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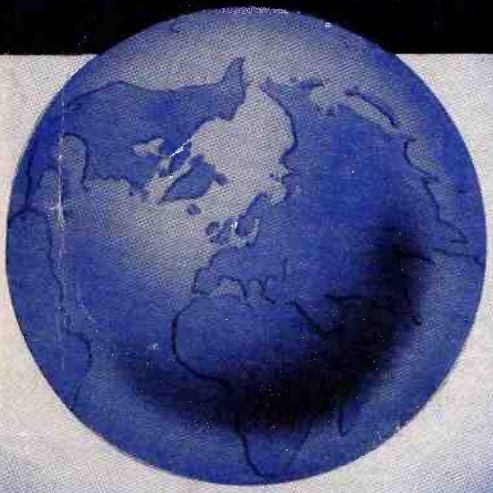

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VOL. IX No. 11 JANUARY, 1952

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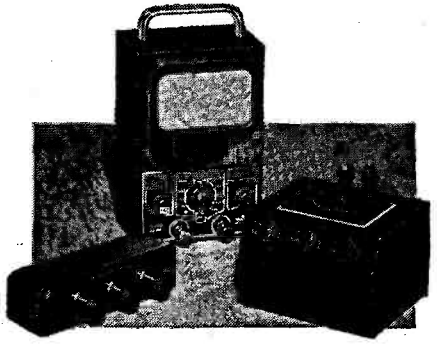

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SHORT WAVE MAGAZINE

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THE *SHORT WAVE LISTENER* ASSOCIATED WITH THIS MAGAZINE IS SPECIALLY FOR THE RECEIVING ENTHUSIAST

The SHORT WAVE Magazine
FOR THE RADIO AMATEUR AND AMATEUR RADIO

EDITORIAL

Forward

Once again we are happy to be able to wish all our Readers, at home and over the seas, and our friends and supporters in the Trade, the best of good wishes for the New Year now upon us.

It will remain the purpose and the function of SHORT WAVE MAGAZINE *to mirror activity and results on the operating bands, to present an even wider range of practical material on methods and techniques, and to comment freely (and we hope fairly) on all those matters of interest in the world of Amateur Radio.*

The field of amateur endeavour is now far wider than it has ever been, and the number of those interested in Amateur Radio is, as we know, constantly increasing. Many of those licensed in recent years are qualified engineers, some with a high skill or a considerable reputation quite unconnected with radio as a profession. This is all to the good, and believing as we do that Amateur Radio is an important scientific hobby which can give great intellectual satisfaction, we are glad to welcome those newcomers who are professionally qualified in other fields. At the same time, there is plenty of room for and much to interest the junior beginner who just wants to build some simple gear and get on the air. And he is no less welcome.

Our good wishes to everyone who may read these words, and may this coming year be full of interest and achievement for us all.

Austin Forsyth G6FO.

Fundamental Drive Oscillator For Ten

DESIGN AND CONSTRUCTION

By **L. G. BLUNDELL (G5LB)**

This is an ingenious and entirely practicable approach to the problem of producing a stable VFO unit for direct control on the 10-metre band. The advantages of being able to do this successfully are obvious when TVI is a local problem—the danger of harmonics or "odd noises" falling in the TV channels can be reduced if not eliminated.—Editor.

MANY amateurs will, no doubt, be interested in a drive system which has been in use at the writer's station for the best part of two years, and which is completely free of the difficulties associated with television interference caused by harmonics arising from a low-frequency source of drive.

Between September 1947 and June 1948 operations on 28-30 mc (the only band used at G5LB) were subject to considerable curtailment, voluntary and otherwise, because of 42-45 mc harmonics generated and radiated from the Tritet CO/FD/PA transmitter. Many months were subsequently spent in "trapping" and filtering various circuits in the transmitter, and eventually a reasonable reduction was effected in the local field strength of the offending harmonic component. This state of affairs only held good, however, so long as no great change in operating frequency was made, and in the event of an appreciable change being necessary in the operating frequency, then it became essential, in order to keep the harmonic component down to the previous level, to re-tune the various traps in circuit.

Such a procedure was not particularly attractive, as a certain amount of flexibility was desirable from time to time, according to the state of activity on the band. Further, in the event of VFO facilities being incorporated in the transmitter in place of a range of crystals, the comparative inflexibility imposed by the high-Q trap circuits would be even more aggravating, and, in the writer's private opinion, the general situation was rather indicative of that where one can lose on both swing *and* roundabout!

Practical Philosophy — "Straight Through" Operation

Consideration of causes and effects impelled the train of thought toward the obvious-enough answer: that if natural order harmonics were to be "barred" below, say, 50 mc, then the fundamental frequency cannot be below 25 mc. On the other hand, harmonics in the 50-60 mc spectrum might very well be, under certain circumstances, an embarrassment. So, the circumstances required for 28-30 mc are that the fundamental frequency be also the operating frequency (or *vice versa* if you prefer it that way) and, possibly, no second harmonic worth speaking of. As the latter contingency can be taken care of by means of a well-balanced push-pull final amplifier, the prime question is the appropriate type of oscillator for use on the frequencies concerned.

Oscillator for 28-30 mc

For some reason, or reasons, the use of stable self-excited oscillators in the higher HF ranges seems to be restricted (in a very general sense) to receiving equipment, although it is evident that the high orders of frequency stability demanded in such employment (and comparatively easily provided) could be more often utilised in a transmitting frequency source, where, by and large, reliance is placed on quartz plate control (operated in fundamental or harmonic mode), and a number of plates provided to give the required frequency range.

So far as the writer was concerned, quartz control was immediately "out" because of cost and inconvenience, and a good alternative had to be found. The problem was referred to standard and accepted professional text-book treatment of the subject, and after due thought had been given to the physical and mechanical requirements of this, that, and the other circuit, a final choice was made in favour of the standard electron-coupled Colpitts circuit, with but one modification. The modification consisted simply of replacing the normal

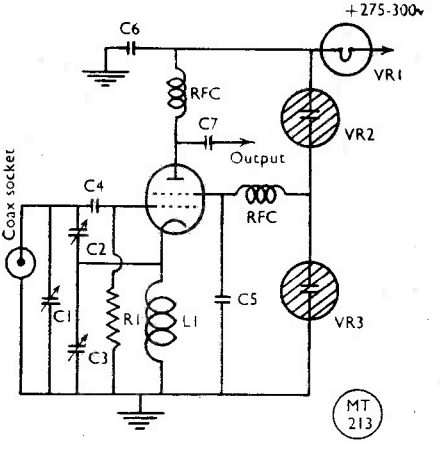


Fig. 1. Circuit arrangement of 28-30 mc ECO described by G5LB. The objective was an oscillator sufficiently stable to give direct control on Ten.

coil with a length of 80 ohm coaxial cable to act as a linear (or near linear) circuit.

Design and Construction of the 28-30 mc ECO

Having made the choice of circuit with the single component modification noted above, a prototype was made up for test and experimental treatment, and Fig. 1 shows the circuit and components as used by the writer. It will be appreciated that the HT voltage regulating components can well be on the power supply chassis, but since these components are actually a very important part of the ECO as a whole, they have been, for the purpose of reference, included in the diagram.

It will not be out of place at this point to state that, in the construction and operation of a stable oscillator for the frequencies in question, due regard *must* be given to all those circumstances and conditions which can and will affect the overall stability characteristics of the circuit, *i.e.* internal and external screening of the valve, complete screening of the respective "input" and "output" sections of the circuit, and, equally important, mechanical rigidity in chassis work and the mounting of components. These latter requirements are all the more important where the ultimately amplified and radiated signal frequency is the same as the oscillator frequency.

Table of Values

Fig. 1. Basic 10-metre VFO as described by G5LB.

C1	=	30-40 $\mu\mu$F, midget tuning
C2, C3	=	20-30 $\mu\mu$F, midget trimmer
C4	=	10-50 $\mu\mu$F, silver mica
C5, C6	=	.005 μF mica
C7	=	500 $\mu\mu$F, silver mica
R1	=	100,000 ohms, ½-watt
L1	=	Close-wound on small former to self-resonate at 29 mc
RFC	=	Standard RF choke
VR2, VR3	=	S.130 stabilisers
Valve	=	807

The same high order of inter-circuit and external screening must also be achieved in respect of all the isolating or buffer stages which complete the drive unit. (To this end, the writer cheerfully admits to having spent all of three months in arriving at a physical and mechanical design which met the various requirements, before daring to put an ECO controlled signal on the air!)

Fig 2 shows how a great deal can be achieved by way of screening-up the circuits when using 807-type valves. The components can be nicely placed round the respective ends of the valve, and, when all are mounted and wired up, the end sections can be completely boxed in.

To those amateurs wishing to use valves other than 807's, *e.g.* single-ended types, it will be apparent that more normal types of chassis can be employed. Under these circumstances, however, it must be realised that the matter of external screening, and screening between input and output sections of each stage, *must* be made as complete as possible. As Fig. 1 shows, there is nothing "fancy" about the circuit or the various components comprising it, and, providing it is constructed with reasonable care, it will give a signal which is comparable with many lower frequency counterparts.

Checking Oscillator Performance

For the purpose of initial running tests, leave off the chassis end-covers, and, assuming a valve has been inserted, connect up to an appropriate power supply, the HT side of which is known to have fairly good regulation, and to be well smoothed. Switch on power and, after valve has thoroughly warmed up, note reading on HT feed meter. Check that the reading is reasonable for the valve in use considering the anode and screen volts applied, and the fact that the circuit is, as yet, in a non-oscillating condition (or should be so).

If all is so far in order, procure a 7-ft. length of 80 ohm coaxial cable, fix a

temporary shorting contact between inner and outer conductors at one end, and attach a proper coaxial-type plug at the other.

Next, set C1, C2 and C3 at half capacity and then plug the coaxial cable into the socket provided on the ECO chassis. Having done this, note reading on HT feed meter. If the reading has dropped substantially, and the new reading is steady, it may be taken that the circuit is now oscillating fairly readily at a frequency which has yet to be determined.

Leave the oscillator running; in the meantime, bring into use a well-calibrated receiver, and set up to cover the range of, say, 20 mc to 30 mc. Allow the receiver to warm up thoroughly, then switch in BFO. Now search for the signal from the ECO, the strength of which, when located, should leave no room for doubting the source of the signal.

Having located the ECO signal, tune for a beat-note of about 1 kc and let things run at that for the next fifteen or twenty minutes (the receiver should be operated with RF gain control backed off as far as possible). During this period just sit back and listen pretty carefully, and critically, to the beat-note produced by the receiver. The beat-note, if the ECO is in fair shape, and the receiver ditto, should be in the region of T8 to T9. If, however, it is worse than T8, then the power supply HT smoothing should be checked for ripple. If the HT supply is known, or found, to be as near-as-no-matter pure DC, then it would be as well to check the ECO valve for poor heater/cathode insulation. If these two items prove faultless, then then whole set-up — ECO, power supply and receiver — should be checked for "out-of-place" AC.

Assuming that the beat-note qualifies at least for T8, the next step is to get the ECO frequency up into the 28-30 mc band. This is very easily accomplished by pruning-down the coaxial line 6 inches at a time (replacing the shorting device after each cut, of course) and locating the new frequency each time on the receiver. On arrival at a frequency of 26/27 mc, the next few cuts off the coaxial line should be made in steps of about ½ inch at a time, until 28 mc is reached; then stop cutting and make a better job of the short circuit between inner and outer conductors by lightly soldering together. Let the ECO

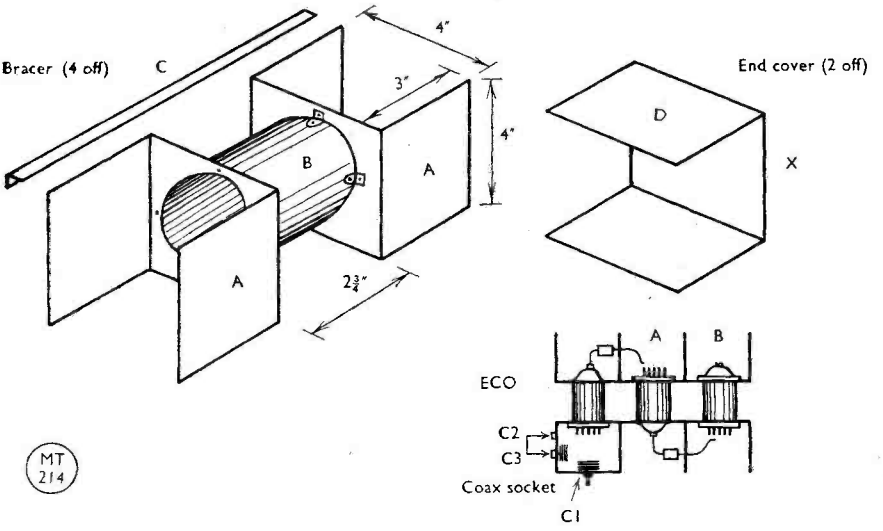


Fig. 2. Chassis design for the ECO-Driver, on the lines discussed in the text. The 'A' and 'D' sections can be in 16-18 g. aluminium or dural; 'B' is a small tin can or tube to clear valve envelope; 'C' is ½in. or 3/4in. angle, in the same material as 'A' and 'D.' The sketch at lower right shows how the chassis can be assembled head-to-tail. A rigid sub-panel must be provided to mount C1; when bending up section 'D,' dimension 'X' should allow for a close fit over the outside faces of the bracing members 'C.'

run for another five minutes, and note whether the frequency remains fairly stable. If it is found that the frequency "jumps" slightly, but erratically, it will be necessary to check all soldered connections in the ECO circuit, including the end connections to all resistors and condensers, and valve pin/socket contacts, and so on. As it is very easy to be misled in this particular matter, a check-up should also be made on the receiver and the power unit supplying the ECO.

If and when the signal is stable (apart, maybe, from slight drift), power may be taken off the ECO, and end covers fitted over the open ends of the chassis. In doing this, remember to provide lead holes for the power leads and for the connecting lead from C7 at the anode end of the chassis. Remember also to provide some ventilation apertures in the anode "box," or, alternatively, use a good-quality metal gauze for the cover, which material will give both adequate screening and ventilation.

Final Adjustment and Checks

Now, with the ECO chassis fully screened up, and all retaining bolts, etc., tightly screwed down, it is possible to proceed with the final setting up of the circuit and check for long-term stability. First, re-set C2 and C3 to one-third of maximum capacity. Second, connect a 10,000 ohm one-watt resistor to the end of the lead from C7 and to chassis (this provides a temporary load circuit). Third, ensure that C1 is still set at half-capacity, and then re-apply power to the circuit. In consequence of the adjustments to C2 and C3, the operating frequency will now be higher than before, and the new frequency should be logged on the receiver. Next, set C1 to *maximum* capacity and again locate, on the receiver, this last (and lower) frequency, which will, most likely, be in the region of 27 mc. Leave C1 at maximum capacity, and again prune-down the length of coaxial line in cuts of one-quarter of an inch at a time until, with a good short circuit between inner aud outer at the cut, the frequency comes up to 28 mc dead on zero beat. At this point remove the temporary short-circuit and, stripping off a little of the insulants, solder inner and outer conductors together. It is most important that a thoroughly good job be made of this, both electrically and mechanically. The best method is to leave about one-quarter of an inch of the inner conductor protruding, perfectly straight,

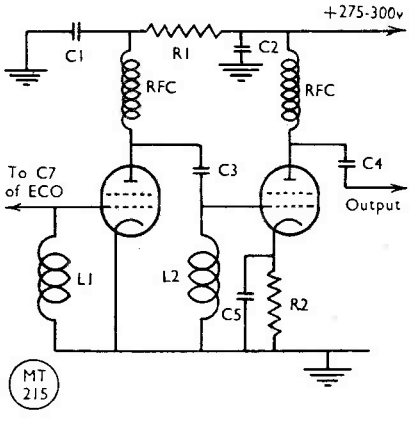


Fig. 3. Circuitry for a simple broad-band inter-stage coupling for the 28-30 mc Exciter. See text for details and table for values.

Table of Values

Fig. 3. Inter-Stage coupling for 28 mc Operation

C1, C2, C5 = .005 μF mica
C3, C4 = 500-1000 μμF, silver mica
R1 = 5,000 ohms 5-w.
R2 = 1,000-2,000 ohms 2-w.
RFC = Standard RF choke
L1 = Close-wound to self-resonate at about 28.5 mc
L2 = Close-wound to self-resonate at 29.5 mc
Valves = 807

(*Note: L1/L2 comprise broad-band coupler*)

out of the insulant, quickly tin about one-half of its length with a very hot iron, then pinch the outer braid round it and twist tightly. Apply flux and solder (with a very hot iron) to the twisted portion and ensure that the solder is fluid enough to penetrate through to, and unite with, that on the centre conductor. Allow the joint to cool thoroughly before handling the cable again. The cable can then be coiled and strapped, or tied, to the chassis in some convenient manner.

Setting-Up Tests

All is now ready for the main "proving" test, but before starting this, rotate C1 from maximum to minimum capacity and note from the receiver what tuning range is available. With good quality coaxial line and similar quality construction in C1, C2 and C3, the tuning range should be at least 1.5 mc. The upper frequency limit depends

on the self-capacity of the coaxial line as reckoned against the various other fixed circuit capacities. After this check, take all power off the ECO and allow it ample time to get "stone cold," but, in the meantime, leave the receiver running and bring into service a sub-standard frequency source such as a 100 kc oscillator, with, if possible, a multivibrator giving 10 or 5 kc check points.

Set up receiver (BFO off) on the 29 mc harmonic from the sub-standard. This signal should be made heavy enough to give S5 to S6 on the receiver carrier meter (or something of the same order if judged aurally). Now switch on power to ECO and, immediately the HT feed meter indicates that the circuit is oscillating, quickly tune the ECO to zero beat with the sub-standard signal on 29 mc, and note exact time. From this moment, check, at intervals of five minutes, the amount of drift exhibited by the ECO until it reaches a stable state. Do not rely on estimation of beat-note frequency as an indication of the amount of drift, but at the end of the five-minute periods tune the receiver from the sub-standard signal to the middle of the ECO signal, and thus measure the drift to some degree of accuracy. After checking the amount of drift in each period, the ECO should, of course, be re-tuned to zero beat with the sub-standard signal.

At G5LB the average drift checks as follows: In the first five minutes (from cold start) 10 kc; at the end of second five minutes, 3 kc; at end of third five minutes, 1½ kc; at end of fourth five minutes, less than 1 kc. From then on the frequency holds to within a few hundred cycles of the sub-standard frequency. In cases where the amount of drift is appreciably in excess of the above-mentioned average figures, judicious raising or lowering of screen voltage to the ECO valve will effect some control over the amount and direction of drift. If the indications are that a lower voltage than that obtaining at the junction of the S.130 regulators is required, then a resistance (of generous rating) of appropriate value should be inserted in the feed line to the valve. If a higher voltage is required, then the upper S.130 should have some parallel resistance placed across it.

Buffer Stages and Circuits

It is not thought necessary to treat this part of the equipment in detail, since technique and operation are much the same as for lower frequency work.

However, it will not be out of place to make several recommendations which are appropriate to the "straight-through" method of operation on the frequencies immediately concerned. Such recommendations apply to the electrical operating conditions and physical design of the various stages involved.

In the first place, no less than three buffer stages should be used between the ECO and the final power amplifier. These stages should be operated Class A, B, and C, in that order. All these stages should be run with DC inputs well within valve ratings for each condition of operation. With the ECO giving complete VF facilities, it is, of course, necessary that the RF coupling circuits in the successive buffer stages be of the aperiodic or semi-aperiodic variety. Properly designed "broad-band" couplings will, of course, be most satisfactory, but rather expensive. Alternatively, a very useful amount of "broad-band" characteristic can be achieved by the use of RF chokes and "self-resonant" coils in capacity coupled circuits. Fig. 3 gives an idea of the very simple, but effective, arrangements used by the writer.

With regard to the physical and mechanical design of the various buffer stages, it is strongly recommended that the screening provided between input and output circuits of each stage be made as complete and as thorough as possible. Likewise, the external screening of the same stages should be every bit as good as that provided for the oscillator.

It is further recommended that the completed drive unit, comprising ECO and the three buffer stages, be split, from the power supply point of view, into two sections, *i.e.* ECO and Class A buffer (run continuously) with common power source; Classes B and C buffers with common power source. Under these circumstances, the "drive on/off" switching should be operated in the Class B stage, and keying for CW in the Class C stage. Appropriate metering facilities should, of course, be incorporated in all feed circuits.

As stated in the opening paragraph of this article, equipment such as described has been in use over a period of nearly three years, with an average run of three hours per day, and, in spite of pretty severe manhandling at various times, has maintained the high order of operational stability previously mentioned.

