QTH. Stations in or very close to a marked town or village give QTH as a bearing and distance from another much more remote place. Bearings taken from conurbation or large towns such as Birmingham or Croydon cannot be pinpointed and some distances given are much too large, giving rise to errors in the QTH even before distances are measured. Entrants are invited to ask themselves, " Could I, if a stranger to the area, pinpoint my station say to 1 or 2 km with the information I give out over the air? " In many cases the answer must be " No."

Several entrants suggested a return to the old scheme of identifying bands by letters given with the report (e.g. RST579A001 etc.). While keeping an open mind two points may be made: is it good policy to make things easy for the users of defective equipment and incompetent

A group of members of the Silverthorn Radio Club in the tent housing G3SRA/P. The equipment was a TW2 feeding an 8 element Yagi. *(Photo by G2HR)*

operators and would it not be better to identify the band before the contact has reached the reporting stage? Competent operators were heard to call " CQ 2 metres," etc., rather than just " CQ ", or to say " Now tuning from 70·1 Mc/s up" or " now tuning the 4 metre band." Unfortunately such considerate people usually own well-adjusted equipment and those who cannot be bothered to make their calls clear cannot be bothered to build (or buy) equipment of the quality needed on our congested bands.

The form filling has brought forth some comment. The cover sheets sent out are of course a hasty adaptation of the NFD sheets made as a result of the utter chaos of the 1963 entry. In this event at least it has been possible to relate call-signs to the appropriate clubs and make some assessment of the leaders early in the checking. Even so one entry which omitted to claim a total score only emerged as a major award winner at the end of the checking, having previously been assessed as two separate stations. (This was not the Severn Valley/Wolverhampton combination whose claim was clearly set out).

There are also requests for a published list of entrants as for NFD, but this involves a surprising amount of work which the Contests Committee is not prepared to take on. It also inhibits last minute decisions to take part or, for example, changes of call-sign if the owner of the one chosen is indisposed.

Mishaps during Field Day

The misfortunes of others make interesting reading and perhaps are a warning of the things which can go wrong. Reports of generator failure are fewer, perhaps as a result of G3PTB's article in the May, 1964, BULLETIN.

The Loughton and District Radio Club were among the unfortunates, and finding that their generator was quite irreparable in the field they ran out a " few hundred yards " of cable to a nearby mains supply. Quite correctly they claim points only for the first part of their log and submitted the remainder of their QSO's as a check log. But for RSGB contests purposes they were no longer portable after the failure and contacts with them should have been worth only single points. It was felt that such contacts were certainly in the spirit of the event and double points have in fact been awarded. The point will not arise in 1965 under the amended rules.

Basingstoke found that the armature leads of their generator had not been secured by the maker so that the soldered joints to the commutator failed, putting them off the air for several hours. They were, however, able to find and repair this fault, which is no small matter in the field in the small hours of the morning.

The Harrow No. 1 station snapped its wooden mast while erecting it complete with aerials for 70 and 432 Mc/s. The 70 Mc/s four element Yagi was completely wrecked, but the only casualty among the personnel suffered slight lacerations. They consider themselves very lucky, for a v.h.f. array falling from about 20 ft. is a fearsome weapon.

The Southampton Group operators were able to do a good turn, when they spotted a heath fire some five miles away and called up a station in their home town to report it. The County Fire Brigade duly dealt with the matter.

Check Logs

Once again a gratifying number of check logs greatly helped the checking of this event and these are gratefully acknowledged from G2BQ, G2JF, G2WS, G3AZI, G3EHR, G3NOH, G3PMJ, BRS15744, and two portable stations G3COJ/P and G3ERD/P.

CONTESTS DIARY

February 6-7	- QCWA Party.
February 13-14	- ARRL DX Contest (Phone).
February 14	- First 70 Mc/s Contest (Open).
February 20-21	- BERU Contest (see page 678, October, 1964).
February 20-21	- YL/OM (Phone) Contest.
February 27-28	- ARRL DX Contest (C.W.).
February 27-28	- REF (Phone).
March 6-7	- Second 144 Mc/s Contest (Open) and Listeners' V.H.F. Contest (see page 741, November, 1964).
March 6-7	- YL/OM (C.W.) Contest.
March 13-14	- ARRL International DX Competition (Phone).
March 20-21	- First 1·8 Mc/s Contest (see page 741, November, 1964).
March 20-21	- International S.S.B.'ers Contest.
March 20-21	- BARTG RTTY DX Contest.
March 27-28	- ARRL International DX Competition (C.W.).

April 1-15	— Goose Bay ARC QSO Party.
April 3-4	— International SRKB V.H.F. Contest.
April 4	— Low Power Contest.
April 10-11	— CQ WW S.S.B. Contest.
April 24-25	— PACC Contest (C.W. and Phone).
April 25	— Derby D/F Qualifying Event.
May 2	— Third 144 Mc/s Contest (Portable).
May 8-9	— USSR DX (C.W.) Contest.
May 9	— High Wycombe D/F Qualifying Event.
May 15-16	— Second 70 Mc/s Contest (Open).
May 23	— South Manchester D/F Qualifying Event.
May 29-30	— First 432 Mc/s Contest.
June 4-7	— CHC/FHC/HTH QSO Party.
June 12-13	— National Field Day.
June 27	— D/F Qualifying Event.
July 4	— Fourth 144 Mc/s Contest (Portable).
July 17-18	— 1296 Mc/s Tests.
July 18	— Oxford D/F Qualifying Event.
July 25	— Third 70 Mc/s Contest (Portable).
September 4-5	— Region 1 IARU Contest.
September 4-5	— V.H.F. National Field Day.
September 12	— D/F National Final.
September 19	— Low Power Field Day.
September 25-26	— 21/28 Mc/s Telephony/Receiving Contest.
October 9-10	— Raynet Rally.
October 16-17	— 7 Mc/s DX Contest (Phone).
October 24-25	— CQ World Wide Contest (Phone).
October 30-31	— Second 432 Mc/s Contest.
November 6-7	— 7 Mc/s DX Contest (C.W.).
November 20-21	— Second 1·8 Mc/s Contest.
November 28-29	— CQ World Wide Contest (C.W.).
December 5	— Fourth 70 Mc/s Contest (C.W.).

