RSGB BULLETIN

MARCH, 1961

VOL. 36, No. 9

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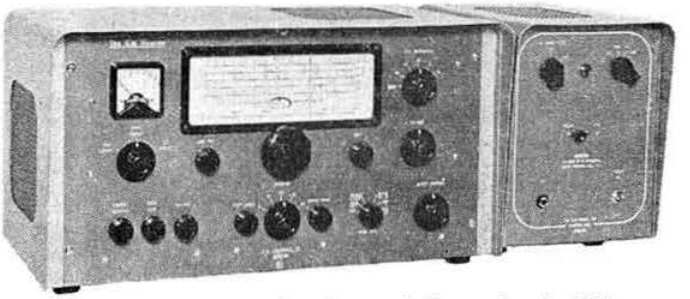

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Volume 36 No. 9

March 1961

2/6 Monthly

R.S.G.B. BULLETIN

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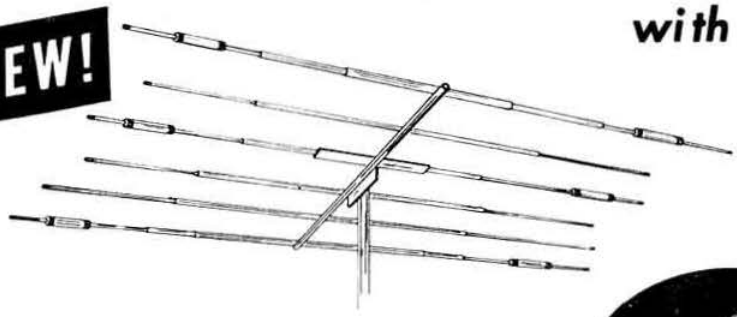

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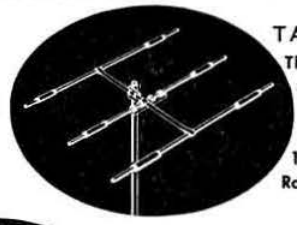

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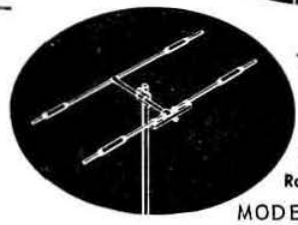

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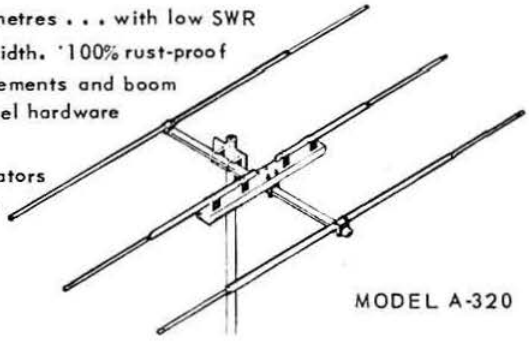

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O. J. Russell, G3BHJ, Manager

Current Comment

discusses topics of the day

Golden Jubilee

THE announcement made last month that the Council had set up a special Committee to prepare for the Golden Jubilee of the Society in 1963 will have been read with particular interest by all who were associated in one way or another with the early days of the Amateur Radio movement in the United Kingdom.

In order to enable the Committee to put forward plans which are likely to appeal to the majority of members, a questionnaire in the form of a Business Reply Service postcard is to be included as an inset in the April issue of the R.S.G.B. BULLETIN. The questionnaire will invite members to state whether they would prefer to support a formal dinner in London on or about July 5, 1963 (the 50th anniversary of the day on which the London Wireless Club, forerunner of the Wireless Society of London and later the Radio Society of Great Britain was founded), or a two/three day National Convention later that year ending up with a dinner, or a combination of both events.

In the month that will elapse before the questionnaire is issued members may like to discuss these proposals among themselves and be ready when the time comes to make further constructive suggestions for celebrating the Golden Jubilee.

As part of the celebrations it is proposed to publish an account of Amateur Radio over the past half century. The manuscript has already been written but in order to add interest to the text, reproductions of a number of photographs will be included. Members who are in possession of historic pictures and documents are invited to loan them to the Society so that they may be considered for publication when the time comes for a final choice to be made.

The Golden Jubilee celebrations will provide the Society with countless opportunities of demonstrating to the world at large how great a debt mankind owes to the pioneers of Amateur Radio. The need for accurate and fully authenticated documentation is of vital importance.

J. C.

Readership Survey

FROM time to time, Headquarters carries out a survey of member's opinions regarding the BULLETIN by a simple sampling process. The most recent of these surveys was conducted during the autumn of 1960 and the replies have now been analysed.

The results obtained are encouraging though the survey, like its predecessors, turned up a few surprises. The most popular regular feature is *Technical Topics*, liked by the very high percentage of 96 per cent of readers, followed very closely by the advertising pages. *Current Comment* has increased its popularity in recent years while *Letters to the Editor* maintains its popularity, due no doubt to the forum it provides for members to express their views on all facets of Amateur Radio. No reminder is needed of the many subjects discussed and the arguments which have raged in recent months.

The monthly commentary features *The Month on the Air* and *Four Metres and Down* maintain their appeal for a great many members while *Single Sideband*, reflecting no doubt the mounting interest in s.s.b., has increased its rating by 20 per cent since the last survey.

Almost all those who took part in the survey considered the technical standard to be " about right " but wanted more space devoted to technical and theoretical subjects. This expression of opinion is already being acted upon, as forthcoming issues will reveal.

Members were asked to name any recent article which had particularly interested them. Practically every article published in the previous 12 months was mentioned by someone but only two received support from a considerable number of members and both were by the same author: The *G2DAF S.S.B. Transmitter* and *Communication Receiver Design Considerations*.

Replies to another question revealed that 80 per cent of members build most of their own equipment and that constructional work is still an important interest with the majority. We can be sure, therefore, that the leading constructional article in this issue—the *G2DAF Communication Receiver*—will be warmly welcomed. A shorter but none-the-less important constructional article in this issue describes the use of one of the recently released and inexpensive Nuvistor valves in a really low noise r.f. amplifier for 144 Mc/s.

Apart from the views of members on the BULLETIN, the opportunity was taken to obtain information on present trends in Amateur Radio. The order of popularity of the main bands is 14 Mc/s, 1·8 Mc/s, 3·5 Mc/s, 7 Mc/s, 21 Mc/s, 28 Mc/s, 144 Mc/s, 420 Mc/s and 70 Mc/s. Working DX occupies much of the time of 80 per cent of those who replied while v.h.f. attracts an increasing number of enthusiasts. Mobile operation too is rising in popularity. Most surprisingly, all the transmitting members who took part said that they use a.m. phone, although 80 per cent use c.w. and 9 per cent s.s.b. as well.

J. A. R.

NEXT MONTH...

Constructional details of

A Low Noise Transistorized Converter for 144 Mc/s

...in the BULLETIN

Presidential Address

Military Telecommunications of the Past, Present and Future*

By MAJOR-GENERAL E. S. COLE, C.B., C.B.E., G2EC

IN selecting the subject of this evening's address I have set myself somewhat of a problem of compression. The field is very wide, the time limited and I must perforce give scant treatment to many subjects. To make my task of compression even more difficult, I have felt it necessary to go some way back in history to show that the problems facing military communicators in bygone days were identical in relative magnitude to those that face us today. I am also conscious that I am addressing a technically erudite audience to which the millivolt and micron are words in common everyday use and feel tempted to pitch my talk accordingly. I must, however, speak in very general terms, or what the author of *1066 and All That* described as "absolutely general knowledge." If, therefore, some of you feel that I am insulting your technical or historical knowledge, I hope that you will take the advice given by the Victorian mother when she was asked questions by her daughter about the wedding night—"Suffer it my dear," she said, "Suffer it and think about something else."

Two main factors have always influenced military communications: the fire power of weapons and reliability.

Before, and even long after, the introduction of gunpowder, weapons were of short range and this dictated the distances between opposing forces, those separating elements of our own forces and of course distances over which communications had to be provided. As weapon ranges increased, due to such inventions as the rifling of a gun barrel and the adoption of an elongated projectile, so did communication ranges. Nevertheless, until a year or so ago critical battles were always fought between concentrations of opposing forces, a Commander endeavouring to pack the maximum punch into a relatively small area. It is noteworthy that this tactic, whereby Commanders meet in opposed concentrations each attempting to disperse the enemy concentration and thus defeat him in detail, has remained until the advent of the most devasting weapon, so far, of all, the nuclear weapon. The concept is now to avoid concentration and to start with forces dispersed and to attempt to force the opposition to concentrate and thus provide a target for a nuclear strike. Dispersion and of course the mobility which must accompany it, together spell anathema to the communicator responsible for devising communication systems.

As regards reliability, I would say that it is vital under all conditions, for anything less than the maximum reliability is not only inefficient, it is highly dangerous. Doubts regarding reliability have often, and quite rightly, resulted in first class forward looking and imaginative concepts being either discarded or put back for several years.

Reliability leads me to still one more factor, which applies not only to military telecommunications but to wider fields and that is simplicity. In war, and indeed in all times of acute strain, stress or confusion, it is the complex system which fails first and the simple system which remains in operation. St. Exupery hit the nail rather accurately on the head when he said that " Perfection is reached not when there is nothing further to add, but when there is nothing further to take away."

History

From earliest times to the end of the 18th century means of communication—message-carrying agencies, visual and sound signals—remained virtually unchanged. Control in the field was exercised by trumpet and bugle calls or mounted messengers. Pigeons were used fairly widely by the ancient Egyptians, by the Romans B.C., whilst later history relates that the famous or infamous Ghengiz Khan organized a pigeon relay service across Asia and a part of Europe.

The exposure of lights—visual signalling or smoke from fires—all in accordance with a prearranged code, were practised. In England a system of beacons was designed to give warning of the Spanish Armada. The Greeks much earlier invented an alphabetic code and even forestalled by many centuries the time element code by inventing a water clock which regulated the exposure of light or smoke to a code pattern.

The tempo of progress speeded up in the 18th century. The first telegraph, a form of semaphore signal, was introduced in France. We followed soon after by introducing the semaphore telegraph, an invention of Lord George Murray. The Admiralty put in such a system connecting Portsmouth and the Admiralty, employing several relay points, with transmission time delays, under perfect weather conditions, of only a few minutes. The Army gave a trial to a mobile form of this telegraph, mounted, as the military specification of the period states, "on a cart or old coach wheels with iron axle." It appeared to be fairly successful for it was used during the defence of the "Lines of Torres Vedros."

Early in the 19th century, Wellington was forward looking enough to appreciate the value of Signals and he formed a Signal Section, admittedly small, for each Division of one officer, one non-commissioned officer and three men. As an incentive, and as a recognition of the need for some technical knowledge, a rider was added that the men should receive extra pay.

The 19th century saw many advances in science of which you are well aware. In 1805 Volta's first primary cell, the voltaic battery, Oersted's discovery of the magnetic properties of an electric current and in the same year Ampere's proposal for an electric telegraph comprising voltaic battery, wire, a coil and magnetic needles. Partly because no one saw much application for this, and possibly because no one had as yet sorted out the relationships between e.m.f., current and resistance, enunciated in 1827 under Ohm's Law, it was 1837 before an electric telegraph was used practically in England—in fact a railway telegraph between Euston and Camden. As important as any of the inventions was that of Samuel Morse and his code which gave a great stimulus to telegraphy either electric or visual and was used widely by the Army.

I must deal very briefly with developments thereafter. The telegraph improved to permit a submarine cable to be laid in 1855 across the Black Sea to connect the U.K. and the

* *Delivered at a meeting of the Society held at the Institution of Electrical Engineers, London, W.C.2, on Friday, January 20, 1961.*

Commander-in-Chief in the Crimea. This was a mixed blessing as it resulted in a bombardment of instructions from Whitehall to a grossly overworked staff. The Commander-in-Chief's comment that " the telegraph has upset everything " appears a gross understatement. In this campaign the first signal unit functioned under the Royal Engineers laying for the first time field cable. This cable was not too successful, one of the main contributory reasons being that the British soldier discovered that a length of the gutta percha cable with the wire removed made an excellent pipe stem.

Twenty-seven years later the first *Army Signalling Manual* had been produced. After describing the details of current methods, however, it makes the cryptic remark, "The most accurate way of transmitting intelligence is by means of an orderly carrying a *written* message."

Signalling continued through the campaigns of the late 19th century and during the Egyptian War in 1882 the telephone was used for the first time. The telephone was mistrusted, however, and the staff were most reluctant to use it and so continued until the First World War. I wish that they were still reluctant, for it was only a week or so ago that I had to convince our financial people that an annual telephone bill of £3·5 million for the Army was modest.

At the end of the 19th century the Army became interested in Marconi's adaptations of wireless in spite of a somewhat unco-operative attitude of the Admiralty who acquired the rights to use them to the exclusion of all Government Departments including the War Office. An Army experimental wireless section however went out to the South African War.

Major-General E. S. Cole, C.B., C.B.E., G2EC

President 1961

The Use of Radio

I would like now to concentrate on radio and its progress from the beginning of this century to the present time, as it is clearly impossible for me to cover more than this limited facet of our work in the time available.

In terms of today's tempo, little progress was made during the years between the South African and the First World War, except one major event, namely, that Commanders and staffs were beginning to appreciate the value of signals.

Progress in radio, again by our present standards, during that War was slow. Techniques to make wireless sets portable or transportable were non-existent, and with so much of the fighting being static and trench bound the drive for mobility, even had the techniques existed, was lacking. The first practicable set produced early in the War was the 50 watt trench spark set working on about 1,000 kc/s. In theory it was a three man load and simple to operate. In practise it took nine men to move complete and its aerial was conspicuous.

However a wireless net was set up in late 1915 with some success and several more in 1916. By the end of 1916 we had three types of set, all spark and all rather cumbersome working in various systems, but there was, justifiably, a lack of confidence in wireless.

The impetus given to wireless development by the invention of the continuous wave technique was only just becoming effective at the end of the war, at which time a small, and the word small is relative, 30 watt c.w. set was in fairly wide issue.

Development between the Wars

The position then in the years soon after the war was that we had four types, the A Set, the C Set, both portable, and the 120 watt and 500 watt, both transportable in large vehicles. The A Set I know well, perhaps too well, as it represented the total wireless resources of the first section I commanded. It was distributed in equal loads on a pack pony's back and its nominal range was about 6,000 yards. Its true range depended on the wireless operators, for they were, as they still are, divided into two classes, those who could make a set sit up and beg and those who could not, and those who could pick out and copy a S1 signal from a background of mush and static, and those to whom the same signal was inaudible. The C Set was a slightly more cumbersome version, while the 120 watt and 500 watt sets were both valved by large brilliantly lighted triodes the size of a small rugger ball.

There was an extremely bold innovation in 1928 when some forward looking scientists produced a telephony set working on 10 metres (the megacycle had not then been introduced). Five models were produced and they worked and worked well in what is now the present 10 metre amateur band. I was commanding the Royal Artillery Signal Section selected for the trial of these sets, not because of any merits of that Signal Section, I hasten to add, but because of the Gunner Brigade which it served. I regret to say that they were unsuccessful; firstly because the Gunners, the users, did not take kindly to the one way at a time speech concept and the over-over business, but primarily due to the high mortality rate of the valves. These valves, resembling rather fat Bologna sausages, had to be carried in a special container between uses on a man's back. It is tragic to look back and now appreciate that there in 1928 we had nine-tenths of the solution to short distance communications by use of the lower v.h.f.'s but the spark or vision was missing and it took another World War and almost 30 years before the present v.h.f. sets became available.

At that time, therefore, further designs were made for sets of varying power and of very limited frequency range in sub bands between 1·36 and 6·6 Mc/s and the products came

into being and use at an incredibly slow pace in the years from 1931 to the outbreak of World War II. It must be appreciated however, that the root of the trouble was financial stringency, for whereas the Navy and the Air Force could claim that their units could not function without wireless, the Army could not prove such necessity. Again the problems of design were immense. Many of you here this evening may feel proud of your mobile rigs. If I were to ask you to design a mobile set, using the cumbersome, power drinking components of three decades ago, valves whose filaments were as delicate as a spider's web, the whole of which had to be carried on the back of a trotting or galloping horse, or the unsprung limber of a horse drawn wagon, then I think you will agree that it would be quite a task.

Of course there was a clear requirement for wireless for use between armoured vehicles and tanks but under the peculiar arrangements then in force designs of tanks and the designs of wireless sets which had to be fitted into them, were often out of phase, resulting in sets which could not be fitted, for you will appreciate that making a modification to 6 in. armour is not easy. After several miss hits, however, the best features of two sets were incorporated into a third set and in accordance with then common practice the production contract was given to the lowest tenderer. This firm was, however, working, it transpired, on a financial shoestring and it went bankrupt and the set was stillborn.

Long Distance

As far as long distance communications were concerned we were in hardly better shape. In a peace time atmosphere it was difficult to prove that the Army needed such seeming luxuries. We had one official main link only between Aldershot and Hong Kong and in 1937 a junior officer in the Corps, who was also a keen radio amateur, built a 1 kW transmitter at Catterick Camp which was successful in working daily schedules to Singapore. The amateur played an important part in improvising communications in those days. In Egypt it was an amateur who built in 1933 an experimental transmitter to work Aldershot with such success that it was taken over as the Army transmitter to provide the Egypt/U.K. circuit. Another it was who in 1933, when the Army in Egypt were compelled to fly in troops to Cyprus, necessitating a communication link far beyond the capability of any existing Service equipment, built and tested a complete amateur type station between the hours of 3 p.m. and midnight in time for it to accompany the troops with their departure at dawn the following morning. That amateur station, working of course in other than amateur bands, provided a solid, and the only, circuit between Cyprus and Egypt for the four weeks of the emergency.

At the outbreak of the Second World War we were not in a very healthy position as regards wireless. The atmosphere of war, however, had a wonderful tonic effect on the loosening of the purse strings so that elapsed time between a proven requirement and the resulting hardware was drastically cut. A typical case was that of the 8 set, the man pack set for Battalion Company communications; although the specification described it as a man pack set, it did not specify the size of the man, and it was regarded by the unfortunates who had to carry it with a very jaundiced eye. A then still small but now large electronic firm took one horrified look at this and guaranteed to produce a set of twice the range in half the weight, a threat which fortunately they were able to carry out in a matter of months.

As the war progressed, inevitably there was a greater and greater demand for more and more wireless, eventually reaching a scale which was not exceeded in any other Army: a wider scale of issue for Infantry, sets for the Artillery and anti-aircraft communications, for airborne and amphibious operations, for ground air links. Everybody it seemed wanted their own private system of direct wireless communications and it pays great tribute to those who were responsible for frequency assignment plans that this vast horde of users was somehow accommodated in the available frequency bands. Perhaps the most successful set was the Hallicrafters BC610. We had not, and it seemed could not, produce a suitable set to give reliable ground wave ranges of up to 100 miles. The Americans faced with the same problem bought off the peg the production line of the Hallicrafters HT1, mounted the set in a 3-ton truck and it served throughout the war and long after as the standard medium power mobile. As a further compliment to that self same set, it is noteworthy that 14 months ago, faced with an urgent requirement for a half dozen medium power transmitters for a special purpose, the War Office were compelled to go shopping in the surplus market and bought back BC610s discarded years before!

One interesting development concerned the communications for combined air amphibious operations. It was quite clear in 1940 that re-entry into the Continent could only be achieved by a major opposed landing. Apart from tactics, a demand arose for equipment which was waterproof, not damp proof or splash proof, but immersion proof. Signal equipment eventually used met the specification. A second important requirement was to provide a massive scale of radio communications for the Navy, Army and Air Force from the ship acting as controlling HQs in the assault. To those of us who at the time were directly responsible for providing these it soon became apparent that there was a limit to the number of radio sets which could be built into a ship, so we decided to select the required number of radio sets and build a ship around them. Fortunately, the then Chief of Combined Operations, Admiral Mountbatten, had been a naval communicator himself and immediately appreciated the advantages. Thanks to him a ship, at the time when submarine sinkings were tragically high, was made available and converted to the communicators' specifications.

Communications Security

A major problem throughout the war, and for that matter today, was that of communication security. We were well aware that virtually no transmissions took place which were not intercepted by the enemy. We knew that their intercept service was extremely efficient and that it was not from the intercept of some highly important message that they gained their intelligence but from the intercept of small apparently innocuous bits of information which when analysed and pieced together provided an amazingly accurate picture of our strengths and plans.

Ciphers and cipher machines and codes had to be introduced and used and these were of course the cause of much irritation and reduced drastically one of the main advantages of radio. Then as now the greatest danger was the otherwise intelligent officer who thought that he could conceal by double talk and innuendoes over the microphone the true meaning of a message. To trained intercept people who have spent a lifetime at their job, this seeming mumbo jumbo is equivalent to plain language. Security, both communication and electronic security in all its forms, is more vital today than it was then, but for obvious reasons I cannot enlarge upon its many facets.

Post War Equipment

At the end of the war we were of course immeasurably better served than at the beginning, but with the possible exception of pulse techniques used on a v.h.f. microwave system, progress was generally due to continually improving design and better methods of application rather than improved techniques. We had an infinitely greater number and range of radio sets, but they were developed and produced piece meal, not as individual parts of an overall system. Plans were made immediately after the war to

rectify this position so that the future would see the Army in possession of means of communication which would satisfy operational requirements. But now it was peace time, the dead hand of the financier clamped down with its usual omnipotence.

Since the war, therefore, we have had to struggle for new equipment and in the meantime reluctantly accept the continued use of that we had at the end of the war. In face of the fact that there were massive stocks of equipment which, of course, was usable, the task of convincing finance that it should be jettisoned and replaced by modern equipment was difficult. Until quite recently, therefore, there was widespread use of sets designed in 1941 and 1942, quite unsuitable for modern conditions. Development of the new range of equipment nevertheless proceeded, but very slowly, and I am very glad to say that our post war range of communication equipment has been very largely distributed and I am also very proud to say that we believe this present range of field radio equipment is second to none in the Armies of the World. These ranges of equipments, of course, embody modern techniques, miniaturization and where applicable transistors, and all must meet more stringent requirements of portability. Portability includes that of air portability for the larger installations, for we must have the capability of flying in to a scene of operations a comprehensive force. They are rugged and tropicalized, have continuous frequency coverage, extremely accurate tuning arrangements, with built-in crystal calibrators, and most have coupled transmit and receiver tuning controls. Installation of these sets in vehicles, and especially armoured vehicles, involves a quite comprehensive harness of internal vehicle switching and intercom connections so that occupants of the vehicles, which in the case of a tank might be the Tank Commander, the gunner, the loader operator and the driver, can speak or listen on any of the installed sets, can control volume, or can intercommunicate.

As far as field sets are concerned they vary from very small infantry manpack sets to the slightly larger vehicle sets using v.h.f. and frequency modulation, while a parallel range from manpack to vehicle sets are h.f. and amplitude modulation. For one small set we have accepted phase modulation as only thus could we get the power without the weight increase. Large equipments entail large power supplies, for the chances of finding a convenient 220 volt power socket in the middle of a desert are remote. Power supplies for installations both large and small remain a problem and especially for the smaller sets, and even now we have been unable to produce a power generator to the ultimate specification that is to run as silently as a dry battery.

One important feature of our new range of sets is that they are all of a family and generally arranged that where two sets of different types do not completely interoperate, rebroadcast facilities are incorporated so that retransmission from one net on one frequency to another net on another frequency can take place. As a result of this facility, dictated by the requirements of military tactics, it could well happen that some military nets on occasions might consist of 200 stations. While this is exceptional the fact remains that military radio nets are often large, which necessitates radio procedures and discipline of extreme strictness, which requires 100 per cent obedience by operators with no, repeat no, latitude given to any operator. Having, as a military communicator, lived with this radio discipline for the greater part of my life, it has resulted in a personal antipathy to the use of voice on Amateur Radio nets. I suppose it is true to say that on the average amateur voice net the maximum number of words and the maximum amount of time are used to convey the very minimum of essential intelligence!

Procedure

The strict observation of radio procedures I have just mentioned was not always thus. In Egypt in 1931, at the time the Mediteranean Fleet was visiting Alexandria, communication was established between the Fleet and our main Army Station in Cairo. At the end of the daily schedule the Army operator suggested to the Navy operator that the latter should call in when ashore and have a drink. Now the Navy's radio discipline was strict and everything was logged and appeared on a signal pad viewed daily by the C.-in-C. personally. The first we heard, therefore, of this breach of discipline was an official signal from the C.-in-C. to the Chief Signal Officer saying that "The Commander-in-Chief Mediterranean thanks Lance Corporal Jones for his kind invitation to Abbassia Wireless Station for a pint of wallop but regrets that he will be unable to accept."

Frequency Assignment

The problem of frequency assignment always has been a major one but it is now a great deal more complex. By frequency assignment I mean the allocation of individual frequencies to sets or nets of sets. It is quite essential that a group or net of sets, be it an Artillery Regiment, a Brigade Command net or an Armoured Command net, be assigned a frequency which is interference free from all other nets in our ground forces. Bearing in mind that with continually changing physical locations, when individual sets may move from the area of one net into that of another, it will be appreciated that care is needed to avoid interference. Furthermore, it will often happen that there are two, three or more sets in one vehicle all of which must be interference free from the other. In addition you might well have at a Headquarters ten or more vehicles each with several sets and all sets must be interference free from each other. If you consider the problems arising from fundamental frequency interference, adjacent channel, harmonic channel, second channel interference, you can well imagine that the compilation of a frequency assignment list is a colossal task.

Our present Headquarters frequency assignment problem, where large groups of sets are involved, has been likened to that in a major warship where you have a very large number of transmitters and receivers in a very limited restricted area. The Navy have, however, the advantage over us in that the number of sets remains constant, whereas in the ground forces the number of sets with attachments and departures is constantly varied. Furthermore, many of our so called v.h.f. sets have the lower frequency limit of about 22 Mc/s, and as frequencies from 22 to 35 Mc/s, and quite often, above, are extremely suitable in certain conditions for ionospheric propagation, it is not unusual for the most carefully laid frequency plan to be offset by transmissions coming from hundreds and thousands of miles distance.

From my remarks you will appreciate that the preparation of frequency assignment plans requires the whole time application and concentration of highly trained communicators-cum-mathematicians with unlimited patience and an unlimited supply of cold wet towels for constant application to their fevered brows. Our staff have worked nobly on the problem, have produced a very satisfactory answer to it, but I feel that the perfect answer will not be forthcoming until we bring computors into use, which we propose to do in the near future.

The Future

We make much wider use today of what we term radio relay, which is in fact for chains of more or less line of sight v.h.f. and higher frequency stations using back to back relays. These provide the essential much larger number of channels to meet the increasing demands of the users. The longer haul circuits which connect the U.K. to our overseas commands and the Signal Corps of the Commonwealth all form part of our Royal Signals organization called COMCAN. We still retain a few of the old war horses, the SWB8 and 11s, but the conversion to sets of more modern type of 30 kW

is going well. Six channel single sideband is the common system but we shall retain some single channel links employing radio teleprinting and frequency shift keying, an extremely reliable form of machine telegraphy. We make frequent use of teleprinter conference circuits whereby officers and groups of officers in, say, the U.K. and Singapore can be directly connected by teleprinter and hold teleprinter conversations. Such a circuit may entail through patching at one or more relay points. We still retain the rhombic aerial for our longer circuits above 1,000 miles and have found that a quite impressive gain results from raising the aerial. We have almost completed the programme, and I say this even though you as amateurs may feel envious, of discarding our 100 ft. masts and replacing them by 150 ft. masts and towers. These improvements will bear fruit, we hope, in the next few years when the m.u.f. will drop and result in the most appalling congestion in the ether far exceeding anything we have ever known.