Low Power Operating

QRP *v.* QRM

By **J. H. A. NEWTH (G3EJN)**
and **C. E. SUTTON (G3ANQ)**

The first part of this interesting article appeared in our issue for December, 1951. Here the authors discuss experiences with the operating methods they evolved to meet normal QRM conditions on 3.5 mc CW; it was on this band that their experiments were carried out, using low power at all times.
—Editor.

IN the previous article, "Beating the QRM" (*Short Wave Magazine*, December, 1951) the technical considerations involved in reducing interference by rational use of power were discussed. The authors, in arriving at their conclusions, employed a three-watt signal with such unexpected success that they deviated somewhat from their original intention in order to prove how effective such a low input could be. This article describes the operating *methods* they had to use, as an example of what will soon be common practice with increasing QRO interference, and as a basis of what will be necessary if any serious attempt is ever made to reduce it in this country on 80-metre CW by the use of minimum power for domestic communication.

There is a general assumption, invariably stressed in any article on QRP (in this *Magazine* or any other) that Low Power contacts are extraordinary, and difficult if not impossible through the heavy interference of powerful stations, and that favourable times must be chosen if such work is to be successful. But when G3EJN, at Bristol, attempted to get his 3-watt signal through to G3ANQ on top of a 100-ft. building in West Central London in the worst QRM ever known on "Eighty," both operators were soon forced into an entirely new attitude towards QRP working.

On the London aerial the strength of the QRO stations is simply enormous; many of those mentioned in the previous article, when properly tuned-in without any excessive amplification, are clearly readable on the speaker far out on the roof over 100 ft. from the cabin door. It was soon realised that this interference would not only have to be faced but *worked through*, and so, hopeful but not very sanguine, the two operators set out to find a way through the screaming barrage of QRM.

The Competition

Hemmed in and almost obliterated by the tremendous carriers of stations running inputs up to 50 times their own, hammered by key clicks, flogged unmercifully by raucous ripple and bullying phone, tormented by chirping CW and the "yipe" and "twizzle" of galloping VFO's, night after night, through February, March and April of last year, for two hours on end the two QRP stations worked doggedly on, testing and reporting, and finally ragchewing when the night's work was done.

That frequency shift, occasional repetition, and call and counter-call, were necessary to maintain contact and give proper signal reports will be obvious; *but no QSO was ever abandoned, nor was contact ever lost*, save for a few minutes on some occasions, when 'EJN attempted to fight his way through on a new and often "weaker" aerial. Encouraged by continual practice, emboldened by many a hairbreadth escape, the authors came to realise that they could not only survive but actually *fight* the QRO, and this spurred them on to increasing audacity, out of which came a new technique, which previously they would never have considered workable.

This technique is founded, in the first place, on a perfect understanding between the two operators, a mutual determination not to be put off by any kind of interference, close appreciation of receiver selectivity, precise variation of frequency, and rock-steady transmitter note. In the second place, they developed an operating method which calls for special description, since, evolved from sheer necessity, it proved to be their only chance of survival.

The Method of Meeting the QRM

At first, when heavy interference was encountered, 'EJN stood by while 'ANQ searched frantically for a quiet (?) spot, till one awful night, faced with a band one mass of stations, they decided, in 'EJN's pathetic words, to "stay here and

go under together"! They won through that desperate moment, from which they never looked back, and so the new technique was born: a technique of short overs, "beat note change," "dodging the blot-out" and "knifing through."

Break working was employed by 'EJN, while 'ANQ used a C/O switch. It cannot be too clearly emphasised that overs must be *short*, otherwise contact will soon be lost. Break working helps, but cannot be relied upon exclusively, as the weak breaking signal is often inaudible against the tremendous background. Call-signs also must be kept to the minimum; there is a general tendency to overdo them, and this must be avoided. The Post Office requires each station to identify itself and its contact, by sending both call-signs in the prescribed manner at least once every ten minutes, and, provided this is done, they have no objection to break working. On the other hand, to work break continually without call-signs is as foolish as it is illegal, as two QRP stations in heavy interference must keep rapid and constant identification or lose contact.

VFO is essential; no crystal-only station would last five minutes in the conditions under which the authors often worked, even if several channels were available. This is due to the vital importance of a *small* frequency change, discovered accidentally under the desperate conditions just described. With this must be considered "blot-out," or "QBO," to give it the signal invented by the authors to measure and give warning of this particular menace.

Depending on receiver selectivity and RF gain employed, the swamp or blot-out effect of a powerful station extends several kc either side of its frequency. The actual strength of the wanted signal has constantly to be considered, *as well as the amount by which it is reduced.* As no signal exists to warn the distant operator of this, the authors appropriated QBO, which has an aircraft significance which does not matter. QRM, also employed, works *upwards* in S-points, from 0 to 9, as is well known, but QBO works *downwards*, from 8 to 0, giving the nett S-value of the previously reported signal, thus: S6. QBO4. QRM3. or briefly: S6, B4, M3—a state of affairs often encountered.

With the wanted signal hemmed in between two powerful stations, its S6 reduced two whole S-points, as in the above example, and a QRM of S3 besides, the receiving operator may need some help to pull the traffic through. Surprisingly, all he often wants is a QSY of a few hundred *cycles*, enough to give a clear beat-note difference from the QRM3 just mentioned, and for this the authors signalled "up" or "dwn" as needed. If the greater shift was required, the necessary figure of kc was added, and by this simple means contact was maintained under apparently impossible conditions.

In Practice

Incredible as it may seem, the greatest shift has been only 8 kc off the schedule channel—frequently, less than half this—a movement which, at the outset, the two operators would have thought unbelievably small. Receiver selectivity and radiated signal strength have much to do with this at both ends; *the* essential thing in this working is to provide sufficient margin against QBO, which always appears suddenly. To move too far is, invariably, to plunge into fresh or worse interference.

Phone is another menace; also strong ripple—and here, perhaps, the two operators scored their greatest triumph. In London, the telephony jam is, of course, appalling, but G3ANQ's BRT400 has both crystal and audio filters, which strip the sidebands most effectively. Thanks to this "knifing" effect, ripple and telephony have been made bearable, and once, for twenty glorious minutes, G3EJN in Bristol was read clearly straight through the heart of a roaring phone!

Chirp requires particular mention. 'EJN would have been quite impossible to read on most occasions without his steady note with its trace of heavy undertone. Drift, of course, is fatal, as often there is literally no margin either side. But chirping QRM is deadly, as its clapper-like effect, moving to and fro across the wanted signal and, especially, the filter channel, makes note discrimination almost impossible.

Several other points need emphasis. Instant come-back is vital; if no answer was heard, either station would query or start calling in a few seconds, listening meanwhile for break, or instructions to move out of sudden interference; contact cannot be maintained without such rapidity and resource.

Important also is accurate, steady sending and, especially, clear word-

spacing; the average speed was 14 to 16 w.p.m., with occasional excursions up to 20. There was no waiting for QRM to finish: the two stations would never have worked at all had they adopted this popular practice. Neither was there any running away from QBO—merely a movement enough to minimise it if excessive. The correct adjustment for this, the ordering of the distant operator, and interpretation on his part, are matters of some mutual skill and practice. It is difficult at first to believe the penetration of a 3-watt signal among powerful stations and instruct accordingly; also to give, when ordered, the exact touch to the VFO for the critical beat-note change on "up" and "dwn." The tendency is to go too far—about 1 kc—which may make reception hopeless at the other end. It goes without saying that VFO and receiver must be accurately calibrated.

Control Signals

To facilitate understanding, each ordered the other on the old sea principle that the operator receiving is, for the moment, in control; "k" or "nw k" being often added to his orders to signify "go ahead at once without acknowledgment" as in marine practice, which saves vital seconds. This simple method, with the abbreviated signalling of QBO, QRM and frequency change already described, is clearer, safer and faster than any use of QSV, QSY, QSU or QSW. They were tried and abandoned as too clumsy and time-wasting for the rapid "push-to-talk" style working so necessary for continuous contact—and survival.

Finally, those who attempt this type of CW work should realise that nothing makes up for the ability to read Morse through interference and a determination to take on all comers regardless, and fight them to a standstill; for the comparatively quiet channel invites endless interference from QRO operators who do not listen and phone stations who do not care.

The authors, who succeeded far beyond their expectations, feel that there is more and better work to be done in workshop and on the air in the furtherance of this worthy and exhilarating sport, and hope that their modest experience may be an encouragement to Low Power operators in securing fresh triumphs for QRP, to the ultimate benefit of Amateur Radio.

Shielded Link Construction

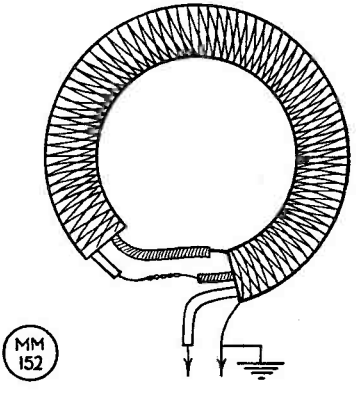
INCREASING COUPLING

By **R. YOUNG (G3BTP)**

THE shielded link constructed of coaxial cable is gaining great favour in amateur circles, since it provides a simple way of obtaining inductive link coupling with a minimum of capacitive coupling. In use, however, there are occasions when insufficient coupling can be obtained with the single-turn link available when coaxial cable is used in the construction.

To obtain increased coupling, a two-turn link can be made just as easily by the use of 70-ohm screened *twin* cable instead of coaxial cable, which gives the necessary freedom from capacity effects, yet permits of greater linkage. Its construction can best be seen from the accompanying diagram, which is self-explanatory.

It is hoped that this extension of an original idea may prove helpful in those cases where the maximum of coupling is required.



Construction of the two-turn shield link.

Voice Operated Carrier

DISCUSSING A PRACTICAL CIRCUIT

By **N. C. HOLMAN (ZS5GO)**

This article discusses a VOC system applied to the screen of the final RF amplifier. It is shown that while satisfactory operation can be obtained, the system holds no great advantage over the more usual AM control methods. On the other hand, there is ample scope for experiment in the development of fully effective VOC circuits.—Editor.

WE have become so used to the present system of transmitting a steady carrier, and then adding audio to it up to 50% of the carrier power, that we are apt to regard it as the only possible system.

However, radiating a constant carrier is a great waste of power, and it might be preferable to vary the carrier at a sub-audio frequency so that its power at any instant is just sufficient to allow 100% modulation with the audio power at that instant. Such a system has been attempted since the earliest days of radio-telephony, with a view to obtaining another advantage of the system—namely, that no send-receive switch would be necessary, since as soon as the operator stops talking, the carrier will also cut off. The latter advantage has not been so easy to realise in practice.

Note that Voice Operated Carrier is not the same as the suppressed carrier used in SSSC (which transmits one sideband without carrier), nor is it the same as Super-modulation. Nor is the V.O.C.S.U. (Voice Operated Carrier Switching Unit) of some Marconi transmitters the same, since here the audio power actually operates a relay to switch the transmitter on and off in the usual way.

It would be convenient to refer to the normal system of modulation as commonly used today as Constant Carrier. The name Voice Operated Carrier would apply to all cases where the carrier is varied at a sub-audio frequency in addition to being modulated at the audio frequency. One form of V.O.C. is the Constant Modulation system (to which this article refers), and independently of this, there will be the usual division into Plate or Screen Modulation, and also there will be Plate Control or Screen Control, according to where the carrier control is applied. Then again, there can be High Level or Low Level modulation and control, depending on whether the modulation and control are applied to the final amplifier or to an earlier stage.

It is easy to represent the Constant Modulation system pictorially. The radio frequency oscillations are supposed to be so rapid that they are not seen individually, but as a shading—as in fact they are seen on an oscilloscope screen. The audio is supposed to be a single word, or sound, and the waves have been reduced in number for clearness. The oscilloscope should be set to a low frequency sweep triggered by the commencement of the audio. The great waste of carrier power is clearly shown. (Fig. 1.)

One such method of obtaining Constant Modulation is to use a special

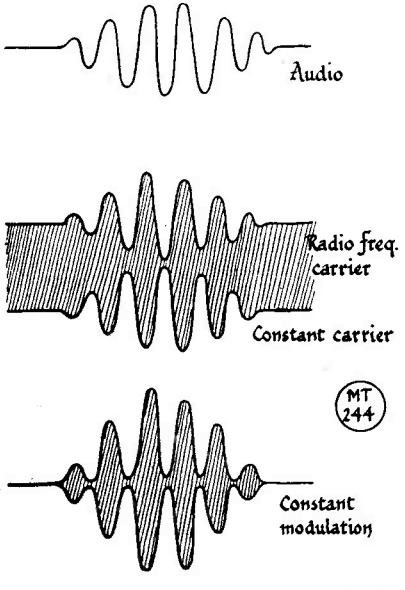


Fig. 1. Waveform shapes to illustrate the discussion in the text.

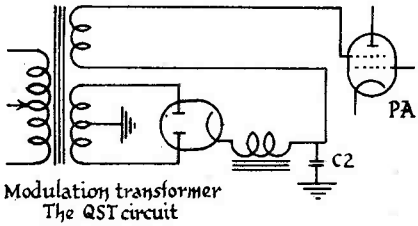
modulation transformer with a centre-tapped tertiary winding. (*QST*, Apr. 1950.) Tests have been carried out over several months on the 40-metre band with this circuit, and also with a simplified circuit which gives identical results, but obviates the necessity for a special modulation transformer. (Fig. 2.) The latter circuit uses a voltage doubling rectifier to supply the DC voltage for the screen control, and can be quite easily added to any existing transformer. The circuit works according to plan, but nevertheless is not satisfactory for the following reasons:

Practical Considerations

The first weakness is the result of applying the control voltage to the screen grid, and it is that the carrier does not cut right off when not speaking. The screen volts do go down to zero, but the carrier remains at about 20% of its normal value, a manifestation which will be well known to all who have tried keying a CW transmitter in the screen of the final amplifier. A negative voltage can be applied to the screen, but it cuts down the maximum of the carrier as well as the minimum—the fact is, that with normal valves (this article refers mainly to the 807 and 813) the screen has not got a sufficiently high mutual conductance to give the control required (and the same limitation applies to screen modulation also, although this is incidental to the present case). But some small negative voltage can be used, and this is shown in the circuit (Fig. 2) as being taken from the final grid leak, avoiding the necessity of a bias battery and not introducing any undesirable complications. About 20 volts is a good value—with two 807's in parallel and a grid drive of 6mA, 30 volts will be available across a 5,000 ohm resistance in series with the usual grid leak.

The second point is that not enough control voltage is available. Heavy overmodulation occurs on louder passages, and the carrier cannot be driven up high enough to obtain the advantage of being able to run the PA at higher power than normal ratings. A screen milliammeter is necessary as well as a plate meter, and ideally the plate current should swing up momentarily on speech to 40% more than the final would normally be run on Constant Carrier.

A third disadvantage applies to all cases where the control voltage is taken



Modulation transformer
The QST circuit

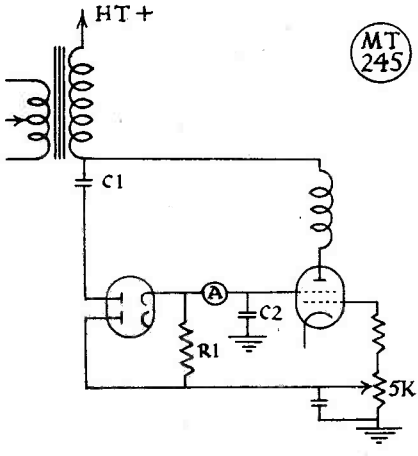


Fig. 2. Essentials of a circuit for controlling on the screen of the PA for VOC working.

from the modulation transformer, and is that the condenser C2 heavily loads the secondary (through the rectifier) and cuts the highs, making the speech very deep and muffled. Inserting a small audio choke in the output from the rectifier (both leads in the case of the voltage-doubler circuit) obviates this at the expense of a further fall in the already inadequate DC control voltage.

The condenser C2 in Fig. 2 is of importance because it defines the time-constant of the control voltage, and holds the carrier on between words. The maker's figures for the screen grid of the 807 are 6 mA. at 275 volts (with 600 volts on the plate) which represents a resistance of 46,000 ohms (or 23,000 for two valves in parallel).

Neglecting R1, which should be high enough not to load the circuit too much, say 100,000 ohms, this requires a value of 0.4 μF for a time constant of a fiftieth of a second (one valve) or 0.8 μF for two valves in parallel. The

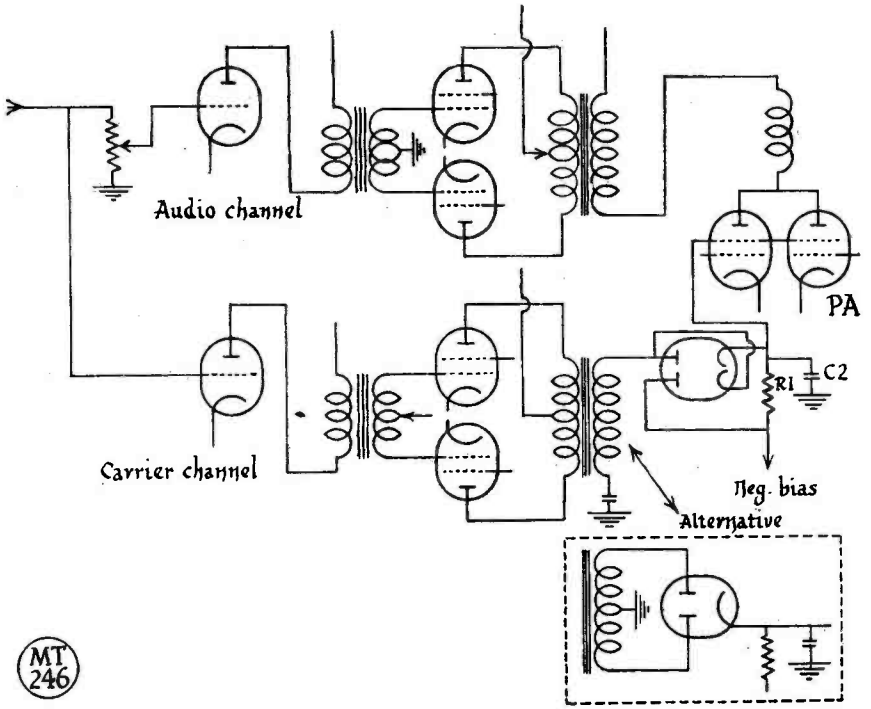


Fig. 3. ZS5GO has had this circuit under test with the results described in his article.

rectifier does not have to be taken into consideration in this calculation as the charge cannot leak away through it.

Satisfactory Solution

A circuit which overcomes these difficulties is given in Fig. 3. A separate channel is used for the carrier control, and it is much more successful than the previous circuits in getting peak power out of the finals, though it still does not solve the problem of obtaining complete carrier cut-off. A gain control is fitted to the audio channel, and the control channel is always run wide open.

After considerable tests with this transmitter its good and bad points can be enumerated. It certainly works according to the book. Using a 60-watt 220-volt lamp as an artificial aerial switched in to replace the 300-ohm line, the lamp does not glow when not talking, but it lights to full brilliance on whistling into the mike. The screen current (with two 807's in the final) swings from zero to 20 mA and the plate current from 20 to 120 mA (with no bias on the control rectifier). There is plenty of output from the control rectifier, so that some negative bias can be applied for cutting down the idling carrier. The question of distortion does not arise since the control circuit does not now load the modulation transformer.

Reports on this transmitter always mention a very high background noise when not speaking. Actually the noise was normal, but it seemed much greater since it was applied to a much smaller carrier, and its effect was still further exaggerated when the receiving station was using AVC. Undue background noise (as when using a carbon microphone) must be avoided, since it would hold the carrier on, and a muting device might be added.

When testing this transmitter with a steady audio note, the 'scope pattern and the meter readings are indistinguishable from the normal system. The

pattern on a trapezoidal figure is a dot when not speaking, opening out into the usual shape on modulation. When using a linear sweep, triggered to the audio, a defect of the system can clearly be seen, namely that the carrier lags slightly behind the audio, causing momentary overmodulation at the beginning of words.

As a portable set working from a battery and genemotor, the variation in load as one talks can be clearly heard in the change in speed of the genemotor.

The transmitter is quite satisfactory, and fulfils all that was expected of the design, but it seems to have insufficient advantages over the normal Constant Carrier system to make its adoption worth while.

Long before the advent of power tetrodes a controlled carrier system was used in which a Class-B modulator was connected in series with the plate lead to the triode final, and no doubt the advantages and disadvantages of the scheme were then fully disclosed, and the whole matter was forgotten for many years till its recent revival.

All in all, unless some new feature is introduced (such as a special valve with high mutual conductance of screen and suppressor grid to plate) this system is unlikely to replace our present high level modulated Constant Carrier sets. The present system which links up with receiver design using AVC is after all pretty well established and it would be a revolution to alter it.