NEWS . . .

Collated by John Clarricoats, O.B.E., G6CL

SRAL joins Rescue Service. The Finnish Amateur Radio Society recently joined the Finnish Rescue Service, an organization established to deal with emergencies. It includes the Scouts, Red Cross and other voluntary organizations of a similar nature.

An International Radio and Electrical Trades Exhibition will be held at a hotel in the Earls Court area of London from September 1 to 7, 1965. It will have the support of the Japanese Electrical and Radio Importers' Association. Organizers are Rex-Hassan Associates, 42 Manchester Square, London, W.1.

Mr T. N. Sutherland, Deputy Chairman and Managing Director of the Marconi Company became President of the Television Society on January 1. He succeeded Sir Robert Renwick who held that office for two years. The Television Society is now in its 38th year of existence, having been founded in 1927.

Offshore Pirates. From January 29, a European agreement has been available for signature by nations who agree to take action against offshore pirate broadcast and television stations. The agreement, drawn up by the Council of Europe, requires signatories to treat as civilian offences the operation and establishment of such stations, as well as the giving of assistance to them. Assistance includes maintenance of equipment, provision of food and supplies and advertising services. The agreement becomes effective one month after it has been ratified by three administrations.

International Convention organized by the American IEEE, to be held in New York from March 22 to 26, 1965, is expected to attract scientists and engineers from upwards of 40 countries. An attendance around 75,000 is anticipated which, if achieved, will make it the largest gathering of its kind ever held.

ITU Centenary. Thirty-two Commonwealth "Crown Agents" territories will issue special postage stamps in May to commemorate the centenary of the founding of the International Telegraphic Union (now the International Telecommunication Union) in 1865. The design, common to all the stamps, will show the ITU symbol—a lightning flash behind the Globe—and all, except, Brunei, will bear the Queen's portrait. Brunei will feature the head of the Sultan. The United Kingdom and other British Commonwealth territories, besides many foreign administrations, will also commemorate the centenary by issuing special stamps.

Handy! The new Plessey-made A13 fully transistorized, light-weight, military h.f. packset incorporates a crystal calibrator which makes any one of 240 channels in the 2 to 8 Mc/s band available immediately, without netting. Phase modulation is claimed to give improved range with longer battery life. Handy for NFD 1975!

US 5 cents Amateur Radio Stamp to commemorate the Golden Jubilee of the ARRL and the work of Radio Amateurs was issued on December 15, 1964. Specially designed envelopes bearing a reproduction of the cover of Vol. 1, Number 1, of *QST* were available from ARRL Headquarters for first day cancellations.

New Postmaster General Anthony Wedgwood Benn is conducting a broad review of policy in connection with the television and radio broadcasting services. BREMA recently advocated the introduction of a further 625-line TV programme to compete both with the BBC and the ITA.

Col. G. W. Raby, C.B.E., has been elected President of the Institution of Radio and Electronic Engineers for the year 1965. In his Presidential Address Col. Raby called for more team work between engineers and scientists in all branches of engineering and research, which involves co-operation between the major engineering institutions.

First day cover received at RSGB Headquarters.

IERE. A nett gain in membership of 832 during the year ended March 31, 1964, was reported at the AGM of the Institution of Electronic and Radio Engineers held in December 1964. Total had reached 9530, including 3100 graduates and 2800 associate members.

BBC Dual Transmitter Stereo Broadcasts have now ended although it had been announced earlier they would continue on alternate Saturday mornings at least until after the Plenary Assembly of the CCIR in 1966. Experimental tone transmissions are still taking place.

New V.H.F. Beacons are now operating in Norway—LA2VHF is on Graakallen, near Trondheim (145·200 Mc/s) and LA3VHF on Harstadsaasen, near Harstad (145·250 Mc/s) LA2VHF began operating on 145·630 Mc/s but was due to change frequency early in the New Year.

Probing Radiation Belts. Explorer 26 Satellite was recently launched from Cape Kennedy, Florida, into a long, looping orbit to investigate the earth's radiation belts. Space scientists are trying to determine how these belts—named after Van Allen who first recognized their existence—trapped in space by the Earth's magnetic field, work as a kind of conveyor belt in discharging particles, earthward and spaceward. Particles discharged earthwards presumably cause the Northern and Southern lights and the magnetic storms that disrupt long-distance radio communication.

First Lighting Exhibition in Britain, will be staged in the New Hall of the Royal Horticultural Society, London, S.W.1, from March 22 to 25, 1965. During the Exhibition the British Lighting Council will present a Conference and Lecture Programme each day. Tickets for the lectures can be obtained on request from Electrical Fairs Ltd., 6 Museum House, 25 Museum Street, London, W.C.1, or the British Lighting Council, 16-18 Lancaster Place, London, W.C.2. General Manager is Phil Thorogood, G4KD, organizer of the RSGB Exhibition and the sponsors are the Electric Light Fittings Association.

Unique Monument, honouring a transmitting valve that lived for "260 years" has been erected by engineers of *Radio Liberty* at the organization's transmitting site in Lampertheim, Germany. Known as "B18" the valve is a steam-cooled 50 kW type that lasted 32,459 hours beyond its normal life expectancy of 7000 hours, corresponding to a human life span of 260 years.

CHANGES OF ADDRESS

Four weeks' notice is required to effect changes of address. When notifying Headquarters, please give the old as well as the new address. Advise changes promptly so that you receive every issue of the BULLETIN without interruption.

