The SHORT WAVE Magazine

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EXCLUSIVELY FOR THE RADIO EXPERIMENTER & TRANSMITTING AMATEUR

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INDEX TO ADVERTISERS

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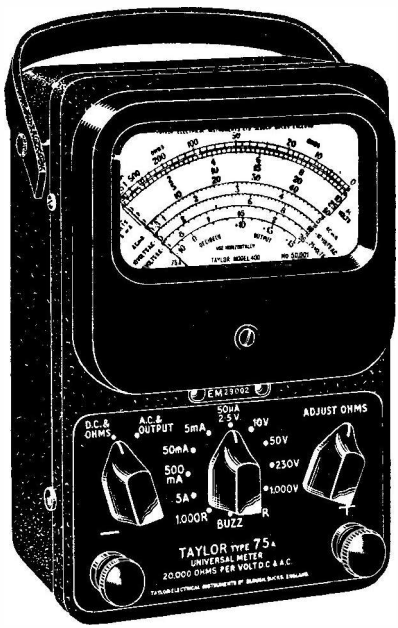

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EDITORIAL

Shadow

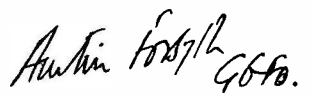
Once again mankind is troubled and, like millions of others, we ponder what the future may hold. It is neither our intention nor our function here to discuss the political events which are being watched so anxiously as the shadow from the East lengthens across the world.

But it is exactly ten years since it was our duty to comment, in this same space, on the situation as it affected Amateur Radio during that first period of extreme tension in our relations with Germany. History is repeating itself in much the same way, with only a slight change of focus but with a threat more evil, and many traitors within the gates.

To the newer generation of amateurs, discussion of this sort in the *Short Wave Magazine* may seem out of place, pompous and unnecessary. But we conceive it our duty to explain how Amateur Radio could be affected if an "extreme emergency" were to arise. All licences would be cancelled by proclamation, followed very quickly by the impounding of each operator's essential transmitting equipment. In 48 hours the curtain would fall, for the third time in living memory, on all amateur activity.

It is at a time like this that licensed operators—in their way the cream of the nation's reserve for the communications branches of the Services—ask themselves what their part could be. As the last war is so close behind us, a very large number of our readers (probably the majority) are themselves ex-Service and so liable to immediate or eventual recall. In a general way, the Service departments have outlined their plans for reserve formations ; and we are told that sufficient information is available to the authorities to ensure that individuals are employed on the work for which they are best fitted.

Though we pray that there will not be another, it is certain that if war does come, amateurs will again acquit themselves with honour and distinction.



Modifying the HRO

Improving HF Performance

By I. E. HILL (G6HL)

(There are many pre-war HRO's in service and this article shows how to set about bringing a popular receiver up to 1948 *standards on our HF communication bands. Extensive modification of a commercial design is never easy ; though the article contains all the information necessary for the experienced constructor, our contributor rightly warns readers who may be obtaining what they feel to be satisfactory results to Leave Well Alone ! His article is useful and instructive reading for those interested in receiver design generally.—Ed.)*

A NEW receiver, fresh from the production line, gladdens the eye and can expect to take pride of place in any amateur station, but Father Time is remorseless and has already relegated the original HRO to the vintage class. However, in these difficult days the HRO is one of the few commercial receivers available at a reasonable price and even by 1948 standards it is still a useful job. Nevertheless, there are a few simple modifications which can readily be effected with a considerable improvement in performance —or one can go the whole way and utilise HRO component parts to build a new receiver.

The writer put an early-model HRO into service again in mid-1946. The following chronicle of modifications effected and results obtained may be of general interest. Not all these modifications were original and acknowledgments are due to many un-named operators for suggestions made in the course of late evening discussions on the 28 mc band.

HRO Limitations

When considering modification of a commercial receiver it is advisable first to determine the objective and likely effect of the modification contemplated. By 1948 standards the old HRO design has several weaknesses, among which are :

(i) Lack of noise limiter.
(ii) Lack of gain in the 28-30 mc band.
(iii) S-meter readings not related to signal on the higher frequencies.
(iv) Rather tricky routine for aligning coils.
(v) Excessive first oscillator frequency creep during the warming-up process, particularly on the 28-30 mc band.

Apart from these points—and, possibly, the inconvenience of plug-in coils—the HRO is a good receiver and very pleasant to handle. The amateur who operates in the LF bands only and has no ignition noise trouble is in clover and is well advised to treat his receiver kindly by leaving well alone. But if HF performance —10 mc and above—is required and the use of a converter is rejected, then a few changes are profitable.