Looking back through past history it is interesting to consider what would have been the effect of modern weapons on battles and campaigns of the past had they been available for use at that time, had for example the modern warship been included in the English fleet at the time of the Spanish armada, or had Wellington at Waterloo had two or three modern tanks. But from our point of view however, it seems that defeats and failures in past history in the majority of cases have resulted from a lack of communications thus preventing Commanders knowing how the battle stood and the resulting confusion because they did not. There are countless instances for example where the availability of a half dozen modern manpack wireless sets would have completely changed the course of battles, and as but one instance I quote the case of the Gallipoli Campaign, when the landing on " Y " Beach was completely successful unbeknown to the Commander and had communications existed the landing as a whole would have been successful and the campaign finished in our favour in short time; because no communication existed, however, withdrawals and confusion resulted with the tragic results that you know.

Electronic Warfare

I would like now to make brief mention of electronic warfare. I do not know who the individual was who first sneaked up and cut someone else's telegraph cable but I am sure that he did not appreciate that he was giving birth to the first electronic counter measure, a facet of what we now term electronic warfare.

The field and scope of Electronic Warfare is vast and I regret that I am not permitted for obvious reasons to enlarge on these few words here. In the amateur field, and in the wider civil field, it is an aspect of telecommunications which fortunately does not worry you, but from the military telecommunication aspect, electronic warfare is of great importance.

In our present communications plans, and of course our future plans, we have worked very closely with our Allies and are very closely associated with the North Atlantic Treaty Organisation and in particular Allied Command Europe. In the latter case, this has introduced difficulties, for many of you will know the problem of reaching agreement between the three Services of one country and will therefore understand how much more complex is the problem of achieving agreement between all three Services of all fifteen countries. However, one has found that among communicators, irrespective of nationality, a very strong common bond exists and this has eased the problem of international intercommunication.

I would like to conclude by saying a few words about the future. This is extremely difficult for the only firm fact I can state is that I cannot foresee the Treasury being any more lenient in the future than they have been in the past. Furthermore, it may surprise you to know that it may take up to ten years between the time that the requirement for equipment first begins to clarify and the time that issues of the final equipment are completed. Lastly, any future plans must of necessity remain sensitive to discussion which prohibits me saying more than generalities.

As regards long distance communications, we have for some time been trying to achieve as much commonality as possible with the Royal Navy and Royal Air Force, and to utilize each others facilities as much as possible. It may well be that in the years ahead we shall have brought this to a stage where all three separate systems have been moulded by integration into virtually a single three service system. On a large number of the circuits E.D.C. (error detection and correction), will be used, while at main terminating and relay points in the network automatic electronic switching will be introduced to obviate the very serious delays which at present result from the slow handling, physical movement and checking of punched tapes in large communication offices. As regards transmission paths, we are in close touch with the applications of space and satellite communications, for these have an undoubted future.

We are continuing to research into and develop suitable aerials, especially wide band types, for as you well know transmitters are just as good as their aerials will permit them to be. You as amateurs are fortunate in having your frequency bands in harmonic relation and a wide band aerial to you is a 100 or 200 kilocycles coverage, whereas to us it must be wide band over megacycles.

On both strategic and tactical systems there is an ever increasing requirement for more and more intelligence to be transmitted in less and less time and inevitably computors and data processing systems will play their part.

As regards field and mobile communication systems, here again the demand for more and more individual communication nets and more and more channels may well result in a form of grid network of high capacity and flexibility to which mobile subscribers may connect themselves instantaneously and by virtue of the system's automatic switching be through connected to other mobile subscribers.

In all radio equipments of course there is, as there always has been, the never ceasing requirement to reduce size without reducing power output. As far as receivers are concerned, as you will know, modern techniques permit drastic size reductions, but on the transmit side we still await the transistor and printed circuit which will handle a few kilowatts of r.f.

That brings me to the end of my address. As I mentioned at the beginning, a talk on this subject is a problem of compression and I do hope that it has not been too disjointed. I also apologize for having been somewhat vague as regards future plans, but I know you will appreciate the military reasons for this.

Revision Notes Available

COMPREHENSIVE revision notes for the use of members who are preparing for the City and Guilds of London Institute examination on Friday, May 5, 1961, are available from Headquarters, price 1s. per set, post paid.

Silent Key

JACK THORPE (G5TO)

It is with deep regret that we record the death on January 25, 1961, of Mr. Jack Thorpe (G5TO), aged 50.

Well known and liked on the h.f. bands, Jack was a staunch supporter of the Society and his call was used for many years in NF.D. He was acknowledged the best contest operator in the Sheffield area, and regularly took part in most events. He was a Past President of the Sheffield Amateur Radio Club.

The Society was represented at the funeral by the R.R. and C.R. and several other local amateurs.

To his widow and family, we extend our deepest sympathy in their bereavement.—J. R. P.

A Nuvistor Pre-amplifier for 144 Mc/s

By G. M. C. STONE, A.M.Brit.I.R.E., Grad.I.E.E. (G3FZL)*

THE quest for improved performance of 144 Mc/s receivers has gone on continuously during the past 10 years with steady progress towards perfection. This progress has depended entirely upon the valves that have become available. It is the purpose of this article to describe a pre-amplifier using the latest type developed by the Radio Corporation of America, the 6CW4 Nuvistor triode, which is only bettered by valves such as the EC57, 416B or A.2599/A.2521 cascode combination. The noise factor of the

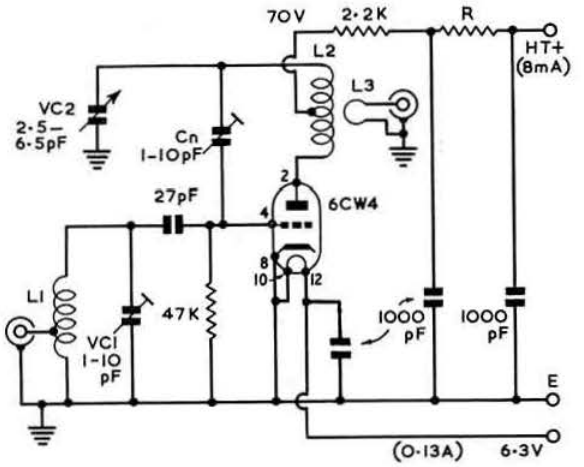


Fig. 1. Circuit diagram of the Nuvistor pre-amplifier for 144 Mc/s. L1, 5 turns, 20 s.w.g. tinned copper, ¼ in. inside diameter, ¾ in. long, tapered at 1¾ turns. L2, 8 turns, 16 s.w.g., enamelled copper, ¾ in. inside diameter, 1 in. long, tapped at 4½ turns from anode end. L3, 1 turn link of insulated wire around the centre of L2.

6CW4 is between 3-4db at 144 Mc/s, yet the valve costs only 18s. 6d. from R.C.A. (Great Britain) Ltd.

The Nuvistor represents perhaps the ultimate in receiving valve technique: it is extremely small (overall length approximately ¾ in., diameter approximately ⅜ in.), very rugged, has a metal envelope with ceramic base wafer and its electrode assembly is entirely supported on the ceramic base without the use of conventional mica supports or separators. The 6CW4, one of a range of Nuvistor valves, was specially designed as a low noise r.f. amplifier in Band V TV tuners and similar applications. Its low noise performance is due to its mutual conductance of 12·5 mA/V at an anode current of only 8 mA.

* *Member, Technical Development Sub-Committee, 10 Liphook Crescent, Forest Hill, London, S.E.23.*

† Wingrove and Rogers 1-10 pF miniature trimmers are available from Webb's Radio, 14 Soho Street, Oxford Street, London, W.1, price 7/- each plus 6d. postage and packing. This firm also stocks Eddystone die-cast boxes. Miniature KLG feed-through insulators can be obtained from G. W. Smith & Co. (Radio) Ltd., 3-34 Lisle Street, London, W.C.2, price 2d. each plus postage.

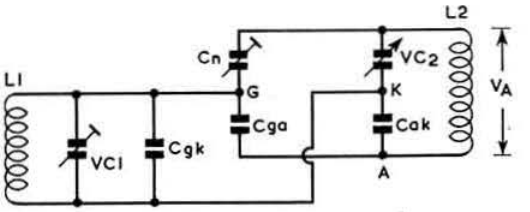


Fig. 2. Equivalent r.f. circuit showing internal valve capacities. Neutralizing will be effective as long as the r.f. voltage difference across points G and K fed back from the anode circuit is less than Va/m where m is the amplification of the stage. (G—grid, K—cathode, A—anode).

Circuit

In the 144 Mc/s pre-amplifier described in the present article, the 6CW4 is used in the conventional grounded cathode mode (Fig. 1) but uses capacity bridge rather than inductive neutralization as the former performs satisfactorily over a wider bandwidth. For this reason the noise factor of the pre-amplifier remains constant to within 0·1db over the range 144-146 Mc/s whilst the overall gain is approximately 20db.

The equivalent r.f. circuit, indicating the internal valve capacities, is shown in Fig. 2 from which it can be seen that C_n, C_{ga}, $VC2$ and C_{ak} form a capacity bridge which will be balanced when $C_n/C_{ga} = VC2/C_{ak}$. Under this condition the r.f. feedback from anode to grid will theoretically be zero. The balance of the bridge will be upset if $VC2$ is detuned to any great extent but the amount is negligible over the range 144-146 Mc/s. If inductive neutralization is used, the equivalent circuit of which is shown in Fig. 3, the feedback varies considerably over the range 144-146 Mc/s owing to the Q factor of the parallel resonant neutralizing circuit (in effect a parallel resonant "rejector") and the noise factor deteriorates noticeably at the band edges. The experimenter should not be discouraged however from trying the inductive neutralizing method in order to compare the performance with bridge capacity neutralizing.

Practical Design

The pre-amplifier was constructed in a 3½ in. × 4½ in. Eddystone die-cast box which contains both the circuitry and the valve. A layout diagram is shown in Fig. 4. The input coil L1 is tuned by means of a miniature Wingrove & Rogers 1-10 pF air spaced trimmer†; if such a trimmer is not available it is possible to adjust the circuit to resonance by compressing or pulling apart the turns of the coil. The anode circuit is tuned by a Wingrove & Rogers 2·5-6·5 pF air spaced variable (of the type used as the r.f. trimmer in the R.F. Unit 27) and is fitted with a knob to give the operator the psychological satisfaction of knowing that the r.f. circuit is on the peak of resonance. A small variation is necessary from one end of the 144-146 Mc/s band to the other although, in practice, the variable capacitor could be used to peak the circuit at 145 Mc/s and then left alone. The

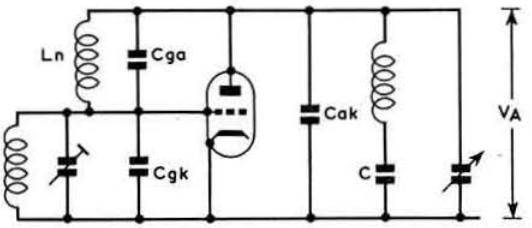


Fig. 3. Inductive neutralization. In this case neutralizing depends upon the "rejector" effect of L_n, C_{ga} as a parallel tuned circuit. C is a decoupling capacitor.

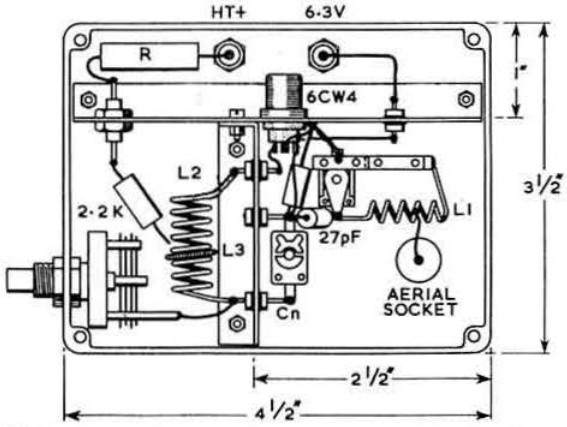


Fig. 4. Layout diagram. The pre-amplifier is built inside an Eddystone 3½ in. by 4½ in. die-cast box. The output socket is mounted immediately below L2.

neutralizing capacitor is also a Wingrove & Rogers 1-10 pF miniature air spaced trimmer. It is important that this capacitor has a minimum capacity as low as 1 pF and for this reason the Philips concentric type of trimmer is unsatisfactory in this application. If a suitable variable capacitor is not available a piece of flat 80 ohm twin feeder can be used instead, and the length progressively reduced to obtain neutralization. This method has been used effectively in push-pull 6J6 amplifiers for a number of years. The output

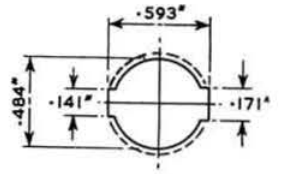


Fig. 5. Chassis cut-out for the Cinch Nuvistor socket, type 133-65-10-001.

is taken by means of a one turn loop wound around the centre of L2.

The valve is operated in accordance with the makers' recommendation with zero bias and with a h.t. of 70 volts, which is adjusted during initial tests by selecting a suitable value for R (8·2 K ohms 1 watt was found satisfactory for a 170 volt supply). Power supplies are fed to the amplifier through 1000 pF feed-through capacitors, but if these are not available 1000 pF hi-K ceramic capacitors will be satisfactory.

The Nuvistor valve requires a special socket (a Cinch Type 133-65-10-001) which is supplied with the valve by R.C.A. (Great Britain) Ltd., Lincoln Way, Windmill Road, Sunbury-on-Thames. A chassis cut-out drawing is shown in Fig. 5. In this pre-amplifier the valve socket is soldered by its two fixing lugs to a brass sub-chassis. The dividing partition is also made of brass and on it the anode coil L2 and neutralizing capacitor C_n are mounted on miniature feedthrough insulators (KLG type or similar).† This provides a very rigid and neat layout.

Amplifier Adjustment

A strong local signal or signal generator is necessary to adjust the pre-amplifier correctly. A suitable receiver (e.g. converter plus main station receiver) should be tuned to a signal around 145 Mc/s and the pre-amplifier then inserted between the aerial and the input of the converter without its h.t. supply connected and *VC1* and *VC2* adjusted for maximum signal. Following this, C_n should be adjusted for minimum signal using a non-metallic trimmer screwdriver. This minimum will be found to be very sharp and care is needed to effect the correct adjustment.

H.T. should then be connected to the pre-amplifier when the signal will, of course, be very much stronger. If the neutralizing has been correctly adjusted, the pre-amplifier will be stable and there will be no spurious signals as *VC2* is tuned at either end of the 144-146 Mc/s band. It may be found that instability occurs if *VC2* is grossly mistuned but this is because the capacity bridge has become unbalanced. This does not indicate that the amplifier is unsatisfactory within the range 144-146 Mc/s. Final adjustment should be performed to give the optimum noise factor.*

It is always difficult to make an absolute measurement of noise factor and frequently comparisons between several different amplifiers are only meaningful if the comparison is made under similar conditions. The 6CW4 pre-amplifier described gave a measured noise factor of 3db at 145 Mc/s compared with 3·6db for a G.E.C. A.2521 and 3·5db for a Mullard E88CC under similar conditions.

The performance obtained on 144 Mc/s suggests that the 6CW4 will be extremely good at 435 Mc/s and development work is proceeding to exploit its potentialities on this band.

* *G. R. Jessop (G6JP), R.S.G.B. Bulletin, May 1958, p. 511.*

Radio Industry Council Appointments

MR. J. W. RIDGEWAY, O.B.E. (A.E.I.), has been elected Chairman of the Radio Industry Council in succession to Mr. E. E. Rosen (Ultra). Mr. Ridgeway was chairman, R.I.C., from 1948 to 1952.

Mr. R. Kelf-Cohen, C.B., who became Acting-Director of the Radio Industry Council on the death of Air Marshal Sir Raymund Hart last year, has been appointed Director and Secretary, R.I.C.

Retrospect—No. 1

The first of a series of edited extracts from the record of the Development of Wireless Telegraphy published in the 1922 edition of the "Year Book of Wireless Telegraphy and Telephony."

1842

Joseph Henry (U.S.A.) noticed that the effect of a single electric spark about 1 in. long occurring in a circuit in an upper room was to magnetise steel needles included in another circuit placed in a cellar 30 ft. below with two floors intervening. He was one of many observers prior to Hertz who had noticed curious effects due to electric sparks produced at a distance, which were commonly ascribed to ordinary electro-magnetic induction.

1843

James Bowman Lindsay of Dundee suggested that if it were possible to provide stations not more than 20 miles apart all the way across the Atlantic, there would be no need to lay any cable!

Noise Factor of Some V.H.F. and U.H.F. Glass-base Valves

By G. R. JESSOP, A.M.Brit.I.R.E., Assoc.I.E.E. (G6JP)*

DURING the past few years amateurs and professional radio engineers have spent a great deal of time and effort in searching for ways and means to improve the input stages of converters and receivers for the 2m and 70cm bands. Each new valve type that has been released has been given a very thorough testing in one way or another and the results have been reported from time to time, often with outstanding noise performance claims. Some such claims are even to be found in advertisements appearing in Amateur Radio periodicals. Very little real data, however, appears to have been published regarding the noise factors of the valves produced by the various makers and the purpose of the information presented in this article is intended to clarify this somewhat unsatisfactory state with some comparative information recently made available to the writer.

TABLE I

Valve Type	Origin	Noise factor at 45 Mc/s
ECC85	Holland	2·5
E180F (pentode connected)	Holland	3·5
(triode connected)	Holland	2·4
D3A (pentode connected)	Germany	2·6
(triode connected)	Germany	2·0
6AM4 (u.h.f. triode)	U.S.A.	2·4
6AJ4 (u.h.f. triode)	U.S.A.	2·4
6AK5 (triode connected)	U.S.A.	2·5
417A (wideband triode)	U.S.A.	2·1
6CW4 (narrowband triode)	U.S.A.	2·1*
E88CC (double triode)	Holland	2·0
A.1714 (u.h.f. triode)	U.K.	1·9
†A.2521 (u.h.f. triode)	U.K.	1·4
‡A.2599 (u.h.f. triode)	U.K.	1·4

* By de-tuning a noise factor of 1·6db is obtainable
† U.S. type 6CR4 ‡ U.S. type 6CT4

No doubt some of the claims that have been made in the past have been due to the belief that a thermionic diode noise generator, like a camera, "cannot lie." The noise generator is capable of repeating its results, but they will not necessarily be correct. In fact, a considerable amount of work has had to be done in recent years to obtain agreement between one establishment and another, let alone between one country and another.

The need for very low noise i.f. amplifiers for radar and other applications has helped in the production of reliable methods of noise factor measurement at 45 Mc/s† while the potential introduction of television in the higher frequency bands in the region of 400-1000 Mc/s has prompted work on valves and measurements for this range. The latter has, of course, had a marked bearing on the economic aspects of v.h.f./u.h.f. valve design. So much so, that the glass base form, which is always cheaper than the disc seal style, has made such advances as to be a strong competitor to the disc seal type for use below 1000 Mc/s except where wideband amplifiers are required.

Readers will probably have seen noise factors claimed in some advertisements which are theoretically unattainable. These are probably due to the noise measuring apparatus being even more optimistic than that used by the writer! The valves on which measurements have been made using the same apparatus are shown in Table 1.

These figures, together with the curve of Fig. 1, give a fair picture of the performance of valves available at present.

From Table 1 it can be seen that a valve such as the 417A, which was designed for wideband applications, is a significantly poorer performer than the A.2521-A.2599 valves which were designed specially for u.h.f. input stage service.

The following comparative figures of noise factor from Fig. 1 are interesting.

Valve	*45 Mc/s*	*145 Mc/s*	*430 Mc/s*
6AM4	2·4	5·9	10·2
417A	2·1	4·9	8·7
A.2521/ A.2599	1·4	3·8	7·0
A.1714	1·9	4·6	8·2

It is clear from this data that the best u.h.f. triodes on glass bases are available in the U.K.

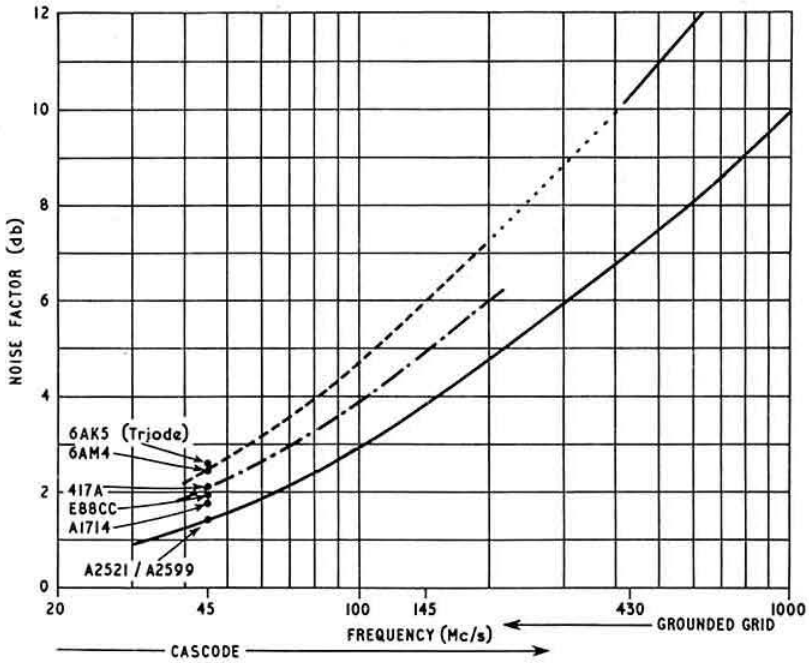


Fig. 1. Graph showing the variation of noise factor with frequency for some of the better valves for use in r.f. stages.

* *32 North View, Pinner, Middlesex.*

† It has now been agreed by the industry and the Services that this frequency should be 48 Mc/s for future tests.

Single Sideband

By G. R. B. THORNLEY (G2DAF)*

PAST comment in this feature on the subject of " talk power " has occasioned interest and in some cases criticism and the suggestion that the claims made for single sideband are either exaggerated or not true. Two such letters written to the Editor were published in the November 1960 and January 1961 issues of the BULLETIN.

An a.m. transmitter is rated on the input power from the source of h.t. supply to the p.a. valve and this is possible because a steady carrier is always being radiated and is unaffected by the absence or presence of modulation. In the case of a s.s.b. transmitter the p.a. operates as a linear amplifier possibly in class B and does not take any current at all until there is speech into the microphone. The current then taken is proportional to the amplitude of the modulation and under speech conditions the p.a. milliameter pointer is continually swinging—there is no steady value. For this reason it is not possible to rate the two methods of transmission on a basis of d.c. input power.

In practice the power handling capability of a transmitter is limited by the peak power the p.a. valve will handle without distortion under full modulation conditions—that is in the case of the a.m. transmitter a peak envelope power (p.e.p.) of four times the unmodulated carrier power. As the p.e.p. of a single sideband transmitter can be calculated or measured, an evaluation based on equal p.e.p. input for the two systems is a fair and a reasonable one.

"Talk Power"

One correspondent states that a 100 watt a.m. transmitter modulated 100 per cent with a sine wave tone has a peak input of 400 watts and makes the suggestion that this should be ignored and states that as the peak carrier power is 200 watts and the peak sideband power 100 watts the total is really 300.

The modulation envelope of an a.m. transmitter can be examined by sampling the r.f. output and feeding it into an oscilloscope. At the crest of modulation the envelope will be seen to have expanded to twice the unmodulated carrier value. The envelope voltage has therefore increased by a ratio of two; as power is proportional to voltage squared the p.e.p. is therefore four times the unmodulated carrier value—in the case of the 100 watt transmitter this is 400 watts. This is not an imaginary mathematical concept and it cannot be dismissed as non-existant. In fact, if the transmitter r.f. output is absorbed in a non-inductive load the voltage across the load can be measured on a peak reading diode probe valve voltmeter (the normally used valve voltmeter is calibrated in r.m.s. values but is actually peak reading) and it will be observed that under 100 per cent modulation conditions the voltage across the load increases to twice the unmodulated carrier only value. The power dissipated in the load must then have increased four times and this is indisputable.

In *Single Sideband* in the September 1960, issue of the BULLETIN the following statement was made, " The sideband transmitter does not transmit the carrier nor the mirror image sideband and the peak power input is providing the intelligence in one sideband. The relative " talk power " is therefore four times as great, a power gain of 6db. As the bandwidth of a single sideband transmission is halved the receiver bandwidth can also be halved without affecting the intelligibility. This increases the signal to noise ratio by 3db; however the voltage recovered at the demodulator is 0·707 of that recovered with two sidebands and this represents a loss of 3db."

As this statement is an evaluation of two systems in terms of equal power the reference to a 3db loss at the detector is also in terms of equal power, in the a.m. case in two equal sidebands, in the other case in one sideband. There is in fact an inherent loss of 3db in the detection process that is peculiar to the single sideband method. In an effort to be entirely fair to the a.m. system this 3db loss was included in the statement made. A power of 100 watts in one sideband does not produce the same voltage at the detector that would be produced by a double sideband transmitter of the same 100 watts with 50 watts in each of two sidebands. This can be shown quite simply as follows: Let the power in both sidebands of a double sideband transmission=1; the power in one sideband=0·5. As voltage is proportional to the square root of the power, the voltage of one sideband $=\sqrt{0{\cdot}5}$ and the voltage of the two sidebands at the detector $=2 \times \sqrt{0{\cdot}5}=1.414$. In the case of the s.s.b. transmission of equal " talk power " the sideband power=1; the voltage therefore $=\sqrt{1}=1$.

It is seen that if X power in a single sideband produced a voltage at the detector of one unit in value, the same power divided into two equal sidebands would produce a voltage at the detector of 1·414 unit value, and this indeed represents a loss in the case of the s.s.b. transmission of 3db. Norgaard pointed this out in 1948.†

The original statement made—in terms of 100 per cent modulation and a single tone sine wave input—of a 4 : 1 gain in " talk power " was an over simplification in an effort to present the figures in a simple manner. In fact the figure quoted of a 6db gain at the transmitter is actually an understatement. A 150 watt a.m. transmitter has a p.e.p. input of 600 watts and would require a modulating power of 75 watts. For the same signal to noise ratio at the receiver, the system gain in terms of equal p.e.p. input is plus 6db in audio output from the detector plus 3db due to the reduction of receiver bandwidth from 6 kc/s to 3 kc/s, a total of 9db. It will be noted that the total sideband power of the s.s.b. transmitter would be eight times the total sideband power of the a.m. transmitter. This is a sideband power increase of 9db and yet the relative increase in the receiver detector output is 6db. The difference between these two figures is the 3db loss in the detection process due to the s.s.b. power being in *one* sideband.

In the case of a double sideband suppressed carrier transmission the voltage from each sideband (being in phase at the modulation peak) would add arithmetically just as it does with the a.m. transmission and the output from the detector would be 3db greater. As it is not possible to recover the modulation of a d.s.b.s.c. transmission correctly without a synchronous detector, the average amateur would have to receive this type of signal using a receiver bandwidth of 3 kc/s. Only one sideband is passing through the i.f. amplifier and the voltage of the other sideband would not appear at the detector and the audio output voltage would be halved—a loss of 6db. This is a very good reason why—if an operator has decided to change from a.m. to a method of transmission with suppressed carrier—he proceeds the whole way and builds a *single* sideband transmitter.

It is also obvious that the reception of an a.m. transmission with a receiver bandwidth of 3db also results in the loss of one sideband at the detector and a loss in audio output of 6db. The correspondent who stated that it is a gross exaggeration to claim a 3db improvement in signal to noise ratio for the s.s.b. system on the grounds that he can also use the same receiver bandwidth for a.m. had not taken this loss into consideration. His claimed gain of 3db is in fact a loss of 3db and reception of one sideband of a double sideband transmission is in no way comparable to the normal reception of a s.s.b. transmission.

