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## INDEX TO ADVERTISERS



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The SHORT WAVE Magazine

## EDITORIAL

**Geneva** *It cannot be said that the immediate results of the Geneva Conference are anything less than highly satisfactory from the Amateur Radio point of view. The details as they affect the amateur bands are set out on pp. 541-542 of this issue and are extracted from the official documents — which are heavy and compendious — promulgated by the International Telecommunications Union at the conclusion of the Conference.*

*It is also fair to say that the amateur representation — arranged by several countries — at the Conference was able to ensure that the Amateur Service received proper consideration in the course of the extremely difficult and tedious negotiations which had to be gone through before majority decisions could be obtained. Fortunately for us, the fact that licensed radio amateurs, in global total, comprise a far larger service than any other could not be overlooked by any delegation, however antagonistic it might be to the concept of the Amateur Service.*

*On the debit side, the loss of 50 kc off the 40-metre band (in the European Region) is a disappointment, but even more so is the fact that no really satisfactory agreement was reached on keeping absolutely clear the 100 kc (7000-7100 kc) we have got, though it is shown in the official record as an exclusive allocation.*

*Moreover, due to the pressures exerted at the Conference, it has been decided to re-survey the whole frequency area 4.0-27.5 mc; this is to be done by an I.T.U. body which is to report next year, after which an expert " Committee of Seven " is to be appointed to make firm recommendations for what could amount to a re-casting of the whole 4.0-27.5 mc allocation. To this extent, therefore, the present settlement may only be a temporary one (depending upon the recommendations of this Committee) and there could conceivably be another Administrative Conference within the next five years.*

*Needless to say, most of the difficulties in the 4.0-27.5 mc frequency area arise by reason of the aspirations of the " new nations " to make themselves heard through the medium of short-wave broadcasting. Once again, we see that this is the real menace not only to Amateur Radio but also to the orderly development of all long-range radio communication systems.*

Austin Forbes G6FO.

# Noise Silencing in Communication Receivers

## SUPPRESSION ON THE IF CHANNEL

**J. B. DANCE, M.Sc.**

*This article is a comprehensive survey of the general problem of noise, and our contributor shows that having decided what are the characteristics of the noise to be suppressed or limited, it is possible to build into the receiver circuits capable of giving a high degree of suppression. One of the arrangements recommended here is entirely original, and is claimed to give excellent results against peak noise.—Editor.*

THE noise present in radio receivers may be divided into two main categories.[1] These are a steady hiss (also known as "sharsh," "mush" or "white noise") due to thermal agitation of the electrons in the aerial or in the early stages of the receiver, and pulse noise which consists of separate bursts of noise of high amplitude but of very short duration (usually less than a microsecond at the aerial). The effects of the steady hiss type of noise can be reduced by the use of a good aerial, a low-noise RF unit and the narrow bandwidth usually employed in communications receivers —but this really lies outside the scope of the present discussion.

Pulse noise can be treated theoretically by operational calculus methods in which each pulse is approximated to two successive Heaviside unit functions. In actual practice pulse noise is usually reduced by the use of noise limiters which cut down the amplitude of the pulses to a little above the level of the signal, and noise silencers which silence or vastly reduce the gain of the receiver during the noise pulse. The operation of either type of circuit is dependent upon the amplitude of the noise pulses being greater than the signal amplitude at the input to the noise reducing circuit; these circuits will therefore only reduce pulse noise, other types of noise being unaffected.

Noise which does not fall clearly into one of the two categories mentioned above is the most difficult to treat theoretically—and the most difficult to eliminate in practice!

Noise pulses are greatly prolonged by shock excitation of high selectivity circuits[2] including crystal filters resulting in damped oscillation ("ringing"). In low selectivity low-Q circuits the damping will be much greater and the total length of the oscillation less than in high selectivity circuits. Optimum results can therefore be obtained only if a noise limiter or silencer is placed at a point in the receiver such that the noise peaks will be reduced before they reach any high selectivity tuned circuits. The duration of a typical noise pulse which has passed through a receiver depends only on the bandwidth of the receiver. There is not so much difference between the performance of silencing and limiting circuits as might be expected, but the *position* of these circuits in a receiver is vitally important. Audio noise limiters are very useful for reducing noise pulses coming from both natural static and from man-made sources, but their efficiency is low because the noise pulses are greatly prolonged by the preceding high selectivity tuned circuits. Nevertheless, audio limiters are used in most commercial communications receivers because of their simplicity. There is no reason, however, why the amateur constructor should not make circuits for his receiver which give the best possible results, as equipment which is so constructed is not subject to the severe economic restrictions which affect commercial receiver production.

It can be shown by mathematical analysis that noise pulses which are of short duration must cover a fairly wide frequency range. Noise components on most of these frequencies are greatly reduced in amplitude when the pulses pass through high selectivity circuits. The amplitude of the pulses as a whole is therefore reduced but their capability for producing sound is not in any way reduced because the pulses are prolonged in time. After passing through the receiver IF stages the noise pulses may be below the signal level whilst the same noise pulses may have been well above the signal level at an earlier stage in the receiver where the bandwidth is still wide. In such a case the signal-to-noise ratio could be improved by placing a silencing circuit early in the receiver, before the high selectivity circuits, but an audio noise limiter or silencer could give no improvement whatsoever because in the audio section of the receiver the noise pulses are below the signal level. The improvement obtained by using a silencer or limiter early in the receiver instead of an audio limiter can be shown to be proportional to the ratio of the width of the pass band at the point where the silencer is inserted to the width of the pass band

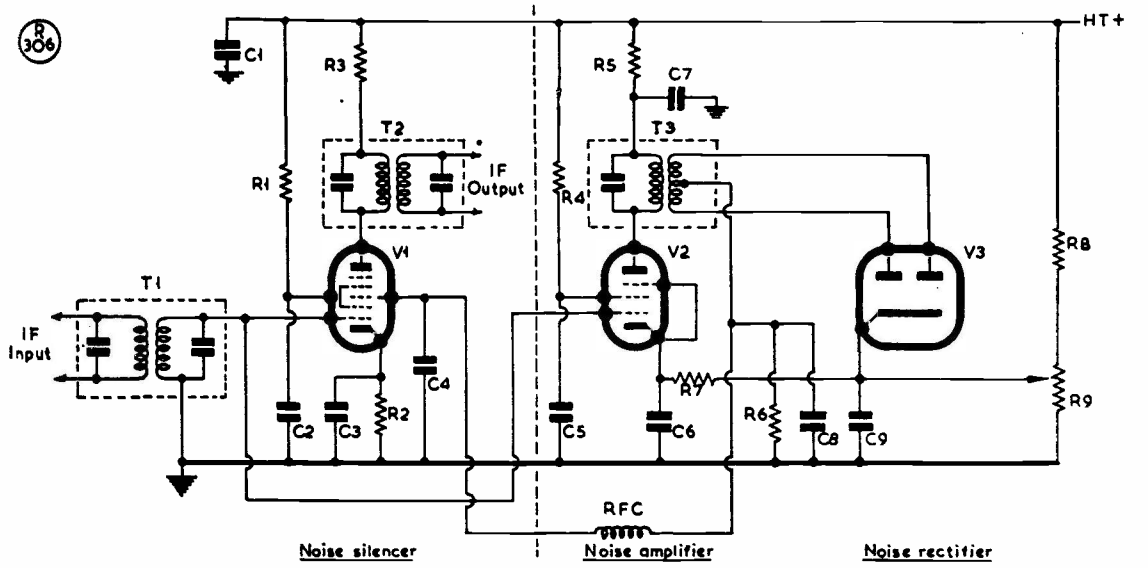


**Fig. 1. The Lamb noise silencing circuit, described in " QST " more than 20 years ago, and still used. It was the first constructive attempt to overcome noise in superheterodyne receivers. In building up this circuit, the decoupling capacities should be as normally used for the IF involved ; for C8, the capacity should be the minimum which will prevent self-oscillation. T3 has its primary tuned to IF, with a centre-tapped secondary, untuned.**

up to the audio limiter.[2] So much for the general theory.

## Lamb Circuit

As long ago as 1936 an IF noise silencing circuit was used by Lamb[3] [4] [5] [6] [7] which overcomes some of the objections associated with audio limiters. In the Lamb circuit (shown in Fig. 1) the IF signal from the receiver is taken off into a separate noise channel and is amplified by V2 in a normal IF stage. A sharp cut off pentode should be used for V2. When the amplitude of a particular noise pulse is great enough to drive one anode of V3 positive with respect to its cathode, the noise pulse is detected. The detector output is a pulse negative with respect to earth and this is applied to the third grid of the 6L7 valve (V1) which is in the main receiver IF chain. The negative pulse silences the receiver during the noise signal and, as the latter is very short, the period of silence cannot be detected in the output. The biasing of the diodes and the gain of the amplifier is set by the threshold control, R9. For optimum results it is essential that the threshold control be accurately adjustable for each individual signal ; it must therefore be on the receiver front panel. The 6L7 with a metal envelope is an especially suitable valve for the noise silencing stage because the very small capacitance between the top cap signal grid and the anode (·001 $\mu\mu$F, max.) results in virtually no output being obtained when the third grid is biased to cut off. The nearest miniature equivalent of the 6L7 is the noval based single ended 6BE6, but the signal grid to anode capacitance of this valve is much greater than that of the 6L7.

A similar circuit to the Lamb silencer using the 6BE6 has been published.[8] A high value of cathode resistor is used to bias the 6L7 so that the negative voltage required to silence the receiver is fairly small. A fairly low screen voltage should also be used.[5] Transformers in the noise channel should not have a very high Q and the coupling may be somewhat greater than critical ; the noise pulse is then kept short.

The noise silencing valve should be placed early in the IF stages of the receiver so that the noise pulses are reduced before they meet any high selectivity circuits. It is also impor-

### Table of Values

**Fig. 1. The Lamb Noise Silencing Circuit**

| | | | |
|---|---|---|---|
| C1, C2, C3, C5, C6, C7, | | R7 | = 330 ohms |
| | | R8 | = 33,000 ohms, 2w. |
| | | R9 | = 5,000 ohms, var. |
| C9 | = .01-0.1 $\mu$F, *see text* | RFC | = 20 mH RF choke |
| | | V1 | = 6L7 IF amp. |
| C4 | = 47 $\mu\mu$F | V2 | = 6J7 noise amp. |
| C8 | = 0-250 $\mu\mu$F, *see text* | V3 | = 6H6 (or 6AL5) noise detector |
| R1, R6 | = 100,000 ohms | T1, T2 | = Normal IF xformers |
| R2, R3, | | | |
| R5 | = 2,000 ohms | T3 | = Pri. tuned to IF, untuned CT sec. |
| R4 | = 10,000 ohms | | |

tant, however, that adequate gain is obtained before the silencing circuit so that the silencing pulse is of sufficient amplitude effectively to silence the receiver. Lamb[5] has suggested that the 6L7 silencing valve should be the first IF amplifier of the receiver. This is satisfactory with intermediate frequencies of the order of 465 kc, but with a single RF stage and a high IF better results have been obtained when the 6L7 has been made the second IF amplifier. In a large double superheterodyne two noise amplifiers may be required and some attenuation of the signal immediately before the second frequency changer might be desirable. Very poor results are obtained if a noise silencer is used at a high signal level, as the noise pulses then leak through the silencing stage; this is, however, rather unlikely to happen in a well designed receiver.

It is most important that regeneration should be avoided in a silencing circuit because it would prolong the noise pulses and prevent effective silencing. The circuit has a tendency to become unstable because the signal in the noise channel is greatly amplified and, after passing through a filter of low time constant, is applied to the same stage as that from which it was originally taken. The difficulty of avoiding regeneration when the noise amplifier is operating at high gain has often caused people to resort to audio limiters. Full wave detection is a necessity in the Lamb silencer, not only for combating unsymmetrical noise, but also so that the fundamental IF voltage in the noise detector output is minimized, as this would cause instability. When a weak signal is being received and the gain of the noise amplifier is steadily increased, the output of the receiver should remain constant at first and then decrease rapidly to zero because the signal itself is being rectified by the noise detector. If, however, the output remains constant and then increases a little before decreasing, regeneration is taking place. As the threshold control is advanced regeneration may be detected in the absence of a signal by an increase in the background noise instead of a decrease at the threshold point. (The receiver layout would have to be very poor for the amount of regeneration to be great enough to cause actual oscillation.)

Some form of simple filter to remove the IF is required between the output of the noise detector and the third grid of the 6L7, but this circuit must have a very " quick " response for effective silencing at the commencement of the noise pulse. The filter in the Lamb circuit, consisting of a 20 mH choke and two condensers, was not found by the writer to be particularly effective in preventing regeneration when a high gain noise amplifier was used in a double superheterodyne receiver, although it was satisfactory when the gain required was low. The capacitors must be kept as small as possible in order to keep the time constant low.

All instability troubles immediately disappeared, however, when a parallel tuned circuit resonant at the 1·6 mc first IF was placed between the noise rectifier output and

**Table of Values**

Fig. 2. An IF Noise Silencer using —HT

| | | | |
|---|---|---|---|
| C1 | = 0.1 $\mu$F | R5 | = 10,000 ohms, var. preset |
| C2, C4 | = 47 $\mu\mu$F | R6 | = 10,000 ohms |
| C3, L1 | = Resonate at IF | Rv | = Var. gain control |
| R1, R2 | = 100,000 ohms | T1 | = IF xformer |
| R3 | = 68,000 ohms | V1 | = 6H6 (or 6AL5) |
| R4 | = 270,000 ohms | V2 | = EF91 |

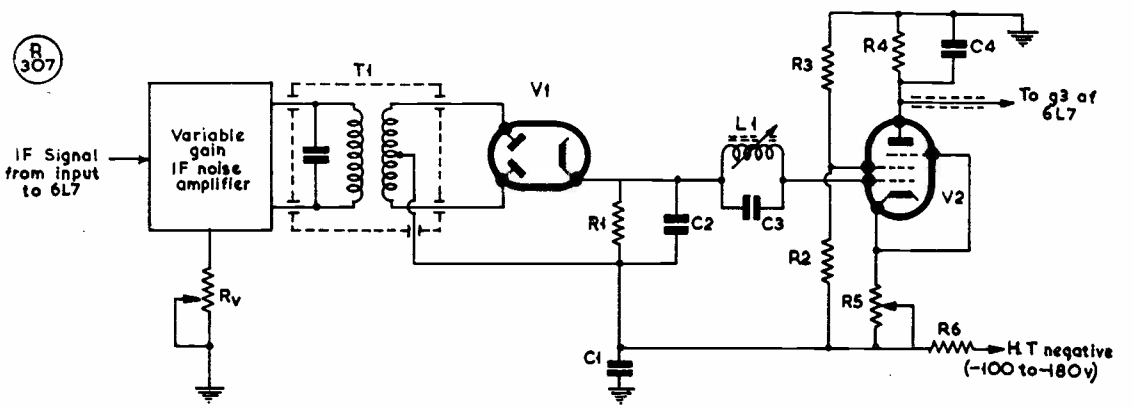


Fig. 2. This is an IF noise-silencing circuit using a negative HT supply, and has been developed by the author of the article. L1 C3, is a tuned circuit resonating at the IF used. An improved arrangement is shown in Fig. 3.

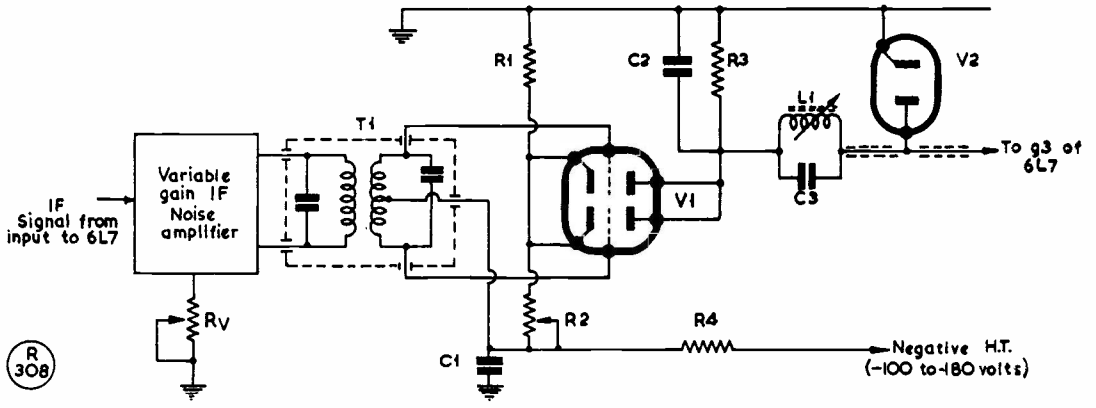


**Fig. 3. In this circuit for IF noise-silencing, a double-triode is used, with a negative HT supply, as in Fig. 2. Again, the tuned circuit L1, C3 resonates at IF. This circuit is an original design by the author, and is claimed to give exceptional results on pulse noise.**

the third grid of the 6L7. The 20 mH choke was not used in addition to the parallel tuned circuit. A series tuned acceptor circuit connected from the rectifier output to earth also removed all traces of instability. Both series and parallel tuned circuits could be used in a very difficult case. High-Q resonant circuits are neither necessary nor desirable for this purpose, as the pulse length must be kept short. A fairly high value of inductance should be used in the parallel rejector circuit in order to obtain maximum IF rejection. Lamb[3] found that resonant filter circuits caused instability, but in the writer's experience this has never occurred except when the rejector circuit has been slightly off tune. A short length of co-ax was used to carry the silencing pulse to the 6L7 and the 47 $\mu\mu$F condenser, C4 of Fig. 1, was not found to be necessary. The transformer T3 must have a centre tapped secondary ; the inductance of this winding can be somewhat greater than that of the tuned primary, in order to obtain maximum gain. The windings should be closely coupled by placing them about $\frac{1}{4}$-in. apart on the former.

### Other Silencing Circuits

A silencing circuit similar to the Lamb circuit has been constructed in which the polarity of the rectified noise output from the double-diode was made positive. These positive pulses were passed through an IF rejector circuit and fed into an EF91 amplifier which was operating from a negative HT supply as shown in Fig. 2. The amplified pulses (now negative) were used to silence the receiver by the same means as in the Lamb circuit. The EF91 should be biased to cut off or nearly so. The advantage of this circuit is that the amplitude of the silencing pulse is not so severely limited by the over-loading of the noise amplifier as it is in the Lamb arrangement. Whilst quite good results have been obtained with the circuit of Fig. 2, the silencing action was nevertheless somewhat inferior to that obtained with the simpler circuit of Fig. 3 ; this is probably because the circuit of Fig. 2 prolonged the pulses somewhat ; it will not therefore be discussed in any further detail here.

### Table of Values

Fig. 3. Noise Silencer using double-triode with —HT

| | | | |
|---|---|---|---|
| C1 | = 0.1 $\mu$F | R4 | = 10,000 ohms |
| C2 | = 47 $\mu\mu$F | Rv | = Var. gain control |
| C3, L1 | = Resonate at IF | T1 | = IF xformer |
| R1 | = 56,000 ohms, 1w. | V1 | = 12AX7 (or ECC83) |
| R2 | = 5,000 ohms, var. preset | V2 | = Half 6AL5 (or 6H6) |
| R3 | = 100,000 ohms | | |

The circuit shown in Fig. 3 is another alternative to the Lamb silencer ; it has the advantage that it possesses a sharper threshold level and gives a somewhat better silencing action on both static and artificial noise. It is particularly effective on large peaks, as silencing voltages of about 150v. are easily obtained whilst the maximum silencing voltage from the Lamb circuit is limited by the overloading of the noise amplifier. The variable gain noise amplifier shown in block form in Fig. 3 is an ordinary IF amplifier similar to that used in the Lamb silencer, with a 6L7 in the IF chain, as in the Lamb version. The 12AX7 double triode is fed from a negative HT supply and may be biased to cut off when no signal is present on either of its grids ; more effective silencing is obtained, however, if a current of about ten microamps passes through R3 under

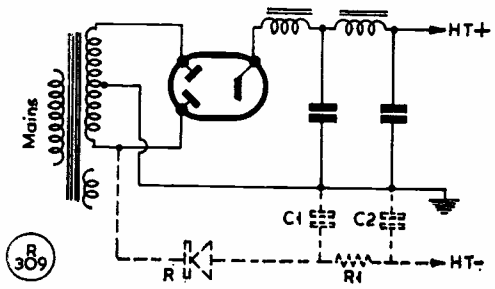


Fig. 4. The items shown dotted will enable a negative HT supply to be obtained from a normal power pack — values are: C1, C2, 8 μF; R1, 10,000 ohms, smoothing resistor. The rectifier R can be a small metal type or a miniature rectifier valve such as the 6X4.

no-signal conditions, giving a permanent bias of about one volt to the third grid of the 6L7 in addition to the bias appearing across the cathode resistor of that valve. The biasing of the 12AX7 is controlled by R2 which is a preset variable resistor. A potential divider, R1 and R2, has to be used, as dropping resistors are useless when the valve is at cut off. The two triode grids operate in push-pull for the same reason that full-wave rectification is used in the Lamb silencer. Any noise pulse will be positive on one of the two grids and current will pass through this half of the valve *via* R3. The negative voltage at the anode is applied to the third grid of the 6L7 to silence the receiver *via* the parallel resonant circuit L1,C3 which rejects the IF and prevents regeneration. The IF transformer feeding the 12AX7 should have a coupling coefficient slightly greater than critical and the secondary may be tuned by the use of a condenser if desired in order to obtain more gain. The purpose of the diode (V2 in Fig. 3) is to prevent positive overshoots from being applied to the 6L7 third grid.

When a condenser was connected from the 12AX7 cathodes to earth, the silencing was found to be much less effective. The resistors R1 and R2 in the potential divider should be made fairly low so that the cathode potential does not vary much when a noise pulse is applied to the valve; degeneration due to the absence of a cathode decoupling condenser is then quite small.

The method of obtaining a negative HT supply shown in Fig. 4 is quite satisfactory, as the current required is only a few milliamps. The receiver mains transformer is utilised and the only additional components required are a half-wave rectifier, two smoothing capacities and a smoothing resistor. It is important that the negative voltage should not be high enough to cause the cathode-to-heater voltage rating of the 12AX7 (180 volts) to be exceeded; the smoothing resistor should be increased if necessary to reduce the output voltage. Other uses can be found for a negative HT supply, *e.g.* for obtaining amplified A.G.C.[9] and possibly for other gain control devices.

In a receiver in which the negative HT supply was also used to obtain amplified AGC, it was found possible to make the AGC control the noise threshold so that it followed variations in the signal strength almost exactly and enabled the silencer to be used on fading signals. The AGC was applied to the valves in the noise channel as well as those in the main receiver. Nevertheless it is still desirable that the noise amplifier gain control should be brought out to the front panel so that it can be adjusted very accurately for each individual signal.

**Results**

The circuits described are only intended to reduce noise and not necessarily to eliminate it completely, but the performance of any noise silencing circuit depends very much on the type of noise. When the noise present is very peaky, the results obtained are really quite amazing, but if long pulses of fairly low amplitude are present, the circuit may be almost completely ineffective. Interference caused by electric fences, local factories, car ignition systems and natural static may be almost completely eliminated. In some cases a completely unintelligible signal is made intelligible, and in other cases, *e.g.* interference from electric fences or static, listening to the signal is made very much easier.

Interference from electric motors is not easy to eliminate because it does not fall completely into the category of impulse noise. Nevertheless a combination of a noise silencer followed by high selectivity can be of great assistance in reducing this type of noise. It is often possible

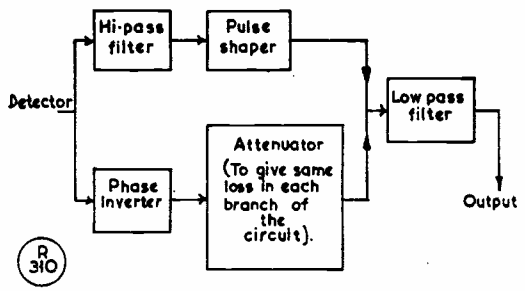


Fig. 5. Block diagram illustrating the action of the Rogers noise silencing circuit — see text for discussion.

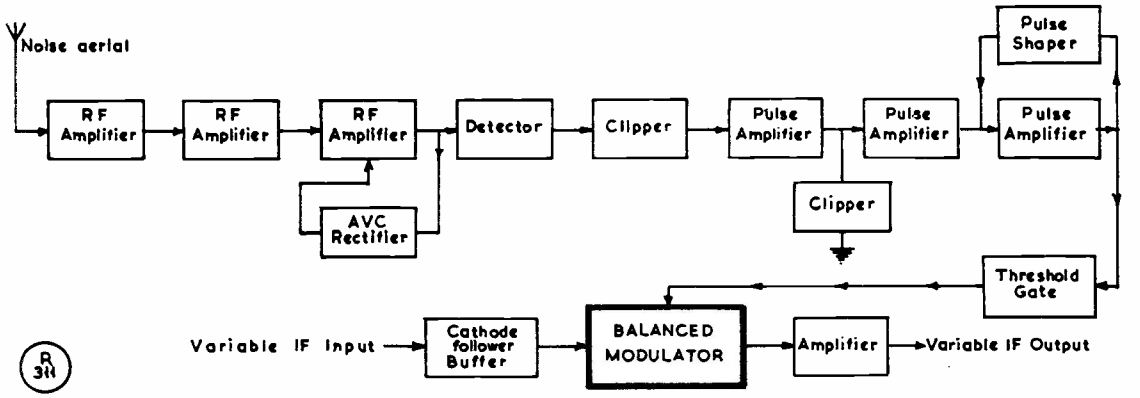


**Fig. 6. Block schematic of a very sophisticated noise-reducing arrangement, developed by the Collins Co. and called the Noise Blanker. Its action depends on amplified noise pick-up at some frequency well away from other signals, usually around 40 mc.**

to adjust the threshold control until an extremely loud and apparently continuous noise is completely removed leaving no sound output from the receiver at all; on increasing the gain of the receiver the signal may come through with barely any noise. Silencing circuits can be used on Morse and in SSB reception as well as on ordinary double side band signals. The improvement obtained by the use of a silencer for FM reception is not quite the same as for AM reception.[10] [11]

Although the best results can be expected only if the silencing circuit is placed in front of the high-selectivity circuits, a difficulty arises when an unwanted carrier which is much more powerful than the wanted signal reaches the silencing circuit before being removed by the following high-selectivity circuits. The powerful unwanted carrier would be detected by the noise rectifier and the receiver would be completely silenced. In such a case the best results can be obtained by using the IF silencer with the threshold level set just above that of the unwanted carrier. The high peaks of the noise will then be removed before they can excite any high-selectivity tuned circuits, although quite a large amount of noise may still be present at the output. It can be shown by theoretical considerations that this noise cannot be further reduced by the use of an audio noise limiter in addition to the silencing circuit. This is because the noise impulses are reduced to the signal amplitude after passing through the high-selectivity parts of the receiver, assuming that adequate selectivity is used to remove the interfering signal. Silencing circuits give the best results when used for VHF reception because the carrier spacing at these frequencies is large and the selectivity required ahead of the silencer is low.

