OCTOBER, 1960

RSGB BULLETIN

VOL. 36, No. 4

COMPLETE RELIABILITY UNDER THE MOST ADVERSE CONDITIONS

WITH AN

EDDYSTONE 888A

Messrs. Stratton & Co., Ltd.,
Eddystone Works,
Alvechurch Road.,
Birmingham. 31,
ENGLAND.

c/o B.O.A.C.,
Speedbird House,
Bahrain,
ARABIAN GULF.

Dear Sirs,

20th April, 1960.

I should like to write a few words in praise of the Eddystone 888A amateur-band receiver which I purchased almost a year ago, since which time it has been in operation for over six hours daily under the most adverse conditions.

It has performed far beyond my wildest expectations and has enabled me to work literally thousands of amateur stations on CW, AM and SSB in my DX-peditions to QATAR, TRUCIAL OMAN and the SULTANATE OF MUSCAT AND OMAN.

The selectivity, bandspread and accurate dial calibration of the 888A have been of great assistance in working stations in the phenomenal "pile-ups" which have occured whenever I have appeared on the air from one of the DX locations from which I have operated.

The receiver has survived being carried by air in only its cardboard packing case to various rough desert landing strips around the Arabian Gulf, which speaks highly for its rugged mechanical construction. I might add that the standard of wiring, assembly and general design compares very favourably with the best American aircraft radio equipment.

The high temperature and humidity encountered in the Arabian Gulf during the summer months had no detrimental effects on the receiver whatsoever; in fact, on my two SSB expeditions to Trucial Oman and the Sultanate of Muscat and Oman, the receiver operated continuously for five days with the mercury at 120°F. in the shade at mid-day. At this temperature, to touch the metal case or handles of the receiver caused a sensation comparable to that of accidentally touching a kettle of hot water; yet, in spite of this fact, the receiver continued to work perfectly with no signs of distress.

I should therefore like to thank you, as the manufacturers of this fine instrument, for a truly great receiver.

Yours faithfully,
Bryan A. Bisley.
Bryan A. Bisley.
VP4BDA, VP4LDB, VP4JO, VP4TAB.

This is one of many testimonials amply confirming our recommendation of the EDDYSTONE "888A." It is designed especially for amateur use, covering the six bands 1·8 Mc/s to 28 Mc/s each spread over the whole 12 in. long scale; in addition a logging scale allows reading from 2 kc/s per division on 10 metres to 250 c/s on the top band, the accuracy being ensured by an internal crystal controlled calibration oscillator. Some further features are double superhet circuit, R.F. stage, 12 valves, noise limiter, excellent S.S.B. reception, variable selectivity, aerial trimmer—and a host of other details directed to one aim, to meet the highly specialised needs of the Amateur Radio operator. A full specification comes to you post free on request. The cash price of the "888A" in its attractive grey hammer finish is £110.

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Recently the British Ornithologists' Union was given permission to make an expedition to Bulgaria—the first allowed behind the 'Iron Curtain'. Led by Guy Mountfort, the party took over 4,000 photographs (Eric Hosking was chief photographer) and made a large collection of recordings of rare bird-songs, using Emitape exclusively.

Mr. Mountfort afterwards said: "We had no 'second chances' with bird-song—it had to be right first time, every time. We often recorded under the most appalling conditions, where an inferior tape might have let us down. With its dependability, and the complete absence of flaws in its recording quality, Emitape always gave us superb results and without a trace of background noise."

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Volume 36 No. 4
October 1960
2/6 Monthly

R.S.G.B. BULLETIN

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Current Comment

discusses topics of the day

Keeping in Touch

AFTER the summer recess and late holidays October is the month in the year when group activities of all types get fully into their stride. Amateur Radio, as one of the most important of all hobby interests, is no exception and, as our *Forthcoming Events* page shows, local R.S.G.B. groups and affiliated societies are already in the throes of autumn programmes which vary in scope from a Morse class for beginners to a lecture on parametric amplifiers.

Every month R.S.G.B. Headquarters receives a vast number of technical publications, most of them professionally written for commercial sale, but among the mass of literature can always be found a goodly number of local newsletters, bulletins and the like which have been produced by groups of enthusiasts.

Glancing through those local bulletins it is easy to see why some clubs and groups can muster attendances of nearly 100 members at a local meeting. The enthusiasm that leads to the production of a local newsletter running to upwards of twenty pages of typescript must, and clearly does, permeate through the whole group. It would be invidious to single out for special mention any particular group publication because all of them are providing a first class service to members; rather, it is to those groups and societies that have not yet tried their hand at producing a local newsletter that we would make an urgent appeal to them to do so. The group which at present has no such device for keeping members in touch with one another should regard it as a challenge to be taken up immediately.

With very few exceptions those who are responsible for producing the newsletters which reach Headquarters are not professional journalists, neither have they the facilities of a large duplicating organization at their command, yet the information which is conveyed to their readers does much to make the group or club a successful local amenity.

At least half a dozen local news bulletins set a very high technical standard, in fact the editorial staff at R.S.G.B. Headquarters frequently glance with envious eyes at the interesting and often intriguing articles that appear in local publications.

Visitors to the R.S.G.B. Radio Hobbies Exhibition next month will have an opportunity of examining copies of some of the local news bulletins and the like that reach Headquarters. Maybe the display will spur on those clubs or groups which are at the moment not issuing a newsletter, to follow the good example of those that do.

Incidentally this issue of the R.S.G.B. BULLETIN contains the names of nearly 150 societies and clubs which are in affiliation with the R.S.G.B. Although this figure must represent a very high proportion of the total number of clubs in existence there are certainly some that are not listed.

Societies and clubs who desire to become affiliated to the R.S.G.B. are required to satisfy the Council that they are properly constituted by forwarding a copy of their rules, a list of officers and a statement showing total membership.

It is a matter of fact that the majority of clubs and societies regard affiliation to the R.S.G.B. as a very great honour. The R.S.G.B. in turn is conscious of the fine support which affiliated societies and clubs give to the parent body. J. C.

Balance of Power

IT has become apparent during recent weeks that the votes of the newly admitted African and Asian states will have a marked effect on the balance of power at the United Nations. Last year, at the Geneva Radio Conference, there were many outward and visible signs that the votes of new and developing countries would play an important part in the shaping of future frequency allocation tables. It is quite certain that most, if not all, of the recently admitted new countries will eventually seek membership of the International Telecommunication Union. In anticipation of that happening it is the duty of the amateur organizations in those countries to bring to the notice of all concerned the importance of the Amateur Service.

Several of the new states already recognize the value of Amateur Radio and grant licences to qualified persons but there are others where suspicion rears its ugly head.

The Amateur Radio movement has a record of service which should be sufficient to convince the most backward administration that it is a hobby interest that should be encouraged.

The International Amateur Radio Union can perform an important task at this time by giving guidance to amateurs in the new and developing countries and by helping them to establish national societies where no such societies exist.

One of the main objects of the I.A.R.U. is to represent Amateur Radio communications interests at International Radio Conferences and this it must continue to do if it is to remain a live organization in a changing world.

The balance of power is vitally important to the Amateur Radio movement. J. C.

Communication Receiver Design Considerations

Part 4.–Circuit Details

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

IN Part 3, the circuits of the front end and selectivity determining stages were described in some detail. The desired signal in its progression through these stages has been amplified and unwanted signals rejected. It is now ready for demodulation but first the use of the signal as a means of controlling the gain characteristics of the receiver will be considered.

Two Speed Automatic Gain Control System

A normal a.g.c. system has a slow time constant that is a function of the resistance and capacitance in the circuit, normally made up of the combined effect of the series resistance and the shunt reservoir and grid circuit bypass capacity on the a.g.c. feed line. This is usually of the order of 0·1 to 0·25 second and is quite satisfactory under a.m. reception conditions where there is a continuous carrier as part of the transmission. The usual circuit arrangement is shown in Fig. 24.

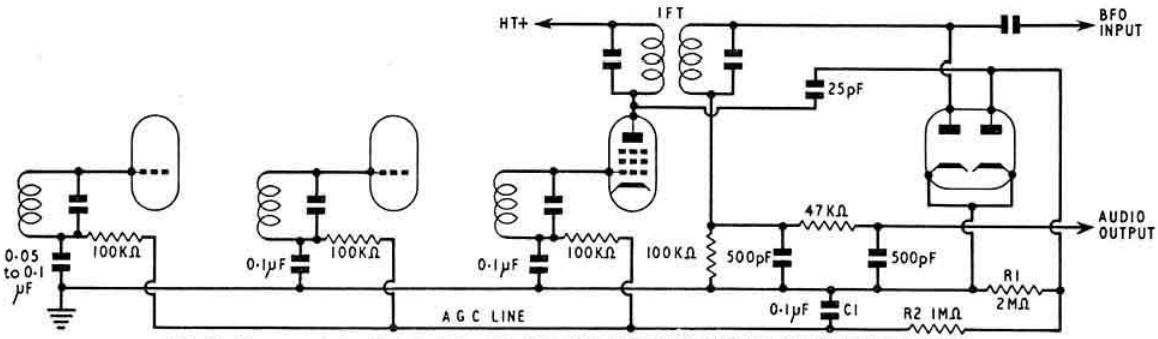


Fig. 24. Common type of a.g.c. system used in older communication receivers for a.m. reception.

A.c. shunt loading of the signal diode by the a.g.c. system would produce harmonic distortion but this can be reduced by feeding the a.g.c. diode from the *primary* of the i.f.t. If the grid circuit bypass capacitors are kept small in value—of the order of 0·01 to 0·05 μF—the time constant of the circuit during charge is determined by R2C1 and during discharge by (R2 + R1) C1.

For c.w. reception the b.f.o. is usually coupled to the diode anode through a small value of fixed capacity. This strong carrier will feed through the i.f.t. into the primary and to the a.g.c. diode anode and produce a strong a.g.c. voltage that will bias off the controlled valves and reduce the receiver gain. For c.w. reception therefore it is necessary to switch off the a.g.c. system and use manual r.f. and i.f. gain control.

S.s.b. signals require to be heterodyned in the same way as c.w. signals, with the b.f.o. in operation, yet it is highly desirable to be able to use an automatic control system. This difficulty is overcome by making the a.g.c. circuitry entirely independent and physically separated from the signal detector and the b.f.o. section. (Modern practice is to refer to this oscillator as the carrier insertion oscillator or c.i.o. and this abbreviation will now be used.)

In s.s.b. reception the carrier is suppressed at the transmitter and the incoming r.f. is rising and falling at an audio rate. It is therefore necessary to devise a system that will respond almost instantaneously to prevent the first syllable of a word blasting through the receiver. However, if the decay of the developed bias voltage were as rapid, the receiver background noise would rise and fall in between words in a most unpleasant manner. Additionally the S meter pointer would flick backwards and forwards continuously and it would not be possible to take a meter reading. There are then two conflicting requirements—a fast rise time for the attack, and a slow time constant for the release—so obviously a common *RC* network cannot be used. This difficulty is overcome by using low values of feed resistor and decoupling capacity to each controlled stage, so that the time constant of the a.g.c. *feed line* is fast (of the order of 0·005 second) and feeding the output voltage of the a.g.c. rectifier through a one way switch or gate circuit so that the developed potential on the a.g.c. feed line can only discharge through a controlled high value resistance back to earth. This is shown in simplified form in Fig. 25.

The signal input develops a negative going voltage across the 47 K ohm resistor and the r.f. component is filtered off by the 500 pF capacitors and the 22 K ohm resistor, leaving the audio modulation driving the cathode of the gate diode. As the anode is initially at zero potential each negative half cycle will cause the diode to conduct and charge up the capacitor C1 through the 10 K ohm filter resistance until both the diode anode and the reservoir capacitor almost reach the same voltage as the peak cathode excursion. At this point the gate diode will only be supplying small pulses of current sufficient to make up the slow loss of charge in C1. During any gap in the transmission the drive voltage on the gate diode cathode will be zero but as the anode is at the negative potential of the a.g.c. line the diode will not conduct and the a.g.c. bias will " hold up " for a period determined by the value of the return path to earth through the switch and the resistance in circuit. The time constant of the dis-

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

Previous articles in this series appeared in the R.S.G.B. BULLETIN *for July, August and September, 1960. Copies are available price 2/6 each from R.S.G.B. Headquarters.*

charge is quite independent of the rectifier circuitry and is dependent only on C1 R1 or C1 R2. If R2 is made 10 times the value of R1 the ratio of slow speed to fast speed will be 10 : 1. (To find the time in seconds, multiply the capacity in μF by the resistance value in Megohms.) A two speed system with a release ratio of about 10 : 1 has been found to be the most satisfactory arrangement for s.s.b. and normal a.m. reception.

Under reception conditions where there is a signal input with or without modulation (i.e., c.w. or the carrier of an a.m. transmission that has been tuned to the centre of the i.f. passband for reception without the c.i.o.) a potential will be developed across the 47 K ohms diode load resistor due to the incoming carrier. The gate diode cathode will follow this potential and the operation of the a.g.c. system will be maintained unaffected by the different signal input conditions.

Bias requirement—that is the maximum grid voltage for minimum gain—will depend on the method of screen feed to the controlled r.f. and i.f. valves and may be either 20 or 50 volts approximately. Obviously the a.g.c. rectifier cannot provide this unless it has a greater peak signal input. The rectifier is not concerned with frequency and it makes no difference whether the input is at r.f. from the i.f. stages, or at audio frequency from the l.f. stages. Any claim that the audio derived system has a better performance is not based on fact and is quite unrealistic. As the required drive voltage is not available in the l.f. stages an a.g.c. amplifier valve will be necessary. This voltage would be available from the last i.f. transformer, but it would be inadvisable to take it from this point because of the risk (with certain types of detectors) of the strong c.i.o. feed voltage to the signal demodulator breaking through into the a.g.c. system. With either method then, an a.g.c. amplifier stage will be necessary.

There are further considerations in regard to a.m. reception in the normal manner and these have been dealt with in Part 2 of this series. After reviewing all the relevant factors the balance is in favour of the r.f. derived system fed from the second i.f. amplifier and the preferred arrangement is given in Fig. 26.

When a diode cathode is heated a few of the electrons leaving the cathode will have sufficient velocity to reach the anode and even when the anode has zero potential these electrons will flow back to the cathode through the external circuit. In the gate diode this return path is a high value resistance and the small " leakage " current through the diode will produce a voltage that will be fed to the bias line. In the " slow " position of the switch the return path is 10 times as large and the voltage produced will be greater. This is most undesirable. It means in practice that a small controlling a.g.c. bias is being developed without any signal input into the receiver and that the zero setting of the S meter will shift when the a.g.c. operating switch S1/S2 is turned through its three positions. The most convenient cure for this is to return the gate diode anode circuit to a small negative " bucking " voltage.

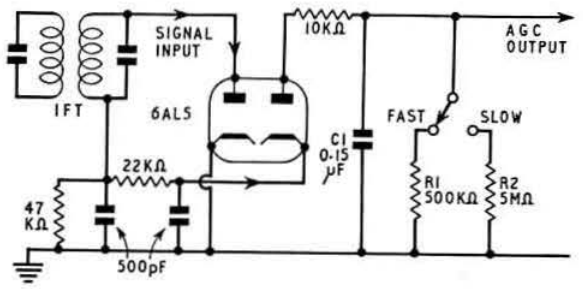


Fig. 25. A.g.c. rectifier and gate diode with switch for fast and slow release time.

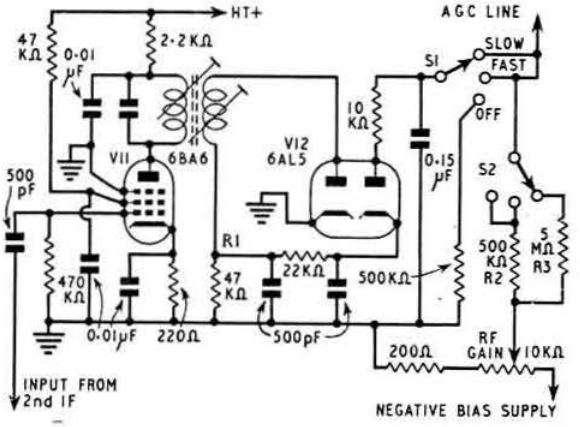


Fig. 26. Complete a.g.c. system comprising amplifier, rectifier, gate diode and control switch.

Under conditions of powerful adjacent channel interference the receiver front end stages could be overloaded with consequent cross modulation of the wanted signal. Additionally, a strong heterodyne within the passband (either tone modulated or not sufficiently stable to be eliminated by the *Q* multiplier rejection filter) could provide a considerable a.g.c. bias and reduce the gain just when it was most needed for the reception of a weak wanted signal. It would therefore be undesirable to rely wholly on an automatic control of gain and the provision of additional manual control is an operating necessity. This could be arranged by returning the cathode of the required stages to a 10 K ohm variable potentiometer on the front panel. There is, however, already a common feed to the grids of the required valves carrying the a.g.c. bias. If therefore the bias line return resistors R2 and R3 are connected to the slider of a potentiometer fed at one end from a source of fixed negative voltage and the other end taken to earth through a small resistor of 200 ohms or so, the potentiometer will become a manual r.f. gain control. At the maximum gain setting (slider at earth end) the potential across the 200 ohm resistor will provide the required small " bucking " voltage to offset the gate diode leakage current.

This system works very well in practice. The negative voltage from the slider of the r.f. gain control is in effect a variable delay bias on the anode of the gate diode applied simultaneously with the bias to the grids of the controlled valves. The delay point can be set just less than the peak negative excursion of the cathode due to the incoming signal. This allows the a.g.c. system to be driven by and to follow the variation in the strength of the incoming signal but holds up the a.g.c. voltage decay to whatever level has been set on the manual control. By this means the background noise can be effectively reduced and yet the received signal is still in control and the S meter will be indicating the correct signal strength reading. The operating procedure is to back off the r.f. gain control until the S meter reads approximately one or two S points below the incoming signal level.

The negative bias source can either be obtained from a resistance in series with the common negative return in the main h.t. supply or from a separate fixed bias rectifier and small mains transformer. This voltage is also available to feed the necessary fixed bias to the output valve.

Aside from the simplicity of the system as a whole, there is the added advantage of flexibility. The amplitude of the bias voltage in relation to the signal input and the time for both fast and slow release speeds can be adjusted or altered in value to suit individual requirements without affecting the overall performance in any way.

The reader will have already noted that the circuit of the a.g.c. rectifier in Fig. 26 is exactly the same as a shunt diode detector. As the signal modulation is available across the load resistor R1, why it is not taken off from this point and the a.g.c. rectifier also used as an envelope detector for normal a.m. reception? This could be done, but it is not recommended because of the a.c. shunt loading of the gate diode and the consequent severe second harmonic distortion.

After zero setting the S meter with the potentiometer in the bridge cathode circuit of V9, the a.g.c. system is set up and calibrated as follows. The receiver is tuned to 3·8 Mc/s and a 10,000 μV input at this frequency fed from a signal generator into the aerial input terminal, and the value of R1 adjusted until the correct bias for minimum gain in the r.f. and i.f. controlled stages is developed on the common a.g.c. feed line. (This will be of the order of 20 or 50 volts, depending on the method of h.t. feed to the valve screens.)

To calibrate the S meter, the meter terminals are first shunted with a fixed resistor of the correct value to give exactly full scale deflection. The signal generator input is then reduced to 1 μV and the position of the pointer marked in pencil to indicate S1 and 0db. (1 μV is the smallest signal that will give a signal/noise ratio of 20db and is taken as the threshold level.) The signal generator input is then doubled to 2 μV and the position of the pointer marked S2 and 6db. It is then doubled again to 4 μV and the pointer position marked S3 and 12db; doubled again to 8 μV and the pointer position marked S4 and 18db; doubled again to 16 μV and the position marked S5 and 24db; doubled again to 32 μV and marked S6 and 30db; doubled to 64 μV and marked S7 and 36db; 128 μV and S8 and 42db; 256 μV and S9 and 48db; 512 μV and S9 + 6db and 54db; 1024 μV and S9 + 12db and 60db; 2048 μV and S9 + 18db and 66db; and finally 4096 μV and S9 + 24db and 72db.

A report to a S9 station would then be given as, " Your signal input is 48db above 1 μV." This report actually means something and is a concrete value—not an arbitrary, elastic S unit, dependent on the whim of the receiver manufacturer. If this report is not understood, it could be given as, " The S meter is calibrated at 6db per S point above 1 μV and your signal input is S9." As 6 db represents a voltage ratio of 2 : 1 the operator could work out the input signal in μV for himself if he so wished. It will be noted that the signal input for a S9 meter reading is 256 μV, so that reports given with this method of calibration are neither " scotch " or flattering —in fact they represent an attempt at a much needed measure of honesty.

It is hardly necessary to stress that the accuracy of the S meter readings will depend on the receiver gain remaining at a constant level on all bands from 160 to 10m. In practice it does not do this. The gain from the r.f. stage increases on the lower frequency bands because of the higher dynamic resistance of the tuned circuits.

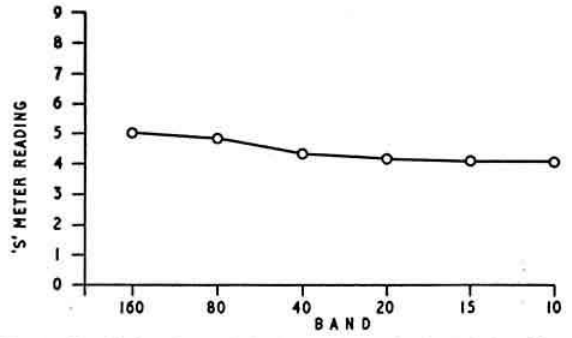


Fig. 27. Graph showing variation in receiver gain for each band from 160 to 10 metres.

If a graph is drawn for the S meter readings for a constant signal input on each band in turn, it will give a curve similar to that shown in Fig. 27 in which it will be noted that the S meter reading is within 2db from 20 to 10m. This is quite satisfactory and in practice an error of 2db is likely to be as good or better than the accuracy of the meter observation. There is a further rise on 40m and quite a pronounced jump on 80 and 160m, where the error is approximately one S point—this is 6db or an input voltage error of 2 : 1. This rising gain on the three lower bands could be corrected quite easily by incorporating the required value of resistive damping across the r.f. valve anode coil but it is not recommended

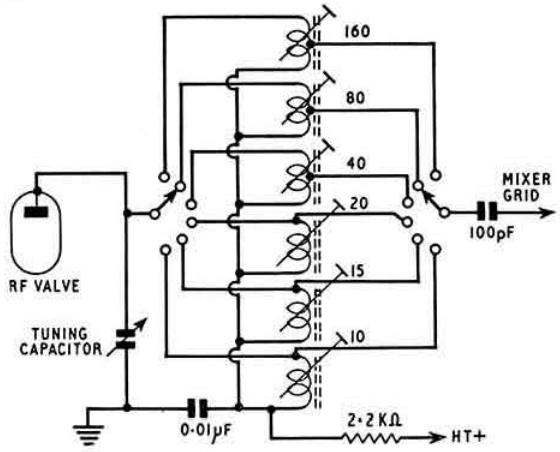


Fig. 28. Method of selecting a tapping point on the r.f. anode coil to maintain constant gain on all bands.

because the damping would lower the Q of these tuned circuits and adversely affect the image and i.f. breakthrough rejection.

The method adopted in practice is to fit an additional bank to the main band change assembly so that the mixer grid can be connected to a lower voltage tapping point on the coil as shown in Fig. 28. The tapping points are selected to give a voltage output that maintains the overall stage gain reasonably constant on all bands. A further advantage is the reduction of the grid input loading and an increase in circuit Q with the benefit of better image and i.f. breakthrough rejection on those bands where this improvement would have the greatest value.

S.S.B. and A.M. Demodulators

S.s.b. demodulation does not present any particular problem of design and in fact the normal diode envelope detector used for a.m. reception is in practice quite satisfactory. With this type of detector there is, however, some measure of a.c. shunt loading due to the following volume control, which is effectively in parallel with the diode load, and consequently a small percentage of second harmonic distortion. Additionally there is a small amount of harmonic distortion at low signal levels due to the curvature of the diode characteristics at the foot of the anode current anode voltage curve.

Within the last few years another type of demodulator has come into greater use. This is the infinite impedance detector —a small triode with the audio output taken off the cathode (Fig. 29). At audio frequencies, there is a considerable amount of negative current feedback across the large value cathode resistor, so the distortion with this type of detector is very low. As the triode is not driven into grid current the i.f. transformer secondary is not loaded and a higher signal voltage is available. For s.s.b. or c.w. reception the c.i.o.

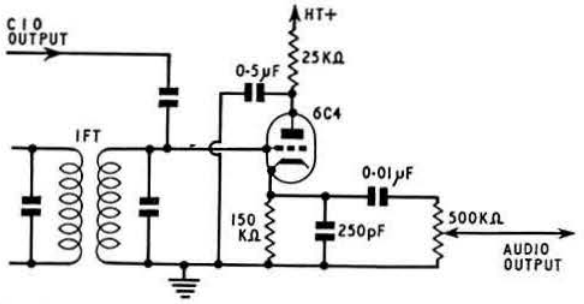


Fig. 29. Infinite impedance detector for use in a communications receiver.

input is fed to the grid through a small capacitor in the usual way.

However, it is agreed that the heterodyne detector has lower intermodulation distortion and where the receiver is being specifically designed for the maximum possible performance and the correct operating conditions can be incorporated into the design, a specialized type of demodulator is well worth while. An excellent arrangement—well tried and proven as a balanced modulator for transmitter application —is the modified ring modulator using two germanimum diodes in a bridge circuit. Sideband demodulation in a receiver is only the opposite of sideband modulation in a transmitter and the diode bridge modulator has a reputation for clean output and very low distortion.

The circuit is shown in Fig. 30.

The resonating capacity across the i.f.t. secondary is split into two fixed capacitors with a ratio of approximately 10 : 1 to present a low impedance load to the diodes. The c.i.o. voltage is fed in push pull across a balancing potentiometer from a low impedance link winding on the oscillator anode coil. This is a true heterodyne detector and there is no output whatsoever (after balancing with the 2 K ohm potentiometer) if the c.i.o. voltage is removed.

Germanimum diodes do not have to reach a stable operating temperature, are not affected by variation in h.t. or heater voltage, do not require any power supply, take up little space, do not produce hum or microphony, retain their balance over a long period and cost less than the valve they replace. Like all good things, there is a snag and that is the necessity to provide a separate detector for normal a.m.

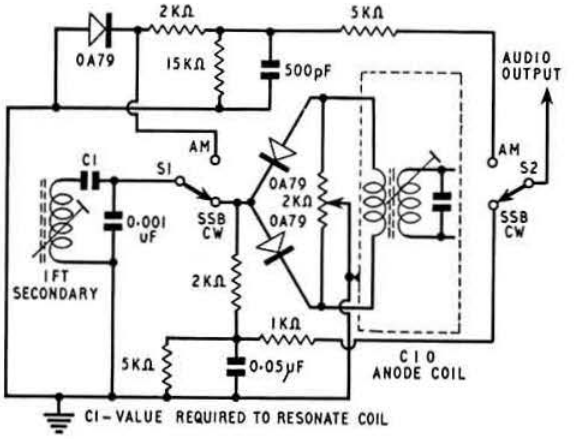


Fig. 30. S.s.b., c.w. and a.m. demodulator circuit arrangement (S1 and S2 ganged to c.i.o. switch).

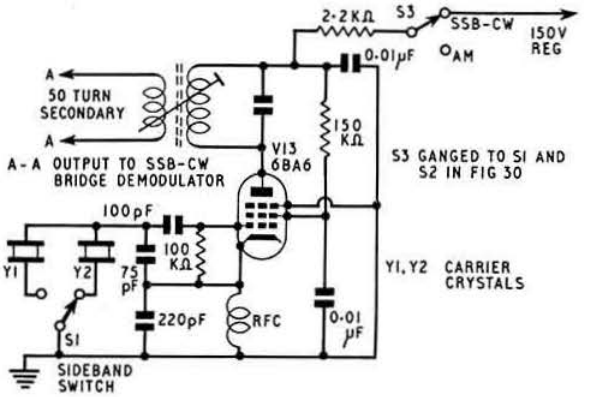


Fig. 31. Carrier insertion oscillator.

reception. Fortunately this is easily overcome with another germanium diode.

The considerations in regard to the frequency control of the c.i.o. have been discussed earlier and it has been shown that the advantages are with crystal control with two carrier crystals and switching to allow upper or lower sideband selection. Fig. 31 shows the preferred circuit arrangement.

Sideband Switching—Automatic V.F.O. Correction

Sideband switching is obtained by selecting either one of two carrier crystals. These crystals are placed symmetrically either side of the filter passband so that the carrier is re-inserted in the receiver in the correct frequency relationship for natural speech reproduction. If the higher frequency crystal is selected the filter will pass the lower sideband. If

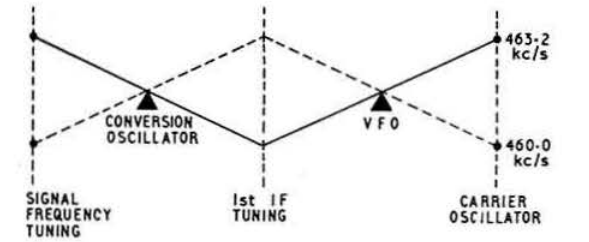


Fig. 32. Functional diagram showing the effect of sideband switching on the receiver front end tuning.

the lower frequency crystal is selected the filter will pass the higher sideband.