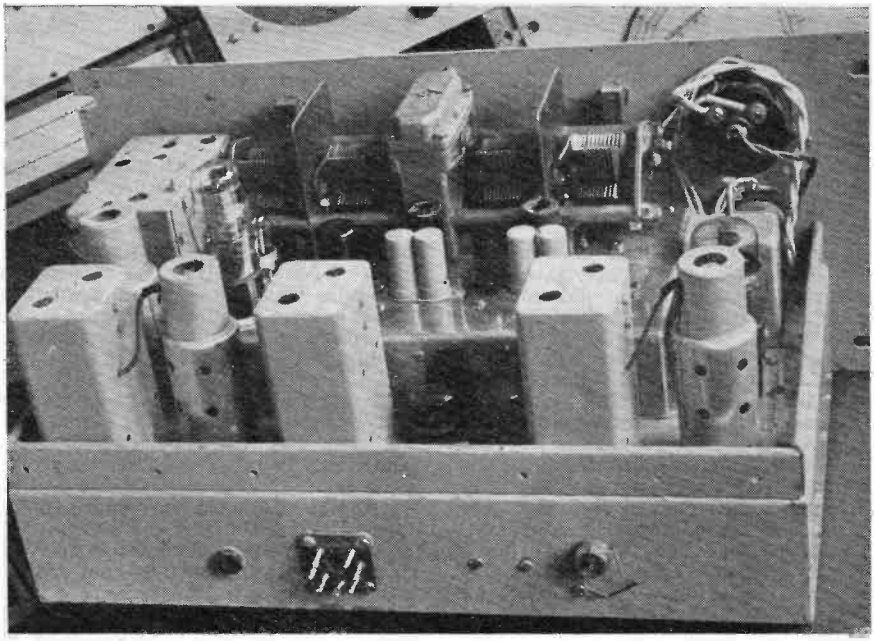
Some Modifications

First, the easy modifications which can be made with the minimum of effort and alteration from ex-works condition.

IF Gain can be increased by changing the cathode resistor of the second IF valve. The usual value is 1,000 to 2,000 ohms, but it can be reduced to 500 ohms with increased IF gain.

Noise Limiter. This is a necessity for operation on 28 mc (and 21 mc when we get it). Various limiters were tried at a main-road location in Hampshire. The standard HRO limiter is easy to install and provides fairly reasonable limiting effect but does not entirely remove the noise. Several other schemes were tested, including diodes, triodes and eventually a 6L7 substituted for the last IF valve and a "hole punching" circuit incorporated. Each scheme had disadvantages, mainly in the requirement of readjustment for individual signal-noise levels. Eventually the QTH was changed for one less frequented by traffic and a diode limiter (page 91, Tenth Edition, *Jones Handbook*) incorporated. It limits but does not remove the noise ; as noise is only occasional this is acceptable—for the present.

RF Gain on 28 mc. The HRO 28 mc bandspread coil is required also to tune 30 to 14 mc on general coverage. To accomplish this and give satisfactory tracking a tertiary winding has been incorporated in the coils by the manufacturers. For 28-30 mc working on 21-30 mc coverage only, this results in a considerable loss of gain so



The modified HRO with the new sub-chassis in position ; the 100 kc oscillator is behind the output valve, and tubular metal-cased by-pass condensers stand in front of the 6AK5 shields. New calibration charts have been made for each set of coils.

"tear 'em up" and rewind the coils. Retain the oscillator coil as at present but rewind the RF and mixer coils on the lines suggested later. If the original valves are retained then the number of turns may have to be reduced. Easiest routine is to get the mixer coil right first and then rewind the RF coils exactly the same.

Second Channel Interference can be troublesome on 28 mc if a low IF is in use (455 kc in the HRO) and even two RF stages will not entirely remove it from local or exceptionally strong signals. The remedy is, however, quite simple and the HRO coils readily lend themselves to the modification of tapping the grid down from the "hot" ends of the secondary RF and mixer coils.

This arrangement was found necessary also at 14 mc in the more complete modification described later.

Re-valving

So much for the easy modifications each of which will considerably improve the performance of the receiver—particularly at 28-30 mc. Looking at the valves in the standard HRO an obvious thought towards improved gain is to change them for their more modern counterparts. An initial effort was made with a 6AC7 in the first RF stage but the result was an uncontrollable audio hoot. Reference to the HRO circuit diagram indicated the trouble as lack of decoupling. This was remedied and results were then a little more encouraging and the second RF valve was also changed for a 6AC7. The overall gain certainly went up but so did second channel trouble. It was at this stage that the grids were tapped down from the hot ends of the coils. A further change was made in favour of EF50's in the two RF stages but little improvement in performance was noted.

The next development centred around acquisition of several 6AK5's, but by this time the HRO chassis had suffered somewhat and to put the miniature valves in the original chassis positions would have thrown away the advantages of short leads in the RF circuits. So the two RF, mixer and 1st oscillator valves were removed and a strip constructed containing four 6AK5's, suitably placed to shorten wiring and including associated by-pass condensers. The circuit used was almost identical with that of the standard HRO, component values being suitably altered and decoupling provided to operate the first RF stage at 180 volts on the plate and the remaining 6AK5's at 150 volts ; the 1st oscillator

was also stabilised with a VR150-30. Screen injection was retained to the mixer. Results on 28-30 mc were exceptionally good but some difficulty was experienced owing to pulling between first oscillator and mixer.

Further Improvement

The receiver functioned in this form until Christmas, 1947, and gave very satisfactory results, but it did not look pretty and there was still the pulling at the mixer stage. So dismantling was started once again. By this time the under-chassis looked a bit rough so the whole lot was stripped off, components removed and the condenser support attended to with a ½-in. cold steel chisel and 8-oz. hammer! A coat of light grey paint improved the chassis appearance. A sub-chassis was built up to take the condenser and the front end valves, together with associated resistors, condensers and so on. A new one-piece coil contact strip was made and bolted to the sub-chassis, which in turn could be bolted down to the main chassis. In this manner the "front end" could be self-contained and treated as a complete unit.

To overcome pulling, a 6SA7 was put in as the mixer; it had been intended to use the miniature equivalent 6BE6, but one could not be located. With the 6SA7, conversion gain and signal-noise ratio was not so good as with the 6AK5, *but* the pulling effect on the oscillator had disappeared. The first oscillator was changed to a 6C4 and its plate supply stabilised with a VR150-30. The HRO coil connections were also changed round somewhat to obtain reduced length of connecting leads.