## Another Method

An entirely different method of suppressing impulse noise which depends on the short pulse length has been used by Rogers.[12] This system is only applicable when low selectivity can be used, *i.e.* at signal frequencies above about 30 mc. The noise pulses are separated from the signal by means of a high-pass filter and are then passed through a pulse shaper. The output from this is combined additively with the phase inverted signal so that the noise pulses are cancelled out, as illustrated in the block diagram of Fig. 5. An improvement of 24dB was found with a 200 kc bandwidth. This is very similar to the improvement obtained by the use of the Lamb circuit.

The efficacy of all of the circuits described above is limited by the opposing requirements that appreciable selectivity is required ahead of the silencer if signals are present on adjacent channels and that good silencing can be obtained only if the noise peaks are kept short and large in amplitude. This difficulty has been at least partly overcome in the Collins system.[13] They have produced a silencing circuit especially designed for some of their receivers in which the silencing pulses are obtained from a completely separate receiver which utilises the noise present on a frequency of about 40 mc. There is usually no adjacent channel trouble present at this frequency and therefore the 40 mc noise receiver can have a broad bandwidth. The circuit will operate effectively, however, only if the noise present at a frequency of 40 mc is very similar to that present at the frequency of the wanted station. Impulse noise has, by its very nature, a wide frequency spectrum and in most cases the noise at 40 mc will be similar to that at the signal frequency providing the latter is not very

low, *i.e.* far removed in frequency.

The Collins unit employs four 6AU8A triode-pentode valves and eight diodes. It is designed for use with a variable IF receiver but could be adapted for use at a fixed IF. Three of the pentode sections operate as 40 mc broadband RF amplifiers and the circuit uses the diodes as clippers, pulse shaper and gating circuits. The block diagram given in Fig. 6 shows the basic idea of the Collins circuit. The noise is picked up on a separate 40 mc aerial and is then amplified in three successive pentodes, simple AGC being applied to the cathode of the third pentode by means of a diode ; a diode detects the noise pulses which are then clipped by another diode and amplified by a pentode. Another diode clips the negative peaks which are then amplified further. A diode provides feedback across the amplifier to shape the pulses so that they become rectangular and they pass through a gating diode to the balanced modulator where the actual silencing takes place. Only pulses of comparatively large amplitude can pass through the gating diode.

The Collins unit is one of the few attempts which have been made to get really good silencing in crowded bands. It would also be possible to get good silencing under such conditions by applying a silencing pulse obtained from a separate 40 mc amplifier to the third grid of a 6L7 valve in the IF chain of the main receiver.

It is interesting to compare communications receiver noise silencing with a method of suppressing surface noise on gramophone records. In a lecture by D. T. N. Williamson[14] it was shown that impulse noise (of duration about 300 microseconds) due to dust particles on records could be removed by using the high energy content of the noise above 20 kc to silence the amplifier. The audio signal as a whole was delayed by 150 microseconds so that the peak of the noise pulse could be used for the silencing. It was stated that pulses of duration up to 250 microseconds and together amounting to one-tenth of the total time could be satisfactorily removed. If this can be done in a high fidelity system, one wonders how great the possibilities may be when intelligibility only is required. Much depends on the amount of trouble and expense which are justified on circuits which often make reception possible under the most difficult conditions.

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## THE CONSTRUCTION COMPETITION

Further to the categories announced on p.485 of the January issue of SHORT WAVE MAGAZINE, we have decided to introduce two more classes: *(d)* For an all-transistor station capable of operation on one band only, and *(e)* For a mobile station capable of operation on any two of the bands Top to Two Metres inclusive. In all other respects, the rules and conditions remain as stated in the January issue.

## SOME F.O.C. STATISTICS

Membership of the First-Class Operators' Club now stands at 342, of whom 176 are G's, the other 166 representing some 50 different countries. The year's accounts show a comfortable credit balance. Entries for the DX Marathon totalled only 26 logs received, though over 100 F.O.C. members were known to have been on for the contest ; the leading European operator was G3IMV, who worked five bands, and the non-European leader was W2MUM, using four bands. The president of the Club is G5LC, and the hon. secretary L. Belger, G3JLB, 103 Whitehill Road, Gravesend, Kent. Membership is by invitation only to nominated operators who have been licensed for not less than three years.

## "VOICE OF AMERICA" AMATEUR BROADCASTS

From time to time, we are reminded that we should mention the regular VOA broadcasts to amateurs, which are made through various outlets at different times. The most convenient for European listening is Munich on 1734m. (long-wave), 1196 kc (251m.), 3980 kc (75·38m.) and 6185 kc (48·50m.) during 1715-1730 GMT on Sundays. The programme presented is of strictly Amateur Radio interest, and is conducted by W2SKE, the QSL address being W. Leonard, W2SKE, P.O. Box 29, Geneva 12, Switzerland.

## AMATEUR LICENCE FIGURES

As at the end of December, the total of U.K. amateur transmitting licences in issue was 8,672; of this number, 789 were for /M operation and 78 for Amateur TV transmission.

# All-Band CW/Phone Transmitter

## CONCLUDING CONSTRUCTION—ALIGNMENT AND TESTING

*Part IV*

**C. L. WRIGHT, B.A., B.Sc. (G3CCA)**

*Previous parts of this article appeared in our October, November and December issues, which should be referred to for continuity. While it is not supposed that this transmitter will be built in large numbers exactly as described, readers will agree that our contributor has brought out a great many interesting points of construction and design—which is the main reason why the treatment has been in such detail. As much as anything else, the intention has been that it should stimulate those looking for ideas for home-constructed apparatus.—Editor.*

AS silicon rectifiers may be relatively new to many readers, a brief survey is given on their application as medium-power DC rectifiers. Considerable advances have been made in the past few years in AC rectification by the use of silicon units and some comments on the precautions that are necessary, to prevent voltage and current overloads from damaging the rectifiers, may be helpful.

Under no circumstances must the rated peak inverse voltage (p.i.v.) of the rectifiers be exceeded; this is very important otherwise *instant* breakdown of the junction will occur, with disastrous results to the transformer. It is an easy matter to increase the p.i.v. of a silicon rectifier system by connecting the individual units in series. For instance, two 600 volt p.i.v. rectifiers connected in series will have a circuit p.i.v. of 1,200 volts. It may be necessary with some silicon rectifiers to use voltage-sharing resistors, or condensers, connected in parallel with them.

When calculating the p.i.v. of a circuit it should be remembered that the computed value will depend on the type of circuit used and in such calculations allowances must be made for transient voltage surges which occur during switching operations. These surges must be limited to a value within the total p.i.v. of the rectifier system; suitable condensers connected across the secondary winding of the transformer will help to reduce these transients. Taking into account all the voltage variables which are liable to be present in the circuit involved, the working p.i.v. value for the rectifiers can be found by measuring the no load r.m.s. voltage of the transformer secondary and multiplying the result by a factor of 1·6. (If suitable instruments are not available to enable the no-load voltage to be measured, the p.i.v. of the circuit can be estimated by multiplying the r.m.s. value of the secondary winding by a factor of 2·3.)

Due to the low forward resistance of silicon rectifiers it is essential to limit surge currents which occur in capacitive circuits at the instant of switching on. A small value resistor is therefore necessary between the rectifier and the reservoir condenser; this can be seen in both the PA and modulator HT circuits (R25 in Fig. 8, p.410, December).

Certain precautions have to be taken when connecting silicon devices into the circuit, as follows: Care should be taken to avoid overheating to element, so at least ¼in. of lead wire must be left between the body of the device and any bend in the wire. The wire should be gripped with a pair of pliers between the rectifier element and the point to be soldered in order to provide a heat sink until the joint has cooled. It is not a good thing to use a soldering iron without an earth connection, as the leakage current from the iron element to the soldering iron bit may cause permanent damage to the rectifier. Finally, it is essential to use a non-corrosive flux, such as "Coraline" soldering paste; only a small amount is required to ensure a sound electrical connection.

### Construction of Modulator and Power Unit

The mechnical construction of the modulator and HT unit follows the same pattern as the RF unit. The cabinet is constructed of Imhof extrusions and aluminium panels, in conjunction with a standard 17in. × 10in. aluminium chassis.

The layout of the two circuits follows common practice, the modulator being nearest the front panel and the PA power supply at the rear. No dimensional diagrams are given of the chassis because the layout may vary according to the size of the components selected; these vary from manufacturer to manufacturer. To assist in the construction of both the cabinets a diagram showing the method of assembling the various Imhof components is given in Fig. 11, p.524.

[over

The chassis is fastened to a 20in × 13in. heavy gauge aluminium front panel with $\frac{3}{8}$in. Parker-Kalon No. 6 self-tapping screws. As in the case of the RF unit, strengthening straps constructed from $\frac{1}{8}$in. thick aluminium are fitted between the front panel and each end of the chassis. A heavy-duty rotary master control switch is mounted on the front panel, for the mains supply to both units and to reduce the HT to the 6146 for phone operation. The various voltage feeds for the RF unit are taken out through two Belling-Lee "Unitor" type L654/s 8 pin sockets; these sockets are fitted with type L654/R3 retainers. A Belling-Lee BNC type coaxial socket is fitted to couple the output of the microphone pre-amplifier in the RF section to the modulator input. To reduce the cost, these sockets may be replaced with octal valveholders and the coaxial socket replaced with a standard TV type.

The mains supply is fed through a Bulgin type P.73 three-pin plug and socket to a distribution block under the chassis. An RF filter is included between this block and the mains input socket; details of the filter are shown on the PA HT supply circuit diagram—*see* Fig. 10 below.

After assembling the cabinet in the manner described for the RF section and illustrated in Fig. 11, it is finished in a two-tone colour scheme with I.C.I. Belco Brushing Cellulose to match the RF cabinet.

The connecting leads between the 8-pin sockets on the RF unit and those on the Modulator-PA HT unit were constructed from

## Table of Values

Fig. 10. PA HT Supply Unit

| | | |
|---|---|---|
| C1 | = | 100 $\mu$F elect. 450 v. wkg., insulated can, Radiospares |
| C2 | = | 100 $\mu$F elect., 450 v. wkg., negative can, Radiospares |
| C3 | = | 64 $\mu$F elect., 450 v. wkg., insulated can, Radiospares |
| C4 | = | 64 $\mu$F elect., 450 v. wkg., negative can, Radiospares |
| C5 | = | 16 $\mu$F elect., 500 v. wkg., insulated can, Radiospares |
| C6 | = | 16 $\mu$F elect., 500 v. wkg., negative can, Radiospares |
| C7 | = | .001 $\mu$F moulded mica, 1,500 v. wkg. T.C.C. type M3GO |
| C8 | = | .005 $\mu$F paper tubular, 1,500 v. wkg. T.C.C. type 1545 |
| C9 | = | .005 $\mu$F paper tubular, 1,500 v. wkg. T.C.C. type 1545 |
| C10 | = | .003 $\mu$F paper tubular, 1,500 v. wkg. T.C.C. type 1545 |
| C11 | = | .003 $\mu$F paper tubular, 1,500 v. wkg. T.C.C. type 1545 |
| R1 | = | 1,000 ohms, 35 watt w/w, Painton type P2002 |
| R2 | = | 100,000 ohms $\frac{1}{2}$ watt 20% carbon, Radiospares |
| R3 | = | 100,000 ohms $\frac{1}{2}$ watt 20% carbon, Radiospares |
| R4 | = | 100,000 ohms $\frac{1}{2}$ watt 20% carbon, Radiospares |
| R5 | = | 100,000 ohms $\frac{1}{2}$ watt 20% carbon, Radiospares |
| R6 | = | 100,000 ohms $\frac{1}{2}$ watt 20% carbon, Radiospares |
| R7 | = | 100,000 ohms $\frac{1}{2}$ watt 20% carbon, Radiospares |
| R8 | = | 20 ohms 2 watt 20% carbon, Radiospares |
| R9 | = | 220 ohms 15 watt w/w, Painton type P2002 |
| SR1 to SR8 | = | Simet silicon rectifiers, type 60.AS. Plessey |
| L1 | = | 5/25 Hy, swinging choke, Woden type PCS 11 |
| L2, L3 | = | Combined mains suppressor unit, Radiospares |
| RLp | = | 2 pole n/o AC relay: Magnetic Device Series 100 with 250 volt 50 c/s coil, 5 amp contacts |
| Mains Input | = | 3-pin mains plug and socket, Radiospares |
| DB | = | 10 terminal tag strip: Constructed with Radiospares turret tags and BS.1137 Grade 1 laminated sheet |
| X and Y Sockets | = | Belling-Lee "Unitor" 8-pin plugs and sockets (*see text*) |
| Sw1 | = | 3-pole 3-way heavy-duty rotary switch. (Omitted in prototype equipment — *see text*) |

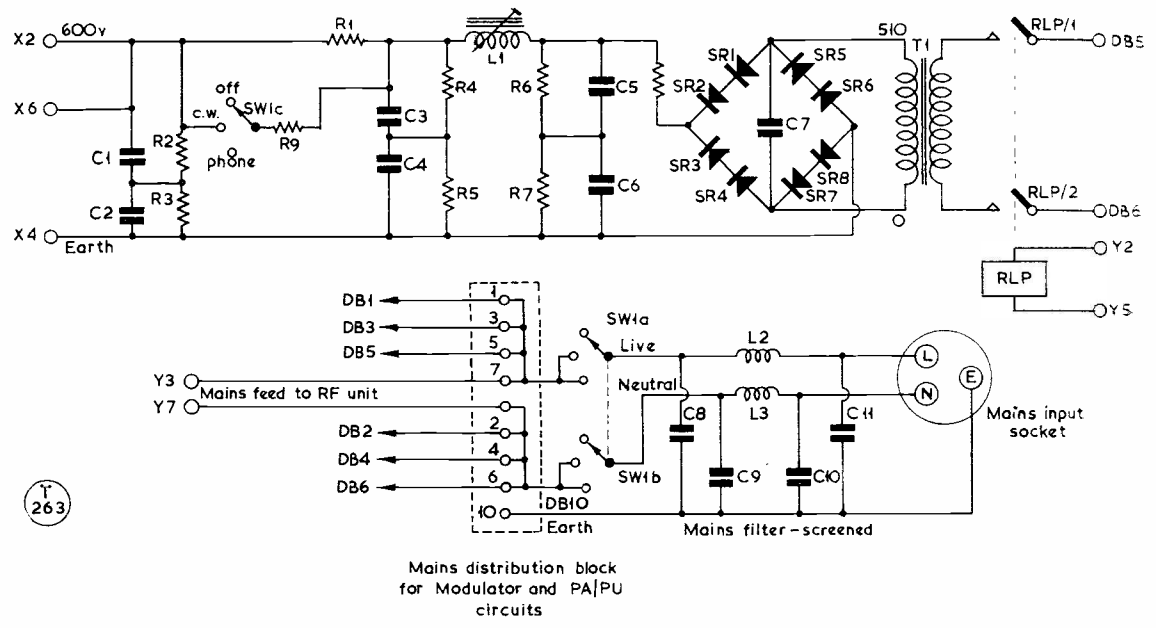
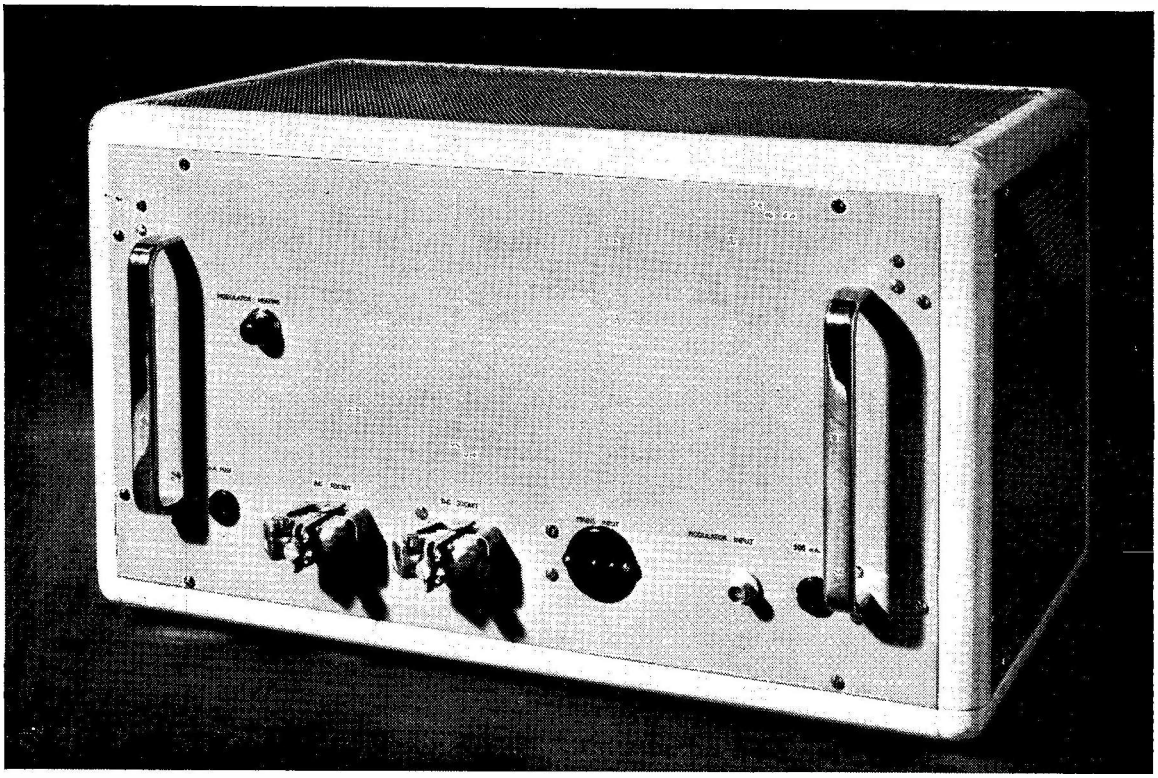



**Fig. 10. Circuit of the PA HT supply — for inter-connection see Fig. 1 (B) p. 294 October issue, and Fig. 8. Again, silicon rectifiers are used. The smoothing condensers are series-connected electrolytics with parallel resistors to equalise the voltage across each section. This enables physically small condensers to be used, with ample voltage rating across the pair. Note that in this circuit the resistor between the junction of SR2, SR3 and the top of C5 should be marked R8.**



**General view of the Modulator unit, incorporating the PA high-tension supply. As considerable heat is generated during sustained operating sessions, good ventilation must be provided. The KT88 valves in the modulator normally run hot when on full power.**

Glover's multicore screened cable (since the prototype was made Radiospares have produced a similar cable).

### Alignment Procedure

Although the Geloso 4/104 unit is virtually factory aligned it is necessary to trim the oscillator to the "band-edge" positions—*see* Fig. 12. To carry out this operation the tuning capacitor is fully meshed and the pointer adjusted to the "O" mark on the red scale of the dial. The alignment can now be commenced in accordance with the instructions given in Table 1, the inductances being adjusted at the low frequency end of the band, and the condensers at the HF end. It is only necessary to carry out these adjustments on the 3·5 mc, 14 mc and 28 mc bands as the other bands are inter-related. This procedure must be repeated several times to ensure correct tracking and spot frequency checks logged on the red scale in conjunction with a crystal calibrator and the receiver must not vary by more than $\pm\frac{1}{2}$ a degree. The author uses a transistor, crystal controlled, frequency meter which gives 1 mc, 100 kc and 10 kc reference points. At the end of the warm-up period HT is applied to the VFO by placing the control switch in the "netting" position. Under no circumstances must HT be applied to the PA during the alignment operation. The alignment adjustments must be made with care and the procedure repeated several times until a satisfactory alignment is obtained; the tolerance stated by the manufacturers is $\frac{1}{2}$ degree of the logging scale of the dial.

After the alignment of the oscillator circuit has been completed, a dummy load should be connected to the aerial socket and the control switch placed in the "transmit" position. With a 240-volt 150-watt lamp connected *via* 52-ohm coaxial cable to the aerial socket, it was possible to load the transmitter effectively on the 7 mc band, so all the adjustments were carried out on this frequency. With the 6146 anode voltage at 600 volts and the screen voltage around 200 volts it was possible to load the output stage to give 148 mA on resonance with a grid drive current of 2·5 mA. Reducing the anode voltage to 500 and keeping the screen voltage at 200 gave a reading of 110 mA when correctly tuned. The latter con-

dition is employed for phone operation and with modulation applied, the microphone pre-amplifier control was advanced until full 100% modulation could be observed on an oscilloscope monitoring the carrier. This condition was achieved with the pre-amplifier gain control advanced to about two-thirds of its full traverse in a clockwise direction.

Observations were made of the effect of the screen voltage control on the DC input to the 6146 valve, and it was found that the input could be reduced by 48% of the full value with this control. All these tests were carried out with the "Phone-CW" switch in the "Phone" position and controlling the transmitter by the operating switch in the microphone handle. The next test is to check the operation of the Clamp circuit and is carried out with the key in circuit and the panel switch in the "CW" position. With the key depressed put the control switch to "transmit" and observe the meter readings. Release the key and note that the anode current of the 6146 falls to approximately 35 mA due to the action of the Clamp circuit. Should this not occur, the screen resistors in the 6146 screen circuit must be adjusted until the correct value of the anode current (no grid drive) is obtained.

On completion of these tests the dummy load can be removed and the aerial system connected to the transmitter *via* a low-pass filter and any other device deemed necessary for aerial matching. Care must be taken when tuning the PA stage for 3·5 mc operation as it is possible to double the frequency on the tuning arrangement and transmit on 7 mc.

If all the precautions detailed are carried out, TVI should be non-existent and operating can be maintained on all bands during TV hours.

**Initial Tests**

In a project having complex switching circuits, such as the one described, it would not be true to say that the initial tests were completed without a small amount of trouble ! So the faults encountered are duly recorded.

The RF unit was first tested by applying the mains supply direct to pins Y3 and Y7 on the AC socket; operating the control switch in the microphone handle applied the HT to the VFO. The latter would not oscillate and on checking the Clapp circuit it was found that there was a broken wire on the cathode choke (L11); repairing this resulted in satisfactory oscillation on all frequency ranges. At this point in the proceedings the alignment checks were carried out as there is no need to connect the modulator-PA supply unit to enable this to be done. On completion of these tests, the dummy load was coupled to the aerial socket and the mains leads removed from the RF unit, the linking cables were coupled to both the RF section and the modulator-PA supply unit and the mains voltage applied to the input plug and socket. The PA was switched on and the tuning condenser adjusted for maximum dip. Although there *was* a "dip" it was very slight and not so pronounced as expected, also the load lamp only just glowed. As the DC input to the 6146 was in the region of 100 watts

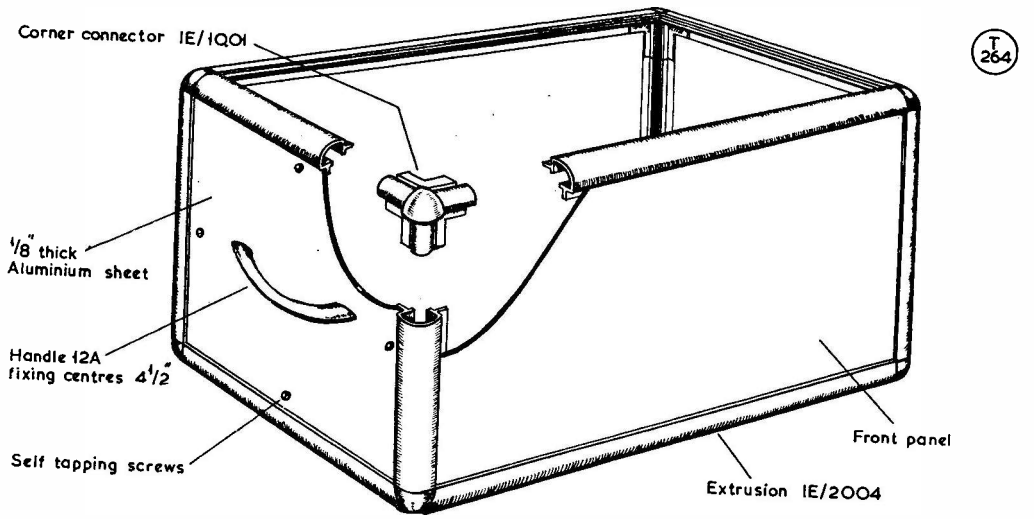



**Fig. 11. Detail for the construction of both cabinets, one to house the RF section of the Transmitter, and the other for the Modulator/Power Supply unit. The references are to the Imhof standard part numbers, as used for these cabinets. Adequate ventilation is an important point.**

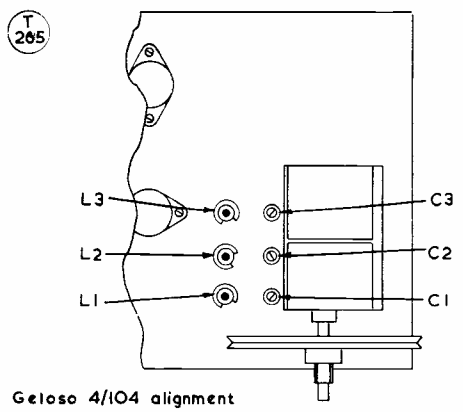



**Fig. 12. Alignment procedure, see Table I.**

**Table I : OSCILLATOR ALIGNMENT**

| Frequency | Inductance | Capacity Trimmer |
|---|---|---|
| 3.5 mc | L2 | — |
| 4.0 mc | — | C2 |
| 14.0 mc | L1 | — |
| 14.5 mc | — | C1 |
| 28.0 mc | L3 | — |
| 28.7 mc | — | C3 |

**Important** : Set dial pointer to "O" on logging scale before commencing alignment.

it was decided that the RF was getting lost somewhere. A neon search bulb was used to try and track it down—it was found with a vengeance, as when the bulb was placed near the anode of the 6146, the glass shattered. The reason for this was an open circuit condenser (C4) ; when this was replaced the "dip" was from 120 mA off-resonance to 20 mA on resonance ; this could be pulled up to 148 mA with the aerial tuning condenser.