CLUBROOM

A Monthly Survey of Group and Club Activities

Ainsdale RC. A 2m, 4m and 160m DXpedition, possibly to Westmorland, is being arranged for the coming Spring, and further details of this activity will be published as soon as they are available. A more definite future event is a Hot-Pot supper on Friday, February 26, to be held at "The Morris Dancers," Scarisbrick, near Southport. The officers of this club, elected at the AGM on January 6, are: R. J. Woodroffe, G2DQX (Chairman); N. Horrocks, G2CUZ, 34 Sandbrook Road, Ainsdale, Southport, Lancs. (Honorary Secretary), and P. Cardwell, G3FXI (Honorary Treasurer).

A club in **Aldridge,** Walsall, Staffs., was formed on December 10, 1964, when 19 persons, including three licensed amateurs, met at the Tynings County Secondary School, Aldridge. The second meeting was scheduled for January 15, which would be devoted to forming a committee and arranging a programme. We hope to hear more from this club when things get going.

Basildon and District ARS. A junk sale is to be held at the cafe of the Van Gogh, Paycocke Road, Basildon, on Tuesday, February 16, 1965, starting at 7.30 p.m. All amateurs in the district are cordially invited. Honorary Secretary: C. Roberson, G8AAO, Milestone Cottage, London Road, Wickford, Essex.

Basingstoke ARC. At the next monthly meeting on February 13, John Elliott, G3IUU, will give an "Introduction to Transmission Techniques." This lecture will begin at 7 p.m. in the Immanuel Hall, Wote Street, Basingstoke.

Bromsgrove and District ARC. The inaugural meeting took place on January 8; we have no idea yet whether there was a good turnout, but more members are being sought. All amateurs and SWLs in the area who are interested are welcome to attend the next meeting, which will be held on February 5 in the Co-operative Meeting Rooms in the High Street, Bromsgrove, at the junction with Stratford Road. Unfortunately no meeting time was given in the report, but no doubt this, and any other details, can be obtained from the Honorary Secretary, John Harvey, BRS19682, 22 Elm Grove, Bromsgrove, Worcestershire.

Bury RS. A new committee was elected at the AGM in December: Chairman, F. Burnett, G3RSM; Honorary Secretary, K. Drinkwater, G3RHR, 16 Lindale Avenue, Accrington; Honorary Treasurer, G. F. Williams, G3RNR, and committee members G2GA, G3ETU, G3JAG, G3TF and an SWL. Meetings will continue to be held on the second Tuesday in each month at 8 p.m., but in a new venue, the "Old Boar's Head," at the corner of Crompton Street and The Rock, Bury. G3JAG will be speaking about receivers for c.w., a.m. and s.s.b. at the meeting on February 9, and on March 9 there will be a junk bring-and-buy sale; we have been asked to point out that more "gear," and less "junk" would be appreciated, especially by the younger members.

The top table at the Dorking and District Radio Society's Christmas Dinner on December 15, at the Star and Garter, Dorking, Surrey. Left to right: D & DARS Chairman, Bruce Bonehill, G3LHC, and Mrs. Bonehill; Guest of Honour, Mr D. Licence of Enthoven Solders Ltd.; Mrs Greenwell, and D & DARS Honorary Secretary, John Greenwell, G3AEZ.

Cambridge and District ARC. The club still has a considerable amount of excellent gear to dispose of, and any members who have not yet taken the opportunity to examine these items are urged to contact the Honorary Treasurer, G3IIT, for particulars and prices. A sausage supper on December 18, arranged by Fred Taylor, G3RFP, proved to be very popular, and tickets for the Annual Dinner at the University Arms Hotel, with the President of the RSGB as Guest of Honour, were all sold a month before the event.

Chester and District RS. The society met on January 5 for the AGM, and the following officers were elected: President, K. Gray; Chairman, D. Wardle, G3EWZ; Vice-Chairman, H. Morris, G3ATZ; Honorary Secretary, R. Tricky, G3DRB; Honorary Treasurer, B. Fallows, G3OWY, and Committee Members GW3JAZ, G3FNV, G3SQP, A3784, and G3TRL. The society's auditor is J. Goldburgh, G3ETH. It was proposed at the meeting to form a Contests Sub-Committee and to consider the possibility of regaining the club's original call-sign. Meetings are held every Tuesday, except the first in each month, at 8 p.m. in the YMCA, Chester.

Cornish Radio Amateur Club. At the meeting held on January 7, a discussion on the very controversial subject of s.s.b. *vs* a.m. came out in favour of a.m. The protagonists were G3OCB, backed up by G3AET, for s.s.b., and G3XC, backed up by G3THT, for a.m. The subjects of future meetings will be the agenda for the AGM and a film show in February; a debate on a.m. *vs* c.w. in March; the AGM, and lectures on chassis by G3NVJ and aerials for restricted spaces by G3AET in April, and a film show in May. Meetings are held at the SWEB Recreation Hall, Pool, Cambourne, on the first Thursday in each month. Those interested in v.h.f. are also welcome to turn up at meetings of the club's V.H.F. Group at the Coach and Horses, Pydar Street, Truro, on the third Thursday in each month. Honorary Secretary: W. J. Gilbert, 7 Poltair Road, Penryn, Cornwall.

Crawley ARC held its AGM in December, and the following officers and committee were elected: Chairman, J. C. Graham, G3TR; Honorary Secretary, R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley, Sussex; Honorary Treasurer, J. E. Parsons, BRS22560; Committee Members, G3PHG, G3RXJ, G3CTP and G3LHZ. A full programme is being arranged for 1965, and during the February meeting there will be a lecture on portable and mobile operation by G3JEQ. In addition, the Annual Constructional Contest will be judged by members of the Reigate Amateur Transmitting Society. The Crawley Club's Annual Dinner will be held on Friday, March 19, when the Guest of Honour will be W. H. Allen, MBE, G2UJ, President of the West Kent ARS.