Performance this time was equal to the all-through 6AK5 line-up, but the undesirable pulling effect between mixer and oscillator had largely been obviated. The first RF valve still operated at 180 volts on the plate and with fixed cathode bias. The second RF stage had 150 volts on the plate and a variable cathode bias resistor —a useful adjunct to vary gain without upsetting the S-meter operation. Remaining details in the circuit diagram of Fig. 1 are self-explanatory and readily adaptable to any similar receiver.

The two RF stages gave considerable effective gain but with grids connected to the "hot" ends of the coils second channel

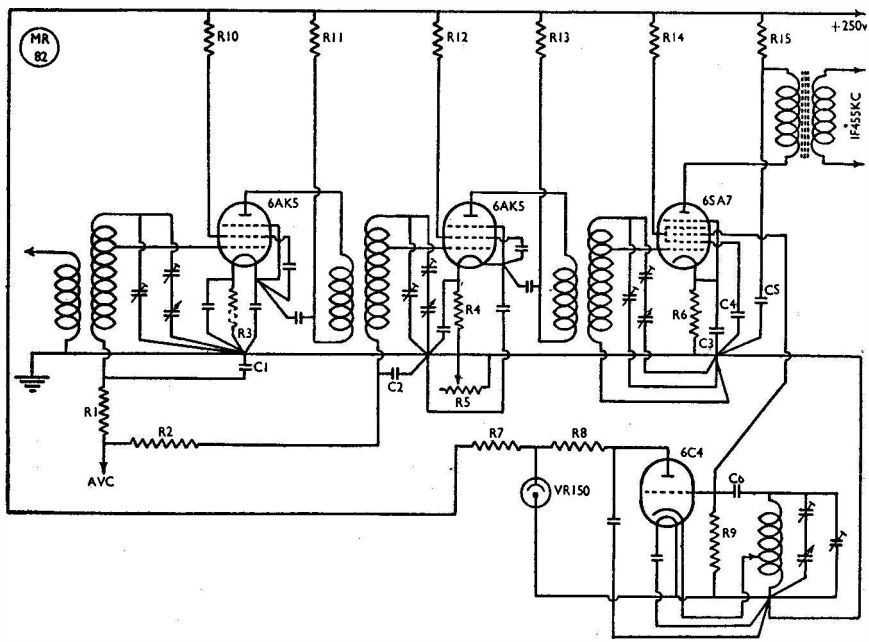


Fig. 1. Circuit of G6HL's front end for the modified HRO drawn to emphasise the single-point earth connection in each section. Pre-set trimmers are those already existing in the HRO coils; where not otherwise stated in the table of values alongside, all by-pass capacities are ·005 μF.

is troublesome at higher frequencies. However, this is easily overcome by tapping the grid one-third down the coils from the "hot" end. On 14 mc it was found that an untunable background noise was getting through to the IF stages and on removing the oscillator valve high-speed auto-signals could be heard beating with amateur signals. The auto signal was a strong one just outside the band and was beating with signals in the band 455 kc away. This was also completely cured by tapping the grid down the coils.

Redesigned Coils

Having got the receiver working satisfactorily, further attention was given to the coils, which it was decided should provide band-spread only. The RF and mixer coils were rewound with a considerable increase in the number of turns. The 28-30 mc coils were increased from 5 turns, ½ in. diameter, to 12 turns on a ½ in. diameter former, with the grids tapped on at the ninth turns. The trimmers were rewired so that one provided band-set adjustment and the other in series with the main tuning condenser gave band-spread. In adjusting the coils, the main tuning condenser is set at 480 degrees and the HF edge of the band located using the band-set trimmer. The main condenser is then rotated to 40 degrees and the LF end of the band set up using the band-spread trimmer. Some readjustment of the band-set trimmer will now be necessary, the main condenser being returned to 480 degrees. Subsequently, a further small adjustment of the band-spread trimmer may be required. The result is to spread the band over most of the dial, but increasing the L/C ratio has also had the effect of opening the tuning scale out at the LF end of the band. If this is considered undesirable the L/C ratio (or alternatively the size of the main tuning condenser) must be reduced. Unfortunately the latter has the effect of spoiling the HRO coverage on MF. In any case, the open scale at the LF end of the band is advantageous for CW working.

A few other modifications have also been made to the receiver. A 100 kc oscillator has been installed which can be brought into operation by a panel switch and is used for locating band edges and checking calibration. The S-meter has been changed to a bridge in the plate feed of the IF strip and a front-panel zero setting control provided. AVC is taken from the input

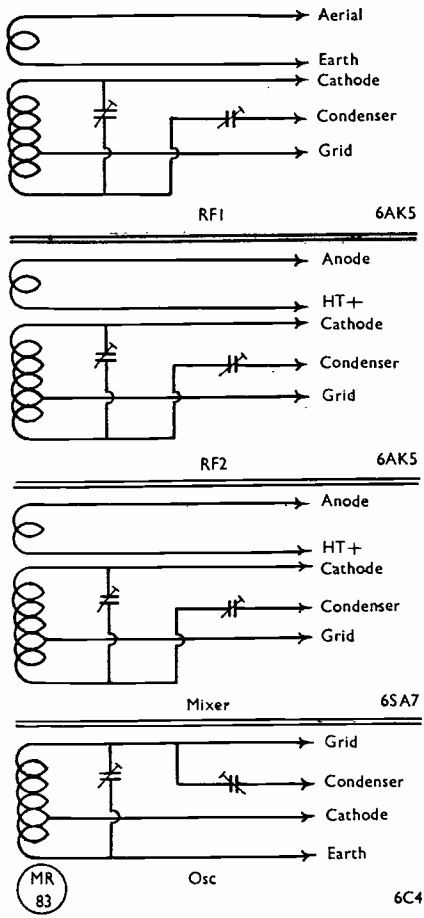


Fig. 2. Rearrangement of HRO coil connections, referring to one coil pack. For 14, 21 and 28 mc the grid tap is one-third the way down from the grid end, and on the grid end for frequencies below 14 mc; approximately double the original number of turns is used. The original oscillator winding is retained for all bands.