It was thought that all the troubles had now ended until the meter switch was rotated from the "anode current" position to "anode voltage," an operation which proved to be very costly as the meter disintegrated in smoke. A careful check was made on the wiring but no error could be found ; a close inspection of the switch, however, established that it was a "make-before-break" type which resulted in the full HT voltage being placed across the 1 mA movement during the switching operation. Both the meter and the switch were replaced, the latter being a break-before-make type.

**Future Developments**

The transmitter described was designed with view to the author's future requirements, the modulator-PA supply being used for the same function in a 144 mc VFO transmitter which is at present being designed around a Geloso type 4/103 VHF exciter unit. This system will result in an ultimate saving in the cost of rebuilding the complete transmitting station as it will only be necessary to construct the RF unit for the 144 mc installation.

Great interest has been shown in the present transmitter assembly and since it was constructed it has been seen by many amateurs and technical personnel of several manufacturers ; the author was surprised at the interest taken by the latter in amateur transmitting projects as a whole. This has resulted in one or two minor modifications being carried out to the mechanical construction of the units, in particular to the RF section.

Tests have also been carried out on a complete Geloso pi-coil assembly which can be substituted for the arrangement in this transmitter ; with this new tuning unit, the coarse-fine system is not necessary. The revised tuning circuit was constructed with a Geloso Type N.4/111 150-watt pi-coil in conjunction with types N.774 and N.771 condensers. The N.774 capacity consists of three variable sections with a maximum capacity of 62 $\mu\mu$F each ; these are connected in parallel to form one section of 186 $\mu\mu$F maximum for anode tuning. The N.771 has three sections of 461 $\mu\mu$F each which, when connected in parallel, make a total capacity of ·00138 $\mu$F and form the aerial loading condenser. This system results in a better band change-tuning facility but is more costly than the one used in the prototype transmitter.

A further modification is to increase the input power to the 150 watt maximum and experiments are being carried with the new G.E.C. TT21 valve which will enable the full 150 watts to be obtained both on phone and CW without any change in anode voltage. The 600-volt power supply can be used for both modulated and un-modulated signals. Apart from a change in component values a new front panel is required.

At this point the following should be noted: new products such as valves are very costly, and this should be borne in mind before deciding to wait for the TT21 modifications to be published. It also requires a new heater transformer with a rating of 6·3 volts at 4 amps, and a new Clamp valve system.

It is recommended that the British equivalent of the 6146 be operated strictly in accor-

dance with the manufacturer's published data and *not* according to the American specification for the type. Although the author has operated, and is still operating at times, the British valve at the American ratings, suffice it to say that the transmitter described was designed around the data published for the U.K. type.

**Acknowledgments**

The list of firms and individuals who have assisted in this project is too long for all to be mentioned. The co-operation of the following must, however, be recorded: A. L. Milnethorpe, G2FMO, for his valuable suggestions on factors affecting the final design and tests: F. Wyer, G8RY, for his observations and comments on the transmitter in general; R. Hallam, B.Sc., for his criticism and assistance during the preparation of the manuscript, together with comments on the C.U.L.A. circuit.

Finally, the author is greatly indebted to a young apprentice electronic engineer, R. C. Guymer, without whose help this project could never have been completed. Not only did he devote much of his spare time to carrying out all the constructional work but he also translated the author's pencil sketches into the circuit diagrams and illustrations required for this manuscript.

*(Concluded)*

# Radiating on Two Frequencies ?

## SPURIOUS TRANSMISSIONS —SOME CAUSES AND CURES

**B. M. SANDALL (G3LGK)**

THERE can be several reasons for radiating a transmission on other than the intended frequency, and in some cases the transmission on the required frequency is quite normal while it is happening. Many of these unwanted emissions can be a potential source of serious trouble because (apart from the operator perhaps not knowing what is happening) they may come out on frequencies outside the amateur bands. Such radiation, which can often be quite strong, can not only cause local QRM, but may interfere on commercial channels outside our bands.

Take the case of some amateur who has just been told: "You are being heard on 80m. while putting out a normal signal on 40m." Many transmitters can produce this embarrassing effect unless a few simple precautions are taken. For this defect to occur, the VFO must be on a lower-frequency band than the operating band—say, on 160 or 80 metres when the transmitter is set up for 40m. If only a very small amount of RF direct from the VFO or intermediate doubler stages is allowed to reach the PA grid, then the PA will produce some output at that frequency, as well as giving normal output on the desired frequency. If, as is often the case, a pi-network is used in the PA tank, there is no means of rejecting a lower frequency signal, and so the unwanted radiation will be passed out into the aerial. If there is no LF rejection at the aerial, it will be radiated. If a good aerial tuning unit is used, it will *almost* completely eliminate the unwanted signal, because the ATU will be at resonance for the desired frequency.

**Cause—**

It may be asked: "How can the PA be getting grid-drive on 80m. if the doubler is tuned to 40m.?" Quite easily, as a consideration of Fig. 1A will show. This is a typical doubler arrangement and in many designs a wide-band tuned circuit is used in this position, L1,C1 in Fig. 1A, to avoid the necessity for adjusting the circuit manually when changing frequency. This means that L1 in Fig. 1A usually has quite a low Q, with a fair amount of resistance by reason of being wound with thin wire to produce the wideband effect; now, though this coil may be tuned to 40 metres all right, due to its reactance a small voltage will appear across it at the doubler input frequency from 80m. There is nothing to prevent this small voltage appearing at the PA grid, together with the 40m. drive, and being passed on by the PA, as already explained.

**—and Cure**

The cure for this is not to have single-tuned circuits in wideband multipliers. The double-tuned, or transformer coupled arrangement with inductive coupling, should be used, and the right sort of layout, electrically speaking, is shown in Fig. 1B. The Labgear WBC is a good commercial example of the inductively-coupled arrangement and is almost completely immune from the "double-frequency effect," due to the extra selectivity inherent in the

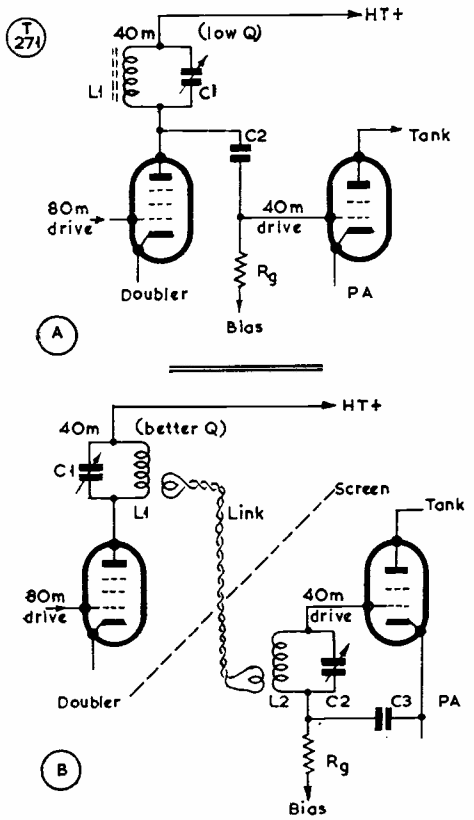



**Fig. 1B below shows desirable circuitry for an inter-stage multiplier, to avoid any RF at fundamental frequency reaching the grid of the driven valve. In the circuit of Fig. 1A there is quite likely to be a fundamental component (80m. in this case) on the grid of the PA stage.**

design. Incidentally, this fact may also be taken as a warning *not* to modify the Labgear coupler to a circuit having only one coil, being a measure which is sometimes adopted to increase drive on the HF bands!

This test was carried out by the writer: At a distance of four miles, his 10-metre signal with the single-circuit doubler was 20 dB over 9, but it was also 6 dB over 9 on 20 metres. On the other hand, a 150-watt transmitter using the unmodified Labgear couplers radiates only on its required output frequency when checked at a distance of 100 yards, with no reading on any other band.

Another cure for the double-frequency phenomenon is to run the VFO on the operating band, so that signals of lower frequency are not generated in the first place.

### The SSB Case

In an SSB exciter, where a crystal-controlled mixer is used for band-switching, the radiation of stray signals may be even easier than in the example already discussed. The reason for this is that in the anode circuit of the mixer appear both the input frequencies, also their sum and difference (and their second harmonics). If a single tuned-anode circuit is used, any of these frequencies may be passed on, in greater or less degree, to succeeding stages. This is what can happen:

Taking the case of a transmitter set up on 40 metres, one well-known system develops the SSB signal on 2·25 mc; to get to 7 mc for transmission, a 4·9 mc CC oscillator is mixed with 2·25 mc. Thus, in the mixer output circuit appear 2·25 and 4·9 mc (the input frequencies), 7·15 mc (the wanted signal) and 2·65 mc (unwanted difference frequency), not to mention any of their harmonics. Now, 2·25 and 2·65 mc are both in the Shipping frequency area just above Top Band and any interference caused could be serious; when the PA is running 150 watts or so, these spurious emissions might easily be at a level of several watts if the general design is poor. The precaution to be taken is, again, the double-tuned or transformer circuit. If a single-tuned circuit must be used, it should be made as high-Q as possible, with the final assistance of a sharply resonated ATU.

What it comes to is that the more high-Q—or reasonably high-Q—tuned circuits one can use, the easier and more certain becomes the rejection of spurious radiation. It is, in any event, always a good thing to have a check made on any transmitter, by a neighbouring amateur or an SWL, at as short a range as possible down to a few hundred yards.

### SOME LABGEAR PRICE REDUCTIONS

Consequent upon improved production methods and a greater output, Labgear Ltd. have been able to make some significant reductions in the price of a large number of the TV aerial systems they manufacture. For instance, the Model 311 goes down to 125s. from 154s. 6d., and the Model 334 from 32s. 6d. to 28s. The quality of material used is in no way affected, nor have the designs been altered.

### AMENDMENTS AND CORRECTIONS

In the circuit on p.471 of our January issue, G3KEP says that the value of the resistance R is actually calculated as given in the example, and is not a fixed value. G6QC (Woodhouse Eaves, Leics.) asks us to say that, in regard to the SWL note on p.483 of the same issue, he has held the callsign G6QC ever since it was issued in 1926. The footnote to p.484 should, of course, read "Eddystone Receiver Types." And in their advertisement on the inside back cover, Tiger Radio point out that their telephone number ought to have been given as *Bournemouth 48792*.

# DX COMMENTARY

**L. H. THOMAS, M.B.E. (G6QB)**

A PRETTY good month all round for the band-hopper and the bread-and-butter DX man, but not so exciting for the chaser of new ones and DX-otics. However, even they had their share of the excitement at times. *Ten* and *Fifteen* were often open at their widest—sometimes until a much later hour than customary. *Forty* was, as usual, rather too full of junk—but some DX was there for those who could find it. *Twenty* actually had some of those ideal moments when the short-skip switched itself off and there was nothing audible on the band *except* DX!

Provided you don't expect too much, the bands are pretty good these days, considering the time of the year, and they will undoubtedly improve as the Spring comes round once more.

Cold weather has rendered a good many shacks uninhabitable, it seems; but there have been compensating cases where, the shack being the smallest and warmest room in the house, the owner has been on the air rather more than usual.

### Still Unrepentant

Last month's remarks concerning Contests have brought forth some very interesting letters and (in our opinion) some very sensible suggestions. Except for the very few to whom Contests are the life-blood of Amateur Radio, we find that most people dislike them cordially—not merely from a personal point of view, but with apprehension concerning what outsiders may think of us. We quote: "A more pointless, stupid and completely useless effort than the average contest have I still yet to experience. The usual outcome of such a contest is *nil*—it brings to the front an extensive array of bad manners, bad operating and bad notes." This particular critic goes on to suggest a use for them —"Put all these people on one frequency and use them for a jammer, so saving a little of the taxpayers' money . . . it's no wonder that other radio authorities keep nibbling off bits of our bands; should they listen to an average contest they must get the impression that we're a lot of Nuts."

And here's another, with a most interesting suggestion. "Award *no points at all* for contacts between stations less than, say, 2500 miles apart. This would mean that a lot more time would have to be spent listening, with the QRM level consequently reduced. In fact, 5000 miles would probably be a fair figure for Ten or Fifteen. This system would mean that a lot of the operators who, at present, enter contests with mediocre equipment and a piece of wet string, would soon realise their disadvantages and give the whole thing a fillip by attention to the necessary points of efficiency rather than relying on their ability to swing a bug or wield a mike." Intriguing? We feel that there's a lot of sound sense behind this suggestion.

Other comments run thus: "They *do* permit a larger number of QSO's with DX stations than otherwise" . . . "I can recall, on many occasions, switching on the rig at week-ends, only to find some Contest or other taking place, much to my disgust" . . . "There is no personal satisfaction to be gained from 99 per cent of contest QSO's. Here in G-land. on 20, 15 and 10 metres, all that they amount to is working strings and strings of East Coast W's with the odd WØ, 6 or 7 thrown in." And another: "One contest per Continent per annum would still be too much."

These, and many other comments in the course of letters, seem to indicate that the majority


**UR2BU**

## CALLS HEARD, WORKED and QSL'd

of operators are now beginning to regard the present form of week-end Contest with horror rather than pleasant anticipation. As a matter of fact, in the whole of this month's mail, there were only two voices speaking up in favour of them —in one case, quite powerfully, though with some qualification in regard to some of them. Even more surprising, there was not one single rude comment on the remarks in last month's Commentary, in which we slammed the matter pretty hard.

**Contests**

This is probably the right spot in which to give details of the forthcoming Contests! The *ARRL* (26th International DX Competition) affair runs from February 5 to 7 and March 4 to 6 on Phone; from February 19 to 21 and March 18 to 20 on CW, beginning and ending at midnight (2359, not 0000) on all days. Rules as always —W/VE stations pass abbreviated form of their State or Province; stations working them use their power as the three last figures of their number. KH6 and KL7 stations are now in with the W's, not counting as DX stations.

The annual *REF* Contest runs from 1300 GMT, February 27, to 2100. February 28 (CW); and from 1300, April 9, to 2100, April 10 (Phone). Exchange RST (or RS) and the serial number of the QSO. Three points per QSO, no multiplier. Logs to REF within one month of the contest week-end.

**News from Overseas**

MP4BBW (Awali) makes a welcome reappearance with a new Five-Band score; recent additions to his total were KG6IJ, W7AHW/KG6, 9N1GW, KV4BQ, VP7BB, HS1K, VR2AP, KX6BT, BV1USC and OK7HZ/YK. We quote the list in full because they were *all 14 mc SSB*. UA9KWA was also worked (on AM) for Zone 17. MP4M (Muscat and Oman) has seen some activity by MP4MAB, 4MAD and 4MAE, but there is no permanent station there. MP4QAO is using 4BBW's KWM-1, which he has operated as MP4TAE and will be working under MP4MAB. A smaller SSB rig, the Argonaut, is *en route* to FB8 and other interesting places. Finally, MP4BBW mentions sideband activity from Russia — UF6BC, UI8BA and UJ8OJ have all been worked. UA9KWA is building an SSB rig. A WAZ on two-way SSB will soon be a possibility— MP4BBW has worked 36 of the Zones already.

VQ4GQ says there's nothing much to report, and G's are very scarce on 7 mc these days. It's only on rainy nights that Europe can be heard at all. An interesting one for him on 7 mc was ETE3CE—an American at the College of Engineering, Addis Ababa. (But why the funny call?)

A very old friend turns up in the person of H. K. Bourne (G2KB pre-war). He now owns the call VE3CXW, but has been in Washington for three years and is able to operate as VE3CXW/W4; look for him on 14 mc CW, with 60 watts and a ground-plane. He particularly welcomes G contacts, especially with friends from the old days—QSL *via* W4 Bureau.

VO2NA (Goose Bay) sends along his WPX List, but just too late for the little ladder that was forming, as we have now started the 1960 Marathon. For the record, his score at the beginning of December was 252 (213 confirmed). Recent new contacts include GC and TF on 7 mc, CE and HK on 14.

VQ6GM (Berbera) is ex-G3BYM, GM3BYM and SU1GM. He has had a few contacts, using VQ6ST's rig, but hopes to be on the air in a big way by about March, in own gear still being in transit.

VS6ED (RAF Little Sai Wan, Hong Kong) sends some news of their Club station VS6DV. They hope to have a good transmitter operating by February, having

**FIVE BAND DX TABLE**
**(POST WAR)**

| Station | Points | 3.5 mc | 7 mc | 14 mc | 21 mc | 28 mc | Countries |
|---|---|---|---|---|---|---|---|
| G3FXB | 823 | 75 | 132 | 225 | 223 | 168 | 264 |
| G2DC | 803 | 86 | 118 | 237 | 198 | 164 | 265 |
| G5BZ | 790 | 66 | 121 | 267 | 206 | 130 | 276 |
| G3FPQ | 772 | 72 | 104 | 220 | 215 | 161 | 246 |
| G3DO | 692 | 25 | 51 | 249 | 188 | 179 | 276 |
| GW3AHN | 664 | 16 | 55 | 203 | 242 | 148 | 263 |
| G3BHW | 635 | 15 | 39 | 205 | 211 | 165 | 246 |
| GI3IVJ | 631 | 41 | 70 | 175 | 182 | 163 | 229 |
| G3ABG | 558 | 55 | 88 | 188 | 134 | 123 | 213 |
| W6AM | 566 | 40 | 68 | 296 | 96 | 67 | 296 |
| G2YS | 532 | 73 | 92 | 164 | 120 | 83 | 182 |
| G3LET | 486 | 37 | 95 | 185 | 119 | 50 | 204 |
| G3IGW | 461 | 46 | 75 | 113 | 119 | 108 | 165 |
| G6VC | 456 | 39 | 60 | 158 | 113 | 86 | 107 |
| UR2BU | 446 | 18 | 42 | 143 | 136 | 107 | 180 |
| GM2DBX (Phone) | 427 | 34 | 31 | 160 | 102 | 100 | 176 |
| W6AM (Phone) | 425 | 23 | 62 | 280 | 49 | 31 | 280 |
| G3FPK | 414 | 36 | 82 | 126 | 100 | 70 | 161 |
| G3JZK | 408 | 17 | 60 | 94 | 137 | 100 | 187 |
| MP4BBW (Phone) | 374 | 1 | 5 | 163 | 125 | 80 | 184 |
| UR2BU (Phone) | 341 | 5 | 16 | 102 | 116 | 102 | 154 |
| G6TC | 333 | 20 | 71 | 128 | 72 | 42 | 146 |
| G3LHJ | 325 | 15 | 39 | 104 | 115 | 57 | 152 |
| G2BLA | 320 | 34 | 62 | 71 | 76 | 77 | 128 |
| G8DI | 320 | 34 | 62 | 91 | 73 | 60 | 128 |
| G3DNR | 291 | 10 | 23 | 90 | 84 | 84 | 130 |
| G3MCN (Phone) | 285 | 4 | 8 | 62 | 139 | 72 | 173 |
| G3BHJ | 275 | 8 | 28 | 38 | 129 | 72 | 159 |
| VO2NA | 267 | 19 | 37 | 110 | 65 | 36 | 118 |
| G3NOF (Phone) | 264 | 8 | 14 | 28 | 109 | 105 | 142 |
| G2DHV | 262 | 22 | 29 | 129 | 61 | 21 | 145 |
| G3WP | 260 | 17 | 34 | 80 | 24 | 105 | 141 |
| G3JFF | 228 | 19 | 52 | 108 | 40 | 9 | 116 |
| W3HQO | 227 | 3 | 8 | 76 | 110 | 30 | 155 |
| VQ4GQ | 212 | 1 | 24 | 77 | 73 | 37 | 115 |
| G3JSN | 208 | 31 | 37 | 40 | 56 | 44 | 84 |
| G3MMP | 193 | 5 | 26 | 45 | 57 | 66 | 93 |
| G3NAC | 184 | 6 | 21 | 50 | 74 | 33 | 94 |
| G3LZF | 168 | 11 | 19 | 53 | 39 | 46 | 106 |
| G3DNF | 156 | 7 | 31 | 45 | 41 | 32 | 68 |
| G3IDG | 151 | 15 | 15 | 41 | 41 | 39 | 68 |

*(Failure to report for three months entails removal from this Table. New claims can be made at any time)*

previously been on a B.2! Some character has been pirating their call, and they are snowed under with bogus QSL's. VS6EE has his own rig and a good aerial farm . . . VS6EF is not active, but hopes to be soon . . . VS6DX, 6DO, 6DP and 6EC have all departed homewards. Conditions have not been good out there, so the ten or so VS6's have not been spending much time on the air. (VS6ED, by the way, is G3MDD.)

The former ZB1CR is now GI3NKQ and claims his WBC, as worked from ZB1. He asks us to say that overseas stations appreciate it if all G's will mark the county on their cards—some of those in the larger towns don't bother.

John Powell, a very old friend of ours (ex-VQ3HJP, 4HJP and 1HJP) writes from Mafia Island, where he says he is "firmly and solidly fixed, with no urge to go back on the air"—although he might think of it if they would produce a suitable transistor/dry battery receiver or converter. He was moved to drop a line, having seen a copy of the *Magazine* in a local bookshop . . . on Mafia Island! Many old friends of his will join us in wishing that he may be bitten by the bug again, one of these days—as assuredly he will!

**DX Gossip**

The two promised DX-peditions duly showed up during the month: VU2ANI/5 and ZM6AP/ZM7. Naturally, they were snapped up by all and sundry, with pile-ups, dog-fights and rat-races going full blast whenever they showed themselves on the air. The former was mostly on 14 mc, but also occasionally on 21; the ZM7 was on both bands, but seldom audible in this country.

Other good Exotics of the month were 9N1GW (mostly 14 phone), VK2APX/LH (14 CW), and ZS6IF/8, VR3W and ZM6AB (likewise 14 CW). FR7ZD was another useful one on 14 mc.

The Tokelau team of VR2DA and W5PQA may by now be on their way again—aiming at Nepal, Sikkim and Eastern Pakistan.

Another rumoured DX-otic is an expedition to Malpelo Island, which belongs to Colombia and has never yet been on our bands. The party is to include three well-known HK's, W3PZW, W4KVX and W9EVI, and plans to have three stations working 24 hours a day for a five-day stay.

Yet another—JA1ACB from Marcus Island, probably all over by now. This island is about 1000 miles from Japan and may possibly be a new one.

KS6 is still pretty rare . . . K6CQV is resident there at the moment, but whether he plans activity or not, we do not know . . . For the SSB enthusiasts, the following were (or are) all active in that mode: YV1CS, HC8JU, 9N1GW, MP4BBW and 4BCC, BV1USC, KG6FAE, EA8BO, MP4QAO, OE9IM, CR6BW, LA3SG/P, PZ1AX, HI8GA, OY7ML and SVØWB (Rhodes).

9N1CJ hopes to be on by February . . . 9N1GW has a kilowatt, but is only using 500 watts owing to "final trouble" . . . LU2ZI is active from the South Shetlands (14 CW) . . . UM8KAA (T9c) has appeared again on 14 mc . . . XE1PJ is on 21 mc again, CW, for Zone 6.

A new Comic Prefix is used by IE1SMO (IT1SMO) operating from "an active volcano 12 miles off the N.E. coast of Sicily." Reported by SWL Tim Garden (Worcester).

VK9XN, mentioned last month as a suspected pirate, has now closed down "at the request of the GPO"! His QTH was nearer Sheffield than Papua.

Notes from SWL Peter Day (Sheffield): VU2ANI/5 heard, both on phone and CW, up to January 13, but pile-ups tremendous . . . ZM6AP/P appeared on January 4 . . . ZM7DA active from January 13, operated by VR2DA, SSB . . . IE1SMO was on Vulcano Island, Lipari Group . . . "ZC3RF," who was another pretty obvious phoney in the Sheffield area, met his end the way they all do, sooner or later.

The Willis Island story: VK4DS *was* allocated but apparently has never been active. VK4IA *was* there in 1955-56; VK4IC operated thence in 1954-55 and 1956-57; he apparently intends to QSL the many contacts he had during his stay. It's a very small coral island 300 miles from the Queensland coast, with two radio men, one weather man, a year's term of duty and no mail during that period.

It seems that HC8JU will not score for Galapagos after all—apparently, they never actually got the gear ashore and, in effect, were operating /MM. However, another expedition signing HCCC8 was due on the Island towards the end of January—yes, HCCC8!

**Top Band DX**

This is turning out to be a disappointing year for Trans-Atlantic DX, although the chasers on the other side are having plenty of fun among themselves. Another recent "first" was made between W9PNE and YS4RA, followed up by WØNWX, 8GDQ, 9PWU and ØIFH.

