R.S.G.B Bulletin

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

Vol. 32 No. 4 | OCTOBER, 1956 | Price 2/6 Monthly

R.S.G.B. BULLETIN

Devoted to the Science and Advancement of Amateur Radio

Vol. 32, No. 4 October, 1956

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ADVERTISEMENT MANAGER : HORACE FREEMAN
ADVERTISING OFFICE : THE NATIONAL PUBLICITY CO., LTD.,
36-37 UPPER THAMES STREET, LONDON, E.C.4
Telephone : CENtral 0473-6

Published on or about the 15th of each month as its official journal by the Radio Society of Great Britain and issued free to members.

Closing date for copy is the 22nd of the month preceding publication.

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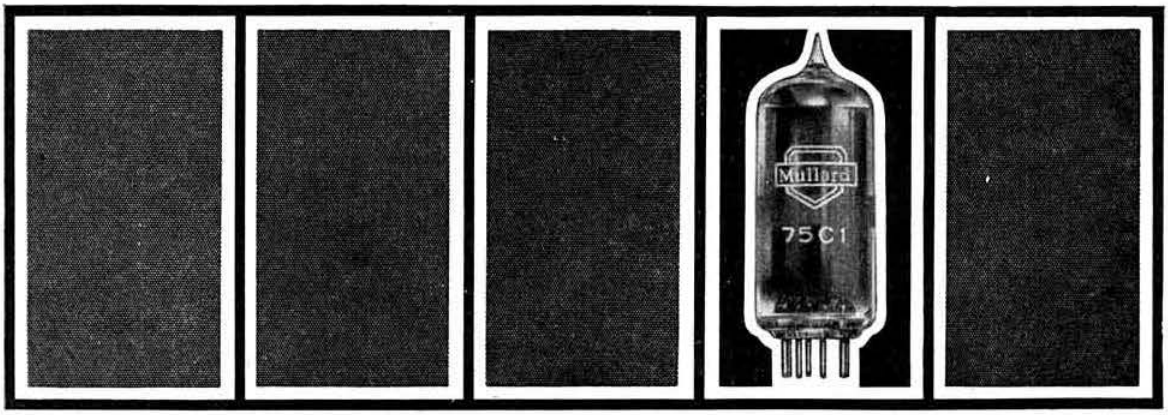

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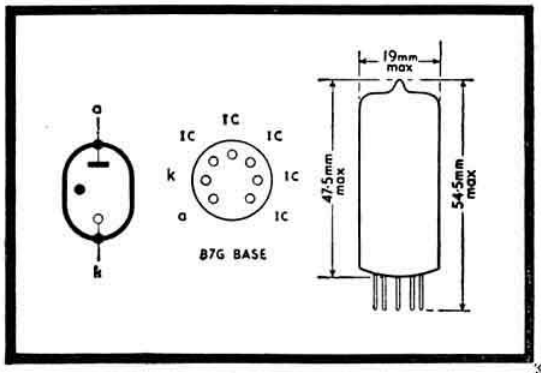

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Current Comment

When The Wires Are Down

MEMBERS of the Radio Amateur Emergency Network must have experienced a keen sense of satisfaction at the blessing bestowed by High Authority (meaning the Postmaster General) upon the proposed co-operation by R.A.E.N. with the British Red Cross. Until this happened, any aid given by amateurs in providing emergency communications was strictly unofficial.

Many British amateurs have regretted that this should be so, especially when they noted the real service which their American counterparts, using amateur frequencies and procedure, have been able to render their own communities when the lines were down. An urge to render similar service in our own country has long existed, and has been expressed to the Council on many occasions. There has been the feeling that there should be something more to Amateur Radio than constructing and communicating. It could be said that some form of sublimation was sought; for more than a thousand British Amateurs R.A.E.N. provided it.

It seems likely that this figure will substantially increase now that the project for R.A.E.N.-Red Cross co-operation has received the official *cachet*. The desire to serve burns pretty strongly in the more responsible citizens, among whom radio amateurs as a group rank high.

Preparedness demands practice; and it is of little use belonging to R.A.E.N. unless regular participation in the Network's exercises over the air is intended. In this context two things need saying firmly, by way of conclusion:

First, that the co-operation of non-R.A.E.N. members is earnestly sought in helping to avoid interference to these exercises. No man with a spark of humanitarianism about him would deliberately sabotage, or consider "imprudent," radio communications that have as their ultimate aim the succour of life and property; but the chance of unintentional interference should be watched when it is known that R.A.E.N. exercises are on.

Secondly, R.A.E.N. operators need no telling that they hold no prescriptive right to any particular frequency, any more than do those 3.5 Mc/s phone operators who are heard to complain that "someone has taken my channel"!

An R.A.E.N. station is still an amateur station unvested with any special privileges. The best service to its cause can be rendered if its standard of operating is impeccable.—J.H.

Key Man

IT is round about this time of the year that R.S.G.B. Town Groups begin to tie up their arrangements for the coming autumn and winter season. Upon the effectiveness of these arrangements depends the viability of the Group for the next half year or more.

Key man in these affairs is the Town Representative. He is "The Society" in towns large and small throughout the land. Sometimes, it must be confessed, he is no more than "king for a day," appointed as a matter of expediency so that an official entry may be put in for National Field Day—though expediency quite frequently becomes permanency when the value of having a T.R. is realized.

Although the Town Representative is a key man in the generally accepted sense, he is discreet enough not to let himself be known as a "key man" in the telegraphy sense! There must be some telephony sometimes! Partisanship for any specific branch of the art is preferably kept private; which no T.R. who accords with the admirable clause in the amateur code, "The Amateur is Balanced," needs telling.

Although the Town Representative is the last man in the chain of responsibility that stretches out to him from the Council through the Regional Representatives and County Representatives, he has fair claim to be regarded as one of its most important links. Without him, local activities do not flourish. Social and technical relationships fail to develop; and while the "lone-wolf" operator might say this does not matter, there are plenty of others who will say it does.

Now is the time to let your T.R. know what you would like to see on the Fixture List for the coming season. And if you haven't got a T.R., now is the time to appoint one!—J. H.

Governing Body

LOCAL activities revolve around the Town Representative, as is inferred above. National activities are the preoccupation of the Council of the R.S.G.B., sitting in London.

Since the institution of the new composition of Council under the revised Articles of Association, many members do not seem completely *au fait* with the method by which the Governing Body is appointed, and for this reason it might be useful briefly to restate it.

Council is made up of three components—the Officers, the Ordinary Members and the Zonal Representatives.

Flanking the President are the Executive Vice-President (who by tradition will move into the Presidential chair in the following year, though there is no compulsive reason why he invariably should), and the men who were presidents last year and the year

before—officially called the Immediate Past President and Penultimate Past President. Valuable continuity of thought and policy is achieved by retaining the last *two* Presidents in each new Council: this did not happen before the Articles of Association were revised.

The fourth officer is that indispensable being, the Honorary Treasurer. Exceptionally, the 1956 holder of that office is Executive Vice-President, which has turned out to be a useful and practical duality of office that came about because Mr. Findlay happens to be professionally engaged in accountancy.

Ordinary Members of Council are seven in number, of whom a proportion retire each year. Nominations to fill these vacancies are made by the retiring Council each year, but it is every R.S.G.B. member's right to nominate (in the approved manner) anyone whom he feels can usefully serve. Indeed, it is important for the well-being of the Society that there should be a steady influx of new faces on to the Council from time to time, rather than that the old ones should reappear too often.

Once upon a time *all* the Members of Council retired every year. If none of them was re-elected for the following year (as could happen in theory), continuity might be seriously impaired. For this reason, under the revised Articles of Association, *only a proportion* now retire annually.

Now for the Third Force on Council: the Zonal Representatives. When the Articles of Association were revised they provided for the appointment to the Governing Body of six members representing large geographical sub-divisions of the country, to ensure adequate provincial representation on the Council.

It cannot be too firmly emphasized that a retiring Council does not nominate Zonal Representatives. If no nominations come from members in any particular Zone then no Zonal Representative can serve it—obviously enough.

The private member's duty at this time is clear and two-fold: to nominate for the 1957 Council anyone whom he feels will make a good member of that body, and secondly, to nominate a man to be his Zonal Representative. There are nine days to go. Closing date for nominations is October 24.—J.H.

Still a Matter for Caution

TWICE within a period of 24 hours during the early part of September, London amateurs whilst in QSO were requested to take steps to obtain rare drugs for the treatment of persons said to be seriously ill. In one case the patient was in Israel; in the other the patient, a child, was in Belgium. Both cases were fully reported upon in the national Press at the time.

The time seems opportune to draw the attention of members to a statement dealing with rare drugs which appeared on page 395 of the March, 1954, issue of the R.S.G.B. BULLETIN.

In that statement members were advised to notify Scotland Yard immediately they receive a message relating to drugs. They were also reminded that by the terms of their licence they are precluded from divulging the content or even the existence of a message to any unauthorized person, and this, of course, includes the Press.

Having notified Scotland Yard members were advised to take no further action. The statement expressed grave concern that U.K. amateurs had been asked to handle messages which should have been sent through public communication channels. The view was expressed that it seems wrong that a patient's life—assuming every case to be genuine—should be allowed to depend upon the ability of an unknown radio amateur to locate a source of supply for the particular drug concerned.

In the case of the Belgian child we understand that the request for drugs was first sent by a Belgian amateur to an amateur in Portugal who passed it to one or more stations in the United States. They in their turn tried to pass it to London. One London amateur who was asked to accept the message queried the name of the hospital requiring the drug, the doctor in charge, the name and sex of the patient and most important asked if the Belgian medical authorities had attempted to contact the hospital in London to whom the message was addressed. The net result of his enquiries was nil. Wisely, therefore, he declined to accept the message.

We cannot do better than remind members that there are recognized international channels, available to every doctor, for dealing with matters of this nature.

International Red Cross Broadcasts

IN a letter to the British Red Cross Society M. Georges Kuhne of the Broadcasting and Television Section of the International Committee of the Red Cross in Geneva, asks that his thanks be conveyed to those members of the R.S.G.B. who reported upon the recent test broadcasts from Geneva.

Malayan Amateur Radio Society

MR. K. J. Creamer (B.R.S.10167), 14 Brynland Avenue, Bristol, 7, who is the United Kingdom representative of the Malayan Amateur Radio Society will be pleased to send details of that Society's work to members of the R.S.G.B.

The Malayan Amateur Radio Society issues an interesting magazine six times a year, the annual subscription to which is 12/-. The current issue lists the calls and addresses of all amateurs in VS1, 2, 4, 5, ZC2, 5, VS6 and 4S7. Details are also given of several new certificates issued by the Japanese Amateur Radio League.

LONDON MEETINGS

The following programme of meetings at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2, has been arranged.

October 26, 1956: "MORE ABOUT THE ANTENNA-MATCH" by F. Hicks-Arnold (G6MB).

November 30, 1956: "1250 Mc/s OPERATION." Discussion opened by Members of the London U.H.F. Group.

December 14, 1956: **Annual General Meeting and Presentation of Trophies.** (To be held in the Lecture Theatre of E.L.M.A. in same building as I.E.E.)

January 25, 1957: **Presidential Address** followed by Lecture and Demonstration of MINIATURE AERIALS by F. Charman, B.E.M. (G6CJ).

March 1, 1957: "MODERN AMATEUR COMMUNICATION RECEIVER DESIGN," by R. G. Lane (G2BYA).

March 29, 1957: "MOBILE OPERATION." Discussion opened by F. W. Crabtree (G3BK) and R. G. Shears (G8KW).

High Level Modulation for 150 Watts

Volume Compression and Restricted Frequency Response for Maximum Intelligibility

By N. SHIRES (G3BTM)*

SINGLE sideband transmission with suppressed carrier is the most efficient method of obtaining the maximum output from any given input when using telephony. Unfortunately, the limiting factors for amateurs of (a) reception difficulties with normal receivers and (b) the present restricted use of this system, make it of somewhat doubtful value for general operation in the writer's opinion. The alternative, high level modulation of the final amplifier, is a system which with the very minimum of test equipment can be adjusted to give satisfactory results. In addition, it will permit the maximum efficiency on both c.w. and telephony as the output stage with which it is used may be run under class C conditions.

The amplifier to be described will easily give sufficient power to modulate a 150 watt stage with frequency characteristics suitable for amateur use. The low frequency cut-off commences at about 200 c/s and is well down at 100 c/s. The upper limit is variable although normally it should not greatly exceed 3 kc/s. These limits convey all speech frequencies needed for intelligence. The use of anything approaching " hi-fi " is obviously unwarranted as, apart from the wide bandwidth necessary, the average communications receiver is incapable of reproducing it.

The generation of audio power is deceptively simple and unfortunately in some quarters a tendency to fiddle with component values and then ask for reports is very prevalent. This practice is bad because, if the station has no test equipment for audio gear, equipment should be built using component values according to valve makers' figures or taken from designs known to give the desired results. Such characteristics can be designed and should not be found by trial and error. If, on the other hand, checking gear, such as an oscilloscope, is available, its intelligent use will provide far more data than the uncritical and often biased ear of a listener.

Circuit Description

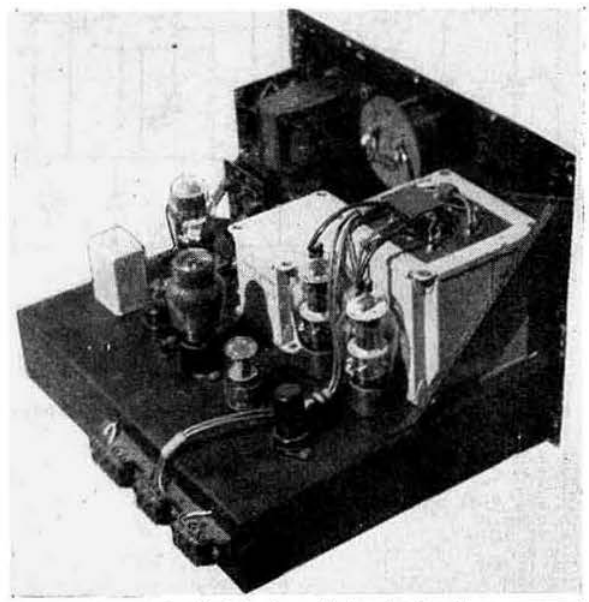
The circuit used in the present design is quite straightforward and is shown in Fig. 1. Some volume compression is used to increase the average modulation depth and when correctly adjusted will limit the peaks to any desired value.

The components used have been selected to give the maximum gain at speech frequencies and the figures quoted below for stage gains, etc., are based on this limited frequency range. V1 is a pentode stage with a designed gain greater than 200 and a maximum voltage output in excess of 70. This gain, however, will not be realised in practice as with normal inputs the compression circuit applies a negative potential to grid 3 as will be described later. V2a is a further voltage amplifier with a gain of at least 12. From this it can be seen that sufficient gain is available to permit adequate compression when using any crystal microphone. V3 is a power amplifier capable of driving V4 and V5 sufficiently hard to produce upwards of 100 watts of audio power if the necessary h.t. is available. V4 and V5 are tetrodes connected as zero bias triodes. The disadvantage of this system is the large driving power (about 5 watts) required. However, with sufficient drive the use of such a system is worthwhile for the following reasons. The circuit is easy to handle, without instability, and no bias supplies or well regulated screen supplies are required. Due to the operating condition of the valves the grids together take power throughout the cycle and therefore the load presented to the driving stage is fairly constant. The possible output is greater than a 150 watt station can use. The result is a unit that will go from the start without critical adjustment.

V2b was originally incorporated as a side-chain amplifier for the compression circuit. Its use has not been found necessary with the recommended components, but if an alternative type of driver transformer is used the gain will probably be less and it will be necessary to use the extra valve. The method of doing this is to connect the grid of V2b to the grid of V3 through a 0.001μF condenser. The primary of T4 becomes the anode load of V2b and the cathode is taken to earth via a 1000 ohm resistor shunted with about 10μF. C15 will not be required.

The Compressor Circuit

The action of the compression circuit depends on the fact that the gain of a pentode valve is governed to some degree by the d.c. voltage applied to its suppressor grid. Unfortunately the effect of a given voltage on one particular valve will not necessarily be reproduced on another valve of the same type and some margin of



A rear view of the high level modulator showing the arrangement of the main components and valves.

*8 Marconi Bungalows, North Weald, Epping, Essex.

control voltage must be provided. This is due to there being no guaranteed slope for voltages applied to grid 3 on most pentodes. The effect, however, of such a voltage is similar to applying the voltage to grid 1 of a variable-mu valve. The cut off voltage is quite high, generally in the region above 50. From this it will be seen that a considerable voltage must be developed to affect the gain of the valve to any extent. It is necessary therefore to provide a minimum of approximately 50 volts negative with a control capable of reducing the rectified voltage to a low value. The first requiremtnt, therefore, is that the voltage appearing across the secondary of T4 should exceed 50 volts either side of the centre tap. In the original case an inter-valve transformer designed for working into push-pull grids with a ratio of 5 to 1 has been found adequate. To control the negative voltage developed it is necessary to bias the cathodes of V6 positive. This is achieved by VR3 in the network R8 and R11. The network C5, C6, C7, R12, R13 and R14 is the smoothing circuit and load resistance for the d.c. output from V6.

The h.t. supply is quite normal except for the use of R18. The value of this may vary according to the transformer used as its purpose is to maintain the h.t. line volts within the makers' limits for V3.

Adjustment

Adjustment is quite simple and requires no elaborate test equipment. Having checked that the wiring is correct, a source of audio voltage should be applied to the grid of V1 and the output checked across the grids of V4 and V5. An oscilloscope is a great help if it is available as the output waveform can be studied qualitatively. With VR2 adjusted so that V3 is not overloaded, the input frequency shou'd be adjusted to about 3 kc/s. VR1 is then adjusted so that its time constant in conjunction with C14 is such that between 30 and 50 per cent attenuation occurs. This will prevent the transmission of un-

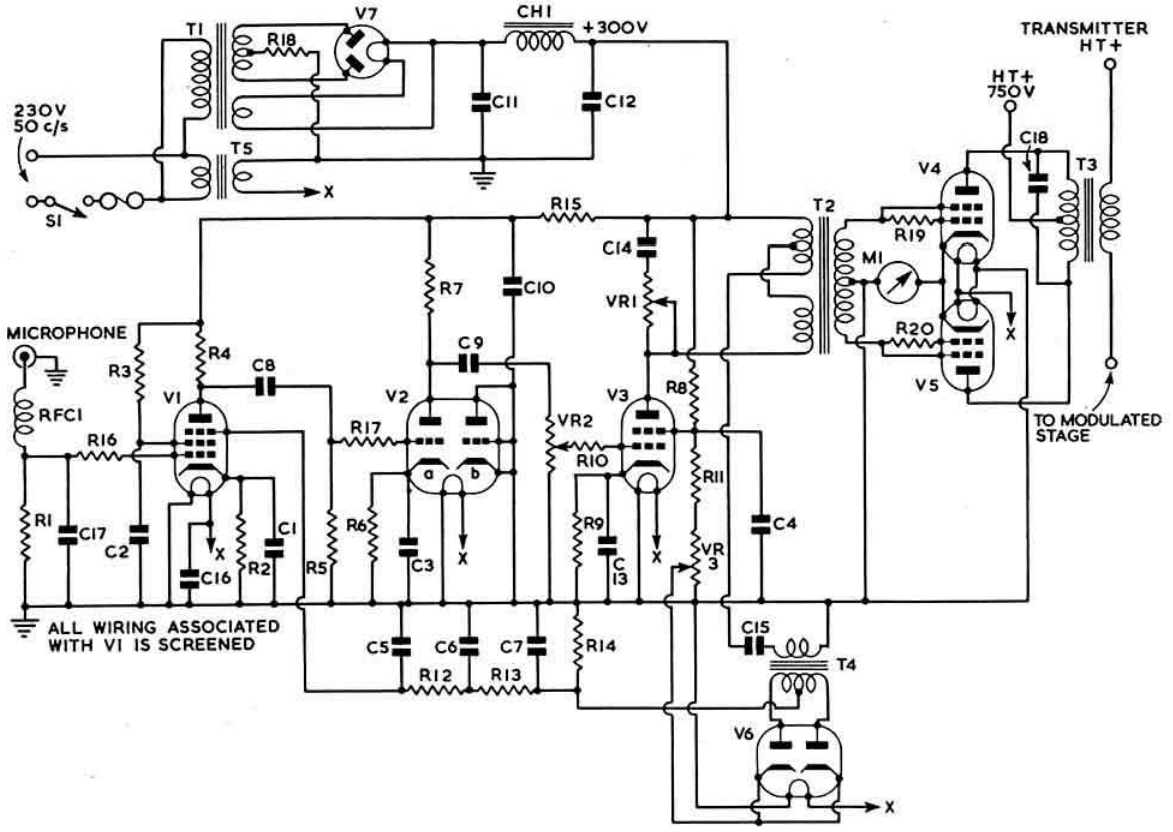


Fig. 1. Circuit diagram of the high level modulator for use with a 150 watt transmitter.

C1, 2μF.
C2, 0.05μF.
C3, 1μF.
C4, 5, 6, 7, 14. 0.1μF.
C8, 0.002μF.
C9, 15, 0.01μF.
C10, 4μF.
C11, 12, 6μF.
C13, 25μF.
C16, 0.5μF.
C17, 0.0001μF.
C18, 0.002μF ceramicon 5000V wkg.

CH1, 10H 100mA.
M1, 0-500mA.
R1, 3 Megohms.
R2, 150Ω ohms.
R3, 2.2 Megohms.
R4, 500K ohms.
R5, 1 Megohm.
R6, 2500 ohms Erie type 2.
R7, 100K ohms Erie type 2.
R8, 15K ohms Erie type 2.
R9, 280 ohms Erie type 2.
R10, 16, 17, 10K ohms.

R11, 100K ohms Erie type 2.
R12, 13, 14, 250K ohms.
R15, 15K ohms Erie type 2.
R18, 1000 ohms 20 watts.
R19, 20, 22K ohms.
VR1, 20K ohms.
VR2, 250K ohms.
VR3, 20K ohms.
All resistors are Erie type 8 unless otherwise stated.
RFC1, 2.5μH choke.
S1, S.p.s.t. toggle switch.

T1, 350-0-350V 100mA, 5V 2A.
T2, Woden type UM1.
T3, Woden type UM3.
T4, see text.
T5, 6.3V 5A.
V1, 6SJ7.
V2, 6SN7 or 12AU7.
V3, 6L6 or 5B255M.
V4, 5, 807 or 5B254M.
V6, 6H6.
V7, Rectifier to suit T1.

wanted high frequencies. The attenuation of the low frequencies is taken care of by the design of the circuit of V1 and V2.

With a dummy load of equal impedance to that of the p.a. to which the modulator is to be connected, the compression circuit can next be adjusted. The peak-to-peak voltage required across the load should equal the voltage applied to the p.a. anode. With a voltmeter suitably connected across the whole or part of the load, VR3 should be adjusted so that the required voltage output cannot be exceeded. This should be done with the gain control VR2 advanced to the point where the lowest level of speech is picked up. The point where extraneous noises are audible is not the correct position, as the transmission of such sounds reduces the intelligence considerably. The modulator should now be ready for use. The controls VR1 and VR3 will not normally require any further adjustment unless the valve V1 is changed or the operating conditions of the amplifier to which the modulator is connected are altered.

Construction

The whole unit with the exception of the h.t. supply for valves V4 and V5 is contained in a metal case 16 in. wide, 13 in. deep and 12 in. high. The chassis is 15 in. by 12 in. by 3 in. providing plenty of room for all the components. The general layout is shown in the photograph, although it is not suggested that this is the only possible arrangement. Having most of the valves in line does permit the use of one group board for the components with the exception of R19 and R20. In the original there is no trouble from instability or hum as all the wiring to V1 is screened.

As considerable care has been taken to obtain the correct bandwidth the values of all components should be closely followed, although the choice of such items as T1, T5, CH1, C11 and C12 can obviously be governed by what is to hand.

The h.t. line volts must not exceed 300 when loaded and this can be adjusted by varying R18. The h.t. required by the output valves is 750 volts at a maximum current of 200 mA. The regulation should be the best that can be obtained and, preferably, a choke input filter used.

In conclusion, a word of warning. This unit can produce more than sufficient power of good quality than is required for a 150 watt transmitter. Don't "go over the top"—the intelligence will suffer, your fellow amateurs will suffer and the TV addict will not suffer in silence! Persistent overmodulation shows an abysmal ignorance of the fundamentals of telephony and is inexcusable.

A Modern Transmitter for the Amateur

IN Mr. Shire's article published last month a 100 pF variable condenser should have been shown across L1 in Fig. 3 to tune the device to the applied signal.

London Lecture Meeting

Friday, October 26, 1956

"MORE ABOUT THE ANTENNAMATCH"

by

FRANK HICKS-ARNOLD (G6MB)

at the

Institution of Electrical Engineers, Savoy Place, Victoria Embankment

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

Chance Meeting
Personal QSO in Andorra

WHILST passing through France on his way to spend a short holiday in Spain Mr. D. C. Evans, G3CGZ, of Loughton, Essex, decided to take a quick look at the tiny independent state of Andorra. His surprise can be imagined when, on reaching the summit of a mountain he noticed some people engaged in the task of erecting a couple of 50 ft aerial masts. Stopping the car to investigate he discovered they were a group of

In this picture taken by G3CGZ at the summit of an Andorra mountain, are the chief operators of PX1EX. Left to right, F8EO, F3IB, F9UK, F8EX, and F3TJ.