The carrier crystal spacing should be determined from the plotted response of the filter and will normally be the same as the filter bandwidth at the 20db points. In practice with three half lattice sections using FT241A crystals the spacing is likely to be 3·2 kc/s. If therefore the carrier crystal is switched during reception the receiver signal frequency tuning would alter by the same amount, the received signal would disappear and it would be necessary to find it again by re-tuning. In effect the conversion oscillator and the v.f.o. are fixed pivots and the other frequencies " see-saw " about them. When the carrier frequency goes lower the tunable i.f. goes higher. When the tunable i.f. moves higher the signal frequency goes lower. This is shown in the functional diagram in Fig. 32. (It should be appreciated that this only holds good when the two heterodyning frequencies are on the high side.)

This shift in tuning can be corrected by moving either of the oscillators by the same amount. It will be seen from Fig.

32 that when the carrier crystal frequency goes lower the tunable first i.f. goes higher; if therefore the v.f.o. were simultaneously shifted by the same amount the first i.f. tuning would remain unaltered and so would the signal frequency tuning.

While there is no theoretical difficulty in pulling down the frequency of a v.f.o. by the small amount of 3·2 kc/s—it is only necessary to switch in a small additional capacity across the tuning capacitor—the practical difficulty is brought about by the fact that the v.f.o. has a tuning range of 500 kc/s, and therefore the L/C ratio of the tuned circuit is varying throughout the band. The value of fixed capacity that would shift the v.f.o. frequency 3·2 kc/s at the h.f. end of its range would not be large enough in value to shift it this amount at the l.f. end of the range.

However, a Colpitts oscillator has a large value of fixed capacitance between the valve cathode and the earthy end of the coil that is also part of the tuned circuit. It is obviously possible to reduce the v.f.o. frequency by 3·2 kc/s by switching additional capacity across this capacitor. Further, if the required value were a small proportion of the existing 2000 pF capacity, the percentage error across the v.f.o. tuning range would also be quite small. This approach was tried out experimentally and in the writer's receiver the additional value of capacity required is approximately 20 pF or 1 per cent of the existing fixed value.

As the required capacity will depend on the amount of correction for the carrier crystal spacing in use, and will also be affected by the choice of the band for the i.f. tuning and therefore the frequency band the v.f.o. is actually covering, it is advisable to use a small variable capacitor that can be pre-set to the correct value. A Philips 3-30 pF trimmer is suitable. The circuit arrangement is shown in Fig. 33. A single bank 1 pole, 2 way Yaxley switch is used and ganged to the single bank 1 pole, 2 way Yaxley switch selecting the carrier crystals in the c.i.o. section.

To set up the system correctly the Philips trimmer is almost fully unscrewed and the sideband selector switch is put in the " LOW " position and a steady c.w. signal tuned in at 3·8 Mc/s to zero beat. (One of the 100 kc/s pips from the calibration oscillator is suitable.) " Tuned in to zero beat " means that the carrier is just dropped down the side of the filter passband so that it is only just inaudible. The sideband switch is now moved to the " HIGH " position and the Philips trimmer increased in capacity until the carrier is again at zero beat.

The 80m band and the frequency of 3·8 Mc/s has been selected as the setting up frequency because it is on this band that the great majority of s.s.b. stations try out new transmitters, make adjustments and ask for sideband suppression

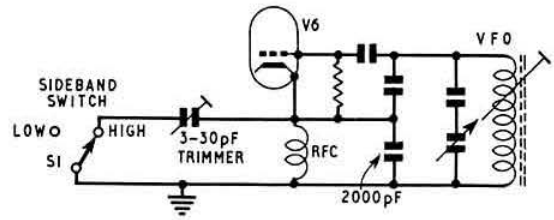


Fig. 33. Automatic v.f.o. correction when switching sidebands (S1 ganged to S1 in Fig. 31).

reports. As the sideband sections of all the main bands are around this same position of the receiver tuning scale the sideband switching accuracy will be greatest where it is most needed.

A check of the correction error is easily determined by selecting the calibration oscillator pips at each of the six points throughout the 500 kc/s tuning range and switching sidebands at each one.

In the writer's receiver the correction is within a few cycles from 4·0 Mc/s to 3·7 Mc/s; at the worst point (3·5 Mc/s) it is still a low pitched growl. This error does not matter in practice because the low end of the tuning scale is also the low end of the band on all six of the amateur channels; as these are the c.w. sections, sideband switching would not be required there anyway.

(To be concluded)

South Manchester and Stockport Radio Rally

MORE than 300 visitors attended a rally at Buxton Pavilion Gardens, Derbyshire on August 28, 1960, jointly organized by the South Manchester Radio Club and Stockport Radio Society. Altogether 70 cars were fitted for mobile operation.

The rally commenced at Stockport with a treasure hunt to Buxton in which 41 competitors (23 mobile and 18 non-mobile) took part. The mobile section was won by Don Barber (G2AKR/M) followed by Eric Taylor (G2ALN/M). Mrs. Taylor, in partnership with Mrs. Norlene Dunn (wife of G3KTL) lead the non-mobile section with Jack Taylor (G2BJT) in second place.

The Top Band and 2m control and talk-in stations on the treasure hunt route and at the Pavilion Gardens were kept fully occupied throughout.

During the day a road safety display was given by courtesy of the Chief Constable of Derbyshire, and a typical N.F.D. station was set up by the Stockport Society.

Advance publicity for the rally was given by the B.B.C. in *The Week Ahead* and included a recording of a contact between G6DN/M and G3NOA/M.

Early Birds

THE 21st anniversary of the occasion when the first batch of Royal Air Force Civilian Wireless Reservists, known as The Early Birds, embarked for France was celebrated by a Reunion Dinner at The Horseshoe Hotel, Tottenham Court Road, London, W.C.1 on Saturday, September 3, 1960.

At the Reunion 20 of the original Early Birds answered the roll call under the chairmanship of Leslie Hill, G8KS. The dinner was organised by Messrs. Hill, E. R. Dolman, G2HFG and R. F. Stevens, G2BVN and the guest speaker was the General Secretary of the R.S.G.B. (Mr. John Clarricoats, O.B.E., G6CL) who described some of the war-time activities and exploits of R.S.G.B. members.

(The Early Birds helped to man a Wireless Intelligence Screen along the Maginot Line.—ED.)

Surplus Teleprinters

MEMBERS interested in Amateur RTTY may like to know that a small quantity of Type 3 teleprinters is available to callers only, price £3/10/- each, from Chelmsford Metals Ltd., 59 Wood Street, Chelmsford.

A Transistorized Voice Control Unit

By HAMISH V. BELL, B.Sc. (G3MAZ)*

THE device to be described is the result of a search for a small, efficient, noiseless, voice-controlled switch (VOX) with a time delay largely independent of input level.

A voice-controlled switch is, as its name suggests, a device which will switch on some associated equipment, such as a transmitter, only when a voice signal is present. The usual method of achieving this is to rectify the applied audio signal and use it to control the bias on the grid of a valve. The valve has in its anode circuit a sensitive relay which is connected to the associated equipment to perform the switching. A time delay must be incorporated so that the relay does not respond to each individual syllable of the speech but only to the presence, or absence for a specified length of time, of the input signal.

The delay is generally arranged by means of a capacitor in the grid circuit which is charged by the rectified audio input and which discharges through a resistor when the input is removed. A disadvantage of this is that the time delay is dependent upon the voltage to which the capacitor has charged. If the last sound input was of low intensity, then the delay will be short and if of high intensity, the delay will be long. With this type of circuit, a sensitive relay is required and so precautions have to be taken to ensure that noise from the relay is not fed back through the system as this will cause instability.

Voice control circuits which do not use relays have been described in the past. In these a valve is connected between earth and a negative voltage rather than a positive voltage and earth. A negative bias voltage can therefore be obtained to switch an external circuit without employing relays. Since *p-n-p* transistors require negative voltages for their normal operation, their use in a circuit of this nature should be advantageous.

Comparison

To assess this advantage and any others which might arise from using transistors, it is necessary to compare the large signal characteristics of valves and transistors. Considering the circuit shown in Fig. 1 with the valve anode connected to earth via a resistive load and the cathode returned to a negative potential (V) then for a value of grid voltage more negative than the cathode potential, no anode current will flow. Since no anode current is flowing there can be no voltage drop in the anode load and so the anode is at earth potential. As the grid is brought to the same potential as the cathode, anode current will flow and the anode voltage will fall towards $-V$ until the valve bottoms or the product of anode voltage and current is limited by the anode dissipation of the valve. At this point there will still be a large voltage across the valve as it has quite a high impedance. This voltage has to be added to that required to switch the external circuit when the h.t. voltage is being determined. Since a negative output voltage is required, the valve has to operate with the cathode at a high negative voltage and this may lead to a breakdown of the heater-cathode insulation.

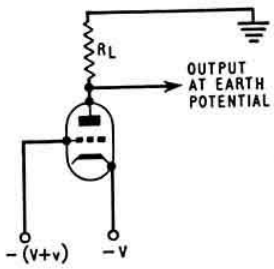


Fig. 1. Basic valve circuit $-(V+v)$ greater than $-V$.

With a *p-n-p* transistor in the grounded emitter configuration (Fig. 2) the situation is rather different. When a slight positive bias is applied via the resistor (Rb) to the base, the transistor is cut off. The cut-off is not complete: some leakage current (of the order of micro-amps) still flows. The collector voltage is therefore not quite equal to the supply voltage but with a low value of collector load (Rc) the difference is only fractional and can be neglected. If the input voltage is now made steadily negative, base current will flow and by transistor action the collector current will increase. In consequence the voltage drop across the collector load will increase and the collector voltage will move towards earth. A certain value of base current will be reached beyond which there will be no change of collector voltage as nearly all the available supply voltage will be dropped across the collector load. The rest is a small potential difference of the order of 0·2 V across the transistor itself from collector to emitter. The transistor in this condition is termed " on," " saturated," or " bottomed " and when only leakage current flows it is termed " off."

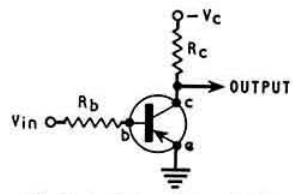


Fig. 2. Basic transistor circuit. (c, collector; b, base; e, emitter).

The total value of current possible in the collector circuit depends upon the input current and the current gain in grounded emitter (α' or β) of the transistor. Owing to the wide variation in transistor charcteristics the circuit must be designed taking a minimum value for α' to ensure that the required current is obtained with all transistors. No damage is done if the α' is higher than the value assumed, since the collector load will limit the current to the design value.

The advantages of the transistor for this application, apart from the suitability of supplies mentioned originally, are therefore:

(*a*) Full use of the available voltage, i.e. the output can swing from −0·2 volt (transistor bottomed) up to the maximum supply voltage.

(*b*) Low power dissipation in both states: OFF, high voltage, low current; ON, low voltage, high current. (Maximum dissipation occurs at half the voltage swing when half the maximum current is flowing.)

(*c*) No heater-cathode insulation worries.

Design

With these points in mind, the circuit of Fig. 3 was developed. The maximum voltage the transistors can safely stand is −30 V and so this was used, it being a convenient value also for biasing off valves in receivers and low level transmitter stages. The values of collector resistors were chosen to ensure bottoming at low current levels and so reduce the drain on the battery. The necessary delay is effected by the large capacitor C2 connected from the base circuit of TR2 to earth. The value must be high because of the low resistance discharge path through the base-emitter junction.

In order that the second stage may be quickly driven into

* *152 Kingsway, Widnes, Lancashire.*

saturation, the input source must supply sufficient current to charge the capacitor to the required voltage in a very short time. Since some form of isolating circuit is also required to reduce the loading effect of the large capacitance on the preceding speech amplifier, an emitter follower is used. This stage is biased in such a manner as to rectify the input speech waveform and so fulfils three functions. An OC72 is employed in this position since a high value of α' is required.

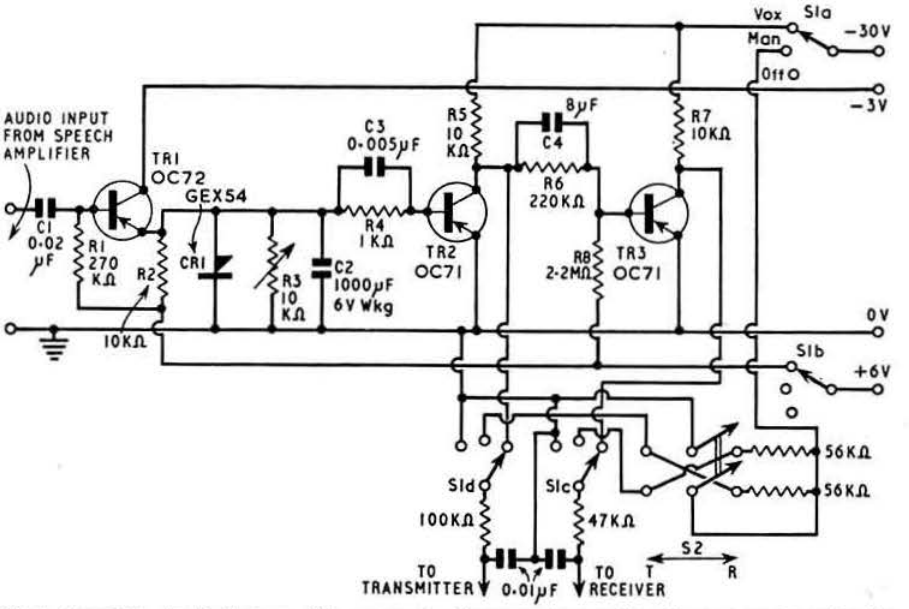


Fig. 3. Complete circuit diagram. The outputs to the transmitter and receiver are connected to the earthy end of the grid circuit of the controlled stages. The audio input from the speech amplifier should be of the order of 30 volts.

Circuit Operation

The complete operation of the circuit is as follows.

With no input signal to the emitter follower (TR1), this transistor is cut off due to the positive bias on its base, with respect to the emitter, and so the only current that flows is from the +6 V supply through the resistor R2 and the diode CR1 to earth. This holds the emitter of TR1, the capacitor C2 and hence the base of TR2 at a very slight positive potential and so ensures that TR2 is cut off. At the same time TR3 conducts, being supplied with base current from the −30 V supply. When an alternating signal is applied to the input, the emitter of TR1 follows the negative excursions, the positive ones being suppressed owing to the biasing. As the emitter goes negative, the diode CR1 is reverse biased and so can be considered out of circuit, leaving C2 to be charged to the peak d.c. value of the emitter voltage.

The second stage is arranged to saturate when the capacitor C2 is charged to −0·5 V and so its collector will remain at earth potential while the capacitor voltage is more negative than this value. The capacitor C3 in parallel with the base resistor of this stage helps to reduce the response time of the transistor since, for rapid changes of input, it is virtually a short circuit. The steady state conditions are maintained by the value of the base resistor. Owing to the smoothing effect of the capacitor C2 and the low impedance discharge path through the transistor, it will be found that the emitter voltage of TR1 is almost constant while an input is applied, such variations as are present being small compared with the target voltage of +6 volts. In this way, the time delay can be made largely independent of the input intensity. The discharge of C2 controls the delay before the circuit returns to its original condition, the discharge path being via R2 to the +6 V supply.

The discharge rate is, of course, exponential and depends upon the values of R2, C2, the voltage to which C2 is charged and the target voltage (+6 V in this case). This rate of discharge will be high initially and this is the characteristic required to ensure that TR2 and TR3 pass quickly from one condition to the other once it is obvious no further input is to be applied. However, the nearer the potential of C2 becomes to the target potential the slower will be the discharge and this would upset the switching action. Use is therefore made of a positive target voltage (+6 V), to give a high discharge rate, and of diode CR1. Once the potential of C2 becomes slightly positive CR1 conducts and " clamps " the potential of C2 to earth. By this means, only the first rapid portion of the discharge characteristic is employed. A parallel discharge path is provided by the variable resistor R3 to allow some variation of the time delay to suit individual requirements.

The third stage is merely an inverter to give a negative bias voltage for the receiver when the transmitter is turned on. The high value of capacitor across the base resistor is unconventional but is necessary to speed up the turn off time of the receiver. This enables the receiver to be completely muted before the transmitter is fully energized and so the operation is smooth and quiet. Another approach to this would be to slow down the turn on time of the transmitter but this would tend to produce excessive clipping of the first syllable and so reduce the efficiency of the device. Owing to its recovery time, the receiver does not regain full sensitivity until the transmitter is biased off again and so no noise is generated in the change-over.

A further difficulty sometimes encountered when voice control circuits are used with a loudspeaker is the tendency for sounds from the loudspeaker to switch the circuit over. A slow form of oscillation can then develop since when the receiver goes off the sound from the loudspeaker which initiated the switching also disappears. After a length of time governed by the delay components, the receiver will come on again, the sound from the loudspeaker will once more trip the circuit and the cycle will be repeated.

In this instance, the gain of the speech amplifier feeding the voice control unit has been held to the minimum necessary for reliable operation when speaking about two inches away from the microphone. The loudspeaker is placed some 2 ft. away and so does not trip the voice control circuit. As a result no anti-trip circuit was included. If tripping does occur, it is possible to feed a voltage from the receiver so that it cancels the voltage produced by sounds from the loudspeaker which are picked up by the microphone.

Construction

The form of construction is not important, although the original unit was built mainly on a tag-strip. No difficulties should be encountered in this respect, the only point to note being that the bias line decoupling components should be

(Continued on page 164)

TECHNICAL TOPICS By PAT HAWKER (G3VA)

Heat versus Reliability · Crystal Filter Ideas · Transistorized Moving-coil Microphone

Inverted-V Dipoles · Inexpensive Modulation Transformers

Straight Transistor Receivers · New Valves

THE strength of a chain—our elders were fond of telling us—is that of its weakest link. The reliability of electronic equipment is often that of any single part among some hundreds of components and valves. Television receivers, for example, still need an average of about three service calls a year. The fabulous U.S. military communications equipment is said to require between two and ten times its original cost in maintenance charges, yet an American general is on record as saying " . . . the funny thing is, when they push-to-talk, commanders never know whether the system will work." Most amateurs know exactly how those military gentlemen must feel.

A *Wireless World* reader recently put forward an interesting theory to account for the indisputable fact that some apparatus, even of most reputable make, seems to be constantly in need of repair: he suggested that assemblers automatically choose first from their bins the components in visually prime condition so that " end of batch " models tend to acquire a more than fair share of the " below par " components.

But in amateur-built equipment a good deal of the blame must often go to our blithe disregard for " reliability " as a major design factor—and of course to our inveterate use of junk-box components of uncertain age and dubious case histories. There is usually not much harm done by a sudden departure from the air, but with the increasing tendency towards complex equipment in which TVI precautions are more important than " accessibility for servicing," unreliable equipment can be terribly time consuming.

It may therefore be pertinent to review briefly some of the main causes of component breakdowns and to indicate, if only sketchily, the ways in which these can sometimes be avoided.

Apart from what may be called " mechanical " faults—wires becoming loose and touching, drive cord breakages, " dry " soldered joints, etc.—the primary cause of electronic breakdown is the generation of too much heat in a given spot. A secondary cause—fortunately less important in temperate climates—is chemical action such as that which attacks inductor windings at a positive voltage to core producing " pin holes " in the insulation and eventually the so-called " green spot " breakages. In general, the problem of chemical action resolves itself into moisture exclusion techniques and is one about which the constructor can do little except buy modern " tropicalized " components, avoid damp or steamy spots, or stay resolutely in the English countryside, far away from all urban or salt-laden atmospheres.

But component overheating is something we can all try to avoid by careful design. Since the thirties the amateur has perforce swung away from the inherently well ventilated baseboard and panel construction to the fully enclosed cabinet in which adequate ventilation, if it is to be achieved, requires careful attention to basic principles. It is seldom good enough just to have a few gauze-covered vent holes or louvres at the top and leave the components to sweat away at the base: convection currents will carry away some heat but a much better arrangement is to create an efficient " chimney effect " by encouraging cool air to enter freely at the bottom, flow up through holes in the chassis around the main heat-producing valves and voltage-dropping resistors, and to egress as warm air at the top.

The poor ventilation of conventional close-fitting valve shields has been referred to earlier (*Technical Topics*, September, 1959) as an important factor in valve failures. Judicous use of heat shielding screens between the main heat sources and the more susceptible components can also be useful. The heat sources should be given as much space as possible, not only to improve ventilation but also to keep them as far away as possible from other components. Remember that bulb temperatures of power valves such as the TT21 may go as high as 250° Centigrade (far above the safe limits for many components); even a typical small power valve such as the 6BW6 conventionally reaches a bulb temperature of 170° C. or so above ambient.

Resistors not only generate heat but often undergo a small permanent change in value with each heat cycle to which they are subjected. One of the most common causes of faulty performance in domestic as well as communications equipment is the tendency for composition resistors carrying d.c. to increase gradually in value: anode load, screen feed and cathode bias resistors are particularly susceptible, the more so when running near their wattage limits. In two recent surveys of television receiver faults, fixed and variable resistors topped the component fault tables (though it must be admitted that resistors come out well in relation to the number employed). This potential source of unsatisfactory performance can be much reduced by always using generously rated resistors: it is worth remembering that the wattage rating of a composition resistor is based on some arbitary working temperature (usually 70° C.) and its safe practical wattage may be very much less at higher temperatures.

Metal rectifiers are extremely vulnerable to excessive heat and should always be mounted with their cooling fins in the vertical plane and with unrestricted ventilation; preferably immediately above a chassis air vent so that they do not receive preheated air from valves or other components.

An elementary precaution, sometimes overlooked, is always to make certain that the mains voltage tapping adjustment of equipment has been correctly set for the mains supply it is being used on: even a 10 per cent misadjustment may cause temperatures to rise markedly (while too low heater voltages can lead to premature loss of cathode emission).

The leakage current of an electrolytic capacitor rises rapidly at temperatures above a point depending on its particular construction (the critical point is usually between about 80° and 100° C.). This may lead to a vicious spiral of high leakage current generating more internal heat causing even more leakage current . . . and ending only too often in a dud capacitor, a dud rectifier valve and/or a dud mains transformer. The temperature characteristics of electrolytic capacitors—like most components—have improved considerably in recent years but they are still usually happier out of immediate range of that hot rectifier valve, and efficiently clamped, from the thermal viewpoint, to chassis.

Many subsequent equipment failures are caused by overheating components during soldering. Slap-happy use of high wattage soldering irons can seriously weaken many physically small components such as ¼ watt resistors and the smaller capacitors. Most of us are by now well aware of the lethal nature of the soldering iron when dealing with semiconductor devices (transistors, crystal diodes, silicon rectifiers, etc.) but tend to forget the ease with which it can inflict permanent injury on other components. One answer to this problem is the small wattage iron (provided that it does not lead simply to longer application of the iron); another is the use of a metal " heat sink " between the point of soldering and the component. (For instance, a pair of flat-nosed pliers or better still one of those surgical instruments that can be clamped to the wire to leave both hands free, or a crocodile clip loaded with thick copper wires filed flat and fitted with heat dissipating plates.) Particular difficulty may arise when attempting to solder v.h.f. " feed-through " and similar capacitors direct to chassis. These are readily damaged by heat and the problem of soldering to a large area of metal is well known. A good liquid flux of resin base will help such joints to be made rapidly; an iron of reasonable thermal capacity but small physical size will also assist in avoiding damage.

But even when we have taken every precaution to keep our equipment cool, we are still likely to come up against the inexorable Finnagle's Law (brilliantly expounded by Jack Darr, *Wireless World*, September 1959): " If anything can possibly go wrong . . . it will certainly do so."

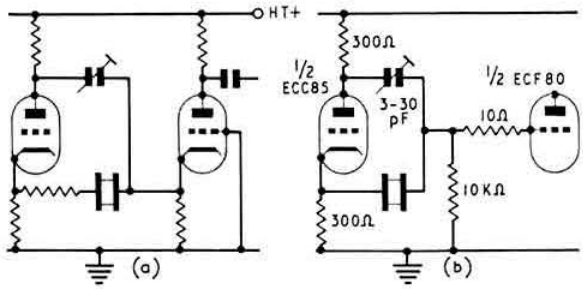


Fig. 3. Aperiodic filters. (a) is a basic circuit from DJ2KY's article; (b) from a practical design.

Tried Any New Crystal Filters Lately?

Despite the considerable increase in the application of crystal filter networks in receivers and s.s.b. transmitters, most British and American amateurs have been content to use variations of the standard half-lattice arrangement, though tending to employ increasing numbers of crystals to winkle out the kinks in the passband. A typical filter using six surplus crystals, designed by W1SGN for the Super Pro but equally applicable to other receivers, appeared in *QST* (July, 1960): see Fig. 1. This type of filter is usually based on the FT241 crystal units available between 370 and 1040 kc/s, but their effectiveness falls off when used with higher frequency crystals such as the FT243 units (1–8·75 Mc/s).

Recently there has been growing interest—notably in Germany and Switzerland—in some alternative circuits for the higher frequencies. An informative-looking review of filter circuits " Quartzfilter-Schaltungen " by DJ2KY is published in *DL-QTC* (August, 1960). Unfortunately the text is beyond our linguistic range but two circuits have been extracted.

Fig. 2 shows a circuit usually referred to as the " KY-filter," believed to be a revival of an old idea but noted on a number of occasions during the last few years in German publications. It provides several switched degrees of selectivity with one crystal, often of the order of 1600 kc/s. The crystal forms the coupling link at various impedances between the two tuned i.f. circuits, thus making use of the increasing effect of a quartz crystal as input and output impedances are lowered. The stray crystal capacitance is rendered ineffective by making it part of a tuned circuit by connecting the KY inductor in parallel with it. This inductor (like the tapped i.f. inductors) is usually wound on a ferrite pot core; unfortunately we do not have any constructional details but perhaps some member has fuller information on these filters.

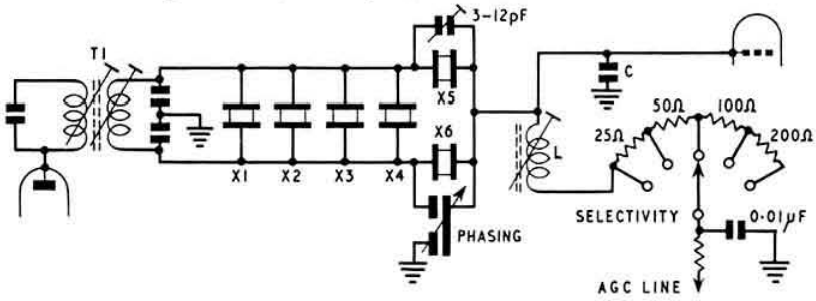


Fig. 1. W1SGN's low cost half-lattice filter. Suggested channel numbers for 465 kc/s unit: X1, 49 (461·1 kc/s); X2, 50 (462·9 kc/s); X3, 53 (468·5 kc/s); X4, 54 (470·4 kc/s); X5, 51 (464·8 kc/s); X6, 52 (466·7 kc/s). T1 and L/C should be tuned to mid filter frequency. Signals must not be allowed to leak round the filter.

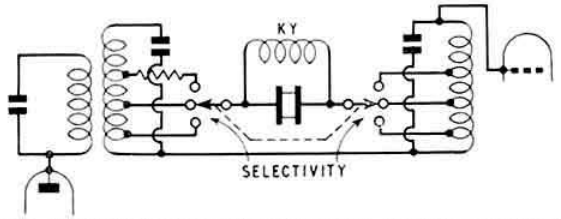


Fig. 2. The " KY-filter " popular in Germany. Sometimes additional capacitance is added across the crystal to facilitate the tuning of the trap circuit formed by " KY " and the crystal capacitance to the crystal frequency

Fig. 3 (*a*) is a basic " aperiodic filter " now turning up in various designs, including at least one commercially built German amateur bands receiver: Fig. 3 (*b*) is a practical circuit used when several of these filters are cascaded. An article on this type of i.f. design has appeared in *QST* (February, 1958) and referred to in this column in April, 1958. With surplus crystals available at prices below those of good i.f. transformers there is clearly a future in this type of circuit.

Since the above paragraph was written, the September issue of *QST* has arrived containing an excellent example of a crystal filter of this type. It is used by W4PHJ in a c.w. receiver for 14 and 21 Mc/s (" The PHJ-1 ") of high performance but relatively straightforward construction. Two 1690 kc/s crystals (surplus type DC34) are used in cascade by means of two 12AX7 valves in a single-conversion set of most modern design which also features a cascode r.f. amplifier, a 6J6 cathode-coupled h.f. oscillator, built-in selectoject (two 12AU7) and product detector with crystal controlled b.f.o. Selectivity is said to be 500 c/s bandwidth

at −6db points and about 1 kc/s at −20db points (the limit of measuring equipment available to W4PHJ) which is a good indication of the practical value of the " aperiodic" crystal filter at a high i.f.

Another type of h.f. crystal filter, based on the bridged-T filter, has been used successfully in the Hallicrafters s.s.b. transmitters.