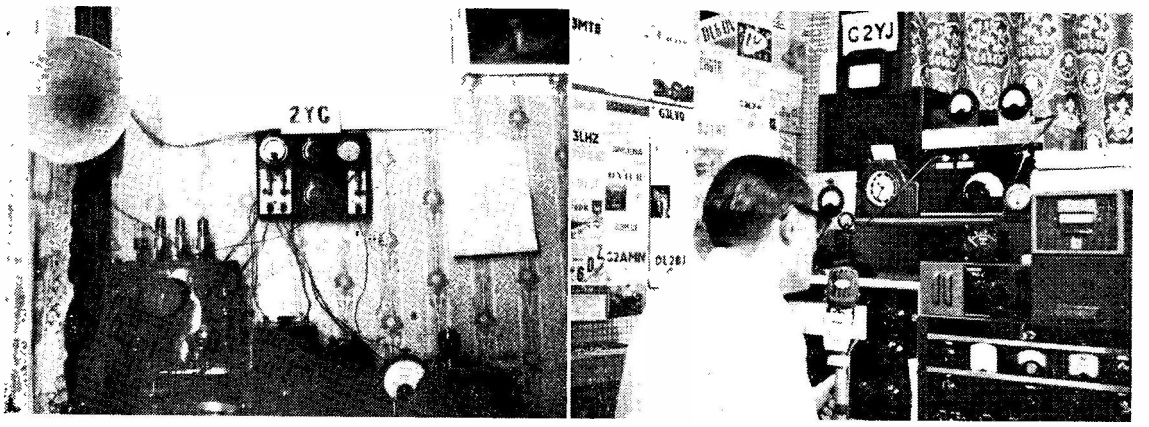
W8JIN is making a real effort to reach Europe, with a vertical aerial slung from 100-ft. towers . . . K6HXT, with a 50-ft. vertical and a fine earth system (including swimming-pool!) is being heard all over the States with his 200 watts . . . W1IGU plans to put up a box-kite with a long vertical if he can spirit-up a wind of 25-30 knots on the right night!

W6KIP still runs his skeds with ZL3RB and is heard regularly; K6RAN has been lured on to 160 metres with three rigs—home, mobile and maritime!

W1BB recently paid personal visits to K2BWR and W2EQS, both tremendously keen Top Band DX'ers. The latter has worked 26 countries in five continents; K2BWR is said to have a fine location over salty ground—in fact, during a hurricane he once had 24 inches of salt water *inside* the shack!

During the scheduled test on December 20, G5JU heard W3RGQ and W8ANO; W2EQS heard G5JU and DL1FF; and W1BB was heard throughout by D. W. E. Powell (Gibraltar).

A long letter from the latter keen SWL gives the following interesting gen.: W1BB was heard on November 1, 15, and 22, December 20 and January 3—no other W's logged, and conditions seemed less favourable than last




**The old and the new. G2YJ (Croydon) was first licensed, in 1922, as 2YG (photo left) in which we see battery-operated gear consisting of a single-valve SEO transmitter, " input possibly one watt," an O-V-3 receiver, and horn loud-speaker. The transmitter is on the extreme right in this photograph ; note the switches mounted on china (" porcelain "), much in vogue in those days! Both transmitter and receiver used Dutch valves, " hard " or " soft " variety, the latter being favoured for the detector in the receiver to get that much sought-after " smooth control of reaction." The right-hand photograph shows the station as it is today, with a Panda Explorer, AR88 with multi-Q unit, Z-Match, Monimatch and all the modern trimmings. G2YJ can be heard on 40-metre phone most mornings.**

season.

Outstanding G's have been G3CNM, G3FPQ, G3PU and G5JU. On January 3, G3PU, rarely heard out there in ZB2, was peaking S8 as late as 0715, and was S7 in daylight at 0723. G3FPQ and G6HB peaked at S8 the same morning; G3ABM/P, G3CNM and G5JU were S7. DL1FF, the most consistent continental, peaked S8 on the same day.

Other U.K. stations heard during the test periods: G2DC, G2IM, G3AZY, G3CHN, G3ERN, G3HVX, G3JEQ, G3KNF, G3KNV, G3KOR, G3LHJ, G3LZE, G3MCQ, G3NDY, G3NEO and G6BQ.

Evening listening hours have been restricted, but GI3NKO was logged recently for a new country. Detailed reports will be forwarded to any who drop a line—D. W. E. Powell, 323 Main Street, Gibraltar.

### Top Band CW Contest

VE3BWY recently suggested a 160-metre Contest, primarily for the benefit of W and VE stations. This has now been arranged for the period 0200 GMT, March 12 until 1400 GMT March 13. CW only, and the scoring is on the basis of one point for QSO's with one's own district, two points for other districts and five for foreign QSO's (outside W, VE and VO) with a multiplier of one for each State, Canadian province or foreign country worked. Logs to *CQ Magazine*, Att: 160 Contest, 300 West 43rd Street, New York 36, N.Y., not later than March 31.

Needless to say, during this forthcoming contest the W's and VE's will have their ears well swivelled in this direction for 5-point contacts, and it may be a good chance to get across.

Thanks, as usual, to W1BB for the bulk of the foregoing information, and for his regular news letters.

### Top Band at Home

Phone WABC's are still moderately rare, so we are glad to record that G3ISG (Bristol) recently collected WABC No. 202 (No. 8 on Phone). He says that he has been up on Sundays occasionally at 0500, and has been amazed at the high level of G activity at that hour—and also at the number of G's calling haphazard CQ's in the 1800-1830 kc sector. There's nothing more annoying, as he says, than to hear a weak W station underneath an S9 G, who is calling "CQ DX" on a frequency on which the W's won't listen, anyway. Kind of pointless and definitely in the Clottery category.

G2BLA (Welwyn) has appeared on the band with a new Tx—first QSO was OK3AL . . . G3NKH is now at Malvern and hopes to move his Top Band rig there from Huddersfield, so as to resume activity . . . G3LNR (Nottingham) has nothing to report for himself, but he heard HB9T working GM6RI as early as 1700 on January 10.

G3NNO (Leeds) is a first-time reporter who has worked 30 counties since starting up in October—good going! He has also worked five OK's and, more recently, GD3LXT (and been heard in Gibraltar, too, it seems).

G3APA (Coventry) tells us that he heard G3JRH—on the TTx described in December issue of SHORT WAVE MAGAZINE—working an OK station who had actually called him first. The distance he makes about 900 miles. How's that for about half-a-watt?

G3JFF (Kingswear) raised GI3NEB (Antrim), GW3ALE (Mon.) and sundry G's for new counties, and also worked DJ2HC. G3NFV found conditions excellent on January 12, with HB9T, OK3KVB, DL1LB, GC3HFE and GM's, all at good strength between 2115 and 2130 GMT.

G2NJ (Peterborough) reports 160-metre contacts with DL1LB and HB9T.

### Eighty Metres

The 3·5 mc band is still something of a washout, although some of the keen DX'ers are known to have been working distant W's

and the occasional ZL in the early mornings. Some late-night SSB activity is separately chronicled under another heading later on.

G6VC (Northfleet) winkled out CT1KD for a new one; G3JSN (Watford) collected W1RTI, VE1RF, UA9CM, UC2 and CT1; G3LHJ (Newton Abbot) worked his first DX on the band—K3EKO—with 12 watts. He also raised EI9J.

G3LHJ came across a character signing ZA5DM—we hope he's OK! W1LRZ was worked at 0910 one morning; Europeans were UP2KBC, UA1, UB5, YU and the like. GI3IVJ (Belfast) booked in UA9CM for a new one on this band.

**Forty Metres**

There is plenty of DX activity on 7 mc these days, but it takes some finding. Every time we listen, nine stations out of ten appear to be YU's—just why this should be, we can't understand! However, in the small, cold hours all sorts of strange things happen, and only those with high will-power will ever know just what goes on.

G6VC worked VQ3HD but doesn't say when; G3DO (Sutton Coldfield) had a session on CW and raised UD6, UL7, UQ2 and UR2, all new for the band; G2BLA worked CN8MB, FA9UO and K2DGT.

G3NQX (Preston) writes for the first time—he runs 75w., CW only, with a dipole, and reports some good contacts.

G3JSN mentions UD6KEA, UA9CM and PY7NS; G3NFV (Ashtead) got his CW to UA3MB and W2DNP; G3BHJ (Norwich) winkled out M1H; GI3NKQ (ex-ZB1CR) collected HC4IE one morning.

GI3IVJ must have been busier on the band than most, since his list includes CN8JX, EA8CU, OHØNC, TI2CMF, UF6, UO5, UA9, VP9BO, W1, 2, 3, 4, 8 and 9, VE's and PY's—nice going for 40 metres.

G3LPS (Blackburn) has had an SWL report from JA1, giving him RST-339; stations worked include SVØWI, OX3RH, VP9, UA9 and "a few W's."

SWL Peter Day reports late-night CW from CN2AO, 5A2CV, KP4AMT, KG4AG, OX3RH, UI8AE, UL7IJ and W4WYI/MM—also "dozens of W's between 7200 and 7300 kc, many operating on 7205 SSB." FA8BG was heard on phone at 0700 GMT one Sunday morning.

**Twenty Metres**

There have been some excellent spells on 14 mc, which still carries most of the DX and is also nearly as bad as Forty for QRM at times.

Some of our ideas of "best times" seem to have been going wrong this month; on one occasion all continents were heard within five minutes during *mid-afternoon*—most unusual for this band, surely? Rare ones are active, but never overlooked—their very first call produces a pile-up, showing that *some* people are listening and not continually calling "CQ DX."

Most of our collectors-of-rare-pieces seem to have been too busy to report this month, but we know of several who have worked VU2ANI/5 *and* the rare ZM7.

G6VC collected two new ones—DU7SV and VU2ANI/5; G3JSN (CW) raised DU7SV, KL7's, W6 and 7, and ZS6; G3EKW, on CW, accounted for FF8, JA8 and 9, LU, PY's, TF, UL7, VE, VK, W's and ZL's; on phone he contacted CO, EA8, PY, VE, VK, VQ4 and W's.

G3ABG (Cannock) raised KL7, VU2ANI/5, VU2XG and ZS7M—all on a 33-ft. Zepp.; G3LHJ stuck to CW and worked CR4XA, HK4JC, OD5CN, OX3NK, ZD2's, ZS6IF/8, VE6AAE/SU and UA1KAL (Antarctica).

G5BZ (Croydon) was not very active, but spent most of his time on Twenty, to the tune of KH6's, ON4TX/MM (area Antarctica), YV's, OQ5EW, VU2XG, KR6DO, TI2LA, ZD2IHP and the usual run of VE-VK-W stations.

G3BHJ only mentions ZB2U on phone; G2VV raised OR4RW and VP4WI; G3NOF (Yeovil) got his phone to VP3IG and 4X4AS.

G3JFF worked UA9CM and 9JR, HC4FD, PI1NTB, but missed KG6, KR6 and VK6SM; GI3IVJ, on CW, raised CR7's, FB8XX, FQ8HO, FR7ZD, LA5AP/P, MP4TAF, SU1MS, UAØ, UL7, VKØTF, VQ4HT, VS9OM, XZ2TH, YA1AO, ZS6IF/8 and 9M2FR.

**Fifteen Metres**

Difficult to know what to say about this band, these days. On some occasions one would think it had been set aside as a jammer-and-jingle-bells band; on others there is little to be heard except good solid DX signals. It's becoming rather like Ten in its general behaviour, but much more popular around the CW end than Ten has ever been—except perhaps during contests.

G2JB (Grimsby) was apparently the first G to work VU2ANI/5—on phone. Others collected during the month, same mode, were

**TOP BAND COUNTIES LADDER**

(*Starting Jan. 1, 1952*)

| Station | Confirmed | Worked |
|---|---|---|
| G2NJ | 98 | 98 |
| G6VC | 96 | 96 |
| G3FNV | 94 | 95 |
| G3JHH | 94 | 94 |
| G3KEP | 86 | 86 |
| G3KOR | 84 | 90 |
| G2CZU | 81 | 83 |
| GM3AVA (Phone) | 72 | 74 |
| G3APA | 70 | 83 |
| G3LHJ | 70 | 74 |
| G3MCY | 69 | 70 |
| G2CZU (Phone) | 67 | 68 |
| G6QN | 64 | 76 |
| G3LEV | 64 | 74 |
| G3KEP (Phone) | 62 | 64 |
| G3NFV | 61 | 67 |
| G3FS (Phone) | 61 | 61 |
| G3LEV (Phone) | 60 | 68 |
| G3LNR | 51 | 57 |
| G2AAM | 48 | 53 |
| G3MXJ | 47 | 54 |
| G3NPB | 36 | 47 |
| G3JFF | 36 | 44 |
| G3NKH (Phone) | 26 | 32 |
| G3LZF | 22 | 29 |
| G3JRH/A (TTx) | 20 | 24 |
| G3NNO | 10 | 30 |

*(Failure to report for three months entails removal from this Table. New claims can be made at any time.)*

CR7's, EL4A, HV1CN, KR6CQ, OX3NK (using 15 watts, foot-pedalled !), PX2FH (?), PZ1AP, VQ6GM, VQ8AV, VS6EL and VU2BK. A nice bunch, that !

G2BLA raised W5EZB/KG6 for a new one, also VK2ZH and VQ4HT; G3JSN swopped phone with CN2BK, EA6AR, HC1FM, VP4MM, XE1JP, YV5AIP and ZS4X; CW with VK and ZL.

G3NFV worked OQ5RS on Phone, CR7IZ on CW; G3ABG stuck to CW on this band and raised HC1JW, MP4BCR/MM, VQ2IE, YA1AO and some VE's and VK's; G5BZ worked KG6AAY and G6VC caught KV4CG.

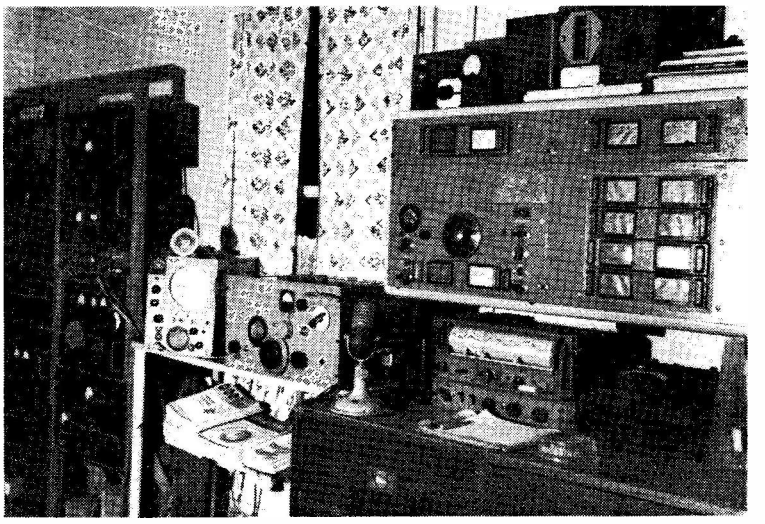
G3LHJ found conditions to VK and ZL pretty good, and on phone he worked EA9AZ, five KR6's, VK9RO, VS9OM and VU2ANI, as well as " scores of VK, ZL and W."

G3DNR (Broadstairs) stuck mainly to this band, notching up XE1PJ and UP2KCB for new ones, plus VO, 9G1, OQ, UA9, VK and the like; G2VV, with his 68-ft. indoor aerial, got his CW to VK3AZY (589 report), UL7HB, KR6ZT, KV4CG, JA3FT, VK6, VE7, UA9 and ZD2.

G3BHJ worked phone with CX1AK, DU1AP, HH2CB, HV1CN, HZ1AB, IP1ZGY, OHØNC, PZ1AB, KR6DZ, OX3KW, OY1R and 2Z, TF2WEE, VQ2VZ, VP6's and VK; CW produced a contact with UAØGF. G3FXB (Southwick), just too late for last month, reports phone contacts with HP1AC, HH2NV, HS1B, VK9BS, VP2AR, VR2AZ, and a solitary CW one with ST2AR.

G3NOF sends a long phone list which includes CE3DY, FE8AR, HH2CB, HK1OI, KP4's, KR6RB, MP4BCC, VP6, VS6, VU2BK, YV5AIP, ZB2's, ZS3D, 9G1AA and 1CT—plus, of course, many of " the usual."

G3JFF collected some WAE-scorers as well as a new one (EA9AQ) and KH6, OX, UA9, KL7 and W's; GI3IVJ was one of the lucky ones who worked VU2ANI (on CW) along with OQ5, PJ2AE, ST2AR, VK9XK, VQ4DT and VS9OM. His phone fetched in IE1SMO, KR6IM, OQ5IG, UAØSK, VP5BL, VQ2CH, 9G1DF, VK's, ZL's, and ZS's.



**Licensed in November, 1955, G3KPW (Askern, Yorks.) started up on 80 metres, since when the station has been greatly expanded and much gear built. The main transmitter now runs 150w. to an 813, over 80-10 metres, modulated by a pair of TZ40's, and the receiver is a rebuilt and miniaturised HRO, incorporating a product detector and noise limiter, with a lattice filter under construction. A prototype SSB rig using the phasing mode is in hand. For aerials, G3KPW has a 132ft. wire, a 20-metre dipole, and a 3-element Minibeam, with a Cubical Quad for 10-15 metres projected — if he can keep it airborne, two having been lost so far ! As the photograph shows, the station is also fully equipped with test gear and ancillaries.**

### Ten Metres

G3NOF, on phone, lists CE1AD and 3RC, CR6, EL4A, FF8, HC1RY, HH2FB, HR2MT, IE1SMO, KG4AT, OA2F, and 4JH, OQ5, PJ3AB, PZ1AE, VP8DW and 8EM, VS9AE, VU2ANI, ZD1EO, ZE7JW and ZS6's.

G3FXB weighs in, also on phone, with EL4A, FQ8, HH2V, VQ5AU, VS9AZ, YA1AO, YN1CJ, ZS3S and a bunch of Russians including RN1 and RH8. G3JFF made some more WAE QSO's and also his first W's on the band, but nothing exciting.

G3BHJ worked phone with VP6HR and 6WR, VQ5FS and YN1WW; G3LHJ didn't use the band much, but acquired VQ2RG, CR6AI and W's on CW; VK4EL and RH8 on phone; G3ABG worked CW with CR6AI and PY1ADA.

G3NFV's phone connected with TI2W, OA4ED, VP2DY, VP9DV, CO, CT3, YN1AW, HI8JBD, VS9AE, ZD3E and IE1SMO ; CW raised 9K2AD. G3JSN used CW for JA2AAT, OQ5IG and VK's; phone for CO2XA, IE1SMO, XE2BM and ZD3E.

G2BLA, on 20 watts of CW, worked CR6AI, FA, FB8CJ, FQ8, KZ5, UAØAZ, VK, VQ2 and 4, W's and ZS. G3LDJ (Huddersfield) reports for the first time, with a phone contact in ZE2, using 25 watts and a long wire.

### WPX Marathon

The first instalment of the WPX scores for 1960, though covering only the first few days of January, looks like a real runaway start for G6VC, with a score twice as big as that of the runner up. Who will catch him next month ? We will accept new entries for this ladder up to the *March* issue, after which it must stay closed.

### Miscellany

G2VV (Sunbury) recently queried a character signing 5LWP/MM. He now finds that it is the S.T. *Eurydice,* a Greek-owned, Liberian-registered tanker, running from Venezuela to Montevideo; this station works only on 21080 kc CW, rock-bound. Also from G2VV—Nelly Corry, G2YL, is on holiday at Christchurch, N.Z., and may be heard from ZL stations; she returns to the U.K. about March, *via* VK2, 3, 6, 7, VS2, HS, VU, EQ and OD,

possibly making station visits *en route*.

G3KBE (Burton-on-Trent) tells us that W8QHW is QSL manager for VP2LS (St. Lucia)—send a self-addressed envelope and one IRC for your card. Also that W6OT has organised a tour around California for those interesting themselves in the California Counties Award, and that he will be working from the rarer northern counties during the Easter holiday. This will be on Ten and Fifteen, CW and Phone.

G3LZF (Todmorden) was surprised and pleased to be awarded the Israel Jubilee marathon certificate—first place in England. This he collected with only 20 watts of phone. On the end of this he is now using two linear PA's of 75 watts each, with separate tuning and separate aerials, but both operating together. He finds that by various degrees of "de-tuning and re-tuning" he can swing his RF output "round the compass"!

And for those who may want it, the QSL address for VU2ANI is: W8PQQ, 1013 Belmont. Forest Hills. Charleston. W.Va.

**Quotes**

"Got a Tri-bander beam now, but too darn cold to get it up aloft" (G6VC); "Have been running a new Tx. designed by myself and G3HQX. with 20 watts on all bands" (G2BLA); "Since Ten and Fifteen have lost some of their sparkle I have been delving in the QRM of Twenty and Forty, with quite encouraging results" (GI3IVJ).

"Being home for only short periods at three-monthly intervals doesn't give one time to get the 'feel' of the bands like those who have a go every day" (G3JFF); "Years ago you organised a contest of two hours' duration, 14 mc only. This is the sort of thing we want. How about one per month throughout the year, especially for 'DX Commentary' readers?" (G6TC).

"Surely the USSR fully-licensed stations should petition their authority to limit the activities of these novices. Ten metres, a wonderful DX band, is being ruined during one of its last good seasons for perhaps many years" (G3JSN). "With a bit of patience, and a good receiver there is plenty of DX on Forty; I never call CQ" (G3NQX).

**WPX MARATHON**

***Starting January 1, 1960***

| CW Only | | Phone Only | |
|---|---|---|---|
| G6VC | 125 | G3LHJ | 36 |
| G8DI | 60 | G2FQW | 27 |
| G3LZF | 48 | G3JSN | 8 |
| GM3NQB | 35 | G3MGL | 3 |
| G3JSN | 26 | | |
| G3LHJ | 25 | | |
| G3MGL | 24 | | |
| GM3LYI | 19 | | |
| G3BHJ | 18 | | |


**SP7HX, Lodz, is ex-SP1LP and runs 100 watts input, with a BC-348 and converter on the receiving side. He is a keen collector of operating certificates and has many of the European issues.**

**Side-Band**

G3DO writes he has acquired a Collins 32-S1, and will be mostly SSB in future; he has already raised 9N1GW (two-way SSB) for an all-time new country on 14 mc, also OHØND on 3·5 mc. In four weeks' operating he has worked 50 countries, two-way SSB. Good going!

G6MN (Worksop) also makes a welcome appearance and says he is going strong on SSB with 61 countries to date. He uses a home-made Tx with a ½-lattice type filter driving a 6146 in Class-A, which drives a 4-125 A in Class AB1. The aerial is a Minibeam.

GW5TJ (Merthyr Tydfil) sends news that an SSB group consisting of VO2AD, W1BU. W1FOS, W1FRR and W1HKK are all on 3830 kc in the late evenings, looking for U.K. contacts. They call for DX at 2230, 2300, 2330, 0001, 0030, and 0130. listening on 3785 and 3798 kc. GW5TJ finds he can work them on SSB most evenings from 2330, with a very good signal from W1FOS, who only uses 40 watts.

G3LFF (Droitwich) makes a similar report, but says that the DX stations are looking for G's on 3700 kc, the QRM on 3775-3800 now being too bad. W1BU has asked him to pass on the word to G stations to call the group on 3700 kc. G3LFF also says that G's have been making contacts as early as 2130 GMT.

**RTTY Progress**

G3CQE (Norwich) forwarded an issue of the *RTTY Magazine*, completed with "teleprinted" front cover illustration! A Model 26 page-printer is on its way through the Customs for him—complete with 60-cycle motor, which may cause a little fun.

We also have about five feet of "copy-off-the-floor" from VE7KX which includes a long three-way QSO between himself, W6CG and G3CQE. RTTY WAC's and DXCC's seem to be in the offing. but as yet it is of course a minority interest, especially in the U.K. GM3KSN is active, however, and gave G3CQE a new country!

Later news is that G3CQE has broken his own RTTY world record by working ZL3HJ, who previously had not worked further than VK, although he had printed several W's. FB !

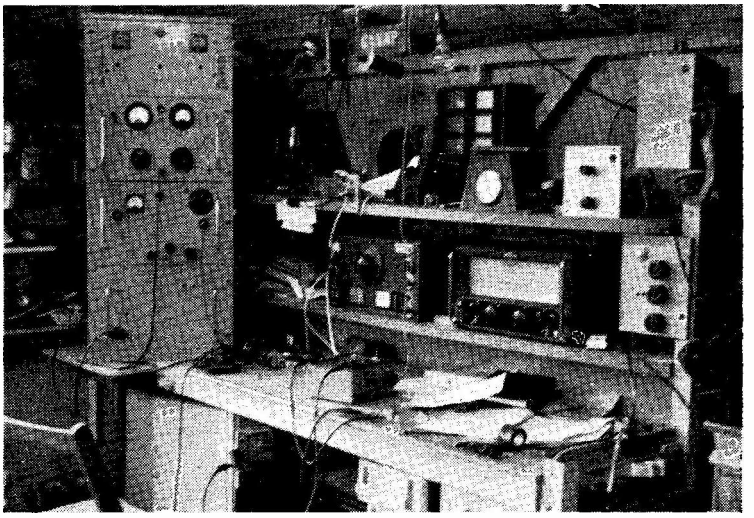
**Operating Note**

Perhaps it's not a new phenomenon on our bands, but it's of fairly recent origin; one might call it the "chain-reaction QSO." We met with a typical example lately. LA1NG/P was working KL7MF, and duly signed with him; G6QB, standing by, wanted KL7MF, an old personal friend, but rather expected a rash of QRM from stations calling LA1NG/P. But what happened was this: a W6 called the LA on his frequency; as soon as he signed, a DJ5 called the W6; as *he* signed, a YU called the DJ5; and as *he* signed, a UA3 called him. By this time there was a good chance that they would all come on at once, calling each other, so we moved clean off the frequency, just in time to hear KL7MF—sensible chap—already working someone else !

What causes this sort of thing? We have often wondered why it is that, say, a YU may call some goodish DX station, and as soon as he signs, up comes another European calling not the DX, but the YU. Probably the answer is that many of these noisy Europeans have receivers that will only just about cope with other Europeans, and the DX for which they are always CQ-ing (but never getting) is just a closed book to them.

And so to the end, once more. Thanks and acknowledgments to all correspondents, and please continue the good work. Next deadline is **first post on Friday, February 12** — an early one, so please be sure to catch it. Don't forget the WPX Marathon scores. Address everything, as usual, to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Until next month, 73. Good Hunting and—BCNU.

(*Editorial Note*: A number of useful and interesting report-letters were received well after the closing date for this issue. They could not be fully covered. It is not usually possible to take in reports reaching us after the deadline, as this is already as late as we can make it.)