Reception of Amateur SSB Telephony

FURTHER NOTES ON RECEIVER ADJUSTMENT

Part II

By **H. C. WOODHEAD (G2NX)**

The first part of this article appeared in our August issue and discussed in general the principles involved in the reception of SSB telephony transmissions on any standard amateur-band receiver fitted with a variable-pitch BFO. —Editor.

HAVING become proficient in the SSB tuning procedure, one may examine the results a little more closely.

If the transmission is a good one, having adequate suppression of the unwanted sideband, there will be a narrow band A, over the whole of which intelligible, even good quality, speech will be received, as shown in Fig. 2; but, in exploring this band more closely, it will be found that there is only one point, B, Fig. 3, where speech which is a true reproduction of the speaker's voice, is received. On either side of this point the voice appears to be higher or lower in pitch than is normal. This is only, to a small degree, insufficient to render it unintelligible; indeed, without knowing the speaker's natural voice, any point in this band would pass as satisfactory. In other words, there is a small amount of latitude of adjustment in this area.

If the transmission is not a perfect single sideband—that is to say, if some appreciable amount of the unwanted sideband is present, this will show up in the part marked A of Fig. 2. It will no longer be true that there is some latitude either side of the point B, Fig. 3. The raising or lowering of the voice pitch will be noticed on either side of B, but it is accompanied by what is

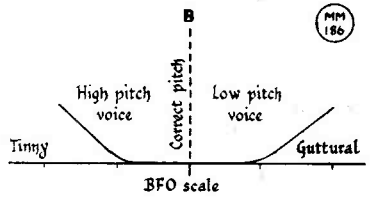


Fig. 3. This sketch expands Fig. 2 to illustrate the argument in the text. *(See Part I.)*

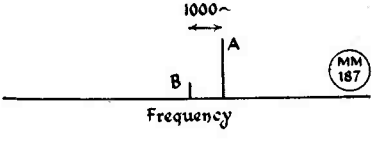


Fig. 4. A single 1000-cycle tone frequency with reduced carrier.

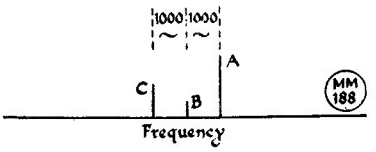


Fig. 5. An imperfectly suppressed single-sideband transmission of 1000-cycle tone.

best described as a "frog in the throat" effect. The point B is very difficult, if not impossible, to find. This is especially noticeable if the unwanted sideband is only slightly suppressed, and in this case the raising and lowering of the pitch is not nearly so clear. Each side of B the voice seems to go both guttural and tinny at the same time, so that it is impossible to distinguish one side from the other. When adjusted very close to the point B, a kind of beat note may be heard in the speech, which is only present when speech is passing. The beat is due to the error in setting the BFO and is caused by the beating together of the two sidebands, which are different from each other by twice the error of the BFO. This is much easier to observe if tone is being transmitted instead of speech.

Testing with Tone

It is probably reasonable to say that every SSB station should have a source of pure tone permanently on hand for testing, for it is almost an essential for assessing the quality of the transmission. It may therefore be of interest to consider how the transmission will be received in this case.

If the transmission has already been adjusted by the BFO to give good speech and the transmission is as it should be, only one frequency will be discernible in the receiver, which will be the same as the original tone transmitted, but will be caused by the beat due to the difference in frequency between the BFO and the transmitted frequency (transferred to the IF of the receiver.)

This tone frequency can be reduced to zero by shifting the BFO until it agrees with the transmitted frequency. Any carrier present would now appear as a faint tone of the same frequency as before. The loudness of the two tones in these conditions may be used as a measure of the two signals—sideband and carrier. It may be that no carrier is heard at all, though it is sometimes an advantage to the receiving end if some carrier, at very low level, is put out by the transmitter.

This method of measurement will be made clear by reference to Fig. 4, which shows one sideband and reduced carrier. If the BFO is set to zero beat with the carrier B, then A will be heard as a 1000-cycle tone; if the BFO is set to zero beat with the side frequency A, then B will appear as a 1000-cycle tone of lower level.

The case where there is some unwanted sideband as well as carrier is shown in Fig. 5. First, if the BFO is set exactly to zero beat with the residual carrier B, a 1000-cycle tone will be provided from each side-frequency A and C. If, however, the BFO be displaced towards C by as much as one cycle, then C will appear as 999 cycles and A as 1001 cycles. There will also be a slow beat of 2 cycles per second, which will be proportional to the amplitude of the unwanted side frequency C. It is this latter which causes the "frog in the throat" effect on speech.

It is interesting to consider the same test on a perfect transmission, with no unwanted sideband. The resulting tone in the receiver would be 1001 cycles instead of 1000, and it is doubtful whether many of us would be able to detect the difference! It is the beat with the unwanted sideband which causes all the trouble and necessitates its suppression.

Returning to the case shown in Fig. 5 and setting the BFO to zero beat with the wanted side-frequency A, then B will appear as the 1000-cycle tone and C its second harmonic. An hour spent in tuning around on the lines indicated above will go far to elucidate the mysteries of SSB.

Receiver Improvements

There are, of course, one or two directions in which the average com-

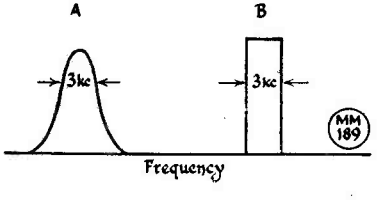


Fig. 6. The response usually to be expected from a receiver, compared with the ideal.

munications receiver fails to make the most of the advantages of SSB working. Notably, the first oscillator—which is usually the most critical one—may be lacking in frequency stability and, in consequence, it may be necessary to re-tune the BFO continually to compensate for drift. Not that this is an insuperable difficulty; it can usually be overcome by stabilisng the HT supply to the first oscillator with a VR 150 (which ought to be done in any case).

Then there is the question of bandwidth. SSB uses less than half the bandwidth of the ordinary AM system, and, to take full advantage of it, the receiver bandwidth should be cut down to suit. This can usually be done by employing a fairly narrow band in the case of a receiver provided with a switched bandwidth. If SSB, occupying less than 3 kc, is received in the full-bandwidth conditions, which may be ± 6 kc (that is, a total width of 12 kc), noise and QRM will be received over the whole 12 kc and will be four times as great as if the receiver band was cut down to 3 kc. It should be borne in mind, in this connection, that the narrower bands, such as 3 kc, on the average communications receiver are likely to be similar to A of Fig. 6, whereas ideally they should be like B.

Again, on some types of receiver one finds that there is a tendency for the BFO to "pull in" on low frequencies. The principle is that if a stable oscillator is supplied with a small amount of power at a frequency very close to its own, it is liable to "lock on" to this frequency instead of its own. The effect depends on the power of the external signal and the proximity of the two frequencies. The higher the power and the closer the two frequencies, the more likely is it to occur. The effect is familiar to anyone who has constructed convertors for use on VHF bands. The condition is illustrated in Fig. 7, where A shows the case where there is no pulling and an audio frequency is obtainable right down to zero beat. When pulling is experienced, the beat frequency falls to zero some way before the zero point is reached, and the BFO is held in synchronism with the signal right through to the same point on the other side of what would have been the zero point. This is shown in B. Fig 7. It can be checked on any receiver by tuning to a steady carrier, switching on the BFO and tuning it through zero to ascertain the lowest

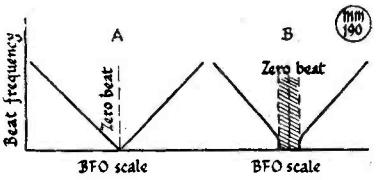


Fig. 7. When the BFO "pulls" under the conditions explained in G2NX's article, this is what happens (B).

frequency which can be obtained without the oscillator being pulled into synchronism. The result can be compared with that obtained when using a heterodyne wavemeter to produce a beat in a local receiver from an incoming carrier. In this latter case beats can be produced down to one every few seconds without pulling in.

The pulling of the BFO depends largely on the form of coupling between it and the final IF stage. It may be avoided by using a separate heterodyne at the signal frequency, as indicated above, instead of the IF, provided some instrument like the BC-221 is available. Many SSB stations use the leak signal from the VFO of their AM transmitting gear.

Future Development

There is plenty of scope, therefore, for the development of special circuits at the receiving end to suit SSB, though most reception is being carried out at the moment on ordinary receivers. One suggestion has already been given in *Short Wave Magazine* by G3AAT (July 1950), and no doubt the information in his article may have encouraged others, who are mainly interested in the receiving side, to try their hand. In view of the close limits of tuning accuracy required on SSB, there is a definite need for a receiver with a form of AFC to hold it to the correct frequency, and this will probably require the transmission of a low-level pilot carrier such as is used in the commercial SSB transmissions.

THANK YOU!

It is at this time of year that we take a corner of space to thank all those many readers who have been kind enough to remember us with Christmas cards and letters of encouragement and good wishes. Each and every one is greatly appreciated.

General Purpose RF Test Meter

USEFUL DE-BUGGGING DEVICE

By **F. E. WINGFIELD (G2AO)**

IN these days of TVI and BCI, of odd harmonics, triplers and quadruplers, it is most necessary to know where you are and where things are going. Many wave-meters have been used at G2AO, all including crystal rectification and meter indication. The one described here was built as a result of not being able to get into a small corner of the transmitter with a 4-in. cube box when chasing a TV bug let loose in a cable form. It is named the D-B. or—De-Bugger.

Circuit?—There is very little to it, and all parts can be obtained from the junk box, except possibly the 1N34; it has proved to have sharp tuning, although it does not contain the recommended loosely-coupled meter circuit. The latter did not lend itself to the probe type of coil desired.

For those who wish to copy it exactly, full details are given in the figures and tables. Variations in dial readings will naturally occur, but some are given as a guide.

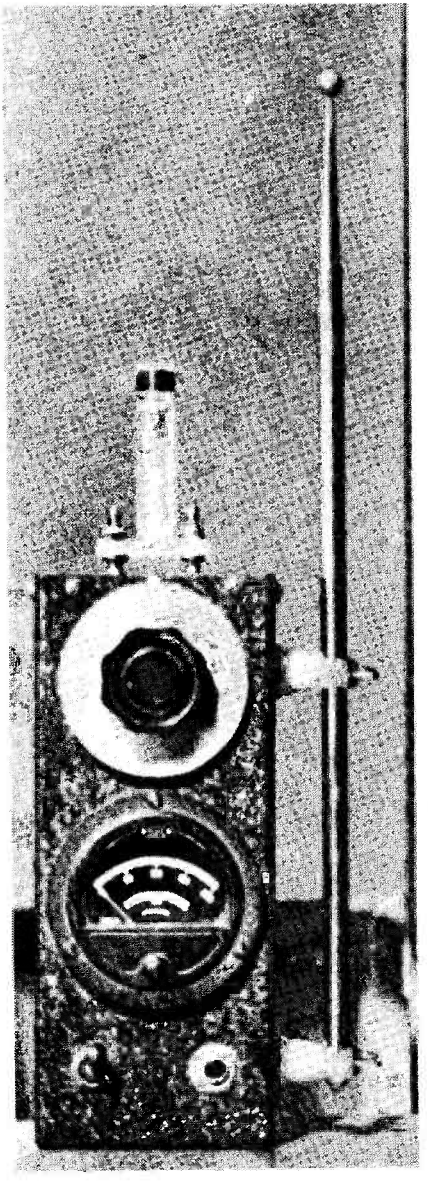
The box was half of a long biscuit tin and measures 7in. long x 3in. wide x 2in. deep; fitted into one end is a piece of ¼-in. thick perspex for mounting the two sockets for the plug-in coils.

Application Notes

Before dealing with the uses to which this instrument can be put, a few notes about absorption wave-meters may not be out of place. They are not highly accurate for two reasons: (i) The indication of resonance is fairly broad when

Coil Data

Coil	Dim : A.	T	SWG
A	Surplus 104 μH	Inductance	
B	$\frac{5}{8}$in.	115	40
C	$\frac{3}{8}$in.	40	36
D	$\frac{1}{4}$in.	15	32
E	$\frac{3}{8}$in.	6	20
F	Loop $\frac{1}{8}$in. diam. silver plated copper 3$\frac{1}{2}$in. including top of plugs.		



View of the completed RF Tester, which has many practical applications.

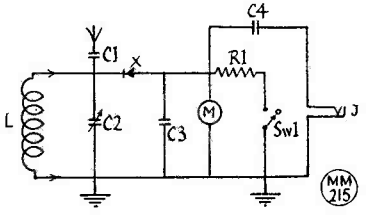


Fig. 1. Circuit arrangement of the G2AO De-Bugger—simple enough

Table of Values

Fig. 1. Circuit of the G2AO DeBugger

C1 = 47 $\mu\mu$F Ceramic
C2 = 100 $\mu\mu$F midget variable
C3 = 0.002 μF mica
C4 = 0.01 μF mica
R1 = 100 ohms ½-watt
M = 0-200 microampere meter
Sw1 = SPST toggle switch
X = 1N34 or BTH equivalent
L = *See* coil tables
J = Single circuit jack.

compared with the zero beat obtained when using a heterodyne frequency meter; (ii) Owing to the fact that close coupling is generally necessary between the meter and the circuit being checked, a certain amount of detuning occurs in both circuits and therefore the calibration depends to some extent upon the coupling.

On the other side of the house we have the following:—(i) By using a sensitive meter, the degree of coupling is less and therefore does not cause so much variation in calibration; by using a remote coupling cord, this is reduced

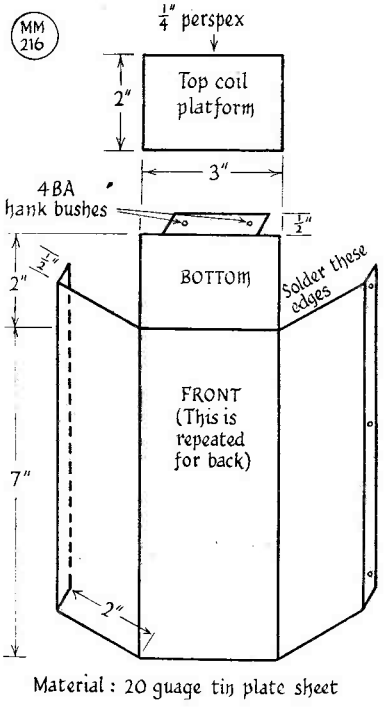


Fig. 2. Details of the box for the RF Tester.

even more. (ii) No power supplies are required. (iii) With the heterodyne meter it is possible to get into trouble with the number of harmonics present,

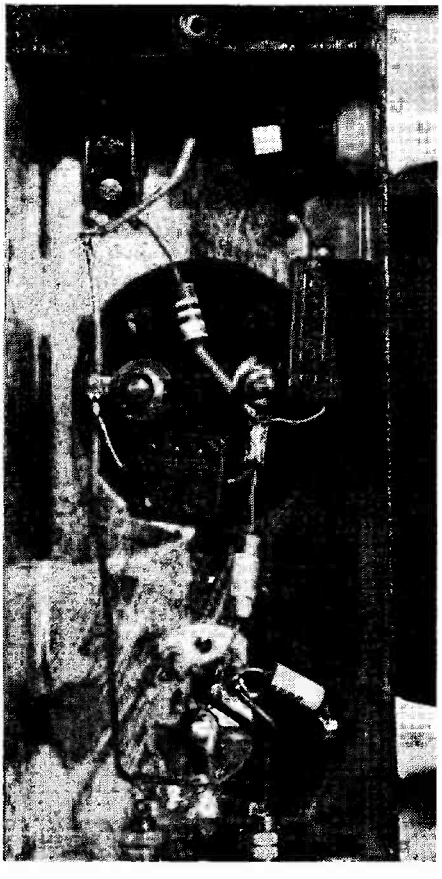
Coil Frequency Table

A		B		C		D		E		F	
Mc.	Dial	Mc.	Dial	Mc.	Dial	Mc.	Dial	Mc.	Dial	Mc.	Dial
2·03	30	3·8	15	9·74	9	24	7	56	8·5	136	5
2·0	32	3·52	20	8	18	21	13	48	15	128	8
1·8	46	2·54	53·5	7	29	17·7	22	40	24	120	11
1·74	54	2·4	59	6	41	16	30·5	35	33	104	17
		2·3	69	5·7	48	14	41	32	41	96	21
		2·1	84	4·8	69	12	58	30	48·5	88	26
		2	95	4·45	84	11·4	67	28	57	80	32
				4·3	91	10·7	76	24	80	72	41
						9·7	93·5	22	97·5	64	53
										56	70
										48	98

whereas with a simple tuned circuit this is avoided, as it will only respond to one frequency.

Apart from chasing RF along cables, this meter can be used for checking output frequencies, neutralizing, as a phone monitor and as a field strength meter.

To adapt the instrument as a field strength meter a 48-in. (extended) long telescopic whip aerial is attached to the side of the case by means of feed-through insulators which have clips fitted to hold the aerial. When used for this purpose, the rod should be fully extended or made a half-wave on 144 mc and held horizontally. Immediate



Interior of the useful RF Tester described by G2AO.

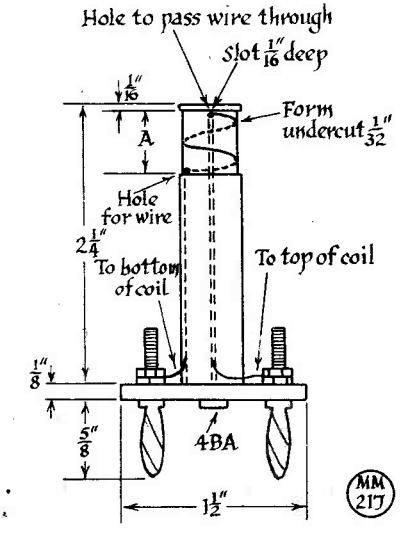


Fig. 3. Dimensions of the coil former used by G2AO Winding specifications are given in the table.

field patterns can be traced out easily. This aerial has also been found useful for checking for RF in house wiring by putting it parallel to the cables. For all other purposes, the aerial should be removed when the meter is in use, otherwise the pick-up will not be concentrated in the required area.

For checking the output frequencies of a doubler or any device producing RF, great care must be taken that the meter is coupled only to the circuit to be measured and that no RF is being picked up from other stages. To achieve this, in difficult positions, a coupling line has been made. This consists of a coil, to which is connected a length of coaxial cable with a detachable search loop, which slides over the plug-in coils.

Neutralising Tester

When checking neutralising, make sure that there is no stray coupling to earlier stages. When this is difficult, due to a compact PA, the long lead can be used without the search loop. The lead should be connected directly to the aerial link on the PA. Tune the neutralizing condenser for minimum reading as in any other method.

The instrument can also be used to get

a rough idea where the oscillator of a receiver or converter is by coupling to the oscillator coil; in some cases a meter reading can be obtained, but when this is not possible, by using headphones on the receiver one can hear the oscillator being pulled when the wave-meter is tuned through its frequency.

To use the instrument as a phone monitor, a pair of headphones are plugged into the jack on the front panel of the unit; depending on how close it is to the transmitter, the aerial may or may not be necessary. The phones are coupled to the detector by C4 to avoid placing a low resistance across the meter; if high impedance phones are employed this is not necessary.

The switch Sw1 places R1 in parallel with the meter when a very large signal is liable to be encountered in initial measurements, or at any other time when reduced sensitivity is required. In the unit described it reduced the reading to approximately one-sixth.

Remember—always make the coupling between the meter and the circuit to be checked *as loose as possible* and you will have a very useful and quite selective piece of equipment.

Amateur Radio Exhibition

THE fifth in the series, the Amateur Radio Exhibition this year took place in London during the period November 28 to December 1. There were many interesting exhibits—in particular, the showing of amateur-built equipment was a successful innovation, even if it did mean that a number of trade stands had not been taken up. In fact, some firms well known in the Amateur Radio field were notably absent, and there was a marked falling off in trade support compared with previous years.

Some very fine examples of amateur craftsmanship in the radio and electronics field were shown, and the generally high standard of these exhibits probably surprised a great many of the visitors—the band-switched transmitter by G4DC, the 70-centimetre apparatus by G4LU, and the 2-metre equipment by G3AST are worthy of special mention as outstanding examples of amateur design and construction.

Round the Stands

The Royal Navy and the Royal Air Force had effective and interesting recruiting displays, and the trade stands included AVO with their world-famous range of instruments; Cosmocord displaying many items of interest to amateurs and sound-recording enthusiasts; E.M.I. Sales showing a selection of high-grade equipment; Easibind with their well-known product, specially made for a number of leading periodicals; English Electric displaying some interesting TV and specialised products; the G.E.C. with a wide range of Osram valves, CR tubes and germanium crystal diodes—and the BRT-400, a fine example of modern communications receiver engineering; the Panda Radio Co., coming to the fore with a new all-band CW/Phone transmitter in the modern table-top design; Salford Electrical Instruments, showing many examples of crystal units, and selenium and copper oxide rectifiers; Philpotts with their well-designed chassis, cabinet and rack-panel assemblies; and Woden's showing their transformers and chokes, now widely used in communications, television and electronic equipment generally.