French amateurs who were on the point of bringing PX1EX into operation. Two large marquees had been erected, one as living quarters and the other for equipment. The transmitter used an 807 running at 30 watts and the receiver was a double superhet. Aerials were long wire and a ground plane on 14 Mc/s.

The warmth of welcome extended to G3CGZ and his party was considerable but unfortunately they were unable to stay for the first transmission.

Radio Amateurs' Examination

RIVERSDALE TECHNICAL COLLEGE, Aigburth, Liverpool 19, have recently inaugurated a new evening course leading to the City and Guilds of London Institute Radio Amateurs' Examination.

Practical demonstrations form a part of the course work which is expected to extend over one session of two or three evenings a week. The Principal will be glad to furnish further details on request.

Beyond-The-Horizon Radio Transmission *

By KENNETH BULLINGTON†,
FELLOW, INSTITUTE OF RADIO ENGINEERS (U.S.A.)

As long ago as May, 1937, QST reported that evidence collected by radio amateurs suggested that the line-of-sight theory regarding v.h.f. propagation was untrue. Since then, amateur operators have confirmed that conclusion with thousands of contacts on v.h.f. and u.h.f. at ranges far beyond the horizon. In this article, the author reviews present thought on long range v.h.f. and u.h.f. communication by means of tropospheric scattering. How amateurs can best use the techniques discussed remains to be seen.

DURING the past five years, it has been definitely established that useful radio signals at all frequencies can be received consistently at distances far beyond the horizon. These facts have forced a considerable modification of the theories, concepts, and charts found in most textbooks and handbooks. Even more important, these facts have opened up many interesting radio possibilities, particularly in the field of fixed point-to-point communication.

This relatively long distance transmission has been called by various names, such as beyond-the-horizon or extended range transmission, but perhaps it is most generally known by the term, "scatter." It is important to note that the word "scatter" is used in a specialized sense which is actually closer to the layman's concept of reflection than it is to the opposite concept of scattering in all directions. More recently, the term "forward scatter" has been used in an attempt to minimize this language difficulty. In this paper, the phrase "beyond-the-horizon transmission" will ordinarily be used because it is a descriptive term which does not imply a mechanism.

The situation in beyond-horizon transmission is similar to the old argument about an irresistible force and an immovable body. Until a few years ago, the general feeling was that the barrier to beyond-the-horizon transmission was immovable, so why try? Now we know that this obstruction, although difficult, is not impossible to overcome and the race is on for higher power and larger antennas.

There are two different types of beyond-horizon or scatter transmission. One type is the ionospheric scatter which is useful for telegraph signals at frequencies below about 50 Mc/s for distances up to a thousand miles or more. The second type is tropospheric transmission which is useful over a very wide band of frequencies but is limited in distance to a few hundred miles.

This paper compares the two types but is concerned primarily with the second type, that is, tropospheric transmission. The available experimental data are summarized with a minimum of theoretical interpretation. It is shown that the phenomena observed beyond the horizon are a logical extension of well-known phenomena observed on line-of-sight paths. In other words, nature is continuous and perhaps more can be learned by looking at the similarities than by assuming that line-of-sight and beyond-the-horizon transmission are essentially separate phenomena.

*Reprinted from the *Proceedings of the I.R.E.*, October, 1955 (Scatter Propagation Issue) by permission of the Editor.

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History of Tropospheric Transmission Beyond-the-Horizon

The problem of diffraction of radio waves around a smooth spherical earth was first solved mathematically by Watson in 1919 but it was nearly 20 years before it was put in a form suitable for numerical computations by Van der Pol and Bremmer[1, 2]. The smooth sphere theory predicts an exponential decrease in signal level beyond the horizon of about 1.2 db per mile at 500 Mc/s and 2.4 db per mile at 4,000 Mc/s. In the experimental side, Marconi talked over a distance of 168 miles at about 500 megacycles in 1932[3]. However, this circuit was not reliable because of its low power and small antennas and such reports of occasional long distance transmission were assumed to be unusual phenomena like mirages in the case of light.

By the early 1940's the smooth sphere theory was generally accepted but it had not been proved for points far beyond the horizon. The basic assumptions of the smooth sphere theory (outside of mathematical approximations) are that the earth is a perfectly smooth sphere and that the atmosphere is perfectly uniform. In addition, it is assumed that the use of an effective earth's radius (such as 4/3 of the true earth radius) to correct for average atmospheric refraction does not affect the accuracy of the basic theory.

Although the smooth sphere theory was generally accepted, experimental observations by several independent investigators indicated that v.h.f. signals received at points far beyond the horizon faded over wide ranges[4–6]. This fading was generally attributed at the time to the presence of signals reflected from sharp gradients in the refractive index of the troposphere. The existence of such v.h.f. tropospheric waves was sufficiently well known by 1940 that predictions of the field intensity to be expected by reflections from tropospheric layers were presented to the Federal Communication Commission at the same time as the smooth sphere theory[7]. Also at the same hearing, short term measurements on a number of paths at frequencies in the 40-50 Mc/s band were presented to show the departures from the smooth sphere predictions.

During the war years, higher power valves and larger antennas were developed at increasingly higher frequencies. Radar ranges much greater than expected were occasionally observed at both hundreds and thousands of megacycles. At the same time communication equipment, working primarily at frequencies below 100 megacycles, also showed greater range than would have been predicted by the smooth sphere theory. The concept of an atmospheric duct or waveguide caused by special meteorological conditions (mirages) was introduced to explain these effects. As more and more observations were reported it became clear that long-distance transmission occurred much more frequently than the meteorological effects required by the duct theory.

Also during the war years and immediately thereafter, numerous long-term tests were conducted in the frequencies of the 40-50 Mc/s band[8]. Most of these data were collected by the FCC and made generally available in 1948[9]. A general review of results in the 40-100 Mc/s band was given in 1948 in which it was postulated that the persistent tropospheric fields unexplainable in terms of duct propagation were caused by reflections from

many small discontinuities in the refractive index of the atmosphere[10]. It was also pointed out that the median signal received at points far beyond the horizon could not be explained by modifying the effective earth radius since the data could not be fitted to an exponential law[11].

At frequencies in the thousands of megacycles short-term measurements over sea-water showed relatively strong signals even when no ducts were present[12, 13]. Unpublished reports of 1948 investigations of interference between microwave radio relay stations showed a similar long-distance transmission phenomenon over land.

Until the late 1940's there was little expectation that this long-distance transmission could be used for reliable communication purposes; rather it was looked upon primarily as a source of interference. One sign of the times was the 1949 "freeze" on new U.S. TV stations which was brought about because the co-channel interference proved to be much greater than had been expected from the allocation plan based on the smooth sphere theory.

While most of the data available by 1950 were in the lower v.h.f. or s.h.f. ranges, similar long-distance results had also been obtained in the intermediate range around 400 Mc/s[14]. Each bit of data taken by itself seemed erratic and baffling. However, taken collectively all the data from 40 to 4,000 Mc/s showed that the received signal was much stronger than could be accounted for by the existing theories and the long-term data in the 40-50 Mc/s band showed that the lower frequencies at least could be received consistently at distances of 200-300 miles. The implications of these results throughout the frequency spectrum led in 1950 to a definite programme to investigate the usefulness and reliability of microwave transmission beyond the horizon[15]. The conclusions of this investigation were presented at the 1952 IRE Convention and have proved useful for subsequent engineering purposes[16].

Many individuals and several organizations including National Bureau of Standards, Lincoln Laboratory of MIT and Bell Telephone Laboratories among others have been active in this field. Nevertheless, experimental data have accumulated relatively slowly because such tests require high power, large antennas and a relatively long and expensive testing programme. On the other hand, theoretical speculation is relatively inexpensive and it was inevitable that similar or related ideas occurred in a relatively short time to many individuals working independently. For this reason it is very difficult to write a history of this period that provides proper individual credit.

On the theoretical side, the basic assumption of a perfectly smooth sphere has been questioned many times, but the mathematical difficulties in estimating the effects of roughness have not been solved. It is interesting to note that the experimental data fall in between two diverging theoretical curves which give the diffraction loss over either a smooth sphere or a knife edge. At points far beyond the horizon the two diffraction losses differ by tens and even hundreds of decibels, so the two computations serve only to emphasize that diffraction calculations depend very critically on the assumed path profile. The most recent application of the knife edge diffraction curve has been in the "obstacle gain" theory, which fits the exceptional path where the profile approaches a knife edge but which cannot be expected to fit the average or typical path[17].

The basic assumption of a uniform atmosphere has been questioned by the scattering theories[18–23]. The index of refraction of the atmosphere is slightly greater than unity near the surface of the earth, and must be equal to unity at very high elevation. The uniform decrease in refraction with height is accounted for by the concept of an effective earth's radius of 4/3 times the true earth's radius. However, the turbulence of the air superimposes many random irregularities which have been called scatterers, "blobs," or radio clouds. At first it was assumed that the blobs were small compared with the wavelength. However, it was soon recognized that the size of the blobs must be large compared with the wavelength in order to explain the v.h.f. as well as the s.h.f. results, and measurements of the index of refraction have tended to confirm this assumption[24, 25]. In addition to the physical size of the blobs, the magnitude of the change in the index of refraction and the distribution of the size, number and magnitude of the blobs in both space and time are needed to calculate radio transmission phenomena.

The third basic assumption in the application of the smooth sphere theory is that the use of an effective earth radius to account for the average refraction in the earth's atmosphere does not change the basic accuracy of the theory. This assumption is questioned in the internal reflection theory which maintains that the decrease in air density due to gravity not only refracts the radio waves but also reflects a small portion of this energy back to earth[26–28]. It is maintained that these internal reflected signals add in a more favourable manner than does the normally diffracted signal (around a perfect sphere) so that the internal reflected components become controlling at points far beyond the horizon. Internal reflections do occur in a stratified medium with sharp discontinuities. Whether or not such reflections occur in a continuously varying medium involves a mathematical controversy that has not yet been completely resolved.

The fading in signal level with time must be caused by variations in the atmosphere. On the other hand the theoretical explanation of the average signal level has not yet been definitely established, but considerable experimental data are now available for engineering purposes.

Variations with Distance and Frequency

The variation of average signal level with distance is shown on Fig. 1. The ordinate is in terms of db below the value that would be expected at the same distance in free space with the same power and same antennas.

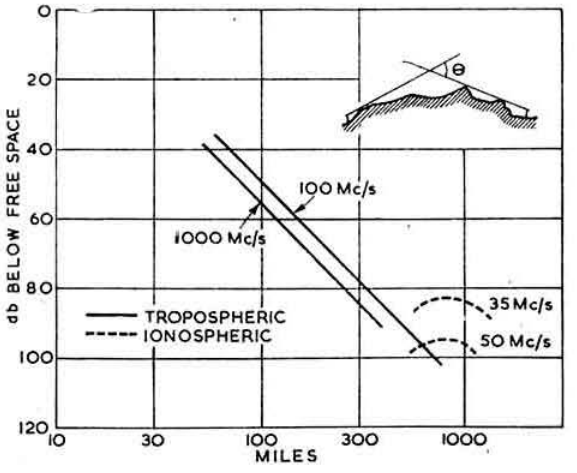

Fig. 1. Beyond-horizon transmission, median signal level vs distance.

At distances less than about 300-400 miles, the transmission is definitely tropospheric. The strongest signals are obtained by pointing the antennas at the horizon along the great circle route. At distances greater than about 600 miles, the ionospheric and meteoric components seem to dominate, at least in the lower v.h.f. band. The principal feature is that the tropospheric transmission decreases rapidly with increasing distance while the ionospheric transmission is weak but relatively independent of distance. With regard to frequency, the situation is reversed. Tropospheric transmission decreases relatively slowly with increasing frequency, while in the ionospheric case there is a big difference betwen 35 and 50 Mc/s and frequencies greater than 60-70 megacycles are not likely to prove useful. The transition from one type to another is a gradual one and no drop-outs have been found at the intermediate distances around 500 miles. The figures shown on this chart are average values and it is necessary to point out that substantial variations are to be expected from hour to hour as well as with location, climate and season. The basic data supporting these generalizations have been obtained from many sources. The variations caused by terrain can be reduced by plotting the results as a function of the angle between the major lobes of the transmitting and receiving antennas as illustrated in Fig. 1[29]. However, for the present purpose the simpler co-ordinate of distance is easier to interpret.

This same information is shown as a function of frequency on Fig. 2. In this case the ionospheric transmission is shown on the left. At low frequencies, the level

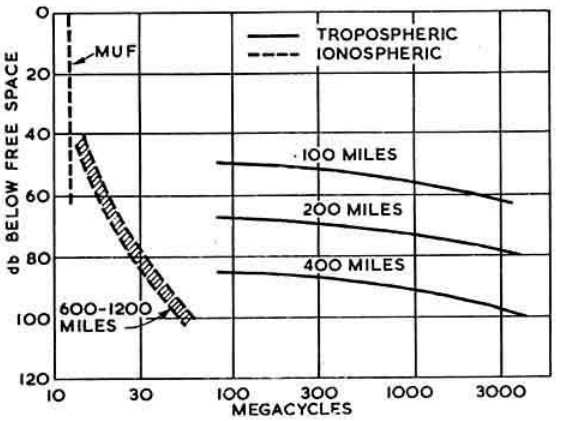

Fig. 2. Beyond-horizon transmission, median signal level vs frequency.

of the ionospheric (sky-wave) signals are close to the free space values. As the frequency is raised above the maximum usable sky wave frequency (m.u.f.), the signal level drops rapidly. The early assumption was that the signal dropped out completely. Now we know that this curve is not discontinuous but that there is a floor below which the signal does not fall. The floor is now known as ionospheric scatter transmission.

The information on tropospheric transmission shown on the right of Fig. 2 indicates once again that these signals depend on distance but decrease relatively slowly with frequency.

Fading Phenomena

The fading of tropospheric radio signals can be divided into two principal types: fast fading and slow fading. The fast fading is caused by multipath transmission in the atmosphere and the rate of this fading increases as either the frequency or distance is increased. The depth of fading ordinarily does not exceed the Rayleigh distribution, which is shown by the solid line on Fig. 3. For example, a 20-db fade is expected about one per cent of the time and a 30-db fade for only one-tenth of one per cent of the time. The multipath or fast fading characteristics is one of the principal reasons why this type of transmission has been called "scatter." However, multipath transmission is also the principal cause of fading on good line-of-sight paths. The cross-hatched area on the chart shows the range of monthly fading distributions at 4,000 megacycles on eleven typical line-of-sight paths ranging from 25 to 77 miles in length. At frequencies below 4,000 megacycles, the fading rate on good optical paths becomes progressively slower until it is difficult to distinguish it from the second general type of fading that has been called slow fading.

Slow fading means variations in signal level over a period of hours or longer and it occurs within the horizon as well as on paths beyond-the-horizon. This type of fading is almost independent of frequency and seems to be associated with changes in the average refraction in the atmosphere. Forty db fades of this type are rare on a good optical path but they have occurred. At points far beyond the horizon the variation in hourly median values follows a normal probability law in decibels with a standard deviation of about 8 db; it is also true, however, that larger variations occur on paths that are more nearly grazing.

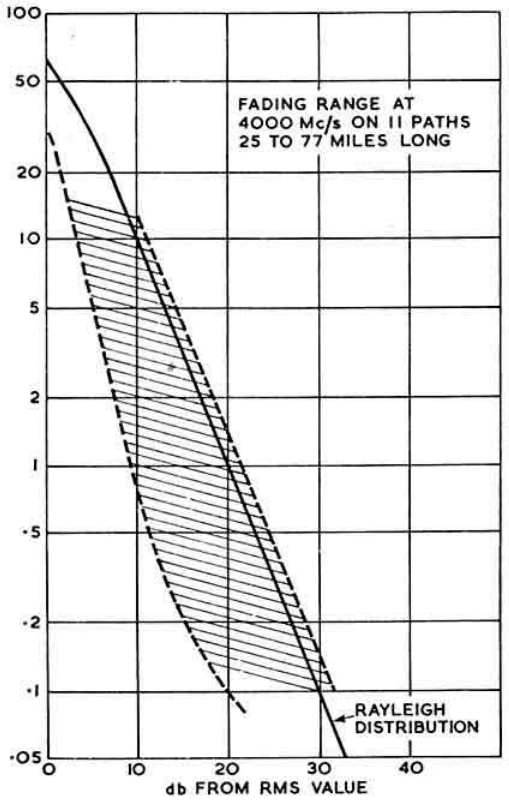

Fig. 3. Multipath fading distribution.

Echo Delay—Useful Bandwidth

The fast fading or multipath phenomena mean that the signal contains one or more echoes. Echoes cause selective fading, which in turn causes distortion in telephone channels or ghosts in television pictures. However, these effects are not troublesome as long as the echo time delays are very short in comparison with one cycle of the highest baseband frequency to be transmitted.

It turns out that for the same size antennas, the useful bandwidth at points far beyond the horizon is at least one-tenth of the corresponding bandwith for 30-mile line-of-sight path. By using narrow beam antennas, which are needed anyway for gain purposes, useful bandwidths of several megacycles can be obtained. This is illustrated on Fig. 4. The ordinate shows the maximum delay to be expected for strong echoes in free space. The delay time shown is the difference in travel time between the direct ray and a delayed signal that leaves the transmitting antenna and enters the receiving antenna at the 3 db points on their respective antenna patterns. For example, on a 30-mile path with 40-db antennas, the maximum computed time delay for strong echoes is about 16 millimicroseconds. Measurements of selective fading under these conditions are in good agreement with these values and have shown that the maximum delay (of strong echoes) does not exceed 6 to 10 millimicroseconds. The experimental values are shown by the crosses on the chart[30, 31]. These conditions are typical of the various links along the transcontinental microwave radio relay system which is now providing an acceptable service of transcontinental television. In other words echo delays of at least 10 millimicroseconds can be tolerated for the transmission bandwidths now in use. The corresponding frequency separation needed for adequate frequency diversity is shown on the right side of Fig. 4.

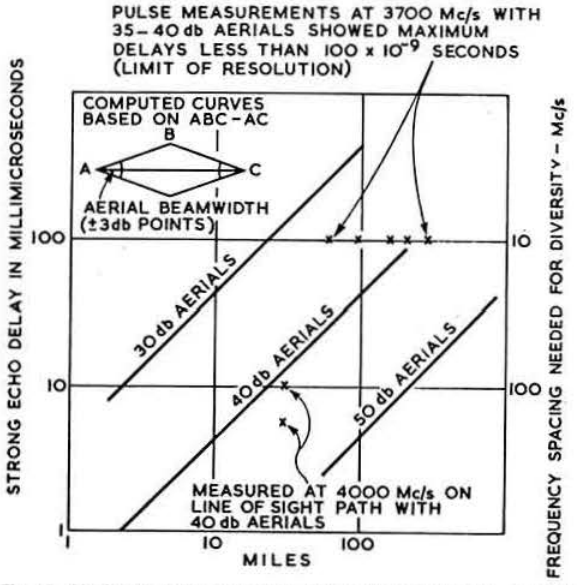

Fig. 4. Maximum delay of strong echoes (<6 db below principal component).

As the distance increases, the maximum echo delay will increase for a given size antenna. In going beyond the horizon, the delay may increase even more rapidly than this simple picture indicates. This more rapid increase was predicted in a recent paper by deBettencourt and Brooker[32]. Nevertheless, pulse tests at distances of 75-200 miles have shown that the maximum delays of strong echoes are less than the resolution capability of the equipment which was approximately 100 millimicroseconds. Moreover, these results were obtained with 35-40 db antennas, which indicates that the maximum delay on 150-mile path is less than ten times that observed on good line-of-sight paths. The high gain antennas that are needed for gain purposes in beyond-the-horizon transmission will tend to reduce the delay time. Consequently, it is expected that useful bandwidths of several megacycles can be obtained beyond the horizon with 45-50 db antennas.

The actual situation is complicated by aircraft reflections and other factors not included in this simple picture, but the essential point is that transmission beyond the horizon does not automatically mean a drastic reduction in useful bandwidths.

Antenna Gain

Another problem that is important in beyond-the-horizon transmission concerns the amount of antenna gain that can be realized. The presence of multipath fading indicates that the phase front of the radio signal is not uniform. When these variations are appreciable over the face of the antenna, it cannot deliver its full theoretical gain. This problem also exists on line-of-sight paths although to a lesser degree. Angle of arrival measurements on optical paths have shown some components of the signal arriving at angles as much as 0.75 degrees from the expected direction[33, 34]. This variation is comparable to the beamwidth of a 40-db antenna. In other words, even on a line-of-sight path, an antenna whose gain is considerably greater than 40 db will lose some of its theoretical gain during fading conditions. This experimental fact was one consideration in the choice of 40-db antennas for the transcontinental microwave radio relay system.

On paths beyond the horizon, the fading exists all the time and high-gain, narrow-beam antennas may not be as efficient as on a short line-of-sight path. However, experimental data on 150-200 mile paths show that a 40-db antenna does not, on the average, lose more than 1 or 2 db of its theoretical gain. The estimated gain that can be realized on a long path is compared on Fig. 5 with

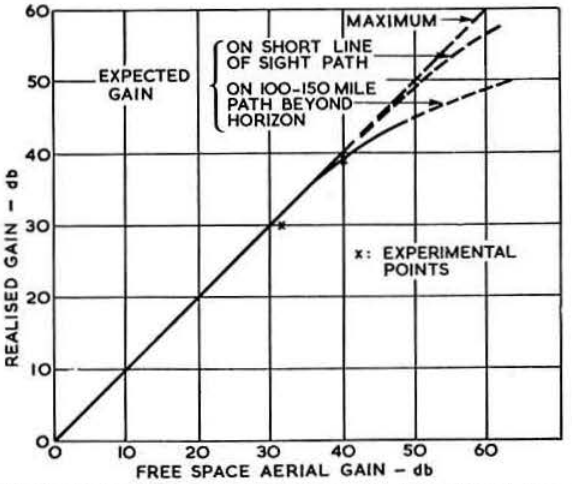

Fig. 5. Median antenna gain realized on paths with adequate foreground clearance.

the gain of the same antenna on a very short free space path. For large antennas, the average realized gain is expected to increase more slowly than the theoretical gain as shown by the dash line on the chart. For example, an antenna that provides 50-db gain on a short line-of-sight path may realize only about 45 db on a 200-mile path.

Conclusion

This review of the principal characteristics of tropospheric transmission indicates that the differences between line-of-sight and beyond-the-horizon transmission are not as great as has been commonly believed. Until a few years ago, the general expectations were that, first, the beyond-horizon signal would not be reliable, second, it could not be used effectively because antennas would not realize their free space gain, and third, the useful bandwidth would be very small. All of these doubts had a logical basis and contained an element of truth, but these fears have been exaggerated. Beyond-horizon circuits can be made reliable with adequate engineering. The maximum useful antenna size is determined at the present time more by mechanical and economic factors than it is by radio propagation. The useful bandwidth can be several megacycles and is limited at the present time more by first circuit noise than it is by echo or scattering phenomena.

These new techniques open up new possibilities, particularly for point-to-point circuits over difficult terrain. It is now clear that reliable point-to-point radio circuits can be engineered for path lengths of 150 miles or more to provide good quality multichannel voice circuits or possibly even television for radio relay purposes. Such circuits require high power and large antennas but they are technically feasible.

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A Simple Automatic Keyer and Paddle

By S. N. RADCLIFFE, M.A. (G3GZB)* and G. I. TURNER (G3DGN)**

IN recent years the popularity of the automatic type of Morse key has increased considerably. Several models of varying degrees of complexity have been described in Amateur Radio magazines but it is felt that there is a real need for an easily made auto-key. Full details of the mechanical part are given here as it is known that many operators have avoided making keyers due to the need for a special "paddle."

The keyer circuit is offered as a simple alternative to the more usual schemes involving several valves and one or more relays. As shown, only one fixed speed is obtained (apart from spacing individual letters and words more than usual). A switch and a few paper capacitors can soon be added, however, to give a range of speeds, although it is surprising how useful just one speed can be.

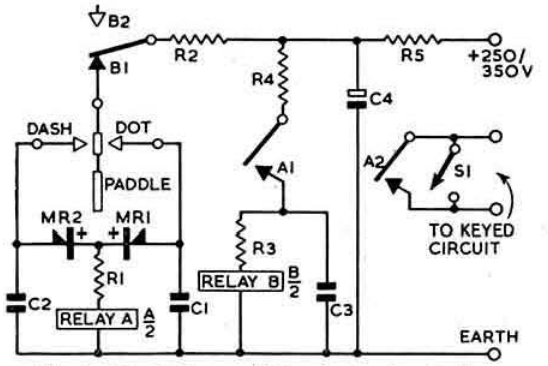

Fig. 1. Circuit diagram of the simple automatic key. C1, 3, 0.25μF; C2, 1μF; C4, 16μF electrolytic; MR1, MR2, S.T.C. type K2/8 or N2/8 metal rectifiers; R1, 3, 33,000 ohms; R2, 330 ohms; R4, 1,500 ohms; R5, 4,700 ohms. The relays are P.O. type 600, 3,000 ohms. In this diagram contacts A1 and A2 should have appeared as open triangles. Relay B has only one set of contacts.