Cray Valley RS. Meetings of this group are held at the Congregational Church Hall, Court Road, Eltham, on the first Thursday in each month at 7.30 p.m. The forthcoming programme is: February 5, "The Princess Transmitter," by G3JJG; March 5, "My Shack," part 2, by G3GJW; April 1, the AGM and "Vocal Synthesizers," by G3JJC; May 6, "Workshop Practice," by G3MQT; June 3, "How it all Began," by G2VB; and July 1 "—/M V.H.F.," by G3MCG.

Dorking and District RS. The Annual Dinner held on December 15 at the Star and Garter, Dorking, seems to have been a great success, with almost a full turn-out of members. In his speech to visitors, the chairman commented on the encouraging news that Dorking had at last climbed on to page one of the NFD results, due, no doubt, to the valuable talk on soldering given earlier in the year by their guest of honour, Mr Licence.

Dudley ARC. Since the last report, there has been quite a varied programme, with a lecture by the Birmingham Tape Club, a junk sale, a talk on s.s.b., a quiz (Hams *vs* SWLs), a visit to BBC Sound Studios in Broad Street, Birmingham, and a lecture by R and A Amplifiers of Wolverhampton. The programme for February is promising, with a demonstration of members' tape recordings on the 12th, and a demonstration of new hi-fi equipment by Pye Ltd. of Cambridge, on the 26th. Meetings are held at the Art Gallery, Dudley, at 8 p.m., and visitors are always made welcome.

The **Durham City ARS** has just passed its first anniversary and is still thriving, with average attendances at meetings of 30 and more. Visitors and prospective new members are always welcome to look in at the meetings, held on alternate Thursdays at 7.30 p.m. in the Bridge Hotel, North Road, Durham. The next will be on February 11. Honorary Secretary: M. Allenson, G3TGD, Physics Dept., University of Durham, South Road, Durham.

East Kent RS. This society is now settled in new premises, which are apparently far cleaner and more comfortable than the old cellar used before. It is hoped that this will aid in attracting a larger membership, including the members who have in the past gradually dropped out. The club station G3LTY will be far more active, and it is hoped to start a series of slow Morse transmissions from G3LTY. The new clubroom is the Toc-H Hall, St. Mary Bredin's Vicarage, Canterbury. The society also has a new Honorary Secretary, G3TMI, as G3DMO had to resign owing to the lack of time. G3TMI's address is 18 Dover Street, Canterbury Kent.

The **Eccles and District RC** has at last been successful in obtaining the use of a large room, complete with central heating and space to store equipment, for the regular weekly meetings. The address is Patricroft Congregational Schools, Shakespeare Crescent, Patricroft, Eccles. Members are asked to note that in addition to the meetings every Tuesday, there is also a club 'phone net on Thursdays at 20.30.

Ex-G Club. At the close of 1964, the club celebrated its fourth anniversary, boasting almost 200 members in 25 countries. All these members were born in the UK, and are now residing abroad. They keep in touch by taking part in the world-wide nets, and through the monthly *Ex-G Club Bulletin*. Full details of the club, and the certificates issued, may be obtained by sending an s.a.e. to G4MJ, W3HQO or the Secretary, W8YHO.

The first report has been received from a newly-formed club in Fareham, Hants. It has been officially named the **Fareham Amateur Radio Club,** and meetings take place on Sundays at 7.30 p.m. at the home of G3SHD, 39 Nicholas Crescent, Fareham. Full details of future activities were not known as at the end of December, but anyone who is interested is invited to get in touch with the Honorary Secretary, C. A. Gledhill, G3LGX, 113 Oak Road, Fareham, Hants. (Telephone: Titchfield 2482.)

Havering and District ARC. With the increasing Amateur Radio activity in and around Havering, Essex, many amateurs and SWLs in the area strongly felt that a club was needed. It was therefore decided to form this club, and at least two successful meetings have been held so far. Anyone who would be interested in supporting this new venture is invited to write to O. S. Tillett, G3TPJ, 27 Cranbrook Drive, Gidea Park, Romford, Essex.

Lothians RS. The meeting on December 10 was devoted to a demonstration of Solartron equipment; members were fascinated by the performance of the higher priced (£600) oscilloscopes, especially the facility provided for expanding any part of the timebase scan to permit a more detailed examination of the waveform.

Northern Heights ARS. The activities of 1964 were agreeably rounded off by the Annual Dinner in December, when everyone present had a most enjoyable time. Among the forthcoming arrangements are a visit to the Bradford GPO on February 10, a ragchew on the 17th, and a repeat lecture entitled " Radio on Stamps," by Mrs M. I. Shaw, G3OMM, on March 3.

Peterborough ARS. At the January meeting, members were joined by friends from the Stamford, March and Cambridge clubs, for a knock-down sale of new, ex-manufacturers' surplus components. All were in little plastic bags, at a popular price of sixpence each! Honorary Secretary: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

Plymouth RC. The outstanding event since the last contribution to *Clubroom* was a visit to the shack of the club's President, G5ZT, for a practical demonstration of Amateur TV. Other nights saw lectures on phase and frequency modulation by G3SN, DX TV reception by Reg Roper, and a film show. The Annual Dinner will be held on February 6, but by the time that this appears in print it will probably be far too late to book additional tables. Honorary Secretary: R. Hooper, G3SCW, 2 Chestnut Road, Peverell, Plymouth.

Reading ARC. The next meeting will be held on February 27, when the subject for the evening will be NFD and other 1965 contests arrangements. Honorary Secretary: R. G. Nash, G3EJA, " Peacehaven," 9 Holybrook Road, Reading.