Other stands were taken by the Television Society, Iliffe & Sons, Ltd., Short Wave Magazine, Ltd., and the Radio Society of Great Britain, sponsors of the Exhibition itself.

The attendance was fair on the opening day (Wednesday), but below expectations on Thursday and Friday. Saturday, as always, saw a good crowd between 3 and 8 p.m. The attendance overall was certainly down on last year; for this Exhibition, 1948 was probably the peak year, in terms both of attendance and general trade support.

PHOTOGRAPHS

Readers are reminded that we are always glad to see good photographs—which can be any size, print or negative, but must be *clear* and *sharp*—of Amateur Radio interest, for possible publication in these pages. Payment is made for all such photographs used, immediately upon appearance in print.

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

MAY we start by wishing all our readers, great and small, QRO and QRP, DX and local, a Happy New Year! May 1952 prove a successful year for you, both in Amateur Radio and in whatever other occupation for which you may have to spare time. And, in particular, may it prove a better year than 1951 from the point of view of conditions. Even Shakespeare had a thought for present-day Amateur Radio when he wrote "*Now is the winter of our discontent.*"

It certainly has been pretty grim at times. In November we had some quite good patches, but then it settled down to a spell of *the* most uninteresting conditions. Even the breakfast-time ZL and the tea-time W6 became a chancy business, and of the more exotic DX there was none—except for the soothing sound of the pirates and phoneys quietly going about their nefarious business.

Don't Trust Them

It's a pity to have to begin 1952 on a discordant note, but one or two of these fakers have removed themselves from the category of mere clots and have now become infernal nuisances. There was a "VQ1RF" let loose on 80-metre CW; he took several people in, although VQ4RF was still on the air from Kenya, and telling people on 10-metre phone that the VQ1 expedition had been delayed for a few days.

Last month G5RY reported working "ZK1AB" on Eighty, but we rather fear that ZK1AB went off the air a year or two ago; now this month we have some reports of QSO's (same band) with "VR2CJ." Even recent QSO's, late at night, with CE2AC are suspect. All these contacts seem to have happened around 3520 kc; the chap we suspect has a T9x note and sends very slowly with a good fist. He extracts the right Christian name from the Call Book, and

Calls Heard, Worked & QSL'd

he spends his spare time thinking of nice new call-signs to use. He is probably very QRP and "somewhere in Europe"; he fades in and out most convincingly. We won't comment on his behaviour; what we think of him should be fairly obvious. The best way to thwart a pest like this is to stop his fun by not working him. (At the same time, if we happened to know his address . . . .)

And so to the month's DX, which is not very thrilling. Nevertheless, we will take it band by band, as usual.

Ten-Metre DX

Pretty grim, compared with November, although the phone men have notched-up a point or two. G6QX (Hornchurch) found ZC4XP for a new one (CW) and worked other Africans, such as ZS and FF8. G5JU (Birmingham) winkled out TA3EFA and SVØWS, to push up his Marathon score to 46.

G2AJ (Biggin Hill) raised the genuine VQ1RF and was his second G contact, G2DPZ being the first. He confirms that 1RF is using phone only, and says they have half Zanzibar working for them, putting up Vee-beams and so forth. VQ4RF has to hold a regular pay parade for the native labourers!

G2BW (Walton) only heard three stations, all of whom he worked—ZC4XP, ZS2A and 4X4BX (CW). G3FXB (Hove) found an opening one Saturday and raised FF8, KP4, VQ2, ZC4, ZS and W. GM2DBX (Methelhill) worked CE, CX, JY and ZS on phone, with AP5TM, OA1F and ZS3G giving him new ones.

G3ATU (Roker) worked AR8BB and a couple of KP4's, but he says "I wish more users of this band would throw away their blinking mikes!" GW3FSP (Neath) did well with ZS3E, CR7CJ,

Operating position at G3ZI, Chobham, Surrey. Receivers are a Radiovision "Commander" and an RME-69 with DB-20 in front. A two-metre converter works into the "Commander." A further description of G3ZI appears in "Other Man's Station" this Month.

FF8AG as well as CE, CO, KP4, VK, VQ2, VU, W, ZC4 and ZS—a nice bunch. G2NS (Bournemouth) collected PY, LU and sundry W's—all on CW.

That just about concludes the ten-metre list; the only "openings" for the CW man appear to happen at week-ends when a Contest of some kind is running. And then, curiously enough, the band always seems wide open on the Saturday and dead tired of it by the Sunday. Practically all the good ten-metre DX of this year has been worked on Saturday afternoons, as far as the CW experts are concerned. Football fans, please note.

The DX on Twenty

Here we certainly have more to choose from, although conditions have been pretty foul. FB8ZZ (New Amsterdam, Zone 39) has been giving a few people a new country and, in the case of G6QX, a new Zone as well. The best of the month at G5JU were CR4AJ, JA2KW, VK1BS, VP5BL and ZD6DU.

G8KU (Scarborough) raked in PX1AA on phone; he, by the way, was genuine. He was operated by DL4IA, who proceeded afterwards to Monaco, where he became 3A2AP. All this mileage was covered on a motor-bike—complete with station! G2BW also worked him, and so did G5BZ (Croydon), who also collected ZD6DU—both on CW.

G3GUM (Formby) thinks we must surely be in the bottom of the trough now, although he managed to raise CO7AH, CR5AA, KH6PM, ZE4JG and sundry Mobiles of the /MM and /AM variety. G5MR (Hythe) added one to his score with EA9BA on CW.

G3FXB has not had much time to spare, but worked EA8, HZ, KP4, VO, VP9 and more of "the usual stuff," with nothing outstanding. G2HKU (Sheerness) raised CO2OE, EQ3Q (claiming to be in Teheran, but we wonder!), FQ8AE and MD2JB, who is W1LIV and leaving in a month. Gotaways were some FF's, FB8ZZ, HV2PX (!) and VK9XK. HV2PX was asking someone to wait for his QSL, but he didn't say how long . . .

GM2DBX rustled-up 3A2AP, KG4AT, JY1XY, PX1AA and a couple of OX's, all on phone. G3ATU has hardly been on the band, having been amassing more Marathon points on the others. G5VT

(Bishops Stortford) says F9JD (Corsica) on phone is an easy one for new country-chasers; he has been QRT until recently, but is now very active, and there is only one other station on the island—we think that must be F9QV. 'VT adds that VQ8AL is a useful phone signal round about 1730 (14300 kc).

GW3FSP has had quite a good month and quotes EAØAD (1700), EL2R (1800), FB8BB (1800), FI8YB (1430), PX1AA, ZD6DU (1750) and ZS2MI, the latter on phone at 1930. G6YR (Southport) singles out FB8BB, FF8AE, FQ8AE, HZ1AR, LZ5LL, PX1AA, some OX's and TA1AR, as well as three QSO's with JA2KW, each with a different operator at the other end. Sundry gotaways included EQ3FM, FK8AC, some FQ's, FY7YB, PJ5RE and ZS3Q. A noteworthy point about 'YR's DX is that he is rock-bound; *without having used a VFO*, he has put up a score of 38Z and 147C, which must surely be a record of some sort? But a VFO is on the way, so we must expect a rapid rise.

G2NS, working only between 1400 and 1630 GMT, managed to collect HS1UN, FF8AG, PJ1UF, PX1AA, MP4KAE, LZ1RF and XZ2EM, as well as a lot of more routine DX. His gotaways included HB9GX/MM ("The Swiss Navy"), KT1LA, 3V8AN and 9S4AX. By the way, we make no apology for quoting all these "gotaways," because so many regular followers have said that they find them most interesting. After all, whether you *work* the man or not, he's still DX and he's still there, on the band. Incidentally, G6QB's own offerings in this category include ZS3Q (four times), FB8ZZ, DU1VVS (1320), VK1BS, XZ2EM, VR2CG and FR7ZA, who is back on CW but considerably mobbed by W6's.

Forty-Metre Work

When Ten and Twenty go bad on you, you usually expect Forty to turn up trumps. Alas! this month it has been just about as bad as the others. Early in December and soon after mid-November it wasn't too bad, but for the rest of the time it was terrible. In mid-November G5DQ (Cambridge) hit the high spots, with CR9AF (1615), VS6BZ (1920), VP7NM and 7NW (2300), ZD2DCP (2225) and sundry W6's the long way round at 1500. G5RI (Hexham) has not reported, but we know that he has consistently worked the W6's in the afternoons, with G6QB tailing along behind, unable to compete with a rhombic!

G5JU worked MP4BJS, VP4CQ and VP7NW. G5FA also worked the latter, together with W's and FA, TP, VK5 and ZC4. G2AJ weighs-in with CT2BO, KP4KD, VK5FH and 5KU, VS7NG and ZC4XP. G3FXB thinks the band should be better than it is (don't we all?) and has found it quite flat at times when 3.5 mc has been open. His DX includes CT3, EA9, FA, FQ8AE, KP4, KZ5CW, PY, TA, ZC4 and ZL. VE1ABJ was worked at 1915 GMT for a surprising one.

G3ATU was quite pleased to raise VU2RX at 1750, especially as he needed just this one point to bring his Marathon score to 300. The rest of his interest in the band has, he says, been "left-footed," and occasioned by UL7, UH8,

FOUR BAND MARATHON

(STARTING JANUARY 1, 1951)

Station	Total Points	3.5 mc	7 mc	14 mc	28 mc	Countries
G3ATU	300	40	90	151	19	158
G6QB	282	34	69	137	42	156
G5JU	277	33	72	126	46	139
G3FXB	274	35	84	131	24	144
G2AJ	271	36	62	126	47	139
G5BZ	261	33	62	149	17	154
G6QX	247	43	78	104	22	126
G5FA	220	29	75	109	7	120
G3ABG	203	30	65	83	25	103
GM2DBX	190	1	30	94	65	112
G2BW	177	14	42	92	29	103
G8KU	156	16	29	100	11	105
W2WC	148	22	35	84	7	91
G6TC	137	14	37	71	15	77
G8IP	133	12	50	63	8	86
G3COI	107	19	18	68	2	75

(Note that new entries to this table must not include QSO's dating back more than two months from the time of entry. Regular reporters should send in their score month by month—three months' failure to do so will be taken to indicate loss of interest and the score will be deleted).

UM8 and similar unworkable DX. He says he hopes "WSEM" doesn't mean anything rude. As a matter of fact, it is an abbreviation for a long, complicated Russian word which means just about "CQ"—but, of course, for only one side of the Curtain.

GW3FSP collected KP4, SU, HZ, EK, CT3, TA, VS7, KZ5 and EA9. Many others have just mentioned the band, but have not worked anything of outstanding interest.

Eighty-Metre DX

As you will have gathered from an earlier paragraph, any claims of super-DX on this band must be tempered with reserve. For the moment we are assuming that ZK1AB, VR2CJ, VQ1RF and possibly CE2AC are all the QRP-gent - from - Mittel - Europa. We will supply him with some high voltage at any times he desires, but *not* for the purpose of connecting it to his PA.

G5DQ worked VQ1RF twice or three times, the first being a fortnight before the real one started operating! G6QX collected EK1CW, OY2Z, VO4W, YO6CA and ZC4XP. G5JU found EK1CW for a new one. G2AJ had a three-way with VE1CN and VE1ABV on eighty-metre phone; he has now erected a ground-plane for the band, so should be turning in some nice DX in the next few months.

G5BZ is still keeping his fingers crossed over VR2CJ; he was worked at 0800 and "sounded like a ZL." G3GUM tells us that G3ATO worked "ZK1AB" with 6 watts input, which, alone, makes us slightly suspicious. After all, you can work VK or ZL on the band with very low inputs, *when conditions are right*, but to raise a rarity like "ZK1AB," who, presumably, is being called by dozens of QRO stations at the same time, takes more than 6 watts. "VQ1RF" is in rather the same category, having come back to a CQ by a station using 7 watts.

G3FXB raised FA, GD, PX1AA, VE's, W's and ZC4, mostly during the European contest. Gotaways were VS7NG and VP8AP—what a pity, too! G3HMC (Yeovil) made his first Trans-Atlantic QSO *on any band* by working VE1EA up here. It was at 2120 GMT, with an input of 19 watts. Others on the band, but not worked at the time, were W1 and 2, KP4CC, EK, SP and ZC4.

G3ATU collected CT3AB, KP4CC, OY2Z and . . . . VQ1RF! He, too, heard VP8AP and VS7NG, both round about midnight. GW3FSP worked KP4, EK, ZC4 and 4X—all before midnight.

To sum up, this band remains the queer mixture that it always has been; a band on which one can strain one's ears to bursting point for an elusive piece of DX, while two G's at S9 plus indulge in a long and perfectly legitimate ragchew on the same frequency. If the DX boys could annex just 20 kc or so, what a difference it would make—but they would have to keep outside of it themselves, and with the present VFO-happy technique it wouldn't work.

The Top-Band Season

By the time you read this, two of the Trans-Atlantic parties will be over. It looks as though the season should be a very successful one, since G3PU (Weymouth) opened the door as long ago as Sunday, November 25. On that

ZONES WORKED LISTING

POST WAR

Station	Z	C
Phone and CW		
G6ZO	WAZ	235
G6RH	WAZ	229
G6QB	WAZ	220
G4CF	WAZ	213
G3ATU	WAZ	212
G3DO	WAZ	209
G5YV	WAZ	205
G8IG	WAZ	200
G2FSR	WAZ	196
G2VD	WAZ	171
G5GK	WAZ	163
G3BI	WAZ	162
G3TK	WAZ	157
G3AAM	WAZ	154
G2IO	WAZ	154
G3YF	WAZ	152
G8IP	WAZ	144
G3AZ	WAZ	133
G5BJ	WAZ	126
G5VU	WAZ	124
G2AJ	40	210
G5BZ	40	200
G2WW	40	183
G8KU	40	165
G3FNJ	40	150
G3BNE	40	134
G5MR	40	131
G3BDQ	39	172
G5FA	39	162
GM3EST	39	161
G6QX	39	153
G3FXB	39	153
G2BJY	38	162
G3COJ	38	157
G3FGT	38	148
G6YR	38	147

Station	Z	C
cont'd.		
G3GUM	37	151
G2FYT	37	143
G3ABG	37	141
G2YS	36	135
G2HKU	36	128
G3CIZ	36	127
G6TC	36	118
G2DHV	36	109
GM3CVZ	35	114
G3HDA	34	103
GM3EDU	32	114
G2BBI	30	101
Phone only		
G8IG	39	170
G2AJ	38	171
G3DO	37	166
G6WX	37	135
G8QX	36	139
G3COJ	36	134
G2WW	36	134
HC2JR	35	171
G2VJ	35	122
GM2DBX	34	118
G2BBI	30	98

morning he worked VE1EA from 0520 until 0546, and shortly after that a CQ DX from G3PU was answered by W1LYV. This is a fine show, and such an early opening seems to point to the fact that this season might be better than last. Abandon sleep (on Sunday mornings) all ye who enter here!

As a follow-up to the recent notes about 4X4CJ and his Top-Band aspirations, G2QX (Luton) tells us that GW3FSP was working 4X4CJ on December 8. This was after 'FSP had written in with his news of the other bands, so we are glad to be able to bring it up to date for him. Another country in the bag! (*Late Flash*: 'FSP didn't work him, but they both tried hard!)

G2AJ will be a new participant this year, and from what we know of the aerial situation there (75-footers and the like, on top of a very nice hill) we are inclined to bet heavily on him. G3ATU is also going to have a crack, but wishes his long wires were higher.

GW3FSP has been working on the job of swinging his aerial system round from ZL-wards to States-wards! Considering that it consists of two or three half-waves in phase, you will appreciate that this is not just a matter of turning a handle. And 'FSP has another big item in his favour; to quote:—"My XYL has Job beaten all ends up for patience." It helps—even at 5 a.m. on a cold Sunday morning.

G5GQ (London, N.W.3) passes on the information that KV4AA will be on either 1902 or 1998 kc, looking for European contacts in January. No news yet of any South American activity, although we well remember HC1JW's signal last year. EK1AO has given no sign as yet, but EK1CW will definitely be on, and 4X4CJ will also be taking part in the Tests. Probably he will be most interested in trying to raise the W's and VE's, which means he will use the European frequencies and times. EK1CW has already worked six G's and a GM; he says signals are better at 0600 than late at night.

The Four-Band Marathon

Final scores will not, of course, be through until next month's issue, December still having 20 days to run at the time this month's scores were sent in. G3ATU continues to be strongly fancied; his lead is colossal compared with the bunching between the second and fifth scorers. Next month, too, we hope to show the starting scores for the 1952 Marathon. Don't forget that, in effect, our two tables are changing place next year; the Four-Band Table will be on a Post-War basis (please send one of those in, too), and the 1952 Marathon will be for Zones and Countries, irrespective of band.

So those who are in the present Marathon can send in *three* scores next month:—final score, 1951 Four-Band Marathon; starting score, 1952 WAZ Marathon; and Post-War Four-Band score. After the February issue there will, of course, be only the two tables. We hope for a particularly good and keen entry for the 1952 Marathon, which has no Four-Band label to scare away those who don't use them all.

Miscellany

G8JC (Worcester) mentions peculiar conditions on Eighty, in which the band was completely devoid of G's; HB9's were S9 plus, and a PAØ and a couple of SM's made up the rest of the population. GM2DBX is now claiming his DXCC on phone, a card from AP5TM having given him his 100th confirmed.

G3ATU says there is reason to suppose that the phoney MD9BO, who was never in or near Yemen, operated from Iceland, of all places. 'ATU makes the bright suggestion that if all the chaps who have worked 190 or over would send in lists of "countries wanted," it would make interesting reading. Some of us might even discover some valuable information on how to get them.

All sorts of news snippets from GW3FSP: ZB2A is a club station, and the receipt of a QSL is a matter of luck, according to which operator was worked. ZS3K *does* QSL. 'FSP has never sent a reply coupon to anyone for a card; he has 145 confirmed and 25 that are not. His black list includes all sorts of people that we know have QSL'd to others. He got his one and only ON4 card by blackmail; ZS7C told the Belgian that he would only receive his ZS7 card when GW3FSP certified that he had received his ON4! Finally, Dewi is the proud owner of A.A.A. Certificate No. 28, just arrived from the S.A.R.L.

G2HKU says SP5SF has been active on Top Band CW, but he doesn't know of anyone who has yet worked him. G5FA had an interesting visit from ex-MP4BAD and VQ3SS and had a long chat about the doubtful pleasure of being a "rarity"—as seen from the other end. G2AJ also had a visit—from

Station of G3GIR, Gorleston-on-Sea, Norfolk. Frequency control is by Heterodyne Crystal Oscillator-VFO, using a 6F6 through two 6V6's as buffer-doubler; the PA is a pair of PT15's driven to 150 watts by an 807, modulation being by cathode control of the PA with a pair of 807's. The receiver is an S.640 and main interest at G3GIR is 14 mc phone and CW operation.

VK2AGW—and they had a good phone QSO with another ex-G: VP6CDI. Then, later, he worked VK2US, and G3DCU showed up at the mike. He is there for three years and will have his own call soon.

Talking of exiled G's and ex-G's, G5LI is by now in Canada, where he is working for a year's trial period, and will stay there for good if he likes it enough. George asks to be remembered to all his old DX-chasing friends; he will be on the air as frequently as possible from VE2WA, and does not expect to have either gear or call-sign of his own for the first year.

G3GUM remarks on what a friendly lot of chaps you all are! Meaning you who regularly report your doings to this Commentary. He has worked several of the regulars, and finds that they all want to compare "gotaways." They greet him as an old friend, although they have only met in print. Which is at it should be. G6QB could voice the same sentiment, with the proviso that when someone says "I've been wanting to get hold of you for years," he never knows quite what is coming!

'GUM would like us to publish a list of Contest-free week-ends. He says that after the first misunderstanding regarding the various brands of numbers which he encounters each Sunday morning, he switches off and gets along with building his grid dip oscillator, or something like that.

G3FXB is playing with a quarter-wave vertical on 7 mc—not a ground-plane—and finds results interesting compared with his usual Zepp. G6QX also had some aerial fun, when the feeder of his Windom broke. He used the co-ax to his beam as an 80-metre aerial (although half of it is screened inside a 2-in. Dural tube) and managed to work VE1GU on it. Most of the "aerial" was 7 ft. high!