Table of Values

Fig. 1. HRO Front-End Stages as Modified

C1, C2, C4 = ·01 μF
C3, C5 = 0·1 μF
C6 = 100 μμF
R1, R2 = 470,000 ohms
R3, R4 = 220 ohms
R5, R7, R15 = 5,000 ohms
R6 = 600 ohms
R8 = 20,000 ohms
R9 = 50,000 ohms
R10 = 25,000 ohms
R11 = 2,500 ohms
R12, R14 = 30,000 ohms
R13 = 3,000 ohms

side of the last IF transformer and a separate diode used. Separate diodes (6H6) are employed for AVC second detector and noise limiter.

Further Improvement Possible

Results with the receiver are very satisfactory, but further changes are contemplated for the future and will be :

(*i*) Inclusion of 6AG5 in lieu of 6AK5 in the RF stages and increase of plate feed to 200 volts.

(*ii*) Change of 6SA7 to 6BE6 in the convertor stage.

(*iii*) Modification of the crystal filter to band pass 300 cycles and 3 kc.

The foregoing modifications have been applied to the HRO but are obviously adaptable to other pre-war commercially built receivers. However, before work is commenced the constructor (or should one say *de*structor) is well advised to refer back to an earlier paragraph. *Consider carefully whether the modifications, when completed, are likely to give results in keeping with the requirements of the individual.* In most cases, a 3·5 mc or 7 mc enthusiast will find little advantage in pulling an existing commercially built receiver to pieces—but for 28 mc, 21 mc or even 14 mc the story is very different and the labour involved well worth while.

Flexible Crystal-VF Oscillator

Describing a New Driver Circuit

By **F. BUTLER, B.Sc., M.I.E.E.**

The quest for new types of high-stability driver unit, capable of accurate calibration, goes on unendingly. Here are the details of an original arrangement, devised by the author, the application of which is of particular interest in the field of Amateur Radio.—Ed.

IN transmitter design, it is customary to employ quartz-crystal or variable-frequency oscillators as alternatives for the purpose of primary drive and frequency control. There are both technical and operational reasons for this functional separation, though in certain classes of equipment it is of advantage to be able to combine the two. It has been found possible to do this, using a circuit developed by the writer, a theoretical account of which has already been published. ("Series Resonant Crystal Oscillator," *Wireless Engineer*, June, 1946.)

It is the purpose of this article to give a simplified description of the new arrangement with sufficient practical detail to induce experimenters to give it a trial in comparison with more conventional circuits. The distinguishing feature of the new crystal oscillator is that it uses the series-resonant mode of vibration of the quartz plate, as against the more usual parallel-resonant mode. Before going into an explanation of the action of the oscillator, it is essential to understand the difference between these two modes.

It is possible to resolve into an equivalent electrical circuit and so to calculate the performance of most electro-mechanical apparatus, including telephones, loudspeakers, microphones, gramophone pick-ups, sound-boxes and piezo-electric and magneto-striction devices. The vibration modes of a quartz plate are particularly simple to determine by this technique, and without going into unnecessary detail, it turns out that there are two principal modes, the characteristics of which are simulated respectively by the series and parallel resonances of a coil and condenser circuit of extremely high "Q." It transpires that the two oscillation modes occur at slightly different frequencies, the series resonance being a few parts in a thousand lower in frequency than the parallel mode. A further point emerges, in that the series-resonant frequency is not greatly affected by changes in the parallel capacity shunting the crystal, whereas, in the parallel case, there is an appreciable variation. For this reason, the series mode is almost always chosen for employment in oscillators of the highest precision. It is more usual for crystals to be operated in circuits of the Pierce or Miller type, or in some variation of them, so that crystals

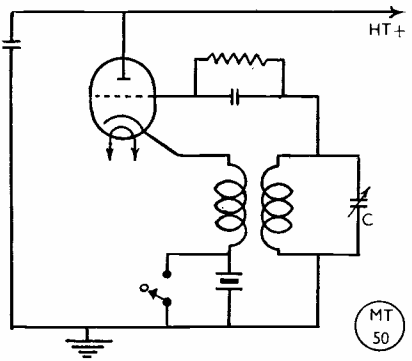


Fig. 1. Basic series-resonant crystal oscillator circuit as designed by the author.

are calibrated for the parallel-resonance operation which these employ. Though higher in absolute stability, the series-resonant crystals will operate at lower values than the frequencies marked on the holders and they must be measured or recalibrated in the alternative circuits to be described. This operation is easily performed, using a heterodyne frequency meter.