Operation

To understand the method of operation, consider the dot contact made on the paddle (Fig. 1).

(a) C1 charges quickly via R2 and contact B1;
(b) Relay A operates via MR1 and R1. Contact A2 switches the transmitter on. (S1 shorts this contact for tuning or telephony);
(c) C3 charges quickly via contact A1 and R4;
(d) Relay B operates and removes the h.t. supply from the paddle;
(e) C1 discharges through MR1, R1 and relay A;
(f) Relay A releases after an interval depending upon the value of C1 and the transmitter is switched off. (The time from step (b) to step (f) equals one dot);
(g) C3 discharges through R3 and relay B;
(h) Relay B releases after an interval ("space") and restores the h.t. supply to the paddle;
(i) The cycle repeats.

If the dash contact is considered, the cycle is the same, except that MR2 and C2 are substituted for MR1 and C1, giving a longer delay on the release of relay A. Note that once C1 and C2 is charged via the paddle contacts nothing can go wrong due to bad manipulation. The values quoted will give a speed of 18 to 20 words per minute with moderate relay spring tensions. It has been found that it is very easy to adjust the spacing by "spring bending"—in fact the only reason a changeover rather than a break contact on relay B is used, is to give more scope for adjustment.

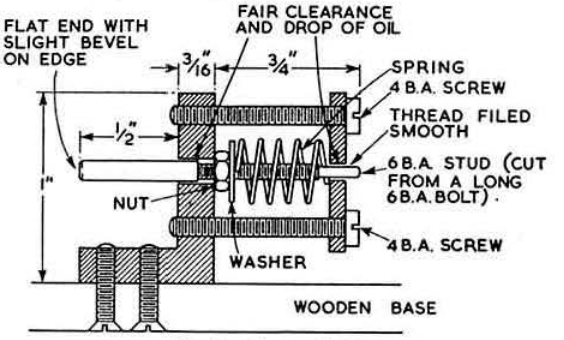

Fig. 2. Plunger details.

Varying the Speed

To vary the speed of sending it is necessary to change C1, C2 and C3 simultaneously and G3GZB's first key on these lines had three speeds set by a single rotary switch. The rectifiers MR1 and MR2 serve only to isolate the dot and dash delay capacitors from each other and, if preferred, two relays may be used in place of relay A, one across each capacitor, with their contacts in parallel and R1 duplicated.

The Paddle

The paddle must have smooth positive action with no overshoot on release, separate adjustment of dot and dash spring tensions, be comfortable to use, rugged, easily made and of low cost. Last but not least all "live" parts must be safeguarded. (There is a potential of approximately 250 volts between the metal part of the paddle and earth in normal use although the current is restricted to a few milliamps by R5.)

The first three points are all catered for by the plunger

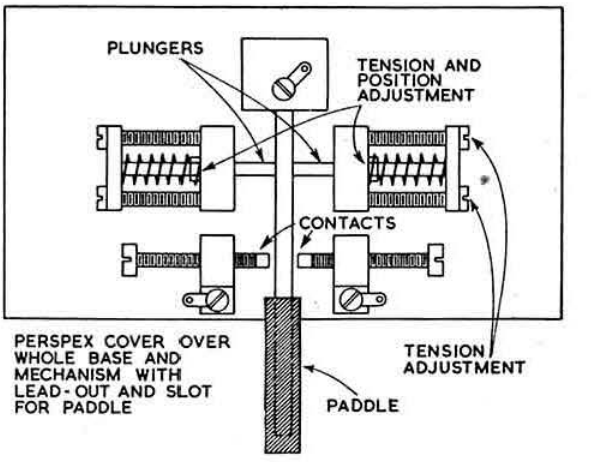

Fig. 3. Sketch of the mechanism.

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**Deegeen, Clifford Road, New Barnet, Herts.

design while the height and shape of the handle have been found well suited for long periods of use. There is of course no reason why any other type and shape should not be used. Robustness is assured by stout materials and the pivot design. Safety is taken care of by a plastic cover.

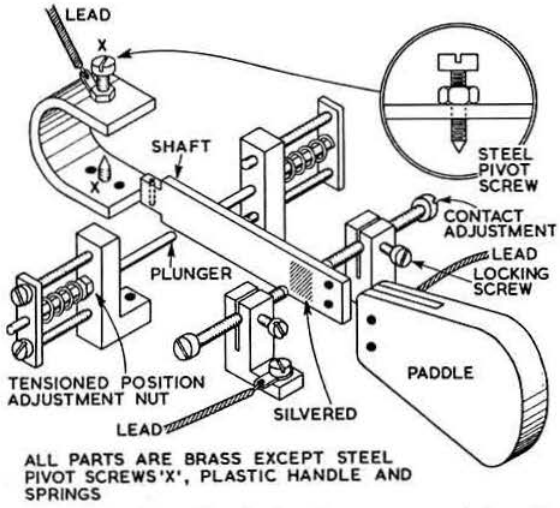

Fig. 4. An exploded view showing the arrangement of the various parts.

Construction

The only unusual tools used are two taps (taper) for 2BA and 4BA and if not to hand may be bought for a shilling or two. The drawings of the key (Figs. 2, 3, 4 and 5) are self-explanatory but one or two remarks may not be amiss. The pivots are made from steel 2BA grub screws with the ends filed to points; the moving contacts are made from silver; the two contact screws have old relay contacts soldered to their tips; the springs are made by winding a piece of thin piano wire (about 28 s.w.g.) round the plain shank of a long 4BA bolt. When all parts are assembled do not forget a little light machine oil on all moving components. The cover was made from thin perspex sheet cut to shape, made plastic with very hot water, and bent round a condiment tin 2 in. in diameter. The side plates for the cover were attached with perspex cement (scraps of perspex dissolved in chloroform—*very inflammable*) and the edges filed to shape. A suitable slot for the moving part of the paddle is cut with a hacksaw and finished with a file. An improved type of plunger is suggested in Fig. 5 but this has not yet been tried.

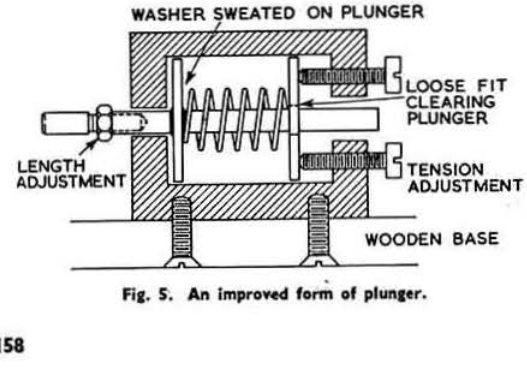

Fig. 5. An improved form of plunger.

Adjustment

The keyer is most conveniently connected to a receiver power supply although any source of 250 to 350 volts will suffice. 50 volts variation in the h.t. supply in use will not affect the operation and a stable supply is not necessary. G3DGN has a spare connection on the front of his R107 receiver and, together with an earth lead, this forms a handy supply point, not only for normal home use, but also for occasions such as N.F.D. In this case, R5 was fitted inside the receiver to eliminate a possibly dangerous connection. The tolerance of reasonable modern capacitors is probably adequate to give the correct ratio of dot and dash lengths and spacing may be conveniently checked by either using a transmitter (with a dummy load) with a anode or grid current meter affected by the keying (*not* an r.f. ammeter) or by use of a milliammeter, battery and suitable resistance in series with the keying contacts. (A normal ohmeter, AVO, etc., can be used of course.) The method is far from original but is repeated here for completeness.

With S1 closed, set the meter to a convenient deflection, say 100 divisions. Then a series of dots should give a reading of 50 and a series of dashes a reading of 75. Alternatively, the "dot" to "space" ratio may be set up by this method and the dash length checked by comparing the number of dots and dashes in, say, ten seconds. There should be twice as many dots as dashes.

It will be noticed that the dash timing capacitor C2 is in fact four times as large as the dot capacitor C1. This is because part of both "dot" and "dash" times is made up of relay operate and release times, which are the same for either "dot" or "dash." Thus the theoretical three to one capacitor ratio would result in overlong "dots." The key adjustment is simple but rather a matter of trial and error.

Set the contact tensions on relay A so that positive operation is obtained with fairly high spring pressures. Next check the dot space ratio using one of the above methods and adjust the B relay springs to give 50 per cent deflection. On checking the dash space ratio it will probably be found that adjustment is required. One way is to alter the value of C2 or alternatively the spring tensions may be reset.

If the dashes are too long (indicated by more than 75 per cent deflection) then both A and B relay springs must be eased off a little; A first and then B readjusted for 50 per cent on dots. This will have the effect also of reducing the speed slightly. If the dashes are too short, the reverse applies. Once made, the adjustment will be found remarkably stable, the ratios remaining constant for periods of years without attention.

The key was set up in the following manner.

With the plungers withdrawn and the contact screws set to a wide gap, the paddle is set midway between the contact screw brackets and the pivot screw set for easy but firm movement of the paddle (a drop of oil should be used). The paddle should now be held centrally by screwing in the contact screws, and the plunger length adjusting nuts set so that the plungers just touch the bar. Unscrew the contact screws to a suitable gap distance and set the spring tensions by the spring back plate screws to give the "feel" required. It has been found that once set up little further adjustment is necessary.

In conclusion it may be said that a keyer of this type has been in use for several years and has given no trouble (including three N.F.D.s and two Top Band contests). The present paddle while of more recent manufacture is showing no signs of wear. For home use the keyer is rather noisy and a box was made from soundproofing "soft" hardboard. (A piece 2ft x 1ft costs 3s.)

Modulator Power Supplies

By G. L. BENBOW, M.Sc., A.M.I.E.E. (ex-G3HB)*

THE power supply for the modulator should always receive the same amount of attention as to design and construction as the modulator itself. Each type of modulator output stage has definite h.t. requirements which must be met if optimum results are to be obtained, and a well designed modulator will be largely wasted unless the power supply is designed exactly to its requirements. In general, it may be said that these requirements are more stringent than those for the r.f. stages of the transmitter.

Power Supply Characteristics

The most important characteristics of a power unit for an a.f. amplifier are the ripple and the regulation. These may be defined as follows:—

(a) *Ripple*

The ripple voltage or ripple on the output of a power unit is the a.c. voltage which remains on the d.c. output after smoothing. It may be expressed as a percentage of the d.c. output voltage of the power unit; alternatively, its R.M.S. or peak-to-peak value may be quoted.

(b) *Regulation*

The regulation of a power supply is the change in output voltage, expressed as a percentage of the maximum output voltage, when the load current is changed from its maximum value to its minimum value, or

$$\text{Regulation} = \frac{E_1 - E_2}{E_1} \times 100\%$$

where E_1 and E_2 are the output voltages corresponding to minimum and maximum load currents respectively. A preferred way of defining regulation is in terms of the "source impedance" or "regulation resistance" of the power unit. Thus, a power unit whose output voltage changes by 25 volts for a 100 mA change in load current is said to have a source impedance of 25V/100mA = 250 ohms. The practical advantage of using this method will be seen later.

Typical Power Unit Circuit

Fig. 1 shows a typical power supply circuit known as the single-phase full-wave circuit. There are several other possible circuit arrangements, but the single-phase full-wave circuit is capable of outputs up to at least 1,000 volts at 250 mA, using easily obtained rectifier valves and without recourse to excessively large components. It is therefore more than adequate for 100 watts output modulators. The requirements of modulator power units will be considered in terms of this circuit.

The output of the transformer-rectifier combination is as shown in Fig. 1 (b), i.e., it consists of a series of half sine waves of voltage. Before use, this large variation of voltage must be smoothed out. It should be noted that the frequency of the variation is twice the mains frequency. The two most commonly used smoothing circuits are shown in Fig. 2, from which it will be seen that they are both combinations of series inductance and shunt capacitance. There is no limit to the number of sections which may be used but two is the normal maximum. The characteristics of the two circuits are appreciably different, e.g., in (a), which is known as a condenser-input smoothing circuit, the input or reservoir condenser, C1, charges up to the peak value of the transformer voltage. In (b), the choke-input circuit, C1 is prevented from doing this by the input inductance L1. Thus condenser input smoothing gives a higher output voltage than does choke input smoothing. As a direct result of this, the rectifier valves are called upon to pass a higher peak current when followed by a condenser-input smoothing circuit.

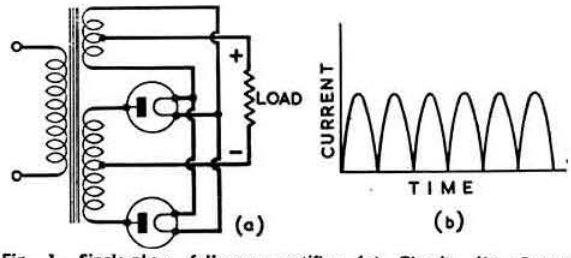

Fig. 1. Single-phase full-wave rectifier (a) Circuit. (b) Output waveform.

The load characteristics of both circuits are compared in Fig. 3. It will be seen that choke-input smoothing gives a more constant but lower output voltage than condenser-input smoothing. The characteristics of choke-input smoothing may be somewhat improved by using a "swinging" choke for L1. This is a choke whose inductance varies appreciably with the current flowing through it, i.e., the inductance should be higher at low

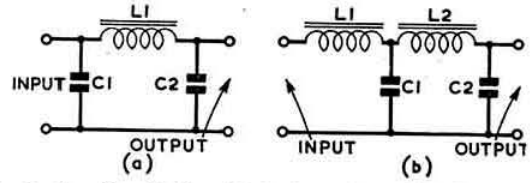

Fig. 2. Smoothing circuits. (a) Condenser input. (b) Choke input.

currents and vice versa. This property results from assembling the stampings of the choke so that there is no air gap in the magnetic circuit. When L1 is a swinging choke, the circuit acts as a choke input circuit at low currents, but as the current increases, the inductance of L1 falls and so the circuit tends to move towards the condenser-input condition. The degree of smoothing, or ripple attenuation, of a single section choke-input circuit is approximately equal to the ratio of the reactances of the choke and the condenser, or $\omega L / \frac{1}{\omega C}$ or $\omega^2 LC$; thus, increasing L or C will reduce the ripple. Two sections, each having an attenuation of, say, 20:1 when connected in series will give an attenuation of 20 times 20 or 400:1.

The reason for the drop in voltage as the load current is increased is clear. The load current must also flow through the smoothing choke(s), the rectifier valves and the transformer. As these each have resistance and as the current flowing through them increases, so the voltage drop across them increases. The resistances of the chokes and transformer are constant (assuming, of course, that temperature effects are ignored) whereas the resistance of the valves will depend on the current flowing.

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In the example quoted earlier of a power unit whose output changed by 25 volts for a 100 mA change in load current, the regulation was quoted in terms of a "regulation resistance" or "source impedance" of 250 ohms. In other words, the total resistance of the

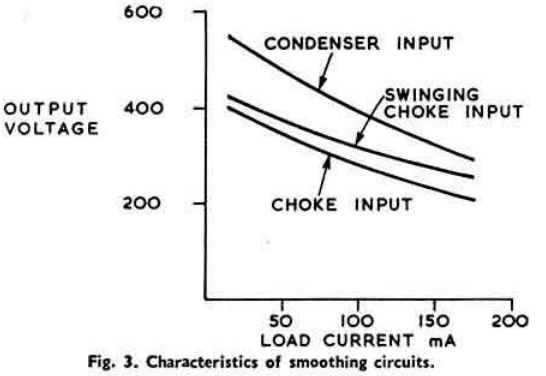

Fig. 3. Characteristics of smoothing circuits.

power unit circuit is 250 ohms. The regulation is therefore improved by reducing the resistance of the transformer and chokes, i.e., for the same voltage or inductance these must be wound with thicker wire and so become larger. The resistance of the rectifier valves may be reduced by using two in parallel, or alternatively, by the use of "soft", i.e., mercury vapour rectifiers, instead of "high vacuum" types.

Power Requirements of Various Types of Power Amplifier

Four different supplies must be considered:
(a) H.t for the speech amplifier.
(b) H.t. for the anodes of output valves.
(c) H.t. for the screens of output valves if tetrodes.
(d) G.b. for the output valves in fixed bias operation.

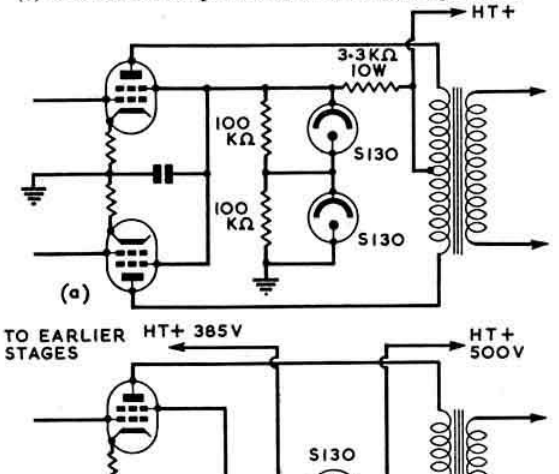

Fig. 4. The use of cold cathode gas filled regulator tubes to stabilize screen voltage.

Of these, the h.t. supply for the speech amplifier presents the least difficulty as any well smoothed supply of the order of 250 volts at 20-30 mA will suffice. The h.t. requirements of the output valves are dictated by the mode of operation.

Class A Operation

Class A operation presents no difficulties as the current drain is constant. The screen voltage may be obtained from a potentiometer connected across the h.t. supply. The speech amplifier may also be fed from this point. Bias for the output valves is normally obtained automatically.

Class AB2 and Class B Operation

In these cases, there is considerable variation in both anode and screen currents and fixed bias is necessary. For optimum results it is normally specified that anode, screen and grid bias voltages shall not vary by more than 5 per cent. In order to appraise the practical significance of this requirement, consider the case of two tetrodes type 807 operating in class AB2. The supplies needed are (i) anode, 750 volts at 56 to 240 mA; (ii) screen, 300 volts at 5 to 20 mA. In order that the supply voltages shall not vary by more than 5 per cent, the maximum permissible source impedances are 204 ohms for the anode supply and 1000 ohms for the screen supply.

A source impedance of 204 ohms for the anode supply would need quite a large transformer and smoothing choke (i.e., low resistance) if hard valve rectifiers are to be used. For this application it would be preferable to use mercury vapour rectifiers such as the 866, in which case, a source impedance of 204 ohms should be achieved without great difficulty.

Due to the "peaky" nature of the speech waveform, the peak demand of 240 mA in this example will not occur often. It is therefore reasonable to design the power unit to provide a continuous output of somewhat less than the peak demand of 240 mA and to rely on the storage effect of the final smoothing condenser to supply the occasional peak. A reasonable design figure in this example would be 200 mA assuming a smoothing condenser of at least 4 μF.

In this particular example, the screen requirement is not critical and the screens could be safely fed from the speech amplifier supply. A more stable screen supply may be obtained by the use of cold-cathode gas-filled voltage stabilizer tubes such as the VR105, VR150 and S130, etc. Two methods of doing this are shown in Fig. 4. The arrangement shown in (a) of Fig 4 would be suitable for the screen supply of valves type 6146. (Source impedance required: 420 ohms.)

A convenient method of obtaining the grid bias voltage is the use of a dry battery; however, a battery, once installed, is liable to be forgotten, sometimes with disastrous results. Alternatively the bias voltage may be obtained from a separate power unit preferably having a fairly low bleed resistor across the output, or from the main h.t. transformer as shown in Fig. 5. In this case, care should be taken to prevent excessive unbalance of the h.t. transformer secondary winding by too heavy a load on the bias supply.

A simple circuit providing a bias voltage of -30V to -35V by the use of two voltage stabilizer tubes is shown in Fig. 1 on page 21 of R.S.G.B. BULLETIN, July, 1956.

In the case of an output stage which is fed from three separate power units, the advisability of installing protective relays to cut off all supplies in the event of failure of one should be considered.

Class AB1 Operation

Class AB1 is an intermediate mode of operation between class A and class AB2/B and hence it is less easy to generalize on the power supplies required.

Grid bias is normally obtained automatically and the anode and screen supplies are best considered in terms of the particular output values to be used.

As class AB1 operation often implies that the maximum possible output is not required, the power requirements are not stringent and the comments made with regard to class A operation may be applied.

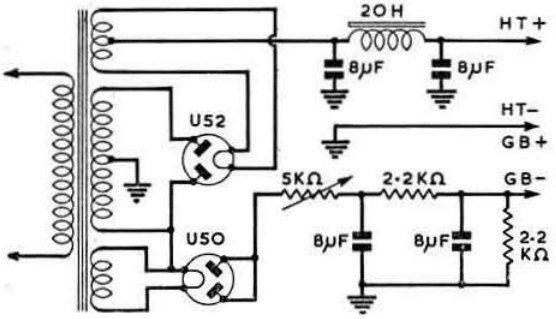

Fig. 5. Economical method of obtaining grid bias.

Electronic Voltage Stabilization

An alternative to the use of mercury vapour rectifiers and fairly large components in order to obtain a low source impedance is the use of electronic voltage stabilization.

The electronic voltage stabilizer is a fairly complicated circuit in which variations in output voltage due to load variations are compensated for by varying automatically the voltage drop across a regulator valve which is in series with the load current. A typical circuit is shown in Fig. 6.

Reasonably simple voltage stabilizers are capable of giving a source impedance of 3 to 5 ohms and a ripple voltage of less than 100 mV (peak to peak), i.e., characteristics which are very much better than are required for class B amplifiers.

The design of electronic voltage stabilizers is outside the scope of the present article and the reader is referred to the two articles quoted in the bibliography.

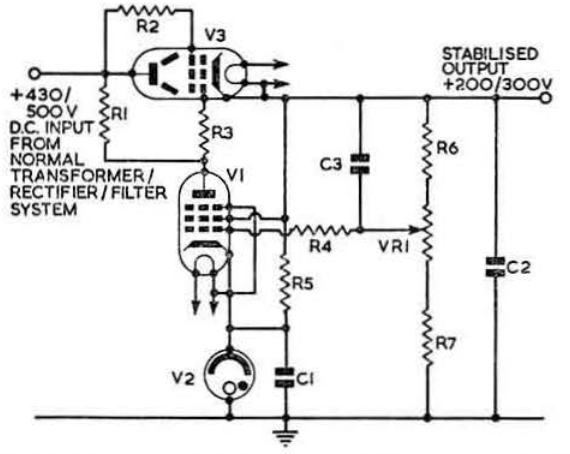

Fig. 6. Electronic stabilizing circuit. C1, 4 μF, 250 V wkg.; C2, 8 μF, 350 V wkg.; C3, 0.25 μF, 350 V wkg; R1, 270,000 ohms ½ watt, 20 per cent tol., carbon; R2, 100 ohms ½ watt, 20 per cent tol., carbon; R3, 4, 1000 ohms ½ watt, 20 per cent tol., carbon; R5, 12,000 ohms 2 watt, 20 per cent tol., carbon; R6, 7, 68,000 ohms 6 watt, 10 per cent tol., wirewound; V1, EF91 or EF50; V2, VR150/30 or similar; V3, 6L6, 6L6G or 807; VR1, 25,000 ohms wirewound potentiometer.

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"Power Pack Design", P. E. Leventhall, *Short Wave Magazine*, February 1949, p. 877, and March 1949, p. 45.

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"Improved Stabilized Power Supply", J. Wood, R.S.G.B. BULLETIN, February 1953.

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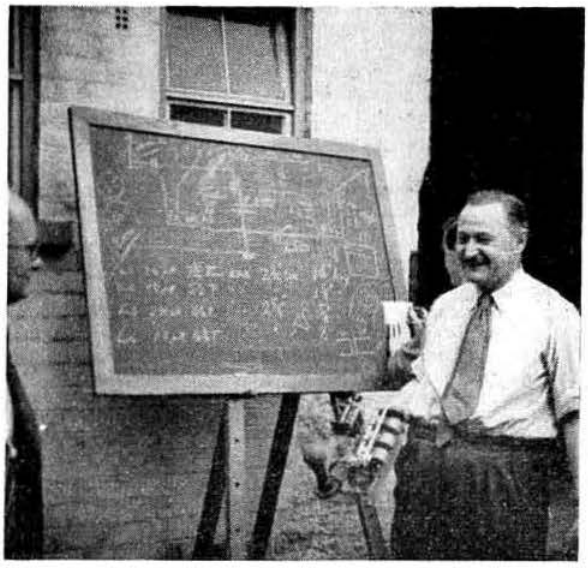
Ham Party at G6UT

IT has become a tradition for Vice-President T. A. St. Johnston, G6UT ("Uncle Tom" to all his friends) to hold a "ham party" at his home (Normandie Farm, Little Hallingbury, Essex) on a Sunday afternoon in September. This year about 50 members and their ladies accepted the invitation to attend the party.

Old timers, of which there were many, mingled happily with newcomers, whilst fair weather—it was one of the best afternoons of the summer—did much to bring added pleasure to the occasion for the ladies.

"Uncle Tom's" cabin, with its glittering array of DX operating certificates, was in constant occupation throughout the afternoon.

The thanks of all who were privileged to attend the party are offered to Mr. St. Johnston and to his family for their hospitality. A buffet tea set the seal on a most happy occasion.



At the York Regional Meeting on July 8, Frank Hicks-Arnold (G6MB) had so much to say about The Antennamatch that he continued to answer questions in the yard of the Windmill Hotel when the lecture room was required for other purposes. G6MB will be saying "More about The Antennamatch" at the lecture to the Society at the Institution of Electrical Engineers, London, on October 26 at 6.30 p.m.