Reigate ATS. G2DP, G3FRV from Crawley and G3LBA from Dorking formed the panel of judges for the Annual Constructional Contest held at the December meeting. The winners were: Open Class for the G8KW Cup, D. Thom, G3NKS; and Junior Class for the XYL Cup, R. Wells, G3RIN, for the fourth time in five years. The judges congratulated the juniors on their very high standard, exceeding that of the Open Class, and warned the latter that a number of the juniors would be eligible for the Open Class in 1965! A members' evening will be held at the clubroom, the George and Dragon, Redhill, on February 20, when members will be asked to talk briefly on their favourite piece of equipment. The Annual Dinner will be held on February 12 at the Reigate Hill Hotel, tickets for which cost 25s. Honorary Secretary: F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey.

At last we have a report from the **Roding Boys' Society**; they have featured prominently at the past two RSGB Exhibitions, but so far all we have heard from this quarter are the mentions in *QUA Associates*. The RBS started about four years ago as an offspring of the old Wanstead and Woodford Radio Society, and now regularly holds meetings on Tuesdays at 7.30 p.m. at Wanstead House, The Green, Wanstead (near Wanstead Underground station). We were surprised to hear that lately support has been dwindling a little, with members vanishing to colleges and other far off places; there must be many enthusiastic SWLs and young " licensees " in the area, so why not drop in one evening: you can be sure of a jolly welcome from 'JIX *et al.*

Royston and District ARC. Although this club has a fairly small following, its members believe in a "do it yourself" principle. Having recently built a considerable amount of neat gear of high-class workmanship for club use, the members are now busy re-flooring the clubroom.

The **Saltash and District ARC** has not been formed long, but already has 22 members and a committee. The Chairman is H. Griffiths, G2DFH; the Honorary Secretary, D. Bowers; the Honorary Treasurer, J. Martin; and the Club Magazine Editor, R. Ellis, G3SN. Meetings are held at the Toc-H Hall, Burraton Saltash (near Plymouth), Cornwall. No dates or times of the meetings were given in the report submitted to us, but no doubt Mr Bowers, 95 Grenfell Avenue, Saltash, Cornwall, will be glad to supply information to anyone who is interested.

Slade RS. The forthcoming programme of activities includes a Mullard film evening at the Great Hall of the College of Advanced Technology, Gosta Green, Birmingham 4, on February 25 at 7.30 p.m.; a lecture on mobile operation by R. Palmer, G5PP at the usual venue on March 5, and a lecture entitled " Designs and Considerations for the Construction of Sideband Equipment for the Amateur Radio Station" by Jim Tiptaft, G3MVT, on March 19 (we shall have to start renting *Clubroom* space soon if titles like this become a fashion!). Meetings begin at 7.45 p.m. at the Church House, High Street, Erdington. Honorary Secretary: D. T. Wilson, 177 Dower Road, Four Oaks, Sutton Coldfield.

Southgate, Finchley and District Group. The subject of the lecture for the meeting on February 11 was not known at the time of going to press, but as it will be one selected from several that have been prepared by members, it promises to be an interesting evening. The Honorary Secretary, R. Wilkinson, has recently changed his address, which is now 23 Ashridge Gardens, Palmers Green, London, N.13.

South Birmingham RS. The December meeting, a junk sale, increased the society funds by £5, despite the free tea and biscuits provided and a free raffle with a prize for everyone. The club, which recently gained some favourable publicity for its activities in assisting a disabled SWL gain his ticket has now taken under its wing two more deserving cases. The first has been equipped with a receiver, and the second, who is a member of the " white stick club," now possesses, as a result of the good offices of a Studley amateur, an Eddystone 840A.

South Dorset. The January meeting was devoted to showing members' colour slides of their holidays, NFD and other Amateur Radio events. A social evening is planned for February, and this will take place at the W.I. Hall, Dorchester. In March, Mr E. Box, BSc, will give a further talk on meteorology.

South Shields and District ARC. Meetings are usually on Friday evenings in the Trinity House Social Centre, Lyagate, South Shields, although the first meeting in February will be on Thursday, the 4th, when a Mullard Film Show will be presented. During most meetings theory instruction and Morse practice is given for the benefit of SWLs, but the first meeting in each month is set aside for business, which usually includes a

(Continued on page 129)

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. A.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Regional Representatives are requested to set out the copy, preferably typed double spaced, in the style used below. Standing instructions cannot be accepted.

LOOKING AHEAD

April 10.—International V.H.F. Convention.
April 11.—RSGB National Mobile Rally, Texas Instruments Ltd., Bedford.
April 11.—North Midlands Mobile Rally, Trentham Gardens.
May 18-21.—RECMF Exhibition, Olympia, London.
May 30.—RNARS Mobile Rally at RN Signal School, HMS Mercury.
June 6.—RSGB National Mobile Rally, USAF Base, Wethersfield.
June 20.—Hunstanton Bucket and Spade Party.
June 27.—Longleat Mobile Rally.
July 10-11.—Tenth Anniversary Rally, Oxford.
July 11.—Sixth South Shields Mobile Rally.
August 25-September 4.—Radio Show, Earls Court, London.
September 12.—RSGB National Mobile Rally, Woburn Abbey.
October 2.—N.W. V.H.F. Convention.
October 16-17.—Eighth Jamboree-on-the-Air.