Series-Resonant Oscillator Circuit

One of the commonest drive-circuits used in amateur practice is the electron-coupled oscillator. This is a version of the Hartley circuit in which the anode of the oscillator valve is earthed at RF, and the cathode is taken to a coupling coil or to a tap on the tuning coil, one end of which is earthed and the other taken to the valve grid, through a grid-leak and condenser auto-bias circuit. The tuning capacity normally shunts the whole of the main tuning coil. If a pentode or tetrode valve is used, a further parallel-tuned circuit may be connected in the anode circuit (the screen being earthed at RF) and used to select the fundamental or, more usually, some harmonic frequency. This circuit forms the variable-frequency oscillator to be described, and it is the basis of the series-resonant quartz oscillator, the circuit of which is given in Fig. 1.

It will be seen that this is a conventional cathode-coupled oscillator, with a quartz plate joined in series with the coupling coil. At series resonance, the impedance of a tuned LC circuit degenerates to a very low resistance, being practically that of the coil alone. The quartz plate, at its series resonance frequency, is almost a short

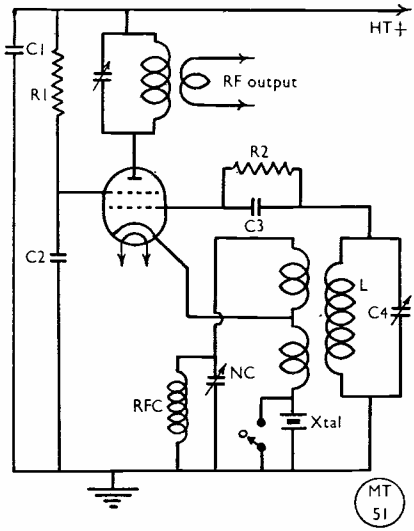


Fig. 2. Practical circuit derived from the original Butler oscillator, giving crystal or VFO operation at will.

Table of Values

Fig. 2. The Butler Oscillator

C1 = ·002 μF
C2 = ·01 μF
C3 = 100 μμF
C4 = 500 μμF
R1 = 50,000 ohms
R2 = 30,000 ohms

circuit and so permits sufficient feedback to sustain oscillation. The frequency is selected by the setting of the main tuning condenser C. Off resonance, the quartz plate simulates a high reactance, the feedback is altered in magnitude and phase, and oscillations stop. A milliammeter in the anode circuit shows a dip in current at the true resonant point, the rise on either side being almost symmetrical in form and quite different from the readings observed in the case of a Pierce or Miller circuit, where a markedly unsymmetrical characteristic is encountered. This tuning property is one very useful feature of the new circuit, and makes it extremely easy to set up on frequency.

To operate the system as a VFO it is sufficient to join a short-circuiting switch across the crystal.

The elementary arrangement in Fig. 1 suffers from one obvious and one more obscure disadvantage. In the first place, quartz is an insulator, and so the flow of

anode current is prohibited. To avoid this an RF choke is connected across the crystal. The value of this choke is not at all critical.

There is another objection to the circuit as it stands. This is due to the capacity of the quartz holder, which may permit sufficient feed-back, at frequencies remote from the crystal resonance, to start self-oscillation. This defect is avoided by the use of a neutralising circuit, shown in Fig. 2. In this, the main tuned circuit LC is the same as in Fig. 1, the values being selected to cover the desired range of frequency. The coupling coil is centre-tapped, and a neutralising condenser, equal in maximum capacity to that of the crystal holder, is joined between one free end and earth. The other end of the coupling coil is connected to the quartz crystal. As before, the RF choke serves merely as a DC path for the valve anode current. A tetrode is shown, in the anode circuit of which is a second tuned circuit set to the fundamental, or preferably to some harmonic frequency.

Values and Tuning Procedure

In setting up an oscillator of this type, the first step is to choose a coil which will tune, with the main variable condenser, over the desired range. Each half of the coupled winding should include about one-fifth of the number of turns used on the main coil and should be well insulated from it. The neutralising condenser should normally be an air trimmer covering say 3-30 $\mu\mu$F.

To adjust the oscillator, first short-circuit the anode coil, and with a meter in the HT lead, set the neutralising condenser about half-scale and tune the main variable condenser slowly through its range. A pronounced dip will be observed when the setting is correct. Note this reading, then search for spurious responses at other settings. These can be eliminated by trial adjustments of the neutralising condenser. If the tuned circuit covers an exceptionally wide range, it is possible that a harmonic response of the crystal will be excited. This must not be confused with some undesired feed-back instability. Having adjusted the crystal circuit, remove the short-circuit on the anode coil and tune this circuit to resonance. Practically any tetrode valve and any type of crystal from 50 kc to 10 mc can be used in the circuit. With reasonable HT voltages, crystal current is low and the output and efficiency are both high. Grid leak and condenser values are normal, *e.g.*, 30,000 ohms and 100 $\mu\mu$F.

Multi-Crystal Operation

A remarkable property of the circuit is that a number of crystals can be employed simultaneously, all joined in parallel, without any form of switching. The desired frequency is selected merely by tuning the main condenser and watching for the separate dips in anode current. Naturally, the anode circuit will need re-tuning to each new frequency. Multi-crystal operation requires only an increase in the setting of the neutralising condenser to allow for the increased total holder capacity. The crystal frequencies must not be very closely adjacent, or there will be some interaction. In any of the circuits described, VFO operation is secured by connecting a short-circuiting switch across the crystal, or bank of crystals. It is well to remember that VF oscillators of high stability should be operated with a large fixed padding capacity and a variable portion just large enough to sweep over the desired frequency range.

As a refinement, voltage-stabilised supplies can be used, but this is not normally required.

Frequency Measuring Applications

The form of oscillator described has its principal use as a driving source for an RF amplifier. In addition, it can be used in a signal generator or in a heterodyne frequency meter. For these applications, the tuned harmonic selection feature is not required, and a simple triode oscillator can be used. The possibility of working on one of a number of spot frequencies, with an easy change to variable-frequency control by the use of a single switch, makes the circuit extremely convenient in operation.