A Voltage Regulated Grid-Bias Supply

By A. E. LIVESEY, D.F.H. (G6LI)*

This article describes the conversion of the Canadian Power Pack type 19-2 to a bias pack combining versatility with very low input requirements. It is designed to handle grid currents as high as 60-70mA.

WHEN it was realized, after questioning several ardent home constructors, that the problem of stable and predictable grid bias sources was generally countered by most uncertain devices, some cool and cheap, many costly and radiantly warm, the author was shocked into the discovery that he too had given the subject no real thought for some years. It might generally be said that most amateurs will eventually gravitate towards the full 150 watts. Once the tiresome presence of large grid currents becomes a constant reality, action must go beyond such makeshifts as faithful old dry batteries.

Most of the popular tetrodes can be supplied with self-bias through a suitable grid-leak, and held in check, when excitation is removed, through the use of a clamp valve. Of course, this simple scheme fades from the picture when it is required to operate a pair of push-pull v.h.f. triodes, assuming that you are not, in common with the majority, able to buy costly new v.h.f. tetrodes. The same applies to any transmitter using triodes and in these cases a bias power pack is needed. It may even be found that a regulated source of variable bias can also smooth out half the doubts and difficulties which beset the general run of exciters and frequency multipliers.

The parts contained in the Canadian Power Pack type 19-2, make an excellent foundation for a compound unit, which, after a few simple additions, not to mention some very useful subtractions, provides regulated bias of 150 volts, 105 volts and one variable source of 0-75 volts.

An Elementary Pack

The simplest conception of a bias pack, as shown in Fig. 1, is merely a normal power supply having polarity in reverse to the high tension supply. The load resistor R1 is arranged to carry a large bleed current. The tap for the grid can be set for a convenient standing bias but when grid current flows, the current through R1 rises and the bias voltage rises beyond reasonable bounds. As an example, assume that the voltage across R1 is 250 volts, and a large bleed current of 100mA is going through 2500 ohms; tapping up to 500 ohms from earth will give 50 volts of negative bias but 20mA of additional rectified grid current will rush up this value to 60 volts. By raising the bleed current to 200mA making R1 1250 ohms, and tapping at 250 ohms above earth, there will still be 50 volts of static bias and the rise caused by 20mA of grid current will produce a total of only 55 volts. Still not very regulated, and the voltage divider now has to dissipate 50 watts!

*The Lindens, Ludborough, Grimsby, Lincs.

These figures prove the rule-of-thumb formula suggested in the *Radio Amateur's Handbook*, viz:—The bleed current of this type of power-pack must be not less than 8 times the grid current. Roughly calculated, it is apparent that 500mA bleed current is required for a 50mA grid current if the bias is to be held at 10 per cent fluctuation. The idea was toyed with, at one time, of obtaining a low tension rectifier—say, 50 volts delivering 1 Ampere. This is a perfectly sound scheme. A bank of miniature accumulators is another solution. A small motor-generator is very sound also, but unless it is compound wound, the grid voltage will drive the generator

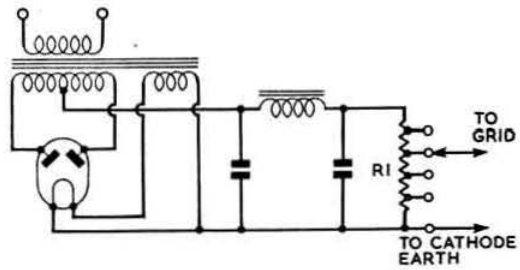


Fig. 1. An elementary form of grid-bias supply.

and speed up the machine. Last, and most satisfactory for bias from 75 volts upwards, is the employment of voltage regulator tubes in continuous ignition'.

Circuit Considerations

Fig. 2 shows a re-arrangement of the major parts of the Canadian 19-2 pack, originally designed to supply two voltage regulated 150 volt 30 mA supplies. A large, strong chassis of steel gives ample room for this and further additions. The unit comes in a transit case complete with three VR150 voltage regulators and three 5Y4G rectifiers. The author required 150 volts bias, 105 volts and a variable source. The constructor can have any combination of his choice by selection of suitable VR tubes, combined with small grid leaks to cover intermediate steps.

In the circuit shown, allowing for about 80 per cent conversion efficiency, the input to T1 will be about 48 watts only. The filter uses choke input to avoid the need for excessive voltage reduction and 265 volts appears across C1. The switch S1 applies negative voltage to either a pair of parallel VR105s or VR150s. The potentiometers VR1 and VR2 are used to control the ignition voltage and limit the idle current through the tubes, each of which has a separate 250 ohm resistor in series to help it to strike simultaneously. Transformer T2 is connected back-to-back on the 600 volt winding, and the rectifier V2, connected in half-wave only across the 115 volt primary winding, is followed by a capacity

input filter to improve the smoothing. The voltage across C3 is 225 volts, applied across R5 and VR3 in series. The voltage regulator V4 across VR3 stabilizes at 75 volts. The voltage selected is applied to the grid of V3, decoupled by R4C2, and connected to earth potential via R3. Bias is then obtained between anode and cathode, the static value being set by VR3; the working grid current flows through V3, which functions as a variable grid leak.[2] The condenser C5 across the output checks the tendency to changes caused when keying excitation.

Constructional Notes

From the parts list of Fig. 2 it will be seen that in the type 19-2 pack two of the four smoothing chokes

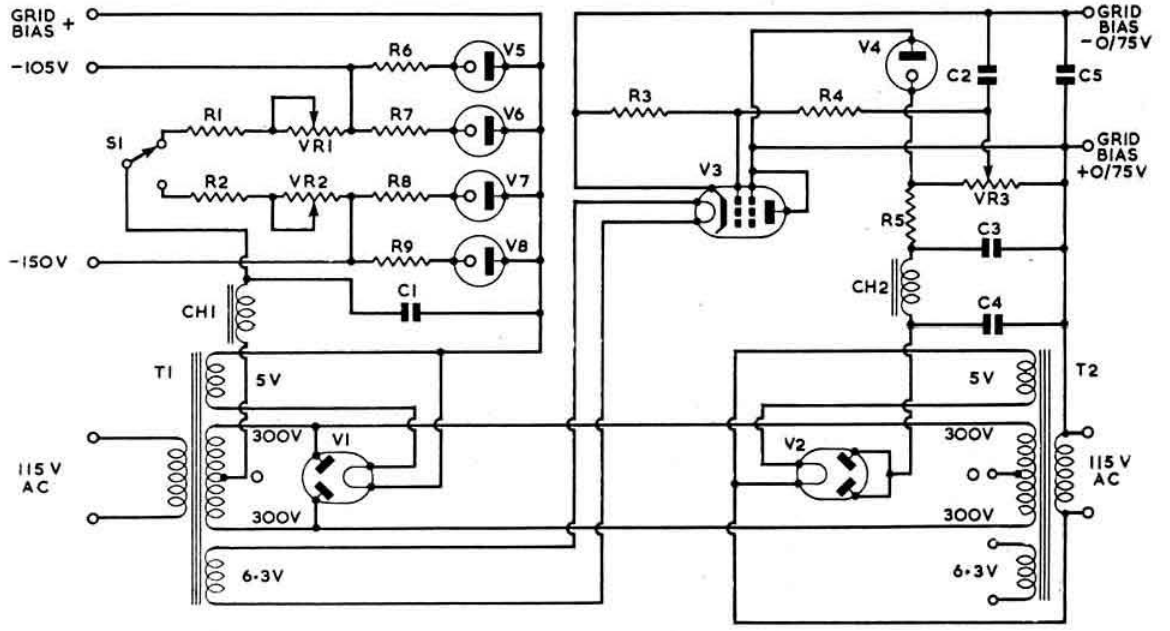


Fig. 2. The voltage regulated grid-bias supply based on the Canadian type 19-2 power pack.

C1, 2, 3, 4, 5, 8μF 450V wkg. or 10μF 750V wkg.* (see text).
CH1, 2, 10H choke*.
R1, 2, 4K ohms.*
R3, 100K ohms ½ watt.
R4, 10K ohms ½ watt.
R5, 25K ohms 2 watt.
R6, 7, 8, 9, 250 ohms ½ watt.
T1, 2, 115V 50 c/s input, 300-0-300V 70 mA, 6.3V 3A, 5V 2A outputs.*
V1, 2, 5Y4G* (if these valves are not available, Brimar 5Z4G or 5Y3GT may be substituted with minor alterations to the base connections).
V3, KT66.
V4, VR75.
V5, 6, VR105.
V7, 8, VR150*.
VR1, 2, 5K ohms potentiometer*.
VR3, 50K ohms wire wound 2 watt potentiometer (Radiospares).

***Indicates components from the original unit.**

are not required and that the four 750 volt 10μF oil-filled condensers are optional in favour of putting in cheap, low-rated electrolytics. The larger items would serve a far better purpose in a modulator power supply. Their removal clears the way for the extra valve sockets for the VR105s, the VR75 and the KT66 regulator, avoiding any need to cut the chassis anywhere. If electrolytic condensers are used (with bias positive returned to chassis) remember to connect them in the proper sense! The unit can be fed from the simplest auto-transformer, as the load is constant or a line reactor can be put in series with the primary of T1 to reduce the voltage to 115 volts a.c. The writer found that an old telephone line-transformer primary was a typically suitable reactor.

Operation

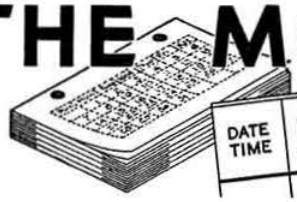
The VR105 and VR150 tubes will ignite with about 8-10 mA current. On switching on it may be necessary to rotate S1 a few times before both paralleled tubes will strike. When grid current flows from the transmitter it passes through the VR tubes, not back into the ignition source. The bias remains solidly constant up to the full loading of the pair. Allowing a maximum of 10 mA bleed current per tube this leaves a safe margin of 60 mA grid current as the maximum rating. The VR75 tube runs constantly at about 5 mA. Other variable or fixed outputs can be added to the pack if necessary. Better regulation can be secured from the variable supply if a valve of very low resistance can be used, such as the type 6A3.

No original work is incorporated in the design as the references reveal. However, it happens only too often that the hypnotised surplus buyer, after the trance is over, finds that his new treasure must go the way of all the previous jewels—into the junk-box. It is hoped that this article will prevent that fate overtaking the Canadian 19-2 power pack.

References

[1] *Radio Amateur's Handbook*, 1954 Edition, page 218.
[2] *Radio Handbook*, Tenth Edition, page 329.

THE MONTH ON THE AIR



By S. A. HERBERT (G3ATU)

THIS month, most of the interest seems to have been aroused by the behaviour of the three high-frequency bands, all of which have been well and truly open at one time or another. It looks as though the coming winter is going to provide conditions approaching those of the peak of 1947, which means that DX will be available on one band or another for twenty-four hours a day—a desirable state of affairs, but by no means an unmixed blessing. The approaching series of DX Contests looms as tests of stamina and endurance more than anything—in fact if one is to make any kind of a show in these mammoth, forty-eight-hour free-for-all affairs, it looks as if an efficient rig takes second place to the need for a Pirie-like constitution!

Ten Metres DX

As prophesised, ten metres opened well and truly towards the middle of September with the North Atlantic path producing strong signals from all over Canada and the U.S.A. The Ws in particular made their presence felt both by their numbers and by the extremely loud signals some of them put across, but openings have by no means been confined to that area. Asia, the Far East, Australia, Africa, in fact all continents have been represented and one interesting occurrence has been the appearance of signals from sundry VE8 and KL7 stations, which were scarce and hard to come by during the last peak. Ten is once again *the* DX phone band—just as twenty is still *the* DX c.w. band—and so the following reports are concerned with phone unless otherwise listed. **B.R.S.20135** (Newport, I.o.W.) found 14 Mc/s so full of loud non-DX phone that he turned with a shudder to 21 and 28 where things were better. On ten, his best catch was VP8BR (Antarctica—18.55 G.M.T.). In addition he heard KA2LZ (10.00), ZL3RB (09.55), ZD8SC (09.50), TI2LA, ZS3AB and CT2AH.

B.R.S.18989 (Solihull) sends his first report. Many years' interest in Amateur Radio was becoming dampened by the prevailing "clutter" on 20 so he was delighted to hear 10 open for VK5RV (12.00), ZE2KL, KP4UY and lots of W6's. An attic dipole, various wires and a pre-amplified S640 did the job for him. **B.R.S.20317** (Bromley) has always been a keen chaser of l.f. band DX but now that the h.f. bands are hotting-up he wonders whether to give up burning midnight oil. His RF26 and BC348 netted him TG9BG, FM7WF, CR7DS, VP3HAG and on c.w., XW8AB, VS1FP, '2CR and some VK's. **B.R.S.20106** (Petts Wood) heard thirty or so countries and considers his best to be W2CSQ/MM (*S. S. Santa Louisa*—off Ecuador), ZS3AB, CR7BB (13.20), ZD3BFC, VK4TN, '6MK, ZL2 and ZL3 at more or less the normal times, but he was in on an interesting evening opening when he heard ZL1ABO and ZL2RC around 20.00, while VE7WW was coming through as late as 21.25. Good c.w. DX came from ST2NG, JA1EC, '3AB, '8AQ (08.30-10.00), VS2CR, '2GU, HP1EH, HZ1HZ, ZD6BX, OQ5RU and UN1AA, with VE8OW (17.30) and KL7AZI (21.10), two more late birds.

Roker House, St. George's Terrace, Roker, Sunderland.

G3BHT (Hightown, Lancs) has done a little chasing now that conditions are getting back to 47/49 shape and as he considers our hobby benefits by putting something into it, rather than just sitting back comfortably, he sends his latest findings. He found the c.w. end quiet with only W and VK4FJ to report but the phone log shows ZS1, ZE6JU and ZD6RM. The latter is the only ZD6 on phone at present while a colleague is on leave. 'BHT finds 120/150 watts and a 102ft aerial, centre-fed with tuned feeders adequate from ten to forty. Your commentator spoke to VS1FE (16.00), VK6FL (12.00) and YN4CB (P.O. Box 4, Bluefields, Nicaragua) but failed to contact XE1PY (18.15), VP2KB and VQ4AA, who still puts over a good signal while operating from a train, using a rotary converter power supply. Around on c.w. were K0GSC/VE8 (Resolution Is.), VU2MD, VS6DE and CR6AI.

Fifteen Metres

Fifteen is going great guns these days, from early morning (with strong ZL/VK's) until late at night (North, Central and South Americans). It sems a far cry to the days when it was regarded as a week-end-only band, yet in fact that was the case just over a year ago. **G3EKN** (Birmingham) has gone QRO (from 40 to 60 watts!) and a 137ft end-fed aerial helped to give him several new ones, bringing his score to 121C. Although he says he rarely manages the "juicy" ones, his list shows some good c.w. DX such as MP4BBL, CR7BS, VE4DB, VE5JI, '5TK (his first VE5's), ZL3 and W7BMI and W7WZW (both in Montana). A Utah QSO would give him W.A.S., so it was bad luck for him to miss W7WSS

One of the best known YL amateurs in the world is Austine Henry (VK3YL) of Murrumbeena, Victoria, seen here (right) with Evelyn Scott (W6NZP) of Long Beach, California. Austine, licensed in 1927, has been an R.S.G.B. member since 1953. She holds B.E.R.T.A., DXCC, and other operating awards. W6NZP was visiting Australia with her husband when this photograph was taken.

one morning. **G3IRU** (Sutton) found the W's strong and everything else weak, but he got new ones in CN8DA and JA1CR on the key.

G3BHT had a phone QSO with OA5G. **B.R.S.20104** (South Harrow) found KG6, KH6, KR6 and ZL phones at S7 to 8 at 09.00-10.00 one Sunday, while **A1328** (London, W.1) used an S640 loaned him by G4AJ to log new ones in VQ4ERR and CE3CZ, plus KV4BB and PY5QZ on phone. **A1357** (Hereford) decided to remedy the silence from that town and reports phones HZ1AB, VP3DFM, VP4LB, '4LF, KP4, YV and VP6, all between 21.00 and 00.00 B.S.T. **B.R.S.20135** mentions DU6IV, 4S7YL, ZD2JHP, ZD4CF, KH6LG, '6ZA (09.30), VS1, '2, '6 and many VK's and ZL's. He heard one G telling another that he had counted seventeen separate jammers doing their worst in one evening! **B.R.S.18989** heard VK1GU (Canberra) and other VK's, KL7RZ and VP4KL. **B.R.S. 20317** got onto OA4C and FB8BW on A3 and XW8AB, VS6 and JA on A1. **B.R.S.20106** adds some exotic ones. On c.w., he heard VR3AA working SP3BL (12.30) and later being called by G's. VP8BZ, ZS7C, UA0KCA and an ET3 followed. On phone, VR2BA was saying good night to G3FPQ at 10.12 and Norman also picked up KX6ZB, VP8BY, VP8BP, VK9DB (15.20), HR1LW (13.00), AP2BP, CP5EP/CP6, ZS9G, FM7WQ (20.00), ZS3BC, CR5SP, UB5WF, VE6TF and the KH6, VK and ZL gang. All **G3ATU** can add to that little lot is UA1KAE (Antarctica) on c.w. at 11.00 and FB8BZ on phone at 18.00.

Twenty Metres

Despite the distractions of the higher frequencies, business continues as usual on twenty but after the comparative peace and quiet of ten—from a local point of view—the terrific racket caused by short-skip strikes one very forcibly and phone DX especially is becoming more and more difficult to work through the S9 QRM. However, we'd better not complain too bitterly—we'd be in an awful mess if the band was taken away!

G3IRU played his part in saving a life when he worked 4X4DR in heavyv QRM/N. Drugs were needed urgently in Israel, and 'IRU and a London amateur (G3AAE at a guess)—who was copying the 4X4 more easily—between them got the wheels turning. Result—a letter via G2MI from the I.A.R.C. President, thanking 'IRU for his part. He got two new ones—KP4JE and JA2AT and so didn't much mind missing YK1DF, ZD3D and KR6SC. G3EKN raised CE3RE and UL7CB for new ones and **G3KBH** (Gravesend) finally got his CR6 with CR6CW on A1, then added BV1US and ZD2DCP. KR6QW, UC2, W5, KL7 and VE6. FB8BX came back but QRM, as usual, intervened! 'KBH tried phone and QSO's resulted with 3A2BF, AP2U and AP2Z, OQ5FH. W6SXI gave him S9 plus but the great triumph was an R5, S5 from VK2AHT. Got-aways were ZP9AY, DU7SV, HZ1SD, ZD4BT, EL2S, '12C, ET2US, KX6BQ, KH6ER, UA1KAE, HI6EC, KG6NAA (trafficking and so not called) and ZC3AC. (A pretty list in any log!). **G2ZR** (Bath) adds to the W5CFG story. A QSL from him states that 'CFG is 17, has 37Z and 217C to his credit and is now chasing British counties. Recent DX from '2ZR has been VK9XK (Papua—20.50), W6, '7, '0 worked and HH3DL, ST2NG and VE2ACW/VE8 (Southampton Is.) heard.

G3BHT got VE8CT (Yukon) and he too worked the type signing EA0AM—name Xan—Fuchs aerial—who he (and G3ATU) suspects is nearer DL than EA0. **B.R.S. 20249** (Sutton) added UA9DX, UH8KAA (08.30) and UG6AB to his c.w. score and heard JA1FI and VQ5GJ through numerous over-eager callers, while **B.R.S.21049** (Shrewsbury) got A3 from UC2KAB and KL7ACO. **B.R.S.20104** says little DX has crept down his feeder lately, then mentions VR2BA (Box 201, Nadi Airport), FB8ZZ (14040-20.00), VK1ON (said to be on Cocos Is.), YA1AA (R. L. Peck, 3428, South St., Lafayette, Ind.), ZS2MI (Marion Is.) and RAEM, active again after years of silence. RAEM was originally the call of the Soviet ship *Chelyuskin* and is now the personal call of its former chief operator, Ernst Krenkel, to whom it was given in reward for his work when the vessel had been smashed by ice in the Polar Sea in 1934. 20104 heard HC8GI (Galapagos) on phone and a week later realised it was a new one. **A1328** heard TA3US, VP6FO and ZB1CA—all new to him, while **A1357** was pleased with KX6BP. **B.R.S.** 20317 had new ones in UL7CB and AP2RH, CP3CA, CR4AH, FY7YC, FL8AB, FG7XC, FE8AE, PZ1AP, UI8, UJ8, VP4LG, '7NS and VU to boot. **B.R.S.20106** heard XW8AB (18.00), UH8BA, KB6AQ (06.45), KW6BC (13.00—calling KJ6BP) on c.w. FW4DZ (13.15) on phone sounds interesting, as do UL7CB and VR4AA calling F8PQ, but VR4AA (Danny Weil) is off by now, bound for pastures new. FL8AB continues to dodge your commentator, who heard ZD9AE weakly at 20.00 working KH6. SV1AB (Athens) is ex-F9QN, VP6AM is ex-G3CDR, VS6HR. ST2DD (Jack Darkey) is a new licence in the Sudan. ST2NG keeps the c.w. men happy with his expert activity and ST2DB does similar service for the audio-minded types.

This photograph was taken on June 24, 1956, at the home of ZD4BV in Takoradi, to mark the occasion of the first Hamfest to be held in the Gold Coast. Standing (l. to r.) ZD4BT, 4BV, 4BL, 4BR, 4BO, XYL-4BQ, S.W.L., XYL-4BT, 4AE, 4AF, 4BF, 4BQ, G3QP. Sitting (l. to r.) XYL-4BR, XYL-4BF, G3QP Junior, ZD4BK, XYL-4AF, XYL-G3QP.

Forty and Eighty Metres

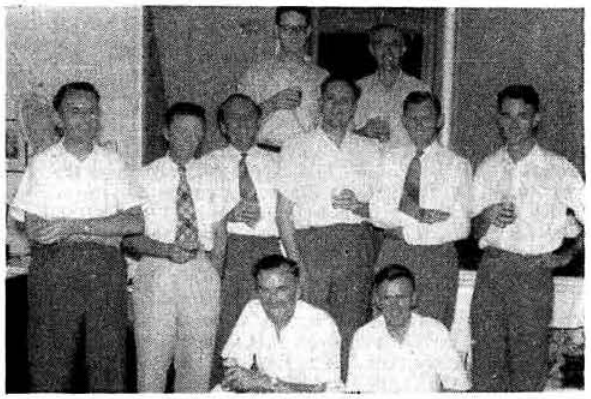
Somewhat naturally, with things happening elsewhere, both bands seem quieter than they really are and not many people spend much time on them. However, **G3BHT** seized PX1EX on *forty* and **B.R.S.20317** did well with KZ5BE, OQ5DT, OY1R, UI8KBA, UM8KAA, VS1GZ, VQ4DT, VE8AW (05.50), VK3GU, XW8AB, YI2DX, ZB2CT, ZS1DL and 4X4FK (and there's nothing wrong with a band that holds that lot!). Bill checked *eighty* and came across K3UD/OX (00.30), OY7ML, UO5FC, UB5 and UA3. **B.R.S.20106** combed *forty* for ZS1KJ (19.47), UA9AE, UA9CM and UI8KBA, while **B.R.S.20249** heard TF5TP for a new one there. **G3NT** (Northallerton) worked an SP2 on *eighty*, though someone apparently disapproved and QRM'ed the SP each time he replied. UA1 and SP9 were heard and 'NT is looking for W, LU and PY on the band and wonders about times for them. Well, G3ATU had old-timer PY2OE come back to a CQ DX recently at 23.30 G.M.T.—a pleasant surprise—but that is too early normally. The early hours should be more reliable these days, especially for S. America. Incidentally, '3ATU heard GM3FDN/M/Aden make a short CQ at 18.45 but nothing resulted and he wasn't heard again.

Top Band News

GM3KHH has started up from Elgin, Morayshire and a local evening net with GM3COV (Caithness) and GM3AUD (Ross-shire) is blossoming; '3AUD will be /P in Sutherland in the near future and '3KHH is often in Nairn, where a /A address is almost ready. Portable excursions to Banff will, no doubt be arranged at an early date. G3NT will be there for the G/ZL attempts and says it would be interesting to know what the "experts" use by way of aerials and p.a. valves. He has had reports from Poland on his Top Band signals, but, so far, no W QSO's.

Overseas News

G3KRD/VS6DL has news of interest to Top Band DX chasers. He is moving shortly to a good location—actually the site where VS6CO did his 160/80 tests—and will try to *sked* anyone interested, possibly during November, December. He will use crystal control (he has plenty of "rocks") and is open to any suggestions likely to help a successful QSO. Write to W.O.II W. J. Northcott, 7592680 R.A.O.C., Sgts. Mess, 11th Inf. W/Shops, R.E.M.E., B.A.P.O. No. 1.



Rare DX
Although not a very good one this picture, taken by the Chairman of the Fiji Radio Club (VR2AS), depicts some of the most sought-after DX men in the world. L. to r. (standing) VR2CV, 2CW, 2BB, 2AD, 2CT, 2AA; (back) VR2AM, 2AS; (front) VR2AP, 2CM.