**Station of G2HNP, Ilford, Essex, obviously intended for experimental work and typical of many a U.K. amateur shack. G2HNP says "there is nothing outstanding about my station" but he enjoys himself in it — he is away from the house, in a hut 18 ft. by 9 ft., with power supplied by buried cable and a private inter-com. telephone system.**

## DEATH BY ELECTROCUTION — G5QG

We very much regret to have to report the untimely death of Mark Hollinshead, G5QG, of King's Norton, Birmingham—more especially because he died by being electrocuted in the course of a DX phone contact on Christmas Eve. As he was alone with his gear at the time, it is not very clear what actually happened, but as the cause of death was given, at the inquest on December 31, as "cardiac failure by electrocution," he is thought to have come in contact with the 1250v. HT supply, which was unprotected. G5QG had been licensed for many years and was aged 55 at the time of his death.

## TELEPRINTER BROADCAST STATIONS

From *News Sheet No. 5* of the British Amateur Radio Teleprinter Group, we get it that there are a number of T/P press broadcasting stations which can easily be received in this country—that is not the same thing as the Service T/P transmitters, idling interminably in the 80-metre band sending that lyric phrase *the quick brown fox jumped over the lazy dog* (sometimes varied by *of all the fishes in the sea, the mermaid is the one for me).* The teleprinter press broadcasters run at the international speed suitable for Type 3 machines and use 850 c/s shift FSK. Some of these stations are: DHJ, 2769 and 3600 kc; FDW, 3240 and 5250 kc; FUE, 8590 kc; ISX, 10225 and 10900 kc (news in Italian); RAN, 5360, 5680 and 7830 kc (Tass agency official Russian news in English). These are all strong signals and can be found at almost any time—when they have "nothing to transmit," they hold the channel by idling on a test phrase.

## TIGER RADIO, LTD.

We are asked by Tiger Radio, Ltd., of 136 River Way, Christchurch, Hants., to make it clear that requests for leaflets should be accompanied by a 3d. stamp or an s.a.e. Visitors to the Bournemouth district will be welcome at the Tiger Radio Works, 36a Kimberley Road, Southbourne. The firm now holds the calls G3NLJ/G3NLK for the air testing of Tiger transmitters on all amateur bands.

# Another S-Meter Circuit

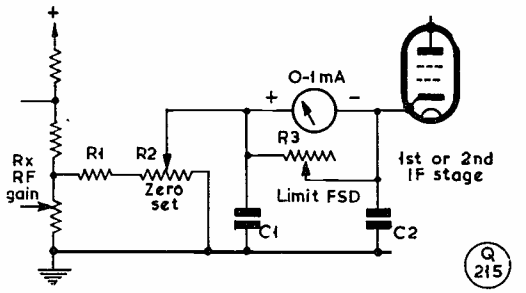
## SUITABLE FOR MOST RECEIVERS

IT has often been said that a meter device giving *some* indication of an incoming signal—even if it is not an accurate measure of signal level—is better than no indication at all. While it is true that what you hear is what matters, the point is that a meter somewhere in the receiver circuit, capable of reading something on a scale, is an extremely useful adjunct for comparative purposes alone.

In commercial receivers, the S-meter is a calibrated instrument—though there is a wide divergence of opinion as to what the calibration standard should be, while in some cases the S-point is reckoned at 4 dB and in others at 6 dB. For those who simply want a signal-level indicator—and in any event have no accurate means of calibration—the question of how the scale is marked is of no importance. It can be scaled 0-10, with ½-points, and so long as it reads full-scale on strong local signals, and *pro rata* on those not so strong, it can always be used as a reliable comparison check.

The circuit for such an S-meter device is shown in the diagram, for wiring into the cathode line of the first (or second) IF stage. It can also be used in the second RF stage of a receiver having two RF stages, or in the RF of a receiver normally operated with a one- or two-stage preselector. In most cases, however, the first IF stage will be found to give the best results — the requirement being, of course, adequate current swing in the particular cathode line to be used. Because the meter circuit is under AVC influence it will not always be smacking the pin on really strong signals.

Using an 0-1 mA moving-coil meter, R3 is for controlling the full-scale deflection and R2 for zero-setting, the circuit being essentially a voltage balance arrangement, with the "changes in the balance," produced by an AVC-controlled signal, registering on the meter. In the preliminary setting-up process (with AVC on and the receiver tuned to a quiet spot with the aerial shorted to earth) *great care* must be taken not to damage the meter; if R3 happens to be at too high a value and R2 is set too low, there could be excessive current through the meter at the moment of first switching on. It should also be noted that the setting of R2 can vary from band to band—it should therefore be a panel control.




**Circuit of the S-meter discussed in the text, suitable for most types of receiver. Values are: C1, C2, .01 μF; R1, 1000 ohms; R2, 3000 ohms; R3, 10,000 ohms wirewound. These values may require alteration in some cases.**

Another point is that the values given may not be right for all receivers or for any meter but they will work with surplus types such as the R.1155 and BC-348. However, a certain amount of experiment and patience will be called for to get this signal indicator working just right. And if you have a standard signal generator, you can put on a calibration in terms of microvolts, or work out S-points taking a ratio of, say, 5 dB per S-point. But for most people, the 0-10 scaling will be good enough for the purpose of comparing signals, which is all this circuit will really do.

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### FILTER UNIT DESIGN 12

This was mentioned on p.435 of the December issue, and shown in circuit form with values on p.491, January. Now, through the courtesy of G3MBQ, ex-VS2BZ (Scarborough) we have the following figures on its attenuation factor as a low-pass filter: Between 20 and 30 mc, the attenuation varies from 0 to 3.1 dB; at 35 mc it is 52 dB, and at 40 mc it is better than 100 dB. This means that it can be used as an effective harmonic suppressor on all bands up to 10 metres, with negligible insertion loss.

### INDEX TO VOLUME XVII

As we start a new volume of SHORT WAVE MAGAZINE next month, every copy of the March issue will contain, as a free loose supplement, a complete Index to Vol. XVII, now concluded.

### "TELETYPE" A REGISTERED TRADE MARK

We are asked by the Western Electric Co., Ltd. to make it clear that the word *Teletype*—as used in SHORT WAVE MAGAZINE in the RTTY context—is the registered trade mark of the Teletype Corporation, in respect of "printing telegraph apparatus." As a consequence of this, the name of the B.A.R.T.G. is being changed to: British Amateur Radio Teleprinter Group, of which the hon. secretary is A. C. Gee, G2UK, East Keal, Romany Road, Oulton Broad, Suffolk.

# Getting on Top Band

## WITH THE TYPE A MK. III TRANSCEIVER AND WILCOX-GAY TYPE M1-19467-A VFO

**J. N. ROE, M.I.R.E., F.R.S.A. (G2VV)**

ORIGINALLY described in detail some ten years ago, these two pieces of surplus equipment are still to be found in a number of amateur stations. Interest and enquiries for Top Band operation prompted the writer to carry out the simple modifications here discussed. It should be noted that original circuit component numbers are quoted throughout, and it would be a convenience to be able to refer to the original article—*See* "References."

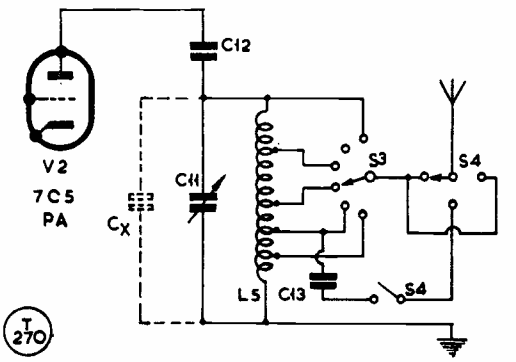
(1) *Type A Mk. III Trans-Receiver.* The addition of one fixed ·0005 μF, ceramic or mica, condenser connected in parallel with the PA tuning circuit gives operation over the whole of Top Band; for this the transmitter waverange switch S2 is set in the ("Blue") 3·2-5·0 mc position. See diagram, where this additional capacity is marked Cx. Note that it must be taken out of circuit for normal 3·5 and 7 mc operation. This is accomplished by one crocodile clip connector!

To fix Cx, a small hole is drilled at the top right hand corner of the front panel. A suitably insulated lead is passed through this and wired to the "hot" end of the PA tuning circuit, C11, L5. The additional condenser is attached *externally* to this lead. The length of lead before entering the hole need only be about one inch; the other end is attached by a short lead to a crocodile clip. When Top Band operation is desired the clip is secured to a nearby protruding (earthed) panel retaining screw. This is located just above the receiver drum tuning control. When operating on 3·5 or 7 mc, the clip is removed from the screw head and left hanging free.

With the usual power supply from mains (or the integral vibrator supply unit) the full ten watts input can be obtained on Top Band.

Note that this modification applies only to the *transmitter* side of the equipment. As users will know, the receiver section is hardly suitable for amateur band working as no band-spread is fitted.

(2) *Wilcox-Gay VFO Type M1-19467-A.* The original oscillator (grid) tuning range of this VFO unit covers 1·0-2·0 mc, the multiplier (plate) range being given as 2·0-3·1 mc. In actual fact the latter, on Range 1, will tune to below 1·8 mc. However, output on Top Band cannot be obtained since it is not possible to operate the grid and plate circuits of the single 807 valve at the same frequency. By altering the frequency range covered by the oscillator satisfactory doubling to 1·8-2 mc can be secured in the multiplier (output) circuit. The addition of one 100 μμF fixed ceramic or mica condenser in the oscillator circuit is the only modification necessary to obtain Top Band output from the VFO.




**Skeleton of PA stage circuit of the Type A Mk. III Transceiver showing the additional condenser Cx 500 μμF, required for Top Band operation. This condenser is taken in and out by means of a short crocodile clip connection on the earthy side.**

Mounted on the top deck of the unit (oscillator section) are switches S401B (second wafer from front panel) and S401C (third wafer from front panel). Placed between these wafers will be found three ceramic condensers. C404, 421, 422, wired together in parallel. The additional ·0001 μF capacity is put in parallel with these three.

For Top Band operation the oscillator switch and multiplier switch are each set to Range 1. This modification affects *only* Range 1 on the oscillator switch. All other settings and coverages remaining as before.

Both pieces of equipment, in their modified form as explained here, have been used together for Top Band working at G2VV and G3FXX for a number of years with excellent results and T9 reports.

REFERENCES

"Surplus VFO Unit," G2VV, *Short Wave Magazine*, September, 1949.
"More On The Wilcox-Gay Driver Unit," GM6LS, *Short Wave Magazine*, November, 1949.
"The Type A Mark III Trans-Receiver," G2VV, *Short Wave Magazine*, December, 1948.

# MODERN MODULATION SYSTEMS

## GENERAL DISCUSSION AND SOME COMPARISONS IN THE AMATEUR CONTEXT

IN the post-war years much has been written about "new and improved modulation systems suitable for amateur use." Too often the advantages claimed for one type of system directly conflict with the claims made for another. This review has been prepared in an attempt to clear away some of the current misunderstandings about these newer systems.

Before dealing with modulation methods, it is necessary to discuss a few more general points:

*Propagation:* While it is true that some systems "get through," or penetrate, more effectively under conditions of poor ionospheric propagation, it is also a fact that all known systems can be either aided or defied by the conditions along the path.

*Bandwidth:* Our commercial friends are worried about the ever-increasing crowding of the available HF allocations. On the other hand, *all* our frequencies are shared and severe co-channel QRM is an everyday occurrence that we have learned to live with. Skip-distance and the ability to move frequency do, of course, help the amateur, but we are still able to make satisfactory contacts through several layers of interference. This does not mean we need not investigate any system we can use that will materially reduce signal bandwidth, as this would be of value to all who use the amateur bands.

*Heterodyne Interference:* The suppressed-carrier systems eliminate this most annoying source of amateur co-channel interference. This very significant improvement in operating comfort has undoubtedly contributed to the present popularity of the SSB and DSB systems.

### Amplitude Modulation

In comparing "new" systems with conventional amplitude-modulation (Fig. 1A), one should be careful to determine how much of the advantage comes from improvements that could be added to any system. Standard AM is the oldest and simplest method of phone transmission. Its primary advantages lie in simplicity and low cost. Many practical techniques have been developed which greatly enhance the usefulness of AM, such as improved bandwidth control and oscillator stability, better noise-limiting, exalted carrier detection and directional aerials; these are just a few of such techniques.

AM is wasteful of spectrum space and being a carrier system is the main cause of the beat-frequency whistle interference encountered on the amateur phone bands.

One of the most serious defects of AM is its susceptibility to distortion from phase-shifts of the various components of the modulated signal. Propagation disturbances often cause selective fading of the various signal frequency components, leading to excessive intermodulation and harmonic distortion in the detector.

The circuit techniques for this type of modulation are straightforward and simple, resulting in economical and reliable equipment. For these reasons alone, AM will continue to be the main modulation method used on the amateur bands for many years to come.

### NBFM

Several years ago there were many amateurs who advocated the use of narrow-band frequency modulation. The chief advantage of this system is that it reduces certain types of broadcast interference. The modulation equipment is simple and inexpensive. So far as effectiveness is concerned, however, a narrow-band frequency-modulated transmitter is about equivalent to a 100% modulated AM transmitter operating at 25% of its normal carrier power. NBFM will give satisfactory results under good conditions over an open path—which is a state of affairs not often encountered on the amateur bands.

### Double-Sideband Suppressed Carrier

Often referred to as the Costas system (after John Costas, W2CRR), synchronous AM or DSB, this method of modulation has found some favour in amateur circles—*see* Fig. 1B.

To resolve any carrier-less signal it is necessary to provide a locally generated carrier at *exactly the same frequency and phase* as the original carrier. With the locally generated carrier re-inserted on either side of the receiver IF pass-band, one sideband of the DSB signal will be resolved. However, unless the other sideband has been rejected in the receiver before detection it will be present in the pass-band as an unintelligible signal superimposed on the intelligible one.

Because of this detection problem, DSB cannot be completely resolved on standard AM receivers having a wide IF pass-band even when the local carrier is correctly re-inserted.

Although rejecting one sideband *will* eliminate the self-interference, tuning is still more critical than with a normal SSB type signal. This is because the unused sideband must be highly attenuated to overcome the effects described.

In order to obtain proper and complete utilisation of both sidebands and to overcome detection problems, Costas has described a special receiver using synchronous detectors (Fig. 2)—obviously a complex piece of equipment. In this technique the phase of a local oscillator is automatically adjusted so that the contributions of the two sidebands reinforce each other. The output from this oscillator is fed to one of two identical heterodyne detectors and is also phase-shifted 90° for the second of the detectors.

When the local oscillator is phase-locked (exactly in phase) to the original carrier frequency, the phase-shifted heterodyne output will remain zero. Any phase difference will cause the shifted detector to provide an audio output proportional to the phase difference. This signal is used to provide a correction voltage for an automatic-frequency-control (AFC) circuit. A full description of this technique, which can be used for reception of AM, DSB, NBFM, SSB and CW, has been published by Costas ("Synchronous

Communications." *Proc. I.R.E.*, Dec. 1956). The circuit of a synchronous detector adaptor for amateur use can also be found in the *New Sideband Handbook* (obtainable from our Publications Dept.).

Apart from the reception difficulties, DSB has a number of advantages which make it attractive for amateur use: (1) no carrier (with consequent reduction of heterodyne interference); (2) higher talk-power output (compared with AM of similar input); (3) simple transmitter circuits, with easy modification of existing equipment; and (4) elimination of selective fading effects.

Despite these obvious advantages, it does not appear likely that Double-Sideband Suppressed-Carrier will be widely accepted for amateur use.

**Compatible Single-Sideband**

This system (SSB with carrier) is now being used by the long-wave "Voice of America" station located in Munich. Generally known as the "Kahn" system, it can be received on normal AM broadcast and communications type receivers—*see* Fig. 1C.

The carrier is removed by balanced-modulator techniques and after one sideband has been filtered out, the carrier is re-inserted at a controlled level. The system is subject to selective fading in much the same manner as conventional AM.

The advantages of this system are: *(a)* Half the normal AM bandwidth; *(b)* Fully compatible with existing receivers; and *(c)* Greatly improved efficiency in high-power transmitter design.

Compatible SSB is unduly complex for amateur use and at the power levels we use there are no real advantages over normal amplitude-modulation.

**Single Sideband (Suppressed Carrier)**

SSB transmits only one sideband and being carrier-less eliminates heterodyne type co-channel interference. The carrier is usually suppressed by a balanced-modulator and the unwanted sideband is phased or filtered out depending on which particular technique is in use.

The transmitted bandwidth is the same as the bandwidth of the modulating frequency and the signals handled in the transmitter amplifier chain are entirely modulation components. Normal power ratings become meaningless because voice modulation has such a complex waveform. For this reason SSB transmitters are usually rated in terms of peak power capability, or peak envelope power (P.E.P.).

It is usual for the SSB signal to be generated at some neutral frequency, *e.g.*, between 400-500 kc for crystal and mechanical filter types, or around 9 mc for high-frequency crystal filter and phasing designs. Other frequencies can, of course, be used, but the two mentioned are in common use for amateur equipment.

Frequency multiplier stages as used in AM and CW transmitters cannot be used to convert the SSB generator frequency to the desired operating frequency. Such circuits multiply the input signal and would therefore double, triple or quadruple the voice modulation frequencies! These stages are by necessity highly non-linear, so that even if the modulation frequency difficulty could be overcome, they would still produce a high percentage of unwanted signals

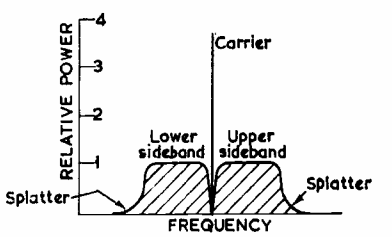


Fig.1a: AMPLITUDE MODULATION

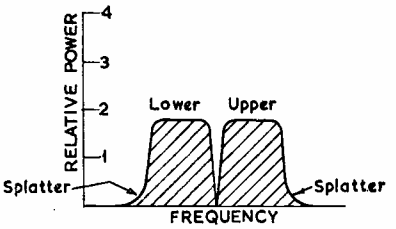


Fig.1b: D.S.B.

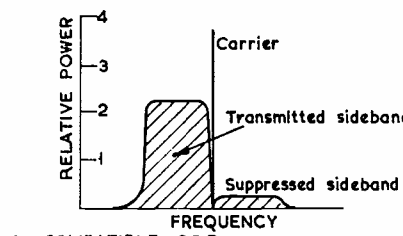


Fig.1c: COMPATIBLE S.S.B

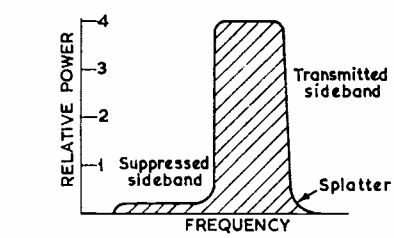


Fig.1d: SINGLE SIDEBAND

Note: All diagrams drawn to similar scale

and severe distortion.

For these reasons heterodyne techniques, as used in the superhet receiver, must be adopted to change frequency in the SSB transmitting chain. This conversion is usually made at low level and in order to avoid image problems. Large changes in frequency *e.g.*, 450 kc to 28 mc, require double-conversion technique.

As previously explained, the stages following the sideband generator must operate strictly in linear mode. The driver and power-amplifier stages are normally operated outside of the Class-C region so as to maintain high linearity. Recently, however, ZL1AAX and our own G2MA have developed linear amplifier circuits which operate under full Class-C conditions.

[over

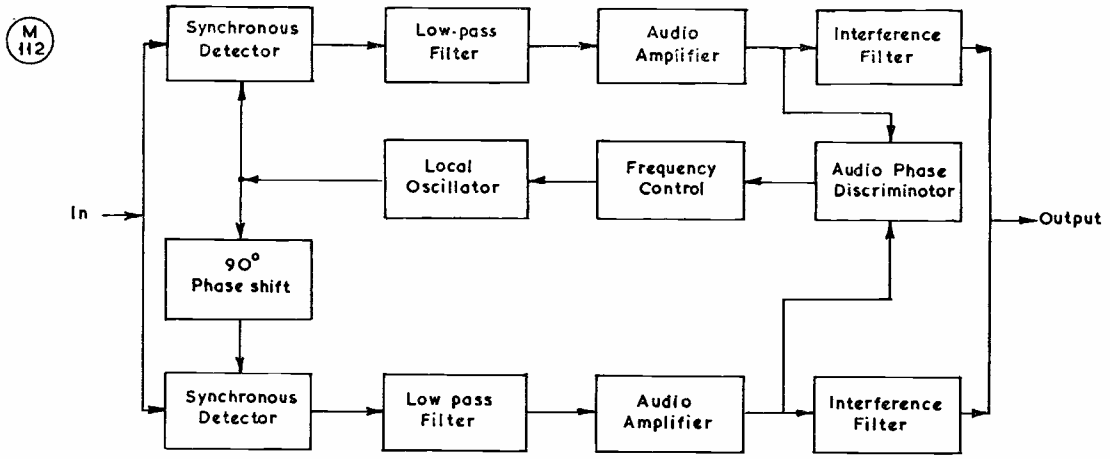



**Fig. 2. In an attempt to make double-sideband suppressed carrier communication a more feasible proposition, a highly specialised receiver arrangement has been developed, and is discussed in the text. This is a simplified block diagram of the synchronous receiver proposed some years ago for DSB working.**

Notwithstanding these new techniques, an SSB power amplifier operating in Class AB, B or C will be highly efficient. This is due to the fact that no carrier power is involved and the stage can be designed to handle high peak powers without over dissipating the valve.

At the receiver, the detection process consists of a frequency-translation of the SSB IF signal down to the audio spectrum. This is accomplished in much the same way as was described in the case of DSB, a local carrier (often supplied by the receiver BFO) being put in to replace the original signal suppressed in the transmitter.

**Useful Definition**

Because SSB is so different in concept from conventional AM, the principles are often misinterpreted. One of the clearest explanations we have heard has been put forward by A. Fisk, head of the Communications Security Section of the U.S. Naval Research Laboratory. Here is what he says about SSB:

> "Rather than considering SSB as a modulation method, we prefer to think of SSB as a frequency-translating process in which, for example, the voice spectrum is translated from the audio range of 300-3,000 cycles up to a suitable RF channel of say 6,000,300-6,003,000 cycles to facilitate transmission, and then retranslated back to 300-3,000 cycles at the receiving end, without the transmission of a carrier, mirror-image sideband, or other spurious signals."

This definition clearly shows some of the advantages that are inherent in the single-sideband type of transmission. Fisk, writing about these advantages in a recent issue of *Electronics*, goes on to say:

> "First, the RF spectrum required to transmit a given signal by means of SSB is exactly that of the original signal, thus maximum use can be made of the available RF spectrum. Second, since only essential signals are transmitted by SSB, without superfluous carrier or mirror image sideband, a power saving of at least 9dB is achieved. Third, and most important of all, SSB systems are affected far less adversely by the transmission disturbances inherent in ionospheric transmission than are AM, FM or any of the double-sideband systems."

The figure of 9dB quoted above applies only when a complete SSB system (transmit-receive) is in use. It has been calculated that 6dB is obtained from the transmitter and the remaining 3dB is the improvement in the signal-to-noise at the receiver end by cutting the IF bandwidth to half that necessary for AM transmission. Thus, if SSB is received on a standard AM receiver without suitable IF filters, this additional 3dB is lost.

The main disadvantages of SSB are: (1) increased complexity; (2) tight frequency-drift specifications; (3) non-compatability with existing equipment; (4) reception problems; and (5) severe linearity requirements for both the transmitter and receiver.

Taking it all in all, while the protagonists for SSB are strongly in its favour, it seems fair to say that AM systems will be standing up beside SSB for a long time yet, particularly on the amateur bands.

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After the foregoing had been written, the December 1959 issue of *Proc.I.R.E.* was received, in which there is an important and interesting article by J. P. Costas, W2CRR, of the G.E.C., N.Y. He challenges the whole basic concept of improving communication efficiency and relieving congestion by narrowing bandwidths. On the contrary, by taking amateur experience and operating methods as the working example, he is able to show by mathematical analysis that broad-band techniques as normally used

by amateurs have definite merit in maintaining communication in the face of interference—because the narrower the bandwidth, the more susceptible it is to jamming.

Taking this further, Costas shows that a military communication system is easiest and cheapest to jam where narrow-band fixed-frequency techniques are used, and most difficult and expensive to disrupt when working broad-band with constant alterations of frequency, as in the normal amateur procedure.

For many people, this original and provocative line of thought will be the explanation of why it is that, in spite of what appears to be the appalling congestion on our bands—not equalled in any other part of the spectrum—it is still possible for most amateurs to make entirely satisfactory contacts, almost at will. And the military implications of the argument are obvious!—*Editor.*

# THE GENEVA OUTCOME

## AMATEUR BAND POSITION — SUMMARY AND EXTRACTS

IN the middle of January we received, from the Director of Public Information, International Telecommunications Union, the documents entitled *Final Acts of the Administrative Radio Conference, Geneva, 1959*, with appropriate *Appendices* and the *Final Protocols of the Convention* — making in all several large and handsome volumes, weighing together about 5 lbs. in the English-language version. It is within these masterly compilations, very well produced and printed, and published within a week or two of the conclusion of the Conference, that the answers lie on the shape of things to come as regards allocations over the whole frequency area 10 kc to 40,000 mc.

Here, we are of course concerned only with the allocations and regulations respecting the Amateur Service, and mainly in Region I at that. For the purpose of frequency assignment, the world is divided into Regions, which may be roughly defined as: Region I, U.K., Europe, U.S.S.R. and Africa; Region II, North and South America; Region III, Far East and Australasia — with the Tropical Zone, approximately the Equatorial Belt, lying across parts of all three Regions. For many of the frequency allocations, the Regions are treated a little differently, but the Amateur Bands have as far as possible been made common to all Regions.

Following is a summary of the Amateur Frequency Allocation, band by band:

**1800-2000 kc, Top Band**

" In Austria, Denmark, Finland, Ireland, Germany, Rhodesia, Nyasaland, United Kingdom, Czechoslovakia, and South Africa administrations may allocate 200 kc of the 1715-2000 kc band to their amateur service, taking such steps as may be necessary to prevent interference with the fixed and mobile services of other countries, and the mean power of any amateur station shall not exceed 10 watts " — so says *Footnote 145* to the 1605-2000 kc column for Region I.

This should mean that in the U.K. we continue on Top Band as at present, perhaps with the amateurs of some other of the countries named as regular occupiers. But in any event whatever allocation we have will be shared, on a non-interference basis. For Regions II and III, the frequency area 1800-2000 kc is a definite amateur assignment, shared as in the U.K. at present.