QRP Topics

We still haven't solved the problem, "What *is* QRP?" We should like to fix an arbitrary limit and say "anything

less than 5 watts," but some think otherwise. We will begin with G3HXZ, the Club call at R.A.F. Compton Bassett. This has been operated by ex-MP4BAB, and, with 15 watts, he has worked too long a list of DX to quote in full. He says "DX can be worked if it can be heard, if the station concerned doesn't keep sending CQ DX every few minutes." When he himself was super-DX, 'way out in Trucial Oman, he says he always answered the call that was short and sharp and sent with a good fist. It's not the longest caller, or even the loudest signal, that gets away with it.

G3GOX (Colyton), our leading YL exponent of QRP, says she uses anything between 1 and 4½ watts to a 66-ft. indoor aerial which is only a few inches above the water pipes. She would prefer the QRP to be optional, rather than forced on her by local conditions, but enjoys it just the same. Working on 7 mc at "the worst time of day," 'GOX has raised Il (2 watts), HB9 (3 watts) and EA (3½ watts). Regular daily schedules seldom fail, although signals are never reported as very strong.

GC2CNC (Jersey) mentions a "QRP Research Group" and suggests that those interested should get in touch with J. Whitehead, 6 Abbotts Tilt, Hersham, Surrey. In a recent contest, 'CNC worked VS6CG with one watt, and earlier in the year raised UM8, CE and VK with the same power. In the same contest he worked G2AJU (250 miles) with one-tenth of a watt both ways. But he wishes to say that he is not claiming anything unusual with all this, because heaps of others have done equally good work.

From Overseas

VS6CF writes from Hong Kong confirming that XU6F is OK, and that his cards even adorn certain walls in Hong Kong! He also tells us that VS6AC has now closed down; the station has not been active since last July, although a pirate has been using the call on 7 mc. VS6CF asks for light on a certain AR8BV, giving his QTH as Tripoli and asking for QSL *via* "Amateurs Francaises, Tunisia."

Ex-G3HGT tells us that he is shortly returning to Khartoum and hopes to put ST2AM back on the air. The station has been neglected for quite a time, but there are two 90-ft. steel masts available, and it does seem a pity not to use them. He hopes to be on the air with phone and CW on Ten and Twenty, and, later, to build a Tx for 40 and 80. Operating times, 1800-2359 GMT most nights. If people who have previously worked ST2AM but have received no card will now send another QSL, it shall be attended to.

S/Ldr. K. S. Rancombe, who we well remember of old as using ST6KR, SU6KR, YI6KR and other exotic calls, writes to say that he has never yet operated his own station in England, but hopes to start in the New Year. He has a 120-watt Tx with push-pull 807's, and an AR88—what more can anyone ask for? Oh, yes—he was also VS7KR last year! He was using a 132-ft. Windom out there, and now hopes to put up something similar, feeding with 300-ohm line. He asks if anyone has tried a 272-ft. version of this aerial yet?

SU1MR (Cairo) writes to explain that he is temporarily off the air because of "the present troubles," but hopes to be able to resume again shortly; he asks us to say that in the meantime all is well with him and his English wife.

Trans-Atlantics, First Leg

Conditions were not at all good, but punctually at 0500 on December 16, W1BB was heard on his usual frequency sending "greetings" and coming at about RST-339. A little later he was joined by K2USA, who had a slightly better signal. By 0630 they were both peaking to S5.

GW3ZV was apparently heard by both of them, but it seems that no other Europeans managed to get across; GW3ZV gave W1BB RST-229 on reception. There was a goodly turn-out of G's, with a lot of bunching towards 1800 kc, and EK1CW was on and coming in at about RST-55/69; he was not mentioned by the W stations. Towards the end of the period, when it was evident that conditions were all against any possibility of a Trans-Atlantic QSO, EK1CW worked a number of G's.

On the whole, this first session was disappointing as regards conditions, but we can look forward to better things as time progresses.

Sundry Gleanings

If you worked ZS2MI (Marion Island) when the first operator was out there, you have probably got your card by now. If, on the other hand, you didn't work them until 1950 or after, you are unlucky. We understand from ZS6BT

". . . Just checking up on the filing system to see if we've worked before, OM . . ."

that the second op. was not really interested in Amateur Radio, and that he hasn't even had any cards printed. The local boys are working hard on him, but, as yet, without result.

VP8AP is a much-sought-after station, particularly on bands other than 14 mc. He keeps a regular sked on 7 mc, every Monday at midnight—but don't crowd him! He has also been heard on 3.5 mc. Another useful contact on 7 mc is W6DFY, who is on 7015 kc most Wednesdays and Saturdays at 1500 GMT. He has been, so far, quite the strongest and most consistent of the W6's.

VR5GA is now back in New Zealand and hopes to get a ZL2 call shortly. ZM6AK is also back in ZL. ZK1BA and 1BC are active from Cook Is., and ZK2AA has returned to Niue. About VR7AA is Nauru we have heard no more. Does he really exist?

January's deadline is rather easier on us than the December one has been. Last date for all news, scores and claims will be **first post on January 16.** For the benefit of overseas readers, the one after that will be *February* 13. Don't forget we shall want entries, on or before January 16, for the 1952 WAZ Marathon; final claims for the 1951 Four-Band Marathon; and a resumption of the Post-War Four-Band Table.

No more for now, so again we wish you all a Happy New Year. May you hear all you work; may pirates and phoneys never take you in; and may conditions grow better each month. So 73, BCNU and Good Fishing.

XTAL XCHÀNGE

Insertions in this space are free, but can be accepted in respect of *exchanges* of crystals only; give make, type, frequency and pin spacing, stating whether a calibration certificate accompanies the crystal. Frequencies of crystals offered must be within the amateur bands, or in harmonic relation with one band. Offers should be set out in the form shown below, and all negotiations conducted direct.

G2XV, 89 Perne Road, Cambridge.
Has American types PR 28731 kc and Monitor 28800 kc crystals, not war surplus. Wants any frequency 1715—1735 and 7150—7175 kc.

G3DFS, 20 Oakwood Road, Sutton Coldfield, Warks.
Has 7473, 7506, 7706, 7716, 8206, 8240 kc crystals, ½in. mounting; and 8180, 8410, 8910 kc crystals in ¾in. holders. Wants 100, 500 or 1000 kc bar, and any frequency in 3.5 and 7 mc amateur bands.

G3EFO, 15 Vincent Road, Coulsdon, Surrey.
Has Brookes 7036 kc crystal, certificated. Wants Brookes or QCC crystal in 1800—1900 kc area.

G3GDB, 118 Woodpecker Road, New Cross, London, S.E.14.
Has QCC crystals 1922.5 and 3527 kc, certificated. Wants 100 kc bar.

G3GZN, 208 Twyford Avenue, Portsmouth, Hants.
Has variety crystals 1780—8146 kc, ¾in. mounting, and 6300—7350 kc, ½in. pin spacing. Wants any frequency 7000—7035 kc, and 3500 kc.

CONVERTER FOR WROTHAM

Readers who may be interested in the BBC's experimental VHF transmission from Wrotham, Kent (on 93.8 mc) will find a useful and fully detailed constructional article on a suitable converter —having an IF of 10 mc—in the January 1952 issue of our *Short Wave Listener & Television Review*; copies are available at 1s. 7d. each, post free, of The Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Sideband Splatter

CAUSE AND EFFECT
CORRECT MODULATOR ADJUSTMENT

THERE must be very few of us who have not experienced that most annoying form of interference caused by side-band splatter from a station on a neighbouring channel when we are trying to receive a weak DX signal. This splatter is probably most troublesome and persistent when it emanates from one of our amateur neighbours living, perhaps, less than a mile away; indeed, it takes courage and tact to report the truth to the culprit. There is always the feeling that the recipient of a "splatter" report will resent it! It is quite true, however, that side-band spread is unnecessary, and on amateur bands it is indeed a sure sign of incorrect transmitter design or adjustment, or both. The present article examines the reasons for splatter from amplitude modulated transmitters and indicates the steps which should be taken to prevent it.

Three possible reasons for excessive frequency spread immediately spring to mind; they are—

(*a*) Unwanted frequency modulation.

(*b*) Radiation of spurious signals due to parasitic oscillation in one or more stages in the transmitter.

(*c*) Excessive sidebands due to incorrect modulation.

The failings under (*a*) and (*b*) are not really included in the scope of this article, and they should not occur in properly designed and engineered transmitters. Suffice it to say, that spurious frequency modulation should be easy to avoid, especially if one or more buffer stages are used between the VFO and the modulated stage and provided that the power supply for the VFO is not itself modulated by the speech equipment, as might happen if common power packs were used. Parasitics can be avoided by the use of correct layout and all the other methods of suppressing them. At present we are concerned mainly with (*c*) and how the excessive sideband spread can be prevented in amateur transmitters.

This article deals in some detail with the troubles traceable to faulty modulator characteristics, and how they can be avoided. It is shown that, for satisfactory speech quality, the audio equipment can cut off above about 4000 *c.p.s., thus avoiding excessive spreading of the transmission. Indeed, if all phone transmitters were adjusted to this standard, there would be a notable improvement in operating conditions on our phone bands.—Editor.*

Amplitude Modulation

In order to appreciate the problem, let us go back to fundamentals for a few paragraphs.

Fig. 1A indicates an unmodulated RF carrier; Figs. 1B and 1C represent the carrier modulated to differing degrees by a low frequency sine wave; whilst Fig. 1D shows an over-modulated carrier which is completely cut off for a certain portion of each LF cycle.

The process of amplitude modulation may be considered as the "mixing" of an RF waveform and an LF waveform, and it can be shown mathematically as well as by practical experiment that the mixing of two sine waves of different frequencies gives rise to four frequencies in the mixture. These are $(f_1 - f_2)$, $(f_1 + f_2)$, f_1 and f_2, where f_1 and f_2 are respectively the RF and LF components. To take a practical example, suppose a transmitter on 1800 kc is modulated by a pure sine wave at 1 kc. If the transmitter output is analysed, component frequencies of 1 kc, 1800 kc, 1799 kc and 1801 kc will be found. Thus, in addition to the carrier and modulation frequencies, we find two new frequencies or "sidebands" spaced equally on either side of the carrier, so that the total spectrum occupied by the modulated carrier now extends for 2 kc. Naturally, if the carrier is modulated at 10 kc, the total spectrum spread of the transmission occupies 1790 kc to 1810 kc, or 20 kc, a goodly slice of any amateur band.

So far we have only spoken of pure sine waves; let us now turn to speech waveforms. It can be shown once again both mathematically and experimentally that any recurrent waveform, however complex, is built up of a fundamental sine wave *plus* a whole series of harmonic sine waves. The relative amplitudes of fundamental and the

various harmonic waveforms in speech and music, and their phase relationships, determine the "quality" or characteristic nature of these sounds. In the case of speech and music, it may be argued that the waveforms are not recurrent, but, indeed, they are so for short periods of time (in speech equal to the syllabic rate), so that the whole family of waves consisting of fundamental *plus* harmonics is constantly changing at syllabic rate.

Now imagine a speech or music waveform modulating an RF carrier: in the modulated output we shall find the carrier frequency and, on either side of it, side bands whose individual frequencies are equal to the sums and differences between carrier and all the component modulating frequencies.

Frequencies Necessary for Good Speech Quality

It has been found by very extensive and authoritative experiment that for the transmission of speech it is necessary to employ only frequencies up to 3000 c.p.s. in order to ensure perfectly good, clear, intelligible speech. No improvement in intelligibility is achieved if higher frequencies are included. A frequency response up to 4000 c.p.s. gives exceptionally good quality speech reproduction and up to 7000 c.p.s. is sufficient for good quality music. Up to 15000 c.p.s. is required for the very highest possible quality rendering of musical instruments, but this is not, of course, achieved in any normal medium-wave broadcasting system; in any case, for speech reproduction little alteration in quality could be detected if the upper limit were raised above 4000 c.p.s. Add to this the fact that all modern communications receivers operate with pass bands not exceeding about 5 kc (*i.e.* ± 2500 c.p.s.) and it will be realised that it is unnecessary (and *wasteful*) to allow the upper limit of frequency of speech modulation to exceed 3000 c/s or, perhaps, 4000 c/s. Any higher modulation frequencies are not detected by a normal communications receiver tuned to carrier frequency, since the sidebands corresponding to these frequencies are outside the receiver's pass band, anyway. But they can, and do, give rise to interference on receivers tuned to nearby channels.

Now, by the use of normal tone control circuits in the speech amplifier (*i.e.* small by-pass condensers in the speech circuits) it is easy to ensure that the amplifier response falls off at frequencies above 3000 or 4000 c/s. This, combined with the falling frequency characteristics of microphones normally used in amateur stations, will ensure that most of the unwanted high frequencies are removed before the modulator stage. If one is really anxious to make the best possible job of filtering out high frequencies, some form of low-pass filter could be included in the audio chain so that a relatively sharp limit is set to the highest frequency which the speech amplifier is capable of handling.

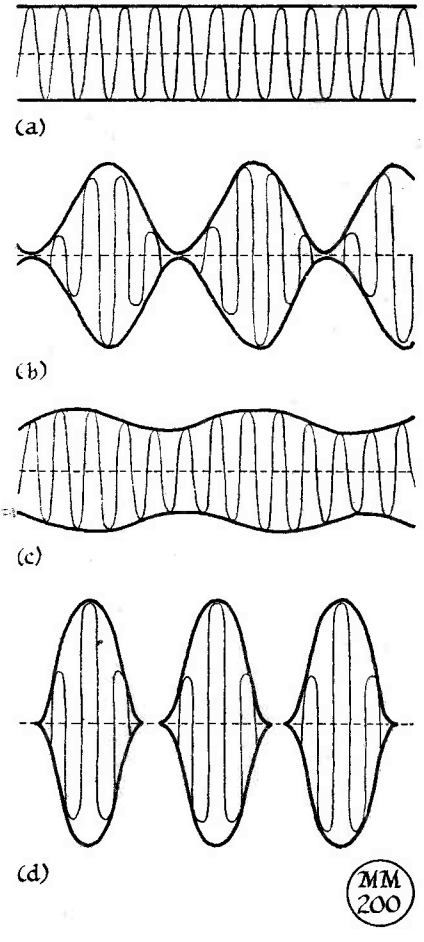


Fig. 1. The modulation effects discussed in the text.

HF Sidebands Caused by Distortion

It may not be generally understood that any waveform distortion which occurs in an amplifier introduces harmonics to the undistorted wave. This clearly follows from the statement made in a previous paragraph to the effect that all recurrent waveforms contain fundamental *plus* harmonics. Suppose we have a speech amplifier with an efficient low-pass filter fitted to an early stage so that everything over 4000 c/s is removed completely. Now suppose that third harmonic distortion occurs in some later stage (say, the modulator itself); it is quite obvious that there will be components at 3 x 4000, or, 12000 c/s in the modulated RF, and thus the total band-spread of the transmission will be 24 kc instead of 8 kc. We must therefore strive at all times to keep distortion to the lowest possible level—we must never try to modulate a large RF carrier with an undersized modulator. Always ensure that the modulator is man enough for the job and that is has something "in hand" when operating at normal modulation and carrier levels. The writer has all too clear recollections of a neighbour living less than a mile away who boasted that he could "fill" his 60-watt carrier by means of a modulater using only a pair of 6V6's; not only did he "fill" his carrier, but he also filled the whole of whatever band he was on with the most objectionable splatter and splash.

Now, let us consider the question of distortion in greater detail. Fig. 2 shows three cycles of a periodic waveform, and it could be proved mathematically to consist of a fundamental sine wave with many orders of harmonics. The line XX is called the axis of the waveform and it is in such a position that the area of one half-cycle above the axis is exactly equal to that of the next half-cycle below, as indicated by the shading. It will be observed at once that the *peak* amplitudes above and below the axis are far from equal; this is not distortion, however, and the waveform could well be a portion of a speech waveform. If this waveform is modified in any way during its passage through amplifier, modulator or modulated stage, new harmonics will be introduced, and if the modified waveform is distorted in such a way that sharp angles occur (as in Fig. 3) these harmonics may well have very high frequencies and thus give rise to unduly wide sidebands. The distortion of Fig. 3 could be due to severe limiting in the amplifier. Such limiting or, as it is often called, "Peak Clipping," is often introduced deliberately into a speech amplifier in order to allow the general level of modulation to be increased without over-modulation (loss of peaks is generally of no consequence to speech intelligibility), but it must *always* be followed by a filter circuit which cuts off all the higher harmonics which have been generated by the clipping process.

It will be noted from Fig. 3 that, in order to maintain equal areas in adjacent half-cycles of the distorted wave, the axis has had to move from XX to X^1X^1. This axis shift is the reason for the DC current changes which occur in a Class-A amplifier which is distorting and in a modulated Class-C amplifier which is not able to follow the modulator output without distortion.

Over-modulation

One of the worst forms of distortion which can give rise to excessive sideband spread is due to over-modulation. A given amount of distortion produced by over-modulation is apparently worse in causing sideband splatter than similar distortion at an earlier stage in the speech amplifier. The reason for this is that all audio frequency harmonics produced by over-modulation are immediately applied to the carrier, which thus receives strong high frequency sidebands. Similar harmonic distortion earlier in the amplifier had to pass through the remainder of the speech stages and the modulator; and, in general, the highest harmonic frequencies will be considerably attenuated in the process, thus giving less signal spread.

Fig. 4A shows a carrier over-modulated with a low frequency wave, and this, as is well known, will produce extremely bad sideband splatter, which is usually attributed to the carrier discontinuities which occur once every cycle of LF. The discontinuity is not the primary cause of splatter, however; the high order sidebands are produced merely because the audio wave has been distorted in such a way that it contains very high order harmonics which naturally cannot be filtered out (since they are produced in the actual process of modulation).

Exactly the same sideband spread is produced by the modulation waveforms shown in Figs. 4B and 4C. These are identical in shape with those of Fig. 4A,

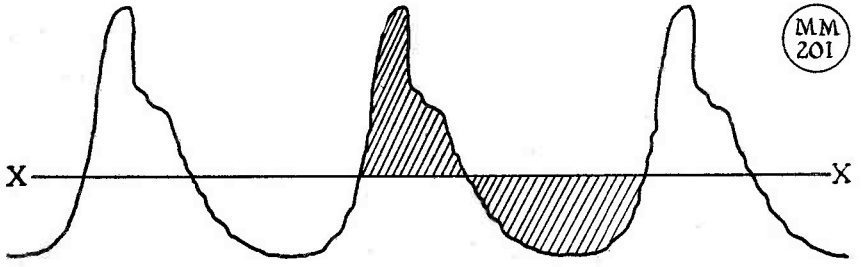


Fig. 2. Speech waveform when modulating conditions are symmetrical.

except that no over-modulation is taking place and in 4C the waveform has been inverted. It will be noted that the same sharp angles exist on the LF wave, and it is these which give rise to high order harmonics and splatter. It is interesting to note that the condition of 4C would be more objectionable than either 4A or 4B because the sharp changes of slope of the modulation envelope occur at much higher power levels and the harmonic content of the wave has a higher intensity.

Some Practical Considerations

Having briefly discussed some of the reasons for excessive sideband spread in amateur transmitters, it is proposed to give a few pointers and comments on ways and means of reducing the nuisance. To carry out measurements and observations, an oscilloscope and an LF oscillator are of immense value, but, even without these, it is possible to take many steps which will ensure clean, crisp transmissions.

In checking transmitter performance, a dummy load, or so-called artificial aerial, must be used at all times (*e.g.* electric light bulbs tapped across the final tank circuit), and it is also very useful to be able to load the modulator itself with a dummy load whilst checking LF performance. A bank of wire-wound or even carbon resistors of sufficient wattage rating are suitable, and they have the advantage that convenient tapping points along the dummy load can be "'scoped" so that output waveforms can be seen without excessive CRT deflection.

If a source of LF waveform is not readily available from some form of LF oscillator, it is possible to use the output of a receiver which is tuned to a steady carrier (say a heterodyne wavemeter) with the BFO switched on; quite a reasonable sine wave output will be obtained.

The following is a resumé of a complete test procedure which could be adopted to check the performance of an amplitude modulated transmitter:—

(1). Disconnect the modulator from the modulated RF stage and load it with a resistive load of suitable value.

(2). Apply input sine wave at any convenient frequency (say, 1000 c/s) to the microphone input socket. Adjust the input amplitude to a very low value by means of a potentiometer arrangement, so that the first stage operates at a voltage level comparable with that obtained when the microphone is in use.

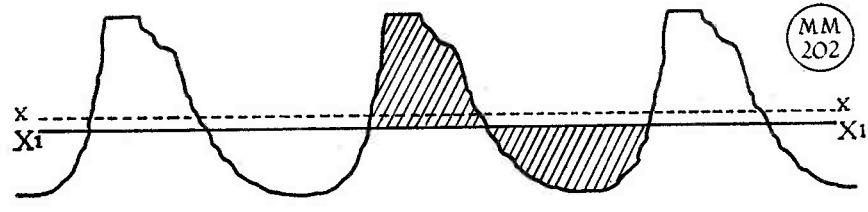


Fig. 3. The condition of Fig. 2 when modulation is not symmetrical due to distortion in the speech chain.