The following cryptic message was left at the R.S.G.B. stand during the Radio Exhibition at Earls Court and is printed without comment- "Any cards outstanding from AP2Z contact George Shell, c/o Rimmer & Shell Electronic Development Co., 354 North End Road, Fulham, S.W.6."

* * *

And that must be all for this month, except to wish everyone excellent hunting on all bands. Reports welcomed as usual, to arrive if possible before October 22. Good luck and 73.

Frequency Predictions for November, 1956

PREPARED BY J. DOUGLAS KAY (G3AAE)

BAND	NORTH AMERICA	CENTRAL AMERICA	SOUTH AMERICA	SOUTH AFRICA	NEAR EAST	MIDDLE EAST	FAR EAST	AUSTRALIA
28 Mc/s	1130—2000	1030—2000	1000—2000	0700—1800	0630—1700	0630—1600	0630—1500	0700—1500
21 Mc/s	1100—2230	0930—2100	0800—2200	0630—2100	0600—1900	0600—1800	0600—1700	0600—2100
14 Mc/s	1030—0000	0830—0300	ALL DAY	0600—2200	ALL DAY	0600—2000	0600—0000	0500—0000
7 Mc/s	2100—0800	2300—0200	2300—0400	1800—0100	1800—0400	2000—0200	2200	1500—2000
3.5 Mc/s	2230—0700	2300—0200	0000—0400	0000	2000—0200	0000	2200	0600—0700

These predictions are based on information provided by the Engineer-in-Chief of the Post Office. All times are G.M.T.

TWO METRES AND DOWN

By F. G. LAMBETH (G2AIW)*

New European 23cm Record

A VERY considerable light has emerged from under its bushel in the shape of a most interesting report on 23cm activity from G6DP (Frodsham, Warrington). It appears that experiments have been conducted over some extensive period with G2JT on this band. On Saturday, September 1, 2-way was established between GM2JT/P on Criffell (1866 ft) in South Kirkcudbright and GW6DP/P on Crib y Ddisgl (3493 ft) about ½ ml N of Snowdon. The distance is given as about 130 miles, which should take the European record, hitherto held by two Czecho-Slovakian amateurs. This is a remarkable achievement, the more so because little has been heard of these activities previously. Hearty congratulations to the two operators concerned.

The apparatus used at both ends was essentially similar, a CV90 oscillator with 6C4 modulator as transmitter and a 6C4 quench as super-regen receiver. Power for reception at both ends was taken from dry batteries. Power for transmission at 2JT was obtained from a lightweight petrol generator specially built for the purpose and giving an input of about 10 watts. At 6DP a hand generator was employed to give an input of 5/6 watts. The aerials were both 11 element Yagis fed by about 1 ft of 70 ohm twin. The path is radio optical and the signal strengths on m.c.w. were steady S7/8 both ways with no fading (a marked contrast to a 70 cm contact over the same path in October 1949) but this may have been due to prevailing conditions rather than to frequency difference. The frequency used for the tests and for the actual QSO was about 1217 Mc/s, *i.e.* at the low end of the band. The weather was fine but cold.

After this success it was planned to try on the following day to make contact over a more difficult, non-optical, path from Snowdon to Hart Fell (2651 ft), on the Peebles/Dumfries border, and also to keep a look-out for any other stations which might have been operating in the R.S.G.B. tests but the weather was unfavourable and no contact was made.

In spite of this disappointment it has been abundantly proved that the aspirations of the operators were amply justified and we look forward confidently to their further progress. At the moment, this progress seems only limited by the weather and the available mountains ! Both 2JT and 6DP will be glad to carry out tests with other interested workers.

23 cm in U.S.A.

From *QST* (September, 1956) we learn that W8IHK/6 and W6IFE/6, working from Point Loma San Diego (Calif) worked W6VIX/6 near Santa Barbara on June 9 last. The distance was 190 miles, and is a record for this band. QSOs were also made on 3300 Mc/s. K6BAT/6 (with W6CDT, W6VSV, K6BAT and W6LRB) also worked K6AXN/6 on 1296 Mc/s at 160 miles (holding the record for 4 hours !). A further contact at 185 miles was made on June 10.

Altogether some very creditable achievements.

*21 Bridge Way, Whitton, Twickenham, Middlesex.

23 cm in Scotland

GM6ZV and 6WL had a phone QSO on September 2, when 6ZV was R5S5 and 6WL R5S9. They were both heard in Glasgow by GM3DYC at 58, with his high performance receiver on 70 cm!

Station Reports—2 metres

It seems fitting that pride of place this month should be given to a 2m QSO between GM2JT and GW6DP on the evening of September 1. GM2JT/M was operating about 5 ml NW of Kirkcudbright and about 600 ft a.s.l. and GW6DP/M from the Great Orme, Llandudno, at about 500 ft a.s.l. Signal strengths varied between S8 and zero but allowed the required information to be exchanged on a mixture of phone and cw.

B.R.S.16075 (Shirley, Southampton) found very good spells with openings to the Continent and Northern Ireland. A distinct flutter (noticed also on previous occasions) occurred on both the 2m and higher wavelength bands for at least 24 hours before "Two" "opened up." Weather had been varied but the barometer had been steady around the 30-in. mark. The most outstanding signals were F8XT (Charente), GI3GXP and GC3EBK (who overloaded the converter). A remarkable point is that all stations were received with the beam pointed North.

B.R.S.19162 (Dewsbury) states that conditions began to improve on September 9. On the 13th GC3EBK was heard for the first time. The only other station heard that night was G3IRS (Locking). G5BD/M was, however, logged on the 17th whilst near his home QTH—a distance of 80 miles from Dewsbury.

B.R.S.20133 (Melton Mowbray) also found 2m wide open and hopes it will remain so. A few weeks ago a single slot with two reflectors was erected at 15 ft (outside) and for 14 days little success was achieved, although all signal strengths were up. The 4 element Yagi was erected at 20 ft and signals were received from far greater distances. His greatest thrill was to hear GC3EBK. His joy will be content when he hears some continental signals. An operator in the Midlands who deserves our appreciation for being active under good or bad conditions, with a very consistent signal, is G3JWQ (Ripley, Derbys). His partner G3JWU is also very active.

G2CZS (Chelmsford) worked ON4HN, G3JWQ and GC3EBK (a new country) during the last good period. OE9BS has been reported heard in Belgium (freq. 144.9 Mc/s, gleaned from a QSO between ON4HN and G3EMU).

G3EMU (Canterbury) is happier this month having worked some new Gs. As almost anything inland from his surrounding hills ranks as DX, we quote them—they are G3FZL, 3GGJ and 6OX. Many contacts with Continentals have been enjoyed, in fact on some occasions it has been possible to work them all day! G2AIW has now had his first QSO with 3EMU.

G8LN (Plumstead) states that most South London operators are regarding 2 m as hopeless during the evening as activity is so low; it was even so during the

European V.H.F. Contest. '8LN was fortunate enough to raise ON4AC for a first. It would appear that good conditions on 10 m do not necessarily imply that they are also good on 2 m. '8LN remarks that G3ANB (Brightlingsea) is still QRT because of TVI but is experimenting with G3IEX to overcome this trouble. (Incidentally G3ANB was heard working G5KG and 6LL at good strength during the evening of September 19.—F.G.L.) '8LN asks whether it is possible to co-operate with REF, UBA and VERON to arrange transmitting and listening times for test evenings once or twice a month. Gs to transmit at say 21.00 G.M.T. and Continentals at 21.15? (Anything is possible if there is the will and the desire—EDITOR.)

G3GZM (now at Tenbury Wells, Worcs) has been inactive owing to a change of address. He hopes to be on 2 m very soon. His new QTH is 325ft a.s.l. G2HKQ (Poole) comes into the 2 m picture having raised GC3EBK as his introduction to the band! The power used was 20 watts with an indoor 3 element beam 15ft above ground. '2HKQ says Dorset doesn't appear very often in these notes. He promises further news of the County in due time, for which many thanks in advance. As a point of interest his QSO with GC3EBK was his first on any frequency above 28 Mc/s.

G5MR (Hythe, Kent) found conditions good on the Saturday evening of the IARU Contest and worked 15 stations. The Sunday morning was very quiet and by 08.00 it was raining heavily. This practically stopped QSOs, only 3 being achieved, but towards the second evening, and the end of the Contest, conditions stepped-up again, G8IL and GC3EBK being worked in the last 20 minutes. '3EBK (195 miles) was the best DX worked or heard. On September 14, F8XT (375 miles) was worked again after a lapse of nearly 3 years.

G6XX (Goole) managed a couple of S9 QSOs with GC3EBK on September 13 and 17. F8GH and PA0BL were heard at S4 on the evening of September 19 using *one* watt! G3KHA (Bristol) has worked about 45 stations during the last month, the best being ON4WI (Ostend). G2BZ (London, W) is making spasmodic appearances and is well heard but no QSO has yet materialised.

G3JGJ (Plympton) still keeps up a sked with GC2FZC, but a "shadow sked" with EI4E has so far brought no results. G3EOH/A was contacted recently on 2 m from Looe and was worked crossband (2m/70cm) from near Plympton. From September 9 3JGJ has been beaming NNE (to S. Wales) and then NE, ENE and E between 19.00 and 19.20 (clock time) also SE (Channel Islands) at 18.20 to 18.30. SWL and other reports (preferably daily, with weather and barometer) will be welcomed.

B.R.S.18572 (Mitcham) has found the band somewhat better lately. ON4WI was very good on September 8. Conditions were excellent to the North from September 13 to 19. GW8UH (Cardiff) writes after a long interval having been mostly QRT for various good reasons. F8XT (near Bordeaux) was worked on September 14 at S9+. Three other French stations were heard, all on the North Coast and no better than S6! Conditions to the East have been poorish, only a few stations being heard lately.

Northern Ireland—Channel Islands

We are pleased to report a QSO between GI3GXP (Kilkeel) and GC3EBK (Guernsey) on the night of September 13/14 for a GI/GC (or GC/GI) first. The contact was on c.w. under QSB conditions but was successful. Congratulations to both operators.

Scotland

GM6WL reports on GM3BOC/A and /M at Brora and in Caithness. GM6KH (Hamilton) worked 3BOC/A (Brora) on August 31; 3BOC 339 and 6KH 459. On September 1 GM3EGW (Dunfermline) was in contact with 3BOC/M in Caithness. '3BOC said he had heard GM3NG (Carluke) at around 22.45 B.S.T. when the latter was sending CQ. '3NG did not hear '3BOC but contacted GM2FHH (Aberdeen) on phone. Since then EI2W has been working into Scotland at up to S9 (August 21). GM3BOC/M again heard GM3NG on c.w. (September 4). On September 6, GM3IBV (Larkhall) worked 3BOC/A (Brora, Sutherland) R5S5 phone and on September 8 both 3IBV and 3NG worked GM3BOC/M at Rumbling Bridge (Kinrosshire) on phone. Finally both 3IBV and 3NG have had a QSO with GM3JFG (Invergordon).

On Monday, September 10, GI3GXP was heard on c.w. by GM6WL (559) but no QSO resulted. '6WL says that "super scatter" will solve the difficulty of contacting London. The idea is to pre-record the message, transmit it at about 1,000 words a minute, then re-record it and slow it down for elucidation! It seems a bit complicated but it is passed on for what it is worth. '6WL finally reports an opening to the south on the night of September 17. GM6KH worked G3GPT, phone and c.w. and G3CCH and G5BD on c.w. GM3NG worked G3GPT (c.w.) whilst 3DIQ worked 3GPT on phone. GM3EGW also contacted several G stations.

G2FHH (Aberdeen) found the advent of GM3BOC/A very welcome, QSOs always being possible at about 100 miles distance. Two new stations have appeared in Dundee, namely GM4HR and 3KYI and both are active. 2FHH has also worked 3JFG (Invergordon) at last! G5YV was heard on September 18 at 569, but no QSO resulted.

EI2W (Dublin)

Conditions improved somewhat on the night of August 21 and 22 when GM3DIQ, GM6KH, GI3GXP and GM6XW (Larbert, Stirlingshire, for a new county), G3HWC, 3EPW, GW3FKO/P (Cardiganshire) and G3KFD were worked. It rained practically the whole weekend of the European V.H.F. Contest and conditions were very poor. The only station heard in Dublin was GM6WL on the Saturday evening (working a local!).

G2AIW was privileged to visit EI2W during the weekend of September 14-16 and was able to hear DX from four countries in record time! G3EPW, GI3GXP, GM3DIQ, G2HGR and EI9C provided OM Fred with an international V.H.F. cocktail. A personal QSO with EI9C followed.

A new station on the band is EI6N (Dublin).

I.A.R.U. Contest

Nothing much has appeared in the reports about the I.A.R.U. (Regional) Contest on September 9/10. It might be thought that conditions were poor but the writer's experience was that in the Home Counties Saturday night was excellent with stations at good strength (including a superlative ON4WI (Ostend)). The only thing lacking was activity. Sunday morning was quiet, the afternoon was nearly dead, but conditions then again steadily improved towards the end of the Contest. Indeed Sunday evening was eventually quite good.

70 cm

G5MR (Hythe, Kent) has constructed a simple tripler (832) and a single slot. A QSO was had with F8MX (St. Valery), crossband because 5MR's converter was not ready. The slot was not up either, so the 832 tripler

was connected to the 2m slots, and F8MX reported 5MR's signals to be R5, S6/7, T9 at a distance of 81 miles. The path is of course favourable, but the input was only 12 watts!

G2XV (Cambridge) reports that the R.S.G.B. 70 cm Contest started off well for the first hour and then conditions rapidly deteriorated. The high spot of the month was September 14 when the band opened up "magically". Calls were received from all directions including G5LL (Lincs), 2BVW (Leics), 6NB (Bucks) and 3HAZ (Birmingham). The modifications to 2XV's 40 element beam have "paid off". He says that what we need now is for a few other operators to take 70 cm seriously and it will then become a valuable communication band.

G5UM (Knebworth) reports: "Sunday September 9 could hardly have been a worse day from the point of view of conditions on 70 cm. A solid wall of water descended from the sky for most of the day, at least so far as South-east England was concerned. The absorption factor, so vital to this band, must have been truly colossal. However, there was one good thing about it: lots of chaps who couldn't do their Sunday gardening found that going in for the contest was a very satisfactory substitute!" This certainly applied to 5UM. "As usual", he says, "I put up no great score, working only 13 stations, none of them more than 40 miles away. The great thing was that activity on 435 Mc/s was really stimulated; it raises the perennial question: "Why does it need a contest to make the boys use the band?" Reactions to any other methods of stimulating activity (*e.g.* the suggestion for a 70 cm chain of stations running east-west and north-south) meet with significant silence".

On another subject: an unexepected source of great pleasure is working full duplex 70 cm to 2m. One snag: one very quickly runs out of things to talk about because there are no "overs" to allow time to think. Yet perhaps this is not wholly true: no v.h.f. addict *ever* runs out of subjects to talk about!

G3KHA (Bristol) has now got on 70 cm by way of an excellent QSO with G3FZL (London). A sked is now in operation, with reports 579/589. In spite of this success '3KHA is surprised that he has not yet succeeded in hearing 3HBW or 3KEQ!

Scotland

GM3DYC is now all set on 70 and will soon be starting tests with GM3DDE (Edinburgh). 3DDE receives '3EGW at S8 on c.w. over the somewhat shorter path from Dunfermline.

Jock Kyle reports that GM3EGW has renewed his interest and is now transmitting as well as receiving. Efforts are being made to get across Scotland from east to west and *vice versa*. 3EGW has just made it with 3NG for a first QSO (on c.w.). GM6ZV (37 miles) managed to get his carrier across to Dunfermline with the b.f.o. on, but phone was not readable. The report was received crossband, as 6ZV has no receiver for 70 cm.

Ireland

EI2W (Dublin) has constructed a 32 element stack for 70 cm and will be on the band during the winter when conditions are favourable. The writer has seen this aerial, and if it works as well as it looks we can expect some excellent signals in due course.

Three Centimetre News

Three centimetres now! This final item is only so because it arrived late. G3BAK (Havant) reports that G3LZ and himself are again active on 10000 Mc/s and have started off well with a two-way QSO over a quarter mile and crossband over five miles using 28 Mc/s as a link. They want to get in touch with any other interested parties who may like to help them in their attempt to beat the world record of 100 miles. Anyone who is "line of sight," say 40 or 50 miles (or more) from the South Downs peaks (either easterly or westerly), could be very helpful.

* * *

That's all for now, quite exciting for the s.h.f. for a change.

November reports by October 22 please.

Worked and Heard on Two

B.R.S.6327 (Earlsfield) September 16.
Heard: F9EA, G2ANG, 2FMJ, 2HCG, 3BJP, 3EYV, 3FAN, 3GHO, 3HES, 3JTQ, 3JWQ, 5YV, 6UH, GC3EBK.

B.R.S.16075 (Shirley, Southampton) August 20–September 19.
Heard: F8XT, G2ADZ, 2AHY, 2ANS, 2BMZ, 2DSP, 2HCG, 2FMJ, 3AGA, 3AUS, 3EGV, 3FGN, 3FGT, 3FMO, 3GHO, 3GPT, 3HBW, 3HRH, 3HXS, 3IOO, 3IRA, 3IRS, 3JFR, 3JHN, 3JWQ, 3KHA, 3KPT, 3KSR/P, 2AK, 2NM, 2YB, 2XV, 2YU, 2YH, 3WW, 5SM, 5KG, 5KW, 5YV, 6AG, 6NB, 6OX, 8AL, GC3EBK, GI3GXP, GW8UH, GW8SU.

B.R.S.18572 (Mitcham) August 21–September 20.
Heard: G2XV, 2ANS, 2CIW, 2DSP, 2FJR, 2FNW, 3WW, 3BJQ, 3CGJ, 3FGT, 3GHO, 3GOP/A, 3GPT, 3GWB, 3IRA, 3JWQ, 3JZG, 3KQR, 5BD, 5DW, 5YV, 6XX, ON4WL.

B.R.S.19162 (Dewsbury) August 19–September 19.
Heard: G2CIW, 2FMJ, 2FJR, 2WJ, 2XV, 3CGQ, 3FZL, 3GHO, 3HBW, 3HTY, 3HXS, 3INU, 3ION/P (Oxon), 3WW, 5KG, 5KW, 5MA, 6AG, 6NB, 6OX, 8AL, 8KW, 8VZ, GC3EBK.

B.R.S.20133 (Melton Mowbray) August 21–September 18.
Heard: G2FNW, 2HGR, 3ALC, 3DKF, 3DMU, 3IVF, 3IWJ, 3KUH, 3GPT, 3JWQ, 3JWQ/P, 3JWU/A, 3JWW, 4JJ/A, 4MK, 5KG, 5ML, 5YV, 5AU, 6AG, 6XX, GC3EBK.

G3EMU (Canterbury) August 21–September 19.
Worked: G2JF, 3FZL, 3GGJ, 3JNI, 5MR, 6NB, 6OX, 8BJ, 8RK, F3AL, 3LQ, 8GH, 9EA/P, ON4IE, 4BZ, 4MN, 4UD, 4OZ, 4AC, 4WI, PA0FB, 0NO, 0BL, 0IPL. *Heard:* G2AIW, 2FVD, 3GOZ, 3HBW, 5KG, 5KW, 5MA, 8KW, 8RW, GC3EBK, PA0RTD/P.

GW8UH (Cardiff) August 19–September 20.
Worked: F8XT. *Heard:* G2DVD, 2FJR, 3GHO, 3KEQ, 3WW.

GC3EBK (Guernsey) July 25–August 9.
Worked: F8MX, 9QE, G2JF, 2UJ, 2YB, 2AIW, 2ANS, 2BVN, 2CIW, 2DSW, 2DVD, 2FVD, 2HDZ, 3JR, 3WS, 2XC, 3YZ/P, 3DKF, 3DVK, 3FAN, 3FIB/P, 3FIH, 3FJR, 3FMO, 3GHO, 3HRH, 3HXJ, 3IRA, 3IRS, 3IUL, 3JMS, 3JUG, 3KEQ, 3KHA, 3KPT, 3KUH, 5BP, 5KW, 5MA, 5YV, 6AG, 6NB, 6OX, 6XX, 8AL, 8DA, 8KW, GW8SU.

GW3GWA (Wrexham) July7–July 8.
Worked: EI9C, F9EA/P, G2CIW, 2DCI, 2DVD, 2HDZ, 2MV, 3EGE, 3FAN, 3FIH, 3HTY, 3IRA/P, 3JGY, 5DW, 5IG, 5KW, GI3GXP.

GW8SU (Porthcawl) Jun 27.
Worked & Heard: G2NY, 2BMZ, 2HCJ, 3GHL, 3GPT, 3HDW, 3HHY, 3HYH, 3IRS, 3KHA, 3KQC, 5DS, 5KW, 5MA, 5US, 5YV, 6NB, 6OX, 8RW, GW3FXR.

70 cm.

B.R.S.18572 (Mitcham).
Heard: G2DD, 2RD, 2WJ, 2AIH, 2HDJ, 2HDZ, 3DF/A, 3EYV, 3EYV/A, 3FD, 3FP, 3GDR, 3GTH, 3HBW, 3IRW, 3KEQ, 5DS, 5DT, 5CD, 5KW, 6NB, 6NF.

DX Television Predictions for November, 1956
Prepared by J. D. Kay (G3AAE)

Barbados	1200-1730	Colombo	0800-1430
Trinidad	1200-1700	Karachi	0800-1330
Buenos Aires	1400-1800	Singapore	0800-1300
Rio	1200-1730	Perth	0800-1300
Santiago	1530-1815	Cairo	0800-1530
Falkland Is.	1500-1700	Accra	0800-1600
Cyprus	0800-1500	Dakar	0900-1700
Aden	0800-1500	Nairobi	0800-1600
Baghdad	0800-1430	Salisbury	1000-1630
Bahrein	0730-1430	Capetown	1000-1700
Tel Aviv	0800-1500	Jo'burg	1000-1700
Bombay	0800-1400		

G.M.T. throughout

CQ Single Sideband

By H. F. KNOTT (G3CU)*

IT is now five years since this column was first introduced and seven years since the single sideband system of transmission was first used by British amateurs. Although the adoption of the system has not been quite so rapid as was at first anticipated, its many advantages are now being quickly appreciated. The number of new stations who have joined the ranks of s.s.b. enthusiasts during the past year has certainly been most encouraging. It is obvious to those who listen regularly that changes in equipment and operating practice are gradually taking place. Today many hundreds of amateurs throughout the world enjoy the improvements which the system provides in signal-to-noise, more talking power, decreased bandwidth, and less distortion.

Much has been written in the BULLETIN on the subject of s.s.b., and many circuits of the more popular types of exciters have been distributed together with advice and offers of help. When considering power ratings of over 50 watts, the cost of s.s.b. equipment is probably far less than that of an a.m. transmitter, whilst the technicalities involved in the adjustment of an s.s.b. transmitter are not difficult—only different.

The development of receivers for this mode of operation has, unfortunately, not kept pace with the progress of the transmitting equipment. However, this is no real disadvantage and is something that is being looked into at the present moment for even those amateurs who have installed only a single half-section lattice filter are finding the benefit of an almost flat-topped i.f. response characteristic in their receivers.

DX Bands

VE3EGO (ex-G3IXL) having settled in Kitchener, Ontario, is now active on 3.5 and 14 Mc/s with a phasing rig feeding a multi-band aerial; he is running 150 watts to a pair of 6146's in parallel. The receiver is a Collins 75A4. During the past few weeks two-way contacts have been established with, among others VK2AEE, VP4AB, ZS6FN and VQ4EO. Stations heard but not contacted include G3MY, G2HQ, G6LX, OZ7T, OZ3EA, ZS7AG, TF3CJ, and HB9FU. All signals were of a good strength. VE3EGO, complains however that very few DX operators listen for Canadian stations, being content only to check the U.S. phone band. He remarks that several Canadian stations are now using s.s.b. and that they usually operate between 14305 and 14310 kc/s. VE3EGO who is looking for G contacts operates daily between 1 p.m. and 1.30 p.m., 5 p.m. and 6 p.m., and 11 p.m. onwards (G.M.T.). It should not be long before s.s.b contacts between this country and North America again take place on 75 m. At the moment, W5's and W7's are often audible in Kitchener. Many Canadians also use that band.

AP2BP appears to have worked most of the s.s.b. G stations on 14 and 21 Mc/s, the most consistent contacts being with G2IG and a new arrival, GW3EHN. G3CWC was heard testing but contact was not established. AP2BP comments that it is rather nice being rare DX. He also finds that the QSOs are of a pretty high standard—14 Mc/s operators being just as keen to engage in a good technical discussion as those working on 3.5 Mc/s. So far AP2BP has worked 40 countries in all continents using s.s.b. He has also worked about 100 U.S. s.s.b. stations in 25 States. His rig is similar to the one he used in England (phasing) but band-switching has now been added to the exciter for 3.5, 14, 21, and 28 Mc/s operation. AP2BP expects to be back home by Christmas.

G3HRO reports continued activity, with one particularly interesting "round table" when a 12-way QSO took place between stations in four continents namely 3 VK's, 4 ZL's, a CL8, W6, W8, CN8, and a ZS5.