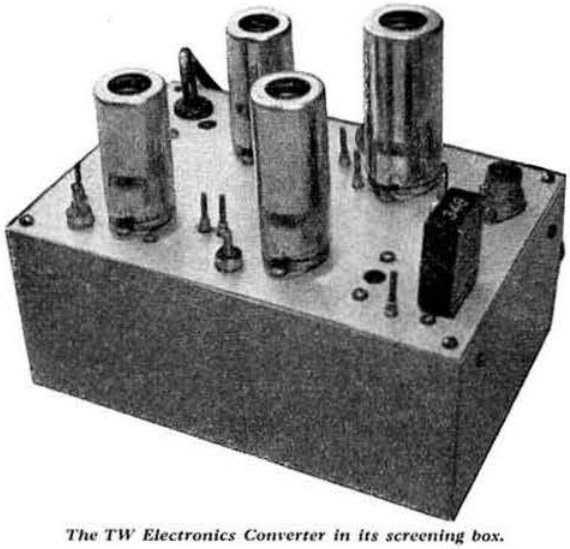
* *5 Janice Drive, Fulwood, Preston, Lancashire.*

† "What Single Sideband has to Offer," Donald E. Norgaard(W2KUJ), *Single Sideband for the Radio Amateur*, A.R.R.L.

New Equipment

The Withers TW Two Metre Converter

THE Withers TW 144 Mc/s converter is a crystal controlled unit suitable for mobile or fixed station use employing the well-tried circuit arrangement of a driven-cascode (6BQ7A) r.f. amplifier, EF95/6AK5 mixer and a crystal oscillator/multiplier chain (ECC91/6J6-EF95). The mixer valve is pentode rather than triode connected, but this departure from normal practice does not appear to have any disadvantage from the point of view of signal-to-noise ratio and provides an entirely adequate signal to the associated main receiver without the use of an i.f. head amplifier. The



The TW Electronics Converter in its screening box.

crystal is operated on its third overtone and oscillator injection is by link coupling between the anode circuit of the EF95 frequency doubler stage to the mixer grid coil. The i.f. output from the mixer stage is taken via a low impedance link winding and a length of co-axial cable to the main receiver.

The construction of the converter is simple and sound both electrically and mechanically. All components are mounted on a flat silver-plated brass plate measuring 6 in. by 4 in. with a longitudinal screen between the oscillator and signal frequency sections of the circuit. The underpart of the chassis is protected by a box 2½ in. deep finished in grey hammer-tone enamel. The overall height of the converter is a little less than 5 in. All trimming adjustments are accessible without removing the chassis from the screening box.

The power requirements are 200 to 250 volts at 35 to 40mA and either 1·2 amp. at 6 volts or 0·6 amp. at 12 volts according to specification. A range of i.f. outputs is available to order, the model tested being for 14 to 16 Mc/s for coverage of the 2m band.

Results

On test the converter performed extremely well and showed a considerable improvement in signal-to-noise ratio when compared with what was considered to be a fairly satisfactory earthed grid triode r.f. circuit, the results in favour of the Withers converter being a gain of approximately two S points in signal over noise.

A point to be considered when dealing with crystal controlled v.h.f. converters is breakthrough of signals at the first intermediate frequency (the tuning range of the main receiver in use) and the existance of spurious carriers resulting from heterodynes between the crystal harmonics and the local oscillator in the main receiver. The i.f. of the converter under test was not ideal as some extremely strong broadcast and commercial signals are encountered between 14 and 16 Mc/s when propagation conditions are good on that band. Some slight interference from this source was noticed at times between 15 and 16 Mc/s on the main receiver tuning range but at a strength only comparable with weak 2m signals. I.f. signal rejection at the converter input was good and was not improved by the use of a short-circuited quarter wave co-axial filter as is the case with most converters. A few weak spurious carriers were found but these were tuned through quickly and caused no problem. The only real source of interference came from the B.B.C. Home Service f.m. transmission from Wrotham on 93·5 Mc/s which appeared as a broad signal centred on 144·85 Mc/s and resulted from the fifth harmonic of the crystal overtone frequency on 21·67 Mc/s beating with the 93·5 Mc/s carrier to produce an i.f. of 14·85 Mc/s. It is only fair to say, however, that the test was conducted only 15 miles from Wrotham, where the field strength of that station is considerable, and that the interference was a result of the particular i.f. in use.

One slight criticism is in regard to the variation in output from the converter over the band due, it is thought, to too loose a coupling between the i.f. output link coil and the mixer anode inductance. This was no more than an inconvenience in operation and no variation in signal to noise ratio dependent upon the actual tuning of this circuit was found.

The converter can confidently be recommended for both fixed and mobile operation, a good feature in the latter connection being the absence of microphonic or other noise induced by vibration. It is manufactured by T. Withers (Electronics), 15(b) Gilbert Street, Enfield, Middlesex.

W. H. A.

Electrical Engineers Exhibition

THE Tenth Electrical Engineers Exhibition at Earls Court, London, will be opened at 12 noon on March 21, 1961, by the Minister of State, Board of Trade, the Rt. Hon. Frederick Erroll, M.A., M.I.E.E., A.M.I.Mech.E., M.P.

The Exhibition is organized by the Electrical Engineers A.S.E.E. Exhibition Ltd., of which Mr. P. A. Thorogood (G4KD) is General Manager.

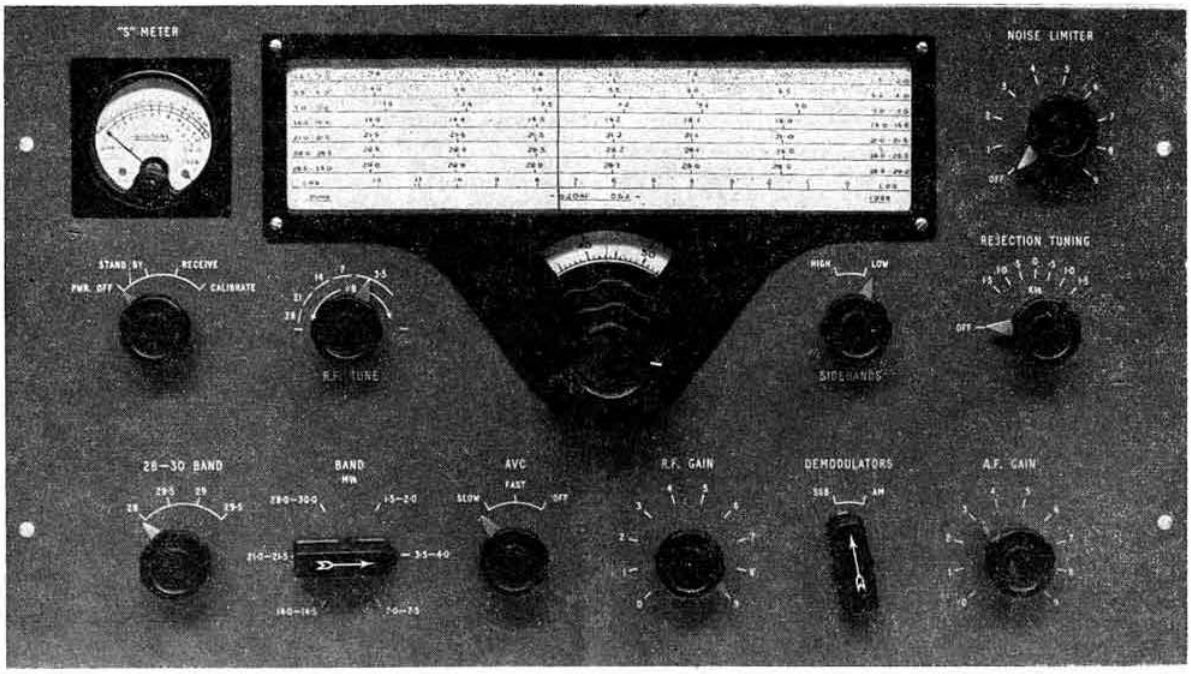
International Audio Festival

THE 1961 International Audio Festival will be held at the Hotel Russell, Russell Square, London, W.C.1, from April 6-9 inclusive. In addition to the usual displays, there will be an Audio Theatre seating 200 in which talks and special demonstrations will be given.

Admission to the Festival will be by ticket obtainable from local dealers or from C. Rex-Hassan, 42 Manchester Street, London, W.1.

WARNING—CRYSTAL ETCHING

Members are warned that the use of ammonium bifluoride for crystal etching is HIGHLY DANGEROUS and should be used with the greatest caution.



The G2DAF Communication Receiver

A High Performance Amateur Band Double Conversion Receiver

Part 1.

By G. R. B. THORNLEY (G2DAF)*

IN recent years the most significant factor affecting the requirements for Amateur Radio communication has undoubtedly been the great increase in band occupancy and today still more new stations are seeking to elbow a way into the existing congestion. In addition, postwar amateur band allocations have in certain cases been made on a shared basis and high power commercial stations operate side by side with relatively much lower power amateur transmitters. The essence of communication is to be able to receive and understand the intelligence the transmitting station is sending and this is only possible if all other unwanted signals are attenuated to a much lower level. With these considerations in mind it is quite obvious that the day of the general coverage receiver with its 9 kc/s bandwidth and poor skirt selectivity is over.

Today's requirement is for the greatest degree of selectivity it is possible to use without impairing the signal intelligibility. This order of selectivity in turn demands a much greater precision in the tuning arrangement, the highest possible degree of bandspread and a much higher degree of frequency stability. Fortunately the amateur has an advantage over the commercial designer because he is only concerned with reception on a limited number of comparatively narrow channels within the 30 Mc/s range normally used for general communication purposes. With one exception these bands are less than 500 kc/s wide. It is therefore perfectly acceptable to build a receiver with a 500 kc/s tuning range at a lower frequency where the stability can be made very high and then by mixing incoming signals with the output from a switched high stability crystal controlled oscillator, translate each of the six amateur bands (from 160 to 10m) to the tunable i.f. range that has been selected. This method has the advantage of a fixed amount of bandspread, constant tuning rate and constant stability on all bands. It also has the advantage of eliminating the tracking of front end oscillator circuits and greatly simplifies the actual construction and the final alignment. These are important considerations to the amateur builder and this method has therefore been adopted in the receiver to be described.

* 5 Janice Drive, Fulwood, Preston, Lancs.

Choice of Conversion Oscillator and Tunable I.F. Range

While valuable advantages are to be gained by the use of a crystal controlled front end and a tunable first i.f., there is the difficulty of avoiding spurious responses caused by beats between the two associated oscillators, particularly so because there is sufficient power in the harmonics up to about the fifth to produce unwanted heterodynes above the threshold noise level. Even if the two oscillators were on fixed frequencies, care would be required, but when one of the oscillators is tunable over a range of 500 kc/s its harmonics are moving over this range multiplied by the harmonic order (i.e., the fifth harmonic is sweeping over a range of $500 \times 5 = 2500$ kc/s) so the selection of suitable frequencies is made much more difficult. In addition to this,

if the higher conversion frequencies required for the 40, 20, 15 and 10m bands are obtained from a lower frequency crystal in an harmonic oscillator the difficulties are made greater still. An example of this would be the use of, say, 25 Mc/s to convert the 15m band to a tunable i.f. of 3·5 to 4·0 Mc/s. This itself is quite satisfactory but if a 8·33 Mc/s crystal had been used in an harmonic oscillator the fundamental and the second harmonic would both beat with the v.f.o. to produce spurious responses. In practice this difficulty would be overcome by using the 8·33 Mc/s crystal in an overtone oscillator circuit; as the crystal would then actually be oscillating on 25 Mc/s there would not be any output on either 8·33 or 16·66 Mc/s.

The overtone oscillator however is inclined to be tricky and temperamental, particularly when using surplus FT243 crystals. It is not possible to get sufficiently reliable output on the fifth overtone and the practical limit is third overtone operation; as the highest available frequency in the FT243 range of crystals is 8650 kc/s this means that the upper usable limit is 25,950 kc/s. Additionally the anode tuned circuit can drift or be pulled off frequency and while the valve is still oscillating and the receiver still apparently working satisfactorily the conversion output is no longer locked to the crystal. With the harmonic oscillator these difficulties do not apply. Output is obtained without the need for regenerative feedback (the output frequency is at all times locked directly to the crystal, second and fourth harmonic output can be used if required, and the required circuitry is simple and tuning of the output coil straight forward) and all types of crystal oscillate reliably and the available output voltage is greater. There are then very good reasons for the choice of an *harmonic* type oscillator for the front end conversion and it would be entirely satisfactory if it was possible to find an i.f. tuning range that would avoid generating spurious beat products.

TABLE 1

TUNABLE I.F. = 5·0 to 5·5 Mc/s SECOND I.F. = 460 kc/s

BAND Mc/s	HARMONIC CONVERSION OSCILLATOR FREQUENCIES (kc/s)					
	Required	Crystal	Second Har. of Crystal	Third Har. of Crystal	Fourth Har. of Crystal	Output Used
1·5–2·0	7000	7000	14,000	21,000	28,000	Fundamental
3·5–4·0	9000	9000	18,000	27,000	36,000	Fundamental
7·0–7·5	12,500	6250	12,500	18,750	25,000	Second Harmonic
14·0–14·5	19,500	6500	13,000	19,500	26,000	Third Harmonic
21·0–21·5	26,500	6625	13,250	19,875	26,500	Fourth Harmonic
28·0–28·5	33,500	8375	16,750	25,125	33,500	Fourth Harmonic
28·5–29·0	34,000	8500	17,000	25,500	34,000	Fourth Harmonic

BAND Mc/s	V.F.O. FREQUENCY CAUSING SPURIOUS RESPONSE kc/s				REMARKS
1·5–2·0	Nil	Nil	Nil	27,540 28,460	
3·5–4·0	Nil	17,540*	27,460	Nil	* This is at 3613 kc/s
7·0–7·5	5790	Nil	Nil	Nil	This is at 7170 kc/s
14·0–14·5	Nil	Nil	Nil	Nil	
21·0–21·5	Nil	Nil	Nil	Nil	
28·0–28·5	Nil	17,210	Nil	Nil	
28·5–29·0	Nil	17,460 16,540	Nil	Nil	

SPURIOUS PRODUCT ORDER	2nd Order	5th Order	8th Order	5th Order	

V.F.O. TUNING RANGE kc/s	Fund.	Second Har.	Third Har.	Fourth Har.	Fifth Har.
	5460 to 5960	10,920 to 11,920	16,380 to 17,880	21,840 to 23,840	27,300 to 29,800

Note.—An alternative for the 40m band (actually used by G2DAF) is a 4166·7 kc/s crystal and this is clear of spurious beats throughout the 500 kc/s tuning range.

TABLE 2

SPURIOUS PRODUCT ORDER RELATIVE STRENGTH (6BE6 SECOND MIXER)

Product Order	S Meter Reading (6db per S Point) S1 = 0db	db down (Relative to 10,000μV Input Signal = 80db)
2	8	40
3	6	50
4	4	60
5	2	75
6	1	80
7	0·5 to 1	80 to 85

Note.—Because there are fifth order products within the receiver tuning range on the 80m and 10m bands (also a sixth order product on 15m with the 4·7 to 5·2 Mc/s tunable i.f.) and these would appear as spurious responses above the threshold noise level, the G2DAF receiver design does not use a 6BE6 second mixer. Particular attention is drawn to paragraph 5 under the heading "Choice of Conversion Oscillator and Tunable I.F. Range."

The second important consideration affecting the choice of tunable i.f. range is that of second channel (image) rejection. This is inherently a compromise because the i.f. that will give the best rejection to the image of the first mixing process will give the worst rejection to the image of the second mixing process. These considerations were dealt with in detail in the July and August 1960 issues of the R.S.G.B. BULLETIN and inspection of the appropriate Tables (3 and 4) in these articles will show that an image rejection of not less than 60db to both the first and second mixing processes can be obtained with an i.f. tuning range of 5·0 to 5·5 Mc/s. The conversion frequencies required are then as follows: 160m–7·0 Mc/s; 80m–9·0 Mc/s; 40m–12·5 Mc/s; 20m–19·5 Mc/s; 15m–26·5 Mc/s; and 10m–33·5 and 34·0 Mc/s. Crystals are available to operate fundamentally for 7·0 and 9·0 Mc/s but the outputs for all other bands have to be obtained as harmonics from lower frequency crystals.

A detailed analysis of the spurious products that will be generated—using an harmonic oscillator—are given in Table 1. The most important consideration is the spurious response order because this will determine the power and therefore the relative strength. The value determined is the mathematical sum of each of the harmonic orders (i.e., a third harmonic of the v.f.o. beating with a second harmonic of the conversion oscillator crystal is a fifth order product. A second harmonic beating with a fundamental is a third order product and so on.) The only exception is where the harmonic is also the required conversion output frequency, and in this case as the anode circuit is tuned to this frequency the relative power would be equivalent to the fundamental. It is therefore—in this special case—given the value of one. The relative strength of spurious product orders are given in Table 2. It must be appreciated that the values are a fair approximation of what to expect but that they are obviously dependent on a number of variable factors. These include the output amplitude and the drive into the following mixers, the purity of oscillator wave form and the harmonic generation within the mixer itself. Additionally, bad chassis layout or insufficient screening could make the figures worse. It must be appreciated that the writer makes no pretence to

be an expert in this matter and these are not textbook values, neither are they the result of a long series of laboratory experiments on a number of receivers with differing chassis layouts and methods of screening. They are in fact observations on the receiver to be described using a 6BE6 second mixer and are given as a guidance for the benefit of potential constructors.

If the only output from the v.f.o. were on the fundamental range it covered and there were no harmonic generation within the mixer, there would be no spurious beats and the problem of their avoidance would not exist. Unfortunately the usual 6BE6 or similar multigrid mixer valve requires that the oscillator injection grid be driven positive so that it is biased into the class C region. Under these conditions, however pure the v.f.o. waveform, the harmonics are put back again by the mixing process. This is just the operating condition to be avoided and accordingly a method of injection (actually used more than 30 years ago in the early domestic superhet) has been further developed to provide the required heterodyning input to a 6BA6 r.f. pentode used as the second mixer, without the need for the usual tuned buffer stage with an impedance step down from the anode circuit, or the alternative of a link winding on the v.f.o. coil and the attendant deterioration in the oscillator stability. The method used provides correct mixing without grid current, a satisfactory conversion efficiency with low valve noise and, most important, a marked reduction in the amplitude of spurious beat products.

TABLE 3

TUNABLE I.F. = 4·7 to 5·2 Mc/s. SECOND I.F. = 460 kc/s

BAND Mc/s	HARMONIC CONVERSION OSCILLATOR FREQUENCIES kc/s					
	Required	Crystal	Second Har. of Crystal	Third Har. of Crystal	Fourth Har. of Crystal	Output Used
1·6–2·1	6800	6800	13,600	20,400	27,200	Fundamental
3·45–3·95	8650	8650	17,300	25,950	34,600	Fundamental
6·8–7·3	12,000	6000	12,000	18,000	24,000	Second Harmonic
14·0–14·5	19,200	6400	12,800	19,200	25,600	Third Harmonic
21·0–21·5	26,200	6550	13,100	19,650	26,200	Fourth Harmonic
28·0–28·5	33,200	8300	16,600	24,900	33,200	Fourth Harmonic
28·5–29·0	33,700	8425	16,850	25,275	33,700	Fourth Harmonic

Band Mc/s	V.F.O. FREQUENCY CAUSING SPURIOUS RESPONSE kc/s					REMARKS
1·6–2·1		Nil	Nil	20,860 †	26,840 27,660	
3·45–3·95		Nil	16,840 *	26,410 ‡	Nil	* This is at 3497 kc/s
6·8–7·3		5540 *	Nil	Nil	Nil	* This is at 6920 kc/s
14·0–14·5		Nil	Nil	Nil	26,060	
21·0–21·5	26,660	Nil	Nil	Nil	26,660	
28·0–28·5		Nil	16,140	Nil	Nil	
28·5–29·0		Nil	16,390	Nil	Nil	
SPURIOUS PRODUCT ORDER	Sixth Order	Second Order	Fifth Order	†Seventh Order ‡Eighth Order	Ninth Order (except 26,660)	

V.F.O. TUNING RANGE kc/s	Fund.	Second Har.	Third Har.	Fourth Har.	Fifth Har.
	5160 to 5660	10,320 to 11,320	15,480 to 16,980	20,640 to 22,640	25,800 to 28,300

With the aerial input short circuited and all gain controls full on, it is possible to tune and hear spurious beats up to about the seventh order. However, with the aerial input open circuit (no aerial connected) orders above and including the fifth are masked by the input circuit noise—they can therefore be safely ignored. Referring to Table 1 again, it may be seen that there is a fifth order product on the 80m band that will occur at 3613 kc/s dial calibration and a second order product on 40m that occurs at a dial frequency of 7170 kc/s. The latter is outside the required amateur band and can be ignored; alternatively it can be moved completely off the 500 kc/s tuning range by using a 12,150 kc/s conversion frequency obtained from a 6075 kc/s crystal. There are also three fifth order products over the 10m range of 28·0 to 29·0 Mc/s. The overall picture, then, over the complete tuning range of the six amateur bands is four fifth order products. This is considered to be quite satisfactory and a small price to pay for the many advantages of harmonic operation of the conversion oscillator.

Many amateurs will have difficulty in obtaining the required 9·0 Mc/s crystal for the 80m band and will desire to use one in the easily obtainable surplus FT243 series. As the highest frequency available is 8650 kc/s it will be necessary to use a different tunable i.f. range and a suggested arrangement is given in Table 3. It will be noted that the 80m band tuning range has been moved to 3·45–3·95 Mc/s in order to bring the spurious response of 16,840 kc/s to a dial frequency of 3497 kc/s and place it outside the amateur band of 3·5–3·8 Mc/s. Also the 40m band tuning range has been moved to 6·8–7·3 Mc/s in order to avoid the strong second order product at 7020 kc/s dial frequency, which would be caused by the use of a 6100 kc/s conversion crystal. The sixth order spurious beat on the 15m band (equivalent to a dial frequency of 21,328 kc/s) has to be accepted. This i.f. tuning range of 4·7 to 5·2 Mc/s avoids the fifth order beat in the 80m band and from the view point of spurious responses is equal to the use of the higher range of 5·0 to 5·5 Mc/s. In practical use, it will prove to be entirely satisfactory but if the necessary crystal frequencies are available, the 5·0 to 5·5 Mc/s tuning range is to be preferred because of the slightly better i.f. breakthrough rejection and this is the range actually used in the G2DAF receiver.

Signal Frequency Amplifier

Because the discrimination against image interference and i.f. breakthrough in a double conversion receiver is not only a function of the choice of i.f. tuning range, but is also directly dependent on the "goodness" factor of the two signal frequency circuits, the operating condition required is the highest possible degree of preselection it is possible to obtain within the limitation of the necessity to keep these circuits down to two in number.* This means a high L/C ratio with high Q and high dynamic resistance, and under these conditions there will be sufficient r.f. feedback across the grid anode capacity of the r.f. valve to cause regeneration. (This applies equally to a double triode cascode amplifier or the more usual r.f. pentode such as a 6BA6 or its equivalent.)

There are two commonly used methods of maintaining stability in an r.f. stage and these are overcoupling of the aerial input coil and reliance on the aerial loading to provide input damping, and the use of a fixed resistor in shunt with the anode coil to provide output damping. Both these

* This limitation is a constructional one only. From the point of view of performance three signal frequency circuits would be a decided advantage. However, this would entail a three gang tuning capacitor, six more coils and their associated switching, and a larger chassis, so some compromise is necessary.

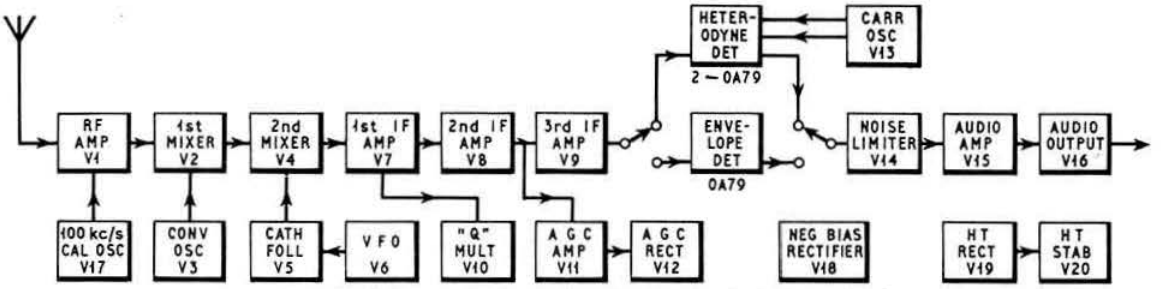


Fig. 1. Block diagram showing the function of each valve in the receiver.

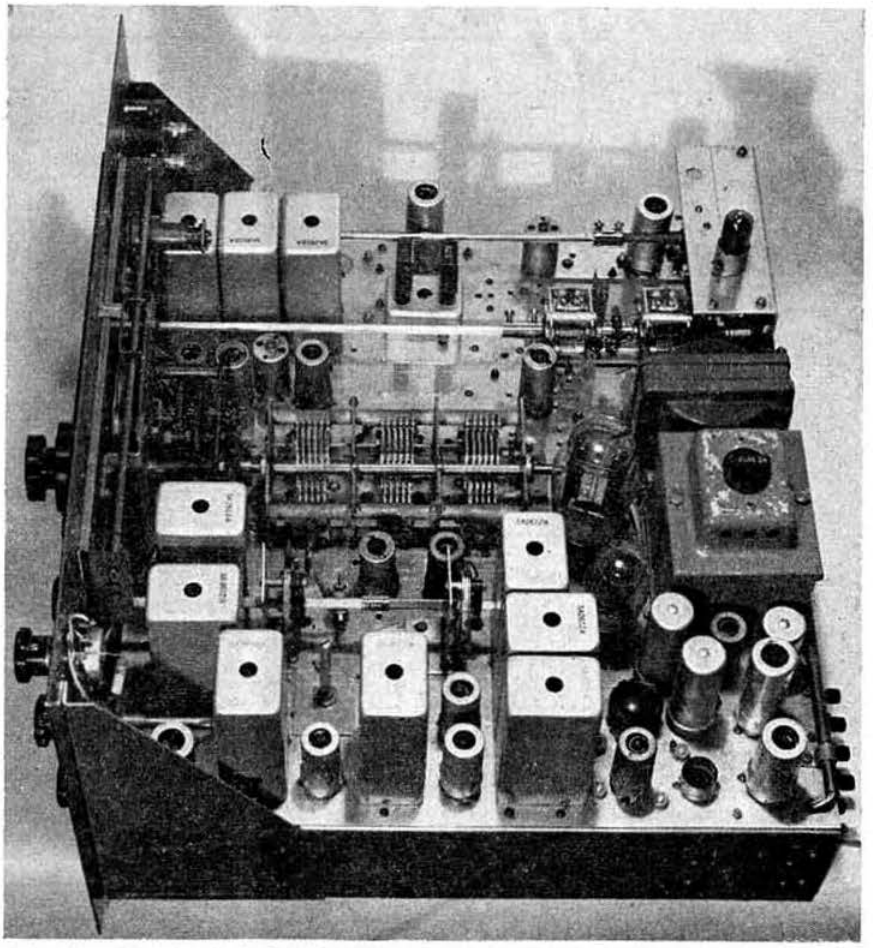
methods seriously reduce the Q of the coil and should be avoided. In addition to the greater discrimination against image and i.f. breakthrough, a high degree of preselection gives greater attenuation to signals either side of the required channel and helps to guard the r.f. and the first mixer valves from the effect of cross modulation by a strong signal outside the bandwidth of the 2·5 kc/s bandpass filter but within the bandwidth of the signal frequency circuits. A further obvious point is that any tendency to regeneration in the r.f. stage would increase the valve noise and adversely affect the signal to noise ratio.

As high Q circuits are required and any form of damping is not permissible the r.f. stage is neutralized by returning the "cold" end of the grid input circuit to earth through a small value of fixed capacity and taking a proportion of the out of phase voltage available as feedback to the anode of the first triode section of the cascode amplifier via a small pre-set neutralizing capacitor. With the aerial input open circuit (no aerial connected) the neutralizing capacitor is adjusted until the r.f. stage is stable on all bands at all settings of the RF TUNE preselector control.