REGION 1

Ainsdale (ARS).—February 3, 17, 8 p.m., 77 Clifton Road, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.
Blackpool (B & FARS).—February 8 (Tape Lecture "My Golden Jubilee Year," by J. Clarricoats, O.B.E., G6CL), February 15 (Questions & Answers), February 23 (AGM), 8 p.m., Pontins Holiday Camp, Squires Gate.
Bury (BRS).—February 9, 8 p.m., Knowsley Hotel, Kay Gardens.
Chester.—Tuesdays, 8 p.m., YMCA.
Crewe.—March 1, 8 p.m., Earl of Crewe Hotel, Nantwich Road.
Eccles (E & DAC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft, Eccles. Every Thursday, club Top Band net at 20.30 hours.
Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.
Macclesfield.—February 16, March 2, The George Hotel, Jordongate.
Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.
(SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.
Morecambe.—February 3, March 3, 125 Regent Road.
Preston.—February 9, 23, March 9 (All meetings start with a Morse practice at 7.30 p.m.), St. Paul's School, Pole Street.
Southport (SRS).—Wednesdays, 8.30 p.m., Sea Cadets Camp, The Esplanade.
Stockport.—February 10, 24, March 10, The Blossoms Hotel, Buxton Road, Stockport.
Wirral.—February 3 (Junk Sale), February 17 (Lecture on "RTTY"), March 3, 7.45 p.m., Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

Bradford.—February 16, 7.30 p.m., 66 Little Horton Lane.
Catterick.—Tuesdays and Thursdays, 7.30 p.m., Club Room, Vimy Road.
Northern Heights (NHARS).—February 3 (Film Show), February 10 (Visit to Bradford GPO), February 17 (Ragchew), 7.30 p.m., Sportsman Inn, Ogden.
Scarborough.—Thursdays, 7.30 p.m., rear of 3 Trinity Road.
Spen Valley.—February 4 ("Model Control," by F. Sharpe, Leeds Model Boat Society), February 18 ("Radio Active Isotopes in Every Day Life," by J. A. Edwards, AMInstE, Research Electronics Ltd.), 7.30 p.m., Heckmondwike Grammar School.

REGION 3

Birmingham (MARS).—February 16, 7.30 p.m., Midland Institute, Paradise Street, Birmingham.
(Slade).—February 12, 26, 7.45 p.m., The Church House, High Street, Erdington.
(South).—February 21 (demonstration and talk on "S.S.B."), 7.30 p.m., Friends Meeting Hall.
Coventry (CARS).—Mondays, 8 p.m., Westfield House, Radford Road, Coventry.
Cannock Chase (CCARS).—February 4, 7.30 p.m., The George Inn, Walsall Road, Cannock.
Dudley (DARS).—February 12 (tape recordings by members), February 26 (demonstration of new hi-fi equipment by Pye Ltd.), 8 p.m., Art Gallery, Dudley.
Leamington Spa (MWARS).—February 8 (AGM), 7.45 p.m., Civil Defence Training School, Harrington House, Newbold Terrace, Leamington Spa.
Stratford-upon-Avon (S-u-AARS).—Fridays, 7.30 p.m., Mason's Arms, Sanctus Road, Stratford-upon-Avon.
Stourbridge (S & DARS).—March 2 (AGM), 7.45 p.m., Foley College, Stourbridge.
Wolverhampton (WARS). — February 22 ("Contest Operating," by G8GF), Mondays, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Burton-on-Trent (B-o-TARS).—February 10 (Chairman's Address), 7.30 p.m., Club Rooms, Stapenhill Institute, Burton-on-Trent.
Derby (D & DARS).—February 3 (AGM), February 10 ("The Short Wave Listener," by B. J. C. Brown, G3JFD), February 13 (Annual Dinner and Dance), February 17 ("NFD 1965," Discussion), February 24 (Technical Film Show by M. Shardlow), March 3 (Surplus Sale), 7.30 p.m., Room 4, 119 Green Lane, Derby.
Heanor (H & DARS).—February 9 ("Radio & TV Interference," by F. C. Ward, G2CVV), February 16 ("V.H.F. Transmitter Construction," by B. Sandall, G3LGK), February 23 (Exchange and Mart), March 2 (Film Show), 7.30 p.m., Room 14, Heanor Technical College, Ilkeston Road, Heanor, Derbys.
Leicester (LRS).—Mondays, 7.30 p.m., Sundays 10.30 a.m., Club Room, Old Hall Farm, Braunstone Lane, Leicester.
Lincoln (ARC).—First Wednesday in each month, 7.30 p.m., Lincoln Technical College, Cathedral Street, Lincoln.
Loughborough (LARC).—February 5 (Equipment Sale), February 12 (Film Show, by G3FYV), February 19 (NFD Discussion), February 26 (Open Evening), 7.30 p.m., Club Rooms, Bleach Yard, Wards End, Loughborough.
Mansfield (MRS).—Fridays, 7.30 p.m., ATC Headquarters, Sutton Road, Mansfield.
Nottingham (ARCN).—Tuesdays, Thursdays, Room 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham.
Northampton (NSWC).—Thursdays, 7 p.m., Allen's Pram Works, 8 Duke Street, Northampton.
Peterborough (P & DARS).—February 5, March 4, 7.30 p.m., The Lecture Hall, Electronics Block, Peterborough Technical College. Other Fridays (Club Nights), HQ Station, The Old Mill, behind the Peacock Inn, London Road, Peterborough.
Worksop (NNARS).—Tuesdays (RAE Classes), Thursdays (Lectures), 7.30 p.m., Club Rooms, 13 Gateford Road, Worksop, Notts.

REGION 5

Bedford (B & DARC).—Second Tuesday and fourth Thursday in each month, Harpur Secondary Modern School, Horne Lane, Bedford.
Cambridge (C & DARC).—February 5 (Junk Sale), February 12 (Informal), February 19 (Demonstration of Eddystone Receivers arranged by Baily, Grundy, & Barrett Ltd.), February 26 (Informal), March 5 ("The QSL Bureau," by Arthur Milne, G2MI), 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
Cambridge University (CUWS).—Tuesdays, during Term, 8.15 p.m., Psychology Department, Downing Site.
Haverhill (HARC).—Mondays, 7.30 p.m., 41a, High Street, Haverhill, Suffolk.
Luton (L & DARS).—Tuesdays, 8 p.m., ATC Headquarters, Crescent Road, Luton, Beds.
March (M & DRAS).—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March Cambs.
Royston (R & DARC).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.
Shefford (S & DARS).—February 4 (Printed Circuit Techniques), February 11 (Mullard Film Strip Lecture), February 18 (Lecture), February 25 ("Transistor Techniques," by G3RFG), March 4 ("Tape Recording Techniques," by C. Brown), 7.45 p.m., Town Recreation Centre, Hitchin Road, Shefford, Beds. (Morse Classes 7.45-8 p.m.).