Transistorized Moving-coil Microphone

A use for a.f. transistors which should not be overlooked is based on their ability to transform impedances. Fig. 4 shows a simple circuit which appeared in *Electronics Illustrated* (May, 1960) to enable a small 2 in. moving coil loudspeaker to be used as a microphone without a step-up transformer. The transistor provides a modest gain while allowing direct matching to a standard high-impedance amplifier socket. With some possible circuit value changes almost any a.f. transistor should be suitable. The speaker

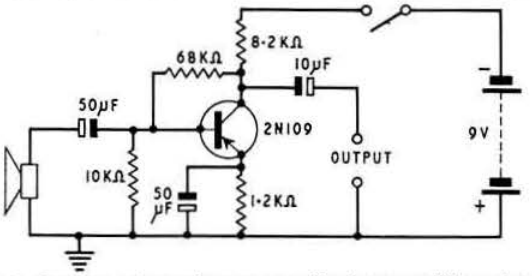


*Fig. 4. Use of an a.f. transistor as a combined pre-amplifier and step-up matching device (***Electronics Illustrated***).*

was one of the type used in transistor receivers with a 10 ohm speech coil.

Inverted-V Dipoles

With sunspot activity—to quote—" on the skids " we can expect good DX on 3·5 and 7 Mc/s during the next few years. K7GCO in the August 1960 *QST* urges the use on these bands of the " inverted V-shaped dipole," claiming consistent out-performance of ground planes and horizontal and vertical dipoles. This aerial is simply a centre-fed dipole with a high centre and the two ends attached to much lower anchor posts, without any suggestion of there being any critical apex angle. Sloping the dipole elements shortens the electrical length and an extra 5 per cent or so should be added to their length; the centre impedance will also be lowered so that it presents a better match to 50-ohm than to 70-ohm coax. K7GCO suggests that band width can be increased—if necessary—by using three- or five-wire " cage " elements rather than a single wire, while two bands can be covered by running paralleled dipoles at right angles from the single high support point.

Inexpensive Modulation Transformers

Modulation transformers for a.m. transmitters are not the cheapest of components, and two ideas for lessening the cost seem worth passing on. The first, from an article " 160 for Mobile " by K8EEY (*QST*, October 1959), is to use a standard grade push-pull output transformer in a low power mobile rig having a 6AQ5 p.a., 6AQ5 modulator: see Fig. 5. In effect this connection provides a 1 : 1 auto-transformer with the p.a. and modulator anode currents tending to de-saturate the transformer core.

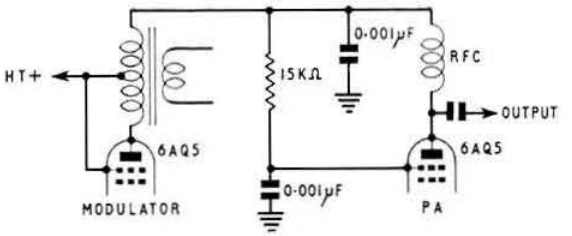


Fig. 5. A 14 K ohms anode-to-anode push-pull output transformer in a low power mobile rig (K8EEY, QST). The low impedance output winding is left unconnected.

The other scheme, though not new, may be fresh to some: it is to use a mains transformer (provided this has good breakdown insulation ratings) as a modulation transformer for a high power rig. Some useful notes on how to calculate permissible ratings and impedance transformations were given by K3BGX in " Inexpensive Modulator Transformers " (*Electronics World*, May 1960). An interesting point is that since the lowest amateur speech frequencies can be made about 200 c/s compared with 50 c/s of the mains supply, the voltage rating per turn can be increased considerably: K3BGX quotes a 440-0-440 transformer as having a peak audio rating of some 2,500-0-2,500 volts: on the other hand current ratings have to be reduced to allow for the audio component.

" Straight " Transistor Receivers

There are still many amateurs who will have a crack at a straight receiver, whereas (though G2DAF may be horrified at this statement) they will not tackle a " superhet." Without delving into the reasons for this, we will merely say that at a time when amateurs must be prepared to give transistors a try unless they wish to fall well behind in the communications race, it is surprising that so few designs have been published for amateur-bands regenerative detector transistor receivers. One of the few which have come to our notice is a five-transistor " 1-v-3 " bandswitched receiver for 80/40/20m in *Funk-Technik* (1 August, 1960) using an OC614 r.f. amplifier and an OC171 regenerative detector followed by three fairly conventional a.f. stages. Fig. 6 indicates the basic circuit of

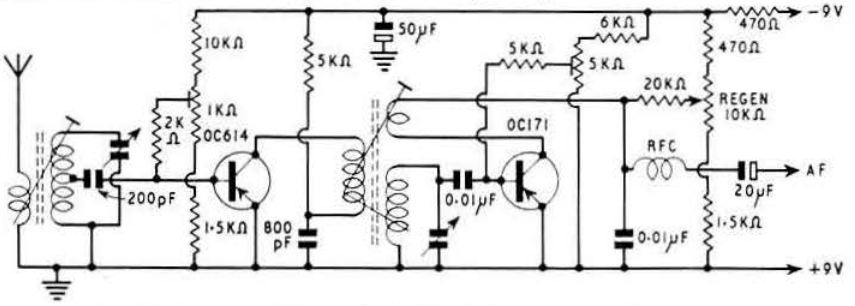


Fig. 6. Skeleton circuit extracted from a " 1-V-3 " straight amateur bands transistor receiver. The turns ratio of the coils is much the same as for a straight valve receiver.

the first two stages, much simplified by the omission of band-switching and bandspread arrangements.

New Valves

As already indicated, a good deal of the heat generated in equipment is unavoidable, but valve designers are constantly striving to reduce heat dissipation. An example of what can be done is provided by rectifiers using combined heater-cathodes of three-ply (aluminium/iron/copper) construction. The total cathode and anode dissipation of, for

instance, the new American 3DG4 is only 26 watts as opposed to the 42 watts of the otherwise comparably rated 5U4GB. The GZ34, 5AR4 and 6CA4 (EZ81) are 5 and 6 volt rectifiers also using special cathode construction to overcome the disadvantages of quick-heating " filament " type rectifiers in supplying a surge of high d.c. output before the other valves have warmed up. The GZ34 and EZ81 are of course available in the U.K.

Another new American valve offers some promising applications: this is the 6EZ8, a miniature, noval-based valve containing three triodes. This makes possible, for example, a single-valve high performance converter with grounded-grid r.f. amplifier, triode mixer and triode oscillator—a design of this type for the U.S. 27 Mc/s Citizens Band was published in *Electronics World*, July 1960.

The new ECL86 triode/output pentode offers a very high-slope output pentode of greater power capabilities than the older ECL types. A very useful looking valve that has appeared recently on the Continent—and presumably will appear here soon—is the ELL80 which has a pair of output pentodes in a single miniature envelope: it should be a boon to mobile modulators.

A further indication of the modern tendency to pack several valves into one envelope is the new range by the American General Electric of " Compactrons " for domestic equipment: one valve in this range replaces both the 12BA6 and 12BE6, while another combines the 35W4, 50C5 and 12AV6, thus making possible a two valve (including rectifier) broadcast receiver of conventional performance. One can only hope that the reliability problems which followed the introduction of combined triode/output pentodes into television receivers are avoided with these new portmanteau valves.

But American amateurs—for all the very wide range of valves available in the States—still seem to have nothing strictly comparable to our TT21 with 150 watts input to a single reasonably priced valve.

A Transistorized Voice Control Unit

(Continued from page 160)

placed as close as possible to the controlled stages in the transmitter and receiver.

The 30 volt battery is a small deaf-aid type, while the −3 V and +6 V supplies are obtained from a 9 volt grid-bias battery.

Conclusions

This voice control unit has been used for some time to control an amateur transmitter and receiver and has performed excellently, fulfilling all the requirements laid out in the introduction. On-the-air tests have shown that clipping of the first syllable is negligible, even for words which start with a " soft " sound such as " Teapot " or "Microphone." The time delay before the circuit switches to receive can be made short, so that a normal pause for breath will allow it to switch, or long so that a more definite pause is necessary. Once set, this delay is virtually independent of the intensity of the last sound.

The current drain is nearly constant at 4 mA and so small batteries can be used to power the device. This drain could be further reduced by using an *n-p-n* transistor for TR3, the inverter. The drain would then be about 1 mA on standby and 7 mA when energized.

Suitable switching is included to provide manual or VOX operation, as well as to remove the voltage supplies when the unit is out of use.

Standard Frequency Services in the United Kingdom*

MSF 2·5, 5 and 10 Mc/s

THE MSF service of high frequency transmissions is designed to provide a frequency and time reference receivable on at least one of three frequencies throughout the United Kingdom. In practice the service area of the transmissions extends to a radius of 1000-1500 km. from Rugby and thus covers also a large part of western Europe. The h.f. transmissions radiated simultaneously on 2·5, 5 and 10 Mc/s are continuous during the 24 hours except for an interruption of 5 minutes from minute 15 to minute 20 in each hour. All transmissions are modulated with 1 c/s pulses for a total of 35 minutes in each hour, the pulses consisting of 5 cycles of 1000 c/s tone while the minute signals are lengthened to 100 cycles of tone. The periods of 1000 c/s modulation previously broadcast have been replaced by periods of 1 c/s pulses following a recommendation by the C.C.I.R. The carrier and modulation frequencies are all derived from a single crystal oscillator which is regulated to $\pm$ 5 parts in 10^9 and calibrated with an accuracy of $\pm$ 2 parts in 10^{10} in terms of the caesium resonator at the National Physical Laboratory.

Except in a small region adjacent to Rugby where the ground wave predominates, the h.f. signals are received after reflection in the ionosphere. Variations in ionospheric conditions cause fluctuations in the received carrier frequencies which may amount to several parts in 10^7. This limitation on the accuracy of the signals can be overcome by making use of the low and very low frequency transmissions from Rugby.

MSF 50 kc/s and GBR 16 kc/s

MSF 60 kc/s is transmitted for one hour each day at 14.29-15.30 UT and it follows the same modulation programme as the h.f. transmissions. The carrier power is 10 kW and the phase stability of the received signal in the United Kingdom is about 0·1 microsecond thus allowing a comparison accuracy of at least 1 part in 10^{10} in the period of the transmission. The deviation of the carrier frequency relative to the N.P.L. caesium resonator is measured each day to an accuracy of two parts in 10^{10} and the results are published monthly in *Electronic Technology*.

The MSF oscillator, in addition to controlling the l.f. and h.f. transmissions is also used to generate the carrier frequency of the v.l.f. telegraphy transmitter GBR on 16 kc/s. This has an effective power of about 40 kW and, generally, is in use for about 22 hours per day, the maintenance period being 1300-1500 UT. The phase stability of the received signal is of the order of 1 microsecond thus providing a frequency reference usable to about one part in 10^{10} in a period of a few hours.

Droitwich 200 kc/s

This station which carries the Light Programme transmission of the B.B.C. and some foreign language broadcasts operates for about 18 hours per day. The radiated power is approximately 270 kW by day and 400 kW after sunset and a satisfactory signal is received throughout the British Isles.

The controlling crystal is allowed to drift over a range of about five parts in 10^8 before being reset to the initial value. The phase of the received carrier is stable to better than 0·1 microsecond but the short period instability of the crystal drive does not permit frequency comparisons to better than one part in 10^9 except over a strictly defined time interval. The deviation of the carrier frequency is measured at 10.30 UT each week-day at the N.P.L. with respect to the caesium resonator and the values published monthly in *Electronic Technology* to an accuracy of one part in 10^9.

* *Communicated by the National Physical Laboratory.*

The MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS (G2BVN) *

WITH the advent of autumn and an improvement in radio conditions, increased activity on the h.f. bands will be the order of the day, more stations will be chasing DX and consequently there will be more QRM. Is a " rubber stamp " QSO with the " Dxotic " concerned, to be followed by several weeks of anxious waiting for the precious card, really worth all the effort involved ? Judging by the activity on the bands today a great number of operators would reply in the affirmative. Whatever the individual interest in Amateur Radio, generally the end product is communication and it is only the distances involved that are different. It therefore seems that the QSL Bureaux of the world will continue to be fully occupied during the months ahead.

One of the advantages of s.s.b. is that it allows break-in working, but this facility has unfortunately produced the operator who, wishing to contact one of the stations concerned in a QSO already under way, chants, " break, break " at every gap in the conversation. Would it not be preferable for the operator to state clearly, and once only, his call sign ? And surely there is a correct time to break-in on a QSO and to show some consideration for the stations already in contact.

The Contest Calendar for the winter session is already full and hardly a weekend will pass without some contest activity. While such an event forms an ideal opportunity for the testing of a new transmitter or aerial it is usually said that only a small percentage of operators are seriously concerned with contests. It is to be expected that support will be forthcoming for the next B.E.R.U. and 21/28 Mc/s Telephony events, but last year the " CQ " contest attracted only about a dozen entries from the U.K. However, from listening on the bands it seems that many more stations than this participate in overseas contests, which means, therefore that the operators, possibly taking part for short periods only, do not send in their logs to the organising body.

Let us now look at future and past events in the world of DX.

News from Overseas

ZD2JKO provides the following items from Central Africa. ZD2PJB (ex-G3LWU), ZD2KHP and ZD2KHK (ex-G3KHK) are three new licensees, all with an interest in s.s.b. ZD2HJG (address in QTH Corner) has failed to receive a batch of about 300 cards sent to him at his previous address, and would be glad if stations who worked him before January 30, 1960 would QSL again, either via the Bureau or to his U.K. address. There is no news yet as to whether the Cameroons will be recognized as a separate country but ZD2KHK will be going to Mubi for a year from November 1960 and promises activity. ZD2JKO, whose score is now 153/101, received his 100th country QSL seven months after he was licensed. As far as is known there is no amateur activity from Niger, Dahomey or Volta but possibly DXpeditions could be arranged. There is, as yet, no news on the prefix to be used now that Nigeria has attained independence.

VP8EG will not now be returning from S. Orkney Is. until February 1962, reaching the U.K. in May. **VE3XF** is the new call of former VE3CFI, also ex-G5GB in 1922.

From R.A.F. Akrotiri, G3MBS, now operating **ZC4AK,** reports increased activity from the club station, mainly on 21 Mc/s phone and 14 Mc/s c.w. using a DX100-U transmitter and CR150 and HRO receivers. The club is licensed for 150 watts on 1·8 Mc/s and operation on this band should commence soon. The QSL address for ZC4AK appears in QTH Corner. **G3OKP,** recently arrived in Libya, promises operation on the h.f. bands and on 1·8 Mc/s. The main QTH will be Tripoli but /A working from 300 miles into the Sahara is also envisaged. The Libyan call is expected to be 5A2OKP.

B.E.R.S.195, Eric Trebilock, reports that the VK QSL Manager Ray Jones, VK3RJ, and his wife expect to be in the U.K. during December 1960. In the meantime Eric is acting as chief VK QSL officer. A write-up (in Russian) on B.E.R.S.195, recently appeared in the Russian magazine *Radio*. Erics score is now 269/256, with 153 during 1960.

Rundy, W3ZA, mentions that Iran is now deleted from the A.R.R.L. ban list, and that **EP5X** and **EP2A** are active on the DX bands. These stations are licensed for police and amateur working, the former being W2AYN/EP.

G3FPK (3A2BT) sends along the address of the QSL manager for Monaco and this appears in *QTH Corner*. 'FPK mentions the following stations as active in the Principality: 3A2', AH, AM, BF, CN and CX. 'CN is on most mornings from 06.00 to 08.00 on 14,130 to 14,160 kc/s a.m.

GM3OEV, Bob Milton, who operated ZB2A/VS9 from the Sultanate of Oman is indignant that doubts should have been cast (not in *M.O.T.A.*) on the legality of the operation. Bob states that after long correspondence the Sultan approved the setting up of the station, which was also recognized by A.R.R.L. A similar procedure was also followed by VS9OM.

VS9AAC has begun a two-year tour of duty in Aden and promises to be active on the h.f. bands with the accent on 14 Mc/s c.w. Address in *QTH Corner*.

Subscriptions to the **S.S.B. Amateur Radio Association,** mentioned in the June BULLETIN, may now be effected through G3KHE at a cost of 24s. The Association journal, *The Sidebander* is issued monthly.

An apology is due to ZD2KH*K* whose call was incorrectly quoted last month in connection with possible operation from the Cameroons.

K6CQM, the Editor of the DX Bulletin of the **N. California DX Club,** is anxious to arrange an exchange of bulletins with other interested DX clubs, and also to make contact with active DX'ers who would be prepared to submit monthly reports. Please write to 864 Rorke Way, Palo Alto, Calif., U.S.A.

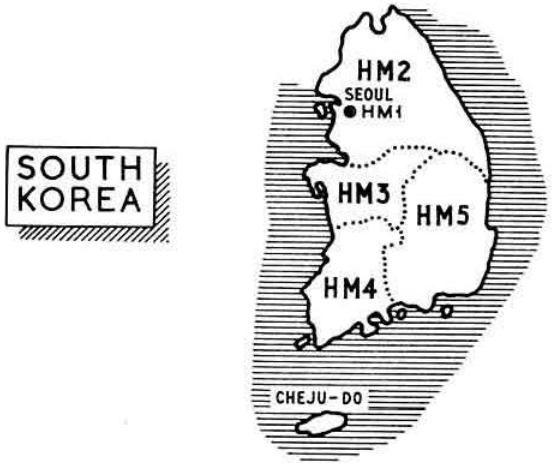
From **B.R.S.22249,** still awaiting his licence after 14 weeks, it is learnt that ZC4DP is now QRT, and ZC4SJ will be active for at least another 2 years after leave in the U.K., where he hopes to acquire a beam. In reply to A.1965 and others the prefix **UW** at present has the same significance as UA; UW9CR is believed to be in Zone 17.

News from Korea

From The Korean Amateur Radio League comes details of recent alterations. From August 1, 1960 the prefix for Korean nationals was changed from HL to **HM.** HL9 remains for stations operated by U.S. personnel. The HQ

* *Please send all reports to R.S.G.B. Headquarters to arrive not later than October 19.*

station of K.A.R.L. formerly HL9TA, now uses the call HM0HQ whilst HM9A is the HQ portable station which will be operated during the period November 11 to 30, from the Fifth National Science Exhibition in Seoul. Operation will be from 7 through 28 Mc/s on c.w. and a.m. At present there are seven amateur stations who have received their licences (HM1AA to HM1AG) but more are expected to be on the air in the near future. The accompanying map shows the five call areas in Korea. HM9 will be used for portable or mobile stations with HM0 for club stations. QSL cards for HM operators are handled through KARL at Central Box 162, Seoul.



DXpeditions

The massive trip by Gus Browning, **W4BPD,** hailing from South Carolina, is now under way; he has already been worked as 3A2BW and M1/W4BPD. Gus and Norman Fitch, G3FPK, together sampled the Monaco sun and, thanks to Norman, we give the future schedule of the expedition, which is: October 21, Seychelles with VQ4AQ and VQ9HB; 23, Platte Is. (VQ9); 25, Coetivy Is. (VQ9); 27 to 30, Agalega Is. (VQ8); November 2/3, Farqua Is. (VQ9); 4/5, Glouriuses Is. (FB8, counts as Madagascar); 6 to 8, Astove Is. (FB8 or VQ7); 8 to 15, Aldabra Is. (VQ7); 17 to 20, Comoros Is. (FB8C); November 24 to December 1, Tromelin Is. (FB8); December 3 to 4, Reunion Is. (FR7ZB). Three days on St. Brandon are scheduled, the exact timing depending on the transport available. Gus anticipates being in Nairobi by mid-December from where he will go via Kuwait to England for Christmas.

ZS6IF will be definitely operating /9 from November 5 to November 13 as mentioned last month. He may be accompanied by ZS6AUB, operating on s.s.b.

CR6CA planned to work from Sao Tome CR5 with subsequent visits to Ajuba, Annobon Is., Dahomey and Togo. Operation was, or will be, on 7 Mc/s through 28 Mc/s, c.w., a.m. and s.s.b. Joe stresses that stations should *not* call him on his frequency and should heed directional calls.

(CR5CA commenced operation on September 22 but so far only MP4BBW has pierced the W/K barrier.—Late news.)

W3ZA confirms that he will be active as **FL8ZA** from December 8 until December 12 or 15. K2UYG advises that the projected trip to XE4 (Socorro Is.) has had to be abandoned as the Island has been declared a restricted area for the present. He mentions the possibility of a return trip by FK8AS to FW8 (Wallis Is.) Latest news is that Danny Weil will leave Guayaquil on October 6 bound for the Galapagos Islands. The **VQ1HT/GQ** foray from Zanzibar commenced on the anticipated date and it is understood that arrangements have been made for QSLs to go via W2CTN.

DXCC News

Several new countries, formerly being part of French West or Equatorial Africa, have been recognized by the A.R.R.L. The complete listing follows, and the effective dates are given: FF, Dahomey Republic (August 1); FF, Mali Federation (June 6); FF, Niger Rep. August 3); FF, Voltaic Rep. (August 5); FF4, Ivory Coast (August 7); FF7, Mauretania (June 20); FQ, Central African Rep. (August 13); FQ, Chad Rep. (August 11); FQ, Congo Rep. (August 8); FQ, Gabon Rep. (August 17.)

Contests and Awards

The annual **CQ WW DX** contest is the next important date on the calendar and the periods are: phone, 02.00 October 29 to 02.00 October 31; c.w., same times, November 26 to November 28. The phone serial numbers consist of the signal report plus the zone number (for the U.K. this is 14), and for c.w. the RST plus the zone number. Logs must be postmarked not later than December 1, 1960 for the phone section and January 15 for the c.w. section, and should be sent to CQ Magazine.

From ON4QX comes details of the new **WOSA** and **HOSA** awards (Worked or Heard Antwerp Stations). Full details can be obtained from P.O. Box 331, Antwerp, but briefly for WOSA it is necessary to work six Antwerp stations since December 31, 1953 and for HOSA to have heard and confirmed ten such stations. Log extracts and not QSLs are required. Sheets giving details of the **America Award** issued by the Mexican National Society, the L.M.R.E.A.C., are held by G2BVN, and will be sent on receipt of a s.a.e. From VK5FY, the Hon. Sec. of the Elizabeth Amateur Radio Club comes details of the **Elizabethan Award.** It is necessary for U.K. stations to contact six amateurs in Elizabeth after January 1, 1960. Log extracts only are required, and should be sent to 142, Woodford Road, Elizabeth North, S. Australia. There are at least 12 active operators in the club.

Operators working for the award of the Greater Cincinnati Amateur Radio Association will be interested to know that the Club Directory, listing about 1,200 members in Ohio and Kentucky, is held by Geoff Voller at the Science Museum, and is available on loan.

Several inquires have been received regarding the awards issued for two-way s.s.b. contacts and full particulars will be given next month. In the meantime it should be noted that d.s.b. QSOs are not eligible.

DX Briefs

The 28 Mc/s band is now often occupied in the mornings by distorted noises signing with three letters following a U.S.S.R. prefix (the first letter not being a K). Presumably these are kindred spirits to the R series.

The band in which **VE** stations are allowed to operate telephony has been extended to 14,100 kc/s.

W9FJY writes to G2RF to say that he has no logs for **ZD7SA** after September 10, 1959, but will be pleased to help with contacts before that date. Please enclose s.a.e. or IRC.

The International Radio Amateur Yearbook contains a wealth of information useful to the DX operator and is available from R.S.G.B. Headquarters, price 4s. p.p.

It seems to be reasonably certain that **UA0LA** in Zone 19 will be active on s.s.b. in the near future. His c.w. signals are very well received in the U.K. on 21 Ms/s.

AC5CQ is known to have been active but apparently due to equipment troubles did not make many DX contacts. He was worked by MF4BBW on 14,160 kc/s a.m.

From the Panama Radio League comes official notification, backed up by a certificate from the Government department concerned, that **HP9FC** is quite definitely unlicensed and has no authority to use an HP prefix. A large number of QSL cards have arrived at the Panama Bureau for this station which has operated /MM and /VQ8.

K2UYG mentions **FR7ZE** occasionally active on 14 c.w. with 600 watts to a ground plane, and that **AC5PN** hopes to become more active as his official duties permit. KJ6BV is now QRT and there is, at present, no activity from this spot.

VS5GS is reported to have copied **G3MXJ** on **1.8 Mc/s** at RST 4/5. 4/5. 9 and 'MXJ has confirmed the report as correct. Thanks G3JAF.

9K2AZ looks natty in his zebra striped shirt—plenty of DX comes back to his exotic call.

Band Reports

7 Mc/s

G3LET (Westcliff-on-Sea) finds conditions on this band improving rapidly but the number of commercials seems to be increasing. However, this did not prevent 'LET from working the following very worthwhile DX: AP2AD (18.50, '020), VU2XG (20.20, '020), ZL4IH (07.00, '015), YV5HL (23.30, '010), VP4LE (23.45, '002), UH8BI (20.00, '030), 3A2BW (07.00, '025), VQ4GQ (18.30, '030), ZD2GUP (23.00, '010) and VK2, 3 and 5 between 19.30 and 21.45. A welcome report from **VS9OA** (Masirah, Oman) includes G3IGW (21.55, '008), G3LET (19.43, '030), UD6GF (19.29, '023), UF6KAE (19.38, '023), UL7HB (17.31, '034), UI8AK (17.46, '034), ZS6EQ (16.26, '030), FB8XX (17.00, '027), VK0BH (18.30, '030, Antarctica), and JA1BTG (19.30, '027). **G5JL** (Hayes) has worked YV5AN (00.30, '010), VP2LD (04.30, '025), MP4BBE (02.30, '025), together with ZL4IH, 3A2BW and numerous PYs.

B.R.S.20317 (Bromley) commences a multiband report with CE3RE (23.22), UA0AG (23.34), UA0CD (20.33), VU2XG (20.25), VQ4HT (20.27), VS9OA (18.55), MP4BCV (18.55) and LU6DBQ (22.27). **B.R.S.22249** (Cyprus) has heard UD6KAB (03.02), UL7OA (23.10), UW3AK (21.30), VP4LE (01.40), 5A5TA (21.24) and PY7SW (21.26). **A.1859** (Barnet) mentions CN8MT (22.50), ever present VS9OA (22.00) and CR6CA (00.15) and PZ1AK (00.10) both on s.s.b.

14 Mc/s

C.W.

VS9AAC (Aden), recently installed, has worked ZE3JO/ZD6 (06.40), VK5BP/8 (16.39), FQ8HW (16.50 Tchad Republic) and 4S7EC (16.15). **ZD2JKO** (Zaria) reports QSOs with EP5X (03.20), VK5NQ/8 (06.15), VP9CX (03.15), ZX2TH (16.00), YS1O (01.30), 312BW (05.40) and 3V8CA (05.15). **VS9OA** exchanged RST with FQ8HO (14.17), KH6ACC (19.17), KH6DLF (13.26), ST2AR (19.05), SP2LV/XZ (14.20), W3ZA/EP (13.53), and VK9XK (11.25). **G3AAE** (Coulsdon) found EP1AD (19.50), VS9OA (20.52), XZ2TH (21.40), ZS3DM (18.45) and IC1IN (08.20). The last mentioned is valid for WPX but is not a new country. **GM3OEV** (Kinloss) keyed with ZK2BN (19.50, '060), FP8BO (21.00), doubtful TA1DB (01.00), UJ8AC (15.20), and 602BL (15.40, '030). **G2FFO** (Burnley) QSOd FQ8HO (17.45), KL7AMH (20.44), KL7AAZ (07.15), UA1KAE (17.50) at Mirny Base, Antarctica and others already listed. 'FFO finally worked

ZB2A with a few nice pieces of gear to keep his stripes company.

FB8XX at 17.20 on '042 to complete his WAZ. **G5VU** (Nottingham), using a single 807, contacted FY7YF (21.00). YA1BW (18.00), UH8DA (21.30), VK5BP/8 (07.50) and the three DXpedition stations already activated by W4BPD. The 50 watts of **G3MBN** (Bath) raised 6O2AB (18.34), 9Q5RM (19.06), ZS7M (17.35), UM8AG (17.52), SP2LV/XZ2 (16.02), VS9AAC (17.05), VK0JM (17.49), and KV4AA (22.28).

A.1930 (Thorpe-le-Soken) reports FF8AG (21.10), OR4TX (17.30), CT3AV (21.42), DU1OR (21.10), UL7UB (21.00), and UM8KAB (21.30). **B.R.S.20317** heard VR2DK (09.35, '068), JT1KAB (17.52, '014), and FB8XX (15.50, '014). **B.R.S.22795** (Kingston), lists UJ8AI (18.52), UI8AK (19.43), VK7LZ (07.10), ZP1BE (22.07), VP9QQ (21.59), and OY7ML (19.36). **B.R.S.22249** logged AP2AC (14.55), CM8RN (23.36), CR4AX (23.45), EP1AD (06.27), KG4AB (00.45), VU2NR (01.50), and others previously mentioned.

W8OCT provides an Oct. grin for M.O.T.A.

DXotic Showcase

Call-sign	kc/s	Mode	G.M.T.	Country
AP2AD	7,020	c.w.	18.50	W. Pakistan
VP2LD	7,025	c.w.	04.30	St. Lucia
ZL4IH	7,015	c.w.	07.00	New Zealand
FY7YF	14,040	c.w.	21.00	French Guiana
VQ1HT	14,060	c.w.	20.49	Zanzibar
ZK2NB	14,060	c.w.	19.50	Niue
ZL4JF	14,119	c.w.	05.31	Campbell Is.
CR5CA	14,347	s.s.b.	23.15	Sao Tome Is.
VR1D	14,154	s.s.b.	05.13	Gilbert and Ellice Is.
VS4JT	14,280	s.s.b.	14.39	Sarawak
AC5CQ	14,162	a.m.	13.18	Bhutan
ZD9AM	14,162	a.m.	17.43	Gough Is.
ET3AZ	21,020	c.w.	16.10	Ethiopia
VR2AS	21,170	a.m.	07.31	Fiji
7G1A	28,040	c.w.	12.30	Rep. of Guinea
FF7AB	28,250	a.m.	16.10	Mauretania

S.S.B.