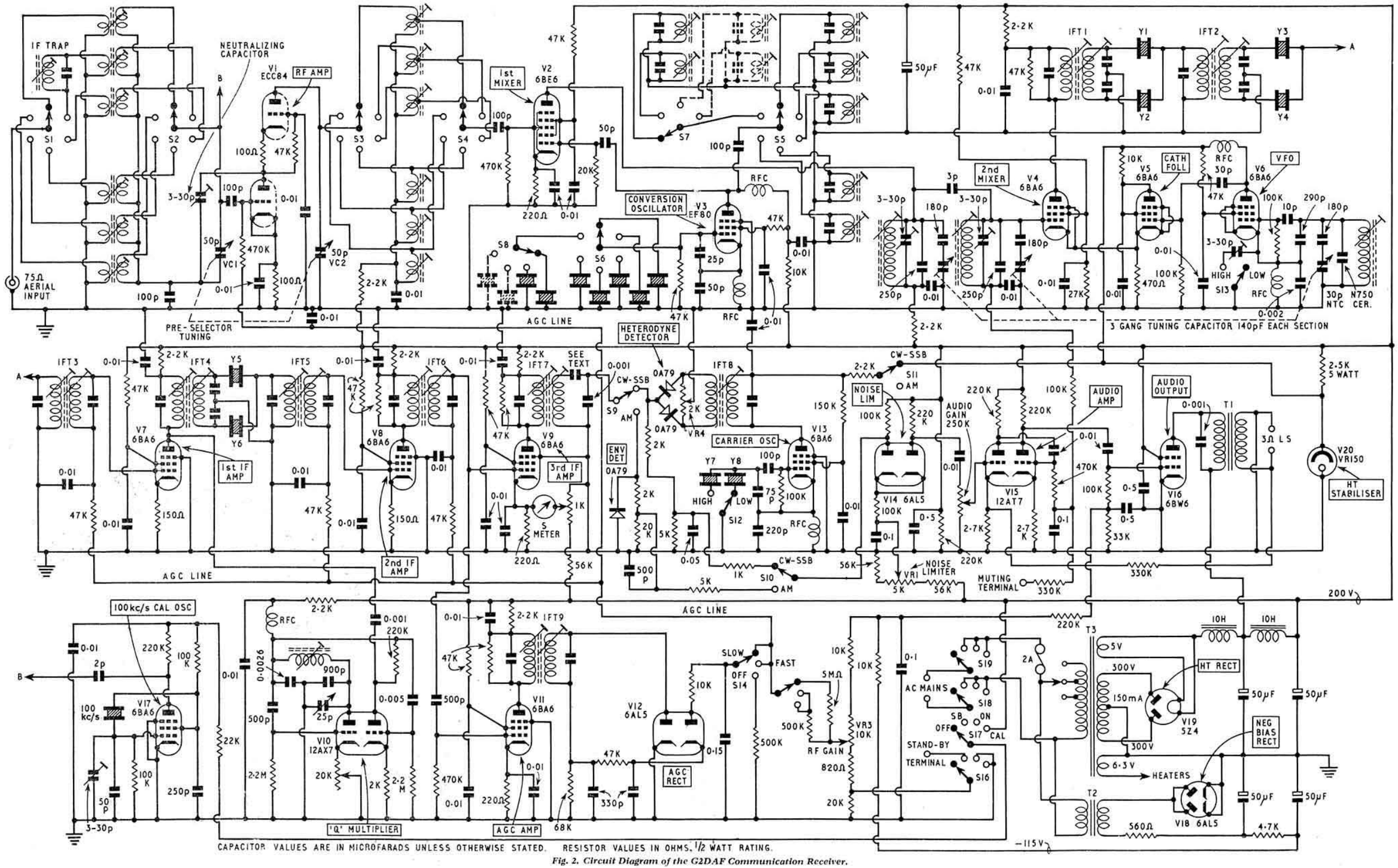
Circuit Description

A block diagram of the complete receiver is shown in Fig. 1 and the circuit in Fig. 2.

The aerial input coil on each band provides the correct match to a 75 ohm aerial feeder. Cascode r.f. amplifier V1 (ECC84) is preferred to the more usual r.f. pentode because of its superior cross modulation characteristics. Signal frequency preselection is by the input coil in the grid circuit and the series fed coil in the anode circuit of V1. These are selected (together with the aerial input) by three banks of the main bandchange selector switch and pretuned for each band with the two ganged 50pF RF TUNE capacitors. The 160, 80 and 40m anode coils are tapped to provide a reasonably constant stage gain on all bands, with the fourth section of the bandswitch feeding the signal into the grid of the first mixer V2 (6BE6). The necessary heterodyning frequency is obtained from a crystal controlled harmonic oscillator V3 (EF80). The required crystal and anode coil are selected by the remaining two banks of the six bank bandchange switch. As suitable types of switch wafers are normally six way the additional 500 kc/s sections of the 10m band are covered by



A top view of the chassis showing the major components and the pointer traversing arrangements.



CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE STATED. RESISTOR VALUES IN OHMS, 1/2 WATT RATING.

Fig. 2. Circuit Diagram of the G2DAF Communication Receiver.

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an auxiliary two bank two pole four way Yaxley switch brought out to a separate panel control. This enables full coverage of 10m to be obtained if required.

The tunable i.f. section covering the 5·0 to 5·5 Mc/s range comprises two tuned circuits in the grid of the second mixer V4 (6BA6) and in the grid of the v.f.o. V6 (6BA6) arranged as a Colpitts oscillator and tuned by a three gang variable capacitor of 140pF each section. The v.f.o. output is via a cathode follower V5 (6BA6) strapped as a triode, with direct injection into the cathode of the second mixer, V4. Automatic v.f.o. frequency correction when switching sidebands is obtained by a 3-30pF trimmer capacitor (pre-set to the required value) and a selector switch in the v.f.o. cathode circuit.

The second i.f. output at 460 kc/s is fed into a two half-lattice crystal bandpass filter and to the first i.f. amplifier V7 (6BA6) and then into a third half-lattice filter section and further amplified by the second and third i.f. stages V8 and V9 (6BA6's). A *Q* multiplier notch filter V10 (12AX7) is fed from the anode of V7. The output of the third i.f. amplifier is switched to the OA79 balanced diode bridge c.w. and s.s.b. demodulator or to a single OA79 diode envelope detector for a.m. reception. The carrier insertion oscillator V13 (also type 6BA6) is crystal controlled, the required crystal being selected by S12, the single pole two way SIDEBAND switch ganged to the v.f.o. correction switch S13.

The required audio output is selected by S10 and fed into the negative and positive peak clipping noise limiter V14(6AL5) and the level set by the potentiometer VR1 (NOISE LIMITER) control. Output is fed via VR2, the AUDIO GAIN control, to the audio amplifier V15 (12AT7) and then to the output valve V16 (6BW6). Negative voltage feedback is provided over all audio stages from the secondary of the output transformer. The necessary bias for the output valve is fed via a potential divider from the negative bias supply comprising the transformer T2 and the rectifier valve V18 (6AL5). In the " STAND BY " position of the operational switch S16/17/18/19 the bias is automatically increased and the output valve standing current reduced to approximately 20mA to lower the loading on the mains transformer T3.

The i.f. input to the grid of the third i.f. amplifier (V9) also feeds the a.g.c. amplifier V11 (6BA6), the output of which is fed to the shunt rectifier and " gate diode " V12 (6AL5). Resultant current pulses at audio frequency charge the 0·15 μF reservoir capacitor. The charge time constant is fast—of the order of 0·01 seconds but discharge can only take place via the AGC switch S14/15, and either the 500K or 5 Megohm resistors. The discharge time constant is therefore slow—of the order of 0·1 and 1·0 second respectively.

The 10 K ohms potentiometer VR3 is the RF GAIN control and applies bias from the negative supply simultaneously to the a.g.c. line and to the anode of the gate diode. This holds up the decay of the available a.g.c. voltage to a level pre-set by the gain control. Because of Miller effect the varying a.g.c. voltage would affect the grid input capacity of the controlled valves and this would particularly affect the bandpass filter response characteristics and degrade the selectivity and affect the audio frequency response. This effect is overcome in the two associated i.f. amplifier valves V7 and V8 by providing negative r.f. feedback with unbypassed 150 ohm cathode resistors. The primaries of the two i.f. transformers in the anode circuits of V4 and V8 are damped with 47 K ohm resistors to prevent filter ringing—sufficient damping of V7 anode circuit is provided by the *Q* multiplier input loading.

The main h.t. supply is from the mains transformer T3 and the rectifier valve V19 (5Z4), with choke input providing 220 volts to the anode of V16, and second stage smoothing providing an output of 200 volts to the main h.t. positive rail. A VR150 voltage regulator (V20) provides 150 volts stabilized to feed the v.f.o. and cathode follower and the carrier insertion oscillator (V13).

The calibration oscillator V17 (6AM6 or equivalent) provides harmonic output from a 100 kc/s crystal and gives accurate calibration pips every 100 kc/s throughout the receiver range. Operation is controlled by S17, part of the main control switch.

(To be concluded)

COMPONENT INFORMATION FOR FIG. 2

S1, 2, 3, 4, 5, 6, Yaxley type ceramic bandswitch, 6 bank 1 pole 6 way (shown fully anti-clockwise in the 1·5-2 Mc/s position).
S7, 8, Yaxley type ceramic (10m band selector), 2 bank 1 pole 4 way.
S9, 10, 11, Yaxley type paxolin (demodulator selector), 1 bank 3 pole 2 way.
S12, 13, Yaxley type ceramic (sideband selector), 2 bank 1 pole 2 way.
S14, 15, Yaxley type paxolin (a.g.c. switch), 1 bank 2 pole 3 way.
S16, 17, Yaxley type paxolin, 1 bank 2 pole 4 way.
S18, 19, Yaxley type paxolin, 1 bank 1 pole 4 way.
(S16, 17, 18 and 19 are the operational switch).
Y1, Y3, Y5, 461·9 kc/s (series resonant frequency).
Y2, Y4, Y6, 459·7 kc/s (series resonant frequency).
Y7, 459·3 kc/s (parallel resonant frequency in situ).
Y8, 462·3 kc/s (parallel resonant frequency).
The r.f. chokes marked RFC are all 2·5 mH.

COIL WINDING DETAILS

FUNCTION	FREQ. OR BAND	WINDING	REMARKS
Signal Frequency V1 Grid	160m	100T sec. 7T prim 40 sw.g. enam.	Paxolin former for 160, 80 and 40 metres. Polystyrene for 20, 15 and 10 metres. $\frac{3}{8}$ in. diam. 2 in. long, $\frac{3}{8}$ in. diam. with dust core.
	80m	55 T sec. 3T prim. 32 s.w.g. enam.	
	40m	30T sec. 2T prim. 24 s.w.g. enam.	
	20m	14T sec. 2T prim. 22 s.w.g. enam.	
	15m	9T sec. 1·5T prim. 22 s.w.g. enam.	
	10m	7T sec. 1T prim. 20 s.w.g. enam. (Spaced 12T per inch)	
		All primaries tightly coupled at cold end of secondary.	
Signal Frequency V1 Anode	160m	100T tap at 50T down, 40 s.w.g. enam.	Formers as above.
	80m	55T tap at 20T down, 32 s.w.g. enam.	
	40m	30T tap at 10T down, 24 s.w.g. enam.	
	20m	14T 22 s.w.g. enam.	
	15m	9T 22 s.w.g. enam.	
	10m	7T 20 s.w.g. enam. (Spaced 12T per inch.)	
Tunable I.F. V2 Anode & V4 Grid	5·0–5·5 Mc/s	14T 22 s.w.g. d.s.c. close wound paxolin former as sig. frequency coils.	Cement windings with Denfix polystyrene cement. For 4·7–5·2 Mc/s i.f. increase turns by 10 per cent.
V.F.O. V6 Grid	5·46–5·96 Mc/s	13T 22 s.w.g. d.s.c. close wound paxolin former as sig. frequency coils.	
Conversion Oscillator V3 Anode	7·0 Mc/s	25T 32 s.w.g. enam. Shunt Cap = 50pF	Former: Aladdin $\frac{1}{2}$ in. diam., 1 in long, with $\frac{5}{16}$ in. diam. dust core.
	9·0 Mc/s	16T 28 s.w.g. enam. Shunt Cap = 75pF	
	12·5 Mc/s	14T 24 s.w.g. enam. Shunt Cap = 50pF	
	19·5 Mc/s	6T 22 s.w.g. spaced to $\frac{1}{4}$ in. long. Shunt Cap = 40pF	
	26·5 Mc/s	6T 22 s.w.g. spaced to $\frac{1}{4}$ in. long. Shunt Cap = 25pF	
	33·5 Mc/s	5T 22 s.w.g. spaced to $\frac{1}{4}$ in. long. Shunt Cap = 15pF	
	34·0 Mc/s	5T 22 s.w.g. spaced to $\frac{1}{4}$ in. long. Shunt Cap = 10pF	
I.F. Trap	5·3 Mc/s	15T 24 s.w.g. enam. Shunt Cap = 350pF	Former: Aladdin as for conv. osc.
Q Multiplier	460 kc/s	60T approximately 9/42 Litz wire on Maxi-Q pot core $\frac{7}{8}$ in. diam. with adjustable slug (Adjust number of turns as necessary to obtain correct tuning.)	

The MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS (G2BVN)*

A RECENT BULLETIN readership survey disclosed a demand for more technical articles and accordingly the Editor has requested a reduction in the length of *M.O.T.A.* which is to be effected by a drastic pruning of the band reports. Henceforth this section will contain paragraphs for each band from 1·8 to 28 Mc/s devoted to notes on conditions and items of unusual interest. Lists of calls heard and worked that previously have been requested will therefore not now be required, but there is a continuing and greater need for news regarding DXpeditions, overseas activities, new QTHs and other items of DX interest, so that the coverage afforded by *M.O.T.A.* shall be as wide as possible.

An operating aid in the form of a *Countries List* has been prepared and published by R.S.G.B. Headquarters, and consists of a tally of the prefixes with country identification together with sufficient space for the writing in of call-signs. Printed on one side only of five foolscap sheets the list will be invaluable for checking countries worked and in connection with various awards, and can be obtained, price 6d., from Headquarters or G2BVN.

Readers will have seen the acknowledgements made to the *DX'press* for news items of DX interest. This excellent bulletin is produced weekly under the auspices of VERON by PA0s FX, VDN and LOU, and is the only publication of its kind, not of North American origin, having an English language section. Obviously there are many items that come to hand at short notice and cannot be dealt with in a monthly journal, and the *DX'press* is well placed to keep its readers up-to-date with current events. Enquiries should be made to PA0FX at 19 Chrysantplein, The Hague, Holland.

News from Overseas

The operators at **VR3L** on Christmas Island will be looking for G contacts on Thursdays and Sundays on 14,100 kc/s from 07.00 to 07.45. It is hoped that s.s.b. operation will be possible in the near future.

The Amateur Radio Society of India advise that there will be no operation from **AC4AX**, as an amateur licence has not been obtained from the authorities at Lhasa.

MP4MAH, operating from Muscat and Oman, will be QSLing all contacts as soon as his cards arrive from the printers. 'MAH is at present the only station operating with an MP4M prefix, the call-sign having been granted by H.B.M. Political Agent at Bahrain, in contrast to some of the VS9 calls which were the subject of local permission only.

For those who need the state of **Nevada** for WAS credit the Eimac Gang Radio Club will be operating as **W6AY/7** from 07.00 April 22 to 02.00 April 24. Operation will be on s.s.b. and c.w. on 7, 14, 21 and 28 Mc/s. A.m. stations are invited to call on the s.s.b. frequency. A 100 per cent QSL policy will be followed and cards should be sent to: The Eimac Radio Club, 301 Industrial Way, San Carlos, California, U.S.A.

VQ4HE reports the following new calls issued: VQ4IC and 'IE (Nairobi); VQ4ID (Eldoret); VQ5IB, 'IF and 'IH (Kampala) and VQ5IG (Entebbe).

Through G8IJ we learn of the untimely death of well known DX'er KP4KD, Ev Mayer. As a temporary measure the **KP4 QSL Bureau** is being taken over by KP4YT whose QTH is: J. Gonzales, P.O. Box 1447, San Juan, Puerto Rico.

Pending official ratification the result of the plebiscite in North Cameroons is that the inhabitants have declared for union with Nigeria. Unfortunately the operating hours of **ZD2KHK/NC** have been severely curtailed due to generator difficulties.

Stations who would like a direct QSL from **ZC4AK** are asked to send their card with an I.R.C. or U.K. 3d. stamp to the ZC4 Bureau, P.O. Box 219, Limassol, Cyprus. Otherwise cards will be acknowledged through the R.S.G.B. Bureau.

6O2RS (G3LOE) will be returning to the U.K. in the near future and promises to QSL 100 per cent when the cards arrive. He is using 100 watts to a 100 ft. high rhombic beamed to the U.K., and cannot usually be active until after 21.00, when 14 Mc/s is the preferred band.

MP4BBW left on February 20 on his round the world trip. He will be in the U.K. from May 6 to May 24, returning to Bahrain on June 3.

DXpeditions

The trip to **Malpelo Island** is scheduled to take place during a five day period between March 15 and 30. The call-sign will be **HK0TU** and will count as a separate country for DXCC. There will be eight operators manning two stations running 24 hours a day, together with a " rover " station which will be scanning the bands for non-Ws only. Frequencies to be used will be: c.w., 3504, 7004, 14040, 21040, 28040; a.m., 14130, 21230, 28430; s.s.b., 14348, 21348, 28648. QSLs may be obtained from Swani Radio Club, Harvard, Illinois, U.S.A., and a self addressed envelope will be much appreciated. This trip is in celebration of the 150th anniversary of the independence of Colombia, and is with the support of the government of that country. March 23 is quoted as the likely starting date.

W1BB was recently awarded the first Top Band W.B.E. certificate for contacts with the stations whose QSL cards are shown in this photo.

** Please send all reports to R.S.G.B. Headquarters to arrive not later than March 20.*

QTH Corner

CN8JO	Box 1194, A.P.O. 113, c/o P.M., N.Y., N.Y., U.S.A.
CT2AH	via K8RTW.
EA8BA	Project Mercury, Las Palmas, Canary Is.
EA8BW	Box 215, Tenerife, Canary Is.
EP5OK	A. Alseus, c/o Diawild Trading Co. Ltd., Soraye Omid, Teheran, Iran.
FF4AC	Box 571, Abidjan, Ivory Coast Rep.
FF4AL	Box1712, U.S. Embassy, Abidjan, Ivory Coast Rep.
FF7AB	Box 100, Nouakchott, Mauretania Rep.
FQ8AS } **FQ8AG** }	Box 138, Brazzaville, Congo Rep.
HS1R (W5OZI)	Capt. L. P. Rose, USARELM, JUSMAG, A.P.O. 146, San Francisco, Calif., U.S.A.
KS4BB	via W9JUV.
MP4BCV	B. H. Crook, 6 Alton Close, Penhill, Swindon, Wilts.
VP6AM	via K1IMP.
VS9APH	M/Sig. P. Hudson, c/o Sgts. Mess, R.A.F. Khormaksar, B.F.P.O. 69.
VS9ARC	R.A.F. Khormaksar Amateur Radio Club, B.F.P.O. 69.
ex-VS9OC	Cpl. T. Owen, Signals Traffic Office, R.A.F. St. Mawgan, Newquay, Cornwall.
YN4AB	via K4ASU.
5N2LKZ	O. Jackson, c/o Airport Commandant, I.A.L., Kano Airport, Kano, N. Nigeria.
6O2RS	P.O. Box 164, Berbera, Somali Rep.
6W8AF	Box 7, Ruefisque, Senegal Rep.
9GICY	Box 45, Bekwai, Ashanti, Ghana.
9GIDS	Box 450, Accra, Ghana.
9M2GR (ex-VS1JV)	Garrison H.Q., Minden Barracks, Penang, Malaya or via W6BAF.

R.S.G.B. QSL Bureau: G2MI, Bromley, Kent.

The latest news regarding the trip to the **Laccadives** by VU2NR is that this may take place about March 15.

The proposed trip by VE7ZM and MP4BBW to **VR1** has been cancelled owing to the heavy business commitments of VE7ZM.

PX1EP is scheduled to be activated by EA2CN during the first fortnight in May on 14, 21 and 28 Mc/s.

After a period of very successful operation from Zone 23 as UA3FE/0, the " Argonaut " type rig was despatched to **Kirghiz** and will probably be heard as UM8FZ.

G3LIG and G3FUN will be operating with Scottish prefixes from Fort William, **Invernesshire,** on all bands from March 31 to April 8.

GD6UW will be the call-sign of the Cambridge University Wireless Society whilst operating from Douglas, Isle of Man, during the week April 5 to 12. All bands will be used with the probability of s.s.b. operation on 14 Mc/s. G3MDR will be pleased to arrange schedules for QSOs on 1·8 Mc/s. Equipment for this trip has been loaned by Eddystone, Labgear and Mosley.

KH6ECD was heard whilst operating from Kure Island but, as far as is known, very few European QSOs were made.

It is hoped that **ZD9AL** will be activated by ZS5SG for 14 days from March 14. The equipment will be a KWM-2.

Late news regarding DXpeditions will be included in the news bulletins from GB2RS.

Contests

The Italian National Society (A.R.I.) announce the **Ancona Fair Contest** to run during the period April 1 to May 3. Stations in Zone 14 must contact at least nine Italian stations located in the Marches region. A diploma will be awarded to all operators making the requisite nine QSOs, and, in addition, a free stay in Ancona is offered to the first winner. Full information can be obtained from the A.R.I. at P.O.B. 122, Ancona, Italy.

Details of the **Dutch P.A.C.C.** contest are obtainable from G2BVN.

There was a high level of activity during the **CQ W.W. S.S.B. Contest** and many U.K. stations participated. G3GJQ paid the penalty of a hurried job when his newly acquired Birdcage was blown down by the gale (not the only casualty) and managed only 37 QSOs with 22 prefixes. G8KS amassed 255 contacts with 88 prefixes, whilst G3DO totalled 311 QSOs, again with 88 prefixes, using 150 watts p.e.p. and a G4ZU Minibeam for the h.f. bands. Among other reported scores was that of G6LX with 325 QSOs and 120 prefixes, a large number of the latter being worked on 3·5 Mc/s. The highest overseas serial number heard was that of ZS5JY who it is believed made in the region of 570 contacts. In the opinion of G2BVN the originators of some of the 48 hours endurance tests would do well to consider the example of this contest where operating was confined to 24 hours out of a 30 hour period.

Awards

The Kroonstad DX Club is the originator of the **6x6 award** which is available to all amateurs who have proof of contact with six separate countries on each of the six Continents. On each Continent three must be on 'phone and three must be on c.w., i.e. a total of 18 countries contacted on c.w. and 18 on 'phone, all of which must be different. QSLs need not be sent if the application is signed either by two other amateurs or by an official of a recognized club. The cost of the award is five I.R.C. or 2s. 6d., and application should be made to Kroonstad DX Club, P.O. Box 378, Kroonstad, South Africa.

From G8PL comes news of the **W-10-W** award which is available to any operator contacting 10 UC2 stations in Minsk. The list of cards should be certified by another amateur and sent to W. P. Pristawko, Post Box 71, Minsk, Byelorussia, U.S.S.R. G8PL reports no reply to his application for the Bulgarian RDS Award.

The **Worked United Nations Award,** not a new diploma, is now available in four classes, i.e. Classes 1, 2, 3 and Novice. The applicant must have contacted countries having membership in the United Nations, the required numbers being respectively: 70, 55, 40 and 10. QSLs need not be sent but the list submitted must be certified by two members of DXCC or an officer of a recognized radio club. The application, together with seven I.R.C. should be sent to W0IUB, T. Harmon, 5019 Gramar, Wichita 18, Kansas, U.S.A.

The first winner of the " Heard Lions Head Radio Club " award is D. M. Evans (A.2389). It is necessary for S.W.L.s to have received QSLs from three members of the Club since October 1, 1960. There are nearly 20 members of the Club active on the DX bands, all with ZS1 prefixes, and applications should be sent to P.O. Box 1167, Capetown, South Africa.

For those operators trying for the **W.A.L.T. Award,** the newly formed Paddington and District A.R.S. will be on the air from London, W.2, on Wednesday evenings after 7.30 p.m. The call G3PAD is expected shortly.

Congratulations to **G3CCN,** the fifth G station to qualify for the *CQ* Worked 100 S.S.B. Certificate.

DX Briefs

5N2LKZ is now on the air, mainly on 14 Mc/s c.w., and his address will be found in *QTH Corner*.

5N2GUP will be closing down during March, and asks the record for the quickest W.A.C. His personal best was two hours 27 minutes from ZD2GUP on 14 Mc/s c.w., but possibly someone has knowledge of an all continents " round table " on s.s.b.?

Senegal Republic, formerly FF8, now uses the prefix **6W8,** and presumably the other former French colonies will be obtaining new prefixes in due course.

K2UYG mentions that **VK8TB** should be operating from Timor (CR10), possibly using the station of CR10AA who is now QRT. So far permission to operate from this country has been denied to all except residents but VK8TB hopes to be able to break the sequence.

TF3KC is said to be another whose aerial sports a skull and crossbones.

KR8 is the prefix allocated to Japanese nationals operating from **Okinawa.**

VQ8BM is particularly looking for contacts with stations in the Portsmouth area and is frequently to be heard with a good signal around 17.00 (via G3YF).

The tally of stations now active from **Kaliningradsk** (UA2), a separate country for DXCC, is now 30. UA2AO is active on s.s.b. and the remainder will be found on c.w. on 7 and 14 Mc/s.

G3OKP has returned from 5A2 and is now active from 70 Hatch Lane, Harmondsworth, Middlesex.

The former **AP2R** is now G3GJQ and the latter will be pleased to fill in any QSL gaps on receipt of the necessary data and s.a.e.

CT2AH will be providing s.s.b. activity from CT1JA in the near future. A 20A exciter will be used and W2VCZ is sending a linear amplifier. QSL via K8RTW.

In addition to the stations mentioned last month, **UA1KED** is said to be in **Franz Josef Land.**

Band Reports

1·8 Mc/s

ZC4AK (Akrotiri) reports that evening conditions to Europe have been poor due mainly to a series of electrical storms. Fewer U.K. stations than normal have been worked but several W stations have been heard at poor strengths in the mornings, and W1ME and UO5AA were contacted at 04.30. ZC4AK, ZC4KV, 5A2CV and OD5LX are usually active from about 21.00 on Saturdays looking for European stations. **W2UWD** (New York) reports contact with G6HB and suggests that a list of W stations heard on this band would be informative.

B.R.S.20317 (Bromley) renders a comprehensive report from which it appears that conditions have varied considerably but that at most times when DX could be expected there was something of interest to be heard. The earliest opening occurred at 00.23 when W2FYT was heard in QSO with W8SM on 1801 kc/s at RST569. New countries heard include OD5LX (04.00), VE1ZZ (04.33), UB5WF (04.36), and EL4A (06.00). On some days no North American stations were heard after 05.00 but on occasions the band remained open until 07.30. **B.R.S.22795** (Kingston) and **A.2122** (Ashtead) report many W stations together with UB5WF (04.30), OD5LX (22.30), ZC4AK (23.00) and 5A2CV (23.30). W. Blanchard (ex-G3JKV of Chichester) describes Top Band reception conditions whilst motoring along an 18 mile dam across the former Zuider Zee. Between 11.30 and 12.30 some 22 different G stations were identified all at excellent signal strength without any fading over the 415 mile path. Our correspondent makes a point of commenting that positive identification of a number of stations was not possible owing to garbled call-signs.