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.
Oxford (O & DARS).—Second and Fourth Wednesdays in each month, 7.30 p.m., Cherwell Hotel, Water Eaton Road, N. Oxford.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—February 16 (Film Show), 7.30 p.m., AEU Club, 66 High Road, Chiswick.
Ashford (Middx.) Echelford ARS.—February 24, 7.30 p.m., Ashford Grammar School.
Barnet (BRC).—February 23, 8 p.m., Red Lion Hotel, Barnet.
Bexleyheath (NKRS).—February 11 ("Goonhilly Receiving Station," by H. P. Shelvey), February 25 ("Telecommunication in Borneo," by R. Skelton, VS4RS), 7.30 p.m., Congregational Hall, Chapel Road, Bexleyheath.
Chingford (Group).—February 19, 35 Middleton Close, Epping. Secretary, Loughton 2397.
Chingford (SRC).—Fridays (except first), 8 p.m., Friday Hill House, Simmons Lane.
Croydon (SRCC).—February 9, 7.30 p.m., Blacksmiths Arms, South End, Croydon.
Dorking (D & DRS).—February 9, 8 p.m., Wheatsheaf, Dorking.
East Ham.—Tuesdays fortnightly, 7.30 p.m., 12 Leigh High Road, East Ham.
East London District.—February 24 ("Closed Circuit Amateur TV Equipment," by M. Lilley, BSc and Alan Glozier, G3CRR) 2.30 p.m., Lambourne Room, Ilford Town Hall.
East Molesey (TVARTS).—February 3 ("Amateur Radio in the '20s," by Bill Corsham, G2UV), Prince of Wales, East Molesey.
Edgware (E & DRS).—February 8 (Junk Sale), February 22 (Talk by R. Skelton, 9M8RS (VS4RS)), 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware.
Enfield.—February 18 (AGM), 8 p.m., George Spicer School, Southbury Road, Enfield.
Gravesend (GRS).—February 17, 7.30 p.m., RAFTA Club, 17 Overcliffe, Gravesend.
Guildford (G & DRS).—February 15, March 1, 8 p.m., Guildford Model Engineering Society, in Stoke Park.

Harlow (DRS).—Tuesdays, 7.30 p.m., rear of 11 High Street.
Harrow (RSH).—Fridays, 8 p.m., Roxeth Manor County School, Eastcote Lane, Harrow.
Holloway (GRS).—Mondays and Wednesdays (RAE and Morse), 7 p.m., Fridays (Club), 7.30 p.m., Montem School, London, N.7.
Hounslow (HADRS).—February 8, 23, Canteen, Mogden Main drainage Dept., Mogden Works, Isleworth.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (Nr. Seven Kings Station).
Kingston.—February 11, 8 p.m., YMCA, Eden Street, Kingston. Fridays (Weekly Morse Classes), 2 Sunray Avenue, Tolworth.
Leyton & Walthamstow.—February 23, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E.10.
London U.H.F. Group.—February 4 ("*Oscar III*," by G2AOX), 7.30 p.m., Bull & Mouth, Bloomsbury Way, Holborn.
London Members Luncheon Club.—Third Friday in each month, 12.30 p.m.
Loughton.—February 12, 7.30 p.m., Loughton Hall (Nr. Debden Station).
Mitcham (M & DRS).—February 12, 7 p.m., "The Cannons," Madeira Road, Mitcham.
New Cross (CARS).—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, London, S.E.14.
Norwood & South London (CP & DRS).—February 20 (AGM), CD Training Centre, Catford, London, S.E.6.
Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, London, W.2.
Purley (P & DRC).—February 19, 8 p.m., Railwaymen's Hall, (Side Entrance), Whytecliffe Road, Purley.
Reigate (RATS).—February 12 (Annual Dinner), 7.30 p.m., Reigate Hill Hotel, February 19 (Talk on "Radio Pets"), 7.30 p.m., George & Dragon, Cromwell Road, Redhill.
Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.
Scout ARS.—February 18, 7.15 p.m., Baden Powell House, Queens Gate, South Kensington.
Science Museum (CSRS).—February 16 (Informal Meeting), March 2 ("Radio and TV Interference," by S. W. Smith of GPO), 6.30 p.m., Science Museum, South Kensington.
Sidcup (CVRS).—February 4, 7.30 p.m., Congregational Church Hall, Court Road, Eltham.
Slough (SARS).—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street, Slough.
Southgate & District.—February 11, 7.30 p.m., Atlasta Lodge, Tottenhall Road, Palmers Green, London, N.13.
St. Albans (Verulam ARC).—February 17, 8 p.m., Hedley Road.
Sutton & Cheam (SCRS).—February 16, 8 p.m., The Harrow Inn, High Street, Cheam.
Uxbridge.—February 15, March 1, 8 p.m., Railway Arms, Vine Street,
Welwyn Garden City.—February 11 (Members' Bring & Buy Sale), 8 p.m., Vineyard Community Centre, Digswell Road.
Wimbledon (W & DRS).—February 12, 8 p.m., Community Centre, St. Georges Road, Wimbledon, London, S.W.19.

REGION 8

Crawley (CARC).—February 10 (for details contact G3FRV), February 24 ("Mobile/Portable Operation," by G3JEQ, and Construction Contest Judging), 8 p.m., Trinity Congregational Church, Ifield. March 19 (Annual Dinner, details from G3FRV).
Worthing (W & DARC).—Second Monday in each month, 7.45 p.m., Adult Education Centre, Union Place, Worthing.