(3). Observe the waveform at each valve anode grid by means of an oscilloscope and note that no distortion is taking place. Check the performance of the gain control.

(4). If a phase splitter is used to provide push-pull drive, check that the amplitudes of the push-pull voltages are equal at the two outputs of the phase splitting stage; if they are not, adjust the values of the phase splitter components until they are.

(5). Observe the waveform at the secondary of the modulation transformer and check for distortion. The output voltage swing on the secondary of the transformer will probably be too large to observe directly; in this case adjust the values of the dummy load resistors so that a suitable tapping point can be used for waveform observation. Fig. 5 shows one such arrangement. Supposing that the correct secondary load is 6000 ohms (for example, corresponding to a modulated Class-C amplifier load of 100 mA at 600 volts, *i.e.* 60 watts input to the modulated amplifier which requires a modulator rated at 30 watts output for complete sine wave modulation), the resistor values shown give 6:1 step-down in voltage at the inspection point. The 5000-ohm resistor must be capable of dissipating at least 30 watts. The actual figures quoted are, of course, given simply as an example.

(6). Disconnect the modulator dummy load and reconnect the Class-C amplifier together with its RF dummy load. Adjust the input to this stage to give correct modulator loading conditions. By means of a pick-up loop placed near the RF tank circuit and connected to the oscilloscope, observe the RF envelope and check its waveform. This should be free from distortion and spurious "wiggles"; breaking of the baseline indicates over-modulation, and flattening of the peaks of the envelope indicates lack of RF grid drive on the Class-C stage (provided that there is no modulator distortion).

(7). Swing the audio input frequency from a low value (say, 100 c/s) up to about 10 kc, keeping its amplitude more or less constant. Note that there are no resonances at any frequency. Arrange suitable tone control circuits so that the output begins to fall off at frequencies above 3 kc.

(8). Replace the sine wave input to the modulator by the microphone and speak whilst observing the RF waveform. The waveform of most people's

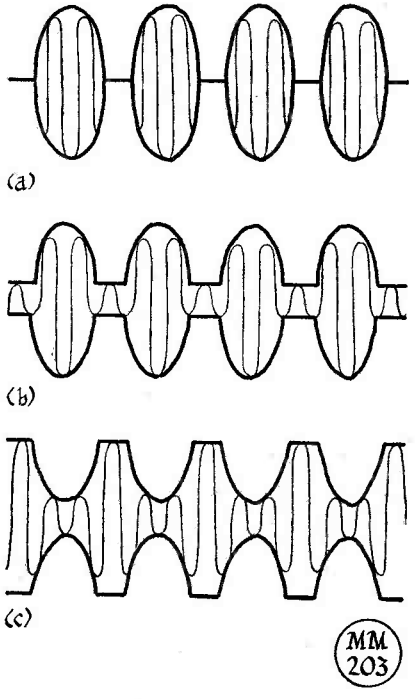


Fig. 4. The waveforms produced (a) Due to over-modulation, (b) When the carrier is under-modulated, and (c) With insufficient grid drive to the PA, causing the peaks to be squared off.

speech is asymmetric, and it is a good idea to arrange the polarity of the secondary of the modulation transformer to ensure that the highest peaks of the speech waveform are "upwards"; in this way the characteristic peaks of one's articulation will not cause breaks in the RF envelope when the general modulation level is still relatively low.

Speech Clipping and Filtering

As in all things, one must learn to walk before attempting to run, and in the case of radio-telephony one must become completely familiar with the management of straightforward modulators before attempting to use special devices such as speech clipping circuits, limiters, filters, compression circuits and the like. Any form of speech clipping or limiting introduces distortion (which may, however, even *improve* intelligibility in special circumstances), and in so

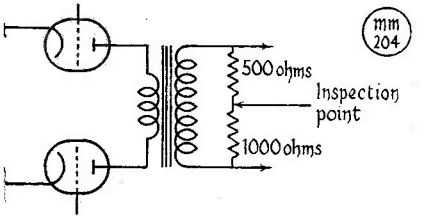


Fig. 5. When checking the peak voltage swing across the secondary of the modulation transformer (normally reaching very high values) the readings can be "kept on the scale" by using this voltage-divider network and multiplying the values obtained by the ratio between the two load resistors.

doing introduces high orders of harmonic content. On no account must these be permitted to modulate the transmitter or excessive sideband splatter will result; hence the clipper circuit must *always* be followed by a low pass filter to remove the unwanted harmonics. Design of suitable filters is beyond the scope of the present article, but design details of several filters are given in various of the Amateur Radio handbooks.

Finally, having done everything possible within the station to prevent the production of excessive sidebands, ask an amateur neighbour to check for splatter. If everything is in order, he should not be able to detect your presence a few kc from your frequency; remember that a 25-watt station, badly designed in the modulation department, can give ten times more local QRM than a correctly-designed 150-watt job. Remember also that excessive sideband spread probably means also BCI and TVI!

WHY, INDEED!

In replying to the toast of "The Ladies" at the Midland Amateur Radio Society's annual dinner on December 1st, Mrs. Macgregor (of G3HMG) remarked that she and many other XYL's were at a loss to explain or understand why, after having had a long and apparently satisfactory local QSO over the air, the OM then finds it necessary to carry on the discussion over the landline immediately afterwards. Mrs. Macgregor also pointed out that the search for a new house was made doubly difficult by the abnormality of the average amateur's requirements, not the least being the fact that, provided the garden was more than 132-ft. long, it need only be two feet wide! (Acknowledgments *M.A.R.S. Newsletter*).

★ ★

THE BRITISH SHORT WAVE LEAGUE

We frequently receive enquiries as to the status and scope of the British Short Wave League, and whether it offers facilities or services of interest to amateur transmitters. The brief answers are (*a*) The League was first established as long ago as 1935 and it has been in continuous existence ever since, (*b*) It has a world-wide membership, which shows a progressive increase over the last three years, (*c*) It publishes its own 12-page *BSWL Review*, which is bound in with our *Short Wave Listener & Television Review*, the combined 44-page magazine going free to members (only) each month, (*d*) There is an active Transmitter Section of the League, the doings of which are covered in the *Review*, (*e*) Membership of the BSWL carries with it entitlement to a number of free services, including our QSL Bureau, (*f*) The League awards Achievement Certificates covering operation on all amateur bands, and (*g*) The subscription rate is 18s. per annum. An explanatory pamphlet on the BSWL is available on request to: The Manager, British Short Wave League, 55 Victoria Street, London, S.W.1.

CARDS IN THE BOX

If your call appears below, it is because our QSL Bureau holds card(s) for you and we have not got your address. Please send a large S.A.E., with name, address and call-sign, to: BCM/QSL, London, W.C.1. Cards will be forwarded on the next G clearance, which will be not more than a fortnight from receipt of your envelope. And if you want your call to appear in "New QTH's," and subsequently in the *Radio Amateur Call Book*, please mention that at the same time.

G2LH, 2LZ, 2NB, 2OZ, 3FBT, 3FLQ, 3FYU, 3GBI, 3GDD, 3HHE, 3HHK, 3HRB, 3HTX, 3HWR, 3HXN, 3HY, 6PI, 8CY, GM3HUT.

ABSTRACTS OF INTEREST

CURRENT TECHNICAL DIGEST

Each month we present brief references to useful practical articles appearing in the overseas radio press. These publications can be obtained on a sterling subscription basis on application to: Gage & Pollard, Publishers' Agents, 55 Victoria Street, London, S.W.1. We are informed that single copies of the periodicals mentioned can NOT be supplied.

RADIO AND TELEVISION NEWS, *October 1951*

In an article entitled "Putting the Clamp Tube to Work," W2GCB describes an ingenious variation on the usual "clamp" circuits by using one valve which will give amplitude-modulated phone or clickless CW, merely by throwing one switch. In the CW position, use is made of the inherent time-delay of a VR-150 to eliminate key-clicks; on phone the clamper valve functions as a Class A modulator with the screen circuit of the PA for its load.

RADIO ELECTRONICS, *November 1951*

Some very interesting facts about the "Discone" as a broad-band aerial system are given by Fred Shunaman. Two students of the College of Engineering, New York University, have produced a *compact* aerial with the incredible band-width of 100 kc to 4000 mc, by using only three switch positions. The lowest band is covered by a whip and tunable loading; the rest of the spectrum—12 to 4000 mc—is covered by two discones. Described as "a radiator intermediate between a conventional dipole and an electro-magnetic horn," the discone is well worth study by VHF enthusiasts. It is compact, easily constructed, and omni-directional; it also possesses this fantastic band-width. Its derivation from other forms of aerial is described in a lucid and interesting manner.

QST, *October 1951*

A description of an interesting pre-amplifier built by W9RZP shows it to be a "series-tuned cathode-coupled grounded-grid push-pull" affair. The circuit diagram looks considerably simpler than the name, and it is claimed that this circuit gives excellent gain as well as signal/noise ratio, having the advantage of extreme ease of adjustment. It should be eminently suitable for use on 144 mc, although the model shown was designed primarily for 28 mc. On the latter band it gives a gain of 20 dB, with an increase in noise of only 15 dB. On 80 mc signal/noise gain of about 5 dB was also recorded.

CQ, *October 1951*

The well-known BC-453 has now been "miniaturised" by the National Bureau of Standards, and although the new receiver will *not* be available for use as a Q5'er, it is described in an article entitled "The Miniaturised Q5'er." The old BC-453 was made to a pre-war design with pre-war components; its successor, incredibly small in physical size, uses the most modern practice in every way. The RF circuits are slug-tuned with ferrite cores, driven by variable-pitch screws to give linear calibration; there is no dynamotor, the 26-volt DC supply being applied to heaters, screens and anodes. This necessitates the use of four valves in parallel-push-pull to give 100 miliwatts of output, and the unit uses, in all, twelve valves of the sub-miniature type. Some idea of the reduction in size over the conventional BC-453 may be gained from the fact that the IF transformers measure 1⅝in. by ½in. by ½in.

RADIO-ELECTRONICS *October 1951*

An interesting variation on the well-known "electronic bug" is described by Martin Crane. This key uses the standard "bug" mechanical method of producing dots, but the dashes are derived from an unsymmetrical multi-vibrator circuit. Thus an ordinary bug key may be used as the "foundation," the dash contact merely being disconnected and fed through the new circuit. Its only disadvantage would appear to be that the dot speed must be adjusted mechanically to match the dash speed selected by the controls, but against this is the advantage of considerable simplicity and cheapness compared with fully electronic keys.

QST, *November 1951*

The need for constantly-increasing selectivity in amateur-band receivers is well illustrated in an article by W6SRY and W6YIR, entitled "One dB per Cycle." In the receiver described, a 14 mc signal is mixed with a high-stability oscillator output at 8 mc, passed through a selective 6 mc amplifier, heterodyned to 470 kc, and passed through another sharp amplifier. The signal then goes through a 20 kc amplifier and the audio stages. Except for the tunable 8 mc oscillator, all oscillators are crystal-controlled. A further interesting feature is that only the 8 mc tuning control is located at the operating position, the rest of the receiver being installed elsewhere. The 20 kc amplifier uses twelve high-Q circuits, the coils being wound on powdered-iron toroid formers. The overall selectivity curve has a flat top with a width of 235 cycles; at 60 dB down the width is 330 cycles, and at 90 dB down, 395 cycles.

QST, *November 1951*

VHF enthusiasts may learn a lot from an article by W1DBM on a 144 mc aerial system. Although designed for civil defence rather than for amateur work, this aerial should be ideal for either. It gives an extremely low angle of radiation by using stacked co-axial dipoles, a system that has not yet been tried out very extensively. A four-section stacked array of the type described may be mounted very easily at the top of a light mast, and the results claimed for it are spectacular. The advantages given by the detailed arrangement are concerned chiefly with preventing a metal mast from radiating, although it is used to form part of the array.

Random Jottings

By **THE OLD TIMER**

A GOOD many problems that perplex the searcher after long distances can be solved by the acquisition of a really good atlas. Two recent publications are really excellent in their presentation of detail. Even the small Pacific Islands are given little maps to themselves, round the margins of the large Pacific Ocean map; and each such island is well and truly "spotted" by having latitude and longitude lines drawn through it and clearly marked on the small map. If you want to know the great circle bearing of Heard Island, Macquarie, Kerguelen, New Amsterdam and literally hundreds of such places, it is an easy matter to locate them in a modern atlas and then transfer them on to a Great Circle map such as our own *DX Zone Map*.

IN THE PANHANDLE

How many readers know that Alaska is not just a chunk of land up in the top left-hand corner of North America, but has a "panhandle" extending down the Canadian coast almost as far south as Vancouver? This is not just geographical memory-jogging, but an attempt to explain why certain KL7 stations seem to be heard only in the evenings, while others show up, mostly in the Spring, and always in the early mornings. The town of Juneau is well down in the panhandle, and its bearing is more or less that of the average VE7; the KL7's up in Fairbanks, Anchorage and other towns in the Far Frozen North obey quite a different set of rules.

AERIAL COUPLERS

A surprising number of amateurs go to the trouble of devising an excellent unit for coupling their transmitter to the aerial system, but very few seem to use this same device for matching into the receiver. Considering the variety of impedances that can be encountered at the lead-in point of the average transmitting aerial, it is a little optimistic to expect the receiver to cope with anything and everything that is offered to it in this way. If your coupler succeeds in making your aerial "look like 72 ohms" for the benefit of the transmitter, why not let it benefit the receiver as well? Incidentally, although the average receiver is designed for an input impedance of 300 ohms or so, it has been proved conclusively that a *better* sig./noise ratio will result from a deliberate mismatch in which it is offered 72 ohms instead. Gain may drop a little, but sig./noise is what counts.

CHANGE-OVER RELAYS

A good many stations with relay switching of power supplies still rely on clumsy manual methods for aerial change-over. Perhaps their owners do not realise how easy it is to make an aerial change-over relay from an ordinary GPO type. The existing contacts are all removed; a thin strip of insulation is fixed to the armature in such a way as to extend it for an inch or so; and the "moving" contact (the one with points on *both* sides of the blade) is then fixed to the end of the insulating strip. With luck, you should now have a moving arm about 2½ in. long, with an up-and-down (or sideways) motion of half-an-inch or so. The other contacts from the dismantled relay can now be mounted on small insulators so as to line up with the moving arm, and a nice low-capacity aerial change-over switch will be the result.

THE BEST OPERATORS?

Once upon a time we used to be able to say, with justification, that the G's were, on the average, the best CW operators in the world—and that they had the best notes. It is doubtful if we can still make this claim—*very* doubtful. Who would you award the palm to at the present day? We rather feel that the ZL's, or possibly the VK's, come well into the running. A few years ago the OZ's and SM's would have stood a chance, but now we hear far too many bad notes from that direction.

PLUGS AND SOCKETS

The standard GPO jack-plug, while excellent for keying circuits, is a snare and a delusion where modulator outputs are concerned; speech or other audio peaks rapidly reduce the insulation to a charred mess and the resulting short-circuit often causes much head-scratching. Even a 5-amp. mains plug will sometimes break down under this treatment. Plugs and sockets for RF, of course, require even more careful choice, but several excellent types for 72-ohm co-ax are available.

VHF BANDS

By **E. J. WILLIAMS, B.Sc. (G2XC)**

Contest Results in Detail—

G3BLP Well in the Lead—

Analysis of the Scoring—

Poor Conditions Continuing—

Band Open on Occasions

AS was anticipated by most competitors, G3BLP won the *Short Wave Magazine* Two-Metre Contest by a handsome margin. In the past three years, G3BLP has therefore progressed from third position through second to first. All readers will join us in offering him hearty congratulations. The consistency of the signal from G3BLP is regularly commented upon in letters from readers in the Midlands and the North. The Contest has, therefore, served to emphasize the potency of the transmissions from Selsdon. At the same time, it must not be forgotten that a Contest score requires two-way contacts, and credit should also be given to the receiving equipment. Your conductor has not personally visited the location at which these remarkable results are obtained, but it is believed it is well situated for working towards the North. Most people who have been to G3BLP, in fact, say "Wish I had his QTH." However, it is obvious from the equipment used, that G3BLP does not rely on a good location alone. The transmitter runs push-pull 826's with 100 to 150 watts input, the driver consisting of a CC EF55 tripling to 24 mc, followed by two EL91's and an 832 buffer stage. The receiver is a cascode with a crystal-controlled oscillator. For aerials, three arrangements are available: a 16-element stack, an 8-element stack fixed NE/SW, and a 4-element Yagi.

Among the better contacts from G3BLP were G5BY, G5YV and GW5MQ—all over 180 miles, and the last two being worked twice. Other good QSO's were with G2OI, G3AOO, G3AUS, G3BOC, and G3AGS. During the gale and downpour of the Sunday evening, G2OI, G5YV, GW2ADZ and GW5MQ were all worked.

A perusal of the logs submitted for the Contest suggested that G5YV (Leeds) had made many excellent contacts; in fact, more than one northern competitor backed him as the winner. Unfortunately, no entry had been received from G5YV. Just in case it had gone astray, your conductor wrote to G5YV and, in reply, came a copy of his Contest log and a note to say that pressure of business had made it impossible to write out the details previously. As the latest date for the acceptance of entries had by then been well passed, it was not possible to include G5YV's score in the official Contest Results, even though his score reached 180 and would have placed him second.

Second position is officially taken by G3DAH (Herne Bay). We are glad of this, partly because we believe it is an unexpected result. At least, it came as a surprise to G3DAH himself! A rather interesting fact is that the best DX contact of the Contest was that between G3DAH, the official runner-up, and G5YV, the unofficial runner-up! The distance is just over 200 miles. G3DAH used a crystal-controlled converter with two 6AK5 RF stages. The transmitter has an 829B in the final with 60 watts input. The aerial was a 4-element wide-spaced Yagi fed by a T-match from 80-ohm twin screened feeder.

G2XV (Cambridge), operating from a location only 35 feet a.s.l., occupies third position—and may we add what a pleasure it is to see one of the real Old Timers so well up in the scoring. His final stage was also an 829B, and the aerial a 3-over-3-over-3 about 39 feet

The Short Wave Magazine

TWO-METRE CONTEST

November 3-4, 1951

POSITION	CALL	LOCATION	POINTS	INPUT (*Watts*)	AERIAL SYSTEM
1	G3BLP	Selsdon, Surrey	274	100/150	Various
2	G3DAH	Herne Bay, Kent	169	60	4 Yagi
3	G2XV	Cambridge	159	90	3/3/3
4	G3WW	Wimblington, Cambs.	155	140	5/5
5	G5DS	Surbiton, Surrey	154	65	12 Stack
6	G4HT	Ealing, Middlesex	152	100/25	Various
7	G5MA	Ashstead, Surrey	151	100/60	4/4
8	G3ABA	Coventry, Warw.	143	120	16 Stack
9	G3GUD	Derby	128	—	8 Stack
	G3CGQ	Luton, Beds.	128	50	8 Stack
11	G3VM	Norwich, Norfolk	119	90	4/4
12	G3GSE	Kingsbury, Middx.	115	50	4/4
13	G2XC	Portsmouth, Hants.	114	25	4/4
14	G2NH	New Malden, Surrey	113	60	4/4
15	G3GDR	Abbots Langley, Herts.	112	20	12 Stack
16	G5RP	Abingdon, Berks.	109	9	5/5
17	G8VR	S. E. London	107	25	4 Yagi
18	G5DF	Reading, Berks.	106	85	16 Stack
19	G2HDZ	Pinner, Middlesex	100	22	Stack
20	G6CB	Wimbledon, Surrey	97	50	3/3/3
21	G3FAN	Ryde, Isle of Wight	88	15	4 Yagi
22	GW5MQ	Rhosesmor, Flints.	87	100	3 Yagi
23	G3FD	Southgate, Herts.	86	40	8 Stack
24	G5BY	Bolt Tail, Devon	85	—	—
25	G2OI	Eccles, Lancs.	81	—	—
26	G3GBO	Denham, Bucks.	66	30	4/4
27	G2AHP	Perivale, Middx.	64	70/20	12 Stack
28	G4MR	Slough, Bucks.	62	20	4 Yagi
29	G5NF	Farnham, Surrey	61	24	12 Stack
	G6TA	Balham, London	61	12	8 Stack
31	G3EYV	S. W. London	59	25	4 Stack
32	G3HAZ	Birmingham, Warw.	57	25	4/4
33	G5PY	Clapham Park, London	56	65	4/4
34	G3ASG	West Ewell, Surrey	55	11	4 Yagi
35	G3HBW	Wembley, Middlesex	54	24	3/3
36	G3GHO	Roade, Northants	50	—	Turnstile
37	G2BN	Kingston, Surrey	48	60	4/4/4
38	G5LQ	Chiswick, Middlesex	44	18	6 Stack
39	G3BOC	Willaston, Cheshire	43	20	City Slicker
40	G3DVQ	Purley, Surrey	42	15	2 × 2/2
	G5HN	Reading, Berks.	42	20	16 Stack
42	G3BVG	Ealing, Middlesex	41	13½	4 Yagi
	G3ENI	Kew Gardens, Surrey	41	15	Tri-square
44	G5UM	Knebworth, Herts.	40	24	3 Yagi
45	G5US	Camberley, Surrey	37	45	8 Yagi
46	G8QY	Birmingham, Warw.	36	40	4 Yagi
47	G3MI	Chesham, Bucks.	35	—	6 Stack
48	G3AGS	Manchester, Lancs.	26	20	4 Stack
49	G3CAZ	Gillingham, Kent	25	60	16 Stack
50	G3HVO	Parkstone, Dorset	22	15	5 Yagi
51	G2BRR	East London	21	—	3 Yagi

NOTE: Figures in the "Aerial System" column give number of elements, e.g., 3/3 denotes 3-over-3

high at its top. A cascode converter, comprising a triode-connected 6AK5, ½ 6J6 (GG) and a 6J6 mixer-doubler, the local oscillator injection being CC, was used to pull the signals in. G2XV's best contact was with GW5MQ and, in all, 62 stations were worked.