3·5 Mc/s

G3NOF (Yeovil) reports s.s.b. contacts with OY7ML (00.13), VO1EX (00.20), W1, 2, 3 and 4, and ZC4AK (21.23). G3NOF has heard VK, ZL, and KG4AP (08.14). **G3FPQ** (Elstead) has been concentrating on this band and has worked KP4AXU (07.45, a.m.), OD5CG (23.30), OY7ML (22.45), PZ1AX (23.55), TG5HC (08.00), YV5ANS (07.00, a.m.), ZL1ACG (07.35), 4X4DK (21.52), UC2AA (20.15), together with W1, 2, 3, 4, 5, 9 and 0, also VE1, 2, 3 and VO. Except where a.m. contacts are indicated all the above have been on s.s.b. Schedules have been kept with VK3AHO who has been heard on three occasions but as yet no QSO has resulted. **ZC4AK** has contacted many European stations using s.s.b. and reports that G3NVA and G6LX provide outstanding signals from the U.K. to which the path has been open as early as 17.00. A four continent " round table " included PA0FM, W1BU, YV5ANS and ZC4AK, the YV stations being on a.m. VE7ZM and VKA3HO have reported hearing ZC4AK and it is hoped that QSOs will result shortly.

B.R.S.20317 reports that the c.w. section of this band usually produces excellent signals on Sunday mornings until about 09.00. North American stations have been logged up to 08.30 and then again after 21.45, both on c.w. and s.s.b. Unusual ones heard include KV4CI (07.00), LA1NG/P (23.43, Jan Mayen), PY7LJ (07.00, Fernando de Noronha), UA2BC (21.20), VP7PB (07.20). **B.R.S.22795** reports VK3AHO on c.w. at 18.15 whilst **A.2501** (Barton-on-Humber) mentions ZL1AAX on s.s.b. at 04.30. These reporters together with A.1930, A.1543, and A.2457 have logged numerous Ws, 4X4DK, UJ8IO, UQ2KBY (22.15) and OY7ML (21.00).

DXotic Showcase

Call-sign	kc/s	Mode	G.M.T.	Country
BV1US	21,150	a.m.	15.15	Formosa
LA2DE/P	21,200	a.m.	15.45	Svalbard
FY7YF	14,043	c.w.	20.30	French Guiana
JZ0PH	14,020	c.w.	13.00	Dutch New Guinea
KW6DG	14,065	c.w.	08.05	Wake Is.
F9QV/FC	14,310	s.s.b.	17.20	Corsica
FM7WQ	14,346	s.s.b.	19.03	Martinique
VK0TC	14,312	s.s.b.	16.42	Antarctica

7 Mc/s

A.1543, A.2122, A.2273, B.R.S.20317 and B.R.S.22795 report **00.00** UG6KAA; **03.00** KZ5MQ, PJ2CJ; **07.00** 5N2GUP; **08.00** W6s, PY7LJ; **09.00** VK3ADB, VP6AG, ZL2AWB; **18.00** TF3AB; **19.00** JA3AIS, OX3WE, UQ2KAU, ZS6AJH **20.00** PY7LJ, UA0OK, VK3ADB; **21.00** KV4CI, VQ4HT; **23.00** EA9AP, HZ1HZ, OA4FM, OD5LX, ZB2AD. All on c.w.

14 Mc/s

C.W.

G3YF (Chingford) opens this section with FB8CE (15.30), FB8XX (16.40), FB8ZZ (16.45), FF4AL (19.50), FF7AG (19.15), FF8BF (19.00), FQ8AR (17.00), FY7YF (09.45), JZ0PH (13.00), LU2ZO (00.50, Antarctica), VP8EE (23.40), VQ9HB (16.45), VS9AHH (17.00), XZ2TH (15.45), ZS7R (16.50), and 5N2JM (16.40). **G8PL** (Hampstead) worked EA8BW (09.21), EP2AF (07.29), LA1NG/P (08.53), UA0AZ (07.57), UA0IT (07.55), UH8KBC (06.30) and UL7KBK (07.25). Amongst the " got aways " were FF4AL (07.20), KW6BF (07.50), MP4TAC (06.15), SU1IM (07.00), VE0NN (07.58), 7G1A (08.01), and JA0MK/1 (07.45). The operating hours of G8PL are limited to the early mornings and an outstanding number of Russian prefixes have been heard, including UA0, UH8, UI8, UL7, UQ2 and UM8. **GM3OEV** (Kinloss) worked FF4AL (22.30), FF7AG (21.55) and EA0AB (21.40), whilst **G3MBN** (Bath) accounted for EP5X (14.38), KA2AB (08.27), KL7DNI (19.00), SM5BUG/9Q5 (18.40), VQ3HD (18.40), VS1KP (16.47), ZE8JO (18.08), 5N2GUP (08.01) and 9U5MC (18.35). **G3AAE** (Loughton) used his dipole to contact EP2AP (09.40), KW6DG (08.05), VK9XK (08.45), ZD2KHK/NC (18.05), ZS7M (17.45) and 4S7EC (16.50). **G8KS** (Farnborough, Kent) exchanged RST with several of the above and UA2AC (15.30), UA0KAE (16.55), 5N2LKZ (17.33) and 6W8CY (20.30). **VQ4HE** (Nairobi) keyed with ET2US (12.20), VK3AWP (13.05) and 9M2FS (15.00), whilst **ZS4MG** (Kroonstad) in the course of an interesting report on conditions in South Africa mentions QSOs with FF8CW, FY7YI, KV4AA, KV4CI, KM6BI, UH8BI and AC5PN. ZS4MG uses 50 watts to a home built three element beam and the present DX rating is 209/180.

The list of stations heard comes from A.1543, A.1930, A.2122, A.2273, A.2432 and B.R.S.22795. **07.00** KW6DF, UD6BB; **08.00** UA0KUA, UH8KBC, UI8KAA, VR2DK; **09.00** UL7KKB, US0TN; **14.00** UI8KAD, XZ2TH; **15.00** FB8ZZ; **16.00** EA0AB, VQ5IB; **17.00** VQ8HW; **19.00** FY7YF, PY7LJ, VP8DG; **21.00** FG7XJ, C02WD; **22.00** EL3Y, FF7AG, HH2JV; **23.00** FF4AL, SU1IM, ZK2KHK/NC.

S.S.B.

G6UT (Gt. Hallingbury) contacted KA2JL (10.03), PA0KC/AM (11.44), UA3FE/0 (11.07), VQ5FS (16.55) and VK0TC (16.42). **G3NOF** had a good month which included CT2AH (20.13), CX2CO (22.05), EA8BA (18.20), PI1LS/MM (10.19, Weather ship *Cirrus*), UC2AA (08.04), UQ2AN (08.22), ZS3E (19.17) and 9G1BF (23.55). **G8KS** worked EP2AG (09.35), KX6DB (09.15), HV1CN (12.10), KA2GL (10.00), PZ1AX (20.00), ZS7P (16.46), VE1 through VE7, VKs and ZLs. **G3MMH** (R.A.F. Wyton) reports QSOs with F9QV/FC (13.30), HC1RB (12.00), UA3FE/0 (11.30), UL7JA (13.10), UN1AB (11.05), UP2CG (11.50), VS6AE (13.15), YV5APS (11.30), ZS3AD (18.00), 5N2PJB (15.00) and 9K2AM (16.50). **ZC4AK** include in their bag the following: AP2CR (13.57), EA8CT (15.27), ET2US (12.00), KG4AP (05.30), LX1SI (16.30), TG9AD (14.00), UQ2AN (12.00), VS1FO (15.30), ZS3E (16.00), 9G1CN (18.00) and 9M2DB (14.15). **G3FPQ** records FM7WQ (19.30) and the widely worked Zone 23 station UA3FE/0 (12.15), whilst **MP4BBW**, now on his travels, completed QSOs with CR9AH (14.56), CT2AH (15.02), DU1SA (15.12), EP2AY (04.47), FB8CM (19.39), FM7WQ (19.31), HA9OZ (14.42), HS2A (17.09), KC4USV (15.00), KC6UZ (11.10), K6CQV/KS6 (05.04), KG6AJB (05.10), KV4BQ (11.55), KX6BQ (05.10), KW6CL (05.25), OA4J (13.51), OH0NC (13.52), TI2HP (11.58), UA0LA (10.32), UC2AA (14.13), UL7JA (03.21), UN1AB (10.53), VK9NT (11.44), VK0RT (15.23), VP8FT (04.01), VQ9JER (18.12), VR3L (04.36), VS1FO (15.05), XE1ZE (14.25), XZ2AD (15.03), ZS3E (17.20), 9N1CJ (11.19). The tally at MP4BBW is now: DXCC 229/220; S.S.B. 202/191; WPX 362/332.

The log of station heards reads: **07.00** KL7FLB; **08.00** CR9AH, EP2AG, HC1FG, HL9KT, KR6CR, KX6BQ, UA3FE/0, UN1AB; **13.00** EP5X, KZ5KQ; **16.00** ET2US, KV4AA, TF2WFM, ZS3E, ZS7P, 3V8CA; **17.00** VP7CD, VK0TC; **18.00** F9QV/FC; **19.00** HV1CN, OA1RZ, ZS3E; **20.00** VQ4RF, ZS3DP, CT2AH. The reporters were A.1543, A.1930, A.2122, A.2432, A.2457, A.2501, B.R.S.22357, B.R.S.22795 and F.R.S.309.

21 Mc/s

G3NOF mentions the following s.s.b. QSOs: CE3RC (12.45), EA8CT (12.49), KP4ATU (13.30), OA4BR (18.39), UR2AR (13.39), VQ2WM (13.46), VQ4RF (09.23) and 5A3TX (09.37), with a.m. accounting for FF7AG (09.11, '262), HC1KA (13.19), KG4AT (12.48), TI2RFT (13.04), VS9AAC (14.52) and 9U5VS (14.21). **GM3OEV** worked EP3HS (11.10), BV1US (15.15, '150), FF7AB (15.00, '160), and ZB2AD (11.45). **G3NAC** (Bourton on the Water) reports the following stations, all worked in one 24-hour period using a DX40 and a three element beam: EP1AD (12.10), FQ8HL (13.15), KR6RN (09.00), KR6VO (10.30), OD5AY (09.20), VK9PJ (10.10), VP6WR (16.50), VS6CL (11.25), VS9MB (16.15), VU2BK (10.40) and XW8AL (12.00). Other DX, also on a.m. includes AP2MR (09.45), CR7BC (16.00), FF8AA (Tchad, 17.00), FF8CE (17.00), SV0WT (Crete, 16.00), TI5RV (15.00), VQ8BM (14.15), VS9AAC (12.00), 6W8AP (12.00) and 6W8CY (12.00). Not bad going for a band allegedly in poor shape. **ZS4MG** worked FF7AB, HH2R, VP3s EYG, FM and RW, and mentions that this band is usually dead after 20.00 in South Africa. **G8KS** found FF7AB (14.10), FQ8HL (14.55), SV0WB (16.15) and 6W8CY (22.30).

Stations reported heard are **09.00** FF7AB, XW8AL; **10.00** KR6DO, VS6CL, VU2BK, 9G1CC; **11.00** UL7FA, VK9PJ, VS9ATH; **13.00** HI8DJC, VP1AD, VP5BB; **14.00** KG4AO, KZ5KQ, TF2WF; **15.00** EA9AQ, LA2DE/P, TI5RV, VP1OR, VP3RW; **16.00** CP1BH, EL5A, HK2YO, VS9MB, ZP5LS, ZS9G; **17.00** FF7AB, HP1AC, YN1AA; **18.00** CR7AG, CR7AE, HC5HA. For this listing we thank A.2262, A.2273, A.2432, A.2457, B.R.S.22299, B.R.S.22795, B.R.S.22844 and F.R.S.309.

28 Mc/s

This band seems to be producing very little in the way of either DX or reporters but **GM3OEV** mentions FF7AP (13.40), MP4BDC (12.15), and 5N2ATU (15.00). **G3NOF** worked KP4ATU (16.21, s.s.b.), LU6DJS (18.26), VP6AM (18.00), ZS1AB (13.25) and 5A1TY (13.48). **G3IPV/MM** mentions the following worked from the South China Sea: ZE1AD, ZE5JH, VQ8AV, 9M2DQ together with numerous JA and ZS stations.

W3BNU (Warminster, Pa.) asks that we bring to the notice of U.K. stations that the American 'phone band does not extend below 28·5 Mc/s. 'BNU finds that many G stations call CQ and only listen around their own frequency thus missing any calls from North America. It is also pointed out that due to the very heavy QRM in the American 'phone band it is preferable for non-W stations to call below 28·5 and not to attempt a QSO by moving above this frequency.

Mention must be made of a very full report from **F.R.S.309** (Richmond, Va.) who lists nearly 50 countries logged on this band. From the stations mentioned it seems that the North-South path has been most productive but that East-West contacts have not been entirely absent. Reports from B.R.S.22357, B.R.S.22795, B.R.S.22844, and F.R.S.309 are amalgamated to give **12.00** MP4BDC, 5A1TY; **13.00** HK3LX, VP2DA; **14.00** TG9BK, VP2GAQ, YV6CN; **15.00** HK3LX, KZ5DX, TI2CP, YN1JK; **16.00** EL1D, HH2V, HP1GA, PJ3AJ, XE3AF; **17.00** EL5A, PZ1BE, VP3HAG, VP6AM, YS1IM—all on a.m.

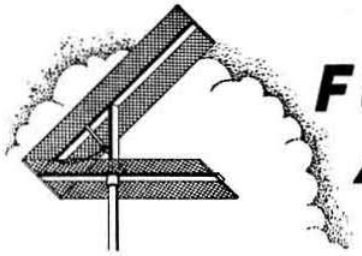
* * *

The offering for this month is brought to a close by expressing appreciation to our contributors, a number of whom have taken particular trouble to set out their reports in a most helpful way. Please send news items and material for the April issue to arrive at R.S.G.B. Headquarters by March 20.

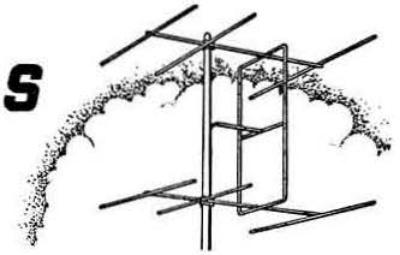
CONTESTS DIARY

March 18-19	- A.R.R.L. DX Contest (C.W. Section)
April 8-9	- Low Power Contest (For details, see page 436)
April 23	- First 420 Mc/s Open Contest (For details, see page 436)
April 30	- D/F Qualifying Event (London) (For details, see page 436)
April 15-16	- R.E.F. Telephony Contest
April 15-16	- Helvetia 22 Contest
April 29-30	- P.A.C.C. Contest (C.W. Section)
May 6-7	- P.A.C.C. Contest (Telephony Section)
May 7	- First 144 Mc/s Field Day * (For details, see page 436)
May 14	- D/F Qualifying Event (South Manchester)
May 28	- D/F Qualifying Event (Slade/Rugby)
June 3-4	- National Field Day (For details, see page 338, January 1961)
June 10-11	- 1250 Mc/s Tests
June 17-18	- 70 Mc/s Contest
June 25	- D/F Qualifying Event
July 2	- Second 144 Mc/s Field Day *
July 9	- D/F Qualifying Event
July 15-16	- Second 420 Mc/s Open Contest
September 2-3	- I.A.R.U. Region 1 V.H.F. Contest
September 10	- D/F National Final
September 17	- Low Power Field Day
October 8	- R.A.E.N. Rally
November 11-12	- Second 1·8 Mc/s Contest
December 2-3	- R.S.G.B. 21/28 Mc/s Telephony Contest R.S.G.B. 21/28 Mc/s Telephony Receiving Contest

* *To coincide with dates of I.A.R.U. Region 1 v.h.f. contests.*



FOUR METRES AND DOWN



By F. G. LAMBETH (G2AIW) *

WHILE listening around the 2m band on any reasonably active weekend under normal conditions, a high proportion of operators will be heard talking about that new converter by this or that author or new valves for use therein. Having heard many such discussions on the air one is tempted to ask the question, What is a good 2m converter? Fortunately for the constructor, there have been many descriptive articles on this subject and there is a fairly wide and reasonably priced range of high performance valves available. The choice is made by the constructor to follow the design which most fits his fancy or pocket.

It seems, however, that the time has come to consider the question with " both feet on the ground." The subject has received a great deal of attention and much experimentation has been carried out, often accompanied by exaggerated claims for low noise factors. It is not intended to be critical in any way of the published data or the performance claimed but to provoke discussion and correspondence on this important subject. By this means, we can perhaps clarify our ideas and so avoid disappointment which sometimes arises when a new converter does not bring in more signals than the previous one. At the same time there is no doubt much equipment which could be very materially improved.

Generally speaking, there are two main groups of operators: the experimenters and the contact-contest men. The experimenter will almost inevitably try each new idea and method in an endeavour to gain some further improvement in one direction or another, and spend much time and effort in getting the noise factor of a converter down another half db or so. In his search for the lowest noise, he will build fairly elaborate test and measuring equipment to assess the final performance.

The other group require the best possible performance to enable them to receive the maximum number of signals, so that they can get on with their pursuit of countries and counties. It is to this group that the present note is mainly directed, because they are the rather more practical of the two and are really not interested in producing auxiliary test or measurement apparatus unless it really contributes to the operational improvement.

How then can the performance of a converter be satisfactorily assessed? In the opinion of G6JP this may be simply defined in the following manner: Any converter in which the noise increases when the aerial is connected compared with a dummy load† (assuming the check is made when the majority of man made hash, such as domestic machines, motor cars etc., is not present), may be regarded as having as good a performance as the location will permit.

On this basis, the requirements of individual stations will vary depending on the location: operators in the quiet rural areas can use a lower noise factor first stage than can an urban or city dweller. It is quite unnecessary therefore to produce a converter with a very low noise factor if it is to be used in a noisy area—it may be nice to have, but unless the ambient noise can be reduced it will yield no more signals.

Some of the converters that have been described have been good enough almost to give aerial directions by the noise produced from the sun, but locations where this may be done are few, such as on the top of St. Catherines Down, Isle of Wight, and similar places. Are we not in danger of " chasing our tails "? What do other 2m operators think? Your comments will be welcomed.

Project OSCAR

Ever since the launching of the first Russian sputnik there has been considerable interest amongst amateurs in the radio and electronics aspects of satellite experiments.

Project OSCAR—*O*rbital *S*atellite *C*arrying *A*mateur *R*adio—is a long range programme to maintain amateur interest in space communications, the initial part of the project being to place in space a 100 mW transistorized beacon transmitter operating in the 144-146 Mc/s band. The proposed power should permit the average amateur with good equipment to hear the signals. Later, it is hoped to use more sophisticated equipment including, possibly, a repeater type mobile Amateur Radio station in space. This unit would use received signals in the lower part of the band to modulate a transmitter at the high frequency end of the U.S. 2m band (i.e. 147-148 Mc/s). Such an arrangement should have great possibilities.

The Project, which is being organized by the Project OSCAR Association, Sunnyvale, California, is described in greater detail in the February issue of *QST*.

GD6UW Expedition

Keep a look out when the time comes for the GD6UW expedition. This effort is mainly h.f. (see *M.O.T.A.*) but it is hoped to include a 2m station running 20 watts on a.m. and c.w., probably on 144·870 Mc/s. The call-sign will usually be GD6UW/P. The receiver will be on all the time but in particular it is hoped to transmit a CQ on a.m. at 20.00 daily. The relevant dates are April 5-12.

Two Metre News and Views

G3EGK (Hale Barns, Cheshire) found conditions during January 1961 to be above average, with GB3VHF a consistent, if not particularly strong signal. The C.W. Contest on January 29 showed that conditions cannot always be judged by the barometer and general weather. The latter could hardly have been worse, yet conditions were quite good. Some stations never previously audible were heard, e.g. GW3MFY (heard) and GW3ATM (worked). Altogether, 24 counties were heard during the Contest and 22 worked. G3LTF and G4DC in Essex and GW3MFY in Glamorgan were amongst the " got aways." Stations in the Midlands are commended for a high degree of activity, and the effectiveness of c.w. in establishing and maintaining contacts over quite reasonable distances at this time of year, has been effectively proved. Contest population does not seem to change very much, the same stations being operative as those worked during the National 144 Mc/s Contest in

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† It is assumed that the first stage will be a neutralized grounded cathode stage, as this gives the best performance at this frequency.

September 1960. Strangely enough, more stations over 100 miles were contacted in the January event although one would have expected the conditions in September to be more favourable.

G5ZT (Plymouth) reports that an opening came down Plymouth way on January 12 with G, GC, GW and many F stations worked. Apart from this, over a year of activity on Monday, Tuesday, Friday and Sunday evenings, plus Sunday mornings and often lunch times has yielded an average of only two contacts a week! G5ZT asks all to turn their beams south westward. He is willing to make skeds for Monday, Tuesday, Thursday and Friday afternoons or any lunch time.

G3LTF (Galleywood) now has a 28-element stack (four 7-element arrays each 10 ft. long spaced on a wavelength square) at 26-40 ft. (depending on the wind). Inside this is a 48-element stack for 70 cm. On January 23 conditions to the north were quite good with G3ILD worked. Conditions for the C.W. Contest were " foul," with a gale most of the time, but 60 stations were worked. Meteor scatter skeds were kept on February 6-8 and 10 with OE6AP without result, although it is thought the OE heard G3LTF. On February 7-9 the OK2VCG sked was also unsuccessful. On the 12th (tropo), 15 French stations were worked at distances between 250-350 miles, on the 13th DJ2YF and DL2XM (280 miles) and DL6SS at 470 miles, and on the 14th DL3YBA at 390 miles. G3HUL (Norwich) has been contacted several times. His frequency is 144·71 Mc/s. On February 15, G3KBS/P (Hereford) was worked for the last English county on 2m. DL5KQ and a few PAs were also raised. On the 16th the beam was turned inland and GW3LJP, G3ILD and GI5AJ were worked as were G2FO, PA0CML and G3JYP (Westmorland). The skeds with GW3MFY and G3ILX are temporarily suspended. G3JYP, who is in Appleby, Westmorland, has been worked for a new one. G3BLP and G3HBW have also contacted him. On February 16, GI5AJ (Bangor, N.I.) was a very strong signal in southern England.

Portables and Mobiles

If you want good coverage for your holiday expeditions, don't forget to let G2AIW have an early note of inclusive dates, locations and frequencies for publication in *Four Metres and Down*.

G5MR (Hythe, Kent) says he found conditions very poor for the C.W. Contest with a s.w. gale and heavy rain. Only a few contacts were made, the best being with G3JZG (Willenhall). For the first time in 11 years no F stations were worked, although F8NB was heard briefly. During the period February 12/16 conditions were good, and some nice contacts were made, including G2DQ, G3BGL, G3DFL, F2IN (Alençon), F3WI (Le Vesinet S. et O.), F9MZ (Dardez, Eure), ON4CP (Louvain), and ON4VN (Brussels).

G3LTN (nr. Andover) found activity at a high level between mid-January and mid-February. On February 4 auroral signals were heard, first at 20.00 G.M.T. and later at 23.00. Stations logged were GM3GUI, GM4HR, G3EGK, GM2FHH and GM3DIQ, but no QSO resulted. A good tropo opening to Europe built up over the week to February 16, and on that night the opening seemed to be the best ever experienced at Weyhill, ON, PA and F stations being worked. GB3VHF was peaking to S8. Among others ON4BZ was heard at 10.00 on February 15.

G3LAR (Tooting) has reacted promptly to the remarks regarding low power activity last month, and points out that his input is 20 watts to a QQV03/10 p.a. From Tooting he has worked 35 counties and five countries since January 1, 1961, and only wants the cards in order to claim one of the new awards. On February 12-17 the best contacts were with G5ZT (Devon), G3CZZ/M (Cornwall) and G3KBS/P (Hereford). The best signals heard were from GI5AJ, G3ILD, G2FO and G3HUL. On February 4 at 20.00 auroral signals were noted from GM3GUI and another unidentified GM. The opening lasted only about 10 minutes. At 22.45-23.45 auroral signals were again heard from GM2FHH, GM3DIQ and apparently from many GM phone stations, as several carriers were heard between 145·8 and 146 Mc/s. No contacts were made. During recent weeks a transistorized converter has been used exclusively and it is very satisfactory. It appears to have a noise factor of 5db and requires only 10 volts at 6 mA. G3LAR mentions that a good deal of activity is noticeable during the period 13.30/18.00 G.M.T. with stations from Wales and the North in evidence. This is very promising, and is doubtless due to the recent openings. G3LAR says that general activity appears good, and points out that in two years he has worked over 500 stations from Tooting and about 300 while /P or /M. The frequencies used are 144·997 and 145·04 Mc/s but if G5TZ and G3FZL are both operating together G3LAR can usually be found elsewhere in the London zone.

G4LX's Auroral Report

A number of 2m operators have recently written to G4LX asking for any details of their signals observed via the aurora during the recorded openings during 1960. Here is where a little co-operation could pay dividends for if you don't send G4LX copies of your own log, how can you expect him to supply you with information?

January 1961 brought nine auroral openings, with successful 2m QSOs on five days. On January 8, SM6PU worked GM2HLH/A and heard other GMs and SMs. GM3GUI heard SM6PU and GMs but did not make any contacts. GM2FHH worked into GI and heard G3MED. On January 9, SM6PU worked LA4YG, LA4RD and several SMs and heard GM3BDA. GM2FHH worked GM3GUI, G3ILD and G5YV. On January 19, 20 and 21 SM6PU had QSOs with LA and SM but no other DX came through, neither have any other reports of 2m propagation been obtained for these days.

Details are awaited in respect of a good opening on February 4 (see reports elsewhere in this column. Other reports would still be appreciated.) Did anyone hear GB3VHF via the aurora that evening?

G4LX will be away during the month of April, and will not be able to answer correspondence until May.

Northern Ireland

GI3OFT reports that the following are active on 144 Mc/s in Northern Ireland: GI3FJA, GI3KYP, GI3NEB, GI3OFT, GI3OMQ (all in Belfast), GI3CDF, GI3IEO (both in Portadown), GI3FJX, GI3LJM (all in Lisburn) and of course GI5AJ in Bangor. Peak activity is around 21.00 on Wednesdays, Fridays, Saturdays and Sundays. During the tropospheric opening on February 20 nine stations were heard including G3BLP (Selsdon, Surrey) and G3HBW (Bushey, Herts) at good strength.

Scottish News

GM4HR (Dundee) found February 4 quite a change from the winter doldrums with a very good auroral opening, first observed on a TV set under repair! It started shortly before 17.00 but was not usable until 18.45 when G5YV was worked 58A both ways. Between then and 19.55, nine Gs and GW3LJA were worked—quite a pleasant break! Conditions were stable with little fading. The aurora returned between 23.00 and mid-night, though not at the same level but four other stations were worked including GI5AJ and GW2HIY. GM4HR notes that when the band is open some GM stations QSY to the lower end of the band on the ground that continentals either cannot or won't tune above 145 Mc/s. GM4HR feels this only causes confusion at a time when some sort of order is more than ever required. We feel that the Band

Plan, should be adhered to, and exhort all readers to tune the whole band. Publicity will be given on the Continent to this.

GM3GUI (Friockheim) reports on the period January 16-February 16 and says the only items worth recording are the auroral periods: January 19, 18.00-18.35, but no 2m signals were heard; January 24, 17.55-18.30, but again no 2m signals; February 4 with aurora evident at 17.30. Then from 18.22 onwards GM2FHH, GM2BDA and G2CIW were heard, followed by G5YV, SM6ANR, and SM6PU heard. At 19.13 onwards G3JYP, G6NB, G6XA, G5YV, G3EHY and at 20.00 GW3MFY were all worked. At 20.20 the aurora effect was gone. At 22.30 it reappeared and several GM and G stations were heard and worked. In tropo conditions during the period, no stations were heard outside GM.

GM2FNF on the Island of Arran in Bute county is now active and has been worked by G3BLP and G3HBW.