MP4BBW (Bahrain) cannot understand complaints regarding poor conditions having worked 100 countries on two-way sideband in 50 days, at the same time adding 12 new prefixes. From the long list received from Ian we select 9N1GW (19.04), VQ5FS (05.02), YS1JR (12.52), BV1USC (17.42), KH6AWS (17.43), 4S7YL (14.16), AP2Q (17.03, A3), VS4JT (13.49), FP8BH (21.50), 9N1SM (13.05), KC4USV (15.09), VQ9TED (18.40), ZL4JF (05.31, '119 A1), XE1AE (13.37), TG9AD (13.48), YN1TAT (00.54), VP9DC/BN (22.47), KV4BQ (19.00), UO5PK (19.40, A3), AC5CQ (13.18, '162, A3), VR1D (05.13, '154), VS6AZ (13.41), YU7LAA (15.04, an Exhibition station), UA9DT (19.24), and UL7JA (16.25). **G6UT** (Gt. Hallingbury) reports KC4USA (08.50), VS1JV (14.41), 9N1SM (14.35), VR1D (08.55), KW6DB (08.35), OA4CV (10.50), W3ZA/EP (13.34) and VQ9TED (16.40).

More than a dozen listener reports have been received for this band and mode which means that, due to space limitations, widely heard stations cannot be duplicated in the lists. First in is **A.1736** (Corby) with ZK1BS (07.15), UA9CM (17.05), OH0NC (08.10), OY7ML (08.05), VU2RX (17.35), HS1B (17.55), and HC1KA (08.12). **A.1859** (Barnet) resolved AP2CR (16.54), FR7ZD (15.40), KH6DLF (16.10), KR6HL (17.12), PZ1AX (19.53), XE1KJ (06.06), and ZS7P (17.50). **A.21111** (Ilford) heard T12HP (07.19), ZL3HZ (07.26), KH6CVR (08.15), KG1BA (08.07), YV6CF (07.52), and KW6CL (09.25). **B.R.S.22844** (Wallington) logged CR6CA (20.41), EL1K (19.47), 9Q5PF (21.55), 9K2AM (21.28), KL7DKG (21.20), and VK/ZLs. **A.1792** reports many of the above plus VP6FO (22.15), LU6AJ (22.10), KA2KC (17.50), and elusive FB8CM (16.40). Amongst stations logged by **A.1918** (Eccles) are VS1JO (17.50), KH6KH (07.00), KM6LD (18.35), VP2AB (21.30), and CR9AH (15.10). **A.2331** (Maidstone) found OA5GE (21.38), MP4BDA (22.24), VQ4FO (18.23), numerous VKs around 07.00, KA2KC (13.43), KA2YA (18.27), KG6NAB (18.08), and KG1FR (18.31).

A.M.

G3MBN worked ET2US (19.08), ZD2JM (20.55), UP6PU (22.34), MP4TAC (20.50), and South Americans. **VS9OA** exchanged reports with DU6TY (13.11), ZS3HT (17.40), and ZD9AM (17.43, '162). **GM3OEV** talked with VK0WH (07.45), HK4BQ (23.40), and HH2V (23.05). A long report from **A.2230** (Faversham) includes HP1TS (07.21), OA4CV (07.31), KL7DDJ (22.25) and numerous VK/ZL stations.

21 Mc/s

C.W.

G3AAE contacted VK9GK (14.18), KL7DJU (09.50), YA1BW (16.30), and ET3AZ (16.10), whilst **GM3OEV** obtained reports from 3V8CA (15.15), FB8XX (15.00, '045), and VP8EG (19.00). **G3JAF** (Lymington) keyed with VP8CC (19.15), VP8EG (18.19), KV4AA (19.08), and 9M2GT (08.15). **G5VU** exchanged RST with FF7AG (18.40), YA1BW (13.00), ZD1AW (08.50), and 6O2GM (17.40). From **ZD2JKO** we have ET3AZ (14.20), OX3GN (15.05), VK9XK (06.40, Papua), ZE3JJ/ZD6 (17.00), and ZP5LS (14.30).

B.R.S.20317 logged K0SLD/KW6 (10.42, '055), FB8XX (08.27), AC5CQ (17.53,'038), VK5BP/8 (15.20), XZ2TH (15.50), VK9GK (10.45), and UJ8KAA (11.55). **B.R.S.22249** heard HK7ZT (00.10), ST2AR (05.50), VS1KL (11.55), VU2XG (11.30), ZS7R (16.25), and VQ2JM (06.02). **A.1543** (Leiston) reports UA9DB (09.27), UA9DT (09.00), UA0AG (09.31), VU2KK (09.08), FQ8HI (16.00), and 9M2EB (17.05).

A.M.

ZD2JKO reports contacts with PX1RC (16.15), VR2AS (07.10, '210), VR2BC (02.05), XE1BBN (07.00), and 9Q5HZ/VQ5/Mobile (08.30). **G3JAF** found much DX from which we choose VP8EE (22.07), VP8EH (20.38), (20.38), VP8DW (20.36), VP8FF (19.55), VS5GS (16.22), VR2AS (07.31, '170), VP2AD (22.00), HP1SB (20.51), FR7ZD (17.45, '140), 4S7GE (18.28) and many VKs and ZLs. **GM3OEV** conversed with FF8AU (21.30), VB2U (15.15), 9U5KU (20.00), ET2BD (17.15), MP4TAC (23.30), KL7BZO (18.00), and unknown VQ9DP (11.00). **G5VU** contacted VR2DE (08.15), EA6AY (09.00), and 9M2GA (15.15). **GB3LY** (Lymington), operated from a local Hobbies Exhibition, reports working 50 countries in 28 hours operating including ZD1AW (16.26), KG4AO (17.40), HI8JSM (18.39), VP3MC (22.00), VK8NE (12.20), VR2DS (12.51), YA1AO (17.00), MP4BBA (17.55), VS1KD (16.02), and HP1SB (18.38).

QTH Corner

AP2Q	P.O. Box 65, Lahore, W. Pakistan.
CR5AE	P.O. Box 77, Bissau, Portuguese Guinea.
CR6CA	P.O. Box 2121, Luanda, Angola, Port. W. Africa.
EL4M	P.O. Box 80, Monrovia, Liberia.
ET3AZ	P.O. Box 3142, Addis Ababa, Ethiopia.
ET3MA	P.O. Box 16, Harar, Ethiopia.
FF4AB	G. Laire, Box 1863, Abidjan, Ivory Coast.
FG7XA	A. Latil, c/o P.A.A. Point a Pitre, Guadeloupe.
FQ8HI	P.O. Box 235, Fort Lamy, Tchad Republic.
G3OKP	R. T. Astell, R.H.R. Geophysics Inc., P.O. Box 638, Tripoli, Libya.
HP Bureau	Panama Radio Club, P.O. Box 1622, Republic of Panama.
VE3XF	41, Kildoran Drive, Scarborough, Ontario, Canada.
VP2MB	Box 219, Montserrat.
VQ9HB	via R.S.G.B.
VQ9TED	c/o P.O. Box 13, Nairobi, Kenya.
VR1D	via ZL2GX.
VR1F	17, St. Albans Ave., Mt. Eden, Auckland, New Zealand.
VR3KD	via K5ADQ.
VR4CW VR4JB	P.O. Box 49, Honiara, Guadalcanal, British Solomon Islands.
VS9AAC	J./T. A. R. W. Cake, c/o Block 1, Bottom West, R.A.F. Khormaksar, B.F.P.O. 69.
VS9OA	L.A.C. Cole, R. E., Billet 1, R.A.F. Detachment, Masirah, B.F.P.O. 69.
XE1BBN	P.O. Box 1094, Guadalajara, Mexico.
ZC4AK	The R.A.F. Akrotiri Amateur Radio Club, via P.O. Box 219, Limassol, Cyprus.
ex-ZD2HJG	H. J. Groves, c/o Decca Navigator Co. Ltd., Overseas Projects Division, Wymondley House, Little Wymondley, Hitchin, Herts.
3A2BW. MI/W4BPD	via W4TO, P.O. Box 341, Station A, Atlanta, Georgia, U.S.A.
3A2 Bureau	Pierre Anderhalt, 3A2CN, 49, Rue Grimaldi, Principaute de Monaco.

* * *

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

A.1736 logged VR2DE (07.40), 9U5JH (21.00), HI8DGH (21.35), UH8EN (14.00), FF8CK (16.20, Mali), and OR4TX (16.30). Multibander **B.R.S.20317** heard XW8AL (09.36), AP2Q (15.40), AP2AD (15.07), VR2AS (09.08), and VS5GS (08.23). **A.1965** (Penzance) reports VU2BK (18.00), UA9KOG (15.45), 602AB (14.00), VS1GZ (15.00), and VS6BE (15.00). From the list of **A.1930** we choose HC5HM (21.10), 9Q5HF (20.00), VS9HAW (17.20), VP3MC (20.30). **B.R.S.22357** (Callander) heard most of the above plus CX4AW (21.55), VP6WR (23.50), 9G1DP (15.20), FA2TW (15.25), and ZP5SF (22.15). **A.2273** (Dudley) received FR7ZD (15.41), FF7AB (11.40), VS9ADL (14.52), VP7BB (22.34), VR2DS (08.47), KR6ID (15.15), and PJ3AH (21.40). 9N1MM (15.20), ZS3R (17.36), and TF5TP (17.53) were the best from **B.R.S.22795,** whilst we choose 9U5KU (20.44), 9G1CC (18.37), and VP9AK (22.03) from the list of **B.R.S.22844. A.1543** offers, amongst others, DL3RO/EP (17.07), 9K2AD (16.13), ZS3X (17.33), and CR6CA (18.33). From **A.1859** we have VP2LS (19.40), VP3EFG (21.52), VP5AK (22.30), VS9AZ (09.02), VP8CX (21.00), XW8AL (15.10), and Pago Pago's K6CQV/KS6 on A3a.

28 Mc/s

This band has shown a remarkable revival and at the time of writing good signals have been heard from all continents **G3AAE** spoke to ET3MA (11.45), PZ1AK (18.27), VQ8AV (14.40), K7BDJ/M (17.25, Arizona), and Antarctica's Davis Base station VK0PM (14.37, '368). **G5VU** reported c.w. from 7G1A (12.30), whilst **ZD2JKO** spoke to KG4AO (17.10), FF7AB (16.10), CX7AR (16.30), CT2AH (17.25), and the Kitwe Hobbies Exhibition station VQ2NRE at 15.45.

A.2389 (London) logged VQ2SB (16.55), UL7ABL (14.05), OA4ED (14.13), YN1CI (12.44), and VK0PM (14.42). **A.1543** lists many including UD6KAR (13.45), 5A2CV (13.40), and VQ3GX (17.27). From the South **A.2273** heard EL4M (17.38), 9G1BA (17.35), 9U5JH (20.06), VQ2WV (18.01). **A.1859** offers CR4AX (19.14), CR7CR (17.02), ET3MA (09.38), KZ5GM (17.38), OR4TX (11.45), TI2OE (21.08), YA1AO (10.26), and VKs. Rounding-off for the SWLs is **B.R.S.20317** with VK0ED (15.50), and GW3ITD/MM (17.39) on phone, also on c.w. JA1AHS (08.35), UAOWC (09.55), UF6KAF (10.10), and UM8AG (08.30), the latter bringing the score to 286/233.

Members of the London Members' Luncheon Club, in particular, will be interested to learn that Frank Fletcher, G2FUX, and his wife arrived at Bagotville, Quebec, on September 15, where they were introduced to the local Department of Transport Radio Inspector. As a result Frank Fletcher now holds the call VE2FUX/M. One of his first contacts was with G6UT. Schedules with VE2FUX/M may be arranged via Miss Beryl Fletcher, B.R.S.20988. Ruislip 2763. The photograph shows VE2BEV and VE2FUX outside the former's shack at Bagotville.

Commonwealth Competition

	28 Mc/s	21 Mc/s	14 Mc/s	7 Mc/s	3·5 Mc/s	Total
G3BHW	41	61	51	4	—	157
G3AAE	48	48	47	14	—	157
VE3BWY	32	25	65	16	9	147
ZD2JKO	30	49	36	24	6	145
VE7KX	14	38	29	32	27	140
G5VU	21	34	39	12	12	118
GB2SM	27	32	13	14	3	89
MP4BBW	—	20	50	—	—	80
G8DI	12	11	21	14	18	76
G3LET	—	—	—	68	—	68
VO2NA	7	10	24	14	6	61
G3MGL	8	2	6	4	—	20

Band Leaders

28 Mc/s—G3AAE 21 Mc/s—G3BHW
14 Mc/s—VE3BWY 7 Mc/s—G3LET
3·5 Mc/s—VE7KX

	28 Mc/s	21 Mc/s	14 Mc/s	7 Mc/s	3.5 Mc/s	Total
B.R.S.20317	41	67	64	60	30	262
A.1859	43	71	52	8	6	180
B.R.S.22013	26	55	65	18	6	170
B.R.S.22249	31	64	38	24	9	166
B.R.S.21008	37	58	46	4	—	145
A.1583	25	62	28	—	3	118
A.1792	28	47	38	—	—	113
B.E.R.S.195	—	—	47	30	12	89
B.R.S.18876	4	64	11	—	—	79
A.1965	12	41	17	2	3	75
A.1980	27	35	6	—	—	68

Band Leaders

28 Mc/s—A.1859 21 Mc/s—A.1859
14 Mc/s—B.R.S.22013 7 Mc/s—B.R.S.20317
3·5 Mc/s—B.R.S.20317

Commonwealth Competition

Where reports have not been received for three months the scores have been deleted from the tables. It is hoped that good conditions will lead to a close finish at the end of the year.

* * *

All correspondents are thanked for their support, particularly ZD2JKO, MP4BBW, G3FPK and B.R.S.20317. Reports of DX calls heard and worked and news items should be sent to R.S.G.B. Headquarters to arrive by October 19.

High Wycombe Show

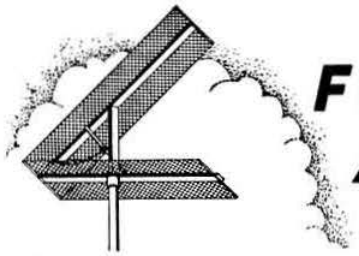
THE Chiltern Amateur Radio Club again took part in the High Wycombe Show, held this year on September 3. Equipment used under the call-sign GB3HWS comprised a KW Vanguard transmitter, Geloso G209 and Racal RA17 receivers and a G8KW multiband dipole. More than 100 contacts were made on 3·5, 7, 14 and 21 Mc/s and all are being confirmed by special cards via the R.S.G.B. QSL Bureau.

Other equipment on show included an Airmec oscilloscope, a large selection of transistor receiver kits and various amateur transmitters and receiver.

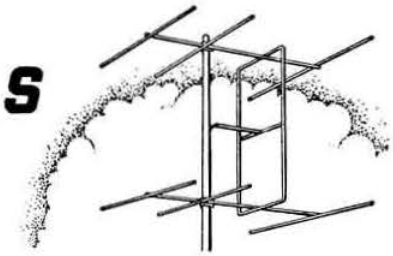
Members were kept busy answering questions about Amateur Radio put to them by visitors.

British Agents for Eitel-McCullough Inc. Appointed

WALMORE ELECTRONICS LTD., Phoenix House, 19/23 Oxford Street, London, W.1, have been appointed sole agents in the United Kingdom for Eimac valves.



FOUR METRES AND DOWN



Successful Transistor Tests on Two Metres—" Rare " Counties worked during DXpedition—Auroral Report

By F. G. LAMBETH (G2AIW) *

ONE of the most interesting features of the I.A.R.U. V.H.F. Contests on September 3-4 was the appearance and splendid operation of the fully transistorized station used by G3LAR and G3LBA. Quite a lot has been heard lately about transistors on 2m but the work appeared up till now to consist of a little dabbling here and there. **G3LAR/P** has now put this mode well on the v.h.f. map with a measured power from his transmitter into the aerial of 8 mW! In all, 57 stations were worked, the best DX being about 75 miles from Tatsfield, Surrey. All but two of the QSOs were on phone. This proof that transistor operation is not only possible but comparatively easy should fire the enthusiasm of many others. What a " natural " for mobile operators!

The gear used on this occasion comprised a converter (built by G3LBA) using 2N503 in the r.f. stage, 2N503 mixer and three OC170s in the oscillator chain; the tunable i.f. chain (4-6 Mc/s) was built by G6OH. Transmitter (built by G3LAR) used an OC170 oscillator/tripler, OC171 tripler and 2N384 doubler, 2N384 power amplifier. The modulator comprised a GET114 driver and p.p. GET114s modulators. The aerial was a 6-over-6 at 27 ft. and the site was 882 ft. above sea level.

Another transistor transmitter, operated by **G2HCJ** (Warrington) has worked G3IWJ (Liverpool) on phone and G3KCB (near Manchester) on c.w. There has been an S7 report at 50 miles from a hill position near home, but so far this has only been tried once.

The Contest did not appear to have produced any sparkling conditions, in the U.K. Whilst DX was certainly workable, the band never seemed to have that " open " sound. Actually DX stations were not very frequently encountered, and there was QSB. Top scores were around or over the 100 stations worked mark, however, so probably those in the good high positions saw the situation from a different angle!

G3EGK (Hale Barns, Cheshire) managed to get back into action at the beginning of April and found things reasonably good up to the end of June; since then, good conditions have been very rare. During the Contest conditions were really poor and the score was down because London area stations were weaker and more difficult to raise; continentals were inaudible. However, it was good fun, even if hard work. More Midlands stations seemed to be on than was the case last year.

Two Metre Happenings

Following the recent report on Hampshire v.h.f. activity, G3CBU (Basingstoke) reports that local activity is provided by G6OU (85 watts), G3ITF (75 watts), G3JUQ (20 watts), G3CBU (100 watts) and G3MDM, the latter being mobile. G3MGZ is almost ready. Outside Basingstoke, there is G3NEL (5 miles west at Steventon), G3JTK (9 miles north at Tadley) and G3MRJ, also of Tadley, who is building for 2m. G2SG, G5GJ and G3GVC are active in the Alton/Petersfield area. In addition, there are several listeners. G3ITF has a Sunday evening sked with G3JFR (West Wickham) and is joined by G6OU and other locals. G3CBU has a sked with GW3DFF (Swansea) most evenings on a path which is usually open.

G3JR (Barnes) with 12 watts and an indoor five element quad says things were beginning to look up a little; in late August (21) he had phone QSOs with G3EMD and G3JWQ. On the evening of August 26 GW3MFY was worked at last. Most of the time, the signals were 329 both ways but G3JR says it's fun to have a " noise scraper " QSO sometimes. Contest conditions on September 3-4 were poor, with only two QSOs phone of particular interest—G2ANS (Roade) and GW3KMT/P (Denbighshire). G3HWR/P had been monitored by G3JR every evening since the trip began, and were heard each time that they were on. No QSOs were made when G3HWR/P was in Huntingdonshire or Cumberland, but it was pleasant to " scrape home " in Westmorland on September 11.

G5MR (Hythe, Kent) has not been on much lately owing to professional commitments away from home. He returned to the band on September 11 and this coincided with a burst of good conditions with some inland French stations exceptionally strong. F2TR (Paris) and F8YT (Reuil) were raised for new ones; the latter was using only 1 *watt* input but is at an altitude of 120m and signals were S8 both ways. Other stations worked were F8LO (Paris), F9QE (near Melun) and F9QW (Corbeil). F8AT (Tours, 245 miles) was heard at 579 on c.w. but could not be raised. On the evening of the same day F9II (Le Rainey) was worked again. This was during the transit of *Echo* 1 but all the indications were that propagation was by normal tropo. **G3LTF**, writing for the last time from Danbury, says he is moving to Galleywood (about 3 miles south of Chelmsford). On August 22 G3OAT/T was worked for a new county (Hunts.). On September 3-4 (Contest) 104 stations were worked, the best DX being PA0EZ, while GM3HLH/A and GI3KYP/P were heard but not raised. Six PA0 stations were worked between 23.00/24.00 G.M.T. on the 3rd. G3HWR/P was worked in Hunts. and on the 7th G3HWR/P from Cumberland. September 8 brought GI3GXP at 569, and on the 10th PA0EZ (Nijmegen), PA0NL, DL1LB, DJ2YD and DL3FM.

GM2FHH (Aberdeen) encountered much improved activity, particularly during the Contest, week-end, when GM3DIQ, GM3EGW, GM3FGJ, GM3GUI, GM3LAV, GM3LDU, GM5VG, and GI5AJ were worked (tropo). There was an auroral opening in the afternoon and evening of September 4 and GM3HLH/A, G3HBW, G3ILD and GI3GXP were worked.

* *R.S.G.B. V.H.F. Manager, 21 Bridge Way, Whitton, Twickenham, Middlesex.*

B.R.S.21476 (Penarth) found the period of August 21/26 very interesting. G3KEQ (Sanderstead) was heard on September 21, 23 and 24. G3HXJ (Southampton) was heard for the first time of the 21st, as also was G3OBB. On the same evening, G3FAN (Isle of Wight) was also heard for the first time.

The G3HWR/G3LAR DXpedition. G3HWR (and G3LAR) operated portable and mobile in various more or less rare counties between September 5 and 18, under the calls G3LAR/M when on the move and either G3HWR/P or G3LAR/P when set on site. The sites and dates were:

September 5: G3HWR/P, near Covington, 5 miles East of Raunds in Huntingdon, N.G.R. TL061715 at 250 ft. a.s.l.

September 6: G3LAR/M in Manchester, various locations.

September 7–10: G3HWR/P on Thwaites Fell, 7 miles North of Millom in Cumberland, N.G.R. SD165900 at 1,100 ft. a.s.l.

September 11–13: G3HWR/P on Strickland Roger, 4 miles North of Kendall in Westmorland, N.G.R. SD354986 at 950 ft. a.s.l.

September 18: G3LAR/P 1½ miles South-west of Uppingham in Rutland, N.G.R. SP853982 at 510 ft. a.s.l.

G3LAR/M: Nr. Great Staunton in Huntingdon.

They much appreciated the local knowledge of G3MAX and G2HCJ who recommended the sites in Cumberland and Westmorland. The transmitter ran 20 watts input to a QQVO3–10 with another QQVO3–10 in the modulator; the receiver employed A2521–6BQ7A–12AT7 mixer, crystal controlled oscillator into a much modified "Command" set tuning 4 to 6 Mc/s. The aerial was a halo when mobile and a 6 over 6 slot fed J-beam at 20 ft. or 27 ft. depending on wind conditions. Power supplies were taken from 12-volt accumulators with a petrol generator for recharging. Conditions were well above average while in the North but with new sites it was difficult to assess just how good conditions were. Stations in the South of England area were worked every evening and many more weak phones were heard but not resolved. Best DX was G3FAN worked three times from Thwaites Fell and twice from Strickland Roger, both just over 260 miles. All contacts but one were on phone both ways.

The normal procedure was to tune from one end of the band to the other systematically, taking each station as it came, but this inevitably led to out-of-zone operation. The operators could not see how to avoid this and still give everybody a fair chance. Nevertheless, it took up to 2½ hours to tune the band and anyone who was overlooked due to QRM or QSB had to wait a long time for them to tune across his frequency again. If, on the other hand, tuning was random no guarantee could have been given that some frequencies would ever be covered, since the stronger stations would then get all the contacts.

Tuning was always with the b.f.o. on and it was found that c.w. signals were more readily identified in QSB than phone even when the average strength was adequate for phone working. More than half the contacts were on c.w. though at least one station persisted in trying to work phone when quite unreadable at S3! There was also trouble with stations that tried to rag-chew after receiving(?) R2 or R3 reports. On the other hand some stations, notably G6OX and GW3MFY, gave them excellent contacts even at SO/3 or S2/4 because they made allowance for fading and repeated all important information.

Arising out of the procedure used for tuning the band when on phone it is quite easy to say the frequency of the station being worked and the direction of tuning but on c.w. this is laborious and the usual QLH, QHM, etc., too rough a guide. Are the Q-codes QLF, QHF yet in use and if not what is the reaction to the following meanings?

QHF I am tuning higher in frequency.

QLF I am tuning lower in frequency.

Then the Procedure:

"G3XXX de G3YYY/P VA cq de G3YYY/P QHF K" is quite clear. Finally a tip to other would-be organizers of portable expeditions. A great part of the success achieved by G3HWR and G3LAR can be attributed to advance publicity in the R.S.G.B. News Bulletins and press. In the course of even a fortnight such news gets around and when the operators arrived on site and put out their first calls, there were stations ready waiting for them. Nothing dampens the enthusiasm quite so much as calling CQ from a superb location in a rare county and getting no replies. This seldom happened to G3HWR and G3LAR.

G5QA (Pinhoe, nr. Exeter) has been quite active since September 1, since when he has managed to work 18 counties in three weeks. The sked with GW3ATM continues on Mondays and Wednesdays and Fridays and they will shortly be on 70 cm.

G2HCJ (Warrington) reports success with the transistor transmitter in collaboration with G3IWJ who accompanied him to Westmorland and Cumberland during the 2m Open Contest. G, GD, GI and GW were worked with some success, but not GM, although they were in sight of Wigtownshire and Kirkcudbrightshire! The best DX was GW3KMT/P 6 miles N.W. Oswestry. The input was 36 milliwatts with approximately 2/3 milliwatts of 144 Mc/s output to a 3-element Yagi, or 6 over 6 slot-fed. The distance was 85 miles and the report 559. The transmitter was a home-built bridge type overtone oscillator on 36 Mc/s using 2 OC170s driving 2 OC170s as a p.p. doubler and a single AFZ11 in the final doubler, with Pi section output coupler. Using an OC170 in the final G3IWJ has been worked on phone at 15 miles and G3KCB on c.w. over about the same distance across a worse path.

A1657 (Cleckheaton) reports that activity in the West Riding is not very high; of 24 stations in the Bradford-Halifax, Huddersfield-Leeds area known to be on 2m, 14 have been logged.

G3LTF is interested in M.S. Skeds with any European (or African !) amateur. His address is P. K. Blair, Chaplin Close, Galleywood, Essex.

News from Wales

GW3MFY (Bridgend) states that the month to September 18 was the best this summer. F3LP (Le Havre) made an appearance on August 20 and worked GW3DFF (Mumbles), GW8SU (Porthcawl) and GW3MFY in quick succession. No other Fs were audible. Things remained good to the S.E. on August 21/22 with G3FAN, G3OBD, G3HXJ, G2IJ and G3CBU all good phone signals. G3JR was worked for the first time on the 26th. G3GTW (Rotherham) was heard in c.w. QSO with G3EHY on the 28th. On September 2, G3NGS (Herne Hill) was another new one on phone. Contest conditions were good during the evening of the 3rd, with worst-ever conditions on the 4th. Eighteen QSOs were made in 12 different counties. Conditions improved remarkably after the Contest with GI3GXP worked on the 8th also G3MRA (Southhampton) and F8MX/A. G3JWQ and G3NBQ were heard on the 9th. GC2FZC and F9NW were worked on the 10th with G3LZP on the 11th. Thanks to G3HWR/O for c.w. QSO with Westmorland on the 12/13th.

B.R.S.20284 (Prestatyn) from a sea level position (100 yards from the shore) with 750 ft. heights within a mile to the S.E., says results seem quite encouraging. Stations like G5MA, G3KEQ, G3EHY, G3FZL, G5DW, etc., are frequently heard from the S.S.-E. direction. '20284 reports activity locally from GW2FVZ, GW3JGA, GW2HIY, GW3KYT and GW3KNZ (Queensferry).

And from Scotland

GM3GUI (Friockheim, Angus) has built the G6JP low-

noise converter and the final results seem well worth-while. The converter was on the air on September 4—Contest morning—and more stations were heard than usual, including G3JWQ, G3ILD and G5YV with, of course, many GMs. At 14.40 a trace of aurora was noticed on GM2FHH and later GI5AJ was worked also GW3EGW, by this mode, by 15.20 the aurora was gone and the band dead. At 21.40 it reappeared on B.B.C. Channel 4 and from 21.47 to 22.30 (when it disappeared again) GM3LDU was worked and GM3EGW, G3HBW, G3ILD, GM3FGJ and G3GWL heard.

On September 5, GM3FGJ (Edinburgh) was heard working GM3BOC/A at Brora. Between September 5/16 many weak stations were heard on phone, but unreadable, mainly from the Glasgow area, but also probably Midlands stations from their band positions. GM3GUI is sure QSOs would have resulted had some of them pointed their beams North or North-East.

G4LX's Auroral Report

During August SM6PU observed auroral tendencies on August 2, 8, 10, 16, 17, 19, 27 and 29. No reports of auroral QSOs by U.K. stations have been reported during the month, but conditions on August 16 and 17 were ideal, so it is feared that lack of activity was responsible. On August 16, SM6PU heard several phone stations via the aurora but did not make any contacts. On August 17 he had QSOs with SM4AMM, SM5BIU, SM6CSI and DL6QS. He heard several other SM stations and also DL1RX, DL9ARA and OZ7BR. On August 29 he had a QSO with SM3AKW.