Two Metres

G3ILI who has been operating on 144 Mc/s with s.s.b. has worked 15 stations and is delighted with the results. All contacts have been completely intelligible even with self-excited oscillators in the converters. This has been most encouraging and is quite contrary to the many predictions. He is now carefully designing a 2 metre linear using a 4X150. As this is proving to be quite a mechanical puzzle it will probably be some time before it is ready. In the meantime a more conventional p.a. is in use with four 8012's in push-pull parallel with a calculated peak output of 280 watts. G3ILI is also building an experimental medium level mixer-cum-linear to convert the 2 metre sideband to 70 cm. The whole secret and ease with which s.s.b. is received at these frequencies is a direct function of sideband suppression. This has been demonstrated by artificially degrading it by measured amounts.

As in England, a great deal of interest is being shown in 2 metre s.s.b. operation by U.S. amateurs. Most v.h.f. enthusiasts are always keen to try out a new system which will extend the reliability and range of operation—sideband is apparently demonstrating just this. Wherever marginal conditions exist s.s.b. clearly shows its superiority. W3HWN runs a pair of 4-125's; K2TKN uses 925 watts; W3YNI has a crystal filter on 447 kc/s and an 829B final in AB2. W3BOL and K2QCI are also active. A point of interest reported by W1HDQ is that s.s.b. interest is high among v.h.f. men, and that on 50 Mc/s s.s.b. along with scatter propagation appear to combine nicely Results being obtained regularly on several 50 Mc/s scatter circuits indicate that voice-controlled s.s.b. could provide the long-sought means of working v.h.f. DX on telephony, eliminating the time spent in waiting for the band to open before long distances can be spanned.

Round and About

On 3.5 Mc/s activity is still very high with the usual quota of stations operating around 3795 kc/s. GC5ZC (Guernsey) recently made his debut using a filter at 36 kc/s and an 813 in the final; he puts a good signal into most European countries. G3FJN and 3KOK are also new to s.s.b.; while G2HMI, G3BUJ, G6HV/M, G3GRO, G3IRP, G3EBL, GI3ZX, ON4CC, and PA0VGR are to be heard most evenings. G3ABJ has a new linear, G5BJ uses a phasing rig ending up with a 4-125A, with G3CWB running a pair of 807's. G8OS is building sideband equipment as is G3KEU although the latter is concentrating first on the receiving side. GI3ZX has now completed his new receiver which consists of a double superhet with crystal controlled converters. The second I.F. is at 85 kc/s and he has a half lattice crystal filter incorporated. His receiver includes a novel form of a.g.c. to replace the normal a.v.c., details of which will be available soon.

In Holland PA0PUY, 0DK, 0IF, and 0VGR are often heard on 3·5 Mc/s, although most of PA0IF's operation is on 14 Mc/s, where his new 75A4 receiver should give a good acount of itself. DL4YU and DL4LZ expect to return to the U.S.A. shortly; the latter will then be operating s.s.b. under the call W8UFN. He will be remembered by those who attended the SSB Conventionette held in London last year. Some renewed activity is apparent on 7 Mc/s where G3ILD and

*15 Hampden Road, Wantage, Berks.

G3AUB are putting up a good show on this rather neglected band. They ask for greater support and more activity on this frequency. 28 Mc/s too, has attracted a number of G stations, apart from the U.S. operators already there. G5IX is very pleased with his results, as is G3HJK who has been heard consistently working in U.S. nets.

A Simple Boost Amplifier

When operating on some of the higher frequencies AP2BP found that to make it a little easier to drive his 813 in Class AB2 (previously driven by a mixer stage) a simple amplifier was installed and found to be more than adequate. The circuit in Fig. 1 shows

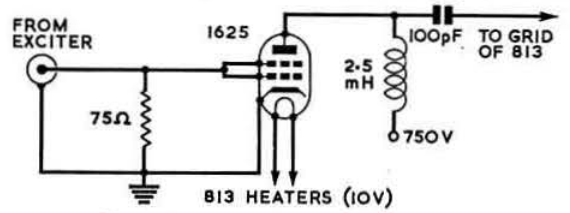


Fig. 1. A novel amplifier for s.s.b. operation.

a 1625 as a driving stage in Class B, zero bias. This novel circuit gives a useful amount of amplification with little modification to the final amplifier. The idea was suggested by G2IG during one of their many QSO's. The 1625 derives its heater voltage from the 10 volt supply of the 813, the control and screen grids being tied together and earthed through a resistor, which may be of any value between 75 and 400 ohms. This acts as a termination for the output link of the previous stage. The plate of the 1625 is connected *via* a 2.5 mH r.f. choke to a 750 volts supply and the coupling to the grid circuit of the 813 is through a 100 pF capacitor. In AP2BP's rig the valve is "wired in" and supported by a large resistor clip around the base.

* * *

Notes and news for inclusion in the January issue should not be sent later than December 16, 1956.

North Western Regional Meeting

SUNDAY, NOVEMBER 11, 1956

BRADFORD HOTEL,

TITHEBARN STREET, LIVERPOOL

Programme

Assemble	12 noon
Lunch	1 p.m.
Business Meeting	2.30 p.m.
Buffet Tea	5 p.m.

Followed by Film Show, Raffle and Lecture, "The Antennamatch" by F. Hicks-Arnold, G6MB.

Tickets 15/- each inclusive from the R. R., B. O'Brien G2AMV, 1 Waterpark Road, Prenton, Birkenhead.

The President (Mr. R. H. Hammans, G2IG), the Zonal Representative (Mr. W. R. Metcalfe, G3DQ) and the General Secretary will represent the Council. Mr. F. Hicks-Arnold (G6MB) and H. W. Mitchell (G2AMG) will also be in attendance.

Radio Amateur Emergency Network

By C. L. FENTON (G3ABB)*

R.A.E.N. members are asked to note that, in an emergency, it is not necessary to wait until the telephone, A.A., Police, Fire, Ambulance, and Civil Defence communications systems are immobilized, before going into action. In such an event and at the request of the British Red Cross Society members can go into action once the local telephone system is CONGESTED.

CORRESPONDENCE continues to be heavy, with many offers of assistance and requests for information as to the needs of R.A.E.N., all stemming directly from the recent Press release of R.A.E.N./B.R.C.S. co-operation. Nevertheless, there are still many areas which require E.C.O's and more members. The writer is still anxious to hear from those who are willing to act as E.C.O.

Once again an appeal is made to E.C.O's to send in regular reports; to keep in touch with the Hon. Secretary, and, above all, to start preparing their groups for exercises with the British Red Cross Society. Before very long any local Red Cross Branch may be seeking co-operation in an exercise, and it is most important that all be ready.

Members are specifically warned against the use of the call "CQ RAEN," the Post Office authorities having asked for an assurance that such a call will not be used. When calling "All Stations," the words, "Radio Amateur Emergency Network" should be spoken in full, and should, of course, always be followed by the call-sign of the station calling.

Around the Regions

Efforts are being made to increase interest in the North-East of England. Interest continues apace in the Wirrall (Cheshire) area with new equipment and promise of support for the Rally. Northern Ireland generally is building up in activity, and premises active participation in the Rally. A special request is made for more members in the Devon area, where efforts are being made to get a really active net in operation.

New E.C.O. Appointments

Messrs. W. Hewitt, G3CFE, 28 Brown's Lane, East Bridgford, Notts, and A. W. Walmsley, G3ADQ, 6 Hilton Road, Bradford 7, Yorks, have been appointed.

Tailpiece

R.A.E.N. member, G2ABR of Hull, recently visited a well known East Coast resort. Whilst watching the local lifeboat returning to its base, he noticed that the winch had failed, with the result that the boat could not be drawn up the slipway. Other assistance not being forthcoming, '2ABR turned to and effected the necessary repairs on the spot, thus saving the lifeboat from being diverted from its home base overnight. Whilst not exactly a function of R.A.E.N. it was certainly a good deed at the right moment.

* * *

Items for inclusion in the November R.A.E.N. column should reach the writer not later than October 20, 1956.

* "*Niarbyl*," *Gay Bowers, Danbury, Chelmsford, Essex.*

Tests and Contests

D/F National Final

FOUR of the twelve starters were successful in locating both hidden stations and the finishing point in the D/F National Final organized on behalf of the Contests Committee by the B.T.H. (Rugby) Group and held on September 9.

Mr. T. C. Reynolds, of the Rugby group, is to be congratulated on repeating his success as winner of last year's event and thus retaining the 1950 Council Trophy for a further year.

Runner-up was Mr. P. N. Prior, also of Rugby, who arrived at the finishing point 20 minutes after Mr. Reynolds, followed at similar intervals by Mr. J. K. Finch (High Wycombe) and Mr. G. T. Peck (High Wycombe).

At the starting point, near Bilton, Rugby, two mobile stations co-operated in relaying information to the operators of the two hidden stations. Heavy rain, which had followed competitors travelling from the South, began to fall shortly before the start and continued throughout the contest, but everything went according to schedule and all the teams left promptly at 13.35. Both signals were adequate in strength, although the "A" station was the stronger and most competitors contrived to find this station first. G3BXF/P was concealed in thick bush by the side of a little stream, and the sight of several suspicious-looking fishermen who were also defying the weather misled some competitors into thinking that a perfectly innocent line might be a loaded aerial!

From 14.14 onwards there was a rush of competitors at the "A" station, but only one party was seen at the "B" station (G3CKQ/P) during the first hour. Between 15.10 and 16.00 seven more competitors arrived at the "B" station, but only four completed the course by handing in their forms to the Contests Committee representatives, Messrs. D. A. Findlay and S. E. Fryer, who acted as the finishing umpires.

Results—D/F National Final, 1956

There may be some slight errors in the times shown below for those competitors who did not complete the whole course. Due to weather conditions some of the records of the two stations became rather difficult to read!

Posn.	Name	A Station	B Station	Finish	Total Time
1	T. C. Reynolds (Rugby)	1415	1510	1527	1 hr. 57 mins.
2	P. N. Prior (Rugby)	1414	1526	1547	2 hrs. 17 mins.
3	J. K. Finch (High Wycombe)	1423	1539	1604	2 hrs. 34 mins.
4	G. T. Peck (High Wycombe)	1448	1557	1620	2 hrs. 50 mins.
	P. J. Evans (Rugby)	1416	1602	—	
	R. D. Charlton (Twickenham)	—	1522	—	
	H. Drury (Romford)	—	1515	—	
	M. D. Fowler (Slade)	1420			
	J. J. Grant (Rugby)	1416½			
	G. C. Simmonds (Slade)	1530			
	J. Walley (Slade)	—	1433		
	C. H. Young (Slade)	—			

Competitors and their parties enjoyed high tea after the contest at the B.T.H. Recreation Clubhouse lounge, and prizes donated by the organizing group were presented by Mrs. Grant to the winner and runner-up and to the first lady member of a team to complete the course.

After remarks from Mr. J. J. Grant, chairman of the Rugby group, replies were made by Mr. Findlay, executive vice-president of the R.S.G.B., Mr. Reynolds as winner and Mr. Peck for the visitors. Many references were made to the successful organization of the event. While these were much appreciated, the Rugby group feel that a good measure of the success was due to the keenness of the competitors and their cheerful disregard of the weather.

Finally, thanks are due to Mr. C. J. Cloke, who acted as starting marshal, Messrs. Walker (G3AZT) and Wright, operators of G3BXF/P, Messrs. Oldham and Tanser (G3BJQ), operators of G3CKQ/P, Messrs. Pretty (G3BMD/M) and Simpson (G3GGK/M), and to Mr. P. J. Evans for his untiring efforts as the organizing secretary.

Second Top Band Contest 1956

AS a result of the experience gained in judging the last two Top Band contests, combined with the comments made by competitors, the Contests Committee has decided to drop the system of dividing these contests into "Short" and "Long" sections. As there is considerable support for both types of contest it has been decided to hold one of each in 1957, and as an experiment the first 1957 contest will be held rather later than usual, in early March. For this reason, the first 1957 contest will be of short duration and the second 1956 contest, the rules of which are printed below, will be of long duration.

Rules

1. The contest is open to all fully paid-up Corporate members of the R.S.G.B. resident in G, GC, GD, GI, GM and GW.
2. The contest will start at 21.00 G.M.T. on Saturday, November 10, and end at 08.00 G.M.T. on Sunday, November 11, 1956.
3. Entries, preferably on one side only of foolscap or quarto paper, must be set out as shown below:—

SECOND TOP BAND CONTEST 1956

Name ..... Claimed score .....
Address ..... Call-sign .....
Transmitter ..... Receiver .....
Aerial system .....

Time G.M.T.	Call-sign of station worked	Report and serial no. SENT	Report and serial no. RECEIVED	Claimed score	Leave blank
2110	G2——	599001	599004	1	
2114	G3——	599002	589006	1	

Declaration: I declare that my station was operated strictly in accordance with the rules and spirit of the Contest and I agree that the ruling of the Council of the R.S.G.B. shall be final in all cases of dispute.
Date..... Signed.....

4. Details at the top of the entry must be completely filled in and the declaration signed, otherwise the entry may be disqualified.
5. Entries must be addressed to the Hon. Secretary, Contests Committee, Rad.o Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, and must bear a postmark not later than Monday, November 19, 1956.
6. Proof of contact may be required.

7. The contest is confined to two-way telegraphy contacts, and only the entrant will be permitted to operate his station during the contest.

8. An exchange of RST reports and a self-assigned three-figure serial number starting between 001 and 100, and increasing by one with each successive contact, will be required before points may be claimed. All reports must be acknowledged with "R."

9. Only one contact with a specific station during the contest will count for points. For purposes of this rule, G2—, G2—/A, G2—/P and G2—/M are all regarded as the same station.

10. The system of scoring will be as follows:— (a) contacts with stations in the British Isles (G, GC, GD, GI, GM and GW) score one point each. (b) contacts with stations outside the British Isles score 3 points each.

11. The power input to the final stage or to any preceding stage of the transmitter must not exceed 10 watts.

12. The *Victor Desmond* Trophy will be awarded to the station in the British Isles with the highest total score, and Certificates of Merit will be awarded to the stations placed second and third.

1955 VK-ZL DX Contest

G6XL (198 points), G2HPF (40), G3GSZ (18), G3GXO (12) were the only English stations to submit entries for the c.w. section of the 1955 VK/ZL Contest. GI4RY (28 points) was the sole representative of Northern Ireland. In the 'phone section G3FPQ scored 91 points and G6XL 16 points. There were no other U.K. entrants except B.R.S.19107 (390) points and B.R.S.15822 (310) who submitted logs for the receiving section. W.I.A. announce that all certificates have been posted to the winners. If any winner has not received his certificate he should write to W.I.A. Box 1234K, G.P.O. Adelaide.

PACC Contests 1956

G8TS (1442 points), G3JWZ (1080) and G3ESP (210) were the only U.K. competitors in the telegraphy section of the PACC Contest organized earlier this year by VERON. G8TS (549 points) and G3IUW (256) entered for the telephony section. The leading Dutch stations were PA0VO (13636) and PA0NN (5575) for the telegraphy and telephony sections respectively.

N.F.D. Results

IN the results published last month the call-sign of the Mitcham "A" station should have been shown as G3ANW and not G2ANW.

R.S.G.B. Frequency Measuring Test

THE second Frequency Measuring Test will take place on Sunday, October 28, using the 12.00 G.M.T. transmission from GB2RS on a nominal frequency of 3600 kc/s.

Following the telephony news bulletin but before the summary in Morse code, there will be a three-minute transmission consisting of periods of about 15 seconds when the carrier will be unmodulated, separated by the telephony announcement, "Frequency Measuring Test from GB2RS".

Measurements should be made as accurately as possible during this three-minute period and the results posted to R.S.G.B. Headquarters by Tuesday, October 30.

The precise frequency and the names of those who have submitted the most accurate measurements will be announced in the news bulletin from GB2RS on Sunday, November 4.

LONDON MEMBERS' LUNCHEON CLUB
will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road, at 12.30 p.m. on
Fridays, October 19 and November 16, 1956.
Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Contests Diary

October 20-22	-	CQ World Wide DX Contest[1]
October 27-29	-	CQ World Wide DX Contest[1]
November 10–11		Top Band Contest No. 2[3]
November 24–25		R.S.G.B. 21–28 Mc/s Phone Contest[2]
December 8–9	-	W.A.E. DX Contest (organized by D.A.R.C.)
January 19–20	-	W.A.E. DX Contest (organized by D.A.R.C.)
January 26–27	-	B.E.R.U.

[1] For details, see page 128, September 1956.
[2] For rules, see page 480, R.S.G.B. Bulletin, May, 1956.
[3] For rules, see pages 172-173.

Frequency Measuring Test, September 30, 1956

THE frequency used during the transmission for the frequency measuring test on September 30, 1956, was 3603.675 kc/s.

Severe interference, mainly from French amateurs, was experienced in the Midlands and south of England and a number of "nil heard" reports were received. Those who did manage to receive and measure the frequency are to be congratulated on their performance.

The most accurate measurements were submitted by D. E. Tomkinson (G3IIE), of Coulsdon, Surrey, K. Procter (G3EPO), of Watton-at-Stone, Hertford, J. L. Goldberg (G3ETH), of Liverpool, and G. W. Alderman (G3JXA), of Tolworth, Surrey, all of whom had errors of less than 50 parts per million.

Mullard Lecture

IN conjunction with Grafton Radio Society, Mullard Ltd. will provide a film show and lecture on "The Cathode Ray Tube" at Manor House Hotel, Finsbury Park, London, N.4, on Thursday, November 22, at 7.30 p.m. Light refreshments will be served.

Society members are cordially invited to support this meeting.

Silent Keys

DAWSON BURGESS (4S7JB—VS7JB)

The death is announced from Ceylon of Dawson Burgess (4S7JB). First licensed in 1930 Mr. Burgess soon became well known for the consistency of his signals in B.E.R.U. and other DX Contests. During the war he carried out important radio work for the Ceylon Government. After the war he continued his amateur activities first as VS7JB and in more recent years as 4S7JB. He was an enthusiastic user of frequency modulation. In recent years he had been employed as Welfare Officer in H.M. Dockyard, Trincomalee.

His passing will be mourned by radio amateurs all over the world and in particular by those in Ceylon who knew him personally and frequently enjoyed the hospitality of his home.

Heartfelt sympathies are extended to his wife, mother and three daughters. 4S7WM.

LEONARD ERNEST CRABBE (G6VF)

We record with deep sorrow the death, suddenly, on September 16, 1956, of Leonard E. Crabbe, G6VF, of Bristol.

A Society Member for over 25 years and always keenly interested in local affairs, of which he was a loyal supporter, Len will be greatly missed by his many friends in the Bristol Group. First licensed in the early 1930's and an energetic experimenter on 56 Mc/s before the War, he retained his interest in the v.h.f. bands although his recent activities were somewhat curtailed following a serious illness last year.

Our sincere sympathies are extended to his wife and daughter, and to his brother G3DHP. G3RQ.

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 August 20, 1956, at 6 p.m.

Present.—The President (Mr. R. H. Hammans in the Chair). Messrs. W. H. Allen, H. A. Bartlett, C. H. L. Edwards, D. A. Findlay, F. Hicks-Arnold, J. H. Hum, R. G. Lane, W. H. Matthews, W. R. Metcalfe, A. O. Milne, L. E. Newnham, W. A. Scarr, J. Taylor, John Clarricoats (General Secretary) and John A. Rouse (Deputy General Secretary).

Apology

An apology for absence was submitted on behalf of Mr. H. W. Mitchell.

* * * *

Membership

(a) *Resolved* (i) to elect 67 Corporate Members and 2 Associates; (ii) to grant Corporate Membership to 5 Associates who had applied for transfer.

(b) The Secretary reported that of the 631 members whose subscriptions became due on May 1, 1956, 68 became 3 months overdue on July 31, 1956. Of this number 11 were London, 45 were Country and 7 were Overseas Members and 5 were Associates. Of those overdue 6 London, 28 Country, and 6 Overseas members held call-signs.

(c) The Secretary reported that 12 of the 68 members referred to in (b) above wrote to resign during the five weeks ended August 18, 1956. Of this number 3 gave no reason for resigning and 9 stated they had lost interest in Amateur Radio.

Applications for Affiliation

Resolved to grant affiliation to:—Army Wireless Reserve Amateur Radio Society, A.T.C.1366 (City of Chester) Squadron Amateur Radio Club, and Bailleul Radio Society (R.E.M.E.).

"Morse for Radio Amateurs"

It was reported that an estimate for printing a new R.S.G.B. publication *Morse for Radio Amateurs* had been accepted by the President and the printing put in hand.

Election of Council—1957

Members were nominated to fill the vacancies which will occur in the Council on December 31, 1956.

(The names of the members nominated were published in the September, 1956, issue of the R.S.G.B. BULLETIN. —EDITOR.)

Society Trophies

Awards of Society trophies were made for the current year. (The names of members to whom trophies have been awarded were published in the September, 1956, issue of the R.S.G.B. BULLETIN.—EDITOR.)

Cambridge O.R.M.

Mr. W. H. Matthews reported on the business discussed at the Cambridge O.R.M.

I.A.R.U. Calendar

Resolved to cast an "aye" vote in favour of the election to membership in the I.A.R.U. of Malayan Amateur Radio Transmitters' Society.

R.A.E.N. and B.R.C.S.

The Secretary reported on the conference at which information was given to the Press on the arrangements for co-operation between the Radio Amateur Emergency Network (organized by the R.S.G.B.) and the British Red Cross Society.

It was agreed to place on record that R.A.E.N. members should not assume any priority claim to frequencies except under general emergency conditions.

Financial Position and Membership

Consideration was given to a report prepared by the Honorary Treasurer in which he showed that the Society's financial position would show a loss of £500 next year unless additional revenue is produced or expenditure reduced. The report showed that Income was expected to exceed Expenditure for the current year by £500. A very large increase in membership appeared to be the essential requirement in order to maintain the Society's finances in a sound position.

A general discussion followed the reception of the report but no formal resolution came before the Council.

Mr. E. Brown (G3CSP) of Sheffield

It was reported that Mr. E. Brown (G3CSP) of Sheffield, had agreed to discontinue his transmitting activities following an interview with the Housing Manager of the Sheffield City Council.

It was reported that the President of the Sheffield Amateur Radio Club had written to the Lord Mayor of Sheffield sending copies of his letter to all Members of the Sheffield City Council. In his letter the President of the Sheffield Society had drawn attention to the unfair treatment meted out to Mr. Brown.

The Secretary and Mr. Metcalfe gave further information on this case.

N.F.D. Rules, 1957

On the advice of the Contests Committee it was *Resolved* to permit N.F.D. stations to operate on the 21 and 28 Mc/s bands during 1957 N.F.D. and to allow the new bands to be added to the bands used by the "A" and "B" stations leaving the choice to individual groups.

It was further *Resolved* to request the Contests Committee to look into the question of increasing the input power limit for N.F.D. stations.

DX Listener's Century Award

The rules for this new award were approved. (The rules were published in the September, 1956, issue of the R.S.G.B. BULLETIN.—EDITOR.)

Contests Committee Recommendations

Recommendations of the Contests Committee in respect to various Contests and other events were approved.

Stresa Conference Recommendations

The recommendations of the Administrative and Technical Committees and the decisions of the Stresa Conference were accepted and adopted. (The various recom-

mendations and decisions were set out in the Report of the Stresa Conference published in the July and August, 1956, issues of the R.S.G.B. BULLETIN.—EDITOR.)

Cash Account

The Cash Account for July, 1956, as prepared by the General Secretary, was accepted and adopted.

Annual Accounts

The Honorary Treasurer submitted a Memorandum to the Council dealing with the Accounts to June 30, 1956. Income was expected to exceed Expenditure by approximately £500.

Resolved to receive the Memorandum.

Reports of Committees

Resolved to receive and adopt as Reports the Minutes of Meetings of the V.H.F. Committee, Exhibition (Home Constructor's Section) Committee, Finance and Staff Committee, DX Convention Committee, Technical Committee and R.A.E.N. Committee.

Action was taken on various recommendations contained in the Reports.

Resolved to set up an *ad hoc* Committee consisting of two members of the Technical Committee and two members of the Finance and Staff Committee to explore the possibilities of publishing a new edition of the *Amateur Radio Handbook*.

Resolved to authorize the V.H.F. Committee to organize a V.H.F. Convention in London on May 25, 1957.

Resolved to award the Norman Keith Adams Prize for 1956 to Mr. G. A. Bird (G4ZU), and the Bevan Swift Memorial Prize for 1956 to Mr. A. L. Mynett (G3HBW).

(Details of these awards were published in the September, 1956, issue of the R.S.G.B. BULLETIN.)

Resolved to authorize the R.A.E.N. Committee to hold a Rally during October, 1956.

The meeting terminated at 9.25 p.m.

Society News

R.S.G.B. Film Library

MEMBERS are reminded that the R.S.G.B. Film Library is again open and that the following films are available:—

1947	D/F event (200ft)
1947	N.F.D. (400ft)
1951	N.F.D. (650ft)
1951	London Convention (800ft)
1954	Bristol Convention (800ft)

Members who wish to borrow any, or all, of these films should write in the first place to **Mr. L. S. Gilham, 2 Parkstone Avenue, Hornchurch, Essex,** giving the following details:—

(1). Film (or films) required.
(2). Date of showing.
(3). Type and number of projector.
(4). Details of projectionist's experience.

The films should be returned by registered post immediately after use to the Film Curator and not to R.S.G.B. Headquarters. Films should be rewound on their *original* spools. Films returned on old spools which are bent or twisted will be rewound anew and the member concerned charged for the cost of the spool. The R.S.G.B. films are also available for display by affiliated societies.