Seventy Centimetres

A very fine contact was made by **G3LTF** (Galleywood) with SM7BAE on February 14. Strong signals were exchanged over a distance of nearly 600 miles. Not a record, but a very meritorious achievement, reached after preliminary explorations on 2m. SM7BAE's frequency is 433·2 Mc/s. On February 15, G3KBS/P (Hereford) heard G3LTF on 70 cm, but no contact was made. A test with G2CIW showed that signals were low on 70cm compared with 2m. On the 16th G2CIW was again worked.

" Networking " on Two

A feature of the weekly " Monday Activity Night on Two " is the operation of the Mid-Herts net on 145·8 Mc/s. It is now in its fifth year of operation and may, suggests G5UM, possibly be one of the first of its kind to be organized on a regular basis. Originally members of the Welwyn Garden City Group were accustomed to meet on Top Band for a Monday evening get-together. As more of them became equipped for v.h.f. the Top Band net fell into disuse and the 2m net grew apace so that at the present time as many as eight or ten stations may be heard participating. The net is frequently joined by stations outside the immediate environs of Mid-Herts, such as G3GHI in Surrey or G2XV in Cambridge, in which circumstances the net extends to almost 70 miles.

" Out of county " participants who happen to possess 8100 kc/s crystals (or a v.f.o.) have a standing invitation to drop in on the Mid-Herts net whenever convenient.

In a net of this size quick overs are the rule. As soon as all stations have checked in they are lined up in alphabetical/numerical order, e.g. G2BLA first, then through the G threes to G5UM and/or G8DR. After about three rounds the net disperses. This takes approximately three-quarters of an hour and members desiring to make individual contacts then move to separate frequencies.

Slight discrepancies from the normal 145·8 Mc/s frequency are noted in spite of the fact that nearly all stations use identical pattern crystals on 8100 kc/s. This does not worry those members who happen to be using wide band i.f. amplifier strips but those employing standard narrow-band communication receiver selectivity find small tuning adjustments need to be made on one or two stations. The " out of zone " frequency of 145·8 Mc/s was chosen, incidentally, so that the net would not tangle with the mid-band activity produced by London and Home Counties stations.

BRITISH ISLES TWO METRE BAND PLAN

Zone	Mc/s	Area
1	144.0 -144.1	Cornwall, Devonshire, Somerset.
2	144.1 -144.25	Berkshire, Dorset, Hampshire, Wiltshire, Channel Islands.
3	144.25-144.5	Brecknockshire, Cardiganshire, Carmarthenshire, Glamorgan, Gloucestershire, Herefordshire, Monmouthshire, Pembrokeshire, Radnorshire, Worcestershire.
4	144.5 -144.7	Kent, Surrey and Sussex.
5	144.7 -145.1	Bedfordshire, Buckinghamshire, Essex, Hertfordshire, London, Middlesex.
6	145.1 -145.3	Cambridgeshire, Huntingdonshire, Leicestershire, Norfolk, Northamptonshire, Oxfordshire, Rutland, Suffolk, Warwickshire.
7	145.3 -145.5	Anglesey, Caernarvonshire, Cheshire, Denbighshire, Flintshire, Merionethshire, Montgomeryshire, Shropshire, Staffordshire.
8	145.5 -145.8	Derbyshire, Lancashire, Lincolnshire, Nottinghamshire, Yorkshire.
9	145.8 -146	All Scotland, Northern Ireland, Isle of Man, Cumberland, Co. Durham, Northumberland, Westmorland.

LONDON U.H.F. GROUP
will meet at the Whitehall Hotel, Bloomsbury Square, London, W.C.1.
at 7.30 p.m. on Thursday, April 6, 1961
All v.h.f. and u.h.f. enthusiasts welcome.
Note the new venue!

Overseas News

LA9T (Moss) reports aurora on January 9 when LA4YG worked DL and SMs and heard GM3BDA. On January 21 aurora was also noted but only SM worked. On February 4 LAs worked DL, SM, OH, OZ and UR2BU. GM3BDA was again very strong for a long time. G3LRP was not so strong, but GM2FHH was heard by LA9T for over half an hour but appeared to be calling CQ all the time! LA9T followed a call for ten minutes, but gave it up. When the calls were finished so, it appeared, were the conditions! Short calls are essential if QSOs are wanted by aurora, says LA9T.

General Notes

It has been suggested that LA, SM and OH stations might co-operate during May/July for possible sporadic *E* openings. GB3VHF will be transmitting on its schedule, and reports from Scandinavia will be eagerly awaited.

Ex-G3HHY (now VE2BAI and later to be VE3BAI) is working 2m in Canada and promises us some news as soon as possible. 73 from G2AIW and all friends, John.

Worked and Heard on V.H.F.

Two Metres

G3LAR (Tooting, S.W.17) February 15 and 17.
Heard: G2AOX, 3BGL, 3BLP, 3CLW, 3EMU, 3FAN, 3HSV, 3ITF, 3IUJ, 3IUL, 3JWQ, 3KEQ, 3KVC, 3LTN, 3LTP/A, 3NUV, 3MI, 3OPW, 3OQB, 3OSC, 4DC, 5DW, 5UM, 6OU, 6WU, 8LM, 8VZ, GW3MFY, 8UH, 8UP.

G5ZT (Plymouth) February 12.
Worked: F2BS, 8OB, 9CZ, 9II, 9NW, 9QE, G2RY, 2UJ, 2BLP, 3LAR, 3LTN, 3MPS, 3NAR, 3CZZ, 3OBB, 3OBD, 3OJY, 5DW, GC2FZC, GW8UM.
Heard: F8AJ, 8AT, 8MW, G6TA, ON4VN.

GM4HR (Dundee) February 4 (Aurora).
Worked: G2CIW, 3CCH, 3HAZ, 3JWQ, 3KCB, 3KEQ, 3LRP, 3NSW, 5YV, 6NB, GI5AJ, GW2HIY, 3LJP.
Heard: G2XV, 3DKF, 3JYP, 5M6ANR.

1961 Baird Memorial Lecture

THE Royal College of Science and Technology, Glasgow, has announced that the Second Baird Memorial Lecture will be delivered by Professor Martin Ryle, F.R.S. (G3CY) in the College on June 7, 1961. The title of Professor Ryle's address will be " Exploring the Universe with Radio Waves."

Society News

Mr. F. G. Lambeth (G2AIW) Elected a Vice-President

AT the meeting of the Council held on February 20, 1961, Mr. Frederick G. Lambeth (G2AIW) was elected a Vice-President of the Society in recognition of his outstanding services to the Society.

Mr. Lambeth has been a member for 22 years and since 1954 he has held the office of Region 7 (London) Representative. In January 1955 he became the Society's V.H.F. Manager, an office he has held ever since. Mr. Lambeth is

F. G. Lambeth (G2AIW).

the Honorary Secretary of the I.A.R.U. Region I V.H.F. Committee and author of the monthly *News Letter* sent to all V.H.F. Managers in I.A.R.U. Region I.

Since December 1954, Mr. Lambeth has contributed gratuitously the v.h.f. article *Four Metres and Down* to the Society's Journal. He is a member of the R.S.G.B. V.H.F. Committee and the organizer of the annual International V.H.F./U.H.F. Convention held in London.

This announcement of the Council's recognition of Mr. Lambeth's services to the Society will be read with pleasure by his many friends in the Amateur Radio Movement.

NORTH WEST OF ENGLAND
OFFICIAL REGIONAL MEETING
IMPERIAL HOTEL, BLACKPOOL

Sunday, April 23, 1961

Programme:

12 noon ...	...	**Assemble**
1 p.m. ...	...	**Luncheon**
2.30 p.m.	...	**Business Meeting**
4.30 p.m.	...	**Buffet Tea**

Talk-in Station

GB2ORM on 1·8 and 144 Mc/s

Preceded by a Mobile Rally and Treasure Hunt on Saturday, April 22, 1961

The Council will be represented by Messrs. R. C. Hills, G3HRH, P. H. Wade, G2BPJ (Zone A Representative) and John Clarricoats, O.B.E., G6CL (General Secretary).

Tickets, price 17s. 6d. each (double, 32s. 6d., children 10s. each) are obtainable from H. G. Newland (G5ND), 161 Penrose Avenue, Marton, Blackpool, from whom applications to take part in the Treasure Hunt and information on overnight accommodation are available.

Four Metres and Down Certificates

THESE certificates, intended to mark successful v.h.f. and u.h.f. achievements are available in eight categories:

Four Metre Award Four Metre Listener Award Two Metre Award Two Metre Listener Award	Qualification: 30 counties and 5 countries
Two Metre Senior Award Two Metre Senior Listener Award	Qualification: 60 counties and 15 countries
Seventy Centimetre Award Seventy Centimetre Listener Award	Qualification: 20 counties and 3 countries

All claims must be fully supported by QSL cards and all contacts must have been made on or after January 1, 1961.

The counties referred to are those in the *United Kingdom of Great Britain and Northern Ireland.*

Stations eligible for these certificates are (*a*) fixed stations; (*b*) alternative address stations (/A, any address); (*c*) portable stations (/P, any location) and (*d*) mobile (/M). Categories cannot be mixed.

Another Pirate Fined

AT Moot Hall Magistrate's Court, Newcastle-on-Tyne, on January 25, 1961, Albert William Nicholson of 5 Wilson Terrace, Forest Hall, Newcastle-on-Tyne, pleaded guilty to a charge of using wireless telegraphy without a licence contrary to Section 1 of the Wireless Telegraphy Act, 1949. He was fined £10 and ordered to pay 3 gns. costs.

Articles for the Newcomer to Amateur Radio

BEFORE the war a series of articles entitled *The Helping Hand to Amateur Radio* appeared in the BULLETIN. It was one of the most popular series ever published by the Society, so much so that many thousands of copies of the articles were sold when they appeared later in booklet form.

There is today an even greater need for articles for the beginner but to meet that demand the Society requires the services of a competent contributor with an ability to write technical articles in an easy-to-follow style. The Editor will be pleased to hear from any qualified member with a flair for technical writing who would be willing to contribute such a series for the beginner. Interested members should submit a precis of the ground they would propose to cover together with an abridged version of the first article. Manuscripts should be typed using double spacing.

Cheltenham Mobile Rally

A DINNER is being arranged for the Saturday evening prior to the Cheltenham Mobile Rally on May 7, 1961. Those wishing to attend should inform T. A. Russell (G3JFH), 10 Dale Walk, Bishop's Cleeve, Cheltenham, as soon as possible, stating the number in their party.

This year's mobile contest will take the form of an initiative test. The type of map required can be purchased at any garage.

Talk-in stations will be in operation on Top Band and 2m.

Region 6 Representative

MR. L. W. LEWIS (G8ML), Region 6 Representative, has moved to 34 Cleevelands Avenue, Cheltenham, Gloucestershire.

G2DAF Communication Receiver

A "buyers' guide" to suppliers of components for the G2DAF receiver will appear in the April issue of the BULLETIN. A drilling diagram for the front panel using an Eddystone type 898 dial drive will also be included in the final part of the article in that issue.

Council Proceedings

Résumé of the Minutes of the Proceedings at a meeting of the Council of the Radio Society of Great Britain held at New Ruskin House, Little Russell Street, London, W.C.1, on Thursday, January 19, 1961, at 6 p.m.

Present: The President (Major-General E. S. Cole, in the Chair), Messrs. C. H. L. Edwards, K. E. S. Ellis, R. C. Hills, E. G. Ingram, J. D. Kay, A. O. Milne, F. K. Parker, F. A. Russell, R. L. Smith-Rose, G. M. C. Stone, E. W. Yeomanson (Members of the Council) and John Clarricoats (General Secretary).

Apologies for Absence. Apologies for absence were submitted on behalf of Messrs. N. Caws, L. E. Newnham, P. H. Wade and A. C. Williams.

* * *

The late W. R. Metcalfe (G3DQ)

The Penultimate Past President (Dr. R. L. Smith-Rose) referred to the death of William Ratcliffe Metcalfe, G3DQ (President, 1960). The Council then stood in silence and honoured the memory of their late colleague.

The Secretary reported upon the many letters and messages of sympathy that had been received from members and others.

Welcome to President

The Penultimate Past President (Dr. R. L. Smith-Rose) extended a warm welcome to the President (Major-General E. S. Cole) and presented to him a badge of office. Major-General Cole thanked Dr. Smith-Rose and his colleagues for their good wishes.

The President then presented to the Executive Vice-President (Mr. E. G. Ingram) a badge of office and handed to Dr. Smith-Rose a Past President's badge.

Membership

Resolved (i) to elect 93 Corporate members and 42 Associates; (ii) to grant Corporate membership to 14 Associates who had applied for transfer.

The Secretary reported, for information, that during 1960 the Council waived the subscriptions of 21 members on the ground that they suffer from blindness.

Applications for Affiliation

Resolved to grant affiliation to the following Societies and Clubs: Lichfield Amateur Radio Society, Rotherham & District Radio Club.

Vice-President

Mr. Ellis moved, in accordance with Article 12, that Mr. F. G. Lambeth (G2AIW) be elected a Vice-President of the Society in recognition of his outstanding services to the Society.

(A Ballot was taken at the meeting of the Council held on February 20, 1961, as the result of which Mr. Lambeth was elected a Vice-President of the Society.—EDITOR.)

Constitution of Committees

The Committees of the Council for 1961 were constituted (a list of the names of Corporate members appointed to serve on the Committees appeared in the February 1961 issue of the R.S.G.B. BULLETIN.—EDITOR).

Golden Jubilee Celebrations

Resolved (i) to constitute a special Committee of the Council to prepare for the Golden Jubilee celebrations of the Society in 1963; (ii) to authorize the Committee to co-opt additional members if considered to be necessary or desirable.

QSL Manager

Resolved to re-appoint Mr. A. O. Milne to the office of QSL Manager for the year 1961.

V.H.F. Manager

Resolved to re-appoint Mr. F. G. Lambeth to the office of V.H.F. Manager for the year 1961.

Official Regional Meetings

Resolved (i) to invite the Society's Representatives in Regions 4, 5, 6, 7, 10, 11, 14, 15, 16 and 17 to put forward proposals for O.R.M.'s during 1961; (ii) to authorize the Region 13 Representative to arrange an O.R.M. in his Region on Saturday, May 13, 1961, and to authorize the President (Major-General Cole), Mr. Ingram and the General Secretary to attend the meeting as representatives of the Council.

East London District

Consideration was given to the following resolution passed at a meeting of the East London District:

"That this District of the R.S.G.B. requests the Council to reconsider the possibility of increasing the size of the BULLETIN as necessary to include monthly minutes of Council meetings and District notes and to report back to membership the approximate increase in subscriptions before implementation."

Resolved to request the London Regional Representative to inform the East London D.R. that (i) in the opinion of the Council there is no evidence to show that District notes are required by the membership at large; (ii) résumés of Minutes of meetings of the Council will in future be published monthly; (iii) important items of business dealt with at a particular Council meeting are reported upon in the first issue of the Society's Journal published after the meeting; (iv) the cost of increasing the Society's Journal from 48 to 64 pages would amount to approximately £2,400 per annum.

Lists of New Members

In order to allow more space to be made available in the Society's Journal for technical articles it was agreed to inform the membership at large that it is proposed, as an experiment, to discontinue the practice of publishing lists of new members.

Reports of Committees

The Minutes of meetings of the R.A.E.N., Finance and Staff, and TVI/BCI Committees, were submitted as Reports.

Resolved to receive the Reports and to accept certain of the Recommendations contained therein.

The Recommendations related to the National Insurance Scheme and to occasional meetings between R.A.E.N. officials and local R.A.E.N. groups.

The meeting terminated at 9.50 p.m.

Build-It-Yourself Leaflets

THE following leaflets and pamphlets, originally produced for sale on the Society's stands at exhibitions, are available from Headquarters. Apart from the BULLETIN reprints, the text is in typescript. The prices quoted include postage.

"All Band Grid Dip Oscillator"*	1/3d.
"Crystal Controlled Converter for the Two Metre Amateur Band"	9d.
†"Curing TVI with Co-axial Stubs"*	9d.
†"Diagnosis of TVI"*	1/-
"Improving the War Surplus HRO Receiver"*	1/3d.
†"Low Pass Filters for TVI Reduction"*	1/3d.
"Morse Sender" (audio)	6d.
"One Valve Two Stage Pick-up Amplifier"	6d.
"Simple 160m Transmitter for the Beginner using Miniature Valves"	1/3d.
"Progressive Three Receiver"	9d.
"Radio Amateur Applications of the Transistor"	2/6d.
"Revision Sheets for Candidates taking the R.A.E."	1/3d.
"R.S.G.B. Two Metre Converter"*	1/3d.
"Simple Receiver for the Beginner"	9d.
"Simple Transistor Amplifier"	6d.
"Simple T.R.F. Receiver using Miniature Valves"	9d.
"Single Sideband Exciter"	2/6d.
"The Beginner's Amateur Bandspread Receiver"	9d.
"Three-in-One Receiver"	9d.
"Transistor Code Practice Audio Oscillator"	9d.
"Transistor Crystal Marker Oscillator"	9d.
"Transistor Tester (*P-N-P*)"	9d.
†"TVI *Can* be Cured"*	1/-

* BULLETIN reprint.

† The set of four TVI reprints may be purchased for 2/6 post paid.

London Meeting

Friday, March 24, 1961

"Mobile Operation and its Problems"

By N. A. S. Fitch (G3FPK)

(Hon. Secretary, Amateur Radio Mobile Society)

at the

Institution of Electrical Engineers, Savoy Place, Victoria Embankment

Buffet Tea 6 p.m. **Lecture 6.30 p.m.**

CONTEST NEWS

RESULTS — REPORTS — RULES

Low Power Contest 1961

THE rules for the Low Power Contest to be held on April 8-9 are substantially the same as for previous years but the scoring system has been modified to encourage the use of wholly transistorized transmitters.

When: 18.00 G.M.T. to 23.00 G.M.T. on April 8 and 08.00 G.M.T. to 20.00 G.M.T. on April 9, 1961.

Eligible Entrants: All fully paid-up members of the R.S.G.B. resident in Europe.

Contacts: Must be made on c.w. (A1) only between 3500 and 3600 kc/s.

Scoring: Points will be scored on the following basis:

Watts input to p.a. stage	Up to 0·5	To 1	To 2	To 3	To 4	To 5
Points per contact	20	10	5	3	2	1

A bonus of 20 points may be claimed for the first contact with each different county code area listed on page 340 of the January issue of the R.S.G.B. BULLETIN. Bonus for the use of wholly transistorized transmitter: double points.

Contest Exchanges: RST reports followed by the contact number starting at 001 and the county code number, e.g. 559001 Nr.17.

Logs: (*a*) Must be tabulated in columns headed (in this order) " Date/Time (G.M.T.)," " Call-sign of station contacted," " My report on his signals and serial number sent," " His report on my signals and serial number received," " His County Code No.," " My input power," " Points claimed."

(*b*) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5 and the declaration signed.

(*c*) Details of the transmitter and power supply must be given. Entrants claiming bonus points for use of transistors must enclose a circuit diagram of the transmitter.

(*d*) Entries must be postmarked not later than **Monday, April 24, 1961.**

Awards: At the discretion of the Council, the **1930 Committee Cup** will be awarded to the winner and **certificates of merit** to the runner-up and to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

The General Rules for R.S.G.B. Contests published on page 341 of the January 1961 issue of the Bulletin apply to the contest.

First 420 Mc/s Open Contest 1961

MEMBERS taking part in this contest are recommended to operate in accordance with the British Isles Seventy Centimetre Band Plan.

When: 09.00 G.M.T. to 23.00 G.M.T. on Sunday, April 23, 1961.

Station Locations: Stations may be operated from more than one site but the National Grid Full Six Figure reference must be recorded in the log for each location in the case of entries from G, GD, GM and GW. In all other cases, entrants must show latitude and longitude.

Eligible Entrants: All fully paid-up members of the R.S.G.B. resident in Europe. Multiple-operator entries will be accepted provided only one call-sign is used.

Contacts: May be made on either A1, A3, A3a or F3.

Scoring: Points will be scored on the basis of one point per mile.

Contest Exchanges: RST (RS) reports followed by the band identification letter B and the contact number and location (e.g. RST559B001 5NE Wigan). This location must be identifiable on the 10 mile to the inch Ordnance Survey Map.

Logs: (*a*) Must be tabulated in columns headed (in this order) " Date/Time (G.M.T.)," " Call-sign of station contacted," " My report on his signals and serial number sent," " His report on my signals and serial number received," " Location of station contacted as received," " Points claimed."

Logs must show clearly when station locations are changed.

(*b*) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5 and the declaration signed. The location of the station as transmitted must be given on the cover sheet.

(*c*) Entries must be postmarked not later than **Monday, May 8, 1961.**

Awards: At the discretion of the Council, a **miniature cup** will be awarded to the winner and **certificates of merit** to the runner-up and to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

The General Rules for R.S.G.B. Contests published on page 341 of the January 1961 issue of the Bulletin apply to this contest.

First 144 Mc/s Field Day 1961

R.S.G.B. members throughout Europe are again invited to take part in this contest, the details of which are as shown below. Contestants are recommended to operate in accordance with the British Isles Two Metre Band Plan.

When: 10.00 G.M.T. to 19.00 G.M.T. on Sunday, May 7, 1961.

Eligible Entrants: All fully paid-up members of the R.S.G.B. resident in Europe. Multi-operator entries will be accepted provided only one call-sign is used.

Power Supplies: Power for any part of the station shall not be derived from supply mains.

Contacts: May be made on either A1, A3, A3a or F3 with an input not exceeding 25 watts to any stage in the transmitter.

Scoring: Points will be scored on the basis of one point per mile for contacts with fixed stations and two points per mile for contacts with other portables or mobiles.

Contest Exchanges: RST or RS reports followed by the band identification letter A and the contact number and location (e.g. RST559A001 5NE Luton). This location must be identifiable on the 10 mile to the inch Ordnance Survey Map.

Logs: (*a*) Must be tabulated in columns headed (in this order) " Date/Time (G.M.T.)," " Call-sign of station contacted," " My report on his signals and serial number sent," " His report on my signals and serial number received," " Location of station contacted as received," " Distance," " Points claimed."

(*b*) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5 and the declaration signed. The National Grid Full Six Figure Reference must be given.

(*c*) Entries must be postmarked not later than **Tuesday, May 23, 1961.**

Awards: At the discretion of the Council a **miniature cup** will be awarded to the winner and certificates of merit to the runner-up and to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

The General Rules for R.S.G.B. Contests published on page 341 of the January 1961 issue of the Bulletin apply to the contest.

D/F Qualifying Event

DETAILS of the London qualifying event are as follows:

Sunday, April 30
Organizer: Clifton Amateur Radio Society—Hon. Secretary, C. H. Bullivant (G3DIC), 25 St. Fillans Road, Catford, London, S.E.6.
Frequency: 1860 kc/s.
Call-sign: G3GHN/P.
Map: Ordnance Survey, New Popular Edition, Sheet No. 171.
Assembly Point: Bridge over River Darent, Eynsford (N.G.R.539656).
Assembly Time: 13.30 B.S.T.
Entries and Tea: Intending competitors should notify the Organizer at least seven days in advance, stating the number in their party requiring tea, which will be held at 17.30 B.S.T. at the Pavillion Café, Green Street Green, near Farnborough, Kent (N.G.R. 455633).

DL7IB at Ideal Home Exhibition

PAUL FERRAND (DL7IB) who is staging *The Dancing Waters Show* at the *Daily Mail* Ideal Home Exhibition at Olympia, London, will be pleased to meet old friends he has worked from Germany. He is staying at the King Charles Hotel, 249 Cromwell Road, Kensington, S.W.5.

GB2RS SCHEDULE

R.S.G.B. 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
	10.30 a.m.	North Midlands
	11 a.m.	North East England
	11.30 a.m.	South West Scotland
	12.00	North East Scotland
145·55 Mc/s	11.15 a.m.	Beaming south-east from Leeds
	11.30 a.m.	Beaming south-west from Leeds
	11.45 a.m.	Beaming north from Leeds
145·3—145·4 Mc/s	12 noon	Beaming north from South East England
	12.15 p.m.	Beaming west from South East England

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.

Letters to the Editor . . .

Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents. Letters for inclusion in this feature should be concise and preferably not more than 200 words in length.

Licence Conditions— Liberality and Tolerance in Western Germany

DEAR SIR,—G2HR's letter in the January BULLETIN concerning the " liberality and intolerance " of the G.P.O. prompts me to take this opportunity of drawing a comparison between conditions in the U.K. and the German Federal Republic concerning operation from a shack other than the one stated in the licence.

The suffix /A is here only applicable for operation from a second address, notice of which has previously been given to the Bundespost and which is then duly entered into the licence. If, however, I am at a fellow amateur's house with either his station or with my own I simply sign /P, without having previously had to inform the authorities of my intentions. It is completely irrelevant whether the other amateur is present or not; this means, therefore, that I can operate from where I like with whose gear I like simply by attaching /P to my call. The German amateur regulations on this point state the following:

" If transmissions are made from any locality other than that officially recorded for the call-sign issued, the suffix /P must be used. In such cases continuous reference must be made to the /P locality during transmission periods." (My translation.)

Another point raised recently by correspondents in this column, and one on which I also feel qualified to remark, is that of reciprocity of licences. When I took up civilian employment in Germany about 3½ years ago, I did not hold a G licence. Had I been in possession of one, I should have been able to obtain a DJ0 call immediately. As it was, there proved to be no objection to my sitting for the normal civilian German R.A.E. the standard, of which varies somewhat from postal district to postal district but which corresponds approximately in difficulty to the U.K. R.A.E. The only difficulty for foreigners, of course, is that of language! On subsequently applying for a U.K. licence, I discovered that the G.P.O. did not accept my German examination pass and that it was necessary to sit for the British R.A.E., although I had been in possession of an amateur licence for 1½ years at the time. Had I been a German national it would have been impossible for me to obtain an amateur transmitting licence for use in the British Isles.

Finally, I should like to mention the fact that I have, in 2½ years of licensed operation as a non-German national, not once received a visit from the German Bundespost authorities. Although I have not yet had practical experience as a transmitting amateur in England and cannot, therefore, draw a personal comparison, I can state that an amateur in the German Federal Republic enjoys a considerable amount of freedom, provided, of course, that he does not come to the notice of the postal authorities by virtue of TVI/BCI, radiation of harmonics, out-of-band operation, etc. This freedom has remained unaltered up to now, despite attempts from certain quarters to have changes made in the West German radio amateur licensing laws which, in my opinion, are among the most liberal in Europe. I am personally extremely grateful for the opportunity of having been able to continue my hobby whilst abroad without meeting the difficulties that would have arisen had I been a foreigner in Great Britain.

Yours faithfully,

Altena i/West German Federal Republic.

GERALD A. S. LANDER (DJ0BF/G3OOH).

The European Band Plan

DEAR SIR,—The letter from Mr. Ballinger in the February BULLETIN gives a distorted view of the band-planning position. Firstly, the Band Plan was not imposed on the amateur movement by the R.S.G.B. or any other body; it merely recognized the existing *de facto* position and recommended that, in the best interests of all concerned, all amateurs should abide by it. Secondly, the smaller bandwidth of a c.w. signal is offset by the much greater number of stations using c.w. than those using telephony; if in fact the bandwidth allocated exclusively to c.w. had been excessive, the Plan would not have had the success which has undoubtedly attended it during the post-war years. Thirdly, although c.w. stations are, under the Plan, entitled to the use of frequencies at the h.f. end of all bands from 7 Mc/s upwards, it is in fact almost impossible for a c.w. contact to take place when these parts of the bands are fully occupied by stations using telephony. (I suggest that Mr. Ballinger should try it sometime.)