GERMAN LICENCES

Latest official information from Germany, dated September 20, is that no amateur licences have yet been issued to German nationals. The reason is that the German Economic Council has not yet presented to the Military Government the ordinance they were instructed to issue by September 1. Hence, there will be a further delay in licensing amateurs, and any German nationals to be heard on our bands are still pirates—more's the pity.

Compact Transmitting Aerial

The Beehive Twenty

By S. C. CLARK (G2FC)

The problem of how to get out when facilities exist for an indoor aerial only bothers many operators, and deters some from coming on the air at all. That satisfactory results on our communication bands are possible with inside aerial systems has often been proved. Here is another suggestion in the same strain.—Ed.

POST-WAR Amateur Radio has found many operators using indoor aerial systems, possibly through the sheer necessity of living space. A dipole folded into a rectangle or square is sometimes employed, of which a good example was recently published in the *Short Wave Magazine* (" Indoor Aerials," p.112, April 1948).

Accordingly, experiments were carried out with an indoor half-wave aerial folded into a rectangle. It was then thought that a useful radiator could be designed by using only this portion and coiling the ends in such a way that the inductance and capacity would be sufficiently well distributed.

Practical Design

In practice a radiator 5 ft long was used, and the ends were coiled up in the form of a beehive with the last few inches left projecting horizontally (Fig. 1). Dural or aluminium tubing may be employed for the radiating portion and 12 or 14 SWG enamelled wire for the coils. The ideal conductor would be a thin hollow tube increasing in diameter towards the centre and tapering to a fine point at each end with a very low RF resistance. However, in practice the arrangement described seems to work quite well.

Resonating the System

It will be understood that it is not easy to calculate the length of wire required for a given frequency. As a start the same length can be used as is normally required for a straight-wire aerial. A short stub may be temporarily connected to the centre, and a thermo-couple shorted across at different points for highest current will show whether more turns are needed on the coils. It was found that 15 ft of wire coiled in about 11 turns of ever decreasing diameter gave best results over the whole of the 14 mc band. The diameter of the first turn was 8 inches, making the total length of the aerial 35 ft.

Matching

It will be found that it is not possible to feed the centre of the aerial with low impedance lines since owing to the short physical length of the radiator and the inductance and capacity distribution, quite a high RF voltage appears at the centre as well as high current values. Consequently, the end impedance is apparently much higher than the normal half-wave straight wire.

The simplest way of matching was found to be a single wire feed tapped at one end on the PA coil, the other tapped on to one of the "beehives." The tapping at the aerial end is very critical and a thermo-couple should be connected in the centre to show maximum current. A more balanced (and safer) system may be the usual twin-wire spaced 2 or 3 in. apart feeding the centre, with a 3-turn coil coupled to the PA anode coil midway between the current and high voltage positions.

If it is essential to current feed, then the artificial tank circuit can be used (Fig. 2), though with some additional losses. It must be stressed that however the system is fed, an ammeter *must* be used to check the current actually obtained at the centre.

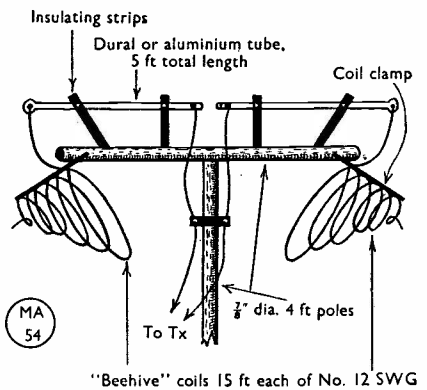


Fig. 1. Showing the general arrangement of G2FC's "Beehive Twenty," discussed in detail in the text, as designed for the 14 mc band.

When a loose-coupled coil is employed, parallel or series tuning may be required depending on the length of feeder. The matching data given refer to relatively short feeder lengths, since the aerial was being used indoors near the transmitter.

Mechanical Mounting

The system was made entirely self-supporting as shown in Fig. 1. Two 4-ft poles (broom handles from the local ironmonger) were screwed together, T-fashion, the radiator proper being mounted on strips of ebonite—alternatively, fairly long stand-off insulators may be used. The "beehive" coils are also clamped between two strips of insulating material and mounted at the ends of the T-piece. High grade insulation must be used owing to the high RF voltage that appears over the whole system.

Results

Under average Class-C amplifier conditions, the centre current will run ·75 to 1·75 amps. for powers of 100 to 150 watts. There is considerable variation of current due to nearby capacity effects when the system is used indoors ; and when set up in a very confined space, with the aerial turned to alter the directivity, retuning of the PA is necessary.

The aerial was tested out under very adverse conditions, being used in a small room and standing 4 ft from the floor near the operator, in a first-floor flat 22 ft above the ground and severely screened in all but one particular direction. Numerous 'phone and CW QSO's have been obtained under short- and medium-skip conditions ; it is unfortunate that it has not been possible to try the system out of doors, since it is believed that this aerial would give a good account of itself when erected under conditions similar to the more conventional types.

Further Experiments

It is not possible to use parasitic reflectors or directors, though two or more driven radiators may be used to obtain greater directivity, in and out of phase and in all the usual close-spaced driven element arrangements. Also, one or more elements may be used vertically where reasonable height can be obtained.