On September 4, auroral conditions appeared during the afternoon and evening in the usual two phases. GM3LDU worked G3KCB and heard GM2FHH, GM3GUI and GM3HLH/A during the afternoon session, and worked GM3GUI, and heard GI5AJ, GM2FHH, GM3BOC/A, GM4HR, GM3DIQ, GM3EGW and G3ILD during the evening. In Northumberland, G2BDQ and G4LX heard several stations during the evening session, but were unable to make contact. These stations included GI3GXP, GI5AJ, GM2FHH, GM3DIQ, GM3EGW, GM4HR, GM3LDU, G3ILD and G3HBW. **G3HBW** had more success and he had QSOs with GM3DIQ, GM3EGW, GM4HR, and GM6XW, hearing GI3GXP and GM3HLH/A. G3HBW was in QSO with GM3LDU when the aurora faded suddenly at 22.16 G.M.T. It returned again at 22.32 G.M.T. when a short QSO was made with GM2FHH. G3HBW suggests that as far as he was concerned, the QSOs appeared to have been a mixture of auroral reflection assisted by tropospheric conditions, as stations exhibited a regular fade which is characteristic of tropo conditions. The most northerly stations, however, remained audible with a long slow fade long after the more southerly stations faded out. Could it be that the northerly stations were closer to the auroral curtain and therefore required less assistance from the tropospheric duct?

On September 5, around 18.00 G.M.T. the aurora was again in evidence on the normal TV channels, but G4LX was unable to obtain any response on 144 Mc/s. However, GW2HIY is believed to have had some success then.

GM3LDU (Clarkston, Renfrew) has sent a very full report, including the auroral news listed by G4LX. A ten element Yagi was completed in time for the Contest on September 3-4 and although tropo conditions did not appear very good, there were some fairly good QSOs. On the 3rd GM3KYI/P (3 miles south at Forfar) was worked on phone, with GI5AJ and GI3KYP/P on c.w. On the 4th GW3KYT/P, GM2FHH, GM3HLH/A, G5YV, and G2HCJ/M the latter 2 miles east of Bootle, Cumberland, were all worked on c.w. At about 14.30 that afternoon the aurora was a pleasant surprise but it was gone by about 15.00 G.M.T. It was again noticed at about 21.40. GM6XW heard a phone station, believed to be Dresden TV. There was a visual aurora at GM3DIQ just before the opening. On September 5 operation was commenced at 19.00 G.M.T. with CQ to the south. GW2HIY answered and said that there had been aurora between 18.00/19.00 G.M.T. and that it was still present at times on GM3LDU'S signals. There was, however, none apparent on GW2HIY'S signals which would only peak in the true beam direction. Later that night GM3LDU had good tropo QSOs with GM3BOC/A, who also worked GI5AJ and GM6XW. On the 8th GI5AJ and GW2HIY were worked, with G2NY and G2CIW heard. On the 9th GI5AJ, G2NY, G3IKV and G5YV were all worked. An interesting event on the 10th was the reception of G3MED's s.s.b. When tuned in it was perfectly readable, but there was some difficulty owing to QSB and a not very suitable receiver. On the 12th G3EHY was heard at 549.

Four Metre News

GW3MFY states that August 21 was the best yet on 4m when G3CLW, GW3ATM, G3GZM, G3AIH and G3EHY were all worked between 09.00 and 11.30 G.M.T. On September 11, G3IUL, G2DD were called, and an inconclusive QSO was had with G8SK.

A1657 advises that G3NAO and G3GJV are running a sked at 21.00 each evening. There is little other activity and 1657 thinks this is due to people listening rather than putting out calls. Those who can transmit on 4 should put out a CQ or two, it might transform the scene.

Seventy Centimetre News

G3LTF sends some interesting news which is recorded here although it contains some 2m connections. During a 2m QSO on August 21 G3KPT changed over to 70 cm and was actually a stronger signal, despite considerably less system gain at both ends. G3KQJ/T (Wolverhampton) was also a good signal but was not worked. G2CIW was worked 59+. On September 10 PA0NL was tried on 70 cm. G3LTF was heard (S2) but could not hear the PA. On the 11th things really woke up and G3JWQ was worked, then followed several PA and DJ QSOs on 2m which led to tests on 70 cm with PA0PO (433·71 Mc/s) which were unsuccessful. The PA reported, however, that G3NOX/T was 59 + 10, which news was passed on, and he was soon in QSO with PA0WAR. Then G3LTF worked PA0WAR duplex 70 cm/2m, the British 70 cm signals being S7 in the Hague. G3NOX/T then worked PA0NL who had come up on 432·12 Mc/s. G2XV and G3NOX/T have also been worked on 70 cm during the month. PA0EZ is building for 70 cm and says that ON4ZK is also QRV. Some relative frequencies are PA0NL (435·12), PA0PO (433·671), G3OAT/T (434·7), G3LTF (435·03).

G2XV has worked his first new 70cm county for two years (G6GN for Gloucestershire). His total is now 33. The 70cm contest on September 3/4 was a flop, says G2XV, due to bad conditions plus absence of contestants caused by the 2m contest on the same day. G2XV asks when those responsible will open their eyes to the fallacy of this idea. A new r.f. stage on 70 cm in the form of two ceramic planar triodes in cascode, and using coils in the tuned circuits, shows great promise and more news is promised later.

"Zanzibar George" Returns

A potent signal to be heard in the Home Counties during the last month has been that of G5ZG whose location near Dunmow is exceptionally good and does full justice to his 25 watts and 4-over-4 aerial. G5UM was able to give Sir Roger his first contact on 2m just after lunch on August 6. They had not met over the air for nearly thirty years.

Worked and Heard on V.H.F.

Two Metres

B.R.S.21476 (Penarth) August 18 to September 14.
Heard: G2BHN, 2JM, 3ARS/M, 3CHW, 3EHY, 3EXW, 3FAN, 3FWW, 3HXJ, 3IRW/P, 3KEQ, 3OBB, 4GR, 5DW, 6GN, GW3ATM, 3DFF, 3KCB/P, 3MFY, 4CG, 4FW, 5AB, 5BI, 8NP, 8SU, 8UH.

Single Sideband

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

THE a.m. operator seeking s.s.b. knowledge has many questions to ask. From personal experience, by far the most common one is, " How can you transmit voice frequencies when you haven't got a carrier to hang them on?"

Over the years the writer has become more than ever convinced that the difficulty many amateurs appear to have in visualising and understanding a s.s.b. signal is due to the fact that their basic instruction—either by tutor or by textbook—has been based on the classical conception of a continuous carrier for c.w., and for speech the same carrier with the modulation superimposed on it in order to effect a variation in carrier amplitude.

Once the true conception of the propagation of an a.m. signal has been correctly understood, the transmission of one sideband—without the carrier or the mirror image sideband—can also be correctly understood.

Carrier and Sideband Relationships

The carrier of an a.m. transmission does not vary in amplitude; it is at all times of constant strength. The modulation introduced at the transmitter heterodynes the carrier and produces sum and difference frequencies. These are symmetrically disposed either side of the original carrier frequency and constitute two bands of side frequencies—those below the carrier form the lower sideband and those above the carrier form the higher sideband. The carrier by itself does not convey any intelligence: the intelligence is conveyed *solely* by the sideband frequencies.

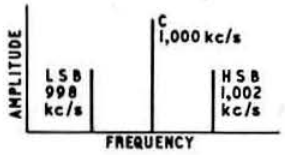


Fig. 1. Amplitude-frequency relationship of a.m. signal modulated with single tone of 2 kc/s.

Suppose that a transmitter on 1000 kc/s was modulated with a pure tone of 2 kc/s. The energy propagated from the aerial would be three entirely separate and individual r.f. outputs on 998, 1000 and 1002 kc/s (see Fig. 1). These three channels of r.f. energy would travel quite separately through the ionosphere and would eventually arrive at the receiving aerial and would then be accepted by the receiver, heterodyned by the local oscillator and converted to the final intermediate frequency of the receiver. If the i.f. pass band was centred on 460 kc/s the i.f. amplifier would present three separate frequencies—462, 460 and 458 kc/s—to the detector. The combined effect of these three frequencies at the detector would in turn produce the modulation envelope. The way in which the modulation envelope is produced can be shown very simply by means of vector diagrams.

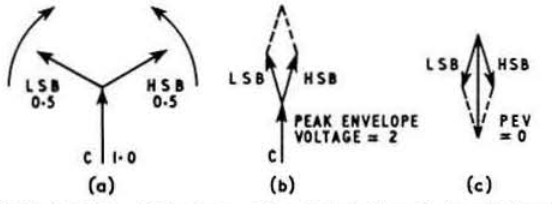


Fig. 2 a, b and c. Vector presentation showing how the two sideband voltages combine with the carrier voltage to form the modulation envelope.

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

The carrier vector is actually rotating at 460,000 c/s with one sideband vector rotating at 458,000 c/s and the other sideband vector rotating at 462,000 c/s. Relative to the carrier one sideband vector is rotating 2000 c/s slower (lagging) and the other sideband vector 2000 c/s faster (leading). If then the carrier is assumed to be stationary and is drawn as a vertical line whose length denotes the carrier voltage—let this be one unit in length—each sideband vector would be 0·5 units in length (the power in one sideband is equal to 0·25 of the power in the carrier and as power is equal to E^2R, the voltage is equal to 0·5 that of the carrier) and would be shown rotating round the carrier vector in opposite directions at the frequency of the modulation (Fig. 2a). At some moment of time the two sidebands will be in phase with each other and in phase with the carrier and the resultant vector length will be two units—the modulation peak (Fig. 2b). At 180° of rotation later they will again be in phase with each other but in opposite phase to the carrier and the resultant vector length will be zero—the modulation trough (Fig. 2c). At all other degrees of angular rotation the resultant voltage will be some in-between value. The modulation envelope recovered is shown in Fig. 3 and, to the same scale, the audio output in Fig. 4.

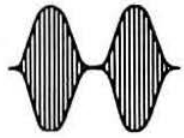


Fig. 3. Modulation envelope recovered at the detector.

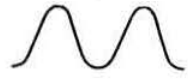


Fig. 4. Resultant audio output voltage.

If therefore the resultant r.f. voltage output from a 100 per cent sine wave modulated transmitter is examined by means of an oscilloscope, the display will show our old friend of the classical text books—the modulation envelope. The important point to understand is that the oscilloscope is not showing the true relationship of the carrier and the sidebands at all. It cannot separate them and show each individual component. The display seen is the resultant *effect* in terms of voltage—in fact the oscilloscope is showing a continuous panorama of voltage vector diagrams. The fact that in a normal a.m. transmission the modulation at the peak of the cycle is in phase with the carrier and *appears* to expand the carrier to twice its original width is purely co-incidental.

S.S.B. Transmission

Now suppose the transmitter was radiating a low sideband s.s.b. signal. The carrier on 1000 kc/s and the higher sideband on 1002 kc/s would be suppressed at the transmitter, and the only output to the aerial would be continuous r.f. energy on 998 kc/s. This would be converted by the receiver to an i.f. of 462 kc/s and fed to the detector. The carrier of 460 kc/s would be generated by a local oscillator (b.f.o.) and also fed to the detector. A vector diagram would show the inserted carrier as a vertical line with the sideband vector rotating around it at the modulating frequency; the modulation envelope would be recovered at the detector and the resultant audio output would be 2 kc/s. It will be seen that the original 2 kc/s tone input has been recovered—yet the s.s.b. transmitter has radiated one continuous r.f. output on one frequency only, 998 kc/s.

If the tone modulation at the transmitter had been changed from 2 to 3 kc/s the sideband radiated would change from 998 to 997 kc/s. This would be converted by the receiver to an i.f. of 463 kc/s, combined in the detector with the local carrier on 460 kc/s and the resultant audio output would be 3 kc/s. Should the transmitter be modulated with both the 2 and 3 kc/s tone simultaneously two r.f. outputs would be

(Continued on page 175)

Society News

Major-General Eric Cole

THE Council take pleasure in announcing that Major-General Eric Cole, C.B., C.B.E., Director of Telecommunications, War Office, has accepted nomination for the office of President for the year 1961.

Major-General Cole joined the Society nearly thirty years ago and for much of that time he was a very active amateur. In the years between 1932 and 1939 his call (SU1EC) was one of the best known in the world and it was during that period (1935) he won the Senior B.E.R.U. Contest with a record score of 4,246 points. Four years later (1939) whilst in Trans-Jordan he won the contest again, this time as ZC6EC—a remarkable achievement.

After the war the famous 'EC call was heard from Greece and other countries in the Mediterranean and Middle East. On his return to the United Kingdom he persuaded the G.P.O.—who up to that time had not issued " E " calls to amateurs—to make an exception—thus G2EC came into existence. Under that call Eric Cole achieved outstanding results from a restricted location in Central London.

At about this time Colonel Cole (as he then was) became Chairman of the British Joint Communications Board (previously the W/T Board and now the B.J.E.C.B.) and it was in that capacity he attended the Atlantic City Radio Conference in 1947.

In 1953, when he opened the Amateur Radio Exhibition at the Royal Hotel, London, he paid warm tribute to the part radio amateurs played during the 1939-45 war.

Last year upon taking up his present appointment at the War Office he became the Army representative on the P.M.G.'s Frequency Advisory Committee.

Dr. Smith-Rose now URSI President

AT the final Plenary Meeting of the 13th Geneva Assembly of the International Scientific Radio Union (URSI) held last month in London, Dr. R. L. Smith-Rose, C.B.E., was elected President in succession to Dr. L. V. Berkner of the United States. Dr. Smith-Rose had been a Vice-President of the Union for several years prior to his elevation to the Presidency.

At the London Assembly, particular interest was shown in matters appertaining to radio astronomy and space research.

A special programme of work is being planned to coincide with the next period of minimum sun-spot activity.

The 14th General Assembly of the Union will take place three years hence in Japan.

London Lecture Meeting on Single Sideband

ON October 21, Mr. R. H. Hammans (G2IG) a past president of the Society and now Chief Engineer of Granada Television, will lecture to the Society on Single Sideband Techniques at the Institution of Electrical Engineers, Victoria Embankment, London.

A large portion of Mr. Hammans' address will be devoted to consideration of whether the radio amateur is going too fast in the matter of single sideband operation. In the early days, s.s.b. enthusiasts were like missionaries preaching, to quote Mr. Hammans, " to the savage unconverted " a.m. users. Nowadays, the system is " selling " itself so rapidly that Mr. Hammans considers it necessary to issue a warning to disillusion those who think it is too simple and to warn them of the duties they owe their fellow amateurs in maintaining good standards of operation.

Mr. Hammans' talk should on no account be missed. It is sure to provoke considerable discussion.

Buffet tea will be served from 6 p.m. and the lecture will commence at 6.30 p.m.

R.S.G.B. VHF/UHF Awards

THE Council has decided to institute, as from January 1, 1961, a series of new certificates to mark successful v.h.f. and u.h.f. achievements. To be known as " R.S.G.B. Four Metres and Down Certificates " they will be available in eight categories, namely:

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

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

The counties referred to are those in the *United Kingdom.*

R.A.E.N. Chairman's Fund

THIS fund was initiated by the R.A.E.N. Committee to assist R.A.E.N. Groups in covering the cost of meetings, correspondence, travelling, etc. incurred in organising R.A.E.N. affairs, in those cases where the group is unable to meet such expenses itself.

It is not an official R.S.G.B. fund and its safe keeping has therefore been vested in the Chairman of the R.A.E.N. Committee. At present the fund stands at £6 15s. 0d., donated by private contributions and proceeds from club junk sales and similar functions. Further donations would be much appreciated and should be sent direct to the present R.A.E.N. Chairman, Dr. Arthur C. Gee (G2UK), " East Keal," Romany Road, Oulton Broad, Suffolk.

Brian Rix (G2DQU) to Open the R.S.G.B. Radio Hobbies Exhibition

THE R.S.G.B. Radio Hobbies Exhibition in the Royal Horticultural Society's Old Hall, London, will be opened on November 23, 1960, by Mr. Brian Rix (G2DQU) the stage, screen and television actor. Mr. Rix is particularly well known for his long series of farces at the Whitehall Theatre.

Committee on Broadcasting

THE Society's Immediate Past President, Dr. R. L. Smith-Rose, C.B.E. is one of the twelve members appointed to serve on the Committee on Broadcasting. The Chairman of the Committee is Sir Harry Pilkington.

The aim of the Postmaster General in setting up the committee has been to pick a well balanced team of people who would bring a wide range of experience to bear objectively on the tasks before the Committee.

The terms of reference of the Committee are:

"To consider the future of the broadcasting services in the United Kingdom, the dissemination by wire of broadcasting and other programmes, and the possibility of television for public showing; to advise on the services which should in future be provided in the United Kingdom by the B.B.C. and the I.T.A.; to recommend whether additional services should be provided by any other organisation; and to propose what financial and other conditions should apply to the conduct of all these services."

Brit.I.R.E. Convention on Space Research

THE subject of next year's Brit.I.R.E. Convention will be "Communications and Space Research." Recent articles in the Institution's *Journal* have referred to proposals for using satellites for relaying radio and television signals and this will form the subject of an important session of the Convention. Associated techniques such as the role of electronics in the guidance and control of rockets and space vehicles, radio astronomy and radio measurements in the ionosphere will also be discussed.

Mr. W. R. (Cliffe) Metcalfe G3DQ, president of the R.S.G.B. at the recent Lincoln Hamfest. The President's chain of office was presented to the Society some years ago by Mr. W. J. Butler, G5LJ. (Photo: G5CP.)

New Post Office Deputy Director of Research

MR. H. STANESBY has been appointed Deputy Director of Research at the Post Office. He is at present Staff Engineer in the Radio Planning and Provision Branch of the G.P.O. Engineering Department.

In 1953 he was awarded the City and Guilds Insignia Award for Technology in recognition of his work in telecommunications, and two years later he was chairman of the Radio and Telecommunications Section of the Institution of Electrical Engineers.

More Pirates Fined

ON September 9, 1960, at Walsall Magistrates' Court, Michael Shekleton, aged 19, of Sutton Road, Walsall, and Michael Taylor, aged 17, of Canberra Road, Walsall were each fined £5 with £3 3s. costs after pleading guilty to using a radio transmitter without a licence. They were ordered to forfeit their equipment.

During the hearing of the cases, it was stated that the Post Office was conducting a drive to discover members of the "Wolverhampton Transmitting Net."

At the Court House, Ascot, on August 17, 1960, C. G. Clements of "Elmhurst," Fairbank Road, Ascot, pleaded guilty to a charge of using wireless telegraphy apparatus without a licence contrary to Section 1(1) of the Wireless Telegraphy Act 1949. He was granted an Absolute Discharge and ordered to pay £3 3s. advocate's fee and 4s. Court charge.

Radio Amateurs' Examination

THE results of the Radio Amateur's Examination conducted by the City and Guilds of London Institute last May are as follows:—

Home Candidates	
Passed 699	54.9%
Failed 575	45.1%
Overseas Candidates	
Passed 36	61%
Failed 23	39%

Last year 657 (59.6%) out of 1102 Home Candidates passed. In the same examination 18 (62.1%) out of 29 Overseas Candidates passed.

A copy of the 1960 examination paper will appear in the November issue of the R.S.G.B. BULLETIN.

73 Magazine

SUBSCRIPTIONS for the new U.S. Amateur Radio publication *73 Magazine* can be accepted by R.S.G.B. Headquarters at the rate of £1/10/- for one year and £2/5/- for two years.

73 Magazine is published by Amateur Radio Publishing Inc. and the Editor is Wayne Green, W2NSD formerly Editor of *CQ Magazine*.

Single Sideband (Continued from page 173)

radiated from the aerial on 997 to 998 kc/s. These would be converted by the receiver to two i.f. outputs of 463 and 462 kc/s. The resultant output recovered by the detector would be 3 and 2 kc/s—the original modulating frequencies.

Obviously there is no theoretical limit to the number of tone inputs that could be used to modulate the transmitter. For instance simultaneous tones every 100 kc/s from 300 to 3,000 c/s modulating the transmitter would produce 28 separate and individual r.f. outputs from the transmitting aerial. Transmission of the human voice simply takes the same process a stage further. As there is no point in occupying a bandwidth greater than is necessary to convey the intelligence, normal s.s.b. transmissions are restricted to a band of frequencies from 300 to 3000 c/s and this is adequate for communication purposes. In practice it is possible to reduce the receiver bandwidth to 2·5 kc/s without any noticeable effect on the quality of reproduction of the human voice. This gives a very good balance between the conflicting requirements of a narrow bandwidth for the maximum possible selectivity—necessary on the crowded amateur bands—and a wide enough bandwidth to allow for slight variation in frequency between a number of stations operating together in one net.

Rules for the R.S.G.B. 21/28 Mc/s Telephony Contest, December 3-4, 1960

RADIO amateurs throughout the world are again invited to take part in the annual R.S.G.B. 21/28 Mc/s Telephony Contest to be held this year on December 3 and 4.

The rules are the same as in previous years but the attention of overseas contestants is drawn to the additional bonus for working each additional ten G3 stations irrespective of band. The G3 series comprises the largest single group of U.K. stations. The scoring system is described in detail in Rule 8.

Rules

1. **Duration.** The contest will start at 07.00 G.M.T. on Saturday, December 3, and end at 19.00 G.M.T. on Sunday, December 4, 1960.

2. **Eligible Entrants.** The contest is open to licensed amateurs in all parts of the world.

3. **Licence Conditions.** Entrants must operate in accordance with the terms of their licences.

4. **Contacts.** Contacts may be made using any telephony system for which the entrant is licensed. Contacts with unlicensed stations will not count for points. Proof of contact may be required. Only one contact on each band may be made with a specific station, whether fixed, portable, mobile or alternative address. Duplicate contacts must be logged and clearly marked as duplicates without claim for points. Cross-band contacts may not be claimed.

5. **Contest Exchanges.** An exchange of RS reports followed by a three figure serial number starting with 001 for the first contact and increasing by one for each successive contact (for example, 58001, 56002, etc.) must be made before points can be claimed.

6. **Operator.** Only the entrant will be permitted to operate his station for the duration of the contest.

7. **Entries.** Entries must (a) be clearly typed or written on ***one side only*** of foolscap paper; (b) log sheets must be ruled in columns headed (in this order) " Date/Time (G.M.T.), " " Call-sign of station worked," " My report on his signals and serial number sent," " His report on my signals and serial number received," " Band," " Leave Blank," " Bonus Points," " Points Claimed "; (c) be addressed to the **Contests Committee, Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, England,** the name of the contest being clearly shown on the top left hand corner of the envelope which must be **postmarked not later than December 19, 1960.**

8. **Scoring.** British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles Stations (G, GB, GC, GD, GI, GM and GW). Scoring will be as follows.

British Isles Stations. Each completed contact will score **5 points.** In addition, a bonus of **20 points** may be claimed for the first contact with each new country on each band. For the purposes of scoring, the official countries list will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as a separate country.

Overseas Stations. Each completed contact with a British Isles station will score **5 points.** In addition, a bonus of **50 points** may be claimed for the first contact with each British Isles country-numeral prefix, i.e. G2, G3, G4, G5, G6, G8, GB, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8. *A further 50 bonus points will be scored for each additional ten G3 stations worked irrespective of band.*

9. **Awards.** The **Whitworth Trophy** will be awarded to the leading British Isles entrant. In addition, **certificates** will be awarded to the leading station in each of the other five British Isles country-prefix zones and to the runner-up in the Trophy winner's zone. Certificates will be awarded to the leading station in each overseas country, VE, VK, W/K, ZL and ZS call areas counting separately as in Rule 8.

SAMPLE COVER SHEET

R.S.G.B. 21/28 Mc/s Telephony Contest **Claimed Score** .....

December 3-4, 1960. **Call-sign** .....

Name .....

Address .....

Transmitter.....Power Input.....watts

Modulation system(s) used .....

Receiver..... Aerial(s) .....

DECLARATION: *I declare that this station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the R.S.G.B. shall be final in all cases of dispute. I certify that the maximum input to the final stage of the transmitter was.....watts.*

Date..... Signed.....

Failure to sign the declaration may involve disqualification of the entry.

The closing date for posting entries is December 19, 1960.

Rules for the R.S.G.B. 21/28 Mc/s Telephony Receiving Contest, 1960

1. **Eligible Entrants.** The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event. Holders of amateur transmitting licences are not eligible to take part.

2. **Duration.** The contest will start at 07.00 G.M.T. on Saturday, December 3, 1960, and end at 19.00 G.M.T. on Sunday, December 4, 1960. The R.S.G.B. 21/28 Mc/s Telephony Contest for transmitting amateurs will take place during the same period.

3. **Entries.** (a) To count for points, logs must show, in columns: (i) Date/Time G.M.T.; (ii) Call-sign of station heard; (iii) Report sent by station heard; (iv) Call-sign of the station being worked; (v) Band in Mc/s; (vi) Bonus points claimed; (vii) Points claimed. *CQ or test calls will not count for points.*

(b) Entries must be set out on ***one side only*** of foolscap or quarto paper, must be postmarked not later than December 19, 1960 and must be addressed to the **Contests Committee, Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, England.**

(c) All entries must contain the following declaration:
I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the R.S.G.B. shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

Date..... Signed.....

4. **Scoring.** British Isles entrants may only log *overseas stations working U.K. stations* for points. Overseas entrants may only log *British Isles stations in contact with overseas stations* for points. A station whether fixed, portable, mobile or alternative address may be logged only once per band for the purposes of scoring. CQ or test calls will not count for points.

British Isles Entrants. Each complete log entry will score *5 points.* In addition a bonus of *20 points* may be claimed for the first station logged in each new country on each of the two bands (21 and 28 Mc/s). For the purposes of scoring the official countries list will be used, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Entrants. Each complete log entry relating to a British Isles station heard will score *5 points.* In addition a bonus of *20 points* may be claimed for the first station heard in each British Isles country-numeral prefix, i.e. G2, G3, GM4 etc., as listed in Rule 8 for the transmitting contest. A further bonus of *50 points* will be scored for each additional ten G3 stations logged irrespective of band.

5. **Awards.** At the discretion of the Council, the **Metcalfe Trophy** will be awarded to the leading British Isles entrant. In addition, **certificates** will be awarded to the British Isles runner-up and to the leading entrant in each overseas country.

Letters to the Editor . . .

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

Swedish Morse Practice Transmissions

DEAR SIR,—In view of the recent correspondence about code proficiency runs I should like to draw attention to the extremely useful practice transmissions from station SHQ at the Army Signals School at Uppsala, Sweden. Five letter code groups (no accented letters) and five figure groups are sent out in alternate weeks on 4465 kc/s on Monday, Tuesday, Thursday and Friday from 18.30 to 20.30 G.M.T. Each evening is divided into six 20 minute sessions; on Tuesday and Thursday the speeds for these six successive periods are 9, 12, 14, 16, 18 and 20 w.p.m. respectively and the transmission is on c.w. On Monday and Friday the order is reversed and the transmission is on m.c.w. Each session commences with the preamble " SHQ 45 (60, 70, etc.) TAKT," the figure given being the number of characters per minute to be sent. The evening's transmission begins and ends with the word " Telegraferingslektioner " and the call-sign is sent from 18.25 to 18.30 for tuning purposes.

Reception of these transmissions is generally good and I personally found them of very great value in raising my speed to the 15 w.p.m. which I considered necessary to be reasonably hopeful of passing the G.P.O. test at the first attempt. No doubt the sessions at 16 to 20 w.p.m. would be of use to those interested in code proficiency runs.

SHQ also sends practice transmissions in plain language (Swedish, of course!) on other frequencies. Particulars can be obtained from Arméns Signalskola, Uppsala.

Yours faithfully,

Petts Wood, Kent. H. W. Darvill (G3OHD).

Mobileers, Watch your own Driving

DEAR SIR,—I am disturbed by the increasing practice by a minority of mobile operators of using their transmitter to broadcast a commentary on the alleged bad driving of the man at the wheel of the car in front.

Remarks such as " Look at this so-and-so in front, crawling along—ought never to be allowed on the road " usually followed by more derisory remarks and a loud blast on the horn, seem to be coming very commonplace.

While it is generally conceded that the average motorist becomes a changed man once he gets behind the wheel of a car I think it is a pity that such arrogance should be permitted to spread to mobile operating.

May I suggest to mobile operators that whatever they think of everyone else's driving it is much more becoming to keep their thoughts to themselves.

Yours faithfully,

Crookham Common, J. GALE (G3LLK).
Near Newbury.

S.S.B. on the CR100

DEAR SIR,—With reference to the interesting articles on single sideband reception by G. R. B. Thornley (G2DAF) may I point out that the CR100 b.f.o. can need not be removed to position the vanes of the variable trimmer to the central position.

Through the spindle nearest to the can will be seen a pin: when this pin is in the horizontal position (that is, parallel to the surface of the chassis) the vanes of the trimmer are in the half mesh position.

To set the b.f.o., turn the pass band switch to the 1200 c/s position and the operational switch to MOD-AVC. Turn the b.f.o. control to the centre position, tune to the Light Programme station on 200 kc/s, adjust the b.f.o. inductance core for zero beat and lock in that position. The note should then be equal in pitch each side of zero beat (12 o'clock for centre position and 3 o'clock for one sideband). Repeat the procedure the other side at 9 o'clock. If the setting was correct in the first setting of the b.f.o. it will be correct for receiving upper and lower sidebands s.s.b. which ever is being used.

I have no trouble at all in resolving s.s.b. on my CR100. It is also possible to resolve d.s.b. suppressed carrier without difficulty.

Yours faithfully,

Poole, Dorset. A. E. HARVEY (G3IUG).

S.S.B. Operators—Identify Yourselves!

DEAR SIR,—With the increase of the use of s.s.b. by British amateurs, largely due to the fact that excellent equipment is now being manufactured in the United Kingdom, I would like to make a plea to them all.