It may well be that in view of the coming loss of one-third of one of the most crowded bands, some reduction of the exclusive c.w. portion of that band may be necessary, but it is to be hoped that before this takes place the R.S.G.B. will have consulted the other European National Societies and that an agreement will be reached by which all will abide. As, during the coming sunspot minimum, 7 Mc/s may well be our main c.w. DX band, it is to be hoped that there are not too many " odd men out " who, like Mr. Ballinger, will act with a selfish cynicism and disregard for the conventions adhered to by the great majority of amateurs.

This state of affairs, in which it is apparently to be maintained that " they are all out of step but Mr. Ballinger," is perhaps an inevitable result of the abolition of the c.w. probationary period which I have always felt was a great mistake. The re-imposition, even now, of this condition would at least ensure that all amateurs, as well as having the 12 w.p.m. Morse qualification, had a knowledge of working conditions at the " c.w. end " of our bands.

In conclusion, may I add that I use c.w. and telephony in approximately equal proportions, and so have no personal axe to grind in this matter. This letter is prompted solely by a desire to prevent a state of anarchy arising on the amateur bands.

Yours faithfully,

Bromley, Kent. WILLIAM H. BORLAND (G3EFS).

Talk Power

DEAR SIR,—Though perhaps it might come better from an active s.s.b. operator, I would like to put forward a treatment of the " talk power " problem which avoids most of the pitfalls which G3PL has mentioned and stepped into. The question of sideband power is always confusing, particularly when the word " peak " appears and I must point out to Mr. Dunn that the power in each sideband in his example is in fact 25 watts, not 50 watts as he suggests. A sideband of an amplitude modulated signal is a continuous r.f. signal in its own right, and assuming simple sine wave modulation, consists of a single frequency of constant amplitude through " thick and thin " of the envelope of the overall modulated signal. The idea of " peak sideband power " has no meaning as it confuses the two alternative ways of looking at an a.m. signal.

An alternative approach avoids all these arguments. Consider the i.f. voltage appearing at the detector diode of a receiver tuned to an a.m. signal, and let us suppose that in the absence of modulation a carrier of 1 volt amplitude appears. If now the transmitted signal is amplitude modulated 100 per cent by an audio frequency sine wave, the amplitude at the diode will vary between 0 and 2 volts. The diode will rectify this and give us, let us say, 2 volts peak-to-peak audio output.

Suppose now that the transmitting operator switches over to s.s.b. and adjusts his rig to give the same peak power in the aerial as before. He will apply an audio tone to his input and adjust gain and matching in such a way that the peak voltage on his aerial is the same as before. This will naturally lead to the same i.f. voltage in the receiver as the previous maximum, that is 2 volts. Without local carrier injection this is useless to us as the diode will merely rectify it to 2 volts of d.c. However, if we inject a local carrier of some higher voltage, say 5 volts, preferably at the same frequency as the suppressed carrier of the transmisson, we find that at some instants the two voltages are in phase and will add voltage-wise, giving 7 volts, while at other times they tend to cancel, giving 5 minus 2, or 3 volts. Rectified by the diode this leads to an audio output of 7 minus 3, equals 4 volts peak-to-peak.

Thus, the change from 100 per cent a.m. to s.s.b. of the same peak power has doubled the audio output voltage from the detector diode, that is an increase of 6db. We can improve the signal-to-noise ratio even further by reducing the bandwidth of the receiver. There is no energy present in the band previously occupied by the southpaw sideband of the a.m. signal, so we can cut this half of the receiver bandwidth out, thus halving (at least) the receiver bandwidth. This halves the received noise power, resulting in 3db improvement in signal-to-noise ratio.

The total theoretical advantage in signal-to-noise ratio is thus

clearly (I hope) seen to be 9db, as often previously stated by others. The practical advantage obtained in conditions of QRM is a somewhat different question and I rather think that a satisfactory answer can only be given on some sort of statistical basis. The true friend of the earnest amateur is still, of course, an honest c.w. signal.

Yours sincerely,

Brentwood, Essex. S. N. RADCLIFFE (G3GZB).

DEAR SIR,—In his letter in the November 1960 BULLETIN, Mr. E. M. Wagner (G3BID) gives convincing evidence of the improved effectiveness of the s.s.b. system of reception rather than attacking or discrediting it as he set out to do. G3BID appears to have missed the point. In both instances in the example he quotes, he is using the s.s.b. technique of reception and therefore will get the same result on both the a.m. signal and the s.s.b. or i.s.b. signal. It is not a matter of the type of signal being received but rather the type of receiving technique in use. A similar advantage of switching sidebands is also available on s.s.b. and i.s.b. systems provided the s.s.b. transmitter has that facility incorporated in it.

The improvement, expressed in db or in any other way, of the s.s.b. or i.s.b. technique of generating or producing sideband power over the a.m. technique is factual and definite. However, the advantages or improvement of the s.s.b. or i.s.b. system of communication over that of an a.m. system depend to some extent on the propagation and interference conditions.

The improvement here is related to the amount that the a.m. total radiated power has to be increased in order to produce the same communication function with the same quality of reproduction of the intelligence at the distant end having the same minimum degree of distortion or errors, regardless of the form of the intelligence being communicated—audio, facsimile, high-speed telegraphy, etc. This improvement has been quoted at times to be of the order of 12 to 16 db.

Yours faithfully,

ARTHUR TIBBITS (VP3MC).

Demerara, British Guiana.

DEAR SIR,—The correspondence columns of the BULLETIN have in recent months been given over a great deal to letters from s.s.b. enthusiasts. Most of them seem to be trying to prove that the sounds that seem to be a cross between Donald Duck and the bath water running away are really much more efficient than a.m. May I suggest that if their interest is in efficiency then the most efficient system of all to use is Morse or as some prefer to call it c.w.?

Please can any of the users of s.s.b. tell me why they are all ashamed of their call-signs?

Yours faithfully,

Welling, Kent. CLIFFORD J. LEAL (G3ISX).

S.S.B. Transmitter Design—Triple Frequency Conversion

DEAR SIR,—I should like to express my appreciation of the excellent articles on single sideband contributed to the BULLETIN by Mr. Thornley. It is certain that many would-be constructors of s.s.b. equipment have lost their temerity and ventured into this new field of amateur activity solely as a result of Mr. Thornley's persuasion and his undoubted ability to " sell " this mode of operation. However, in his January 1961 *Single Sideband* column, when discussing the new Hammarlund HX-500 transmitter, he goes so far as to suggest that triple frequency conversion represents the ultimate in s.s.b. transmitter design. I agree that building up from a basic 3·5 Mc/s exciter is the wrong way to get to the h.f. bands, and to the newcomer to the art suggest the use of high frequency crystal filters. A filter designed around surplus crystals etched up to 9 Mc/s can provide satisfactory s.s.b. signals on both 3·5 and 14 Mc/s when used with a v.f.o. in the 5 to 5·5 Mc/s range. Single conversion simplifies construction and is less likely to produce unwanted harmonics and spurious beats.

The 3·5 and 14 Mc/s bands carry most of the world's s.s.b. traffic and the building of a complicated and expensive all band transmitter can hardly be justified, especially when one considers the rapidly approaching sun spot minima. To would-be constructors of all band triple conversion s.s.b. transmitters I would say " think again before embarking upon such a venture."

I have no wish to cross swords with the protagonists in the " talk power " argument, but I cannot resist adding that I would not swap my 60 watts of s.s.b. for any a.m. rig rated under ¼ kW!

Yours faithfully,

St. Leonards-on-Sea, Sussex. JOHN D. HEYS (G3BDQ).

The DXCC Certificate

DEAR SIR,—Even those operators whose interest in working DX is of a very ephemeral nature are beginning to realize by now that the respect with which the A.R.R.L. DXCC Certificate was for many years regarded, has in recent years lessened to a very great extent. It may be argued that in these enlightened times it is much more easy to produce evidence of contacts with 100 (or more) countries than in years gone by and that this is the cause of the malaise. There may be a certain amount of common sense in this, but it is certainly not the main reason for this sad state of affairs.

For some time now, the manner in which " countries " have been made, unmade, and remade by the A.R.R.L. has been bordering on the ridiculous. One cannot help wondering whether this is merely making a change purely for the sake of maintaining competitive interest in the DXCC or whether it is also a matter of good business principles.

However, we must realize that this is predominantly an A.R.R.L. affair and it is not altogether unnatural that rules be made which favour the U.S. amateur. So that if one line of argument as to what is and what is not a " country " applies in the Caribbean and does not apply in the Mediterranean, we should not be too put out. Nevertheless it does raise questions as to whether there would be sufficient world-wide support for a certificate of a similar category in which the rule making was conducted in a more responsible manner, and which, by its very objectiveness, would preclude a most favoured nation bias.

In this connection I would like to suggest that the R.S.G.B. has a part to play, and I feel that few would dispute that moral support from amateurs everywhere would be forthcoming.

Yours faithfully,

Cheltenham, Glos. C. F. ATKINS (G3HCV).

Christmas Island

DEAR SIR,—In the article on Amateur Radio activity from Christmas Island in the January BULLETIN I notice that it is stated that the first activity was in September 1959. This does not seem to be correct as I had a number of QSOs with VR3F (Jack Elliott) early in 1957. The first was on February 28, and in all we had nine first class phone contacts on 14,320 kc/s. Reports on my signals were consistently RS58/9, and his were RS56 (I have a QSL confirming the first QSO).

During the same period VR3G was active and I had two QSOs with him. I don't think that VR3F contacted many G's although a number used to call him. His signals used to be audible for about 20 minutes to half an hour just after 08.00 G.M.T. He closed down when the gear was required for more important work and although he was trying to get something else sent out from Hawaii I didn't hear from him again. The last contact was on March 17, 1957.

Yours faithfully,

Cheltenham, Glos. L. W. LEWIS (G8ML).

Traffic Handling

DEAR SIR,—I have read with interest the correspondence on the above subject, the more so because during the last 22 years I have had considerable traffic handling experience on service and civilian circuits using W.T., Teleprinters and R.T.

May I first put my old friend Arnold Matthews " back on beam "? The teleprinter is a useful and elegant means of handling traffic over fixed and proven circuits provided the necessary test equipment and highly skilled maintenance technicians are available but no one who has had experience of mobile radio-teleprinter equipment would ever consider it for use in emergency conditions where speed in setting up is vital. If high priority traffic has to be handled during an emergency period, resort is made to hand speed Morse. The setting up period may last from hours to days. In this connection it is interesting to note that certain non-amateur organizations, with the most extensive technical facilities, consider that it may take as long as *ten days* to get a long distance radio teleprinter link on new frequencies working at normal traffic capacity—and this between superbly equipped fixed stations.

In my own experience if a mobile communications party, equipped with a variety of equipment, moves on to a strange site

with instructions to provide communication to a second site, say 75 miles away, the order in which communication is established is almost invariably as follows:

(i) H.f. wireless circuits within minutes—providing the operators are skilled in the use of both W.T. and R.T. and are ready to use whichever mode is most suitable for the prevailing conditions.

(ii) V.h.f. telephone channels in anything from 20 minutes to several hours, depending upon terrain, " the cussedness of inanimate objects " and various other factors. (Remember that usually the h.f. operators can pull up anywhere; the v.h.f. operators often have to find a hill and carry stuff up it.)

(iii) Teleprinters over the v.h.f. circuits—usually several hours.

(iv) H.f. teleprinter circuits last of all.

During the setting up period the v.h.f. and h.f. teleprinter personnel use the h.f. quite a lot for " speaker circuit " messages in connection with their equipment and even the most biased of them admit that without " old fashioned " h.f. wireless it would take them a lot longer to get set up—also that a great deal of urgent traffic would be delayed if the h.f. facilities did not exist.

From the above I would say that if our longer distance amateur emergency communication is to be at maximum efficiency it should involve a nation-wide h.f. telegraphy net and that this net will only be fully efficient if its members have a chance to handle " live " traffic regularly. At the moment, for reasons which I personally cannot understand, the large number of highly skilled amateur Morse operators who still exist in this country seem to be completely and deliberately debarred from using their skill in connection with R.A.E.N. communications, even though, in this area at least, it has been offered on several occasions during the last few years. The fact that at the moment the authorities do not see the value of such a net should not be taken as an excuse. Authority did not foresee the East Coast floods nor, for many years, the need for R.A.E.N. at all. So, let us have a national c.w. traffic net, normally handling unpaid social traffic but ready to swing into operation behind R.A.E.N. in time of emergency. Such an organization cannot but react to the good of the movement as a whole.

Yours faithfully,

Wirral, Cheshire. ANGUS D. TAYLOR (GW8PG).

R.A.E.N. Notes and News

BY E. ARNOLD MATTHEWS (G3FZW) *

" IT is significant that with the introduction of R.A.E.N. into the county more Dorset hams are getting to know one another than ever happened before," writes G2HCD, the county controller, in his latest report.

This column frequently refers to the value of R.A.E.N. to other bodies, and to Amateur Radio in general, and sometimes overlooks the value to the local communities of amateurs. One often hears of local radio societies which exist for long periods with little or no contact with their neighbours. The competitive side of the art, conducted individually or on a team basis, is not noted for any great contribution towards drawing local societies together. R.A.E.N., however, cannot exist without mutual help amongst amateurs, and as groups grow they will necessarily bring closer co-operation to individuals and societies. This will be of a long-term nature.

Mobile rallies, now attended by very many R.A.E.N. members, can provide a useful starting-point for initial contacts between R.A.E.N. groups and neighbouring societies, and groups should explore the possibilities of arranging for the setting up of information stands at such events. Organizers are usually very willing to provide facilities. The North Midlands Rally, for instance, goes out of its way to invite R.A.E.N. participation each year and the Network will be officially represented again this year.

Around the Groups

The **Birmingham** group will be participating in a large scale exercise in Coventry on April 9, and will be assisted by local members from C.A.R.S., Courtaulds R.S., Coventry R.S.G.B. Group, and **Rugby** R.A.E.N. An external link to **Leicester** has been called for, so it seems that the three groups will once more be operating together in an area not unfamiliar to them.

G3BA, the Birmingham v.h.f. officer, is at present considering the development of a lightweight portable transmitter/receiver. At first sight, there are considerable advantages to be gained from the choice of 10m for such equipment, as a very simple design may be used. But the use is immediately restricted since few /Ms in the district operate on that band, and it is very probable that suitable 2m gear, although a little more complex, will have much greater appeal.

Dorset have been investigating propagation conditions around their coastal cliffs using a /P on beaches linked to fixed stations round the county by a /M nearby on the cliff-top. The group participated in B.R.C.S. Exercise " Bob " at Shillingstone with two /Ms, a /P and several fixed stations. They have many S.W.L.s, who are proving very valuable, but more mobile and portable stations are wanted. The C.C., G2HCD, has held further meetings with St.J.A.B. and B.R.C.S. representatives, and expects that more exercises will be held.

The newly-formed **Manchester** Group is proceeding with recruiting and organization and applications for membership are coming in well.

The Surrey/Hampshire border problem has now been solved by the formation of the **West Surrey** Group, which is to be led by G3OJY. Active liaison between the Surrey group and Hampshire will be facilitated as G3OJY nets into both groups' schedules. He is also preparing for RTTY work.

G3IIR, **London** (B.R.C.S. HQ) A.C. is now operational on 2m with RTTY, but has so far found no one he can work by this mode; we are hoping that this state of affairs will soon be rectified!

Lincolnshire and **Norfolk** members recently gave a small demonstration of Amateur Radio to local Coastguards, who showed much interest.

* *1 Shortbutts Lane, Lichfield, Staffs.*

R.S.G.B. Amateur Radio Call Book Correction List No. 1

THE following are corrections to the 1961 edition of the *Call Book:*

G2CVO *F.* H. Osborn, 13 Mount Echo Drive, London, E.4.
G2DRL *S/Ldr.* S. F. *B*ettinson, Officers' Mess, Royal Aircraft Establishment, Farnborough, Hants.
G3CVX J. B. Taylor, *25* Old Fallings Lane, Wolverhampton, Staffs.
G3EIW R. L. Halls, 46 High Street, Wells, Som.
G3ESY P. W. F. Jones, 94 *Holme Lacy* Road, Hereford.
G3GRA C. J. Spencer, 11 Deerswood Road, West Green, Crawley, *Sussex.*
G3IZI D. I. G. Jones, 43 Bromyard Road, St. Johns, Worcester.
G3KZX Cancel—now GW3KZX.
G3MZK D. Kitson, 20 *Wolfreton* Road, Anlaby, Hull, Yorks.
G3NMR M. Margolis, *95* Collinwood Gardens, Ilford, Essex.
G3NXP D. V. Flannery, 32 Mob Lane, High Heath, Pelsall, Walsall, Staffs.
G3NXV H. Jennings, 12 Dark Lane, Hollywood, *Nr. Birmingham, Worcester.*
G3ODF J. Clarges, *4* Upton Road, Hounslow, Middx.
G3ODK N. K. Mort, *28* Willow Crescent, Ribbleton, Preston, Lancs.
G3ODS J. W. *Swain,* 192 Grange Road, Ilford, Essex.
G3OGE J. Rose, 63 *Broomfield* Road, Beckenham, Kent.
G3OHM R. H. Jennings, o/b/o South Birmingham Radio Society, 12 Dark Lane, Hollywood, *Nr. Birmingham, Worcester.*
G3OID R. D. Josephy, 8 *Weet*wood Park Drive, Leeds 16.
G3OIK A. J. Thornbory, Trood House Hotel, Alphington, Exeter.
G3OLE C. E. J. Parker, *65* Granville Road, London, N.22.
G3OLH A. A. Remsbury, 64 Bridge Way, Whitton, Twickenham, Middlesex.
G5BM F. H. Watts, *60* Maidenhall Estate, Highnam, Gloucester.
G8DG K. G. Howell (via R.S.G.B.).
G8DT F. N. Bedwell, *18 Newcourt Park, Charlton Kings,* Cheltenham, Glos.
GM3*OEV* (not GM3EOV), R. J. F. Milton, 5 Salmond Street, R.A.F. Kinloss, Forres, Morayshire.
GM4GK J. C. Imrie, *Red Roofs, Markinch,* Fife, Scotland.

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the 18th of the month preceding publication. T.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 in the style used below. Standing instructions for more than three months ahead cannot be accepted.

DATES FOR YOUR DIARY

March 24.—Lecture Meeting at I.E.E., London. Speaker: N. A. S. Fitch (G3FPK).
April 7.—R.A.O.T.A. Reunion, London.
April 23.—Region 1 O.R.M. at Blackpool.
April 30.—Region 3 O.R.M. at Trentham Gardens.
April 30.—North Midlands Mobile Rally, Trentham Gardens.
May 7.—Cheltenham Mobile Rally.
May 7.—Mid-Surrey Mobile Rally.
May 7.—Thanet Mobile Rally, Cliffsend, Ramsgate.
May 13.—Region 13 O.R.M. at Edinburgh.
May 14.—Grimsby A.R.S. Hamfest at Cleethorpes.
May 27.—International V.H.F./U.H.F. Convention, London.
May 28.—Northern Mobile Radio Rally.
May 28.—Southern Counties Mobile Rally.
June 18.—A.R.M.S. Rally at Barford St. John, near Banbury.
June 25.—Longleat Mobile Rally.
July 7-8.—South Birmingham Mobile Event.
July 8-9.—South Birmingham Night Rally.
July 9.—South Shields Mobile Rally.
August 12-13.—Derby Mobile Rally and Hamfest.
August 23-September 2.—National Radio and Television Show, London.
September 3.—G6UT's "Ham Party."
September 10.—Region 11 O.R.M. at Prestatyn.
September 10.—National Mobile Rally at Woburn Abbey.
September 16.—Region 10 O.R.M. at Cardiff.
September 17.—Lincoln Mobile Rally and Hamfest.
October 21-22.—Scout Jamboree-on-the-Air.
November 22-25.—R.S.G.B. International Radio Hobbies Exhibition, London.

REGION 1

Ainsdale (A.R.C.).—Wednesdays, 8 p.m., 37 Hawthorne Grove, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.
Blackpool (B. & F.A.R.S.).—Tuesdays, 8 p.m., Squires Gate Holiday Camp.
Bury (B.R.S.).—April 11 ("My first 18 months," by G3NNW), 8 p.m., The George Hotel, Kay Gardens.
Chester.—Tuesdays, 8 p.m., Y.M.C.A.
Crosby.—Tuesdays, 8.30 p.m., Colonsay, Crosby Road South, Waterloo.
Liverpool (L. & D.A.R.S.).—Tuesdays, 8 p.m., Gladstone Mission Hall, Queens Drive, Stoneycroft.
Macclesfield.—March 21, April 4, 18, 42 Jordangate.
Manchester (M. & D.A.R.S.).—Wednesdays, 7.30 p.m., King George VI Club, North Road, Moston, Manchester, 10. **(S.M.R.C.)** Fridays, 7.30 p.m., Ladybarn House, Mauldeth Road, Fallowfield.
Morecambe.—April 5, 125 Regent Road.
Preston (P.A.R.S.).—March 28, April 11, 25, St. Paul's School, Pole Street.
Southport (S.R.S.).—Thursdays, 8 p.m., The Esplanade.
Stockport (S.R.S.).—March 15, 29, April 12, 26, 8 p.m. The Blossoms Hotel, Buxton Road.
Wirral (W.A.R.S.).—March 15, April 5, 19, The Castle Hotel, Ivy Street, Birkenhead.

REGION 2

Barnsley.—March 24 ("The Human Machine as a Radio Operator," recorded lecture), April 14 ("S.s.b. Crystal Filters," by H. H. Eyre, G5KM), King George Hotel, Peel Street.
Bradford (B.A.R.S.).—March 28 (A.G.M.), April 11 (N.F.D. Arrangements), April 25 (Junk Sale), 7.30 p.m., Cambridge House, 66 Little Horton Lane, Bradford 5.
Halifax.—April 4 ("Efficiency Modulation," by G3ADG), April 18 (Informal), May 2 (A.G.M.), Sportsman Inn, Ogden.
Leeds (L.A.R.S.).—March 15 (Transmitting Evening), March 22 ("Radar Systems Illustrated," by M. Scargill), April 12 ("Mobile Equipment," by H. Brooks, G3GJV), April 19 (Film Show), 7.30 p.m., Swarthmore Education Centre, 3 Woodhouse Square, Leeds 3.
Scarborough (S.A.R.S.).—Thursdays, 7.30 p.m., Chapman's Yard, North Street, Scarborough.

REGION 3

Birmingham (Bournville).—March 24 ("Aerials" by G3GHB and G3OMG), April 7 ("Brains Trust" and Discussion), 7.30 p.m., Deputy Staff Lounge, Cadbury Bros., Bournville. **(M.A.R.S.).**—March 21, April 6, Midland Institute, Paradise Street, Birmingham. **(Slade).**—March 24 ("My Visit to Moscow"), 7.45 p.m., The Church House, High Street, Erdington, March 26, Informal D/F Test. **(South).**—March 16 (Junk Sale), 7.30 p.m., Friends Meeting House, Moseley Road, Birmingham, March 20, 8.30 p.m., Club Night on the Air (1·8 Mc/s), March 21, "999" Visit, Newton Street, Birmingham.
Cannock.—April 6, 7.30 p.m., Bridgetown Inn, Walsall Road, Cannock.
Coventry (C.A.R.S.).—March 20, 27, 7.30 p.m., 9 Queens Road, Coventry.
Stoke-on-Trent (A.R.S.).—March 23 (Junk Sale), April 6 (A.G.M.), 7.30 p.m., rear of Cottage Inn, London Road, Oak Hills, Stoke-on-Trent.
Stourbridge.—April 4, 8 p.m., Foley Cottage, Stourbridge.
Stratford-upon-Avon (S.R.C.).—March 17 (Club Night), March 24 ("R.A.E. Transmission Lines,") April 7 (Club Night), 14 (R.A.E. "Aerials,") 7.30 p.m., Birds Commercial Motors, Birmingham Road, Stratford.
Sutton Coldfield. — March 23 ("Tape Recorders"), 7.30 p.m., Conservative Committee Rooms, 92 The Parade, Sutton Coldfield.
Wolverhampton.—March 20 ("V.H.F. Techniques" by G3KPT), March 27, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Derby (D. & D.A.R.S.).—March 22 (Visit to Burton Radio Club), March 29 (Open Night—Committee), April 5 (Surplus Sale), April 12 (Visit to Midland Clock Works), 7.30 p.m., Room No. 4, 119 Green Lane, Derby. **(Derby S.W. Exp. Soc.).**—Fridays, 7.30 p.m., Sundays, 10.30 a.m., Nunsfield House, Boulton Lane, Alvaston, Derby.
Grimsby (A.R.S.).—March 30, April 13, 8 p.m., R.A.F.A. Headquarters, Abbey Drive West, Grimsby.
Leicester (L.R.S.).—Mondays, 7.30 p.m. (Morse Tuition, 7.30-8.30 p.m.), Club Rooms, Old Hall Farm, Braunstone Lane, Leicester.
Lincoln (L.S.W.C.).—March 29 (Visit to Ruston & Hornsby Research Establishment), 7.30 p.m., Room No. 19, Technical College, Cathedral Street, Lincoln.
Melton Mowbray (A.R.C.).—March 30 (Shack Visit and General Discussion), 7.30 p.m., H. Hunt (G3FUM), 21 Highfield Avenue, Melton Mowbray.
Newark (Magnus G.S.).—March 17 (Practical), March 21 (A.G.M.), March 24 (Demonstration—Electronic Instruments), March 28 ("Aerials," by C. Crisp, G3ELJ), Junior Physics Lab.
Newark (N. & D.A.R.S.).—March 28 ("A Transistor Receiver for 208m"), 7.30 p.m., Northgate House, Newark.
Northampton (N.S.W.R.C.).—Thursdays, 7 p.m., Allen's Pram Works, Duke Street, Northampton.
Nottingham (A.R.C.).—March 21 (R.S.G.B. Members' Night), March 28 (Recorded Lecture on Receivers), April 4 (Open Night), April 11 (A.G.M.), 7.30 p.m., Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham.
Peterborough (P. & D.A.R.S.).—April 7 ("Aerials"), 7 p.m., Peterborough Technical College.
Retford & Worksop (N.N.R.S.).—Tuesdays (Construction & Beginners), Thursdays, 7.30 p.m., Club Rooms, Victoria Hall, Eastgate, Worksop, Notts.
Wellingborough (W.R.C.).—March 23 (Open), March 30 ("An Introduction to Carrier Telephony" by F. Whitlock, G.P.O. Eng. Dept.), April 6 (Open), April 13 (Talk by M. Robins), 7.30 p.m., Silver Street Club Room, above W.I.C.S. Fruit Shop.

REGION 5

Bedford.—March 23 ("Using Transistors in Communications Equipment," by Texas Instruments Ltd.), 8 p.m., Committee Room, Town Hall. Fridays, T.A. Centre, Ashburnham Road, Bedford.
Cambridge (C. & D. A.R.C.).—March 24 (A.G.M.), 7.30 p.m., "Jolly Waterman," Chesterton Road, Cambridge.

REGION 6

Cheltenham.—Thursdays, 8 p.m., Great Western Hotel, Clarence Street.
High Wycombe (Chiltern A.R.C.).—March 30, 8 p.m., British Legion Hall, St. Mary Street, High Wycombe.
Stroud.—Wednesdays, 8 p.m., Subscription Rooms, Stroud.