Comment

In last month's pre-view of the Contest results, we mentioned that almost every competitor approved the scoring system. The supplementary tables which we print this month show what the positions would have been had only DX been permitted to count for points. Deleting all contacts over shorter distances than 40 miles mainly penalises stations in and around London. In fact, one station in this area loses *all*

his points under such a scheme! On the other hand, G3BLP still achieves more than 200 points, and this means he won the Contest *without* the aid of local contacts. However, G3BLP is an exceptional case, and the stations favoured by omitting the "under 40's" are those located rather more than 40 miles from London. Your conductor, for instance, rises some five places compared with the "official" table.

If we cut out all contacts under 100 miles, some quite violent changes occur in the table, mainly to the benefit of those who are situated just over the 100-mile mark from London. It is particularly noticeable how G3VM (Norwich) and G5BY (Bolt Tail) improve their positions. At the other end of the Table, 19 stations lose all their points, and these are mainly in the London area.

It would be rash to draw hasty conclusions from all this. The prevailing conditions also play their part, and a big part at that. Very poor conditions undoubtedly favour stations in areas of high activity. It was possible to score 70 or 80 points in the London area from stations in the under-40-mile group. On the other hand, exceptionally good conditions must favour the more remote stations, for if the band is open to London, then they have far more high-scoring contacts available to them than have the London stations. Under poor conditions, therefore, it would seem desirable to reduce the scoring on local contacts in order to obtain a more equable state for everyone, while in a good spell of conditions the scoring rate for DX contacts would need reducing. Somewhere in between these two extremes of "very good" and "very poor" must lie the conditions when the scoring system is as fair as can be when judged on a distance basis. From all this it may be concluded that we are content that the present system is as fair as we can make it, and we have every intention of leaving it unchanged for the 1952 Contest.

Many of the scores have had to be changed from those claimed by entrants. Some have risen, some fallen. Changes have been made only after very careful checking. Where no National Grid reference is given by a competitor, it is often difficult to make an accurate measurement. The mere name of a town such as Birmingham or Portsmouth is far from sufficient, as a location, to enable an accurate check to be made. Your conductor's location is, for example, four miles north of the centre of Portsmouth, and, as a result, several entrants who placed him in the middle of the town claimed a point too many. (There are, of course, always the optimists who pin-point G2XC somewhere in the middle of Spithead in the hope of yet another point!) All this brings us to the fact that it is highly desirable for all entrants to quote their NGR's. In this connection, it may be worth mentioning that if the Ordnance Survey "10-mile" Map is used it is possible to *measure* distances correct to the nearest mile if the NGR's are known. No calculations whatever are needed. For contest purposes, this degree of accuracy is quite adequate.

One or two competitors claimed full points on "second contacts" instead of the reduced scoring. This was duly amended! Others, omitting their NGR, located themselves in the south of their home-town when working stations to the north, and in the north when working to the south. For those who have not yet tried this one, we would simply remark that it does help increase the score! In all fairness, however, your conductor must say that there were as many, if not more, who under-estimated their distances and points, and that in general the Contest was entered in the true spirit of Amateur Radio.

Useful check logs were received from G2DHV, G2DSW, G2KF, G2YL, G3AOO, G3FZL, G4JJ, G8IC. Some of these would have made respectable entries, and we thank them for their interest and for adding to the general level of activity during the Contest.

Activity and Inactivity

Every year at about this time the complaints regarding inactivity on the two-metre band start to pour in. The first reaction of your conductor to this is always to point out that if everyone who grumbled about lack of signals on the band were himself active, the cause of the deficiency would be immediately removed. A glance through the log at G2XC for the past few Decembers and Januarys shows that G2XC has, without exception, had to be relatively inactive during those eight weeks. The cause is not difficult to find—your conductor has just not had the time to spare. It is certain others are in a similar position.

Personally, we rather pity the man who writes saying, "I am active every evening from 1900 to 2300." His apparent lack of other interests to

occupy his spare time seems to us deplorable, and we cannot associate ourselves with him when he goes on to a general condemnation of all others who are not also active *every* evening from tea-time to bed-time. Similarly, the man who contends that the VHF operator should never look at a TV programme but always be "on the band" is surely turning a hobby into a taskmaster?

Please, do not get us wrong on all this. Nobody would be more delighted than your conductor to know that there was such activity on two metres that, whenever he switched on, there would be a wide selection of stations to work; but while the number of stations interested in VHF work stands at its prevent average level of just over 200, it is quite unreasonable to expect such a state of affairs to exist. It has been said in these columns before, and on more than one occasion, that the only solution to the empty band is more stations equipped for VHF and not more activity from those already there. The trouble is also partly due to VHF contacts becoming too commonplace. A few weeks ago we looked back through an old log book of pre-war days; one was impressed by the rarity of contacts then on the 5-metre band, and recalled the thrill it gave when, after many nights of hearing nothing, a contact was obtained or perhaps just a signal heard. Nowadays it requires a 600-mile contact to produce a thrill, so when the rains come or the north wind blows, the VHF man finds it much preferable to sit by the fire with a book or the TV than thump a key out in the cold garden shack or climb up into the bitter attic where the VHF gear resides. However, all is not really so gloomy. Spring will come again and, with it, hopes of pushing that DX record up to 700, 800, 900 or who knows, perhaps 1000 miles—and perhaps someone will even go portable in Westmoreland! Then the two-metre man will awake from his winter hibernation, hope that there were not too many good nights during the spell he missed, and once again get down to the job of calling "CQ 2."

Other News

It was pleasing to be able to meet so many readers, including quite a large number from the North, at the Amateur

TWO-METRE CONTEST

Scores after eliminating Local Contacts

POS.	CALL	PTS.	POS.	CALL	PTS.
1	G3BLP	207	26	G3FD	30
2	G3DAH	167	27	G6CB	28
3	G2XV	144	28	G3BOC	27
4	G3WW	143		G4MR	27
5	G3ABA	123		G5NF	27
6	G3VM	114	31	G8QY	25
7	G3GUD	113	32	G2AHP	23
8	G2XC	105	33	G3HBW	21
9	G4HT	97	34	G3AGS	20
10	G5RP	94	35	G3CAZ	18
11	G5MA	88	36	G5PY	16
12	G5DS	87	37	G3GBO	13
13	G3CGQ	85	38	G3HVO	12
	GW5MQ	85	39	G3EYV	11
15	G5BY	83		G5HN	11
16	G3FAN	77		G5LQ	11
17	G2OI	74	42	G5UM	9
18	G5DF	69		G5US	9
19	G8VR	62	44	G3DVQ	8
20	G2NH	60	45	G6TA	7
21	3GHAZ	49	46	G2BN	6
22	G3GSE	47	47	G3ASG	4
23	G3GDR	47	48	G2BRR	2
24	G3GHO	43		G3BVG	2
25	G2HDZ	32		G3ENI	2

NOTE: For this Table only contacts over distances of 40 miles or more have been counted.

Radio Exhibition on December 1st. Opportunity was taken to discuss with the Northern visitors the possibility of arranging a VHF dinner in their part of the country.

Among the few letters received for this month's news paragraphs is one from G2HIF (Wantage). He mentions that, as a result of 7 hours' operating during one week, he had a total of two contacts, one of which was a schedule! He goes on to say: "And before you attempt to explain it by poor conditions, poor night or poor equipment, I hasten to explain that I found conditions fair; that I regard my site as being above average to the north, west and east, and that a noise factor determination of my receiver has not disgraced it." (In case this should serve to discourage anyone who had been thinking of starting up on Two Metres, G2XC would add that since the Contest he has spent just five hours on the band, and in that time worked 13 stations, after which the receiver failed!) G2HIF also criticises the "Activity Table" which normally appears in this feature. He contends that one solitary appearance on the band should not be sufficient to qualify for appearance in this Table. But we must make the point that the object of this monthly list is to help operators identify signals heard on the band and, in fact, its greatest use is in connection with the less frequently heard calls. Surely few VHF men need this Table to tell them that "G3BLP is in Surrey" or even that he is to be heard on the band from time to time. So stations who show even the slightest signs of activity will continue to be listed, and we are confident that in that way we are rendering the best service to VHF operators generally. A further suggestion from G2HIF, that we print the more active stations in heavy type, is impracticable unless someone can tell your conductor how to extend a day to about 36 hours!

G2HIF says he is prepared to guarantee to be active for a minimum of 20 hours each month; and further on the subject of guarantees, he is maintaining his practice of sending a QSL for every initial contact. Finally, he wonders whether some sort of encouragement could be given to those who use the LF bands for local contacts to migrate to Two Metres. This would relieve the LF bands for real DX work, as well as increasing activity on VHF. On this point, at least, your conductor is in full accord with G2HIF. But what encouragement can we give?

G6CI (Kenilworth) has found a few openings during November for signals from the south-east, but, as a whole, conditions have been poor with him. He checks the band each evening and puts out a CQ or two, just in case.

G3AGS (Manchester) has been exclusively on Two Metres since July, 1949. He has added some reflectors to his City Slicker, but the poor conditions have not given him an opportunity to test it out properly. He sends a QSL for each initial QSO, but returns are only about 50%.

G5YV (Leeds) is hoping to put up a lattice steel tower as soon as he gets permission, and that will keep him busy for a month or two. This will probably mean little or no activity on Two until the spring, when, with the beam up at 75 feet, he may even be able to hear the stations in south Hampshire.

G5LI (Hampstead) has departed for Canada. His signal will certainly be missed from the band, but we look forward to hearing from him when he reaches VE and know that he will soon be looking up the VHF stations over in

TWO-METRE CONTEST

Over-100-Mile Scores

POS.	CALL	PTS.
1	G3BLP	144
2	G3VN	90
3	G5BY	75
4	G3GUD	71
5	G3DAH	65
6	GW5MQ	61
7	G2OI	59
8	G5DS	47
9	G5MA	46
10	G4HT	44
11	G2XV	43
12	G3WW	41
13	G2XC	31
14	G3BOC	27
15	G2NH	25
16	G3HAZ	24
17	G3ABA	23
	G8VR	23
19	G3CGQ	21
20	G5DF	20
21	G4MR	16
22	G5RP	14
23	G3FAN	12
	G8QY	12
25	G3AGS	9
26	G2HDZ	8
27	G3GHO	7
	G6CB	7
29	G2AHP	5
	G3CAZ	5
	G3GBO	5
	G3GSE	5

Montreal. G8LN (Plumstead) reports G2BN, G2BRR, G5TP, G6TA and G8HY as regularly active, and says conditions have been fair at times. G3HEA is a new station on. On the subject of making the 522 TVI-proof, G8LN comments: "It is definitely wrong to put RF chokes or condensers in the screen leads of the 832 circuits, as these set up parasitics; hence their omission in the original." Bench-work at G8LN includes a new exciter for two metres.

G6TA (Balham, S.W.12), in applying for FBC membership, remarks that though only on Two since the beginning of October, he has worked 90 different stations already; actually, he is an OT in this VHF game, having started-up on 8 metres, our then VHF band, in 1928.

G8VR (London, S.E.2) has found conditions dull and the going slow, but raised G5BD on November 14 for a new county; he wonders what is the location of a VHF station signing GOP, bearing north from London and sending auto, well heard November 14-16. The G8VR 70-centimetre signal has been received by G2WJ out in Great Canfield, Essex, on a cross-band QSO. G8VR has had the misfortune to lose his aerial gear and will be off until repairs can be completed.

GW5MQ (Nr. Mold) remarks that "the slump has certainly set in on Two," but that he found the band wide open on odd occasions up to December 14. The 13th was one of these evenings, with GM's, 3BDA and 3OL S9 on phone, and G2FO, G3WW, G3AMM and G8GL also excellent signals. The 70-cm log at GW5MQ now shows G3APY (Kirkby-in-Ashfield) worked no less than 14 times.

That short article by G2IQ in our issue for September, 1951, naturally aroused a great deal of interest, and among those who are quite definite that they prefer the Cascode arrangement is G3EYV (London, S.W.4), who says he would "enter the lists with a broadside heavily in favour of the Cascode." Recent activity at G3EYV has been the usual round of locals, and once again he feels the urge to get going on Seventy-cems—the QTH and considerations of aerial space are the present snags.

Unlike most of our correspondents this month, G3EHY, of Banwell, says conditions have been good with him most nights, in proof of which he mentions regular schedule-working with GW2ADZ (Oswestry) and G8OU, of Ashtead, Surrey, in quite another direction; and 75% of these contacts have been on phone. As he rightly remarks, too many VHF operators just assume the winter is the "close season" on Two, without actually coming on and trying the band. About Seventycems, G3EHY is even more encouraging. In his area, stations now active are GW3HCH (Newport, Mon.), G3GFV and G3HSD (Bristol) and also G3GNJ of that city; with the exception of the latter, all these are regularly audible in Banwell on phone, GW3HCH being S9 at times. With a new GG RF stage—a 446B lighthouse in a tuned cavity—added to his 70-centimetre receiver, G3EHY achieved a very fine QSO on that band with GW2ADZ on the evening of December 12, reports being RST-599 solid both ways for three-quarters of an hour. This is in every way a noteworthy contact, and it will undoubtedly help to encourage many others to get going seriously on Seventy-cems. Well done, GW2ADZ/G3EHY!

Some National Grid References

G2AHP	51/169830
G2NH	51/204694
G2XV	52/473568
G3ABA	42/353822
G3BLP	51/349626
G3BOC	33/336792
G3BVG	51/181817
G3DVQ	51/309599
G3EYV	51/302751
G3FD	51/2796
G3GBO	51/041862
G3GDR	52/0902
G3GUD	33/5854
G3VM	63/182101
G4MR	41/988792
G5DS	51/185665
G5LQ	51/195784
GW5MQ	33/209695
G5PY	51/2973

The Clubs

It is hoped to arrange a Five-Band Club Dinner in London in April. Further details will be announced as soon as they are known. Once again the organiser will be the Club's London representative, G3BLP. Looking further ahead, a dinner in the Midlands is envisaged for the summer, while we should be glad to support a similar event further North if someone in the Lancashire or Yorkshire area would care to undertake its organisation in conjunction with us.

New members of the Five-Band Club include G2HIF and G3AGS. Amongst those who have recently qualified for the

VHF Century Club are G8IC and G8VR. Congratulations to both of them. The Club now has 93 members, so the first century should be reached in the next few months. May we take this opportunity of reminding members of their membership promise to continue replying 100% to QSL's received. (And that reminds us of one or two we must send off!)

Late Flash : And having said all that about "Conditions and Activity" further back in this piece, what do we hear but that the band opened wide on the evening of December 12, as the weather changed from cold to milder! Stations in DL, F, ON and PA were heard working one another, and some good inter-G and Continental QSO's were made by those stations on the air at the time.

In Conclusion

Next month it is hoped to review the achievements and happenings of 1951. Please keep up the monthly reports during the "low-activity" period of the winter months, as only by that means can your conductor keep his claim for space for this feature. Many thanks to all those who have written regularly during 1951, and every good wish to all readers for the New Year. Letters for next month should be addressed to E. J. Williams, G2XC, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, to reach us by **January 16 latest.**

NEW POST OFFICE "SELF-HELP" PAMPHLET

Licensed operators will be interested to know that in future holders of sound and television broadcast receiving licences who complain to the Post Office of interference to their reception will be given a pamphlet which tells them how they can make simple tests to ascertain whether the trouble is due to a faulty receiver or an inefficient aerial and earth system. Interference due to such causes should *not* be referred to the Post Office Interference Investigation Service, but should be dealt with by the owner of the receiver, or his radio dealer.

If, however, the tests indicate that the interference is due to causes outside the control of the owner of the set, there is a form at the end of the pamphlet for enlisting the services of Post Office engineers to track down the source of the trouble.

The Post Office says that this new method of dealing with complaints of interference has been adopted because, in a large proportion of cases investigated by the GPO, bad reception was due to faulty receivers and/or inefficient aerial and earth systems. It is hoped that use of the new pamphlet will effect an appreciable reduction in the heavy calls made on the Interference Investigation Service.

"PSE QSL"

From time to time we remind operators who may need SWL reports on tests, or transmissions on particular bands, that a regular feature "Pse QSL" in our *Short Wave Listener & Television Review* is available for the purpose for all who may care to use it. Send call-sign, address for QSL's, and details of transmissions on which reports are wanted—operating periods, frequency, phone/CW, nature of tests, and so on—and the notice will appear in the next available issue of *Short Wave Listener*.

OCTOBER EXAMINATION RESULT

Candidates sitting for the October 1951 Radio Amateurs' Examination, held in London under G.P.O. auspices, totalled 55, of whom 40 were passed, giving a pass-rate of 73%. The paper was on the same lines as that set by the City & Guilds for the R.A.E. held in May last; at the moment of writing, the results of this are still awaited; the number of candidates taking the May examination was, of course, far greater, and it was held at a large number of centres, at home and overseas.

HERE & THERE

December 12, 1901

On this date 50 years ago the first Trans-Atlantic wireless reception was confirmed, when the Morse letter "S" transmitted from Poldhu was received in Newfoundland. Marconi was not, of course, the "inventor" of wireless, but he was the genius who saw, in the known phenomena of his time, the possibility of developing a system of communication by wireless, and he set out with that object in view. Experimental work and the propounding of theories had gone quite a long way before that first signal was heard across the Atlantic. And even in those days there were the experts who said it was impossible—and that Marconi's letter "S" could just as well have been a train of chance atmospheric noises.

SSB Test Signal

We are informed by G3DCN (West Harrow) that an SSB test transmission originating in Germany can be heard on 9450 kc, during the period 2000-2030 GMT most evenings. The text, repeated continuously in English, is "This is Frankfurt-Main, Germany, transmitting on a single-sideband system to permit receiver adjustment. The station is operated by the Overseas Telephone Service for radio communication purposes." As G3DCN remarks, this transmission should be very helpful to those interested in SSB working and receiver setting up.

Premiums for Technical Writers

The Radio Industry Council has recently made a most enlightened decision of great interest and importance to those authors, and would-be contributors, who have their work published in the technical radio press. Premiums of 25 guineas, up to an average of six a year, will be awarded "to the writers of published articles which, in the opinion of a panel of judges, deserve the official commendation of the Industry." Only non-professional writers — defined as those not paid a salary for regular writing, or deriving less than 25% of total income from casual author's fees or book royalties—are eligible for consideration.

Awards will be made only in respect of articles appearing in the public press, by which is meant periodicals normally available on the bookstalls, as distinct from the proceedings of learned societies and privately circulated membership-only publications, which will *not* be eligible. Needless to say, contributors to *Short Wave Magazine* come within the orbit of the scheme, and naturally we hope that in due time we shall be able to announce one of these important awards.

The panel of judges is appointed by the Radio Industry Council, with power to co-opt specialists and seek the advice of learned Editors.

The F.O.C. Dinner

This enjoyable event, the fourth of its kind, was held in London on December 1st, 46 members being present, with Gerald Marcuse, G2NM (President) in the chair. The numbers were made up to 60 by the presence of "sweethearts and wives." It was, however, for everyone there a matter of the deepest regret that Fergie himself, G2ZC, again could not attend because of serious ill-health. Both he and G5PS, the retiring honorary secretaries, were presented with gifts, subscribed for beforehand by the membership of the Club, and framed addresses commemorating their great services to the First Class Operators' Club over a period of years. The speeches were by the President, by G5PS and by an overseas member, PAØXE.