REGION 9

Bath.—February 19, 7.30 p.m., Room 247, Main Building, Bath Technical College.
Bristol.—Fourth Friday in each month, 7.15 p.m., Small Physics Theatre, Royal Fort, Bristol University, Woodland Road, Bristol 8.
Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-sea.
Camborne (CRAC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, near Camborne.
Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
Torquay (TARS).—Last Saturday in each month, Club HQ, Belgrave Road, Torquay.
Weston-super-Mare.—First Tuesday in each month, 7.15 p.m., Technical College, Lower Church Road.
Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Cardiff.—February 8 ("Surplus Receivers," by GW8NP), 7.30 p.m., TA Centre, Park Street, Cardiff.
Port Talbot.—February 9 ("NFD Planning"), 7.30 p.m., Workmen's Institute, 8-10 Jersey Street, Velindre, Port Talbot.

REGION 13

Edinburgh (LRS).—February 11 ("Mobile Operation"), February 25 ("S.S.B.," by A. T. Lawrie, GM3PQU), 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

REGION 14

Glasgow.—First and third Wednesdays in each month, Christian Institute, 70 Bothwell Street, Glasgow, C.2.

REGION 16

Basildon (BDARS).—February 16 (Junk Sale at the Van Gogh), 7.30 p.m., March 2 (Social Evening at the Bullseye). Details from G3IJB.
Chelmsford (CARS).—March 2 ("Getting Going on S.S.B."), 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.
Great Yarmouth (GYRC).—Fridays, 7.30 p.m., the Manager's Office, the Old Power Station, South Quay, Swanton's Road, Great Yarmouth. Details from G3HPR.
Southend (SDARS).—February 12, 26, 7.30 p.m., the Executives' Canteen, E. K. Cole Ltd., Priory Crescent, Southend-on-Sea.

REGION 17

Southampton.—February 13 ("Computors and Electronic Devices," by a representative of IBM Ltd.), 7 p.m., Engineering Lecture Theatre, Lanchester Building, Southampton University.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the White Hall Hotel, Bloomsbury Square, London, W.C.1

at 12.30 p.m. on Fridays, February 19, and March 19, 1965.

Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Clubroom (Continued from page 127)

talk, demonstration, film show or junk sale. Honorary Secretary: D. Forster, G3KZZ, 41 Marlborough Street, South Shields.

Spen Valley ARS. All clubs in the area have been invited to a rather special meeting on Saturday, March 20, at 2.30 p.m. at Heckmondwike Grammar School, when RSGB Council Member John Swinnerton, G2YS, will be a guest.

Surrey Radio Contact Club. Mr Pawling of Mullard Ltd. will be giving his lecture on modern electronic components at the February 9 meeting, after having to postpone it some while ago owing to illness. The meeting will start at 7.30 p.m. at the Blacksmiths Arms, 1 South End (at the junction with Coombe Road), Croydon, Surrey.

Tees-side ARC. This club, which caters socially for the licensed amateurs of Tees-side, is considering plans to enable it to be of better service to the amateurs in the area. A cordial invitation is therefore extended to all absent calls to visit the club, which meets on alternate Fridays (the next on February 5) at 8 p.m. at The Settlement, 132 Newport Road, Middlesbrough, Yorks. The club could then, perhaps, become better acquainted with their needs and fulfil them more satisfactorily. The AGM will be held on February 19, when the members will be pleased to consider any suggestions made. Honorary Secretary: A. L. Taylor, G3JMO, 8 Heythrop Drive, Acklam, Middlesbrough, Yorks.

Thames Valley ARTS. On January 6, the society met at its new headquarters, the Prince of Wales, East Molesey, for the first time. This was the AGM, when the officers of 1964 were re-elected, with the addition of Dave White. Thames Valley have now been issued with a call-sign—appropriately G3TVS—and this has already been given an airing.

Thanet RS. The Annual Dinner and Dance will be held three weeks later than usual this year: on April 3. Those attending should arrive at the San Clu Hotel, East Cliff, Ramsgate, at 7 p.m. for 7.30 p.m. The usual contests for amateurs and SWLs attending the dinner will be held, and G3BKT, the Honorary Secretary, will be preparing a notice giving the necessary details in the near future.

Torbay ARS. Thirteen members of the Plymouth Radio Club attended the December meeting, when both clubs fought it out in a quiz-match. This was followed by a film show featuring the 1964 Dartmouth Mobile Rally and NFD, presented by G5SY.

Wirral ARS. A sale of surplus equipment is scheduled for February 3, and a lecture and demonstration of RTTY will be given on the 17th. It is hoped that Basil O'Brien, G2AMV, will organize another "Basil's Outing" (mobile treasure hunt) in the Spring. Honorary Secretary: A. Seed, G3FOO, 8 Withert Avenue, Bebington, Wirral, Cheshire.

The closing date for reports for the **March** issue is **February 5.**

CLASSIFIED ADVERTISEMENTS

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THURROCK TECHNICAL COLLEGE
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APPOINTMENT OF LABORATORY TECHNICIAN

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SENIOR ELECTRONICS TECHNICIANS required for responsible post in an active and expanding department. Wide range of research into applications of radiation and isotopes in medicine. Applicants should preferably have experience of pulse circuitry and be of H.N.C. standard. Further details may be obtained from Professor J. F. Fowler.

The post is superannuable and salary will be within the range £854 by seven annual increments to £1,085 (increase pending). Starting point may be above minimum for suitably qualified candidate.

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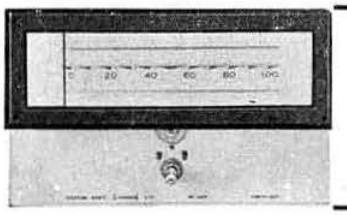

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