REGION 7

Acton, Brentford and Chiswick.—March 21 (Recorded talk on "Receivers"), 7.30 p.m., A.E.U. Rooms, 66 High Road, Chiswick.
Barnet (B. & D.R.C.).—March 28 ("Aerials," by R. C. Hills, G3HRH), April 28 ("D/F Gear," by H. W. Pope, G3HT), 8 p.m., Red Lion Hotel, Barnet.
Bexleyheath (N.K.R.S.).—March 23, April 13, 8 p.m., Congregational Hall, Bexleyheath (nr. Clock Tower).
Croydon (S.R.C.C.).—April 11, 7.30 p.m., "Blacksmiths Arms," South End, Croydon.
Dorking (D. & D.R.S.).—Second and fourth Tuesday in each month, 8 p.m., Star and Garter Hotel, Dorking.
Ealing.—Sundays, 11 a.m., A.B.C. Restaurant, Ealing Broadway, W.5.
East Ham.—March 21 and fortnightly, 8 p.m., 12 Leigh Road, East Ham.
East London.—April 9 (Mullard Films on Transistors), 3 p.m., The Lambourne Rooms, Town Hall, Ilford, Essex.
East Molesey (T.V.A.R.T.S.).—April 5, 8 p.m., Carnarvon Castle Hotel, Hampton Court.
Enfield and District.—March 23 ("H.F. Transistors," by D. E. A. Harvey), 7.30 p.m., George Spicer School, Southbury Road, Enfield.
Guildford (G. & D.R.S.).—March 16, 24 ("Transistorized HRO" by H. C. Spencer, G6NA), April 13, 7.30 p.m., City Café, Onslow Street, Guildford.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road,

at 12.30 p.m. on Friday, March 17, April 21 and May 19, 1961

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

Harlow and District.—Tuesdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow.
Holloway (G.R.S.).—Mondays, Tuesdays and Wednesdays (R.A.E. and Morse), 7 p.m., Fridays (Club), 7.30 p.m., Montem School, Hornsey Road, Holloway, N.7, March 17, 8.30 p.m. ("TW Mobile Gear," by T. Withers, G3HGE). (No meetings March 25/April 9).

(Continued on page 441)

Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (near Seven Kings Station).

Kingston.—Lectures alternate Thursdays, Theory and Morse Classes weekly, 7.45 p.m., Y.M.C.A., Eden Street, Kingston. (Morse at 2 Sunray Avenue, Tolworth). March 23 (Surplus Sale).

Mitcham (M. & D.R.S.).—March 24 (" Beam Aerials," by G. A. Bird, G4ZU), April 7 (Junk Sale), April 21 (N.F.D. Arrangements), 8 p.m., " The Cannons," Madeira Road, Mitcham.

New Cross (C.A.R.S.).—Fridays, 7.30 p.m., Sundays 11.30 a.m., Wednesdays (Morse Practice), 8 p.m. March 24 (" Demonstration of K.W. Electronics Products " by G8KW), 225 New Cross Road, London, S.E.14.

Norwood and South London (C.P. & D.R.C.).—March 18 (Quiz Contest with Clifton Amateur Radio Society), April 15 (" RTTY for the Beginner " by E. W. Yeomanson, G3IIR), 8 p.m., Windermere House Annexe, Westow Street, Crystal Palace. April 4, 8 p.m., Morse Class at G3FZL.

Paddington (P. & D.A.R.S.).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, W.2.

Romford (R. & D.R.S.).—Tuesdays, 8.15 p.m., R.A.F.A. House, 18 Carlton Road, Romford.

South Kensington (C.S.R.S.).—March 21 (Films and recorded lecture " Hints on Mobile Operation "), 6 p.m., Science Museum, South Kensington.

Sutton and Cheam (S. & C.R.S.).—March 21 (" Aircraft Radio "), " The Harrow," High Street, Cheam.

Welwyn Garden City.—April 13 (" Transistors," by B. C. Jones, Murphy Radio Ltd.), 8 p.m., Television School, Murphy Radio Ltd., Bessemer Road.

REGION 8

Crawley (C.A.R.C.).—March 22 (" Electronic Music," by L. H. Thomas, M.B.E., G6QB), 7.30 p.m., West Green Centre. April 26 (Informal), for venue contact G3FRV.

Tunbridge Wells (W.K.A.R.S.).—March 24 (N.F.D. Plans), April 14 (A.G.M. and Competition), 7.30 p.m., Kent County Council Adult Centre, Culverden House, Culverden Park Road, Tunbridge Wells. April 5-8, live station at Tunbridge Wells Hobbies Exhibition.

REGION 9

Bath.—April 17, 7.30 p.m., Committee Room, Bath Technical College.

Bideford.—First Thursday in each month, 7.30 p.m., alternately at T. G. Ward (G2FKO), 38 Clovelly Road ('phone: Bideford 964) and D. H. Jones (G3BO), Rosebank, Westcombe ('phone: Bideford 550).

Bristol.—March 17 (" Electronics without Tears," by E. C. Halliday, G3JMY), 7.15 p.m., Carwardines Restaurant, Baldwin Street, Bristol 1.

Exeter.—Second Thursday in each month, 8 p.m., Y.M.C.A., St. David's Hill, Exeter.

Falmouth.—First Wednesday in each month, Y.M.C.A., Falmouth.

Plymouth (P.R.C.).—Tuesdays, 7.30 p.m., Virginia House Settlement, St. Andrew's Cross. April 18, Judging of entries for the " Ernie Hillyard Trophy."

Torquay (T.A.R.S.).—Second Saturday in each month, 7.30 p.m., Y.M.C.A., The Castle, Torquay.

Weston-super-Mare.—First Tuesday in each month, 7.15 p.m., Technical College, Lower Church Road, Weston-super-Mare.

Yeovil (Y.A.R.C.).—Wednesdays, 7.30 p.m., Grove House, Preston Road, Yeovil.

REGION 10

Cardiff.—April 10 (Junk Sale and " Tips on Conversions "), 7.30 p.m., T.A. Centre, Park Street, Cardiff.

Penarth.—March 27 (" Some Ideas for the Microwave Bands," by B.R.S.21476), April 24 (" Aerials "), 7.30 p.m., R.A.F.A. Club, Windsor Road, Penarth.

REGION 11

Prestatyn (F.R.S.).—March 27 (" Introduction to Transistors," by J. Lawrence, GW3JGA/T), 7.30 p.m., Bee Hotel, Rhyl (next to railway station).

REGION 13

Edinburgh (L.R.S.).—March 23 (" Auroral Effects on Two Metres," by W. Ferrier, GM3BDA), April 13 (N.F.D. Preparations), 7.30 p.m., Y.M.C.A., 14 St. Andrew Street, Edinburgh 2.

REGION 14

Glasgow.—Second Friday in each month, 7.30 p.m., Woodside Halls, Clarendon Street, N.W. (near St. Georges's Cross Underground).

Prestwick.—Third Sunday in each month, 7.15 p.m., Royal Hotel, Prestwick.

REGION 16

Chelmsford.—First Tuesday in each month, 7.30 p.m., Marconi College, Arbour Lane.

Norwich.—Second Friday in each month, 8 p.m., " Golden Lion," St. John Maddermarket (near City Hall), Norwich. **(N. & D.R.C.).**—Fridays, 8 p.m., " Gold Lion," St. John Maddermarket.

REGION 17

Portsmouth.—Tuesdays, 7.30 p.m., Scarrs, 183A Albert Road.

Southampton.—First Saturday in each month, 7 p.m., Prospect House (back of Gas Board showrooms), Above Bar.

Regional and Club News

Acton, Brentford and Chiswick Radio Club.—The club transmitter has been modified for c.w. and phone operation and is on the air at the Headquarters, A.E.U. Rooms, 66 High Road, Chiswick, W.4, during the first Tuesday evening in each month. Morse classes are held on the same evening. Prospective members will be most welcome. *Hon. Secretary:* W. G. Dyer (G3GEH), 188 Gunnersbury Avenue, Acton, London, W.3.

Bristol.—About 60 members and visitors were present at the February meeting when a talk on " Building the G2DAF Single Sideband Transmitter " was given by W. P. Lewis (G3IFV). The M.A.R.S. Trophy, won for the second year by the Bristol Group, was presented by Tom Douglas (G3BA), the President of the Midland Amateur Radio Society, who made the journey from Sutton Coldfield for the occasion. A visit to Gloucestershire Police Information Room at Cheltenham has been arranged for March 26 at 3 p.m. Members who would like to attend and who have transport available are asked to contact the *Hon. Secretary:* R. L. Shaddick, 2 Shanklin Drive, Filton, Bristol. (Phone 693600).

Old-timers Jack Rushton (G2JZ) and Howard Littley (G2NV) at the recent Midland Institute Annual Conversazione in Birmingham, a feature of which was an exhibit entitled " Fifty Years of Amateur Radio," arranged by Midland Amateur Radio Society.

Caithness Amateur Radio Society.—This newly-formed society meets each month, the next meeting being on March 21. Prospective members may obtain further information from the *Hon. Secretary:* W. N. Hardie (GM3NQB), 24 Brownhill Road, Thurso, Caithness.

Cardiff.—Recent activities have included a discussion on aerials for N.F.D., a demonstration of Hallicrafters equipment by James Scott Ltd. of Glasgow, and a recorded lecture by Bob Ford (AC3SS, AC4RF) on Tibet. Meetings are held at the Territorial Army H.Q., Park Street, Cardiff, at 7.30 p.m. on the second Monday in each month.

Cornish Radio and Television Club.—There was an attendance of 35 at the February meeting in Redruth when G3NVJ gave a talk on the South Western Electricity Board's transmission system. *Hon. Secretary:* W. J. Gilbert, 7 Poltair Road, Penryn, Cornwall.

Cheltenham.—Attendance at the A.G.M. was disappointing in spite of circulars and notices on GB2RS. It is hoped that this does not imply lack of support for the O.R.M., one of the subjects discussed. Support is very good for the R.A.E.N. 2m construction programme, from as far afield as Worcester and Malvern. The annual Mobile Rally is to be held on May 7 at Montpellier Gardens. *Town Representative:* J. J. Yeend (G3CGD), 30 St. Luke's Road, Cheltenham.

Clifton Amateur Radio Society.—The RA17 receiver was described and demonstrated by Racal Engineering in January. Other recent activities have included a successful Junk Sale. On March 18 members are visiting Crystal Palace and District A.R.S. for an inter-club quiz. The return match will be on April 7. *Hon. Secretary:* C. H. Bullivant (G3DIC), 25 St. Fillans Road, London, S.E.6.

Crawley Amateur Radio Club.—The Annual Dinner was a great success when visitors from Reigate were amongst those present. Meetings are now held at the West Green Community Centre on the *fourth Wednesday* in each month. Informal meetings are held at the homes of members on the second Wednesday. On March 22, L. H. Thomas, M.B.E. (G6QB) will give a talk on " Elec-

There was an attendance of more than 90 at Glasgow Group's Dinner in December, 1960. In this picture, the T.R., A. Barnes (GM3LTB) is speaking with the Hon. Treasurer, R. H. Pollock (GM3JRP) on his left, and T. P. Hughes (GM3EDZ), a former T.R., on his right.

tronic Music." *Hon. Secretary:* R. G. B. Vaughan (G3FRV), 9 Hawkins Road, Tilgate, Crawley.

Crystal Palace and District Radio Club.—At the A.G.M. on February 18, the following were elected: *Chairman*—D. Deacon (G3BCM); *Hon. Treasurer*—F. H. Lawrence (G2LW); *Hon. Secretary*—G. M. C. Stone (G3FZL), 10 Liphook Crescent, Forest Hill, London, S.E.23. *Committee Member*—G. Gaunt (B.R.S.19261). An interclub exchange quiz versus the Clifton A.R.S. is to be held at Windermere House Annexe on March 18 (see *Forthcoming Events*) and at Clifton A.R.S. on April 7. The " Dulwich and New Cross Trophy " will be presented to the winners.

Derby and District Amateur Radio Society.—At the A.G.M. held on February 1 it was reported that the fully paid membership for 1960 was 122, slightly less than 1959 but that a record number of 65 had already renewed in the first month of 1961. Officers elected to serve for the ensuing year were: *Chairman*—T. Darn (G3FGY); *Vice-Chairman*—S. Swindell (G3NGV); *Hon. Treasurer*—H. Shaw; *Committee Members*—B. J. C. Brown (G3JFD), J. Anthony (G3KQF), A. Hitchcock (G3ESB), F. Allsopp (G3IFA), S. Slater (G3IKM), K. J. Pegg and M. Shardlow (A.1706). The Society's President, Mr. A. G. G. Melville, presided. *Hon. Secretary:* F. C. Ward (G2CVV), 5 Uplands Avenue, Littleover, Derbys.

East Kent Radio Society.—The society is participating with other hobby interests in the area in the Canterbury Technical Hobbies Exhibition from May 31-June 3 to coincide with Commonwealth Technical Training Week. Local radio enthusiasts have already been invited to take part but anyone still requiring information is invited to contact D. J. Bradford (G3LCK), 42 Mount Road, Canterbury.

Edgware and District Radio Society.—Meetings are held on the second and fourth Wednesday in each month at the Community Centre, Merrion Avenue, Stanmore. A Junk Sale is being arranged for April 12. *Hon. Secretary:* D. L. Lisney (G3MNO), 17 Pickett Croft, Stanmore.

Flintshire Radio Society.—At the A.G.M. the following officers were elected: *President*—F. G. Southworth (GW2CCU); *Chairman*—H. J. Jones (GW3NQP); *Hon. Treasurer*—W. Davies; *Hon. Secretary*—L. W. Barnes, 1 Bryn Coed Park, Rhyl; *Committee Members*—J. T. Lawrence (GW3JGA/T), J. Nicholas (GW3OIN), K. Schofield (GW3KYT). Meetings are held on the last Monday in each month at the Bee Hotel, Rhyl.

Grafton Radio Society.—At the meeting on February 17, 1961, the General Secretary of the R.S.G.B. presented certificates to 15 of the 27 candidates from Grafton who were successful in the 1960 R.A.E. Mr. Clarricoats then gave a talk on the R.S.G.B. and the Radio Amateur. There was an attendance of about 50 including a number who are due to take the R.A.E. on May 5 next.

Guildford and District Radio Society. — In January, F. J. Charman, B.E.M. (G6CJ) lectured on Aerials to a large and enthusiastic audience. This was, incidentally, the 75th occasion on which " Dud " has given his famous demonstration. *Hon. Secretary:* Mrs. E. Bennett, The Inglenook, Gravetts Lane, Worplesdon, Surrey.

Harrow, Radio Society of.—Prior to meetings at 8 p.m. on Fridays at Roxeth Manor Secondary School, Eastcote Lane, South Harrow, members hold a " net " on Top Band from approximately 7.15 p.m. onwards. The popular Enthusiasts' Contest, after its initial success last year, is again being held this year. The 1960 winner was Arnold Mynett (G3HBW) who has been elected President for 1961. *Hon. Secretary:* S. C. J. Phillips, 131 Belmont Road, Harrow Weald, Middx.

Lothians Radio Society.—The society now has on loan a Heathkit DX100U transmitter which was recently demonstrated by GM3KIG. On April 13 at 7.30 p.m. plans for N.F.D. will be discussed at the meeting in the Y.M.C.A., St. Andrew Street, Edinburgh. *Hon. Secretary:* L. Lumsden (B.R.S.22359), 33 Hillview Drive, Edinburgh 12.

Nottingham, Amateur Radio Club of.—Membership has risen to 52 and activities are well supported. An s.s.b. transmitter is under construction for club station use. The club's S.640 receiver and a desk microphone were stolen recently. Meetings at Woodthorpe House, Mansfield Road, are arranged for March 21 (R.S.G.B. Night), March 28 (Recorded lecture on receivers), April 4 (Open), April 11 (A.G.M.) and April 18 (R.S.G.B. Night). On April 25 there will be a general discussion on radio teleprinting and a proposal to form a Nottingham R.T.T.Y. Group. *Hon. Secretary:* E. C. Weatherall, 16 Avebury Close, Clifton, Nottingham.

Paddington and District Amateur Radio Society.—Attendance at the weekly meetings continues to rise as does the membership. Amongst those who have recently joined are W1BHZ and W1ZTY who are at present in England. The club station will shortly be ready to go on the air. *Hon. Secretary:* N. Lambert (G3LVK), 22 Sunderland Terrace, Bayswater, London, W.2.

Peterborough and District Amateur Radio Society.—Valves in good working order sold for 3d. each and television sets complete with all valves and a loudspeaker, realised a shilling, at the junk sale held in Peterborough Technical College on February 3. *Hon. Secretary:* D. Byrne (G3KPO), Jersey House, Eye, Peterborough.

Reigate Amateur Transmitting Society.—There was an attendance of 35 at the Annual Dinner held at Laker's Hotel, Redhill, on February 11. G3BBR, G3FRV, G3LHZ and G3OPR judged the society's first constructional competition and awarded the G8KW Trophy to B.R.S.20809 for a compact 160m transceiver for R.A.E.N. In the Junior Competition, the XYL Cup was awarded to Raymond Wells. Leslie Knight has presented the " G5LK Cup " for competition annually amongst clubs in Crawley, Dorking and Reigate. At the meeting at the Tower, Redhill, on March 18 the speaker will be G4ZU. On April 15 G3BCM will describe a " Top to Ten Transportable Transmitter-Receiver." Details of further activities may be obtained from *Hon. Secretary:* F. D. Thom (G3NKT), 12 Willow Road, Redhill.

Rotherham Radio Club.—The programme for the first quarter of 1961 has been formulated with a practical and R.A.E. night once a month and lectures covering Regulations (G3OJG), Test Gear (A. Tinsley) and R.T.T.Y. (G3MBQ). G3LLE has given a very informative lecture on 2m and G3NXZ has described his prize winning Top Band transmitter. *Hon. Secretary:* S. J. Scarborough, 25 Crawshaw Avenue, Beauchief, Sheffield, 8.

Southgate.—The General Secretary of the R.S.G.B. lectured on International Radio Conferences and their effects on the future of the Amateur Service at the meeting of the Southgate & District R.S.G.B. Group held on February 9, 1961, at Arnos School, London, N.14. Mr. Clarricoats traced the history of the I.T.U. from its formation nearly 100 years ago up to the time of the Geneva Radio Conference of 1959. He referred also to some of the problems that may face the Amateur Service in the future due to the claims of the new and developing countries for more frequency space. Reference was also made to the demands of the new Radio Astronomy and Space Research Services.

Spen Valley Amateur Radio Society.—Mr. Douglas Millar, president of the Brighouse Model Engineering Society, was the guest of honour at the Annual Dinner and presented the " Swindon Cup " to M. Firth (G3MMK) in recognition of his services to the society. At the City of Bradford Fire Station on April 11, at 7.30 p.m. C. H. Gardner of Mullard Ltd. will lecture on ultrasonics. Members will be visiting Leeds G.P.O. on April 26. Details of other activities may be obtained from the *Hon. Secretary:* N. Pride, 100 Raikes Lane, Birstall, near Leeds.

Stoke-on-Trent Amateur Radio Society.—The Top Band talk-in facilities at the North Midlands Mobile Rally at Trentham Gardens on April 30 will be provided by the society and tests have already been carried out to ensure coverage of all roads

within a radius of 50 miles. In addition to G3GBU/A at the Rally, G2AMN will be in operation from Stone and G3OGD from Talke. *Hon. Secretary:* V. J. Reynolds (G3COY), 90 Princes Road, Hartshill, Stoke-on-Trent.

Thames Valley Amateur Radio Transmitters Society.—Plans are being made to hold a mobile rally in mid-Surrey on May 7 while a river trip from Richmond to Greenwich is being arranged for June 18. *Hon. Secretary:* K. Rogers (G3AIU), 21 Links Road, Epsom.

Torbay Amateur Radio Society.—At the February meeting, judging of entries for the annual competitions took place. The Senior Construction Cup was won by G3LHJ for his h.f. receiver, with G3LZE as runner-up. The Junior Construction Cup was won by Richard Pavey with an oscilloscope and the Short Wave Listening Competition by Roger Western. The 28 Mc/s cup was awarded to G3LKJ. Later, G3ZC gave a talk on his memories of early Marconi marine tests. The society's Annual Dinner was due to be held at the Abbey Lawn Hotel, Torquay, on March 4. The A.G.M. will take place in April. *Hon. Secretary:* Mrs. Western (G3NQD), 118 Salisbury Avenue, Barton, Torquay.

Wirral Amateur Radio Society.—Meetings are now held at the Castle Hotel, Birkenhead, on the first and third Wednesday in each month. The Annual Dinner was held at The Coach and Horses, Moreton, on February 24. *Hon. Secretary:* A. Seed (G3FOO), 31 Withert Avenue, Bebington.

York Amateur Radio Society.—At the A.G.M., G. Nottingham (G3DTA) was elected Chairman. G3FYP has almost completed the society's new band switched 813 transmitter covering 3·5-28 Mc/s. Meetings are held on Thursdays at 8 p.m. at the Club Rooms, Fetter Lane, York. Visitors are most welcome. *Hon. Secretary:* M. Watson (G3JME), 36 The Paddock, Boroughbridge Road, York.

International Ham-Hop Club

THE Club is developing quickly and with the establishment of a North American Division there are now four Area Divisions in existence. Dr. Lee Gunther (W6THN) is Divisional Representative and VE3XF is National Representative for Canada.

The 1961 programme is already well under way, with VK5BP touring ZL prior to a voyage to the U.K. This will be via VK6 and ZS. Other overseas visitors include VE2AKE and VE3XF, who 30 years ago held the call G5GB.

At the A.G.M. held in London in January it was decided to produce a bi-monthly *I.H.H.C. Newsletter* in addition to the printed *Ham-Hop News*. The editor of the new publication is G3CZS who was also appointed Regional Representative for the Midland Region. G3MIK is London Region Representative and G3MYA Eastern Region Representative. Eric Westmore (B.R.S.19629) is Hospitality Organizer responsible for arranging hospitality in co-operation with the Regional Representatives.

It was also decided that in future three months notice should be given prior to the commencement of a Ham-Hop holiday and to require a waiting period of six months before a member would be eligible for "Ham-Hop." This is to prevent the repetition of new members joining for the sole purpose of enjoying a cheap holiday.

The Hon. Treasurer's report was presented and the balance sheet passed round for inspection. Sixteen members were present, which was considered very satisfactory bearing in mind the long distances which many had to travel.—G3CED.

Grafton Radio Society Top Band Contest

CERTIFICATES of merit will be awarded to the operators placed first, second and third in the Open Section of the Grafton Radio Society's Top Band Contest to be held between 22.30 B.S.T. on April 8 and 01.00 B.S.T. on April 9 (c.w. leg) and the same times on April 15-16 (phone leg). One point will be scored for each contact, the final score being the sum of the scores for the two legs. Only one contact with a specific station in each leg will count for points. Contest exchanges will comprise the RST or RS report followed by the serial number of the contact (commencing with any number between 001 and 010 for the first contact).

Full details may be obtained from the Honorary Secretary, A. W. H. Wennell (G2CJN), 145 Uxendon Hill, Wembley Park, Middlesex.

Ilminster School Radio Society

ALTHOUGH there are less than 200 pupils at Ilminster Grammar School, the radio club is licensed as G3IGS. Last year, four members studied for the R.A.E. under the direction of G3DTB and are now licensed as G3OJL, G3OPV, G3OTK and G3OUI. Several former pupils are also licensed.

Representation

THE following is an addition to the list of County (or District) Representatives published in the December 1960 issue:

REGION 7—LONDON EAST
M. A. C. McBrayne (G3KGU), 25 Purlieu Way, Theydon Bois, Essex.

* * *

THE following are additions or alterations to the list of Town Representatives published in the December 1959 issue:

REGION 7—LONDON SOUTH-WEST
DORKING AND LEATHERHEAD
W. J. Walsh (G3HZJ), 4 Meadowbrook Road, Dorking, Surrey.

REGION 9—COUNTY OF BRISTOL
BRISTOL
R. V. Hinchliffe (G3KHA), 54 Ponsford Road, Knowle, Bristol 4.

SOMERSET
WESTON-SUPER-MARE
J. L. Crowther (G3KMM), c/o Happy Homes Caravan Site, Old Junction Road.

Vacancy

Mr. M. A. C. McBrayne having been appointed District Representative for London East, a vacancy exists for a Town Representative for Theydon Bois and Epping. Nominations should be made in the prescribed form and sent to reach the General Secretary by not later than April 30, 1961.

Affiliated Society Representatives

THE following are additions to the list of Affiliated Society Representatives published in the December 1960 issue:

ABERDEEN AMATEUR RADIO SOCIETY: G. A. Roberts (GM3NOV), 111 Great Southern Road, Aberdeen.

GRIMSBY AMATEUR RADIO SOCIETY: H. O. Gillatt (G3LOP), 102 Station Road, Healing, Grimsby, Lincs.

SOUTH SHIELDS AND DISTRICT AMATEUR RADIO CLUB: D. I. Forster (G3KZZ), 41 Marlborough Street, South Shields, Co. Durham.

YORK AMATEUR RADIO SOCIETY: G. Nottingham (G3DTA), 23 Abbotsway, York.

Affiliated Societies

THE following are additions to the list of Affiliated Societies published in the October 1960 issue:

B.B.C. (RAMPISHAM) CLUB
c/o Miss Z. K. Johnson, B.B.C. Rampisham Down, nr. Maiden Newton, Dorset.

LICHFIELD AMATEUR RADIO SOCIETY
c/o T. L. Painter, 98 Gaia Lane, Lichfield, Staffs.

STRATFORD AND DISTRICT RADIO CLUB
c/o R. G. J. Hewitt, 18 Stratford Road, Warwick.

WOLVERTON DISTRICT RADIO CLUB
c/o D. A. Shepherd, 35 The Crescent, Haversham, Wolverton, Bucks.

EAST OF SCOTLAND
OFFICIAL REGIONAL MEETING
CARLTON HOTEL, EDINBURGH

Saturday, May 13, 1961

Programme:

2.15 p.m.	**Assemble**
2.30 p.m.	**Business Meeting**
4.15 p.m.	**Buffet Tea**
4.45 p.m.	**Talk and Demonstration**
6 p.m. ...	**Demonstration of Commercial Equipment**
7.30 p.m.	**Dinner**

Further information will be published next month and a circular will be sent to all members in Region 13 before the date of the Meeting. Advance information is available from G. P. Millar (GM3UM), 8 Plewlands Gardens, Edinburgh 10.

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Price 4/- (by post 4/6)

Service Valve Equivalents (Second Edition)
Price 2/- (by post 2/6)

The Morse Code for Radio Amateurs (Second Edition)
Price 1/6 (by post 2/-)

AMERICAN PUBLICATIONS

Orders for the following American publications which are usually available from stock can only be accepted from residents in the United Kingdom and British Commonwealth.

Radio Amateur's Handbook, 1961 (*A.R.R.L.*)	34/-
CQ Sideband Handbook (*Cowan*)	25/-
Mobile Manual for Radio Amateurs (*A.R.R.L.*)	24/6
CQ Mobile Handbook (*Cowan*)	24/-
Antenna Book, 9th Edition (*A.R.R.L.*)	19/-
Television Interference—Its Causes and Cures (*Nelson Publishing Co.*)	16/-
CQ Anthology (*Cowan*)	16/-
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Learning the Radiotelegraph Code (*A.R.R.L.*)	4/6
QST (*A.R.R.L.*) Published monthly (p.a.)	43/6
CQ (*Cowan*) Published monthly (p.a.)	44/-
73 Magazine (*A.R.P.Co.*) Published monthly (p.a.)	30/-

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(Small)	6/6

† *Delivery 6-8 weeks.*

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Wireless World Valve Data (*Iliffe*)	6/-
Panel-Signs, Sets 1, 2, 3 and 4 (*Data*) per set	4/-
International Radio Amateur Year Book (*Casling*)	4/-
Radio Amateur Operator's Handbook (*Data Publications*)	4/-
Guide to Broadcasting Stations (*Iliffe*)	4/-
F.M. Explained (*Trader Publishing Co.*)	3/-
Countries List	6d.

All prices include postage unless otherwise stated.

R.S.G.B. Bookshop, New Ruskin House, Little Russell Street, London, W.C.1.

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At the time of going to press **only** the following back issues of the BULLETIN were available:

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1959	January, February, March, April, June, July, August, September, October, November and December. (The September, October and November issues contain articles on the G2DAF S.S.B. Transmitter.)
1960	January, February, March, May, June, July, November and December.
1961	January and February.

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