Call Book Prices

We are informed that, to clear the stocks remaining from the Amateur Radio Exhibition, the price of *The G Call Book* has been reduced to 1s. 6d. and that of the Foreign Section (which is the *Radio Amateur Call Book* proper, less only the United States section) to 5s., post free. Either would be a most acceptable present for any amateur, home or overseas, and at these prices they will be in great demand.

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 quarterly issue 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.

G2ANT W. Law, c/o C. S. Foster & Sons, Ltd., Loughton, Essex.

G2QR H. T. Winter, 23 Willoughby Park Road, Tottenham, London, N.17.

G3AFC P. Beresford, 109 Fortess Road, Tufnell Park, London, N.W.5.

G3BTM N. Shires, 118 Manor Square, Dagenham, Essex.

G3CLW W. J. McInnes, 83 Hillcrest Road, Bromley, Kent.

G3EAX Sgt. A. Weatherley, c/o 58 Sunningdale Road, North Cheam, Sutton, Surrey.

G3EUB J. N. A. Hudson, 53 Rudolph Road, Bushey, Herts. (*Tel: Bushey Heath* 2700).

G3EWU J. F. Whelan, 36 Laxton Road, Liverpool, 19.

G3EZF R. F. Williamson, 39 Orpington Gardens, Edmonton, London, N.18. (*Tel: Tottenham* 9096).

G3FAU V. Cundall, 93 Chandos Road, Stratford, London, E.15.

G3HGJ D. M. Foster, Clapham Vicarage, Yorkshire, via Lancaster. (*Tel:* Clapham 240).

G3HKN F. L. Shakespeare, 14 Richmond St., Burton-on-Trent, Staffs.

G3HMI A. Sandman, 2 Westcliff Avenue, Southend, Essex.

G3HQB L. C. Mason, 29 Upper Brighton Road, Surbiton, Surrey. (*Tel: ELM.* 2186).

GM3HQC C. J. Macpherson, B.E.M., 6 House O'Hill Crescent, Blackhall, Edinburgh, 4. (*Tel: Edinburgh* 78791).

G3HQG G. Atkins, 36 Fire Station, Division Street, Sheffield, Yorkshire.

G3HQM C. E. Light (*ex-VK2QM*), 18 Bramley Close, Whitton, Middlesex.

G3HRD J. Ellis, 9 Boscaswell Terrace, Pendeen, nr. Penzance, Cornwall.

G3HRR G. R. Taylor, 7 Hill Street, Hednesford, Staffs.

G3HTR H. Bolton, 691 Hagley Road West, Quinton, Birmingham, 32.

G3HTW E. W. Parcell, 40 Campers Avenue, Letchworth, Herts.

G3HUK M. P. Morrissey, 51 Grove Lane, Kingston-on-Thames, Surrey.

G3HVA D. G. Pinnock, 19 Fountains Road, Luton, Beds.

G3HVB F. Dickenson, 372 Old Bath Road, Leckhampton Hill, Cheltenham, Glos.

G3HVE A. E. Broadbent, 78 Malthouse Meadows, Liphook, Hants.

GM3HVS A. J. Stevenson, 8 North Blantyre Street, Findochty, Banffshire.

G3HVV R. J. Newman, M.P.S., F.Z.S., 136 Norwood Road, London, S.E.24. (*Tel: TULse Hill* 2454).

G3HWH W. E. Wilkinson, 11 Albemarle Street, Clitheroe, Lancs.

G3HWI E. Whalley, 81 Moorfield Avenue, Ramsgreave, Blackburn, Lancs. (*Tel: Blackburn* 6656).

G3HWM J. F. Cowling, 46 Queens Road, Rayleigh, Essex.

G3HWO B. Taylor, 12 Douglas Road, Mill Hill, Deal, Kent.

G3HWY W. R. Thomas, 89 West Hill Gardens, Radstock, nr. Bath. Somerset.

G3IGW M. G. Whitaker, Stile-House, Shelf, nr. Halifax, Yorkshire.

G3IKY K. C. Young, 58 Flaxton Road, Plumstead, London, S.E.18.

G3ISW S. Watkin, 6 Stanley Avenue, Eccles, Lancs.

G3ITS Central Training School Radio Club, Duncan Hall, Stone, Staffs.

G3TR J. C. Graham, Furzedown, Bassett Dale, Southampton, Hants.

G4TM T. A. Maguire (*ex-G5NV/AC8MG*), 51 Whitchurch Gardens, Edgware, Middlesex.

G6MB F. Hicks Arnold, 64 Garrick Close, Walton-on-Thames, Surrey.

CHANGE OF ADDRESS

G2CKQ F/Lt. R. S. Trevelyan, R.A.F. Regt. Depot, Catterick, Yorkshire. (*Tel: Old Catterick* 140).

G3BHR A. W. Munden, 9 Strawberry Lane, Carshalton, Surrey.

G3BWQ S. H. Iles, 28 The Grange Drive, Winchmore Hill, London, N.21.

G3CCN W/O. H. Goodwill, Sgts' Mess, No. 2 Radio School, Yatesbury, Wilts.

GW3DCY S. Richards, 3 New Farm Cottages, Penyrheol, Pontypool, Mon.

G3ECH R. J. Price (*ex-GW3ECH/SU1VL*), 51 Raleigh Hall, Eccleshall, Staffs.

G3EDE N. Clark, 39 Wimborne Drive, Pinner, Middlesex. (*Tel: Field End* 9136).

G3EEQ K. C. Gill, Homelea, Clowne Road, Barlborough, nr. Chesterfield, Derbyshire.

G3END K. Callow, 88 Dulverton Road, New Eltham, London, S.E.9.

G3ESW B. Insull, 246 Doxey, Stafford, Staffs.

G3FOI W. M. Gregory (*ex-VS7WG*), 85 Maidstone Road, Bounds Green, London, N.11.

G3GGJ A. H. G. Waton, 75 Vinery Road, Cambridge, Cambs.

G3GNT F/Sgt. P. A. C. Wood, Sgts' Mess, R.A.F. Station, Hullavington, nr. Chippenham, Wilts.

G3GWU A. Stenhouse, 20 Overslade Lane, Rugby, Warks.

G3HHY J. C. Watson, 19 Hampton Lane, Solihull, Warks. (*Tel: Sol.* 0187).

G3HKH M. J. F. Harrison, The Cliftonville Tavern, Ilderton Road, Bermondsey, London, S.E.16.

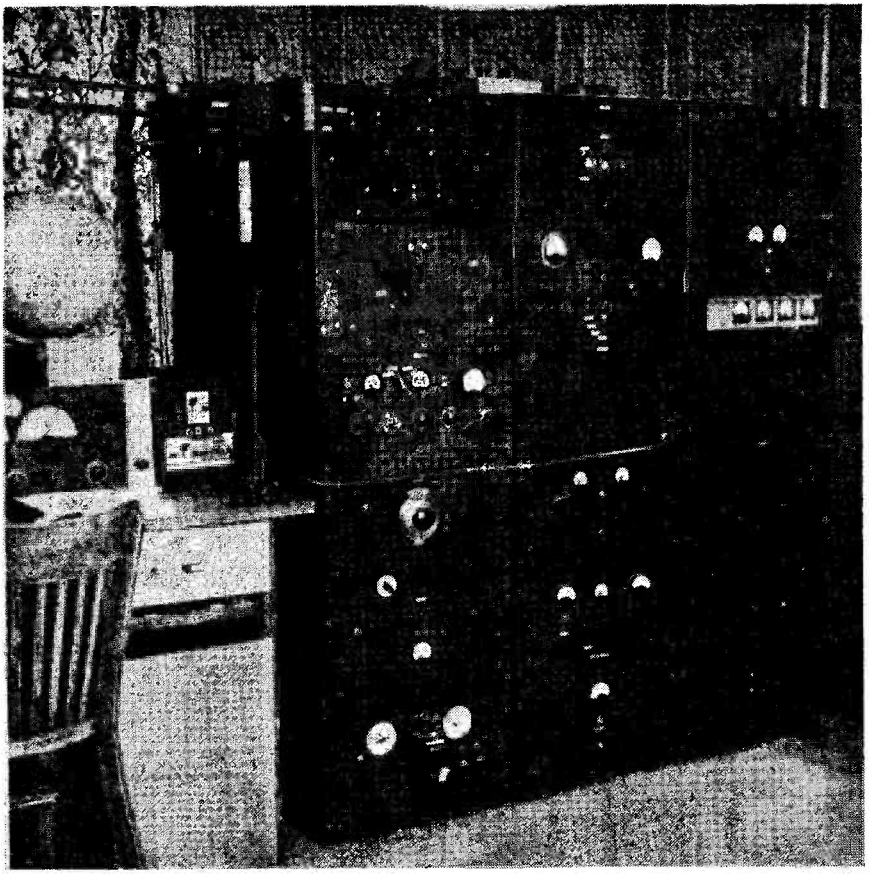
G5UI J. E. Perkis, 12 London Road, Stony Stratford, Wolverton, Bucks.

G6DY C. Keith-Murray, 2 Walrond Road, Swanage, Dorset.

CORRECTION

G3ENT North Kent Radio Society, c/o L. E. J. Clinch, 8 Windsor Road, Bexleyheath, Kent. (*Tel: Bexleyheath* 1393).

Read Short Wave Magazine Regularly and Keep in Touch



The other man's station G3ZI

THE station of G3ZI—owned and operated by L. S. Woollatt at Cedar House, Filpot Lane, Chobham, Woking, Surrey—is of particular interest because he is phone-only on all bands, with 165 countries worked in 38 Zones.

With the exception of the two main receivers, a Radiovision "Commander" and an RME-69 with DB-20 pre-selector, all the gear (including the masts and aerials pictured on p.603 of our December issue) is home-built. Three transmitters are provided: For Forty and Eighty, a pair of 807's are VFO-controlled through the usual buffer stages; on Twenty and Ten, the PA is an 813, and on Two Metres an 832A is run at 18 watts input. Modulation is by a pair of 807's in push-pull, with a crystal microphone, and the whole station is relay controlled by a single switch after selection of the transmitter to be used. For reception on Two Metres, a 6J6 twin-triode converter feeds into the "Commander."

If working phone is one interest at G3ZI, building aerials is another. The static all-band system is a 267-ft. long wire, connected (unusually) Windom fashion. For 14 mc, a 3-element beam is available, rotated by a prop-pitch motor with remote indication across a great circle map. On Ten another beam is fixed to fire West, and for Two Metres there is a 12-element stack.

The photograph shown here does not altogether do justice to G3ZI—a station incorporating the latest operating techniques, right in line with modern ideas, and capable of giving results under the most competitive conditions.

THE SIXTH MCC

THE MAGAZINE TOP-BAND CLUB CONTEST

NOVEMBER 10-18, 1951

ANOTHER 'MCC' is over, and a new page in the history of this Contest has been turned. With a completely new set of rules, giving the event quite a different character from its predecessors, MCC attracted an entry above the average. True, the 28 Clubs competing did not come up to the record numerical standard of last year's 36, but there were some special and strange reasons for this!

A surprising number of Clubs wrote in to say that they would not compete, as they did not agree with the change of rules, and did not approve of a contest which was strictly an Inter-Club affair, as this was to be. They felt that it would be boring; that scoring would be slow; that, to stand a chance of winning, each Club would have to operate every night; and so on.

The remarkable fact is that those who *did* enter for the Contest—many of them being among the newer and smaller Clubs—stated, almost without exception, that the new Rules were an improvement. Competing Clubs, on the whole, enjoyed the Contest very much, and it was only those who stayed outside that did not!

The first three Clubs in this year's event are shown in the Table herewith.

1st:	**Coventry Amateur Radio Society, G2LU (203)**
2nd:	**West Cornwall Radio Club, G3DIY (182)**
3rd:	**Surrey Radio Contact Club, G8TB (174)**

One can almost call it a runaway win for Coventry, in view of the close bunching of the scores between the 2nd and 14th positions. In any case, they are to be heartily congratulated on having staged this come-back, after holding a place among the first three for each of the six MCC events.

Table I gives the full list of positions and scores; *Table II* shows the first three for each of the years from 1946 to 1951. It will be noted that if we allow three marks for a first, two for a second and one for a third, the overall winners up-to-date are, again, Coventry—this represents a very fine *consistent* performance on their part.

It was a pity that Rhigos, GW3FFE, could not compete this year. "Personnel trouble" was at the root of the matter there, with two possible operators sick, one posted away from the district, and another unable to turn up regularly.

Neath and Port Talbot, GW3EOP, who were second in both the 1949 and 1950 events, did not compete seriously this year. The score of 20 points sent in by them is, we are told, to be regarded as a "token entry" in memory of the enjoyment they derived from the last two MCC's; this year they disapproved of the rules.

At least, the new rules have relieved us of the necessity of explaining that so-and-so was regarded as a pirate, and that one Club claimed to have worked a PAØ but hadn't counted him, and so on. Various non-Club stations did appear, and some of them were worked and even counted, but our judges soon put this right. In actual fact, very small deductions were made from the scores, averaging only some three points, for strangers that slipped in and might have been thought to be Club stations.

One or two genuine, but non-competing, Clubs also appeared, mostly on the first two days, and contacts with these have been allowed to count.

General Experiences

The remarks received with the Entry Forms make it abundantly clear that the majority of participants thoroughly enjoyed the Contest. Scoring was not too slow; after all, the thirty hours' limit meant an average operating time of not much more than three hours per

day, and during that three hours there should have been (in theory) 27 possible contacts—if all Clubs had chosen the right three hours!

This was where a certain amount of skill in planning was called for, and the high scorers were those who operated only in what were to be regarded as peak hours.

Coventry say "The contest was enjoyed by all members, of whom about 12 visited the station. The rig was a Clapp VFO, BA and PA, with 8½ watts to a 6L6 and a 150-ft. aerial. Conditions generally were poor, and operating standards not as good as in previous years . . . . Roll on, next year!"

West Cornwall, the runners-up, considered that the scoring system had cut down "bad manners," as displayed formerly by stations in search of a new multiplier, but had become too tame. They suggest that non-Club contacts should be allowed on another occasion, but *without* a multiplier. On the whole, we agree.

Kingston point out that this was their first attempt (and a highly successful one, too, giving them fourth place, bracketed with Gravesend.) They approved of the limitation to Club stations only, appreciating the simplification of the checking required. Gravesend, on the other hand, found the tempo much too slow and state that they will not compete next year under the present rules.

Edgware consider that the restriction to Club stations removes a good deal of the fun, and suggest that if this rule is kept for next year, the contest should be limited to two week-ends. They found conditions good, but static level high during the early part of the week.

Why Half a Band?

Several Club state that they made *all* their contacts between 1830 and 1900 kc. and ask why no one went outside those limits. We are seriously thinking of introducing one or two stations on fixed frequencies near 1715 and 2000 kc next year! It only requires two or three Clubs to move, and the rest would have to follow in order to raise them.

Trouble dogged Grafton this year, their transmitter blowing up on three successive days! They make the comment that the "Clubs Only" rule gave the whole show an intimate touch. Edinburgh, the only entry from North of the Border, gave nearly all Clubs some good GM contacts, and comment on the crowding. They don't agree with the new rules, but intend to compete next year—a spirit of which we approve.

TABLE I

POSITIONS AND SCORES

	CLUB	CALL	POINTS
1.	Coventry	G2LU	203
2.	West Cornwall	G3DIY	182
3.	Surrey (Croydon)	G8TB	174
4.	Gravesend	G3GRS	171
	Kingston	G3HQB	
6.	Edgware	G3ASR/A	168
7.	Grafton	G3AFT	162
8.	Edinburgh	GM3HAM/P	159
9.	Salisbury	G3FKF	153
10.	Sutton & Cheam	G2BOF	142
11.	Thanet	G3DOE	137
12.	Clifton	G3GHN	136
13.	Bristol	G3GIS	135
14.	Albany	G3HPI	131
15.	Rugby (BTH)	G3BXF	127
16.	Torbay	G3GDW	123
17.	Scarborough	G4BP	122
18.	Lincoln	G3XM/A	113
19.	Medway	G2FJA	108
20.	Tees-side	G3HUG	104
21.	Brentwood	G3FSM	98
22.	Sheffield	G3FZM	87
23.	Baldock	G3AXP/A	78
24.	Warrington	G3CKR/A	76
25.	Barnet	G3FFA	63
26.	Birmington	G2BON	52
27.	Eccles	G3GXI	47
28.	Neath & Port Talbot	GW3EOP	20

Comments in Brief

"Much enjoyment was obtained from sorting out the required signals, once the participating Clubs became known" (*Salisbury*) . . . . "Could have wished for more Clubs, and spread throughout the band" (*Sutton and Cheam*) . . . . "Overall standard of operating was good, with G3HPI and G3HQB outstanding" (*Thanet*) . . . . "Not one bad note but a few rather shaky operators" (*Clifton*) . . . .

"Our first contest as a Club station, and I have been asked to say how much we have enjoyed it" (*Bristol*) . . . . "New rules made an interesting contest and altogether fairer than the old system" (*Rugby*) . . . . "Far better for Clubs only than for all and sundry, and we would like next year's Contest on the same lines" (*Scarborough*) . . . .

"The new rules gave the less experienced operators more time to think . . . . but many of the Club stations heard in previous Contests with very good operators were noticeably absent" (*Lincoln*) . . . . "Absence of stations after 2200 hrs. due to operators

catching the last bus home" (*Brentwood*) . . . ." Difficulty in getting operators for the week-ends . . . . altogether, from our viewpoint, the Contest was too long" (*Warrington*) . . . .

"Still keeping the flag flying, we will be there next year—the smallest Club, representing the biggest Midland city" (*Birmingham*) . . . . "Most of our work was done by members who were only licensed this autumn" (*Eccles*) . . . . "Entry should be taken merely as a token of the pleasure and interest which your previous contests have given" (*Neath and Port Talbot*) . . . .

Sundry Matters

Various points came in for comment, not generally, but by individuals. One or two Clubs find it a hardship for two committee members to be excluded from the list of operators, in order to sign the entry form. Sheffield were in a jam because of the rule restricting operating periods to one hour or more, but it all boiled down to an error in keeping their log, which, doubtless, will not occur again! They make the sound suggestion, however, that a "final" period of less than an hour should be allowed, simply to bring the total operating time up to the maximum allowed and to tidy-up the log.

Finally, one or two Clubs operating from schools point out that they cannot operate on Sundays; in some contests this might not be serious, but the rules of this one made it imperative to work all the other Clubs every day of the nine-day period, or lose points.

The Summing-Up

It seems fair enough to remark that the new rules did *not* appeal to those Clubs who treat this Contest with a certain amount of grim earnestness, often using a member's private station and a small team of very efficient operators for the main purpose of amassing a score which will certainly put them near the top of the list.

On the other hand, Clubs with their own station on the premises, and a number of operators with little or no Contest experience, found that the change made MCC much more enjoyable for them than it could have been under the previous rules. In short, it was kinder to the beginner.

There is, of course, much to be said on both sides, with the proviso that there are plenty of other Contests for which those in the first category can enter. The obvious conclusion would seem to be that a formula must be found for MCC which will have its appeal to both types, and it would appear that the ideal would be a Contest in which the accent was—as this year—on inter-Club working, but in which contacts with other stations would also count for points.

We visualise a future MCC in which Club contacts are allowed, as in this one, on every day of the week, and in which they score about five points *each time*. Contacts with other stations would be allowed once only, and would score only one point.

In any case, we are determined to keep it a Club Contest and not to let it become just another Top-Band Contest of the hit-and-run variety. There is plenty of time before next November, and we should welcome comments from competing Clubs on the suggestion in the previous paragraph. It seems to us that the large bonus obtainable from working a Club would put a premium on operating skill and good listening to such an extent that, even if the band were crowded with stations, it would still be necessary to find and work all the other Clubs on each night of the event.

***STOP PRESS**: Stoke-on-Trent (G3GBU) sent in a score of 118, but do not appear in the Tables because their entry arrived several days after the closing date.*

The deadline for next month's routine reports for "Month with the Clubs" is **January 16, 1952,** addressed "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

TABLE II

WINNERS OF PAST MCC CONTESTS

Year	*1st*	*2nd*	*3rd*
1946	Coventry	West Cornwall	Rhigos
1947	West Cornwall	Warrington	Coventry
1948	Rhigos	Coventry	Wirral
1949	Rhigos	Neath	Coventry
1950	Rhigos	Neath	Coventry
1951	Coventry	West Cornwall	Surrey

Points Scored

1st, Three points; 2nd, Two points; 3rd, One point

Coventry	11
Rhigos	10
West Cornwall	7

SMALL ADVERTISEMENTS

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 Magazine, 55 Victoria Street, S.W.1.

TRADE

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