Council Ballot

NOTICE is hereby given that at the Ordinary Meeting of the Society to be held at the Institution of Electrical Engineers, London, on Friday, October 26, 1956, the members present will be asked to choose two or more scrutineers for the purposes of the Council Ballot. The Ballot will be scrutinized at Headquarters during the afternoon of Friday, December 7, 1956.

Dorset County Hamfest

THE 1956 Dorset County Hamfest will be held at Sandacres Hotel, Sandbanks, Poole, on Sunday, November 4, starting at 2 p.m. The programme will include a free draw for prizes donated by manufacturers, a film show and an auction of members' surplus gear. There will also be competitions for the ladies; high tea will be served at 4.30 p.m.

Herb. Bartlett, G5QA, will be at the meeting, which will probably be the last he will attend in his capacity as Region 9 Representative.

Tickets priced at 10/- can be obtained from Mr. K. G. O'Brien, 18 St. Helens Road, Dorchester.

Sandacres Hotel will be open to members from 12 noon. Those who wish to take luncheon there should advise Mr. O'Brien when they apply for tickets.

Region 3 Representative

THE Council has invited Mr. W. A. Higgins, G8GF, 28 Kingsley Road, Kingswinford, Staffs, to act as Region 3 Representative until such time as a successor to Mr. J. Timbrell, G6OI, has been elected. Mr. Higgins has accepted the invitation.

CAN YOU CLAIM W.A.P.?
THE NEW R.S.G.B. BOOKLET
"CERTIFICATES AND AWARDS" WILL
PROVIDE YOU WITH FULL DETAILS

R.S.G.B. Recorded Lecture Library

THE following recorded lectures are available on loan to R.S.G.B. Groups and Affiliated Societies:—

"V.H.F.," by Sir Noel Ashbridge.[1]

"The Engineer and Society," by Captain P. P. Eckersley, M.I.E.E.[1].

"TVI-proof Transmitter Design," by Louis Varney, A.M.I.E.E. (G5RV)[1].

"Interplanetary Travel," by W. A. Scarr, M.A. (G2WS)[1].

"Modern Disc and Tape Recording," by H. A. M. Clark, M.I.E.E. ((G6OT)[1].

"Hints on Mobile Operation," by C. H. L. Edwards, A.M.I.E.E. (G8TL)[1].

"Radio Through the Years," by Captain P. P. Eckersley, M.I.E.E.[2].

"Receivers," by R. H. Hammans (G2IG)[1].

"Aerials," by F. J. H. Charman, B.E.M. (G6CJ)[2].

"Radio in the Antarctic," by Roth Jones (VK3BG)[3].

Applications to book lectures should be made as far in advance as possible and should be sent to **Mr. E. Fish (G2HCZ), 107 Eton Road, Ilford, Essex.** When applying, the type of recorder to be used for the play-back should be stated. Those borrowing tapes are asked to take great care of them and to return them promptly by registered post.

[1]Available for use on Scophony-Baird and standard *twin*-track recorders.
[2]Available for use only on standard *twin*-track recorders.
[3]Available for use only on standard *single*-track recorders.

New Books

ABACS OR NOMOGRAMS by A. Gist. 235 pages, 152 illustrations. Page size 8¼ in. x 5½ in. Published by Iliffe & Sons, Ltd. Price 35/- (postage 10d.).

Most engineers have made use of nomograms at some time in their careers, and are fully alive to the fact that they are very convenient when the same formula has to be solved repeatedly for several sets of variables. Most of the literature on the subject is written for mathematicians and is extremely difficult for the practical engineer to comprehend. The present work, which is the translation of a book that has enjoyed considerable success in France, does not suffer from this defect. It is essentially practical, and not only demonstrates the many and varied applications of the abac or nomogam, but shows how even those without highly specialized mathematical knowledge may construct their own charts. It deals with both Cartesian abacs and alignment charts, and contains a large number of practical examples drawn from the fields of mechanics, physics and electrical engineering. Very few formulae are outside the scope of nomograms if skilfully chosen auxiliary variables are introduced.

* * *

TELEVISION ENGINEERING — PRINCIPLES AND PRACTICE, Vol. II. VIDEO-FREQENCY AMPLIFICATION by S. W. Amos, B.Sc.(Hons.), A.M.I.E.E. and D. C. Birkinshaw, M.B.E., M.A., M.I.E.E. 272 pages. 156 illustrations. Page size 8¼ in. x 5½ in. Published by arrangement with the B.B.C. for *Wireless World* by Iliffe & Sons, Ltd. Price 35/- (postage 1/2).

This is the second volume of a textbook on television engineering written by members of the B.B.C. Engineering Division, primarily for the instruction of the Corporations' own staff. It is intended to provide a comprehensive survey of modern television principles and practice.

This volume describes the fundamental principles of video-frequency amplifiers and examines the factors which limit their performance at the extremes of the passband. A wide variety of circuits is described and particular attention is paid to the use of feedback. There is a section dealing with the special problems of camera-head amplifiers.

Because of the nature of the subject, the text is necessarily more mathematical than that of Volume I, but whenever possible self-contained mathematical derivations have been included as appendices at the ends of chapters.

Volume I deals with fundamental television principles, camera tubes, television optics and electron optics. Volumes III and IV are now in the course of preparation. Volume III will deal with waveform generation and Volume IV with a wide range of circuit techniques. They will complete the work.

* * *

MECHANICAL DESIGN FOR ELECTRONIC ENGINEERS by R. H. Gardner, B.Sc.(Eng.). 223 pages. Page size 8½ in. x 5½ in. Fully illustrated. Published by George Newnes, Ltd., London, W.C.2. Price 25/-.

This book deals concisely but in a most informative and practical manner with many important subjects concerned with the mechanical side of electronic equipment. Chapters included standard rack systems, apparatus cabinets, chassis and sub-panel construction, accessibility for servicing, ventilation and cooling, anti-vibration mountings, sheet metal working, finishing processes, printed circuits and printed components, " potting " of components, soldering, brazing and stripping, labelling cables and panels, coil winding, special service valves, codes of practice and specifications, special materials and accessories, tables and data.

Whilst the requirements of the newcomer to electronic equipment have been given particular attention, the experienced designer also will find much useful reference information within the pages of this book.

* * *

MAINTAINING HI-FI EQUIPMENT by Joseph Marshall. Published by Gernsback Library, Inc., 154 West 14th Street, New York 11, N.Y. 223 pages. Page size 8½ in. x 5½ in. fully illustrated. Price 21/-.

It is a fact that once the trouble on a piece of electrical equipment is identified and the cause located the actual cure or repair is usually a relatively simple matter. The purpose of this book is to provide the service technician with the basic information needed to become competent in performing an accurate diagnosis of faults in hi-fi equipment.

Following a critical survey in Chapter 1 of high fidelity standards the author discusses test instruments, high fidelity circuits, preliminary diagnosis, distortion, low level distortion, high level distortion, loss and treble faults, common audio troubles, phonograph pick-ups and styli, turntables and equalizers and turners.

* * *

PUBLIC ADDRESS AND SOUND DISTRIBUTION HANDBOOK. Edited by Alex J. Walker. 160 pages. Page size 8½ in. x 5 in. 145 illustrations. Published by George Newnes Ltd., London, W.C.2. Price 21/-.

This book provides practical guidance on the planning, installation and maintenance of modern electronic sound amplification and distribution equipment. The opening chapter outlines the theory of valve amplification and the factors which govern the power output of an amplifier. A number of typical amplifier circuits are given for general purpose and high fidelity sound systems. Later chapters deal with the equipment used in sound-amplification systems, the installation of equipment, typical installations, maintenance and servicing.

Delayed sound reinforcement and stereophonic sound are recent developments adequately dealt with in this new book, which should appeal to all who are concerned in public address and sound distribution.

* * *

WIRELESS SERVICING MANUAL by W. T. Cocking, M.I.E.E. 268 pages, 128 illustrations. Page size 8¼ in. x 5½ in. Published for *Wireless World* by Iliffe & Sons, Ltd. Price 17/6 (postage 1/-).

This is the ninth edition of a book which, since 1936, has been known to radio servicemen everywhere as a reliable, thorough and comprehensive guide to solving most of the problems that arise in the repair, maintenance and adjustment of the modern receiver. It has been carefully revised to take account of all recent developments in receiving equipment, and appears in a larger and handier format, while all illustrations have been modernized and brought into line with current symbolism.

The book gives useful advice on the techniques of testing and on interpreting meter readings, and then examines the troubles that can develop in each individual stage of a set. Both the " straight " and superheterodyne types are covered, and special attention is given to short-wave sets. Attention is also paid to the question of ganging, and to such common problems as hum, distortion and instability.

Current features of design dealt with include automatic frequency control, push-pull amplifiers and negative feedback. There is a completely new chapter on the servicing of frequency modulated v.h.f. receivers and much valuable information on aerial-earth systems, the use of cathode-ray test gear, and the fitting of extension loudspeakers.

* * *

RADIO VALVE DATA: Characteristics of 2,500 Valves and C.R. Tubes (Fifth Edition). Compiled by the Staff of *Wireless World*. Published for *Wireless World* by Iliffe & Sons, Ltd. 126 pages. Page size 11in. x 8¼in. Price 4s. 6d.

The latest edition of this widely-used reference book contains full operating data on more than 2,500 types of British and American radio valves, 37 transistors, and 300 cathode ray tubes.

The main tables give electrical characteristics of each valve, but whereas previously the base connections have also been given in tabular form, in the present edition they are shown diagrammatically, the main tables being keyed to the series of diagrams. This new method of presentation makes it easier for the reader to find the information he wants. The main tables further classify the valves into current, replacement or obsolete types, as recommended by the makers. An index enables any valve to be found immediately in the tables.

* * *

THE ARGONAUT A.M./F.M., M.W./V.H.F. TUNER-RECEIVER. By G. Blindell. Reprinted from *The Radio Constructor*. Published by Data Publications Ltd., London, W.2. Price 2/-.

The information contained in this 28 page booklet is based on articles published in *The Radio Constructor* during the latter part of 1954.

The text is illustrated with line diagrams and half-tone blocks designed to assist the would-be constructor.

Regional & Club News

Belfast.—After a lapse of some time " Y-EMMA," the Newsletter of the Belfast City Y.M.C.A. Radio Club makes a welcome appearance. The Chairman of the Club is Bill Douglas, GI3IWD, who is also R.S.G.B. Region 15 Representative. At the A.G.M., held recently, J. Forsythe a founder member of the Club in 1922 was elected President. Others elected or re-elected included *Chairman:* J. W. Douglas, GI3IWD; *Hon. Treasurer:* E. S. Vance and *Hon. Secretary:* R. J. Boal, GI3AXI, 127 Hillman Street, Belfast. At the meeting on September 19, W1ZJQ spoke about Amateur Radio in the U.S.A.

Bristol.—About 50 members were present at the September meeting when a discussion on the design of modern TVI-proof transmitters for the DX bands took place under the Chairmanship of Council Member R. G. Lane (G2BYA). A transmitter, designed by G3IDC for use by the R.A.F.A.R.S., was on display and aroused much interest. A lecture on equipment for the 144 Mc/s band will be given by Council Member W. H. Allen, M.B.E. (G2UJ) at the meeting on October 19 at Carwardine's Restaurant, Baldwin Street, Bristol 1. The speaker on November 16 will be A. H. Hooke (G3CMT).

Crystal Palace.—At the meeting of the Crystal Palace & District Radio Club to be held at 7.30 p.m. Saturday, October 20, G. A. Bird, G4ZU, will discuss the design and construction of his three-band Minibeam aerial. The meeting will take place at Windemere House, Westow Street, Crystal Palace, London, S.E.19. Meetings are also held on the first Tuesday of each month when Morse instruction is given to beginners. It is intended to run a course of lessons at an advanced level including the use of bug and electronic keys.

Grafton Radio Society.—At the A.G.M. held on September 14th, the following were elected or re-elected to office:—*President:* J. H. Clarke (G2AAN); *Vice-Presidents:* B. Randell (GW3ALE), W. Jennings (G2AHB), L. Kippin (G8PL), F. Beresford (G3AFC), J. Reading (G3RX), C. T. Bird; *Chairman:* L. Kippin (G8PL); *Vice-Chairman:* P. Beresford (G3AFC); *Hon. Secretary & Treasurer:* A. Wennell (G2CJN); *Committee Members:* E. Adams (G3KQX), R. Howel (G3KRH), S. Legg (G3KNL).

Harrow.—The Radio Society of Harrow (club call G3EFX) will be taking part in the second Wembley Exhibition which is to be held at Copland County School, High Road, Wembley, on October 27. An Amateur Radio Station, using the special call GB3HAR, will operate from 10 a.m. until 9 p.m. on local and DX bands. *Hon. Secretary:* S. C. J. Phillips, 131 Belmont Road, Harrow Weald, Middlesex.

Hull.—At the Royal Station Hotel, Hull, on Wednesday, November 7, Mullard Ltd., will provide a lecture and demonstration on television tubes. Full details of the lecture programme can be obtained from the Hull T.R. George Taylor, 124 Beverley Road, Hessle, E. Yorks, who is also Chairman of the Hull & District Radio Society.

Liverpool and District Amateur Radio Club.—During the summer several D/F contests were well supported. The local finals took place on September 30. G3LCO and G3LEU have recently been licensed. On October 23 the former will lecture on commercial v.h.f. equipment. A week later G3HII will discuss printed circuit techniques. On November 6 the R.R. (Basil O'Brien, G2AMV) will describe equipment for the sensitive detection of TVI and for aligning filters for its attenuation. An interclub quiz will be held on November 13. *Hon. Secretary:* A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool.

London U.H.F. Group.—At the September meeting Arnold Mynett, G3HBW, played back recordings made the previous weekend of his 24 cm contacts. Selected parts of his QSOs with G3GDR and G5DT and of his reception of G5CD were clearly heard. Members are asked to contact the *Group Secretary:* A. J. Worrall, 169 Kent House Road, Beckenham, Kent, regarding the venue for the meeting to be held on November 1.

Slade Radio Society.—The Annual Dinner was held at The Roebuck Inn, Erdington, Birmingham, on October 13, when the General Secretary (G6CL) was among the guests. At the meeting on November 9 Mr. T. J. Hayward of the R.A.F. School of Radio will lecture on " Microwave Techniques." The Society meets at Church House, High Street, Erdington.

Spen Valley.—Members of the Spen Valley and District Radio and Television Society are due to visit the N.S.F. works at Keighley on October 17, and the M.R.G. works at Bradford on November 14. Officials for 1956/7 include *President:* H. Brooke, G3GJV; *Vice-President:* P. Dennison, G8OK; *Joint Hon. Secretaries:* J. Stubbs, G3KNA and I. Charlesworth, G3IJC. Meetings are held fortnightly on Wednesdays at Temperance Hall, Cleckheaton. Details from G3KNA, 5 Manor Street, Hartshead Moor, Cleckheaton, Yorks.

Stockport Radio Society.—The autumn programme, which began on October 14 with a Hot-Pot Supper, will be continued on October 28 by the showing of four films. The first, loaned by Mullard Ltd., will illustrate the " Manufacture of Cathode Ray Tubes." This will be followed by three fims loaned by the Shell Company entitled " Farnborough," " Monte Carlo " and " The Moving Spirit." On November 21 the Mullard film " The Manufacture of Radio Valves " will be shown, after which Mr. R. Webb of that Company will lecture to the Society. Meetings are held at Blossoms Hotel, Buxton Road, further details of which can be obtained from the *Hon. Secretary:* G. R. Phillips, G3FYE, 7 German Buildings, Buxton Road, Stockport.

Stourbridge & District Amateur Radio Society.—The Timbrell Trophies were won by W. A. Higgins, G8GF, and I. T. Cashmore, G3BMY, in recognition of their achievements in National Contests. Officers for 1956 are:—*President:* J. Timbrell (G6OI); *Chairman:* F. Bills (G3CLG); *Vice-Chairman:* D. Barlow (G3HGI); *Hon. Treasurer:* J. Hogg (G2OG); *Hon. Secretary:* A. K. Davies, 48 Church Avenue, Amblecote, Stourbridge. V.H.F. aerial systems and Hi-Fi reproduction were subjects for discussion at recent well-attended meetings.

Torbay Amateur Radio Society.—Blind member George Western is warmly congratulated on being granted a licence. His call is G3LFL.

Affiliated Societies

THE following are additions and alterations to the list of Affiliated Societies published in the October, 1955, issue of the BULLETIN:—

West Lancashire Radio Society, c/o K. Wright, 24 Stuart Road, Liverpool 20.

The Honorary Secretary of the Edinburgh Amateur Radio Club is now M. Darke (GM3KGK), 44 Howe Street, Edinburgh 3.

The Honorary Secretary of the Oxford & District Amateur Radio Society is now J. Hickling (G3GCS), 33 Chestnut Road, Botley, Oxford. The address of the Headquarters is now Cherwell Hotel, Water Eaton Road, Oxford N.

The Honorary Secretary of the Coventry Amateur Radio Society is now N. J. Bond (G3IHX), 12 William Bree Road, Coventry.

Representation

Vacancy

Mr. E. G. Bright (G3JW) has resigned as Representative for the Town of Exeter.

Nominations for his successor should be made in the prescribed form and sent to reach the General Secretary by not later than November 30th, 1956.

Can You Help ?

● Allen Glover (B.R.S.19569), 120 Terry Road, Stoke, Coventry, who urgently requires the circuit diagram and alignment instructions for the MCR1 communications receiver?

● G. J. Gould (B.R.S.12425), R.N. W/T station, Dingli, Malta, who urgently requires the circuit diagram of the ex-Royal Canadian Air Force transmitter, Reference No. 10D/1267, Type AT1, manufactured by the Canadian Marconi Co. ?

● L. Miles (GW3IMQ), 76 Vicarage Road, Morriston, Swansea, who wishes to know methods of connecting a feeder to a beam aerial, using a non-reversible 1 r.p.m. motor.

● A. G. Pruden (G2CZM), 18 Market Square, Chesham, Bucks, who wishes to purchase or borrow a copy of the Service Manual for the BC 348Q Receiver?

● F. H. Sturdy (G3KAS), 21 Lingwood Gardens, Osterley, Middlesex, who requires the instruction manuals for the Gee airborne equipment, receiver and indicator type 62A and for the AN/APA1 ?

Forthcoming Events

REGION 1

Blackpool (B. & F.A.R.S.).—October 23, 7.30 p.m., 161 Penrose Avenue, Marton.
Bury (B.R.S.).—November 13, 8 p.m., George Hotel, Kay Gardens.
Chester (C. & D.A.R.S.).—Tuesdays, 7.45 p.m., Tarran Hut, Y.M.C.A.
Crosby. — Tuesdays, 8 p.m., over Gordon's Sweetshop, St. John's Road, Waterloo.
Lancaster (L.A.D.A.R.S.). — November 7, 7.30 p.m., George Hotel, Torrisholme.
Liverpool (L. & D.A.R.S.).—Tuesdays, 8 p.m., Room "G," Wavertree Community Centre, Penny Lane, Liverpool, 18.
Manchester (M. & D.R.S.).—November 5, 7.30 p.m., Brunswick Hotel, Piccadilly.
Manchester (S.M.R.C.). — Fridays, 7.45 p.m., Ladybarn House, Mauldeth Road, Manchester, 14.
Preston (P.A.R.S.). — Wednesdays, 7.45 p.m., 48 High Street, off Lancaster Road, Preston.
Rochdale (R.R.T.S.).—Fridays, 7.45 p.m., 1 Law Street, Sudden.
Southport. — Thursdays, 8 p.m., Sea Cadets' Camp, Esplanade.
Stockport (S.R.S.).—October 24, November 7 and 21, 8 p.m., The Blossoms Hotel, Buxton Road, Stockport.
Warrington (W. & D.R.S.). — October 18, November 1 and 15, Royal Oak Hotel, Bridge Street, Warrington.
Wirral (W.A.R.S.).—October 17, November 7 and 21, 7.45 p.m., Y.M.C.A., Whetstone Lane, Birkenhead.

REGION 2

Barnsley.—October 26, 7.30 p.m., King George Hotel, Peel Street.
Bradford.—October 23, 7.15 p.m. Visit to Mains Radio Gramophones, Ltd.
Doncaster.—November 6, 7.30 p.m., Lord Nelson Hotel, Cleveland Street.
Gateshead.—Mondays, 7.30 p.m., Mechanics Institute, 7 Whitehall Road.
Hull.—Second and last Tuesdays, 7.30 p.m., "Rampant Horse," Paisley Street.
Leeds.—Wednesdays, 7.30 p.m., 4 Woodhouse Square.
Newcastle.—November 6, 7.45 p.m., Liberal Club, Pilgrim Street.
Pontefract.—October 18, November 1, 15, 29, 8 p.m., Queen's Hotel, Tanshelf.
Rotherham.—Wednesdays, 7 p.m., "Cutler's Arms," Westgate.
Scarborough. — Thursdays, 7.30 p.m., Chapman's Yard, North Street.
Sheffield (S.A.R.C.). — October 24, 8 p.m., "Dog & Partridge," Trippet Lane.
Slaithwaite.—Fridays, 7.30 p.m., 3 Dartmouth Street.
South Shields (S.S. & D.R.C.).—October 31, 7 p.m., Trinity House Social Centre.
Spen Valley.—October 17, 31, 7.30 p.m. Temperance Hall, Cleckheaton.
York — Thursdays, 7.30 p.m., Club Rooms, Y.A.R.S., Fetter Lane

REGION 3

Birmingham (South).—November 2, 7.30 p.m. "A" Committee Room, Cadbury Bros., Bournville Lane. **M.A.R.S.** — October 16, 7 p.m. Midland Institute. **Slade.**—October 26, 7.45 p.m. Church House, High Street, Erdington.
Coventry.—October 26, 7.30 p.m. Priory High School, Wheatley Street. **Courtaulds.**—5-8.30 p.m. Courtaulds, Ltd., Foleshill Road.
Malvern.—November 5, 8 p.m. "Foley Arms."
Redditch. — October 18, 30, November 15, 8 p.m., "Scale and Compass," Birchfield Road.
Solihull.—October 29, November 12, 7.30 p.m. Defence H.Q., Sutton Lodge, Blossomfield Road.
Stoke.—October 31, 8 p.m., "Lion's Head," John Street, Hanley.
Stourbridge & District.—October 19, "White Horse," Amblecote. (Informal). November 6, King Edward VI School.
Walsall.—October 24, November 14, 8 p.m. Technical College, Bradford Place.
Wolverhampton.—October 22, November 12, 8 p.m. Nechell's Cottage, Stockwell End, Tettenhall.

REGION 4

Alvaston. — Tuesdays, Thursdays, 7.30 p.m. Sundays, 10.30 a.m., Boulton Lane, Alvaston, Derbys.
Chesterfield. — Tuesdays, 7.30 p.m., Bradbury Hall, Chatsworth Road.
Derby (D. & D.A.R.S.).—Wednesdays, 7.30 p.m., Room 4, 119 Green Lane, Derby.
Ilkeston (I. & D.A.R.S.).—Thursdays, 7 p.m., Room 5, Ilkeston College of Further Education, Field Road.
Leicester (L.R.S.).—October 22, November 5, 7.30 p.m., 140 High Cross Street, Leicester.
Lincoln (L.S.W.C.).—November 7, 7.30 p.m., Technical College, Cathedral Street.
Newark (N. & D.A.R.S.). — November 4, 7 p.m., Northgate House, Northgate, Newark.
Northampton (N.S.W.C.). — Fridays, 7 p.m. Clubroom, 8 Duke Street.
Nottingham.—October 19, November 16, 7.30 p.m., Basford Hall Miners Welfare, Nuthall Road, Cinderhill.
Peterborough—November 7, 7.30 p.m. 21 Hankey Street.
Worksop.—November 1, 7 p.m., King Edward Hotel.

REGION 5

Chelmsford.—November 6, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.

REGION 6

Cheltenham. — November 1, 8 p.m., Great Western Hotel, Clarence Street.
Cheltenham (A.R.S.). — Wednesdays, 8 p.m., Club Room, St. Mark's Community Centre, Brooklyn Road.
Gloucester (G.R.C.). — Thursdays, 7.30 p.m., The Cedars, 83 Hucclecote Road.
Newbury (N. & D.A.R.S.). — November 9, 7.30 p.m., Elliott's Canteen, West Street, Newbury ("A Ham in Peace and War," W. H. Allen, G2UJ).
Oxford (O. & D.A.R.S.).—October 25 and November 8, 7.30 p.m., Club Room, "Magdalen Arms," Iffley Road, Oxford.
Portsmouth. — Tuesdays, 7.30 p.m., British Legion Club, Queen's Crescent, Southsea.
Southampton.—November 3, 7 p.m., 1 Prospect Place, Above Bar, Southampton.
Stroud.—Wednesdays, 7.30 p.m., Subscription Rooms.