There is a great field for experiment with compact-aerials on other frequencies. It is thought that a 30 mc system might be scaled down even further. It is not intended to make any exaggerated claims for the arrangement described, but simply to suggest a system which may help those who have to operate in confined spaces for aerial erection.

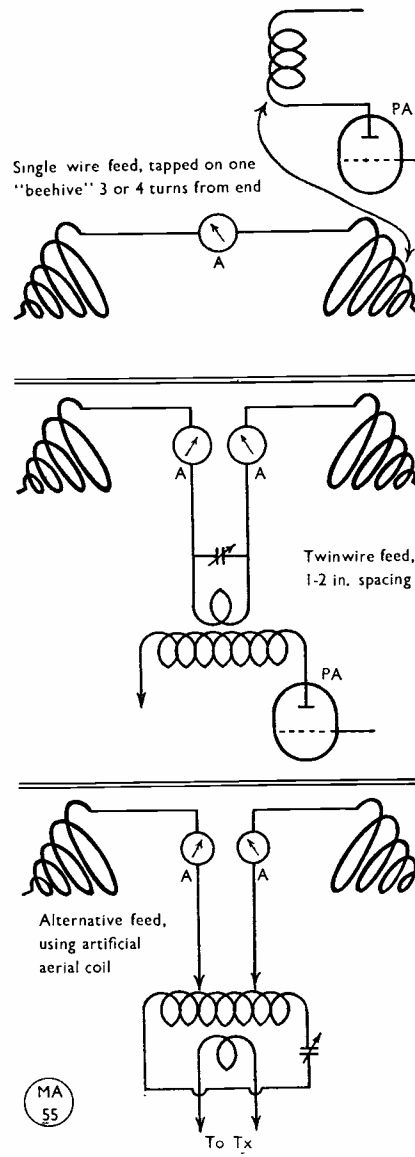


Fig. 2. Methods of feeding the "Beehive Twenty." If used with high power in the near vicinity of the operating position, G2FC remarks that RF burns are a danger.

Neutralising Tetrode Amplifiers

Cleaning Up the "Squiggers" in an RF Stage

By J. N. WALKER (G5JU)

THE subject of instability in beam tetrode RF power amplifiers has been ventilated to such an extent that one would think no more need be said about it. But one has only to listen on the amateur bands to realise that the importance of the point is not yet fully appreciated by many amateurs, who still unwittingly emit signals other than (and in addition to) the fundamental.

It is not the intention here to discuss parasitic oscillation of the VHF and low radio-frequency types. Suffice it to say that tests should always be made, when setting up a new transmitter, to ascertain if such parasitics are present and if any signs of them are found, steps be taken to eliminate them, using methods which are common knowledge.

Cause . . .

To make our present point, let us assume a transmitter with a PA stage using an un-neutralised beam tetrode (or perhaps two in parallel or push-pull) of the 813, 807 or KT8 variety, with bias partly or wholly fixed so that, when not under drive, the anode current is zero.

Switch on the transmitter and adjust for normal excitation and load. Now, in all probability, a study of the emitted unmodulated signal on one's own receiver (with the RF gain backed off) and on the receivers of neighbouring stations, will indicate a single carrier, with clean edges and no spurious "squiggers." On the strength of this, the owner of the signal will probably be convinced (and not without reason) that he has succeeded in obtaining high stability and that, as the manufacturers usually state, "there is no necessity for neutralisation." All well and good. Or is it?

To make quite sure, try this test: Without touching any tuning controls cut off the drive completely but leave normal voltages applied to the electrodes of the PA valve. Or rather, if high voltages are in use, it may be wiser to reduce at least the anode voltage to something like 60 per cent. of normal.

It is popularly supposed that a beam tetrode, when operated in what appears to be a properly designed and laid out RF amplifying stage, does not require neutralising. If you think that, read these notes.—Ed.

Next, gradually reduce the bias voltage. Soon after a standing anode current is registered on the anode current meter, it is only too likely that the current will jump suddenly to a comparatively high value and grid current will also be indicated. The stage has, in fact, gone into self-oscillation.

Again look for the signal on your receiver. The books will tell you that, because of the altered operating conditions (particularly as regards phase) the tuned-plate tuned-grid circuit we are now considering will oscillate at a slightly different frequency when self-excited than when it is driven. Your receiver will confirm this fact. On the 14 mc band, for example, the difference may amount to 500 kc or even more, and the new frequency may lie *outside* the amateur band.

. . . and Effect

Now to the point. If the feedback is sufficient to allow self-oscillation to occur, the transmitter may be operating under what amounts to a "locked" condition. For a fraction of a second when the drive is applied, the PA self-oscillates but very rapidly comes into lock with the drive frequency.

There are two important effects when this happens. One is the interference caused by the actual sweep of 500 kc or so across the band (keeping to the 14 mc example). The other is that a transient of this nature in itself creates sub-harmonics over a wide frequency range and interference can be caused to receivers working on frequencies well removed from the transmitter fundamental—and that over a wide area if considerable power is employed.

Obviously, this effect will occur every time the key is pressed by a CW operator. Not so obviously, it will also occur if the carrier is heavily modulated, through the valve being inoperative for minute fractions of a second at negative peaks. So when you hear "funny noises" at one part of a band and find a local (or perhaps not so local) transmitter putting out a signal in another part of the band—or even another band—you will appreciate what is happening. It is then up to you to see that he knows about it—and also up to you to

make quite sure that your *own* transmitter is not "playing up" in the same way.