**3500-3800 kc, 80 Metres**

Allotted on a shared basis in all Regions, being 3500-4000 kc in Region II and 3500-3900 kc in Region III. The main sharing elements are fixed stations, with " mobile, except aeronautical mobile " marked in for Region I, 3500-3800 kc. For Australia, Region III, 3500-3700 kc is an exclusive allocation.

**7000-7100 kc, 40 Metres**

Marked as an exclusive amateur allocation in all three Regions. For Region II, U.S., Canada and the American Continent, the band is extended to 7300 kc. In South Africa, there is an additional allocation of 7100-7150 kc. These arrangements did not satisfy several countries, in particular Pakistan, who " reserves her position on Resolution 10," which lays it down that broadcasting should be prohibited in the 7000-7100 kc amateur band.

**14000-14350 kc, 20 Metres**

Exclusive amateur allocation in all three Regions, except the U.S.S.R. reserves the right to use 14250-14350 kc for its own fixed services. If this area does become thickly populated with Russian stations, it will in effect reduce our band to 14000-14250 kc.

**21000-21450 kc, 15 Metres**

Exclusive amateur allocation in all three Regions, without qualification.

**28.0-29.7 mc, 10 Metres**

Exclusive amateur allocation in all three Regions, without qualification.

**50.0-54.0 mc, Six Metres**

There is no allocation at all for Region I, U.K. and Europe, but the amateurs of the Belgian Congo, South Africa, Rhodesia and Nyasaland are allotted 50-54 mc, while in Australia the band is 56-58 mc. For Region II, the Americas, there are no qualifications or reservations on the amateur use of the 50-54 mc band.

**70 mc, Four Metres**

There are no official amateur allocations at all, for any Region, but under the generally recognised right of

all countries to control their own (territorial) telecommunication systems, the G.P.O. is continuing to permit the use of 70.2-70.4 mc for U.K. amateurs.

**144-146 mc, Two Metres**

Exclusive amateur allocation for all three Regions. The only qualification is that in July 1963 the Australian assignment will become 148-150 mc. Additionally, both Regions II and III have 146-148 mc, making their two-metre band 144-148 mc.

**UHF/SHF Allocations**

The following are the bands in the UHF areas allotted to Region I amateurs, mostly permitted on a " secondary user " basis only:

420-450 mc (secondary user); 1215-1300 mc (secondary user); 2300-2450 mc (secondary user); 5650-5850 mc (secondary user); 10,000-10,500 mc (secondary user); and 21,000-22,000 mc (exclusive). In Region II, they also have a shared band at 220-225 mc, which is much used by American amateurs.

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So much for what has been agreed — but, as explained in the Editorial in this issue, it may not be quite the end of it, as there was considerable minority dissatisfaction with some of the decisions, and it may be that eventually the " Committee of Seven " will come out with some quite new proposals for the general use of the 4.0-27.5 mc range of frequencies, within which most of the difficulties lie. However, any such recommendations will not emerge for some years yet.

It should also be noted that the date on which the new regulations come into force is more than a year hence — May 1st, 1961. Until then, we continue as at present.

**Amateur Station Regulations**

Article 41 of Chap. X of the Regulations lays down the following in respect of amateur stations:

1. Communication between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radio communication.
2. (1) Transmissions between amateur stations shall be made in plain language and shall be limited to messages of a technical nature and to remarks of a personal character for which, by reason of their unimportance, use of the public telecommunications service is not justified. It is absolutely forbidden for amateurs to transmit international communications on behalf of third parties.
2. (2) This regulation may be modified by special arrangements between the administrations of countries concerned.
3. (1) Any person operating an amateur station shall have proved that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code. This requirement may be waived in the case of stations making use exclusively of frequencies above 144 mc.
3. (2) Administrations shall take such measures as they think necessary to verify the technical qualifications of amateurs.
4. The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the technical qualifications of the operators and the conditions under which these stations shall work.
5. (1) All the general rules of the Convention and of the Radio Regulations shall apply to amateur stations. In particular, the emitted frequency shall be as stable and as free from spurious emissions as the state of technical development for such stations permits.
5. (2) During the course of their transmissions, amateur stations shall transmit their callsigns at short intervals.

**Amateur Station Callsigns**

In Section III of Article 19, Chap. V, it is laid down that, for amateur stations, combinations commencing with a digit when the second character is the letter O or I shall not be used.

It is also laid down that the official international symbol for the designation of an amateur station is AT, *i.e.* radio amateur stations can be described in correspondence and otherwise simply as AT Stations.

**Procedure Signals**

Of the Q-Code as commonly used by amateurs, the following groups, among others, are recommended as radio-*telephony* procedure signals: QRA, QRK, QRM, QRN, QRU and QSL. If sent as a question, the letter B is added, and the Letter Spelling Table (or phonetic alphabet) used to enunciate the group, *e.g.* " Quebec Sierra Lima Bravo " for " QSL?", meaning " Can you acknowledge receipt?" or in AT station parlance " Will you please send me your QSL card?".

Two very good signal reporting codes are recommended in Appendix 14 — though intended for commercial circuits, they could very well be adopted at AT stations for more meaningful signal reporting. Both could be used for Phone working, though SINPO is intended for telegraphy and SINPFEMO for telephony. SINPO means Signal strength-Interference-Noise-Propagation disturbance-Overall rating, the rating scale being 5-1, from " excellent " to " barely audible." A CW signal given as 44334 would mean that it was of good strength, with slight interference, moderate noise, moderate propagation disturbance (or fading), and of good overall rating. There is no tone standard, but in fact nowadays the T-code report is hardly significant!

The SINPFEMO Code brings in modulation, and the meaning is defined as Signal Strength-Interference-Noise-Propagation disturbance-Frequency of fading-Modulation quality-Modulation depth-Overall rating, the scale being 5-1 as before. Thus, a signal could be given as 54322453, meaning that it was of excellent strength with slight interference and moderate noise, subject to severe propagation disturbance with fast fading, but being of good quality with maximum modulation, giving an overall rating of fair reception.

Finally, it is worth mentioning that the group OK, meaning " we agree " or " that is correct," is taken into the official list of Procedure Signals.

## MACCLESFIELD EXHIBITION STATION

During an exhibition to be held at the Town Hall, Macclesfield, Cheshire, from February 27 to March 5, the Macclesfield & District Radio Society will be operating a GB3 station on all bands 1·8 to 28 mc, CW, AM, and SSB, the operating periods being 10.0 a.m. to 10.0 p.m. on the Saturdays, 2.00 p.m. to 10.0 p.m. on the Wednesday, and 5.00 to 10.0 p.m. on other week nights. QSL will be by special card and the address for QSL's, and all correspondence relating to the event, is: B. Haywood, G3MKR, Penarth Cottage, 15 Tunnicliffe Street, Macclesfield, Cheshire. Stations worked are specially requested to send their own QSL direct for the display of cards on the society's stand.

# VHF BANDS

A. J. DEVON

**Meteor Scatter EDX—**

**Projects in Space—**

WHILE a lot of quiet work continues to be done on the VHF bands, there has been only one period during the month when conditions have given any sort of an opening for GDX—and that was between January 5th and 10th, when the glass went high, remained steady and the evening weather was foggy and "warm for the time of year." Earlier than this, on December 30, the near EU's were getting into the southern part of the country—the barograph trace for this period shows a sudden climb, the general line being very much up-and-down during that week.

But the most important news for the period comes from G3HBW (Bushey Heath) who has, indefatigably, persevered with his meteor scatter investigations. During the Geminids appearance, over December 11-15, some 26 hours of operating with OE1WJ produced signals heard both ways, but no actual contact. For the Quadrantids arrival on January 3-4, further schedules were arranged—and, at last, on January 4, from 0145 to 0155 GMT, a two-way QSO was obtained with OE1WJ, signal reports being S26 for OE1WJ and S44 for G3HBW, which were acknowledged both ways. The "S" code used has been devised for investigations under meteor shower conditions, the figures being as in the usual RS scale. Congratulations are due to both G3HBW and OE1WJ for this very interesting result, the first such contact made from the U.K., and the fifth in Europe. And it gives Arnold his 17th country, bracketing him with ON4BZ in one of the two "hot seats" at the top of Countries Worked (not shown this time due to space being a bit tight). As G3HBW says, it is doubtful if his contact—the very first G/OE, and hence another new one for Two-Metre Firsts, which we show from time to time to remind people of what has been done, and what remains to be done—could have been made by any other propagation mechanism. So it is of more than ordinary interest.

At OE1WJ, who is in Vienna, the transmitter runs 180w. to a pair of 3C24's with a straight 4/4, whereas at the G3HBW the transmitter has 4-125A's in push-pull taking 750w. and the aerial is a 28-ele beam.

### Six Metres

Though the 50 mc band is not a transmitting channel in the U.K., it has always been an interesting one for listening, and for cross-band contacts Six/Ten, particularly with the States and South Africa. Our old friend Louis of G3EHY (Banwell, Som.)—still interested and active on VHF—sends a comprehensive report, covering reception for October-early January, from which it is evident that though Trans-Atlantic signals were coming over well at times, particularly during December up to about 49 mc, there had not been a real 6-metre amateur opening (by January 14, at least). A wide variety of American signals were heard at G3EHY in the 40 mc frequency area, consisting of police transmissions, post office services and the "pageing system" on 43·58 mc: this is supposed to be a short-range service (up to about 30 miles) but on many occasions stations like KAA, KAF, KIE, KIF and KIG, from Miami, Fla. to Boston, Mass., were coming in at S9-plus at Banwell, 3,000 miles away. Incidentally, this subscriber-calling service is on the same lines as that now being tried out in the Lancashire area by the Post Office.

### Station Notes

Reports this month have not been very numerous—certainly, we have heard nothing from the various people who wrote in to ask why "VHF Bands" did not appear in December!—but it is ever thus when conditions are not productive of DX.

G3DO (Sutton Coldfield) goes to 42C in All-Time Counties, and G3GSO (Derby) is up to 25C in the Annual—for which we would like to see a lot more entries. G3EHY claims two more for Countries, with DL3VJ and F3LP worked during the September opening.

G2DDD (Littlehampton) is one of the keen 70-cm operators and is now at 16C on that band—which is very creditable, when one remembers that he is right down on the South Coast.

In proof of the fact that there is a little more doing on the two-metre band than might be supposed by casual listening, SWL Hodson (London, N.13) sends a calls-heard list which totals nearly 100 different stations received by him during the month to January 20! The great majority of these are in the London and Home Counties area, though his list also shows that a few more distant G's were getting down south during that period. Among the old hands noted are G2HCG, G2MV, G2RD, G3BLP, G3FZL, G3GBO (home on leave), G3HBW, G3IIT, G3KEQ, G4DC, G5MA, G6LL, G6TA and G6YP and among the very new ones are G3NAT, G3NGS, G3NNK and G3NWG.

G2CIW (Birmingham) was pleased (and surprised!) to find no less than six stations on the 70-cm band on January 10—he heard or worked G2FNW, G3BA, G3KEQ, G3LAY and G3HBW. G2CIW and G2FNW keep a weekly schedule on 70 cm, 1830 clock time on Sundays, and find that signals are always excellent over their 50-mile path: after making contact, they call and

listen round the band, and would be very happy if others would join them. It is a convenient sort of time for most people. G2CIW says that he and G3HAZ now feel that the whole 6 mc of the present 430 mc band is far too wide to search properly after a CQ—they suggest that we should use only 2 mc, say 434 - 436 mc, and they wonder what other 70-cm operators think about this ?

GM3DIQ (Kilbarchan) writes that he has not been on a great deal " because the cooling fan for the 4X150's makes so much noise that it tends to waken the family " —however, Clarke is putting that to rights, and will be with us again soon !

From VE2LI, *ex*-G5LI, and now of Montreal, we have a long and interesting letter : he is an active two-metre man out there, and gets 700w. RF *output* from a pair of 4CX250B's, the beam being two 4-ele flat-tops stacked at 3/4-wave; the SWR of the whole system is about 1·5 : 1 only. As George says, the simpler the aerial system, the easier it is to feed it the power and the more certain is its radiating efficiency — complicated multi-section arrays practically never work " as per book " and unless one has the right sort of test gear (and knowledge) to set up the system and get all sections properly matched, much of the RF is lost in heating the feed lines. He also has some pungent comments on the noise-factors claimed for certain receiving arrangements, pointing out that in a location which is anyway noisy due to man-made interference, a dB more or less in the NF of the receiver itself means little. His own converter is a cascode arrangement using 417A-6AK5 triode mixer-12AT7 osc.mult.-6AH6 cathode follower, into an NC-300 tuned across 30 mc; the pre-amp. is a 416B planar triode, connected grounded-grid, and the measured NF is about 3·5 dB.

Results from VE2LI have been extremely good, with 350-400m. contacts possible at almost any time : some Aurora DX has been worked, and regular schedules kept with VE/W stations up to 400 miles or so. In view of G3HBW's results, already mentioned, of particular interest is the fact that VE2LI ran a schedule with W4RMU during the last Perseids appearance and heard him on a couple of 15-sec. bursts at RST-579, though no QSO resulted; the path distance is just about 1,600 miles.

**Dinner Meetings**

The forthcoming event is the London VHF Group's annual dinner on February 13, of which details were given on p.488 last month—apply to G4KD right away if you have not already booked.

We are asked to announce the arrangements for the Scottish VHF Convention, to take place on Saturday, March 12, at the Brabloch Hotel, Paisley. Requests for tickets (at 21s. 6d. all-in) and for hotel accommodation to be arranged should be addressed to : W. C. Bradford, GM3DIQ, 6 Langside Park, Kilbarchan, Renfrewshire. The GM's are hoping to see a large contingent from " south of the Border " for what is always a very interesting meeting.

**Matters Arising — In Space**

With the plans that are afoot for space research, it is of great interest to see how much depends upon VHF communication. In the recent Geneva settlement, a whole range of frequencies is allocated for Space and Earth-Space working, as follows (all in megacycles) : 136-137, 400-401, 1427-1429, 1700-1710, 2290-2300, 5250-5255, 8400-8500, 15150-15250 and 31500-31800 mc. There is also a specal allocation of 19·99-20·10 mc, already much used by the Russians. The main frequency has been agreed as 136 mc, for future international space work.

Another group of frequencies has been assigned to the radio astronomers, of which the most interesting is 1400-1427 mc, as it is at 1420 mc* that the " hydrogen line " occurs; this may be loosely defined as " the natural frequency of neutral hydrogen " and its significance lies in the fact that this is a practicable frequency for communication with whatever intelligent beings there may be in whatever worlds there are beyond the limits of our own small part of the Universe. A start on this staggering project is being made shortly, using the 85ft. telescope at the American Radio Observatory at Green Bank, West Virginia. This instrument has a range of only about 8 light years, but a bigger one is in hand which will extend the range to 60 light years—though even that will not be enough, as for full exploration ranges up to at least 100 light years are considered necessary. A slight practical difficulty underlying all these possibilities is that man's span of life on earth may not be sufficient for any one individual to send a message and get the answer -so at first the intention is reception-only, to see if there is anyone out there trying to communicate with us.

More immediately, and much nearer at hand, the Americans are proposing to orbit free balloons which will act as more or less permanent VHF reflecting surfaces; these will be up to 100ft. in diameter, with a metallised surface for good reflection, and they will be there for anyone to use. One's first thought is that they may create more problems than they solve, because it is conceivable that there will be a great deal of unwanted VHF reflection. In the meantime, the high-flying atmospheric balloons now being tried in the States for the same sort of purpose are already giving remarkable results in the reflection of VHF signals (such as TV transmissions) to great distances.

**In Conclusion**

With those thoughts we leave you, remarking only that the date for catching the next issue is **February 17**—when we hope to have more space and the Tables in again. Address it all to A. J. Devon, " VHF Bands." With you again on March 4 — till then, *73 de A.J.D.*

* *actually 1420·4056 mc.*

# EXPEDITION TO RATHLIN ISLAND, GI

## EXPERIENCES SIGNING GB3RI SEPTEMBER 11-14, 1959

IT may be remembered that in the September issue of SHORT WAVE MAGAZINE (p.244) we mentioned the proposal for a GI expedition to Rathlin Island, which lies 6 miles off the north coast of Co. Antrim, Northern Ireland. The object was not only to work some DX, but also to commemorate the fact that 1959 was the 50th anniversary of the award of a Nobel Prize to Marconi—moreover, Rathlin Is. was the place to choose because some research by the historian of the Marconi Co. disclosed that as long ago as 1898 Marconi provided a wireless link between Rathlin Is. and Ballycastle on the mainland; this was for Lloyds, concerned for the safety of shipping in the area, and it was actually the very first commercial wireless installation in the history of radio communication.

Nowadays, Rathlin Is. has a small population, and there is a regular thrice-weekly mailboat service. It was also established that 230v. AC would be available from a local generating plant, so it was decided to use commercial equipment and to run full power. By this time the project, inspired by GI3HXV and GI3KYP, was beginning to catch the interest of other GI's, and so it was proposed to re-establish Marconi's old link by putting up another amateur-band station at his original mainland site near Ballycastle.

The Island party had been allotted callsign GB3RI for the three-day period September 11-14, 1959, and the mainland station used GI3MIZ/P. The gear for GB3RI included a Labgear LG.300 complete with PSU/Modulator, an Eddystone 888A receiver, and two collapsible aerial masts. Such items of equipment as tents and stoves had also to be taken, as the crossing party consisted of GI3HXV, GI3ILV, GI3KVQ, GI3KYP, GI3MUS, GI5UR and SWL Dillon. Accommodation for GB3RI was found in a barn, with the tents for living in. The aerial system consisted of two dipoles, one for 15-20 metres and the other for 40-80 metres, using the shorting link method to bring in the extra length for the lower frequency band in each case; this meant aerial adjustments when changing bands, but it worked perfectly satisfactorily. For 10 metres, GI3ILV and GI3KVQ constructed a Cubical Quad on the site.

Starting up on 15m. phone at 1535 on September 11, the first call from GB3RI was taken by W4TBU; from then on, phone and CW were worked on all bands as DX conditions changed. The morning session on 40m. phone on Sunday, September 13, produced the inevitable G pile-up, but TF3TP was worked through it before changing over to Ten for the afternoon.

A break-down of the GB3RI log shows that between 1535 GMT on September 11 and 1030 GMT on September 14, 575 contacts were made in 46 countries and 32 states, with all continents and W call-areas covered. VK5EU and ZL3GG were worked on 21 mc phone, and VK5NO on CW; the first phone contact on 14 mc was with ZP5CF, and the first of 80m. with GI5SJ. QSL's for GB3RI are being handled by GI3HXV, *QTHR*.

Some 160-metre contacts were also made by day visitors GI3LZS and GI3NEB, signing GI3NEB/A, on the Saturday.

The party acknowledges with grateful thanks the help and support given during their visit by Mr. T McCuaig, of Rathlin Is., whose accommodation and transport they were able to use, he also providing the power supply.

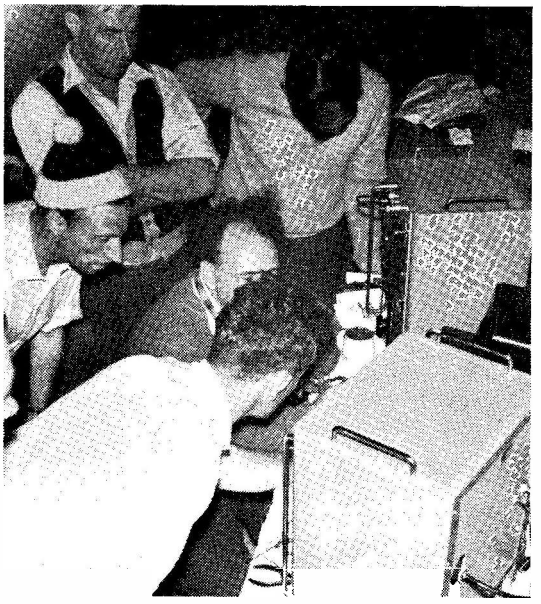
### Mainland Station

This was run by GI3AXI and GI3MIZ, assisted by GI3HCG, from the actual site at which Marconi had erected his shore station for the Rathlin Is. link—indeed, they were assured by the local farmer that he had himself assisted Marconi to put up his aerials! The gear used consisted of an HRO and "Command" transmitters modified for the amateur bands.

Though GI3MIZ/P worked a good deal of HF-band DX, they had great difficulty in raising GB3RI, six miles away, getting only RS-35 on 80 metres! Later, a better contact was obtained on Ten. The mainland station was kept on the air during Saturday-Sunday, September 12-13, having duly re-established the Ballycastle-Rathlin Is. link, first forged by Marconi more than 60 years before.

The foregoing has been taken, by invitation, from notes in the Nov/Dec issue of *Gee Eye*—which did not reach us until early-January, so making this report on the Rathlin Is. expedition rather later than it might otherwise have been. For the GI's concerned, their effort is now no more than a memory. Never-

**During September 11-14, 1959, the Rathlin Island Expedition was signing GB3RI, operated by a crew of GI's. The trip was by way of being a commemoration of Marconi's Nobel Prize in 1909, he having installed a wireless link (for Lloyds) between the Island and the mainland in 1898; this was the first demonstration of the practical use of wireless. Rathlin Island is six miles off the north coast of Co. Antrim, N. Ireland. In the photograph are, left to right, standing: SWL Dillon, GI3HXV, GI3LZS, GI3KYP behind GI5UR (with camera), GI3NEB, GI3KVQ, host of the party, and GI3ILV extreme right.**



**For the Rathlin Is. expedition in September, signing GB3RI, the gear used consisted of a Labgear LG.300 with PSU/Modulator, and an Eddystone 888A receiver; ample power was available from a local generating plant, which consumed 25s. worth of fuel in the three-day period. Using CW and phone on the five bands 80-10 metres, 575 contacts were made in 46 countries and 32 American states.**

theless, they are to be congratulated on their enterprise and its success—and we might also note that this is one expedition which, publicised in advance, *did* come off as scheduled!

## RADIO COMMUNICATION BRANCH—R.N.R.

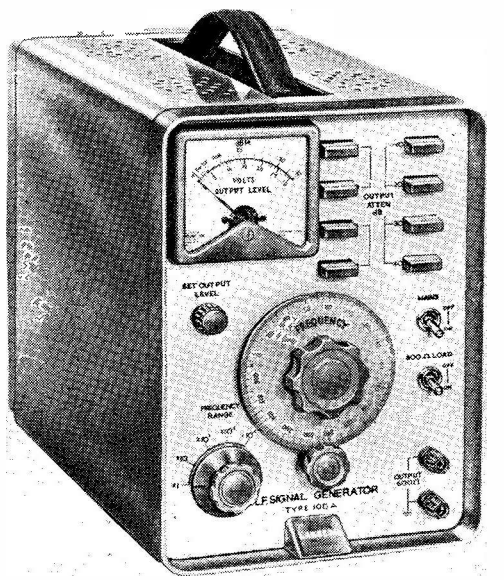
The Royal Naval Reserve offers, through its Radio Communication Branch, facilities to those with an interest in the sea and in radio to join an active organisation which is a reserve formation for the Royal Navy. There are 46 R.N.R. Wireless Training Centres in the United Kingdom, administered by nine Wireless District Hq., all formations being commanded by volunteer officers of the Royal Naval Reserve, many of whom hold amateur licences. The training given to volunteers (who should be between the ages of 16½ and 26 for men, and 17½ and 40 for women) includes 14 days at an R.N. Barracks, and in succeeding years a period at sea in H.M. ships. All out-of-pocket expenses are paid to volunteers when attending the Training Centres, and full R.N. pay and allowances when in barracks or at sea. Qualified operators may obtain, on loan, a CR-100 modified as a transceiver for operation at home on Naval training channels in the 2·0-8·0 mc frequency area; a small allowance is also paid for maintenance of the gear. The Hq. of the Wireless Districts and the Training Centres are conveniently located, with a chief radio communication supervisor, R.N., attached for the instruction of volunteers; a lot of the training is carried out over the air, using the CR-100 transceiver. Those interested in knowing more about a very worth-while Service reserve organisation, which already has many members all over the country, should get in touch with:

Staff Communication Officer,
Office of the Admiral Commanding Reserves,
Queen Anne's Mansions,
Westminster, London, S.W.1.

Readers who were at the Amateur Radio Exhibition in November will remember that the Radio Communication Branch, R.N.R., had a fully-equipped stand with working exhibits. What they may not have known was that the officer in charge was G5IZ (Cdr. F. H. Humphris, R.N.R.), of Solihull, Warks.

## ORDERING THE "CALL BOOK"

As explained on p.498 of the January issue of SHORT WAVE MAGAZINE, there has been an important change in the publication policy of the *Radio Amateur Call Book*, for which we are agents for Europe and the U.K. Though we shall always try to maintain stocks of the two sections, it is already clear that it will be essential for those who require the *Call Book* to order forward, as we are now unable to supply the Abridged Winter Edition. Next issues are the American Section, at 41s. 6d., and the Abridged ("foreign," non-American) at 25s., due over here in April, and entitled the Spring Edition. We can take orders immediately for either (delivery during April) or for the two volumes *together* at the special price of 60s. post free. The complete U.K. listings appear only in the half-yearly (April/October) issues of the 25s. edition.