REGION 7

London Meeting. — October 26, Institution of Electrical Engineers. Lecture "More About the Antennamatch," by G6MB.
London (L.M.L.C.). — October 19, November 16, 12.30 p.m., Bedford Corner Hotel, Bayley Street, Tottenham Court Road, W.C.1.
London (U.H.F. Group).—November 1, 7.30 p.m., Bedford Corner Hotel.
Acton, Brentford and Chiswick.—October 16, November 20, 7.30 p.m., A.E.U. Rooms, 66 High Road, Chiswick, W.4.
Bexleyheath (North Kent R.S.).—Second and fourth Thursday, 7.30 p.m., special meeting on October 18, Mr. W. H. Matthews, G2CD, will be present, Congregation Hall, Chapel Road, Bexleyheath.
East London.—October 21, 2.30 p.m., Ilford Town Hall, "The Future of Amateur Radio," by G2AHL.
Guildford and Woking.—October 28, 3 p.m., Royal Arms Hotel, North Street.
Ilford.—Thursdays, 8 p.m., G2BRH, 579 High Road.
Slough.—November 6, QTH from G2HOX, 13 Quaves Road, or G3GYD, 5 Parklands Avenue, Slough.
Southgate, Finchley and District.—November 8, 8 p.m., Arnos School, Wilmer Way, N.14.
Welwyn Garden City—November 6, 8 p.m., open meeting for Home Counties Groups and Clubs. Lecturettes:—23 cm (G3EOH), 70 cm (G8SK), Raffle and Film Show, Council Offices, Welwyn Garden City.

REGION 9

Bath.—October 22, 7.30 p.m., R.N.V.W.R. H.Q., 12 Pierrepoint Street.
Bristol.—October 19, November 16, 7.15 p.m., Carwardine's Restaurant, Baldwin Street.
Exeter.—November 2, 7 p.m., Y.M.C.A., St. David's Hill.
Falmouth (W.C.R.C.). — Alternate Tuesdays, 7 p.m., Technical Institute, Falmouth.
Plymouth.—October 16, 30, 7.30 p.m., Virginia House Settlement, Barbican.
Torquay.—October 20, 7.30 p.m., Y.M.C.A., Castle Road.
Weston-super-Mare.—November 14, 7.30 p.m., Sea Cadets Hall, Alfred Street.
Yeovil.—Wednesdays, 7.30 p.m., Grove House, Preston Road.

REGION 10

Cardiff.—November 12, 7.30 p.m., "The British Volunteer," The Hayes, Cardiff.
Neath & Port Talbot.—November 6, 7.30 p.m., Royal Dock Hotel, Briton Ferry.

REGION 14

Falkirk & Stirling.—October 26, 7.30 p.m., The Temperance Café, High Street, Falkirk.
Glasgow.—October 26, 7.15 p.m., Christian Institute, 70 Bothwell Street, Glasgow, C.2.

REGION 15

Belfast.—October 26, 8 p.m., Y.M.C.A. (Discussion on N.F.D.).

R.S.G.B. Frequency Measuring Tests

12 noon Transmission from GB2RS (Nominal Frequency 3600 kc/s).

October 28, November 25, December 30

Reports to R.S.G.B. Headquarters by Tuesday, following tests.

C.R. and Council Nominations

Members are reminded that the closing date for nominations for the office of C.R. is October 31, 1956.

The closing date for nominations for Council is October 24, 1956.

New Members

THE following members were elected at the July and August meetings of the Council:—

Corporate Members, Home (Licensed)

GW2DXS† D. L. C. CREEDY, The White Horse Hotel, Overton-on-Dee, Flintshire, North Wales.
G2FAY† F. CLARKE, 62 Chestnut Street, Chadderton, nr. Oldham, Lancs.
G2HKF† H. O. WILLS, 47 Hall Avenue, Rushden, Northants.
G3CPP† J. SMITH, 41 Oxford Gardens, London, W.10.
G3ECR† L. HARRINGTON, 60 Lewis Avenue, Blackley, Manchester, 9, Lancs.
G3GQK J. WALL, 21 Vancouver Road, Forest Hill, London, S.E.23.
G3HAL R. A. PARROTT, 28 Vicarage Lane, Winslow, Bletchley, Bucks.
G3IXI K. H. LANDON, Sydney House Cottage, Littleton, Hants.
G3IYG† B. E. COOK, 19 Recreation Road, Andover, Hants.
G3JIX† K. L. SMITH, 82 Granville Road, Walthamstow, London, E.17.
G3JKS F. SMITH, JNR., 98 Fryston Road, Airedale, Castleford, Yorks.
G3JPJ† J. C. T. PEERLESS, 37 Maitland Street, Liverpool, 8, Lancs.
G3KDB P. A. MILES, 176 Sarehole Road, Hall Green, Birmingham, 28
G3KIP K. G. GROVER, 4a Grove Hill Road, Tunbridge Wells, Kent.
G3KQH J. R. HUNT, 47 Hill Street, Wellingborough, Northants.
G3KQO 4157694 CPL. L. W. J. PLUCK, Hut 641, Roman Camp, R.A.F. Stoke Heath, Market Drayton, Shropshire.
G3KSG F. L. BONES, 45 Merlin Road, Scunthorpe, Lincs.
G3KUB B. E. RICHTER, 25 Dordrecht Road, Acton Vale, London, W.3.
G3KVK P. W. BURNS, 70 Pennethorne Road, Peckham, London, S.E.15.
G3KXB D. E. PANTONY, Herts Farm, Loose, nr. Maidstone, Kent.
G3KXF D. S. RODEN, 115 First Avenue, Gillingham, Kent.
GM3KXG M. S. MACLEAN, 2 Fleming Place, Murray, 2, East Kilbride, Lanarkshire.
G3KYF K. G. SULLIVAN, 21 Chapel Street, Enderby, Leics.
G3KYH* J. A. CARTER, 29 Newsums Meadow, Lowestoft, Suffolk.
G3KYK A. T. DAVIES, 10 Fortescue Road, Ilfracombe, Devon.
G3KZG A. J. BILLS, The Pharmacy, High Street, Kinver, nr. Stourbridge, Worcs.
GI3KZL J. S. ROBERTS, Sgts. Mess, R.A.F. Ballykelly, Limavady, Co. Derry, Northern Ireland.
G3KZN D. W. BLAKELEY, 96 Consort Road, Peckham, London, S.E.15.
G3LAI G. E. LIVINGSTON, 289 The Ridgeway, Erdington, Birmingham, 23.
G3LBG J. N. T. WILLMOTT, 84 Havering Gardens, Chadwell Heath, Romford, Essex.
G3LBH D. A. HUNT, 18 Maiden Lane, Langley Green, Crawley, Sussex.
G3LBM A. H. MULCAHY, 36 Engel Park, Mill Hill, London, N.W.7.
G3LBU R. J. RIDLEY, 33 High Street, Preston, Lancs.
G3LCS D. A. SHEPHERD, 101 Church Green Road, Bletchley, Bucks.
G6NW† F. JAMES, 25 Windsor Gardens, off Bourne Avenue, Hayes, Middlesex.
GI3DZE† J. W. NEILLY, Summerhill, Cullybackey, Ballymena, Co. Antrim, Northern Ireland.
GM3GNX† J. L. FRASER, 37 Witchhill Road, Fraserburgh, Aberdeenshire.

Corporate Members (British Receiving Stations)

21084* P. F. CONE, 1 Mardale Avenue, Withington, Manchester, 20.
21085* R. A. RIMMER, 4 Lancaster Avenue, Kirk Sandall, nr. Doncaster, Yorks.
21086 W. E. SMY, 116 Monega Road, Forest Gate, London, E.7.
21087 S. R. COLEMAN, 29 Camp Hill Road, Nuneaton, Warwicks.
21088 G. MCA. MCALPINE, 44 Cairnview, Waterside, Kirkintilloch, nr. Glasgow.
21089 A. R. PREEDY, 22 High Street, Dawley, Shropshire.
21090 W. A. J. SMITH, 57 Oakwood Crescent, Winchmore Hill, London, N.21.
21091 G. VINER, 34 Middleborough Road, Coventry, Warwicks.
21092 D. D. R. SIBBALD, 13 St. George's Road, Ilford, Essex.
21093 W. D. MONTAGU, Old Farm, Knowle St. Giles, Chard, Somerset.
21094 DR. L. C. BOUSFIELD, Church Gate, Billingshurst, Sussex.
21095 R. D. RAILTON, 4 Landford Road, Putney, London, S.W.15.
21096 L. A. HAWKINS, 26 Plough Hill, Cuffley, Herts.
21097 C. A. G. MILES, 2 St. Swithuns Road, Copnor, Portsmouth, Hants.
21098 S. SMITH, 20 Dunkirk Road, Hillside, Southport, Lancs.
21099 J. G. FINN, 15 Threadneedle Street, Boston, Lincs.
21100 L. M. MARTINS, 37 Haverstock Road, London, N.W.5.
21101 I. SMITH, 46 Cow Heys, Dalton, Huddersfield, Yorks.
21102 R. MORRION, 39 Cole Street, Scunthorpe, Lincs.
19110† H. J. FINK, 46 Bedford Court Mansions, London, W.C.1.
20057† H. A. GRAY, 36 Bosworth Street, Leicester, Leics.

Corporate Members, Overseas (Licensed)

EI3BC R. S. HASLAM, 3 Wasdale Grove, Terenure, Dublin, Eire.
HS1MQ/LU8BF L. M. MORENO-QUINTANA (H), Argentine Legation, Bangkok, Thailand.
K2GMV M. METZGER, 119 East 38th Street, New York City, N.Y., U.S.A.
K6EDE D. S. DIRDEN, Box 547, Susanville, Calif., U.S.A.
VE6NX C. J. GAWLICKI, 9237-86 Street, Edmonton, Alberta, Canada.
VQ2GR G. W. ROWE, c/o Rhodesia Railways, Luanshya, Northern Rhodesia.
VS1GV† W. TENNANT, 2 Sgts. Mess, R.A.F. M.B., Seletar, Singapore, 28.
W1ZDZ H. W. LONG, Walpole Street, Dover, Mass., U.S.A.
W3TPC R. E. ANDREW, 97 Houston Road, Landowne, Penna., U.S.A.
W7BBK C. W. EICHARDT, Route 1, Box 67, Ritzville, Wash., U.S.A.
W7RLR C. P. LINDSAY, 404 W. 11th, Kirkland, Washington, U.S.A.
W7TMF E. D. SPENCER, P.O. Box 142, Salem, Oregon, U.S.A.
W8NKI FRANKLIN D. ROOSEVELT, III, 924 Ford Building, Detroit 26, Mich., U.S.A.
W9KXK P. R. NILES, 325 Center Street, Waupaca, Wis., U.S.A.
ZB1ZR/G3KZR* I. S. DAVIES, 19 Ridings Avenue, Winchmore Hill, London, N.21.
ZB2R G. C. WALLIS, "B" 14, New Camp, R.A.F. Gibraltar.
ZL1AQD V. T. CROSSMAN, P.O. Box 23, Tauranga, New Zealand.

* * *

DL2VK 22515743 Cpl. D. S. F. WILSON, Berlin Signal Squadron, British Forces Post Office 45.
DL2XU 4048747 Cpl. F. J. BURGESS, OMC Flight, 13 Signals Unit, R.A.F. Sundern, B.A.O.R. 39.
DL2YX 4123791 I. J. LAWSON, Cpl. OPS Message Centre, No. 13 Signals Unit, R.A.F. Sundern, B.A.O.R. 39
DL2ZF B. F. STRANGE, Berlin Signal Squadron, B.F.P.O. 45.
W3EH R. K. HARRIS, 108 Sunny Hill Lane, Havertown, Penna, U.S.A.
W5RS E. C. TOWNSEND, 1714 Arlington Drive, Corpus Christi, Texas, U.S.A.
W7TMF E. D. SPENCER, P.O. Box 142, Salem, Oregon, U.S.A.
ZD4CF DR. HUGH DE GLANVILLE, P.O. Box 473, Accra, Gold Coast.
ZE1JA R. G. THOMPSON, P.O. Box 43, Salisbury, Southern Rhodesia.
ZE1JQ B. H. COOPER, 5 Peter House, Monmouth Road, Avondale, Salisbury, Southern Rhodesia.
ZE1JT F. C. PARSONS, P.O. Box 384, Salisbury, Southern Rhodesia.
ZL2ADT W. CRICHTON BROWN, 201 Moana Avenue, Tahunanui, Nelson, New Zealand.

British Empire Receiving Stations

931 14420778 Cpl. D. A. ELLIS, 62 Coy. RASC LAD, REME, B.F.P.O. 45.
932 CAPT. W. H. R. ARMSTRONG, c/o Police H.Q., Bridgetown, Barbados, B.W.I.
934 H. J. WRIGHT, 18 Devonshire Street, Ghadir, Little Aden, Aden Colony.

Associates

B. A. COE, 3 Fir Copse, Purbrook, Hants.
D. H. PHILLIPS, Llangattock Mill Farm, Pempergwm, nr. Abergavenny, Mon.
2753874 SAC M. SHEPPARD, Hut 657, Roman Camp, R.A.F. Stoke Heath, Market Drayton, Shropshire.
M. J. R. COHEN, 6 Woodland Rise, Welwyn Garden City, Herts.
G. HURLEY, 2 Abingdon Street, Burnham-on-Sea, Somerset.
H. F. LAFFAN, 11A Westminster Road, Morecambe, Lancs.
J. M. H. TAYLOR, *H.M.S. Ganges*, Shotley Gate, Ipswich, Suffolk.

* * *

THE following were elected at the September meeting of the Council:—

G2DYY †W. C. LONGMAN, Broomfield House, Westgate, Cleckheaton, Yorks.
G2HFC †N. LOWE, 7 Bellingham Avenue, Wigan, Lancs.
G2HOJ †F. HUNT, 217 Clee Road, Cleethorpes, Lincs.
G3AIM L. S. WRIGHT, 29 Lovel Road, Speke, Liverpool, 19, Lancs.
G3AMF †K. G. THOMPSON, 226 Prospect Road, Woodford Green, Essex.
G3AOS †J. G. BARNES, 5 Prospect Drive, Hale Barns, Ches.
G3AUU †A. J. HILL, 23 Horner Road, Taunton, Som.
G3AYQ †K. STEAD, 429 New Hey Road, Salendine Nook, Huddersfield, Yorks.
G3BBT †J. F. HAGON, 21 Marmion Road, West Hartlepool, co. Durham.
G3BIC †E. J. LAWRENCE, 37 Onibury Road, Handsworth, Birmingham, 21, Warwicks.
G3CLW W. J. MACINNES, 83 Hillcrest Road, Bromley, Kent.
G3EUR †J. I. G. BROWN, 74 Humber Avenue, South Ockendon, Essex.
G3EUZ A. MORRIS, The Anchorage, Queen Camel, Yeovil, Som.
G3FCB †E. D. MELVILLE, 8 Holly Terrace, Fulford Road, York.
G3GRT E. W. E. TAYLOR, 99 Portland Crescent, Stanmore, Middx.
G3HGE †T. H. A. WITHERS, 26 Carpenter Gardens, London, N.21.
G3HC †V. L. J. DELNEVO, 27 Oxford Hill, Witney, Oxon.
G3IQO J. E. TAYLOR, 20 Asbridge Street, Liverpool, 8, Lancs.
G3JDO H. MARTIN, c/o Bulford Post Office, Bulford Village, nr. Salisbury, Wilts.
G3JSW D. K. CLARKE, 188 East Common Lane, Scunthorpe, Lincs.
G3JYK J. R. DOCKERILL, 14 Evans Way, Sawston, Cambridge, Cambs.
G3JYM R. J. FALOON, 74 Pinewood Green, Iver Heath, Bucks.
G3KBS N. COUPE, Beare Street, Nayland, Colchester, Essex.
G3KDL L. D. E. LIGHT, 22 Chippenham Avenue, Wembley, Middx.
G3KGX B. H. LAWRENCE, 33 Sweet Briar Grove, Edmonton, London, N.19.

G3KJC R. A. CHURCH, Little Wittenham, nr. Abingdon, Berks.
G3KMD T. W. BASS, 32 Whitmore Avenue, Stifford Clays, Grays, Essex.
G3KNW J. S. WATT, 30 Tattenhoe Lane, Bletchley, Bucks.
G3KPV J. R. KILLEEN, 94 Mildred Avenue, Watford, Herts.
G3KSC R. M. TILLEY, 63 Stanley Road, Wellingborough, Northants.
G3KTW R. THYER, 12 Spotland Tops, Cutgate, Rochdale, Yorks.
G3KVI CPL. C. TEBAY, 3508352, Block 44, R.A.F. Digby, Lincs.
G3KZY J. RATHBONE, 56 Wild Street, Bredbury, Woodley, Stockport, Ches.
G3KZZ F. I. FORSTER, 41 Marlborough Street, South Shields, co. Durham.
G3LCK D. J. BRADFORD, 77 Derwent Road, London, N.13.
G3LCV *N. J. GERGORY, 785 Harvey Road, Alvaston, Derby, Derbys.
G3LDI R. J. COOKE, 128 Drayton Road, Norwich, Norfolk.
G3LDK MRS. D. ANTHONY, 53 Stafford Road, Ruislip, Middx.
G3LDT L. BOND, 16 Lowerfield Road, Macclesfield, Ches.
G3LEE G. L. SHARPLEY, 14 The Crescent, Flixton, nr. Manchester, Lancs.
G3LEQ *G. L. ADAMS, 5 Byng Road, Tunbridge Wells, Kent.
G3LEU D. ROSENBERG, 237 Edge Lane, Liverpool, 7, Lancs.
G4GC H. E. COOK, 70 Waltham Avenue, Hayes, Middx.
G4HH †J. WOODHOUSE, 22 Darbishire Road, Fleetwood, Lancs.
G4OF †A. ROBEATS, Radiohm, South Street, Morton, Gainsborough, Lincs.
G4PX †G. W. BELSEY, 131 Station Road, King's Heath, Birmingham, 14, Warwicks.
G5SN †N. W. SKINNER, 140 Broadway, Leigh-on-Sea, Essex.
G8QX †K. HOPKINSON, 20 North End Lane, Malvern, Worcs.
GW2CPM W. B. MANSELL, Franklin House, Upper Frog Street, Tenby, Pembs., S. Wales.
GI3KXH SGT. R. GIFFORD, Sgts. Mess, R.A.F. Ballykelly, nr. Limavady, co. Derry, N. Ireland.
GW3KWY A. SWAIN, 32 Hawarden Road, Penyffordd, Chester.
GM3LDR R. C. RALE, 12 Marchmont Road, Edinburgh, 9, Scotland.
GC3LFJ H. R. MESNY, Oxenford House, St. Lawrence, Jersey, Channel Isles.

Corporate Members, Overseas (Licensed)

DL2ZY CPL. G. DALE, Signals Section, R.A.F. Gatow, Berlin B.F.P.O.45.
DL4CN J. J. MCDERMOTT, Signal Division, Berlin Command A.P.O.742, N.Y., U.S.A.
DL4QG/W8DOM CAPT. H. RUPPERT, G-3 Div. Berlin Command, A.P.O.742 U.S. Army.
HB9RS MAX DE HENSELER, 49 Servette, Geneva, Switzerland.
MP4QAL J. M. TIERNEY, c/o Shell Overseas Exploration Co., Doha Qater, Bahrein.
SP6BZ WIESLAW ZIOLKOWSKI, Box 7, Wroclaw 18, Poland.
VE2PZ †C. B. DOWDEN, 23 Sunny Acres, Baie d'Urfee, P.Q., Canada.
VE3ALJ R. S. WHITTLE, 70 Renfrew Avenue, Ottawa, Ont., Canada.
VQ2JN J. P. Nortje, P.W.D. Mpika, Northern Rhodesia.
VS2FB J. A. NEVILLE, 131c Pasar Road, Kuala Lumpur, Malaya.
W0MH †C. COULTAS, Topping Road, Route 13, St. Louis 22, Mo., U.S.A.
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New British Standards

Fixed Paper-dielectric Capacitors

B.S. 2131 " Fixed paper-dielectric capacitors for d.c., for use in telecommunication and allied electronic equipment ", is the first of a series of British Standards dealing with components for telecommunication and allied electronic equipment. The standard applies to fixed capacitors using impregnated paper-dielectric and metal foil electrodes, and suitable for d.c. operation with or without a small superimposed a.c. component; its requirements are applicable to capacitors of equivalent performance having other dielectrics. The capacitors covered by the standard comprise a range from which may be chosen types for use over almost any desired range of temperature and humidity. In this way, widely varying conditions of use are catered for, extending, for example, from use by the Services under extreme conditions to domestic-receiver use in temperate climates. Capacitors suitable for different uses are identified by an indication of the temperature category and humidity classification.

The use of the standard requires reference to B.S. 2011 " Basic climatic and durability tests for components ", which fully describes the range of tests to which components may be subjected, in accordance with the requirements of the standard specifications for the individual component. The object of the tests on components is to establish as far as is possible under laboratory conditions:—

(a) Their suitability for use over stated ranges of temperature and humidity;
(b) Their ability to withstand specified conditions of mechanical shock, such as are to be expected in transit or under operation conditions;
(c) Their ability to withstand normal assembly processes (e.g. soldering) attendant on their incorporation in equipments, without detriment to (a) and (b) above.

Some tests in the standard are accelerated tests, or tests under conditions which may represent or even exceed the most severe conditions of use. Such tests establish arbitrary standards of quality, but they cannot be held to give positive information on any performance beyond or outside the test periods or test conditions.

It is intended at a later date to add a further part to the standard which will specify standard sizes, ratings, etc., of the capacitors.

Copies of the standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, price 3s. 6d.

The Design of Electrical Apparatus Having Double Insulation

THE normal method of protection against electric shock for all electrical appliances used in the United Kingdom is the connection of the frame or exposed metal parts of the appliance to earth. In recent years there has been a tendency for an alternative method known as " double insulation " to be used. This method is particularly useful where a satisfactory connection to earth cannot be arranged, and it appears probable that the use of double-insulated appliances will increase.

The purpose of a memorandum which has now been issued by the British Standards Institution on the " Design of electrical apparatus having double insulation " is to explain the principles involved, and it is intended primarily for the use and guidance of B.S.I. Committees. It is, however, likely to be of interest to all designers, manufacturers and users of electrical appliances.

Section One gives general notes on protection against electric shock. Section Two deals with the design of double-insulated appliances and the various forms in which double insulation can be used.

The use of double insulation as a protection against electric shock instead of the method of earthing which is normally required, has been recognised by the Regulations for the Electric Equipment of Buildings issued by the Institution of Electrical Engineers, provided that the double-insulated appliance is the subject of an appropriate British Standard which has been approved for the purpose of the Regulations.

Copies of the memorandum may be obtained from the British Standards Institution, price 4s.

The Use of Electronic Valves

PART 3 of British Standard Code of Practice CP.1005, 1956, " The use of Electronic Valves," covers requirements for photo-cells, transmitting valves and cold-cathode gas-filled valves and gives information, additional to that in Part 1, on photo-cells, transmitting valves and cold-cathode gas-filled valves; and on the more common aspects of the use of electronic valves, such as: ratings, mountings and temperature. Specific aspects of the subject of which the following are examples, are also dealt with: modulation-frequency response and relative spectral-response for photo-cells; means of ventilation and cooling for transmitting valves; and ionization and de-ionization in cold-cathode gas-filled valves.

The new part should be read in conjunction with the recommendations for all electronic valves contained in Part 1 of the Code of Practice which was published in 1954 together with Part 2.

Reference is made in the document to the possibility of danger arising from X-radiation from valves operating at high voltages.

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EDDYSTONE 640. As new with handbook, £16 10/-, carriage paid. R. D. Charlton, 74 Court Way, Twickenham, Middlesex. (143

EDDYSTONE 659, although six years old, almost unused. What offers ? Box No. 145, The National Publicity Co., Ltd., 36/37 Upper Thames Street, London, E.C.4. (145

EDDYSTONE 680 X Communications Receiver complete with external speaker. Brand New, and Guaranteed for 12 months, £100. B.R.S.21024, Reeves, 54 Clements Road, Yardley, Birmingham. Tel.: Ste. 3195/4255. (139

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LABGEAR Wide Band Multiplier Unit, 50/-. Panda low pass filter, 30/-. S640 with speaker and 'S' meter, £20. Super top band rig with c.r. monitor. Write or call, details 89 Staines Road, Feltham, Middlesex. (140

(Continued on page 188)

EXCHANGE AND MART SECTION (Cont.)

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QSLs and log book (P.M.G. approved). Samples free. State whether G or B.R.S. Atkinson Bros., Printers, Looe, Cornwall. (400

RESISTORS 80Ω carbon for antenna match. 8/6, postage included. G3FQH, 15 Victoria Avenue, Cleckheaton. (134

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WANTED BC610 Hallicrafters, E.T.4336 transmitters, and spare parts for same. Best prices. P.C.A. Radio, Beavor Lane, Hammersmith, W.6. (626

WANTED: HRO coils, receivers, power packs, AR88Ds, AR88LFs, SX28s, BC348s, AR77s, and many other types, also laboratory test equipment and R54/APR4, TN17, TN18 and TN19 units. Details please to R. T. & I. Service, 254 Grove Green Road, Leytonstone, London, E.11 (LEY 4986).

WANTED: Three power packs, or separate transformers, chokes, etc., for approx. 1000V to 1250V at 250 mA. Around 800V at 250 mA. Another at 350V to 400V., 150 mA. Also U.M.3 transformer. Details, lowest prices, G8DC, 463 Colne Road, Burnley, Lancs. (144

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Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, New Ruskin House, Little Russell St., London, W.C.1. by The Haycock Press, Ltd., London, S.E.5

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