In North America one can listen on the s.s.b. portions of the bands and only rarely hear a call-sign given. Much is heard of " go ahead " and " handles " are bandied about. Only today I finished a contact with a YV5 and actually had to ask him for his call-sign after he had signed with me. It is quite usual to break in, but this usually means that one has a QSO with a station whose call is unknown.

May I make a plea that all British operators set the example before they learn wrong habits of others, by using their calls as frequently on s.s.b. as they would on a.m.?

The rest of the world will thank them.

Yours faithfully,

H. A. M. WHYTE (VE3BWY, ex-G6WY).

Toronto, Canada.

Changing Printed Circuit Components

DEAR SIR,—Now that printed circuits are becoming popular, some advice on component changing may be helpful to members. Single connections present no serious problem—difficulties become apparent when a valveholder or similar component has to be replaced.

Equipment called for includes a paint brush, a stiff nail brush (flat type), 60/40 solder and a miniature iron.

The board should be firmly fixed in a vertical position and the solder round pins heated until it is running. The paint brush may then be used to remove solder on each connection. The nail brush can next be used to remove all splashed spots of solder from the rest of the board. New parts can then be fitted, care being taken to avoid disturbing " printing " around the holes.

Should the board unfortunately burn up, the burnt section may be cut out with a fret saw and the circuit completed again with connecting wire.

Finally, (i) never brush hot solder up (it may enter the eyes); (ii) never flex a printed board (the circuit is usually of the order of 0·001 in. thick and is easily broken); (iii) never overheat the board when either removing or fitting components.

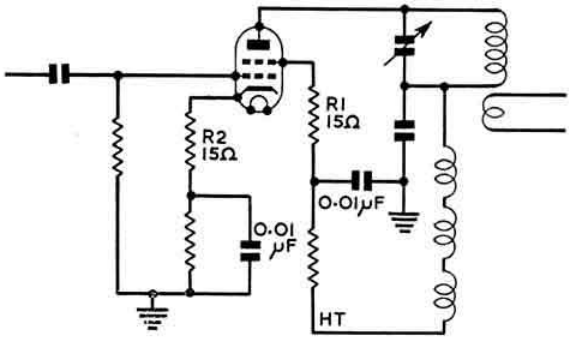
Yours faithfully,

Congleton, Cheshire. A. J. HODGKINSON (G3LLJ).

Taming the 807

DEAR SIR,—Some years ago, when reading through the excellent publication *Ham Tips* published by R.C.A., I came across an article dealing with the 807 valve, as so many American amateurs had been having trouble due to instability and parasitics when using this excellent valve. The writer of the article gave a very simple method of eliminating this trouble, which I tried, and have been using with great success ever since.

The only additional components necessary are the resistors R1



and R2. These are 15 ohm half watt type, and should be soldered as close as possible to the valve pins. All tendency to self-oscillation will disappear, but it will be found that slightly more driving power will be required than when using the normal circuit. The usual precautions such as screening the lower half of the valve, will of course still have to be taken.

Yours faithfully,

Oswestry, Shropshire. N. E. READ (G6US).

Talk Power

DEAR SIR,—It is understandable that some confusion exists in the so-called "Talk-Power" of s.s.b. mentioned by Mr. H. S. Chadwick (G8ON) in the June R.S.G.B. BULLETIN. A well-known American engineer and amateur once suggested that "the power gain of s.s.b. is (9 + N!) db where N is the number of co-authors of the paper!"

However, ignoring some of the more outrageous claims put forward by enthusiasts for this system (A3a) and others, it is clear that the power gain obtained will depend on the premises on which the comparison is being made. The usual ones are equal peak power output and sine-wave modulation. Quite rightly it has been argued that this is a very hypothetical case and that for speech, and especially for clipped speech, the picture would be very different.

It can be shown that for the conditions stated above, the advantage of s.s.b. suppressed carrier over conventional A3 is 6db plus 3db, i.e., 9db. The 6db is due to the suppression of the carrier and the other 3db is obtainable at the receiver by halving the noise-bandwidth. When the "enemy" is QRM rather than pure white noise, the extra 3db becomes doubtful but there is still the basic 6db gain, assuming the conditions stated above.

Many other conditions of comparison could be suggested (e.g. battery drain, p.a. dissipation, different modulating waveforms, etc.) and whole books could be written to illustrate the advantages of one system compared to another. The outcome in each case would be entirely dependant on the selected combination of "if's."

In reply to Mr. Chadwick's query concerning the rating of the capacitors in his p.a. stage it might be pointed out that the peak voltages they must withstand in a conventional A3 (anode-modulated) transmitter is double that of a linear class AB final having the same value of h.t.

The suggestion that the one half of the envelope of a modulated wave is due to the one sideband, and that the other half of the envelope is due to the other sideband is a fallacy which was once displayed even on the front cover of *QST*!

The variation of amplitude takes place equally on both sides of the "zero-line" because all the component frequencies of the wave are r.f., i.e. two sidebands and a carrier wave. Being different in frequency they get "in and out of step with each other" and the envelope varies in amplitude. The variations on both sides, however, are both due to *both* sidebands. If one sideband could be removed by a diode, why bother to design complicated filters?

The greatest distortion produced in A3 operation when selective fading is present is introduced at the detector when the carrier fades more than the sidebands do, producing an "over-modulated" effect. Components of the sidebands will, of course, also fade, but the effect is merely to alter the balance of highs and lows, or to produce temporary changes in the frequency response, and thus the carrier is the *biggest* offender.

One cure for the above-mentioned trouble due to a fading carrier wave is a steady locally-generated one of the right sort injected at the detector stage of the receiver. In the case of d.s.b. though, very special techniques (1) are required to make the inserted carrier sit exactly "half-way" between the two sidebands; the reception of A3a is far less critical, since the phase of the carrier inserted is arbitrary. Even the frequency of the inserted carrier doesn't have to be exact if you're a little tone-deaf!

Finally, it is quite true that a radiated carrier does "serve a useful purpose." It indicates the frequency at which a transmission is being made and when conditions are good it serves to demodulate the transmitted intelligence by beating with the sidebands. But it also wastes most of the transmitted power, causes interference, reduces the power-handling capacity of the p.a. stage, and from time to time fades right out leaving two orphan and disembodied sidebands in a distorted duet!

Yours sincerely,

Ironbridge, Shropshire. G. C. BAGLEY (G3FHL).

(1) J. P. Costas, "Synchronous Communications," *Proc. I.R.E.*, December, 1956, p. 1713.

Licence Matters

DEAR SIR,—Mr. Fitch (G3FPK) in the June issue of the BULLETIN states that a member of an amateur's family who says "Good evening" over the air is technically operating the station. Absurd! Rules are made to serve some useful purpose but when they are regarded as ends in themselves and applied with a rigidity which ignores common sense they become fatuous.

The question is related to message handling. Mr. Davies (G3KZR) in the same issue makes a sensible point. A person sending a message of sufficient importance to warrant spending money on it would not risk non-delivery sending it by amateurs. He would send it via the G.P.O. as a matter of course. If amateurs were allowed to send messages for third parties the majority would be of the "little bit of comfort" type. What could be less harmful than for Mum in Bootle actually to speak to Private Johnny serving a tedious posting in Cyprus? Everybody would feel good about it and the G.P.O. would lose no revenue.

Mr. Chadwick also talks sense about s.s.b. Because our power is limited by d.c. input we cannot use linear amplifiers unless we are prepared to sacrifice much of our possible output power. It cannot matter to the G.P.O. if we use a kilowatt to generate 100 watts or so of output; we pay the electricity bill! Yet we are forced into using amplifiers which generate harmonics at substantial power and worsen our TVI problem simply to keep up amplifier efficiency because of this silly way of restricting power.

Is it not possible for the R.S.G.B. and G.P.O. to get our licence terms based on rational practice? The licence is the biggest single factor which determines the extent to which an amateur may enjoy his hobby.

Yours faithfully.

Newport Pagnell, Bucks. N. H. SEDGWICK (G8WV).

Crystal Erosion Made Easy

DEAR SIR,—I feel that the danger of using ammonium biflouride was not made clear by Jack Hum (G5UM) in his July article and perhaps the best way of correcting the omission would be to quote parts of the original article in *QST* for January 1958.

"Remember always that you are handling a dangerous solution. Arrange the working area so that there is no possibility of spilling. Should the solution come in contact with the skin, wash it off at once with plenty of water. . . . If you want to discard the solution . . . pour it down the drain and flush with plenty of water at once."

Some while ago I supplied a quantity of ammonium biflouride to a prominent 2m operator. Before sending the chemical I insisted on a written statement that he was aware of the danger involved and taking upon himself the responsibility for its storage and use. G3BTC would be well advised to follow my example and to take care to distribute only to responsible individuals.

I am at a loss to understand the use of the word "erosion"; several of my friends describe the process as "etching." My use of erosion is "removal of surface by mechanical means." The process under consideration is chemical.

The rate of etching depends greatly on the surface condition of the quartz and also on temperature as well as solution strength. The initial etching rate can be very high and care must be taken when only a few kc/s change is required. The rate of etching always decreases as the surface becomes smoother. I have experienced rates varying by over 6 : 1 for different crystals so it is important to treat each crystal separately and not work to times obtained for another crystal.

To get on a specified frequency it is best to etch up to 100 cycles h.f. and then lower the frequency with a parallel trimmer capacitor aided if necessary by a pencil mark on the crystal. If the crystal has been etched considerably the surface may become too smooth to hold pencil lead. As an emergency measure rubbing with solder may be effective. Pencil lead can be removed almost instantly by dipping into the etch solution. A "full-stop" will lower the crystal several kc/s at 144 Mc/s. The lead should be rubbed into the crystal with a soft cloth.

My experience has been mainly gained in etching FT243 crystals for 145 Mc/s for a proposed calling frequency and several crystals have been moved 125 kc/s on the fundamental without losing activity.

I prefer to make a small basket of polythene covered wire to hold the crystal which I first dip into a solvent such as carbon tetrachloride to ensure that the etch is not made uneven by grease or wax which may be on the crystal.

Do not be frightened of using the method—it is far more practical than grinding but BE CAREFUL.

Yours faithfully,

RALPH C. TAYLOR (G2HCJ).

Warrington, Lancashire.

New Books

DICTIONARY OF AMPLIFICATION, MODULATION, RECEPTION AND TRANSMISSION, by W. E. Clason. Page size 6 in. × 9 in., 804 pages. Published by Elsevier and distributed by D. Van Nostrand Co. Ltd. Price £6.

The dictionary, compiled by the Head of the Translation Dept. of N. V. Philips, Eindhoven, contains 2,924 words in the basic list. This list, in which terms are defined in English, clearly distinguishes between American and British usages. Each term is set in its proper subject field and defined according to the most precise international standard available. Corresponding terms in the several languages then appear horizontally across the facing page. The languages are English, Dutch, French, German, Italian and Spanish.

F.M. SIMPLIFIED. (THIRD EDITION). By Milton S. Kiver. Published by Van Nostrand. 450 pages. Illustrated. Cloth, $7.50.

Increased interest in f.m. broadcasting, particularly for the high fidelity it offers, prompted a complete revision of the text of this well-known book. With its new detailed drawings and information, every subject has been brought up-to-date to reveal current practice and procedures. The book adheres to non-mathematical explanations and a set of self-check questions for each chapter has been added as an appendix.

RADIO CONSTRUCTION AND REPAIRS. By W. Oliver (G3XT). Published by Foulsham. Price 10s. 6d.

Written for handymen this book provides a complete coverage of the wide field indicated by the title. Advice, information and explicit directions are given concerning new types of v.h.f. sets and portables, both valve and transistor. Concise and clear descriptions explain and simplify the building of sets.

A FIRST COURSE IN WIRELESS (FOURTH EDITION). By " Decibel". Published by Pitman. Price 12s. 6d.

This popular book has been completely revised and brought up-to-date in the light of developments in wireless communication, radar and television in recent years, but the essential character has been retained. The minimum of mathematics has been employed resulting in a book which is free from complications.

A chapter has been added to cover developments in crystal diodes and transistors.

TELEVISION EXPLAINED (SEVENTH EDITION). By W. E. Miller, M.A., M.Brit.I.R.E., and revised by E. A. W. Spreadbury, M.Brit.I.R.E. Published by Iliffe. 192 pages, plus 10 pages of art plates, price 12s. 6d.

This book is specially designed for those requiring technical information on domestic television presented in a simple straightforward manner. The main difference between this edition and the sixth is that a chapter has been included on combined television and f.m. receivers. The rest of the book has been revised where necessary in order to bring it up-to-date.

ELEMENTS OF RADIO ENGINEERING (SECOND EDITION). By H. I. F. Pell, M.Sc.(Tech.), A.M.I.E.E. Published by Cleaver-Hume. Price, 13s. 6d.

Many detailed improvements have been made for this edition, which has a very wide coverage of current syllabuses in Elementary Radio. An elementary knowledge of electricity and magnetism is assumed from which simple a.c. theory is developed. Some elementary consideration of the principles of transistors has been introduced. The book is intended to cover the City and Guilds five year course in Telecommunications but also largely provides for a number of other examinations including the R.A.E. The explicit worked examples will help the student in his work.

THE RADIO AMATEUR OPERATOR'S HANDBOOK 1960/61 Edition. Data Publications Ltd. 48 pages, price 3s. 6d. (by post 4s. from R.S.G.B. Headquarters).

The new edition of this Handbook includes all the most popular features of previous editions and a good deal of new material. A unique feature of this Handbook is the inclusion of a list of prefixes with their bearings from true north.

Amateur codes are fully comprehensive but the R.S.M. code should be omitted in future editions as this method of reporting upon readability, signal strength and modulation quality did not find favour in amateur circles.

INTRODUCTION TO LAPLACE TRANSFORMS, FOR RADIO AND ELECTRONIC ENGINEERS. Iliffe & Sons Ltd. By W. D. Day, Grad.I.E.E., A.M.Brit.I.R.E. 183 pages, 57 text illustrations, price 32s. 6d.

To most of the older generation of engineers, Laplace transforms were little more than a name, but in the past few years the position has entirely changed; Laplace Transforms are included in the syllabus for the Higher National Certificate and, today, any radio or electronic engineer without a sound knowledge of their applications to electrical circuits finds himself seriously handicapped.

The present volume deals with electrical circuits from the first paragraph. The first five chapters are designed for home study, and by the time the student has mastered them he should be able to write down the transform of a particular circuit at sight and then proceed rapidly to the final solution. Before long a Table of Laplace Transforms will be as essential and commonplace as Log Tables or a slide rule. The second half of the book is condensed and is designed as an introduction to more advanced texts.

Book Reviews

BRITISH SEMICONDUCTORS GUIDE, 1960. Edited by C. C. Gee and Charles A. Marshall, B.Sc., A.M.I.E.E. 85 pages; price 5s. Heywood and Co. Ltd., Drury House, Russell Street, Drury Lane, London, W.C.2.

This Guide contains extensive reference data on transistors and semiconductors available from manufacturers in Great Britain. In addition to listing the various types under individual manufacturers, there is a chart of equivalent classification of transistors, and two informative articles dealing with considerations in the use of transistors and transistor parameters and specifications. This well-produced book is a useful addition to existing literature on semiconductors.—R. F. S.

THE REFERENCE MANUAL OF TRANSISTOR CIRCUITS. Published by Mullard Ltd. 308 pp. Price 12s. 6d. in the U.K.

This Manual, which was on sale for the first time at the National Radio Show, contains details of more than 60 circuits ranging from domestic radio and audio equipment to d.c. converters, all using transistors or semiconductor diodes. In all cases the principles of operation are described and component values are given. In addition to the practical information there are chapters on the properties of transistors, together with information on diodes and the phototransistor. The presentation of the text and figures is clear and the volume is attractively bound. It will be invaluable to all those having an interest in semiconductors and may be obtained from radio dealers or from the Home Trade Sales Division of Mullard Ltd., Mullard House, Torrington Place, London, W.C.1. Postage and packing in the U.K. is 1s.—R. F. S.

Second 1·8 Mc/s Contest, 1960

THE rules for this event are the same as for last year.

When: 22.00 G.M.T. on Saturday, November 5, to 08.00 G.M.T. on Sunday, November 6, 1960.

Eligible Entrants: All fully paid-up Corporate members of the R.S.G.B. resident in G, GC, GD, GI, GM and GW.

Contacts: C.w. (A1) only in the 1·8 Mc/s band.

Scoring: Contacts with stations in the British Isles (G, GC, GD, GI, GM and GW) will score *one* point only: contacts with stations outside the British Isles will score *three* points.

Contest Exchanges: RST reports followed by the contact number starting with 001. All reports must be acknowledged with " R."

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

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

(*c*) Entries must be postmarked not later than November 28, 1960.

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

Awards: At the discretion of the Council, the **Victor Desmond Trophy** will be awarded to the winning station and **certificates of merit** to the stations placed second and third. In addition, the **Maitland Trophy** will be awarded to the Scottish member with the highest aggregate number of points in this contest combined with the First 1·8 Mc/s Contest 1961. A certificate of merit will also be awarded to the non-transmitting member submitting the best check log.

The General Rules for R.S.G.B. Contests apply to this contest.

Council Proceedings

JUNE 1960 MEETING

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 Monday, June 27, 1960, at 6 p.m.

Present: The President (Mr. W. R. Metcalfe in the Chair), Messrs. H. A. Bartlett, N. Caws, D. Deacon, C. H. L. Edwards, K. E. S. Ellis, R. C. Hills, E. G. Ingram, J. D. Kay, A. O. Milne, L. E. Newnham, F. K. Parker, F. A. Russell, P. H. Wade, A. C. Williams, E. W. Yeomanson (Members of the Council) and John Clarricoats (General Secretary).

Apologies for Absence. Apologies for absence were submitted on behalf of Dr. R. L. Smith-Rose and Mr. G. M. C. Stone.

* * *

Membership

Resolved (i) to elect 56 Corporate Members and 16 Associates: (ii) to grant Corporate Membership to three Associates who had applied for transfer.

I.A.R.U. Region I Conference

Messrs. Milne, Edwards and Hills reported upon the I.A.R.U. Region I Conference held in Folkestone from June 13-17, 1960.

Resolved to receive the Reports and to record a vote of thanks to Mrs. C. H. L. Edwards for the help she gave to the Conference Technical Committee.

Radio Club of Argentina Trophy

It was reported that a photograph of the Radio Club of Argentina Trophy, together with an illuminated scroll had been presented to the President by Mr. A. L. Budlong during the end-of-Conference Dinner in Folkestone. The trophy itself (weighing 65 lb.) would be shipped to the Society at an early date.

Cambridge National Convention

Mr. F. J. W. Walters (Hon. Treasurer, Cambridge Convention Committee) submitted a detailed financial budget based on estimated income and expenditure.

Resolved to receive and accept the financial budget as submitted by Mr. Walters.

Redcar O.R.M.

The Council's delegates to the Region 2 O.R.M. held in Redcar on June 26, 1960, reported verbally on matters discussed during the business meeting. These included a suggestion that the A.G.M. should be held on a Saturday afternoon in December, the supply of Society publications on a sale or return basis, third party message handling, the *Amateur Radio Handbook*, BULLETIN advertising and the duties of T.R.s.

Weymouth O.R.M.

Resolved to authorize the General Secretary to attend the Weymouth O.R.M. during the weekend October 1/2, 1960.

Aerial Mast Appeal

It was reported that the appeal by Mr. F. I. R. Hunt (G3LNQ) against the decision of the Harrow Borough Council refusing him permission to erect a second aerial mast in his garden had been dismissed by the Minister of Housing and Local Government.

The solicitor acting for Mr. Hunt had suggested that the appeal was dismissed because (i) the aerial itself is unduly prominent and the very fact that it is necessary to rotate it increases its prominence: (ii) the back gardens form a sort of open space with the result that the aerial is overlooked by neighbouring houses on all sides. (The aerial in question is a home made tri-band cubical quad.—EDITOR.)

Army Cadet Force

It was reported that an Associate (M. Hearsey) was using notepaper bearing the words:

" CCF/ACF Wireless Network QSL Bureau
Radio Society of Great Britain "

Resolved to request Mr. Hearsey to delete the words " Radio Society of Great Britain " from his notepaper.

Reports of Committees

Minutes of meetings of the following Committees were submitted as Reports:

Scientific Studies	April 7, May 5, June 2, 1960
V.H.F.	May 23, 1960
Finance and Staff	May 26, 1960
Exhibition	May 31, 1960

Resolved to receive the Reports and to accept the Recommendations contained therein except a Recommendation of the Finance and Staff Committee concerning the National Insurance Act 1959 which was referred back to the Committee for further information.

Headquarters

After considering a report from the Finance and Staff Committee on the financial implications of establishing new Headquarters, it was decided to convene an early meeting of the *ad hoc* Committee which was set up on February 22, 1960, to discuss and report upon the future housing of Headquarters. It was agreed to request the *ad hoc* Committee to examine the possibilities of establishing a Building Fund.

The meeting terminated at 9.50 p.m.

JULY 1960 MEETING

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at the Kingsley Hotel, Bloomsbury Way, London, W.C.1, on Saturday, July 23, 1960, at 2 p.m.

Present: The President (Mr. W. R. Metcalfe in the Chair), Messrs. H. A. Bartlett, N. Caws, D. Deacon, C. H. L. Edwards, K. E. S. Ellis, R. C. Hills, E. G. Ingram, J. D. Kay, L. E. Newnham, F. A. Russell, G. M. C. Stone, A. C. Williams, E. W. Yeomanson (Members of the Council) and John Clarricoats (General Secretary).

Apologies for Absence. Apologies for absence were submitted on behalf of Dr. R. L. Smith-Rose, Messrs. A. O. Milne, F. K. Parker and P. H. Wade.

* * *

Membership

Resolved (i) to elect 59 Corporate members and 18 Associates; (ii) to grant Corporate membership to 3 Associates who had applied for transfer.

Applications for Affiliation

Resolved to grant affiliation to the B.B.C. (Daventry) Club (Radio Section) and R.A.F. (Locking) Airman's Radio Club.

Ham Hop Club

Consideration was given to a special type of QSL card issued by members of the Ham Hop Club. The card had been printed in two sections: the first contained a normal QSL card but with an advertisement of the Club on the reverse, while the second section contained an application for membership in the form of a postcard addressed to the Hon. Secretary of the Club. It was agreed to point out to the Hon. Secretary that (i) the R.S.G.B. QSL Bureau is unable to handle cards of the type in question, and (ii) the card does not conform to postal regulations in respect to the despatch of QSL cards in batches.

National Mobile Rally

Resolved to agree in principle to a suggestion that the Society should organize a National Mobile Rally at Woburn Abbey during 1961.

Reports of Committees

Minutes of meetings of the R.A.E.N., Exhibition, Contests, Technical and TVI/BCI Committees were submitted as Reports.

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

The recommendations dealt with various matters of detail.

In connection with the Report of the Technical Committee Mr. Deacon commented on decisions reached by the Folkestone I.A.R.U. Region I Conference Technical Committee and expressed concern that certain of the R.S.G.B. Technical Committee papers had not been taken up by the Conference. Mr. Edwards (who represented the Society on the Technical Committee at Folkestone) expressed the opinion that greater attention would have been given to the papers in question if they had been issued well in advance of the Conference.

In connection with the Report of the V.H.F. Committee it was stated that the V.H.F. Beacon Station, which would be operated from the B.B.C. mast at Wrotham, Kent, would be used to provide information for C.C.I.R. Study Group V on which the R.S.G.B. is represented.

It was agreed to agree in principle to the issue of R.S.G.B. V.H.F. Operating Awards.

Bulletin Advertising

Attention was drawn to the fact that the R.S.G.B. BULLETIN does not appear to carry its full share of component advertising. It was stated that the Society's Advertisement Manager continues to strive for new business.

The meeting terminated at 6.30 p.m.

London Lecture Meeting
Friday, October 21, 1960

"Single Sideband Techniques"
By R. H. Hammans (G2IG)

Institution of Electrical Engineers
Savoy Place, Victoria Embankment

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

Affiliated Societies and Clubs

THE following Clubs and Societies were affiliated to the Radio Society of Great Britain as at September 15, 1960. The addresses given are for communications.