**The new Labgear Sine/Square-Wave Signal Generator covers the range 10 cycles to one megacycle.**

# NEW QTH's

**This space is available for the publication of the addresses of all holders of new U.K. callsigns, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the U.K. section of the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.**

**EI3AG,** W. Thompson, 76 St. Finians Park, Moville, Co. Donegal.

**EI4AG,** J. Maher, 65 Meadowbank, Lower Dodder Road, Rathfarnham, Dublin.

**G2AOX,** W. Browning, M.I.A.A., M.I.M.I., 47 Brampton Grove, Hendon, London, N.W.4. *(Re-issue.) (Tel.: HEN 9525.)*

**G2LP,** E. A. Knight, 132 Elgar Avenue, Tolworth, Surbiton, Surrey. *(Re-issue, formerly G3BNZ.)*

**G3NFQ,** J. A. Cawley, Brae-Val, Knoll Road, Camberley, Surrey.

**G3NSS,** T. R. Spain, 147 Wolverhampton Road, Birmingham, 32.

**G3NSS/A,** T. R. Spain, 35 Becketts Park Drive, Leeds, 6, Yorkshire.

**GI3NSV,** M. C. Donnelly, Tullykevan, Moy, Co. Tyrone.

**GM3NUP,** J. L. D. Targett, Building 60, R.N.A.S., Machrihanish Aerodrome, Campbeltown, Argyll.

**G3NUT,** J. Chapman, 41 Wakefield Drive, Leasowe, Wallasey, Wirral, Cheshire.

**G3NVE,** E. W. Phillipson, 67 Newport Street, Goole, Yorkshire.

**G3NVG,** L. Robson, 42 Asterley Drive, Acklam, Middlesbrough, Yorkshire.

**G3NVJ,** G. W. Hubber, 9 Cardrew Terrace, Redruth, Cornwall.

**GM3NVQ,** G. Martin, 42 Rose Street, Dunfermline, Fife.

**GM3NVT,** A. Grassam, 5 Bantaskine Gardens, Falkirk, Stirlingshire.

**GM3NVU,** G. A. MacLauchlan, 14 Mannfield Avenue, Bonnybridge, Stirlingshire.

**G3NVZ,** W. J. Nottingham, 48 Sandy Lane, Shrivenham, Swindon, Wilts.

**G3NWE,** N. D. Chubb, 53 Abbotsbury Road, Kensington, London, W.14. *(Tel.: Park 9382.)*

**G3NWF,** M. V. Bond, 19 Chesham Avenue, Petts Wood, Kent.

**G3NWJ,** A. R. Porter, 111 Evington Drive, Leicester, Leics.

**G3NWP,** J. Day, 60 Whitfield Avenue, Glossop, Derbyshire.

**G3NWT,** E. G. Harrison, M.Sc., 228a, Derby Road, Sandiacre, Nottingham. *(Tel.: Sandiacre 2339.)*

**GM3NXA,** P. Gordon, 2 Kintillo Road, Bridge of Earn, Perthshire.

**G3NXC,** A. B. Plant, 178 Clay Lane, South Yardley, Birmingham, 26. *(Tel.: Acocks Green 3109.)*

**G3NXD,** R. C. Shuck, Tregarron, Lowe Lane, Wolverley, Kidderminster, Worcs.

**G3NXJ,** B. James, 50 Keswick Drive, Warndon, Worcester, Worcs.

**G3NXS,** F. A. Shaw, 43 Tann Road, Finedon, Northants.

**G3NXT,** W. H. Fletcher, Holmdale, Martin, Lincoln.

**G3NXU,** B. Booth, 18 Broadlands Avenue, Keynsham, Bristol, Glos.

**G3NXY,** D. C. Joy, 160 Manor Farm Road, Bitterne Park, Southampton, Hants.

**G3NYA,** L. D. Strange, 34 Heathlands Road, Sutton Coldfield, Warks.

### *CHANGE OF ADDRESS*

**G2AHB,** W. H. C. Jennings, 30 Norwich Road, Thornton Heath, Surrey.

**GW2BBO,** L. W. Osmond, 6 Chaucer Close, Penarth, Glam.

**G2BYK,** J. C. Payne, 14 Osborne Road, Bridport, Dorset.

**G3AKX,** R. G. Lascelles, 358 Park Lane, Macclesfield, Cheshire.

**G3COP,** D. Iles, 23 Dryleaze Road, Stapleton, Bristol, Glos.

**G3EMW,** R. D. J. Leslie, 108 Breakspear Road South, Ickenham, Uxbridge, Middlesex.

**G3HMB,** I. E. Elliot, Stoneleigh, Rillage Lane, Torquay, Devon.

**G3ICH,** P. N. Pitt, 8 A.M.Q., Kingsway Gardens, Westville, Hucknall, Notts.

**G3IEX,** D. J. Roper *(ex-DL2BF)*, 293d, Sapphire Road, R.A.F. Station, Henlow, Beds.

**GM3JRP,** R. Pollock, 386 Inverleith Street, South Carntyne, Glasgow, E.2.

**G3KAD,** T. N. Ayscough, Quayside, Port Carlisle, Carlisle, Cumberland.

**G3KFW,** G. Ripley, 47 Rough Common Road, Canterbury, Kent. *(Tel.: Canterbury 3170.)*

**G3KFX,** J. Bays *(ex-DL2XK)*, The Towers, Bentley, Suffolk.

**G3LET,** P. A. Hobbs, 61 Southborough Drive, Westcliff-on-Sea, Essex.

**G3LHZ,** M. J. Underhill, Munzil, Whitehall Drive, Ifield, Crawley, Sussex.

**G3MHD,** A. E. Williams, 51 Poley Road, Stanford-le-Hope, Essex.

**G3MMW,** G. W. Ilbury, Old Rectory Cottage, Caston, Attleborough, Norfolk.

**G3MOE,** J. H. Moxey, 11 Westbury Road, Leckhampton, Cheltenham, Glos. *(Tel.: Cheltenham 4217.)*

**G3MPS,** D. Pack, 107 West Heath Road, Cove, Farnborough, Hants.

**G3MSS,** J. Savage, Barnside, Bury Street, Ruislip, Middlesex.

**G3MWI,** V. A. Lane, 36 Bleasdale Road, Woodhouse Park, Manchester, 22.

**G3MYS,** H. E. Bagguley, Oakdene, Priory Road, Mansfield Woodhouse, Notts.

**G3NAK,** G. Mallinson, 145 Huddersfield Road, Meltham, Huddersfield, Yorkshire.

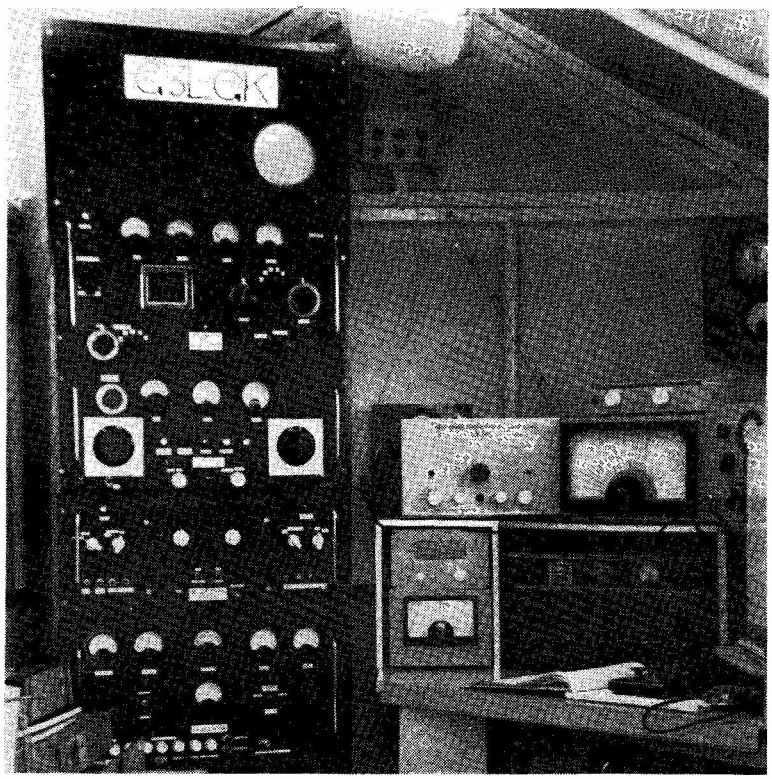
**G3NFD,** N. V. Parker, 11 Anne Crescent, Durrington, Wilts.

### *CORRECTION*

**G3JIE,** D. C. Youngs, 53 Salisbury Road, Norwich, Norfolk, NOR.34.T.

# THE OTHER MAN'S STATION

## G3LGK




SHOWN here is the station owned and operated by B. M. Sandall, of Tybryn, 21 Dale View, Ilkeston, Derbyshire —he has been licensed for three years and at present is more interested in constructional work than in operating. With the obvious exception of the AR88 receiver (which has not been modified), all the gear in the picture is home-constructed, and was built from scratch in about 18 months.

The 6ft. 6in. rack contains a complete 150-watt phone transmitter for 80-10 metres inclusive, with facilities for switching power and audio output to any additional external transmitter, *e.g.* two-metre gear. The two bottom units are power packs, each using 866A's for efficiency, in a bridge circuit—one side for PA and the other for modulator. Next comes the audio section, using 805's in the modulator, driven by a new (G.E.C.-developed) cathode follower arrangement with KT88's. The modulator output transformer is a Woden UM4, to ensure ample audio power-handling capacity.

Following upwards comes a comprehensive control unit, housing the relay power supplies and also the mains distribution fuses for the various units. On a sub-chassis in this section is a crystal-heterodyne frequency control unit, which can be used as an alternative to the VFO, providing nearly 200 spot frequencies in the 80-metre band for multiplication into the band required. Above this panel is the wideband-coupled multiplier, using home-made couplers, feeding an 807 run at 300v. on the plate; this stage is pi-coupled into the next chassis, which is an 813 PA with the usual pi-network output tank circuit.

The top deck is eventually to contain a Z-Match aerial tuning unit and a 6-in. monitor oscilloscope. The rig as a whole contains 22 relays, and a feature of particular interest is a 300v. HT supply pack which, by using 866A's, will give up to 800 mA at a regulation within 5 volts of nominal; this power pack is built on the exciter deck and is used as the HT supply for all gear in the station requiring HT at 300v.

On the operating table, left to right, are: Jason FM tuner standing on 160-metre VFO, AR88D receiver, and record player; the shelf above accommodates an AF sine-wave generator, externally tuned VFO for the main transmitter, the 160-metre transmitter and a crystal-controlled frequency standard.

Interests at G3LGK other than constructional work, not yet finished, are operating the 160-80-40 metre bands, with a bit of HF-band DX as the opportunity arises. The next project is a three-band Cubical Quad, which may, of course, quicken the DX interest, as the present aerial is a 67-ft. doublet. As G3LGK is on the technical staff of the East Midlands Electricity Board, we may assume that his layout—which is a very interesting one—conforms strictly to the wiring and safety regulations laid down by the Authority!

# THE MONTH WITH THE CLUBS

## By *"Club Secretary"*

**(Deadline for March issue : February 12, 1960)**

***(Address all reports for this feature to "Club Secretary")***

DURING the past few months there has been an increasing tendency for Club Secretaries and Scribes to send in, as information for this feature, a copy of their monthly broadsheet, Newsletter or whatever it may be called.

This is an excellent way of making sure that the Club gets a mention in these columns each month, and we also welcome it as a means of seeing in some detail what the Clubs are producing in the way of new ideas.

There is one small disadvantage—not to us, but to the Clubs concerned. Very often the News Letter does not go far enough ahead (for our purpose) with announcements of coming meetings ; it may publicise the meetings that are scheduled to take place some time after its own publication, but by the time our next monthly issue comes round, they are already over.

What we would like to have from all reporting Clubs is this : A copy of the News Letter, or whatever the Club publication is ; *plus* a separate piece of paper with dates and details of meetings due to take place after our own publication date.

For instance, our deadline for the March issue is (as you will see above) February 12 ; the issue concerned appears on March 4 ; so that prior notice of meetings from, say, March 7 onwards will be "hot news" when it appears in these columns.

Clubs without a publication of their own may please themselves whether they send in a letter concerning their general goings-on, or merely a list of forthcoming meetings ; but, in any case, it makes our own work easier if the meeting-dates and details are given separately from the general news in the body of the letter, some of which is often pretty voluminous !

This month we present an unusually spacious report on the Club Publications front . . .

### News Letters and Broadsheets

For some reason, there has been a real spate of these privately-circulated efforts this month, and we therefore bring them all together in this section.

**Crystal Palace** send us *Newsletter* No. 46, with details of meetings (all well before our own publication date) and local gossip. From **Enfield** we have *Newsletter*, Vol. 11, Nos. 8 and 9. These run to six pages each, complete with band reports, personal notes, technical matter complete with diagrams, and a number of light-hearted comments. [over

**The Bournemouth Amateur Radio Society Hamfest took place on December 5, and here we see the company assembled. In the back row are, left to right, SWL Hamshere (hon. sec., B.A.R.S.), G3FPU, G3JQX, SWL Bolt, G3LSC, Maj. Inchbold-Stevens (pres., B.A.R.S.), G3DDZ and SWL Glass (treas., B.A.R.S.) ; in the second row G3HHA, G3JLH, SWL's Maine, Barbour and Norman, G3JAU, G3GYK and, on the extreme right 2nd row from the back, G2DC, the well-known DX operator. In the third row are G3KGL, G3MXF, G3MKN, SWL's Munden and Dutfield, and juniors — with the ladies of the party in the front row.**

**Hastings** publish *Natter-Net Notes*, confined to one quarto sheet, but written in a staccato style that ensures an enormous amount of news in a very small space. It embraces comments on the bands and on club personalities, "technigen," bright ideas and small diagrams where necessary. Highly recommended to clubs with limited supplies of paper!

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
A.E.R.E. (Harwell): D. T. Boffin, G3HS, AERE, Harwell, Didcot, Berks.
ALDERSHOT: A. M. Laidler, Pondside, Sandy Lane, Churt, near Farnham.
BARNET: D. K. Robinson, 3 Castle Road, London, N.12.
BLACKPOOL & FYLDE: J. Nuttall, 27 Penswick Avenue, Anchorsholme, Blackpool.
BOURNEMOUTH: F. G. Hamshere, 55 Maclean Road, West Howe, Bournemouth.
BRADFORD: D. M. Pratt, G3KEP, Glenluce, Lyndale Road, Eldwick, Bingley.
BRIGHTON: H. R. Henley, G3IHR, 72 Loder Road, Brighton 6.
BURY: Mrs. Jean Hodgkins, G3JZP, 24 Beryl Avenue, Tottington, near Bury.
CHELTENHAM: J. H. Moxey, G3MOE, 11 Westbury Road, Leckhampton, Cheltenham.
CHESHAM: K. R. Spratt, 207 Bois Moor Road, Chesham.
CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNISH: G. W. Hubber, 9 Cardrew Terrace, Redruth.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
ENFIELD: V. Croucher, G3AFY, 15 Nelson Road, London, N.15.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
HALIFAX: A. Robinson, G3MDW, 7 Upper Brockholes, Ogden, Halifax.
HASTINGS: W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.
HIGH WYCOMBE: R. Barton, 25 Hillside Road, Marlow.
HULL: G. G. Wray, G3MVO, 93 Wolfreton Lane, Willerby, Hull.
INTERNATIONAL HAM-HOP CLUB: G. A. Partridge, G3CED, 17 Ethel Road, Broadstairs, Kent.
LEEDS: D. Dinsdale, 8 Quarry Mount Street, Leeds 6.
LIVERPOOL: H. James, G3MCN, 448 East Prescot Road, Liverpool 14.
LOTHIANS: L. Lumsden, 33 Hillview Drive, Edinburgh 12.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
MITCHAM: D. Johnston, G3NFA, 23 Woodland Way, Mitcham.
NEWBURY: J. A. Gale, G3LLK, Wild Hedges, Crookham Common, near Newbury.
NORTH KENT: D. W. Wooderson, G3HKX, 39 Woolwich Road, Bexleyheath.
NOTTINGHAM: E. C. Weatherall, 16 Avebury Close, Clifton, Nottingham.
OVERSTONE: P. Crane, 120 The Drive, Northampton.
PURLEY: E. R. Honeywood G3GKF, 105 Whytecliffe Road, Purley.
R.A.I.B.C.: W. Harris, 25 Playford Lane, Rushmere, Ipswich.
READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
SOUTH YORKSHIRE: W. Farrar, G3ESP, 2a Highbury Avenue, Bessacarr, Doncaster.
SOUTH BIRMINGHAM: G. E. Simonite, G3JAO, 19 Wistaria Close, Northfield, Birmingham 31.
SOUTHGATE: A. G. Edwards, G3MBL, 244 Ballards Lane, North Finchley, London, N.12.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, near Leeds.
STOCKPORT: G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
TEES-SIDE: A. L. Taylor, G3JMO, 12 Endsleigh Drive, Middlesbrough.
TORBAY: G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
WANSTEAD & WOODFORD: P. J. Seaman, 39 Kensington Drive, Woodford Green.
WELLINGBOROUGH: D. J. Trusler, 87 Irchester Road, Rushden, Northants.
WOLVERHAMPTON: R. P. Thomas, 91 Fraser Street, Bilston, Staffs.

**Mitcham** put out a two-page *Newsletter* with details of past and future meetings, reports of Club activities, and an exchange-and-mart section. **Newbury,** with their *NADARS Newsletter*, are up to No. 14, also full of news items, details of meetings and the future programme, and a monthly report on the NADARS Marathon Contest. For future meetings, *see* "In Brief."

**North Kent** (*Newsletter* No. 29) run to seven foolscap pages packed with information, featuring, in this issue, the Geneva Conference and the goings-on thereat. They, too, give details of forthcoming meetings which are logged further on. An interesting feature is a membership list, to which additions and amendments are published with each issue.

**Purley** have a regular bulletin which is short and sweet, with details of meetings and news-of-the-month; next meeting, February 19. The **R.A.I.B.C.** circulate their official journal *Radial* to members, and this concentrates on personal news of individual members, interspersed with useful technical "shorts."

*Feedback* is the newsletter of the **Reigate** club, in which a regular feature is "Around the Bands," together with technical information. The latest issue we have seen (Vol. 1, No. 3) has two pages on AC Theory, contributed by a member.

**Southgate, Finchley and District** circulate a very interesting bulletin—the Christmas issue carries a most artistic cover—which has a long news section entitled "Here and There." Additional features are "Around the Bands," "Strays," "Around the Clubs" and an Exchange and Mart. It is circulated free of charge to all who have attended a meeting within the previous three months. This flourishing group has an average attendance of 60 members per meeting.

Overseas Clubs are also well in the swim when it comes to publishing their domestic news. One journal which is outstanding is *The Malayan Radio Amateur*, a printed magazine of thirty pages which appears every two months. This is full of news of the VS1 and VS2 types, and also carried some technical articles, propagation forecasts, details of new licences and a DX section.

We have also received a copy of *QTC*, the journal of the **East Africa** Radio Society, a twenty-page duplicated affair full of interesting material. No. 8, which is to hand, contains a VHF section, a Sunday-morning bulletin roster, many personal notes and an exchange-and-mart section. There is also a full description of the Dar-es-Salaam Motor Exhibition and Trade Show, at which the Club had a comprehensive exhibit.

From Eire comes the *I.R.T.S. News Sheet*—six pages of foolscap which include "Dublin Doings," an SWL section, technical notes, exchange-and-mart and an account of the Regional Meeting at Athlone.

### General News

**A.E.R.E.** (Harwell) report for the first time, having been in existence for twelve months; they meet on the first Monday at 12.45 p.m. in Building 159, A.E.R.E. This meeting room is outside the security area, so any interested persons in the district

are invited to attend ; CW classes are held daily, and several members have already passed the test and the R.A.E. The chairman is G3JMT, treasurer G3NNG, and secretary G3HS *(see* panel for QTH).

**Aldershot** now meet every Wednesday, 7.30 p.m., at Signals Wing, No. 4 Training Regt., R.E., Gibraltar Barracks, Aldershot ; but on the second Wednesday they gather at the Club Hq. at The Cannon, Victoria Road. An R.A.E. course is organised for the coming examination in May, and it is also hoped to run Morse classes. Past members who wish to re-join will be welcomed on any Wednesday, and instructors and lecturers are required for the R.A.E. course. *See* panel for new secretary's QTH.

**When VP6LT visited the Norwich and District Radio Club, this group included, left to right : VP6LT, SWL Burgess, G3IOR, G3LFI, G3LDI, G3MPN and G3BHJ (of Mosley Beams). At this same meeting, G3IOR, chairman of Norwich, presented the Club transmitting trophy to G3MFQ, the contest being on 7 mc CW. Though only licensed comparatively recently, G3MFQ won the cup with the lowest power (10 watts), smallest aerial (24ft. vertical) and biggest built-up area (centre of Norwich) against members using full power under much more favourable conditions.**

**Blackburn** now assemble at the Corporation Park Hotel, Reridge Road, and are up against the problem of junior members, who are not allowed on licensed premises. Other Clubs have struck this one and, as far as we know, the only solution has been for them to move ! Blackburn now hold the Club call G3NTJ, and are active on Top Band and Forty.

**Cheltenham** recently held their AGM and elected G3YZ chairman, G3MOE secretary and Mr. K. Walden treasurer. They hope to organise a number of contests, including D-F Hunts ; meanwhile, they meet every Wednesday, 8 p.m., at St. Mark's Community Centre.

**Chesham** have only recently formed themselves into a Club, and are at present meeting at members' homes, where G3CLJ presides over the Morse enthusiasts and G3NLX keeps the R.A.E. workers busy. They hope to find permanent premises shortly and to get together more local amateurs and young enthusiasts.

**Cornish** report that their president and secretary are now duly licensed, with the calls G3NUJ and G3NVJ, respectively. At their last meeting (at Falmouth) two cups were presented to the Club—the G2FHB Memorial Cup for home-built equipment, and the John Bray Cup for home-built equipment from any member under 21. Topics discussed included the Z-Match and the Cornish electricity supply.

Recent events at **Reading** have included a talk on Aerials (G5HZ and G5TP), one on a home-built receiver (G3LLK) and a Junk Sale and discussion of future programmes. On February 27 and March 26 two members of Bailleul will be talking about Transistors. **Reigate** had a talk on Transistors and also held their first AGM. During January they visited the BBC Monitoring Station at Tatsfield. They now have 20 members, and run R.A.E. and Morse classes.

**Hastings** have moved to new headquarters (33 Cambridge Road) and meet on alternate Tuesdays, 7.30 p.m. On February 9 they will be seeing a film (The Atlantic Link) ; February 23 is an Open Meeting ; and on March 8 they have a Tape Lecture by G3BTM on Tx Design and TVI.

**South Yorkshire** is a newly-formed Club, which attracted about 30 people to its inaugural meeting. Regular meetings will be held at the Stag Inn, Docking Hill Road, Doncaster, 7.30 for 8 p.m., on the second Tuesday and fourth Thursday, starting in February. The quarters are comfortable, and a regular programme is being arranged.

**Tees-Side** recorded an attendance of 62 at their Annual Dinner, at which several Old-Timers with two-letter calls were present. They also report that several young members—secondary schoolboys—have recently been licensed and are active on Top Band with home-built crystal-controlled rigs. Meetings are held on alternate Friday nights at Settlement House, 132 Newport Road, Middlesbrough — next meetings are February 5 and 19.

**Torbay,** at their December meeting, extended a warm welcome to G3IDC (ex-VS1FJ, 4S7FJ and many others) and GI6TK, who most unhappily has lost his sight and is attending a rehabilitation course locally. A transistorised Top Band transmitter and audio amplifier were demonstrated at this meeting. In January, G3NCC gave a talk on Power Supplies ; at the February meeting, G5SY and G3CMT will judge entries for the Construction Cup. The Annual Dinner and Social is fixed for March 5.

**Blackpool & Fylde** will be holding their AGM on March 1, at Squires Gate Holiday Camp, 8 p.m. Having furnished and equipped their permanent premises and acquired a Club licence (G3NJN), they hope to provide many practical facilities not previously possible.

*[over*

**Bournemouth** report that their Annual Hamfest was a great success; also that their AGM was held on January 5, when several new members were enrolled. Working in conjunction with Southampton, Bournemouth will be running the Southern Counties Mobile Rally, to be held at the Lord Montagu Motor Museum, Beaulieu. Regular meetings are on the first and third Tuesdays, 7.45 p.m. at the Cricketers' Arms, Windham Road, Bournemouth.

**Brighton** will meet on February 10 and March 2 for Informal Evenings; on February 17 there will be a Film Show, and on the 24th a talk on a home-made tape recorder (Mr. D. Hemsley).

**Hull** held their Christmas Social on December 29 and their AGM on January 26; and on December 3 twelve members visited the Scarborough Club. Next meeting, on February 9, is booked for a talk on Improving the R.1155, by G3FCY.

**South Birmingham** report for the first time, with the following details of meetings: February 7 and March 6, Top Band Mobile Rallies at Lickey Beacon, Rednal, Birmingham, 10.30 GMT. February 18, lecture on club activities, with films, at Friends' Meeting House, 220 Moseley Road, Birmingham, 12. **Barnet** report a highly successful Christmas Party, which attracted over 150 members and friends. Visitors came from all round London, and the YL's and XYL's were allowed to enjoy themselves "without radio and electronics" for once! Next meeting, February 26 (Ediswan lecture on Transistors in Receivers).

**Bury** will be meeting on March 8 (George Hotel, Kay Gardens), when G2FMU will talk on Simple Test Equipment; on February 9, G2AKR will be talking on "Mobile Matters." **Grafton** have recently had talks by Cossor (Oscilloscopes), KW Electronics, a Junk Sale and the Christmas Party. On February 4 they were due to hear G2AHL on Mobile Operation; on February 19, Taylor Instruments; and on March 4, G5FA on DX Operating. R.A.E. and Morse classes continue on Mondays, Tuesdays and Wednesdays. **Halifax** had a lecture from G3ADG on TVI during January, during which month they also held their Annual Dinner. On February 16 there will be a ragchew meeting, and on March 1 a Film Show.

The **International Ham Hop Club** reports a notable increase in membership. G3JUW starts the 1960 season off with a tour of CT, EA, ZB2 and CN2; the five-week European tour of 4S7SW was a great success. Many Ham-Hop Holidays are being arranged for the coming year.

**Nottingham** will hear about the Racal RA-17 receiver from G6XM on February 9; on the 23rd the subject will be A 150-watt Transmitter (G3CCA). During January they visited Nottingham University and saw many demonstrations of practical work in the sphere of electronics; on another occasion they visited the BBC Nottingham studios.

**Surrey** (Croydon) were given a Film Show by G3GHI on January 12; at the February meeting (on the 9th) the subject is VHF, and G3FP will be demonstrating the possibilities of 23-cm. working.

**Wanstead & Woodford** meet on Wednesdays at 8 p.m., and are collecting new members—a trend which they hope will continue. Coming lectures include one on VHF and another on Receivers. Meetings 8 p.m. at Wanstead House, The Green, London, E.11.