Aberdeen Amateur Radio Society (GM3BSQ): c/o W. K. Heggie (GM3NHW), 80 Leslie Terrace, Aberdeen.
Acton, Brentford & Chiswick Radio Club (G3IIU): c/o W. G. Dyer (G3GEH), 188 Gunnersbury Avenue, London, W.3.
***Admiralty Electronics Society (G3BPU):** c/o R. G. Brown, Glenacre, The Hollow, Dunkerton, Somerset.
A.E.I. Recreation Club Amateur Radio Section (G3BXF): c/o P. B. Appleby, A.E.I. (Rugby) Ltd., Mill Road, Rugby, Warwicks.
Ainsdale Radio Club: c/o R. J. Woodroffe (G2DQX), 72 Burnley Road, Ainsdale, Southport, Lancs.
Aldershot and District Amateur Radio Society (G3OBR): c/o A. M. Laidler, " Pondside," Sandy Lane, Churt, nr. Farnham, Surrey.
***Amateur Radio Club:** c/o A/T Dixon, Army Apprentices School, Arborfield, Berks.
***Amateur Radio Club, H.M.S. Mercury (G3BZU):** East Meon, nr. Petersfield, Hants.
Amateur Radio Club of Nottingham (G3EKW): c/o E. C. Weatherall, 16 Avebury Close, Clifton, Nottingham.
***Amateur Radio Society (GW3CKB):** No. 32 M.U., R.A.F., St. Athan, West Camp, Barry, Glam.
Aquila Radio Club (G3BRK): c/o R. C. B. Cutts (G3HRC), Sigs. Labs., E.I.D. Ministry of Aviation, Aquila, Golf Road, Bromley, Kent.
***Ariel Radio Group, B.B.C. Club (G3AYC):** c/o B. A. Toms, 38 Ashbourne Avenue, London, E.18.
***Ariel Radio Group (Langham):** c/o A. H. B. Bower, Designs Dept., B.B.C., Western House, Great Portland Street, London, W.1.
***Ariel Radio Group, TV Section:** c/o B.B.C., Woodstock Grove, London, W.12.
***Aslington and District Radio Club:** c/o J. F. Wood, Teviot Dale, Hagg House, Ellington, Morpeth, Northumberland.
Atomic Energy Research Establishment Amateur Radio Club: c/o D. T. Boffin (G3HS), 6 Highworth Road, Faringdon, Berks.
Babcock & Wilcox Staff Association Radio Society (G3GKM): c/o M. H. Clark, 209 Euston Road, London, N.W.1.
Bailleul Radio Society (G3IHH): c/o S/Sgt. G. Preston, Sgts. Mess, 3 Trg. Bn., R.E.M.E., Arborfield, Reading, Berks.
Barnet & District Radio Club: c/o F. E. A. Green, 48 Borough Way, Potters Bar, Middx.
Barnsley & District Amateur Radio Club: c/o P. Carbutt (G2AFV), 19 Warner Road, Barnsley, Yorks.
Blackpool & Fylde Amateur Radio Society (G3NJN): c/o L. Beevers (G3JLF), The Howard Hotel, 292 Promenade, Blackpool, N.S., Lancs.
BOAC Speedbird Amateur Radio Club (G3NAF): c/o J. Barker, " Meadowbank," Bath Road, Cranford, Middx.
***Boscombe Down Amateur Radio Club:** c/o F/Lt. T. A. Sheen, 16 Winchester Close, Amesbury, Wilts.
Bournville Radio Society (G6BV): c/o W. V. Shepard (B.R.S.19176), Council Office, Cadbury Bros. Ltd., Birmingham.
Bradford Amateur Radio Society: c/o M. T. Powell, 28 Gledhow Avenue, Roundhay, Leeds 8.
Bridlington & District Radio Society: H. H. Mills, c/o Mrs. Machem, 28 East Road, Bridlington, Yorks.
Brighton & District Radio Club: c/o H. R. Henly (G3IHR), 72 Loder Road, Brighton 6, Sussex.
British Amateur Television Club: c/o D. S. Reid, 21 Silverdale, London, S.E.26.
Bury Radio Society (G3BRS): c/o Mrs. J. Hodgkins (G3JZP), 24 Beryl Avenue, Tottington, nr. Bury, Lancs.
***Burton-on-Trent Grammar School Radio Society (G3KZA):** c/o E. T. Ward (G3JWC), The Grammar School, Burton-on-Trent, Staffs.
Cambridge & District Amateur Radio Club: c/o A. H. G. Waton (G3GGJ), " Arkengarthdale," New Road, Barton, Cambridge.
Cambridge University Wireless Society (G6UW): c/o D. G. Thorpe, Queen's College, Cambridge.
Cathays High School Scientific Society Radio Club: c/o D. L. Edmonds, Cathays High School for Boys, Cardiff, Glam.
Catterick Amateur Radio Club (G3CIO): c/o J. E. Collens, 2 Sqdn., 8th Sig. Regt., Catterick Camp, Yorks.
Cheltenham Amateur Radio Society (G3GPW): c/o J. H. Moxey (G3MOE), 11 Westbury Road, Leckhampton, Cheltenham, Glos.
Chiltern Amateur Radio Club: c/o R. Barton (B.R.S.21518), 25 Hillside Road, Marlow, Bucks.
***City of Belfast Y.M.C.A. Radio Club (GI6YM):** c/o R. J. Boal, Y.M.C.A., Wellington Place, Belfast.
***City & Guilds College Radio Society:** City & Guilds College, South Kensington, London, S.W.7.
***Civil Service Radio Society (GB2SM):** c/o G. Lloyd Dalton, 2 Hinister Heights, Purley, Surrey.
Clifton Amateur Radio Society (G3GHN): c/o C. H. Bullivant (G3DIC), 25 St. Fillans Road, London, S.E.6.
***College Radio Society (G3CXX):** c/o D. Gordon Bagg, Dept. of Chemical Eng., Fuel, Technology and Metallurgy, College of Science and Technology, Sackville Street, Manchester 1.
Conway Valley Amateur Radio Club: c/o R. Jones, " Woodcote," Coed Pella Road, Colwyn Bay, Denbighshire, North Wales.
Cornish Radio & Television Club: c/o W. J. Gilbert, 7 Poltair Road, Penryn, Cornwall.
Courtaulds Amateur Radio Group (G3CQD): c/o W. P. Stevens (B.R.S.4022), Acetate and Synthetic Fibres Laboratory, Courtaulds Ltd., Foleshill Road, Coventry, Warwicks.
Coventry Amateur Radio Society (G2ASF): c/o F. A. Nokes (G2FTK), 4 Baronsfield Road, Cheylesmore, Coventry.
Crawley Amateur Radio Club: c/o R. G. B. Vaughan (G3FRV), 9 Hawkins Road, Tilgate, Crawley, Sussex.
Crystal Palace and District Radio Club: c/o G. M. C. Stone (G3FZL), 10 Liphook Crescent, London, S.E.23.
Derby & District Amateur Radio Society (G3ERD): c/o F. C. Ward (G2CVV), 5 Uplands Avenue, Littleover, Derby.
***Dorking Radio Society:** c/o J. Greenwell, Wigmore Lodge, Beare Green, nr. Dorking, Surrey.
East Kent Radio Society (G3LTY): c/o D. N. T. Williams (G3MDO), " Llandogo," Bridge, nr. Canterbury, Kent.
Edgware & District Radio Society (G3ASR): c/o D. L. Lisney (G3MNO), 17 Pickett Croft, Stanmore, Middx.
***Electronic Amateur Radio Society (G4RG):** c/o D. I. Huggett, Queen Mary College, Mile End Road, London, E.1.
English Electric Aviation (Warton) Amateur Radio Society (G3NZH): c/o K. M. Hodgson, 14 Fairfield Avenue, Normoss, Blackpool, Lancs.
***Flintshire Radio Society:** c/o J. Thornton Lawrence (GW3JGA), Perran Porth, East Avenue, Prestatyn, North Wales.
Grafton Radio Society (G3AFT): c/o A. W. H. Wennell (G2CJN), 145 Uxendon Hill, Wembley Park, Middx.
***Gravesend Amateur Radio Society (G3GRS):** c/o D. J. Andrews, 42 Fairway, Gravesend, Kent.
Grimsby Amateur Radio Society: c/o H. O. Gillatt (G3LOP), 102 Station Road, Healing, Grimsby, Lincs.
***Guildford & District Radio Society:** c/o M. J. Marlow, " Redstacks," Woking Road, Stringers Common, Guildford, Surrey.
Halifax and District Amateur Radio Society: c/o A. Robinson (G3MDW), Candy Cabin, Ogden, Halifax, Yorks.
Harlow and District Radio Society: c/o B. H. Wynn, Black Cat, Abbess Roding, Ongar, Essex.
Hartlepools Amateur Radio Club (G3IDV): c/o L. Foden, 207 Park Road, West Hartlepool, Co. Durham.
Hastings and District Amateur Radio Club (G6HH): c/o W. E. Thompson (G3MQT), 8 Coventry Road, St. Leonards-on-Sea, Sussex.
***Hull & District Radio Society (G3AMW):** c/o Royal Oak, Portland Street, Hull, East Yorks.
***International Aeradio Ltd. Social Club Amateur Radio Section:** c/o J. G. Smith, Personnel & Admin. Officer, Engineering Division, Hayes Road, Southall, Middx.
Ilkeston & District Amateur Radio Society (G3JSZ): c/o E. Eric West, 21 Westfield Avenue, Heanor, Derbyshire.
***Isle of Man Amateur Radio Society (GD3FLH):** c/o T. R. Moore, Glynmoar, St. John's, Isle of Man.
Kingston & District Amateur Radio Society (G3KIN): c/o R. S. Babbs (G3GVU), 28 Grove Lane, Kingston-on-Thames, Surrey.
***Kinloss Amateur Radio Club:** c/o Sgts. Mess, R.A.F. Kinloss, Morayshire, Scotland.
***Kynoch Radio & Television Society (G3HPP):** c/o G. E. Nicholls, 27 Canberra Road, Walsall, Staffs.
***Leicester Radio Society:** c/o P. G. Goadby (G3MCP), 535 Welford Road, Leicester.
***Liverpool & District Amateur Radio Club:** c/o H. James, 448 East Prescot Road, Knotty Ash, Liverpool 14.
***Loughborough College Radio Society:** c/o P. H. Corbishley, Rutland Hall, Ashley Road, Loughborough, Leics.
Manchester & District Radio Society: c/o A. B. Langfield, 2 Rowland Street, Moston, Manchester 10.
Marconi Apprentices' Amateur Radio Club (G3JTW): c/o D. Stevens, Education Dept., Marconi's Wireless Telegraph Co. Ltd., Chelmsford, Essex.
***Magnus Grammar School Radio Society:** c/o D. W. Selby, Magnus Grammar School, Newark-on-Trent, Notts.
Medway Amateur Receiving & Transmitting Society (G2FJA): c/o E. N. Gunnee, 57 Saxton Street, Gillingham, Kent.
Mercury Amateur Radio Club (G3BZU): c/o Hon. Secretary, *H.M.S. Mercury*, Leydene, Petersfield, Hants.
Midland Amateur Radio Society (G3MAR): c/o C. J. Haycock, 360 Portland Road, Edgbaston, Birmingham 17.
Mitcham & District Radio Society: M. Pharaoh, 1 Madeira Road, Mitcham.
Murphy Radio Sports Club, Radio Section, (G8LM): c/o C. Lewis, Television Mechanical Design, Murphy Radio Ltd., Welwyn Garden City, Herts.
***Newark & District Amateur Radio Society:** c/o J. R. Clayton, 160 Wolsey Road, Newark, Notts.
Newbury & District Amateur Radio Society: c/o J. A. Gale (G3LLK), Wild Hedges, Crookham Common, nr. Newbury, Berks.
Northampton Short Wave Radio Club (G3GWB): c/o P. L. Hunt (G3FWB), 3 Meadway, Northampton.
North Kent Radio Society (G3ENT/GB3ENT): c/o D. W. Wooderson (G3HKX), 75 Mount Road, Bexleyheath, Kent.
North West V.H.F. Group (G3OHF): c/o J. G. Barnes (G3AOS), 5 Prospect Drive, Hale Barns, Cheshire.
***Norwich & District Radio Club:** c/o O. F. Simkin, 15 Hillside Road, Thorpe-next-Norwich, Norfolk.

Norwood Technical College Amateur Radio Society (G3HFY): c/o R. F. Burns, 35 Beulah Hill, London, S.E.19.
Oxford and District Amateur Radio Society: c/o J. Hickling, 33 Chestnut Road, Botley, Oxford.
Portsmouth and District Radio Society (G3DIT): c/o A. C. Cake (G3CNO), 7 Wheatstone Road, Southsea, Hants.
Plymouth Radio Club: c/o R. Hooper, 2 Chestnut Road, Peverell, Plymouth, Devon.
Preston Amateur Radio Society (G3KUE): c/o G. Lancefield (G3DWQ), 35 Brixton Road, Frenchwood, Preston, Lancs.
***Queens University Radio Club:** Students' Union, Belfast.
Radio Society of Harrow (G3EFX): c/o S. C. J. Phillips, 131 Belmont Road, Harrow Weald, Middx.
***R.A.F. (Aldergrove) Amateur Radio Club:** R.A.F. Station, Aldergrove, nr. Crumlin, Northern Ireland.
R.A.F. (Chicksands) Amateur Radio Club: R.A.F. Station, Chicksands, nr. Shefford, Beds.
R.A.F. (Compton Bassett) Amateur Radio Club (G3HXZ): c/o Officer i/c, R.A.F. Station, Compton Bassett, Calne, Wilts.
R.A.F. (Locking) Airmens' Amateur Radio and Television Club (G3IRS): c/o F/Sgt. D. Vierod, 102 Anson Road, R.A.F. Locking, Weston-super-Mare, Somerset.
***R.A.F. (Stanbridge) Amateur Radio Society (G3HSX):** R.A.F. Station, Stanbridge, nr. Leighton Buzzard, Beds.
R.A.F. (Watton) Amateur Radio Society (G3MSZ): c/o D. H. Strudwick (G3HFG), 19 Halton Road, R.A.F. Watton, Thetford, Norfolk.
***R.A.F. (Wyton) Amateur Radio Club:** c/o P/O E. A. Le Baigue, R.A.F. Station, Wyton, Huntingdon.
***R.A.F. (Yatesbury) Amateur Radio Club (G3HWF):** R.A.F. Station, Yatesbury, nr. Calne, Wilts.
***Ravensbourne Amateur Radio Club (G3HEV):** c/o J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
Reading Amateur Radio Club: c/o R. G. Nash (G3EJA), 9 Holybrook Road, Reading, Berks.
Reigate Amateur Transmitting Society: c/o F. D. Thom (G3NKT), 12 Willow Road, Redhill, Surrey.
Romford & District Radio Society: c/o L. S. Owen (G3MDP), 53 Applegarth Drive, Newbury Park, Ilford, Essex.
Salisbury & District Short Wave Club (G3FKF): c/o E. J. Spicer, 43 Vale View Road, South Newton, Salisbury, Wilts.
Scarborough Amateur Radio Society (G4BP): c/o P. B. Briscombe (G8KU), Roseacre, Irton, nr. Scarborough, Yorks.
Sheffield Amateur Radio Club: c/o B. E. Cliffe, 16 Moorbank Drive, Sheffield 10, Yorks.
Shefford & District Amateur Radio Society (G3FJE): c/o G. R. Cobb (G3IXG), 75 Ampthill Road, Shefford, Beds.
Slade Road Society (G3JBN): c/o Charles N. Smart, 110 Woolmore Road, Erdington, Birmingham 23.
South Birmingham Radio Society (G3OHM): c/o J. Bratby, c/o Westmead Country Club, Hopwood, Worcs.
Southend & District Radio Society (G5QK): c/o Mrs. P. M. C. Collop, 53 Beedell Avenue, Westcliff-on-Sea, Essex.
South Manchester Radio Club (G3FVA): c/o J. A. Elliott (G3KIQ), 2 Pennine Close, Blackley, Manchester 9, Lancashire.
***South Shields & District Amateur Radio Club (G3DDI):** c/o K. Sketheway, 51 Baret Road, Walkergate, Newcastle-on-Tyne 6.
Southport Radio Society: c/o J. E. Ford (B.R.S.15045), 278 Portland Street, Southport, Lancs.
Spen Valley Amateur Radio Society: c/o N. Pride, 100 Raikes Lane, Birstall, nr. Leeds, Yorks.
S.R.D.E. Amateur Radio Society (G3DMZ): c/o J. Singleton, A.M.I.E.E., Ministry of Aviation, S.R.D.E., Christchurch, Hants.
Stockport Radio Society: c/o G. R. Phillips (G3FYE), 7 Germans Buildings, Buxton Road, Stockport, Cheshire.
Stoke-on-Trent Amateur Radio Society: c/o V. J. Reynolds (G3COY), 90 Princes Road, Hartshill, Stoke-on-Trent, Staffs.
***Stourbridge & District Radio Society:** c/o A. K. Davies, 48 Church Avenue, Amblecote, nr. Stourbridge, Worcs.
Students' Union Radio Society Northern Polytechnic & National College of Rubber Technology: Holloway, London, N.7.
Surrey Radio Contact Club: c/o S. A. Morley (G3FWR), 22 Old Farleigh Road, Selsdon, South Croydon, Surrey.
Sutton & Cheam Radio Society: c/o F. J. Harris, 143 Collingwood Road, Sutton, Surrey.
Sutton Coldfield Radio Society: c/o K. H. Varney (G3DMV), 149 Whitehouse Common Road, Sutton Coldfield, Warwicks.
Thames Valley Amateur Radio Transmitters Society: c/o K. Rogers (G3AIU), 21 Links Road, Epsom, Surrey.
***Thanet Radio Society (G3DOE):** c/o P. O'Brien, 6 Catharine Way, Broadstairs, Kent.
Torbay Amateur Radio Society (G3NJA): c/o G. A. Western (G3LFL), 118 Salisbury Avenue, Barton, Torquay, Devon.
University of Bristol Amateur Radio Society (G3KAC): c/o J. D. Last (G3MZY), University of Bristol Union, The Victoria Rooms, Bristol 8.
***Unit Amateur Radio Club, 46 (NM) Corps Signal Regiment:** T.A. Centre, Kingsway, Derby.
***Upton House School Radio Club:** c/o R. H. Lamb, 17 Queens Road, London, E.1.
Vickers-Armstrongs Social & Athletic Club (Electronics Section) (G3IVW): c/o S. G. Masterson, Tool Drawing Office, Vickers-Armstrong (Aircraft) Ltd., Weybridge, Surrey.
***Wanstead & Woodford Radio Society (G3BRX):** c/o P. J. Seaman, 39 Kensington Drive, Woodford Green, Essex.
West Kent Radio Society: c/o H. F. Richards, 17 Reynolds Lane, Tunbridge Wells, Kent.
Whitchurch (Salop) and District Radio Club: c/o D. Earnshaw, Gerharden, Alkington Road, Whitchurch, Shropshire.
***Wirral Amateur Radio Society:** c/o H. V. Young (G3LCI), 9 Eastcroft Road, Wallasey, Cheshire.
***Wolverhampton Amateur Radio Society:** c/o R. Thomas, 91 Fraser Street, Bilston, Staffs.
Yeovil Amateur Radio Club (G3CMH): c/o D. McLean (G3NOF), 9 Cedar Grove, Yeovil, Somerset.
***Worthing & District Amateur Radio Club:** c/o P. J. Robinson, 46 Hillview Road, Worthing, Sussex.
York Amateur Radio Society (G3HWW): c/o M. Watson (G3JME), 36 The Paddock, Boroughbridge Road, York.
***3rd Training Regt., Royal Signals, Amateur Radio Club (G3JNF):** New Barracks, Burton Road, Lincoln.

OVERSEAS

***Amateur Radio Club (Gibraltar):** c/o The Secretary, Service Institute, R.A.F. Station, North Front, Gibraltar.
***Northern Rhodesia Amateur Radio Society:** c/o G. A. Wafer (VQ2GW), P.O. Box 332, Kitwe, Northern Rhodesia.
Radio Club of Uganda: c/o P.O. Box 3433, Kampala, Uganda.
R.A.F. (Akrotiri) Amateur Radio Club (ZC4AK): R.A.F. Station, Akrotiri, B.F.P.O.53, Cyprus.
R.A.F. (Ayios Nikolaos) Amateur Radio Club (ZC4GT): c/o Hon. Secretary, R.A.F. Station, Ayios Nikolaos, B.F.P.O.53, Cyprus.
***R.A.F. (Changi) Amateur Radio Club:** c/o Sgt. N. G. Cooper, 205 Sqdn., R.A.F. Changi, Singapore 17.
R.A.F. (Pergamos) Amateur Radio Club: c/o LAC G. D. Preece, A Watch, R.A.F. Station, Pergamos, B.F.P.O.53, Cyprus.

** Address subject to confirmation.*

Transistor Circuits and Applications

A SERIES of 11 lectures on Transistor Circuits and Applications is being given on Tuesday evenings from 7 to 9 p.m. at Enfield Technical College, Queensway, Enfield. All the lecturers are members of the Mullard Research Laboratories. Applications for admission to the course should be made to the Head of the Department of Electrical Engineering.

The Mighty Transistor

REPORTING on a proposal to build a B.B.C. television relay station at Hastings, the *Hastings and St. Leonards Observer* stated, " An 8 ft. deep hole has been dug to take the aerial and a small area levelled off for the two small transistor units."

" Noise Factor "

AN error appeared in the Appendix to the article on " Noise Factor " published in the June issue of the BULLETIN. At the end of the first section on page 544 the voltage quoted should be 0·1 μV and not 1 μV.

GB2RS SCHEDULE

R.S.G.B. News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.30 a.m.	North Midlands
	11 a.m.	North East England
	11.30 a.m.	South West Scotland
145·55 Mc/s	11.15 a.m.	Beaming south-east from Leeds
	11.30 a.m.	Beaming south-west from Leeds
	11.45 a.m.	Beaming north from Leeds
145·3—145·4 Mc/s	12 noon	Beaming north from South East England
	12.15 p.m.	Beaming west from South East England

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

R.A.E.N. Notes and News

BY E. ARNOLD MATTHEWS (G3FZW)*

IT is evident from a number of enquiries recently received that some amateurs are still unfamiliar with those parts of the licence which relate to third party messages. R.A.E.N. members are reminded that messages may only be transmitted to or received from other amateur stations and must be originated by and addressed to members of B.R.C.S., St. J.A.B., or Police Forces. The messages must relate to disaster relief operations being conducted by these organizations; or to exercises held by them and relating to disaster relief.

The normal attendance of any of these user services at sports meetings, shows or similar public or private functions may not be classed for R.A.E.N. purposes as disaster relief work, nor may such attendance be used as an exercise situation. The use of R.A.E.N. by the organizers of functions would be contrary to license terms even though there is an accident risk and user services are in attendance.

The standard message form CDF 4, has now been superseded by Form F, Sigs. 52, small, and it is recommended that members take this into use when their stocks of CDF 4 are exhausted.

Around the Groups

Despite the holiday period there has been a considerable amount of activity during the past six weeks. **Norfolk**, for instance have been engaged in exercises and aerial construction and have also found time to hold meetings. The CC has completed one vertical aerial and tests showed that these 25 ft. transportables will out-perform a 132 ft. long wire, and should be very useful at HQ stations and to extend the range of mobile stations operating in a static role. So large is the attendance for the local net held each Sunday morning that a plan to hold two nets is now being considered.

Suffolk group had their message handling ability well tested by East Suffolk Constabulary on August 7 when six fixed stations, four mobiles and the Group HQ station took part in a three-hour exercise. Messages previously prepared by police had been issued in sealed envelopes marked with the time of opening, and contained texts relating to a wide variety of emergencies. Once again a group has effectively demonstrated the high standard of amateur nets. An interesting feature of the net organization was that each mobile was assigned to keep contact with a fixed station in its area, and the latter worked with a 5 kc/s separation between stations, as opposed to the more common single channel mode.

Useful publicity was gained from stand displays by M.A.R.S. at **Birmingham** Show, and by **Co. Durham** at Heddon Flower Show, where a well executed poster caught the eye of a local M.P. who spent 20 minutes getting acquainted with R.A.E.N.

After a period of reduced activity owing to business and domestic commitments G3ERB, the **Cheshire** CC returned to full duties to find his force of mobiles doubled. The DXpeditions recently organized by Wirral members must have given some useful training in logistics. G3FKO is now studying the possibilities in **Berkshire** prior to undertaking the formation of a group. An organization is badly needed in this county not so much for internal needs, but to provide links for Hampshire and Bucks. Mr. V. W. Stewart, A.1394, is interested in forming a group in **Edinburgh** and will be pleased to receive offers of help. Inter-county links are steadily being built up between **Dorset, Hampshire, Somerset, Wiltshire** and **Devon.**

Lincolnshire held a small exercise with the County Police on September 11, with five mobiles participating, and another is planned on a larger scale in the Spring of 1961.

On September 21 G3FGY held a test exercise for **Derbyshire** members in order to ascertain the state of members' equipment.

G3VK gave a talk on R.A.E.N. to members of **Reigate** A.R.S. on September 17, and is hoping to extend activity to Guildford soon. He is also interested in finding suitably sited stations willing to participate in the London-Hampshire 2-metre route.

Personnel

Mr. A. C. Dunn has resigned from the offices of CC, East Yorkshire and R.M. East Coast Trunk Route, and Mr. E. H. Page, G3HKV from the office of AC, S. Somerset.

Appointment

Mr. C. Teale, G3JYB, 3 Barrow Park Road, Peverell, Plymouth, has been appointed Area Controller for Plymouth.

* *1 Shortbutts Lane, Lichfield, Staffs.*

CONTESTS DIARY

1960

October 29-31	CQ World Wide DX Contest (Phone Section)
November 5-6	Second 1·8 Mc/s Contest (For details, see page 179)
November 26-28	CQ World Wide DX Contest (C.W. Section)
December 3-4	R.S.G.B. 21/28 Mc/s Telephony Contest R.S.G.B. 21/28 Mc/s Telephony Receiving Contest (For rules, see page 176)

1961

January 29	- 144 Mc/s C.W. Contest
February 4-5	- Affiliated Societies' Contest
February 25-26	- First 1·8 Mc/s Contest
March 4-5	- 144 Mc/s Open Contest *
March 11-12	- B.E.R.U. Contests
April 8-9	- Low Power Contest
April 16	- D/F Qualifying Event
April 23	- 420 Mc/s Contest
April 30	- D/F Qualifying Event
May 7	- First 144 Mc/s Field Day *
May 28	- D/F Qualifying Event
June 3-4	- National Field Day
June 10-11	- 1250 Mc/s Tests
June 17-18	- 70 Mc/s Contest
June 25	- D/F Qualifying Event
July 2	- Second 144 Mc/s Field Day *
July 9	- D/F Qualifying Event
September 2-3	- I.A.R.U. Region 1 V.H.F. Contest
September 2-3	- National 144 and 420 Mc/s Contests *
September 10	- D/F National Final
September 17	- Low Power Field Day
October 8	- R.A.E.N. Rally
November 11-12	- Second 1·8 Mc/s Contest
December 2-3	- R.S.G.B. 21/28 Mc/s Telephony Contest R.S.G.B. 21/28 Mc/s Telephony Receiving Contest

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

Regional and Club News

Blackwood Amateur Radio Society.—On September 10, the society took part in the Blackwood Autumn Fayre in aid of the Six Bells Disaster Fund. GW3CJR/A was housed in two large tents and used CR100 and S840 receivers, a PR120V and GW3KYA's home built transmitter. The main aerial was a 275 ft. long wire. The complete display, which included examples of both home built and commercial equipment in addition to the live station, proved an outstanding success and drew crowds of visitors. *Hon. Secretary:* Peter M. Fulton, 36 Sunnybank Road, Blackwood, Mon.

Bristol.—Over 50 members were present at the September meeting when a talk on " Modern Teleprinter Communications " was given by H. J. Gratton (G6GN). Members saw a working demonstration of the latest Teleprinter equipment operating from punched tape. A talk on " Radio and TV Line Distribution Systems " will be given on October 21, by J. H. A. Newth (G3EJN). The annual contest for the M.A.R.S./Bristol Trophy will be held on October 30. Local members who are able to take part in the transmitting or receiving sections of the contest should contact the C.R., G2FYT.

Civil Service Radio Society.—The winter session of the Society commenced with a lecture on Radio Astronomy by Mr. J. Haywood of the British Astronomical Association. On November 1, Mr. A. F. Wilkins of the Radio Research Station will be lecturing on the " Beginnings of Radar." Prospective members and visitors are always welcome but they should notify Mr. G. Voller at the Science Museum, Kensington 6371 of their desire to attend. All meetings commence at 6 p.m. and refreshments will be available.

Cornish Radio and Television Club.—At the September meeting, B. Wright (G6LV) gave a talk on aerials and answered many questions. The gift of a Linguaphone Morse Code course has been made to the club by G3OJN. Details of future activities may be obtained from the *Hon. Secretary:* W. J. Gilbert, 7 Poltair Road, Penryn, Cornwall.

Crawley Amateur Radio Club.—At the meeting at the " Brewery Shades," Crawley High Street, on October 27, G3NVB is to give a lecture on " Transistor Power Supplies and Modulators." Members operated G3FRV/P during the National 144 Mc/s Contest on September 3-4. Preparations are now being made to take part in the *Short Wave Magazine* Club Contest next month. *Hon. Secretary:* R. G. B. Vaughan (G3FRV), 9 Hawkins Road, Tilgate, Crawley.

Falkirk R.S.G.B. Group.—Will meet at the Temperance Café, Falkirk on October 27, at 7.30 p.m. when GM4JQ will lecture on " Winding transformers for Amateur use." Visitors will be welcome.

Grafton Radio Society.—At the A.G.M. the following were elected: *President*—J. H. Clarke (G2AAN); *Chairman*—P. Beresford (G3AFC); *Vice-Chairman*—J. H. B. Mulcahy (G3JVV); *Hon. Treasurer*—H. G. Lassman (G3JZX); *Hon. Secretary*—A. W. H. Wennell (G2CJN); 145 Uxendon Hill, Wembley Park, Middlesex. *Committee Members*—R. Howell (G3KRH), R. J. B. Morgan (G3KGC), W. Bailin (G3NOZ), F. D. M. Sloan (B.R.S.22474), G2AHB, G3RX, G8PL, G3AFC, GW3ALE and C. T. Bird were elected Vice-Presidents. The first Worked all London Town Certificate has been won by H. G. Whitmore (G3FS) using telephony on Top Band. A total of 23 members passed the R.A.E. held in May 1960.

The Stoke-on-Trent Amateur Radio Society's stand at the Boat Exhibition held in the city from August 8-13, 1960. During the period of the exhibition GB3SOT was in operation.

Halifax and District Amateur Radio Society.—At the meeting on August 30, J. Craven gave an interesting talk on oscilloscopes. Meetings at the Sportsman Inn, Ogden, are arranged for November 1 (" S.S.B." by G3LGS), November 15 (Informal) and December 6 (" Where, When and What to look for " by G3IGW) and December 20 (Ragchew). *Hon. Secretary:* A Robinson (G3MDW), Candy Cabin, Ogden, Halifax.

Harrow Radio Society.—On October 22, using the special call-sign GB3HAR, the club will be on the air from the Wembley Exhibition where a display of Amateur Radio gear is being arranged. This Exhibition, which is mainly devoted to hobbies, arts and crafts, is held annually at the Copland School, High Road, Wembley. All contacts with GB3HAR will be confirmed by QSL card. There will be no club meeting on October 21, the night before the Wembley Exhibition. On other Fridays in October, meetings will be held as usual at Roxeth Manor Secondary School, Eastcote Lane, South Harrow. *Hon. Secretary:* S. C. J. Phillips, 131 Belmont Road, Harrow Weald.

Houghton-le-Spring and District Radio Club.—The weather was perfect for the first rally organized by the club on August 20 in connection with the Hetton Show, which was attended by more than 10,000 visitors, most of whom passed through the large tent from which G3KBM was active on 40m and G2TG and G3CKC on Top Band. About 120 amateurs signed the visitors book although the number of mobiles was somewhat disappointing. Details of future activities may be obtained from S. L. McAteer (G3CKC), 20 Kirkdale Street, Low Moorsely, Hetton-le-Hole, Co. Durham.

Lothians Radio Society.—Meetings at the Y.M.C.A., South St. Andrew Street, Edinburgh, on the second and fourth Thursday in each month have been resumed. At the meeting on October 27, GM3AKN will give a talk entitled " TVI Proofing—Supression of Interference " during which he will endeavour to demonstrate how to suppress a transmitter while members watch a TV monitor. A Junk Sale has been arranged for November 10. At the A.G.M., GM3FJP was elected President. GM3BDA, GM3AKN and Vic Steward were elected to the Committee. *Hon. Secretary:* Len Lumsden (B.R.S.22359), 33 Hillview Drive, Edinburgh.

Purley and District Radio Club.—On August 21, the club held a very successful field day on Headley Heath when three stations were active on 1·8, 3·5, 7 and 14 Mc/s. Details of future activities may be obtained from the *Hon. Secretary:* E. R. Honeywood (G3GKF), 105 Whytecliffe Road, Purley, Surrey.

R.A.F. Amateur Radio Society.—Mr. R. F. Weston, G6PZ, has resigned as Admin. Secretary and Sgt. K. Smethurst, G3GPE, is now acting in his place. F/O. J. M. Hern, G3NAC, of Little Rissington is the new Publicity Manager. The A.G.M. is to be held on Friday, November 25, at Air Ministry, Whitehall, London, S.W.1. Members who wish to raise matters at the meeting should send details to the Acting Secretary ar Locking, during the next fortnight. The date of the A.G.M. has been fixed to coincide with the period of the R.S.G.B.Radio Hobbies Exhibition.

Reigate Amateur Transmitting Society.—The Society took part in the recent V.H.F. Contest using the call G3VDN/P. The site chosen was Reigate Hill from where 100 contacts were made. A visit to the B.B.C. studios at Maida Vale has been arranged for October 29. The Sunday morning net on 1930 kc/s is deserving of more support. The net begins at 11.00 o'clock. Long term dates include the A.G.M. on January 21, 1961 and the annual dinner on February 11, 1961.

Southgate, Finchley and District.—The group operated four stations at the Friern Barnet Show on August 19-20. A four watt transmitter was used on Top Band, 25 and 75 watts on 10-80m and a Viceroy on s.s.b. Receivers in use included an AR88D and an MR44 while the aerials included a Mosley vertical, dipoles for 20, 40 and 80m, and a 350 ft. long wire. Equipment displayed included g.d.o.'s, high and low pass filters, power supply units and test meters. *Hon. Secretary:* A. G. Edwards (G3MBL), 244 Ballards Lane, Finchley, London N.12.