**Acton, Brentford & Chiswick** meet on the third Tuesday at 66 High Road, Chiswick, London, W.4. On February 16 there will be a talk on Amateur TV, by G3MED/T, with a demonstration. On March 15, G3EOH will lecture on "Getting Going on Two Metres."

**Clifton** will meet on February 26 for a talk on The International Aspects of Amateur Radio, by G2MI. Their clubroom is open every Friday from 7.30 p.m., and every Sunday from 11.30 a.m.—225 New Cross Road, London, S.E.14. The Audio Section also meets on the last Tuesday of the month, from 7.30 p.m.

**Overstone** have a transmitter in course of construction, all bands from Ten to Eighty. They have two licensed amateurs and will be on the air as either G3KQH or G3MPZ.

## CLUB CALENDAR IN BRIEF

News of forthcoming Club meetings:—

**Bradford:** February 9, Inexpensive Sound Fidelity (G3KEP). February 23, Junk Sale.
**Civil Service:** March 1, Transmitters and Transmission Problems (G5KW), 6.30 p.m. at Science Museum, London, S.W.7.
**High Wycombe:** Last Thursday of the month, at British Legion Club, St. Mary's Street. February 25, Aspects of Aerial Design (G3LSK).
**Leeds:** February 10, Simple Items of Test Gear. February 17, Visit—Mains Radio Gramophones, Ltd., Bradford. February 24, Receiver Contest Night.
**Wolverhampton:** February 8, Brains Trust. February 15, RAE Instruction. February 22, Visit to Walsall Power Station.
**Liverpool:** February 5, Hamfest at Stork Hotel.
**Lothians:** February 11, Tape Recording as a Pastime (Edinburgh Tape Recording Club). February 25, Surplus Sale.
**Midland:** February 16, "Fifteen Watts in Fifty Countries" (R. Roberts).
**Reigate:** February 20, The Story of Paul Bates, G3MAC (G2DVD and G3HCU).
**Slade:** February 12, Sale of Surplus Equipment. February 26, Electronics in the Search for Oil (G. T. Peck, M.B.E.).
**Spen Valley:** February 17, Film Show. March 2, Open Meeting.
**Southgate:** February 11, at Arnos School, Wilmer Way, London, N.14.
**Wellingborough:** February 11, Some Aspects of Photography (T. Judge). February 18, A Miscellany of Films. February 25, Open.
**Newbury:** February 26, The Application of Transistors in Electronic Devices (K. Beauchamp).
**North Kent:** February 11, Design and Construction of Multi-Band TVI-Proof Transmitters (G3FBA). February 25, Demonstration of Audio Equipment.
**Mitcham:** AGM, February 26 at 8 p.m.
**Stockport:** February 17, Wirral NFD Film. March 2, Electronic Musical Instruments.

## MAY RADIO AMATEUR EXAMINATION

Candidates for the R.A.E. to be held in May should remember that their applications to sit must be in before the end of February to avoid the surcharge fee for late entries. Applications can be made through the instruction centre being attended, *or* the local technical college or evening institute, *or* the Education Authority for the district. Normally, arrangements are made for candidates to sit the examination at some convenient centre locally.

## SMALL ADVERTISEMENTS

**(" SITUATIONS " AND " TRADE ")**

**9d. per word, minimum charge 12/-. No series discount; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.**

### SITUATIONS VACANT

MANAGING DIRECTOR (Administration) wanted urgently. Small Capital Investment essential. Also Directorship offered capable SSB Engineer. — Tiger Radio Works, Southbourne, Bournemouth.

### TRADE

QSL'S and Logs by Minerva. The best there are.—Samples from Minerva Press, 2 New Road, Brentwood, Essex.

"HUDSON" 4-metre Amateur Band Tx/Rx, AC mains, 15w. Tx, double s/h Rx, cost £125, accept £60; ditto 12-volt mobile Tx/Rx, cost £85, accept £40. Both in excellent order. H.P. terms.—R.E.E. Telecommunications, Telecomm Works, Crewkerne, Somerset.

WANTED FOR CASH: Good clean communication receivers and S.S.B. equipment. Please state price. — Short Wave (Hull) Radio, 30/32 Princes Ave., Hull. *(Tel. 18953.)*

CLEARING-OUT SALE: Commercial Table-top, TV1-proof Tx, VFO/xtal, 25 watts, 14 to 28 mc, complete, unused, £10. Complete Command Tx, 3·5 to 4 mc, 60/-; EHT xformer, 2000v., 20/-, Electrostatic; new Woden swinging choke, 5/25 Hy., 25/-; Electrostatic 7in. tube, 15/-. Class-B Modulator, 2/TZ40's, 65/-; American "Sonar" F.M. exciter, complete with p/pack, 55/-; 2½-h.p. power selsyns (master and slave), will turn beam, £5. Valves: 100TH's, 50/-; HK54, ACT6's, 834's, TZ40's, 15/-; 717 as 807's, 5/- (new). Voitlander Camera, Besser, 3·5, Skoper Synchonised Pronter 1-1/200, 8 or 16, £15, o.n.o.? Eddystone 640 Receiver, £12. Sundry meters and 2-metre gear. — Martin, Castlemount, Worksop.

ALL TYPES Valves from 1/6. Radio Television books, service sheets, components, lists 3d.—Hamilton Radio(s), 237 Sedlescombe Road, N. Hastings.

**QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES. — ATKINSON BROS., PRINTERS, LOOE, CORNWALL.**

"TELECOMM" 40-watt Transistor DC Converters, 12v. in, 300v. out; size 3½ ins. x 2½ ins. x 7 ins.; a "must" for mobile operation; £11 15s.—R.E.E. Telecommunications, Ltd., Telecomm Works, Crewkerne, Somerset.

### READERS' ADVERTISEMENTS

**3d. per word, min. charge 5/-, payable with order. Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.**

75W. CW Tx, 80-10m. par-807, pi-turret, Geloso VFO, 4BI metalwork and p/pack 450v. and 600v., £12.—Box No. 2207, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 840A, mounting blocks, mains filter, spotless, £30; K.W. Vanguard, 160-10 metres, cabinet needs re-crackle, £40. Buyer collects (London area).—Box No. 2208, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Johnson Viking Valiant Tx, or similar, and Collins 75A-1 Rx. Also Mosley 3-band Vertical Antenna. Lancs. area.—Box No. 2209, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

K.W. VANGUARD Transmitter, 10-160m., built by makers, very little used and in mint condition; prefer buyer collects; £45.—G3DJQ, Olver, The Spinney, Moor Hall Park, Sutton Coldfield.

SALE: Amateur Gear, Communication Rx's, Variacs, magslip beam indicators, Tx/Rx valves, sundries; s.a.e. for list.—Dickinson Price, 46 Charlemout Road, Walsall, Staffs.

**SMALL ADVERTISEMENTS, READERS—*continued***

FOR SALE: HRO Senior Rx, table model, good condition, 4 coils, 1·7 to 30 mc, bandspread 14 and 28 mc, £18 o.n.o.? Wilcox-Gay VFO, perfect, £2 10s. 0d. — GM3KMR, 41 Parkhead Crescent, Edinburgh, 11.

AR88D, £55; Mercury Tx, £65 (both excellent); Panda Cub, £35. Offers considered.—G3CPS, 111 Ravenor Park Road, Greenford, Middx.

VALVES: Over 100 new. TRANSISTORS: New OC45, 17/6 (2); GET106, 14/-; OC71, 10/-; OC170, 30/- (5); power RF OC24, £3 10s. 0d. (3); 2N601, £4 10s. 0d. (2); Eddystone 898 dial, £2; Labgear Tx filter, £3; Marconi TF643A Wavemeter, £3 (5/- carr.); two Eddystone 5441B PS units, £1 (5/- each carr.); table-topper Woden potted xformer, £2 (5/- carr.). Laboratory glassware; s.a.e. list components, etc.—P. W. Buck, 54 Ashford Road, Ilford, Bournemouth *(Christchurch 2675).*

WS62 phones/mike, whip, new, £3 10s. 0d. Xtal Calibrator No. 10, new, 30/- (carr. extra).—P. W. Buck, 63a, High Street, Oxford.

EDDYSTONE 680x with speaker, as new, £70 (o.n.o.); buyer collects or carriage extra.—P. Buck, 63a, High Street, Oxford.

WANTED: R.A.E. correspondence course.—Details and s.a.e., please, to Box No. 2210, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BC221AH, unmodified, with charts, but in Type T metal case, £17 10s. Two 247 power packs, £3 each. — G3IDW, 14 Cricklade Road, Swindon, Wilts.

MINICITER VFO (1958), £12; LP Filter (new), £2 5s. 0d.; Radiocraft (1955) FD/PA, 807's, 7, 14, 21, 28 mc c/w ATU 300/80 ohm, grey cabinet (18in. x 13in. x 8in.), £12; PV1/35 PA valve, WS12, 45/-. Post extra.—Box No. 2211, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FEW 813's, new, fully tested and guaranteed, but not boxed, £1 each, p.p. 1/6; pair, 35/-.—Box No. 2217, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HOWARD 440 Communication Receiver, matching speaker, 550 kc-40 mc, RF stage, S-meter, noise limiter, xtal filter, flywheel tuning, manual; £15 (o.n.o.). Buyer collects.—Frisby, 25 Knighton Rise, Leicester *(76512).*

AR88D RECEIVER, in first-class condition, with handbook; bargain price, £40; buyer collects.—Halls, 54 Victoria Avenue, Redfield, Bristol.

MOBILE Palco Bantam Yankee Tx, p/pack, modulator, all-band aerial on special perspex base; has worked VP6 from U.K., Top Band to Ten. Also Eimac Receiver with p/pack; covers Top to Ten. Both in good order, £75. Panadaptor, all mains, two spare tubes, £35.—W. R. Metcalfe, Esk Hall, Sleights, Nr. Whitby *(Tel.: Sleights 221).*

TWO-METRE TRANSMITTER, complete in grey louvred table-top cabinet with chrome handles, Phone/CW, eleven valves (832 final), crystal controlled; just plug-in your mains, aerial and microphone (size 18½in. x 11in. x 11in.), £15—or consider exchange portable typewriter or small portable AC petrol generator. — Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

R107 Communications Receiver, 1·2 to 17·5 mc; excellent condition; with instruction manual and 28 mc converter; £10. Delivered 40 miles.—G3HXO, 25 Stanford Road, Shefford, Beds. *(Telephone Hitchin 2725.)*

**SMALL ADVERTISEMENTS, READERS**—*continued*

FOR SALE: S.640, good condition, £18; Panda Cub, as new. £35. Or £45 the lot.—Lawrence, 97 Sheldon Road. Chippenham, Wilts.

PANDA PR120V, Radiovision "Commander" double superhet, both with makers' manuals. BC221 in metal cabinet with stabilised p/pack and monitor LS (otherwise unmodified), calibration chart. Aerial relay switching system, mains operated, with two meters. Five bound volumes *Short Wave Magazine* with copies to date. Three bound volumes *Bulletin* with other copies to date. All units in excellent order and condition. £100 The Lot (no offers). Delivery within 100 miles of Merseyside area.—Box No. 2212, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SEMI-AUTOMATIC Bug Key wanted; anything considered. — G3MUO, 87 Church Road, Skegness, Lincs.

FOR SALE: Barker & Williamson, Type 5100B and 51SB/B SSB Generator, complete table-top Tx, 140w. AM. 180w. P.E.P. SSB, mint condition; can be demonstrated at owner's QTH; price £240; c.i.f.; HP if required.—Box No. 2213, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Gramdeck Tape Recorder and mike, as new, £10.—Box No. 2214, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

K.W. VALIANT for sale, 160-10 metres, C.W. and Phone; prefer buyer inspect and test—reason for sale. QRO Rig—£30; c/w control and switching unit. — G3HCM, 321 Tile Hill Lane, Coventry.

RECEIVERS (all unmodified): AR77, £25; APR-4, £50; R103, £12 10s.; BC-342, £18 10s.; BC-312, 20; BC-799, £16; R109 GRC, £20; R44/ARR-5, £25; RT-67 GRC, £25; BC-221 Meter, £30; Collins Transmitter ART-13, £20; APN-9, £20; Simpson 260 Multimeter, £12 10s.—Wright, 4a Nepal Avenue, Atherton, Manchester.

WODEN TRANSFORMERS AND CHOKES, all unused: 5/25H, 250 mA, 32/-; 12H, 250 mA, 40/-; 5-0-5v. 10A, 42/-; 3·75-0-3·75v., 5A, 27/6; 2·5-0-2·5v. 3A plus 3·15-0-3·15v. 4A, 28/6; UM1 39/6; UM2, 55/-; DT1, 22/6. Also some used items: Pye 5w. Hi-Fi chassis, unused, cost 25 gns., price 12½ gns.; Walter Tape Recorder, little used, cost £41 19s., price with microphone, £21. Eddystone Speed Key, 37/6. Valves: PX4, new (4), at 10/-; RK-20A, new, 20/-; TZ40 (2), new, 15/-; PT15 (4), used, 5/-; 6L6M (3), used, 3/6. Many unused and used Eddystone. Labgear and other components to clear; s.a.e. with inquiries; all carriage extra. Exchanges considered. WANTED: TCS Rx, unmodified, HRO bandspread coils.—Box No. 2215, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR88D, with matched speaker in metal cabinet, S-meter, high-Z headset and 'scope outlets; FB cond., manual; first offer above £55 (carriage paid).—G4BY, Church Street, Whitstable, Kent.

FOR SALE: CR100 with noise limiter and Class-D Wavemeter; both in first-class condition, with manuals; £25.—P. L. Stiles, Ty'r-y-Bryn, Merthyr Road, Llwycoed, Aberdare, Glamorgan *(Aberdare 884)*.

VALVES (new), 4 guaranteed at 3/-, 6AL5; 3/6, 6AK5; 6J6, 85A2; 4/-, 85A1; 4/6, 6X4, 6V6; 5/-, 3B26, 12AT7; 5/6, 12AU7, 12AX7, 6AQ5; 6/-, 5R4, 83; 30/-, 829/B; s.a.e. for full list.—A. Sykes, 8 New Street, Morley, Leeds.

SMALL ADVERTISEMENTS, READERS—*continued*

G4ZU MINIBEAM, as new, £12 12s. 0d.; Panda ATU, £10; two ZC1's, Mk. II (one working); mobile Ae., mic., speaker, etc., £10 10s. 0d.; Labgear SWR Meter, new, £4. — G3NMR, 95 Collingwood Gardens, Ilford, Essex.

FOR SALE: BC-348 with p/pack, £9; "Miniciter" Exciter (unused), £15. Xfmr., suitable "Miniciter," £1 10s. 0d. AM247 p/pack (600v. at 200 mA and 6·3v. at 3 amp.), £2 10s. 0d. Parallel 807's PA (virtually complete), £2. Will consider reasonable offers.—Box No. 2216, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: PRE-SELECTOR, Radiocraft or similar, covering 14, 21, 28 mc; self-contained power supply; good appearance and working order essential. — Watts, 62 Belmore Road, Thorpe. Norwich.

CR100 RECEIVER, coverage 60 kc-30 mc in 6 bands, noise limiter, overhauled, excellent working condition, £17. T.1131 VHF Tx, £18. 1000v. at 500 mA power packs, 100-watt modulator units, £4 each. Driver/PA Units *(Ex-*T.1131), £3. (P. & p. on above, £1.) Tested valves: 12AU7. 12AX7, 12AT7 at 5/-; 6L6 at 6/6; KT66 at 9/6; EF50 at 10/- per doz. All valves post-free.—B. R. Jessop, G3NOO, Hamble House, Hamble, Hampshire.

IMMACULATE MINIMITTER MR37 Rx, recent makers' mods, and line-up. Offers about £35 (carriage paid). Valves: TZ40, 811, 10/- each.—Airey, West Winds, Dalton-on-Tees, Nr. Darlington, Co. Durham.

EXCELLENT Amateur Station for sale, complete or individual items; s.a.e. for lists to: Hinton. 7 Fremantle Road, Taunton.

R1155A and RF-24, with power pack and output stage, Top Band to Ten, needs re-alignment, fitted with S-meter, any offers?. Buyer collects.—A. Baker, 13 Winifred Road, Poole, Dorset.

WANTED: Circuit of mains power pack for RA-1B Receiver, or willing to buy one made up; all expenses met.—Allen, 30 Cambridge Avenue, Kilburn, N.W.6.

AR77E, excellent condition, £27, o.n.o.? ZC1, Mk. I, mains pack, no valves, £2. Eddystone 358, trawler and long-wave coils twice, £5. R1155N, trawler band, fully valved, needs attention, £4. R1154, new condition, complete, £2. R1335, with RF24, 25, 26, 27, fully valved, mains pack, £3.—H. Bellairs, 118 Albert Street, Grimsby, Lincs.

VALVES, used, boxed: DF91, 5/3; DF92, 3/9; DL93, 6/-; EBC21, 7/-; EF22, 8/-; EF50 (red), 1/6; EF91, 4/-; EF92, 5/6; TT15 (1 only), 10/6; VR150/30, 6/-; 6A6G, 5/-; 6AC7M, 3/-; 6F6M, 6/-; 6G6, 6/-; 6H6M, 1/6; 6H6GT, 1/6; 6J5G, 2/9; 6J7G, 5/-; 6J7M, 5/6; 6SK7, 5/-; 6SL7GT, 6/-; 6SN7GT, 4/6; 6557M, 5/-; 6V6G, 5/6; 6V6GT, 6/-; 12A6M, 5/-; 12AH7GT, 6/-; 12C8M, 6/6; 12H6M, 1/6; 12J5GT, 3/-; 12SG7M, 4/6; p.p. 6d. per valve.—Meikle, 34 Victoria Road, Netley Abbey, Hants.

SALE: All-band Tx, Ph./CW; Creed 250v. DC 3X teleprinter, best offers; s.a.e. list other gear. WANTED: AR88 cabinet. — Cooke, 128, Drayton Road, Norwich, Norfolk.

£30 AVAILABLE for 5-band Tx, working, complete; mains. Phone/CW. — Details to: G3NWI, 103 Warren Road, Hartlepool, Co. Durham.

SMALL ADVERTISEMENTS, READERS—*continued*

MARCONI B28/CR100-7, S-meter, noise limiter, first-class condition, manual, £25 (offers?) R107, as new, £8 (offers?) Delivered Nottingham area. WANTED: Eddystone S.750 or S.680X.—Box No. 2216, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Eddystone 840A Receiver; will accept nearest £28 (buyer collects).—Offers to Williams, 47 Croft Road, Yardley, Birmingham, 26.

FOR SALE: AR88D, £45.—Edwards, 161 Clapham Park Road, London, S.W.4. *(Macaulay 4551.)*

MINIMITTER Converter, as new; HRO, all coils, power pack, LS; Collins TCS Tx/Rx, twin gen. power pack, LS, remote control, mod., xtal mike, offers? — G8DT, 32 Homecroft Drive, Cheltenham.

WANTED: RF Unit No. 1, 19-35 mc, as *Short Wave Magazine*, Sept. 1959. — Douce, 45 Bradstock Road, Kings Norton, Birmingham, 30.

CHROMED CABINET HANDLES, 10½-inch, 5/- pair; 1191A freq. meter, with handbook and spare set valves, £2 10s. 0d.; HRO gang condenser, 12/6; Transformer, 620-550-375v. at 200 and 350 mA simultaneously, 5v. 3A twice, 230v. input, unused, £2 + 5/- carriage. Valves: 829B (2), 30/-; 832A (2), 20/-.—Box No. 2218, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

RANGE TRECOSCOPE with manual, as new, £14. Geloso 209-Type front-end, complete with dial, IFT and circuit, £10. Woden UM1, £1 10s. 0d. Eddystone 898 dial, £2.—Box No. 2219, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Rx's, Eddystone S.640, S.750, SX28, etc. Lowest cash, please, or will accept in part-exchange against new H.M.V. Tape Recorder (sell £43). SELL: Complete boom, masthead fitting and screw-in spreaders for 10m.-15m. Quad, £8.—G3MAD, 70 Arnold Road, Binstead, Ryde, I. o. W.

AR88D, S-meter, manual, £40. Tx 40-20-15-10 meters, 150w., 75w., modulator, power pack, phone monitor, 4ft. 6in. rack, rear door (offers?) BC221, complete, £20. HRO-MX, 9 coils, £20. CR-100, £15. B2 Tx/Rx, complete, £15. Other gear, including transformers, UM2, Labgear wideband coupler, etc. Offers for all or part of any gear considered. — GW3LPR, 34 Graigwen, Penygraig, Llwynhendy, Nr. Llanelly, South Wales.

WANTED URGENTLY: Class-D Wavemeter; good price paid for quality instrument; price to include carriage.—Details to: G3CZS, 74 Barnfield Avenue, Allesley, Coventry

"HAVE YOU GOT ONE?" A VHF Converter for 30-160 mc, esp. 60-120 mc; good condition only.—D. A. Rees-Jones, 56 Higher Road, Hunts Cross, Woolton, Liverpool.

EXCHANGE: Brand-new Taylor Oscilloscope, model 31A, for good Communications Receiver with two RF stages, range 1·5 mc to 30 mc. FOR SALE: Vitovox 12in. speaker; Taylor Valve Tester, Model 45, fair working order; Philips console, projection receiver, complete, not working. Books: *Wireless World*, 1950 to 1954, complete, 1955 (two missing); *Practical Television*, 1950 to 1958 (few missing). Offers, cash or exchanges. Buyer collects.—Box No. 2220, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Eddystone Speed Key or similar bug. —Details and price to G3NEK, 151 Halifax Road, Brighouse, Yorkshire. *(Tel. Brighouse 1130.)*

SMALL ADVERTISEMENTS, READERS—*continued*

EX-PIRATE, who has reason to repent, and Eddystone 888A, Labgear Bi-square Beam and other equipment, seeks a keen licensed type in this locality who will guide him on the straight and narrow path to the RAE. Can assist in SSB equipment, in which particularly interested.—K. Potter, 4 Trevelyan Road, Seaton, Devon.

WANTED for Z-Match: One pair of Johnson 500 $\mu\mu$F variable condensers. Please state price.—G3JZW, H. W. Gadsden, 17 Drovers Way, Dunstable, Beds.

WANTED: Coil boxes for Eddystone 358X receiver, any range, with or without coils.—G3IRM, 10 Lake Avenue, Bury St. Edmunds, Suffolk.

WANTED: 888A; cash waiting if right price. SALE: SX27, 27-143 mc, new front end fitted, £22.—S. Roberts, 43 Brenden Avenue, Somercotes, Derbys.

WANTED: AR88D. Rx/Tx (AM or SSB), mobile equipment; will collect.—Hodgkinson, 794 Bury Road, Bolton, Lancs *(Phone 8046).*

WANTED: Top Band Command Receiver, BC type, 1·5 to 3 mc.—State details and price to: Box No. 2221, Short Wave Magazine. Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Elmac or similar mobile receiver; state age, condition, price. For disposal: Very nice AR88D.—Box No. 2222, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

B2 Tx/Rx and p/pack; rare specimen; mint condition. Rx bandspread Tx, internal VFO; £15. —24 Norfolk Avenue, Sanderstead, Surrey. *(Tel.: Sanderstead 1126.)*

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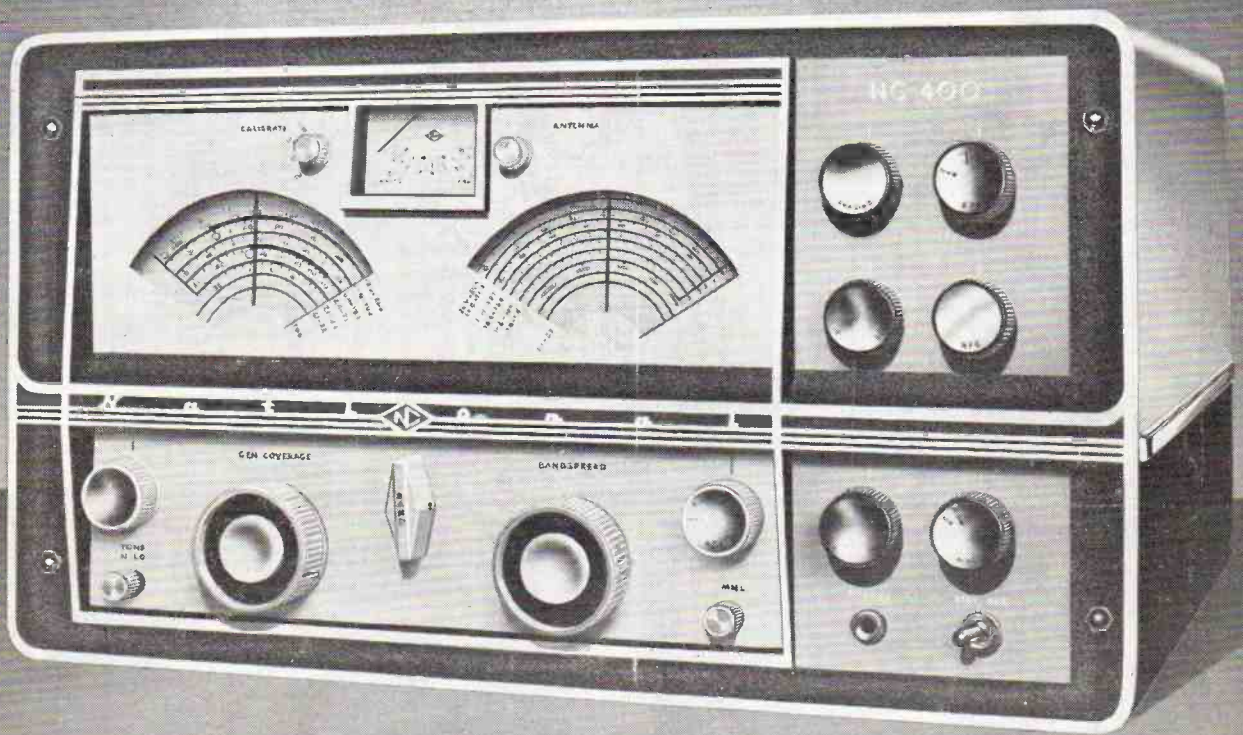


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