Welwyn Garden City.—About 35 members and their ladies recently visited the new studios of Associated-Rediffusion Ltd. at Wembley. Next month the traditional " open meeting " is being held to which local groups and clubs are invited to send representatives. An especially attractive raffle is promised, followed by a showing of the Academy award film " This is the B.B.C." See Forthcoming Events for meeting details.

Wirral Amateur Radio Society.—At the meeting on October 21, Vernon Young (G3LCI) is to give a talk on the Minimitter MR44 receiver with demonstrations, while L. N. Goldsbrough (G3ERB) will give a lecture entitled " Further Modifications to the TR1986 " on November 4. A recent D/F Contest was won by J. Wess, followed by John Wylde (G8BM) and L. Roberts (G3EGX). The next D/F event is on October 16. The club took part in the Region 1 Field Day under the call-sign G3NWR/P. *Hon. Secretary:* A. Seed (G3FOO), 31 Withert Avenue, Bebington.

Bradford Amateur Radio Society.—At the first meeting of the new session, held on September 6, G3LZW discussed " Transistors for the Amateur." On September 13 a recorded talk by W1PFA (illustrated by colour slides) on his DXpedition to St. Pierre & Miquelon, was given by G3LB, whilst " TV Circuitry " was discussed by G3EKE on September 26. Members are due to visit the Tinshill TV Radio Link on November 8 and on November 22 G3KEP will lecture on Modulation. *Hon. Secretary:* M. T. Powell (G3NNO), 28 Gledhow Avenue, Leeds 8.

Liverpool and District Amateur Radio Society.—At the meeting to be held on October 25 G3HII will talk on Television Studio Work. *Hon. Secretary:* H. James (G3MCN), 448 East Prescot Road, Liverpool 14.

Manchester and District Radio Club.—The Club is being reorganised at the King George VI Club, North Road, Moston, where increased facilities are now available. Meetings are held every Wednesday from 7.30 p.m. *Hon. Secretary:* A. B. Langfield (G3IOA), 2 Rowland Street, Manchester 10.

Affiliated Society Representatives

THE following are additions to the list of Affiliated Society Representatives published in the December 1959 issue.

Barnet & District Radio Club: c/o F. E. A. Green, 48 Borough Way, Potters Bar, Middlesex.

Bridlington & District Radio Society: H. H. Mills, c/o Mrs. Machem, 28 East Road, Bridlington, Yorkshire.

Crystal Palace & District Radio Club: G. M. C. Stone (G3FZL), 10 Liphook Crescent, London, S.E.23.

Representation

THE following is an addition to the list of Town Representatives published in the December 1959 issue.

REGION 10

MONMOUTHSHIRE—BLACKWOOD
Peter M. Fulton (GW3MMU), 36 Sunnybank Road, Blackwood.

Slow Morse Practice Transmissions

Time	Call-sign	kc/s	Town
Sundays			
09.00	G3BHS	1810	Southampton
09.30	G3HNJ / G3ESP/M	1980	Doncaster
11.00	G3GZE	1840	Blackburn
11.00	G2FXA	1900	Stockton-on-Tees
11.00	G3HZM	1860	Manchester
12.00	G3LP	1850	Cheltenham
12.00	GI5UR	1860	Belfast
20.00	G3MRA	1915	Southampton
20.30	G3HTA	1850	Exeter
Mondays			
18.30	G3NC	1825	Swindon
19.00	G3KTP	1850	Heanor, Derby
19.00	G3LMT	1850	Exeter
20.00 †	G3EWE / G3IAF	1975	Woking
20.00	G3GZE	1840	Blackburn
20.00	G3MDH	1915	Southampton
20.30	G3AGN	1875	Felixstowe
20.30	G3MXI	1910	Derby
21.30 †	G3LGK / G3MXI	1980	Ilkeston, Derbys. / West Hallam, Derbys.
Tuesdays			
17.30	G2AAM	1875	Swanwick, Derbys.
18.00	G3GZE	1840	Blackburn
18.30	G2FXA	1900	Stockton-on-Tees
20.00	G2FCI	1850	Exeter
20.00	G3IBI	1915	Southampton
20.00	G3NHR	1900	Hounslow
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.30	G3MEH	1900	Sutton, Surrey
20.30	G3NKX	1875	Loughton
21.00	G3EFA	1855	Southport
21.00	G3LSC / G3MKN / G3NUN	1875	Poole
21.15	G2CPL	1875	Felixstowe
21.45	G2UK	1875	Lowestoft
Wednesdays			
19.00 †	G3MCJ / G3FLK / G2FCI / G3HTA	1845	Exeter
19.00	G3LZC	1830	Heanor, Derby
19.00	G8RQ	1850	Chesterfield
19.45	G3KFE	1950	Stevenage
Wednesdays			
20.00	G3BHS	1915	Southampton
20.00	G3GZE	1840	Blackburn
20.00	G3INZ / G3KRR / G3LSK / G3MGH	1920	High Wycombe
20.00	G3NFV	1900	Ashstead, Surrey
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.30	G3MXI	1910	Derby
21.00 / 22.00	G3AGX	1920	Hull
21.30	G3HNJ	1980	Doncaster
22.00 †	G3LGK / G3MXI	1980	Ilkeston, Derbys. / West Hallam, Derbys.
Thursdays			
17.30	G2AAM	1981	Swanwick, Derbys.
18.30	G3NC	1825	Swindon
20.00	G3NBV	1915	Southampton
20.00	G3NHR	1900	Hounslow
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.00 †	G3EWE / G3IAF	1975	Woking
21.30	G3HMY	1850	Exeter
Fridays			
18.30	G3DMN / G3FVP	1880	Ipswich
19.00	G3JKY	1900	Beckenham
19.30	G3FUA	1850	Kilburn, Derby
19.30	G3MHR	1850	Swanwick, Derbys.
20.00	G3JQS	1915	Totton
20.00	G3NYB / G3NXZ	1980	Doncaster
20.00	G3INZ / G3KRR / G3LSK / G3MGH	1920	High Wycombe
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.30	G3ICX	1915	Sutton Coldfield
20.30	G3KGU	1915	Theydon Bois, Essex
21.30 †	G3NPO / G3KSS	1900	Bradford
22.00 †	G3LGK / G3MXI	1980	Ilkeston, Derbys. / West Hallam, Derbys.
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
20.00	G3MCL	1915	Southampton

† *Alternately*

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives. T.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Regional Representatives are requested to set out copy in the style used below.

REGION 1

Ainsdale.—Wednesdays, 8 p.m., 37 Hawthorne Grove, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel Revidge Road.
Blackpool (B. & F.A.R.S.).—Tuesdays, 8 p.m., Squires Gate Holiday Camp.
Bury (B.R.S.).—November 8 (" My first year on the air " GENNW), The George Hotel, Kay Gardens.
Chester.—Tuesdays, 8 p.m., Y.M.C.A.
Crosby (C.A.R.S.).—Tuesdays, 8.30 p.m., Colonsay, Crosby Road South, Waterloo.
Liverpool (L. & D.A.R.S.).—Tuesdays, 8 p.m., Gladstone Mission Hall, Queens Drive, Stoneycroft.
Macclesfield (M. & D.R.S.).—October 14, November 1, 15 and 29, 42 Jordangate.
Manchester (M. & D.R.S.).—November 14, Wellington Hotel, Nicholas Croft, High Street, off Market Street.
Manchester (S.M.R.C.).—Fridays, 7.30 p.m., Ladybarn House, Mauldeth Road, Fallowfield.
Morecambe (M.A.R.S.).—November 2, December 7, 125 Regent Road.
Preston (P.A.R.S.).—October 25th, November 8, 22, St. Paul's School, Pole Street.
Southport.—Thursdays, 8 p.m., The Esplanade.
Stockport (S.R.S.).—October 26, November 9 and 23, The Blossoms Hotel, Buxton Road.
Wirral (W.A.R.S.).—October 21, Y.M.C.A., Whetstone Lane, November 4 and 18, 7.45 p.m., 4 Hamilton Square, Birkenhead.

DATES FOR YOUR DIARY

October 21.—Lecture Meeting at I.E.E., London. Speaker: R. H. Hammans, G2IG.
October 21-23.—Boy Scouts' International Jamboree-on-the-Air.
November 23-26.—R.S.G.B. International Radio Hobbies Exhibition.
December 16.—Annual General Meeting at Over-Seas House, London, S.W.1.
March 24, 1961.—Lecture Meeting at I.E.E., London.
April 23, 1961.—Region 1 O.R.M. at Blackpool.

REGION 2

Scarborough (S.A.R.S.).—Thursdays, 7.30 p.m., Chapman's Yard, North Street, Scarborough.

REGION 3

Birmingham, (Bournville). — October 21 (" Modern Communication Receivers," Part 1, by G3GVA). November 4 (Recorded Lecture " Ham Radio in Antarctic "). November 18 (" Modern Communication," Part 2, 7.30 p.m., by G3GVA), Deputy Staff Lounge, Cadbury Bros., Bournville (South). October 20 (A.G.M.), November 17 (" Brains Trust "), 7 p.m., Friends Meeting House, Moseley Road, Birmingham. October 30 Mobile Rally, Alcester Area.
Stourbridge.—October 21 (Annual Dinner), Bell Hotel, Stourbridge. October 20 (Novice Class), November 4 (Lecture), 8 p.m., Brotherhood Hall, Stourbridge.
Wolverhampton.—October 17 (Juniors' Night). October 31 (Subscriber Trunk Dialling, Talk by G.P.O.), 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Derby (D. & D.A.R.S.).—October 19 (Standing Waves—Demonstration), October 26 (Single Sideband—Discussion and Demonstration by J. Anthony, G3KQF), November 2 (Open Night —Burton-on-Trent Annual Dinner), November 9 (Review of early receivers), November 16 (Stereo Demonstration at Boulton School), 7.30 p.m., Room No. 4, 119 Green Lane, Derby.
Derby (D.S.W. Exp. S.).—Thursday, 7.30 p.m., Sundays, 10.30 a.m., Nunsfield House, Boulton Lane, Alvaston, Derby.
Grimsby (A.R.S.).—October 27, November 10, 8 p.m., R.A.F.A. Headquarters, Abbey Drive West, Grimsby.
Lincoln (L.S.W.C.).—October 26 (Visit to Lincoln Power Station), November 9 (R.A.E. Class), Room No. 19, Technical College, Cathedral Street, Lincoln, 7.30 p.m.
Leicester (L.R.S.).—Mondays, 7.30 p.m. (Morse Tuition, 7.30-8.30 p.m.), Club Rooms, Old Hall Farm, Braunstone Lane, Leicester.
Melton Mowbray (A.R.C.).—October 13 (Rag Chew), 7.30 p.m., G8CZ, 125 Thorpe Road, Melton Mowbray.
Newark (Magnus G.S.R.C.).—Tuesday evenings and Friday afternoons in Junior Physics Lab.
Newark (N. & D.A.R.S.).—November 1 (Sale of Surplus Items), 7.15 p.m., Northgate House, Newark.
Nottingham (A.R.C.).—Thursday evenings reserved for R.A.E. Classes by T. R. Alan Davies (G3LXL), October 18 (Open Night for R.S.G.B. Members), October 25 (proposed talk by G3JWQ on Panoramic Adaptor), November 1, 8 (Open Nights), November 15 (R.S.G.B. Members night), 7.30 p.m., Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham.
Peterborough (A.R.C.).—November 4 (Single Sideband Operation), 7.30 p.m., Peterborough Technical College.
Retford & Worksop (N.N.R.C.).—Thursday evenings, 8 p.m., Club Room, Victoria Hall, Eastgate, Worksop, Notts.
Stamford (R.S.G.B. Group).—No programme received.

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street.
High Wycombe (C.A.R.C.).—October 27, 8 p.m., British Legion Hall, St. Mary Street, High Wycombe.
Stroud.—Wednesdays, 8 p.m., Subscription Rooms, Stroud.

REGION 7

Acton, Brentford and Chiswick.—October 18 (" Recorded Lecture "), 7.30 p.m., A.E.U. Rooms, 66 High Road, Chiswick.
Barnet.—October 25, 7.30 p.m., Red Lion Hotel, Barnet.
Bexleyheath (N.K.R.S.).—October 27, November 10, 8 p.m., Congregational Hall, Bexleyheath (nr. Clock Tower).
Croydon (S.R.C.C.).—November 8, 7.30 p.m., Blacksmiths Arms," South End Croydon.
Dorking (D. & D.R.S.).—Second and fourth Tuesday in each month, 8 p.m., Star and Garter Hotel, Dorking.
Ealing.—Sundays, 11 a.m., A.B.C. Restaurant, Ealing Broadway, W.5.
East Molesey (T.V.A.R.T.S.).—November 2 (Carnarvon Trophy), Carnarvon Castle Hotel, Hampton Court.
Enfield and District.—October 27 (" Annual Exhibition of Home Constructed Equipment), 7.30 p.m., George Spicer School, Southbury Road, Enfield.
Guildford (G. & D.R.S.).—Fourth Friday in each month, 7.30 p.m., " The Cannon," Portsmouth Road, Guildford.
Harlow and District.—Thursdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow.
Holloway (G.R.S.).—Mondays, Tuesdays and Wednesdays (R.A.E. and Morse), Fridays (Club), Montem School, Hornsey Road, London, N.7.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (near Seven Kings Station).
Kingston.—Lectures alternate Thursdays, Theory and Morse classes weekly, 7.45 p.m., Y.M.C.A., Eden Street, Kingston (Morse at 2 Sunray Avenue, Tolworth).
Mitcham (M. & D.R.S.).—October 21 (Description of the DX100 by G3NFV), November 4 (Junk Sale), November 18 (Lecture/Demonstration by Collins Radio Co.), 8 p.m., " The Cannons," Madeira Road, Mitcham.
New Cross (C.A.R.S.).—Fridays, 7.30 p.m., Sundays, 11.30 a.m. (Audio Section last Tuesday in each month), 7.30 p.m., 225 New Cross Road, London, S.E.14.
Norwood and South London (C.P. & D.R.C.).—November 19 (Communications and the East African Safari. M. G. Pavely, VQ4CW/G3GWD), November 29 (Morse Class). Windermere House Annex, Westow Street, Crystal Palace, 8 p.m.
Purley (P. & D. R.C.).—October 21 (Junk Sale) 8 p.m., Railwaymen's Hall, Whytecliffe Road Purley.
Romford (R. & D.R.S.).—Tuesdays, 8.15 p.m., R.A.F.A. House, 18 Carlton Road, Romford.
Southgate, Finchley and District.—November 10 (G6QM Trophy Award), 7.30 p.m., Arnos School, Wilmer Way, London, N.14.
South Kensington (C.S.R.S.).—November 1 (" The Beginning of Radar " by A. P. Wilkins of Radio Research Station), 6 p.m., Science Museum, South Kensington.

REGION 8

Crawley (C. A. R.C.).—October 27 (" Transistor Power Supplies and Modulators " by G3NVB), November 10 (Informal), 8 p.m., " The Brewery Shades," Crawley High Street.
Tunbridge Wells (W.K.A.R.S.).—October 28 (Discussion on Receivers, opened by R. Trevitt), November 11 (" Getting Going on Two Metres," by W. H. Allen, M.B.E., G2UJ), November 25 (Talk on s.s.b.), 7.15 p.m., Culverden House, Culverden Park Road, St. John's, Tunbridge Wells.

REGION 9

Bath.—October 17, 7.30 p.m., Committee Room, Bath Technical College.
Bideford.—First Thursday in each month, 7.30 p.m., alternatively at G2FKO (T. G. Ward), 38 Clovelly Road ('Phone Bideford 964) and G3BO (D. H. Jones), Rosebank, Westcombe ('Phone Bideford 550).
Bristol.—October 21 (" TV and Radio Line Distribution Systems " by J. H. A. Newth, G3EJN), 7.15 p.m., Carwardines Restaurant, Baldwin Street, Bristol 1.
Exeter.—Second Thursday in month, 8 p.m., Y.M.C.A., St. David's Hill, Exeter.
Falmouth.—First Wednesday in each month, Y.M.C.A., Falmouth.
Torquay.—October 8 (Practical Applications of D.F., Part 2 by E. J. Hayman, G3ABU), 7.30 p.m., Y.M.C.A., The Castle, Torquay.
Weston-super-Mare.—Second Wednesday in each month, 7.15 p.m., Technical College, Lower Church Road, Weston-super-Mare.
Yeovil (Y.A.R.C.).—Wednesdays, 7.30 p.m., Grove House, Preston Road, Yeovil.

REGION 10

Cardiff.—November 14 (Film Show), 7.30 p.m., Sgt's. Mess, T.A. Centre, Park Street, Cardiff.
Penarth.—October 24 (Impromptu Draw and Talk), November 28 (" More about the Electricity Supply Industry " by GW2BBO), 7.30 p.m., R.A.F.A. Club, Windsor Road, Penarth.

REGION 11

Prestatyn (F.R.S.).—November 7 (Film Show), 7.30 p.m., Ffrith Hotel, Ffrith, Prestatyn.

REGION 12

Aberdeen (A.A.R.S.).—October 21 (Sale of Radio Equipment), October 28 (Fifteen Metre " Fever " by GM3NOV), November 4 (A.G.M.), November 11 (Activity Review), November 18 (Presidential Address), 7.30 p.m., 6 Blenheim Lane, Aberdeen.

REGION 14

Glasgow.—Second Friday in each month, 7.30 p.m., Woodside Halls, Clarendon Street, N.W. (near St. George's Cross Underground).
Prestwick.—Third Sunday in each month, 7.15 p.m., Royal Hotel, Prestwick.

REGION 17

Portsmouth.—Tuesdays, 7.30 p.m., Scarrs, 183A Albert Road, Portsmouth.
Southampton.—First Saturday in each month, 7 p.m., Prospect House (back of Gas Board showrooms), Above Bar.

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OZ4GT	5/0	6AK5	8/0	6L1	23/3	9D2	4/0	19AQ5	10/6	83	15/9	DL96	8/6	EF41	9/0	HVR2A	6/0	PCL84	12/6	U16	10/0	UL41	9/0
1A5	6/0	6AL5	4/0	6L6G	8/0	10C1	13/0	19H1	10/0	85A2	15/0	DL810	10/6	EF42	10/6	KF35	8/6	PEN25	4/6	U18/20	8/6	UL44	26/6
1A7GT	12/0	6AM6	4/6	6L7GT	7/6	10C2	26/6	20D1	15/3	150B2	15/0	DM70	7/6	EF50(A)	7/0	K1.35	8/6	PEN45	19/6	U19	36/0	UL46	14/6
1C5	12/6	6AQ5	7/6	6L18	13/0	10F1	26/6	20F2	26/6	185BT	33/2	EA50	2/0	EF50(E)	5/0	KT2	5/0	PEN46	7/6	U22	8/0	UL84	8/6
1D5	9/0	6AT6	7/0	6N7	8/0	10P13	15/0	20L1	26/6	807	7/6	EA76	9/6	EF54	5/0	KT33C	10/0	PL33	19/3	U25	17/11	UY21	13/11
1D6	10/6	6AU6	10/0	6P28	26/6	11E3	15/0	20P1	26/6	956	3/0	EABC80	9/0	EF73	10/6	KT36	29/10	PL36	12/0	U26	10/0	UY41	7/6
1G6	17/6	6B8G	4/6	6Q7G	6/6	12A6	5/0	20P3	23/3	4035L	12/6	EAC91	4/6	EF80	7/0	KT41	12/6	PL38	26/6	U31	9/6	UY85	7/0
1H5GT	10/6	6BA6	7/6	6R7G	10/0	12AC6	15/3	20P4	26/6	5768	12/6	EAF42	9/0	EF85	7/0	KT44	12/6	PL81	10/6	U33	26/6	VP2	12/6
1L4	4/6	6BE6	6/0	6SA7GT	8/6	12AD6	17/3	20P5	23/3	7193	5/0	EB34	2/6	EF86	10/6	KT63	7/0	PL82	7/6	U35	26/6	VP4	15/0
1LD5	5/0	6BG6G	23/3	6SC7	7/6	12AE6	13/11	25A6G	10/6	7475	7/6	EB41	8/6	EF89	9/0	KT66	15/0	PL83	9/0	U37	26/6	VP13C	7/0
1LN5	5/0	6BH6	8/0	6SG7GT	8/0	12AH7	8/0	25L6	10/-	9002	5/6	EB91	4/0	EF91	4/6	KTW61	6/6	PL84	12/8	U45	9/0	VP23	6/6
1N5GT	10/6	6BJ6	6/0	6SH7	8/0	12AH8	12/6	25Y5	10/0	9006	6/0	EBC33	5/0	EF92	4/6	KTW62	7/6	PX4	10/6	U50	6/6	VP41	6/0
1R5	6/6	6BQ7A	15/0	6SJ7	8/0	12AT6	7/6	25Y5G	10/0	AC6PEN	7/6	EBC41	8/6	EK32	8/6	KTW63	6/6	PY31	16/7	U52	6/6	VR105	8/0
1S4	9/0	6BR7	15/0	6SK7GT	6/0	12AT7	6/0	25Z4G	9/6	ATP4	5/0	EBF80	9/0	EL32	5/0	KTZ41	8/0	PY32	11/6	U76	6/0	VR150	7/6
1S5	6/0	6BW6	8/6	6SL7GT	6/6	12AU7	6/6	25Z5	9/6	AZ31	10/0	EBF89	9/6	EL33	12/6	KTZ63	7/6	PY80	7/6	U78	5/0	VT61A	5/0
1T4	4/6	6BW7	7/0	6SN7GT	5/6	12AX7	7/6	25Z6G	10/0	B36	15/0	EC62	5/6	EL38	26/6	L63	8/0	PY81	8/6	U251	14/0	VT501	5/0
1U5	6/0	6C4	5/0	6SQ7GT	9/0	12BA6	8/0	27SU	19/11	BL63	7/6	EC64	6/0	EL41	9/0	MHD4	12/6	PY82	7/0	U403	16/7	W76	5/6
2X2	4/6	6C5G	6/6	6SS7	8/0	12BE6	9/0	28D7	7/0	CCH35	23/3	EC70	12/6	EL42	10/6	MHL4	7/6	PY83	8/6	U404	8/6	W81M	6/0
3A4	6/9	6C6	6/6	6U4GT	12/6	12BH7	21/3	30C1	8/0	CK506	6/6	ECC32	5/6	EL81	12/6	MHLD6	12/6	PZ30	19/11	U801	29/10	X24M	24/7
3A5	10/6	6CD6G	36/6	6U5G	7/6	12E1	30/0	30F5	7/0	CV62	16/6	ECC33	8/6	EL84	7/6	QP21	7/0	UABC80	9/0	X61(C)	12/6		
3B7	12/6	6CH6	9/0	6U7G	8/6	12J5GT	4/6	30FL1	10/0	CV428	30/0	ECC34	24/7	EL91	5/0	ML4	8/6	QP25	14/6	UAF42	9/6	X65	12/6
3D6	5/0	6D6	6/6	6V6G	7/0	12J7GT	9/6	30L1	8/0	D77	4/0	ECC35	8/6	EL95	10/6	MU14	8/0	QS150/15		UB41	12/0	X66	12/6
3Q4	7/6	6K5	12/6	6X4	5/0	12K5	17/11	30P12	7/6	DAC32	10/6	ECC40	23/3	EM34	9/6	N37	19/11		10/6	UBC41	8/6	X76(M)	14/0
3Q5GT	9/6	6F1	28/6	6X5GT	6/0	12K7GT	5/6	30PL1	11/6	DAF91	6/0	ECC81	6/0	EM80	9/0	N78	19/11	R12	9/0	UBF80	9/0	X78	21/8
3S4	7/0	6F6G	7/0	6/30L2	10/0	12K8	14/0	30PL13	12/6	DAF96	8/6	ECC82	6/6	EM81	9/0	N339	15/0	RG1-240A		UBF89	9/6	X79	21/8
3V4	7/6	6F12	4/6	7B7	8/6	12Q7GT	5/0	33A/158M		DF66	15/0	ECC83	7/6	EN31	37/0	P61	3/6		45/0	UCC85	9/0	XD(1.5)	6/6
5R4GY	17/6	6F13	11/6	7C5	8/0	12SA7	8/6		30/0	DF70	15/0	ECC84	9/0	EY51	9/0	P220	10/6	RK34	7/6	UCH42	9/6	XFG1	18/0
5U4G	6/6	6G6	6/6	7C6	8/0	12SC7	8/6	35A5	21/3	DF91	4/6	ECC85	8/6	EY86	9/0	PCC84	8/0	S130	15/0	UCH81	9/6	XFY12	9/6
5V4G	10/0	6H6GT	3/0	7D6	10/6	12SG7	7/0	35L6GT	9/6	DF96	8/6	ECC88	18/0	EZ35	6/0	PCC85	9/6	SP4(7)	14/6	UCL82	11/6	XFY34	17/6
5Y3GT	6/6	6J5G	5/0	7H7	8/0	12SH7	8/6	35W4	7/6	DH63(C)	6/6	ECF80	10/6	EZ40	7/0	PCC88	18/0	SP41	3/6	UCL83	19/3	XH(1.5)	6/6
5Z3	12/6	6J6	5/6	7R7	12/6	12SJ7	8/6	35Z3	10/6	DH76	5/0	ECF82	10/6	EZ41	7/0	PCC89	11/6	SP42	12/6	UF41	9/0	Y63	7/6
5Z4G	9/0	6J7G	6/0	787	9/6	12SK7	6/0	35Z4GT	6/0	DH77	7/0	ECH35	6/6	EZ80	7/0	PCF80	8/0	SP61	3/6	UF42	12/6	Z63	7/6
6A7	10/6	6K7G	5/0	7V7	8/6	12SQ7	11/6	35Z5GT	9/0	DK40	21/3	ECH42	9/0	EZ81	7/0	PCF82	10/6	SU25	26/6	UF80	10/6	Z66	17/6
6A8G	9/0	6K8G	6/6	7Y4	7/6	12SR7	8/6	41MTL	8/0	DK91	6/6	ECH81	9/0	FW4/800	8/6	PCF86	15/0	T41	23/3	UF85	9/0	Z77	4/6
								43	10/0	DK92	9/0	ECL80	9/0	GZ30	9/0								
								50C5	10/0	DK96	8/6	ECL82	10/6	GZ32	10/0								
								50L6GT	9/6	DL33	9/6	EF22	14/0	GZ34	14/0								
								72	4/6	DL66	17/6	EF36	4/6	H63	12/6								
								77	8/0	DL68	15/0	EF37A	8/0	HL2	7/6								

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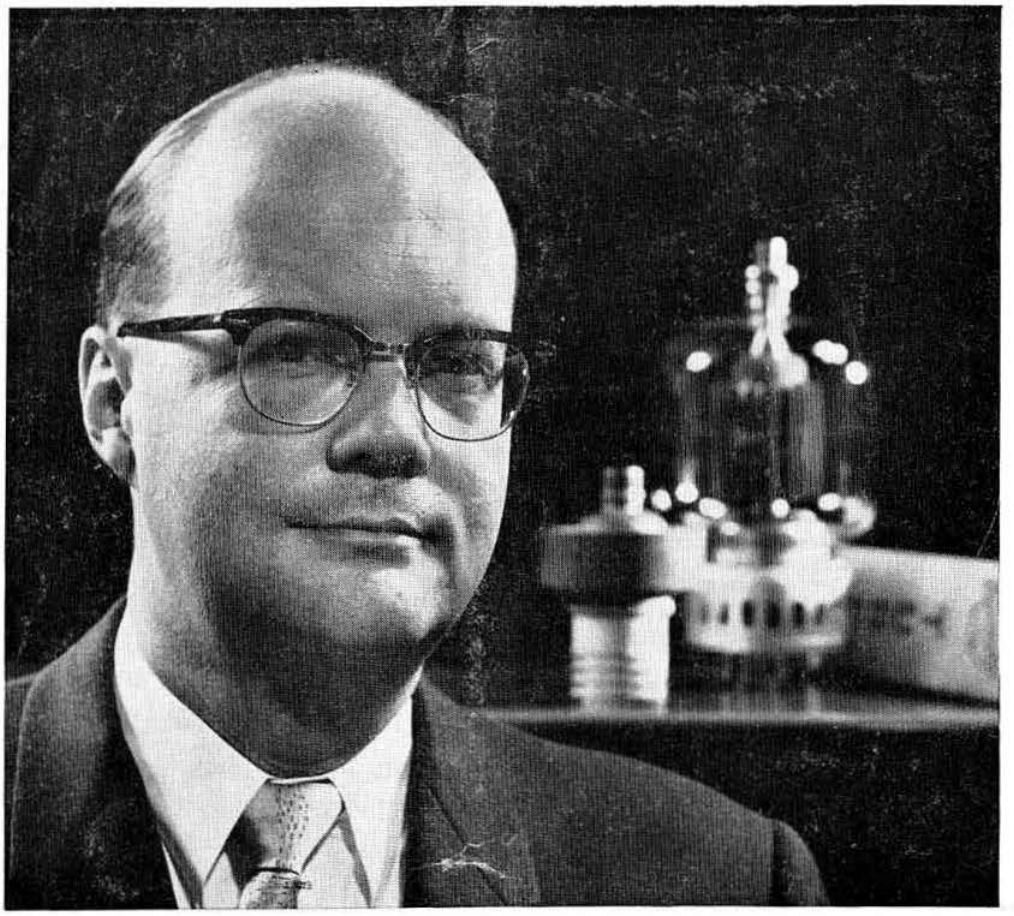

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