If, when carrying out the foregoing test, self-oscillation does not take place before the anode current reaches a value such that the rated dissipation is not exceeded, do not be satisfied. Try rotating the anode and grid tuning condensers (the latter may, of course, be the anode tuning condenser of the preceding stage) to ensure that the stability is high *irrespective* of the settings of the tuning condensers. If self-oscillation is experienced, it will be just as necessary to eradicate it.

The Cure

The cure, obviously, is proper neutralisation, so that the stability is actually as well as apparently high.

Neutralisation is carried out exactly as with a triode amplifier, but by reason of the very much smaller capacity which has to be balanced out, the application is not so easy. A popular method with twin tetrode valves (of the QVO4/20 or 829 types) is to run well-insulated wires from the grids and permit them to lie near the opposing anodes, varying length and distance until neutralisation is correct. The writer approves (and uses) this method on the VHF's as it is desirable to keep the physical mass of metal to a minimum. At the same time, it must be admitted that it is something of a hit-or-miss arrangement and becomes more difficult to apply and adjust with valves of physically greater sizes.

Some means of making a definite adjustment is desirable and the writer has found the answer in the use of a modified Eddystone Cat. No. 481 neutralising condenser (two in a push-pull stage). The modification consists of the removal of the larger of the two cups and the reversal of the metal part which holds the screw plunger so that a wider-than-normal gap results.

The condenser must be mounted in such a way that the two connecting wires are screened from each other—otherwise the capacity between the wires is liable to be greater than that of the condenser! It is also desirable to keep the connecting wires short, particularly at the higher frequencies. There will usually be a metal screen separating the input and output circuits and it should not be difficult to fit the condenser in a position on this screen such that it is readily accessible for adjustment and fulfils the other conditions. The fixing screw should be of the countersunk type, when the possibility of flash-over is remote, even with a well-modulated 813. The circuit will take the normal form, with a split-stator tuning condenser in the anode circuit. The neutralising condenser should be adjusted in the direction which indicates a reduction of grid current under self-oscillatory conditions, and a quite definite setting will be found at which self-oscillation will not occur at *any* positions of the grid and anode tuning condensers.

On returning to the normal driven condition, with grid bias increased to its full value, it will probably be noticed that the grid current is a little less than it was in the unneutralised condition, which is accounted for by the removal of the positive feedback.

Another BC-453 Conversion

Operation with BC-348 or Eddystone 640

By **L. A. LEAR**

IN the September issue of the *Short Wave Magazine*, conversion of the BC-453 for use as a "Q5'er" was described in conjunction with a receiver having an IF within the range 190-550 kc. The purpose of these notes is to show how the BC-453 can be quite easily adapted for use with receivers such as the BC-348 or Eddystone 640, having IF's of 915 kc and 1600 kc respectively.

The Q5'er is first converted exactly as detailed by G2AO, and can be checked by tuning to 200 kc, the frequency of the Light Programme.

Now remove the screws at each end of the RF coil unit and pull the coil box off complete. The coils are of the plug-in type, each in a small aluminium can.

Commencing with the oscillator coil, marked with a blue spot, remove the four red-painted screws and withdraw the coil. Unsolder the outer end of the larger coil and carefully remove the requisite number of turns, as shown in Table 1 or 2 herewith.

The mixer coil, marked with a yellow spot, is treated in the same way, the turns being removed from the lower coil. The coupling coil is left as before.

In the case of the aerial coil, the tap at 75 turns is unsoldered during the unwinding, and after the necessary number of turns has been removed, the outer end of the coil is resoldered to both pins.

Next, take out the small moulded condenser C39 connected between pin 8 of V3 and the 3 × ·05 μF condenser on the side of the chassis.

Adjustment

Remove the outer top cover, after taking out all the plated screws on each side of the chassis, in order to obtain access to the trimmers. Connect HT and LT supplies and tune the set to an injected signal at the required IF. Next, peak the mixer by adjusting the trimmer nearest the aerial terminal. The aerial coil is peaked by means of the panel control marked "align input." If a signal generator is not available it is quite easy to align the unit on broadcast signals.

Table 1

APPROXIMATE FREQUENCY COVERAGE 500-1200 kc

Coil	Number of turns removed
Oscillator	120
Mixer	145
Aerial	155

Table 2

APPROXIMATE FREQUENCY COVERAGE 1000-1700 kc

Coil	Number of turns removed
Oscillator	165
Mixer	193
Aerial	205

Band-spreading the Clapp

High-Stability Oscillator Modified

By **R. T. REED (G2RX)**

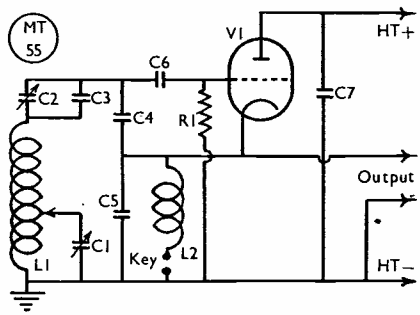
THE Clapp oscillator circuit described in *QST* for May, 1948, is quite outstanding for stability but rather unsuitable for band-spreading. Although it is suggested that this may be obtained by shunting a further capacity across the tuning condenser this will defeat the attempt to keep the tuning capacity small; it also upsets the stability and is difficult to adjust. However, with the modification shown herewith it is possible to arrange to spread the band as much as may be desired.

C1, the main tuning condenser, is about ·0001 μF; C2, the band-set condenser, is 100 μμF and C3 about 50 μμF, so that the circuit does not cease to oscillate when C2 is reduced to a low value. For the oscillator to function at 1·7 mc, L1 should be about 50 turns of 20-gauge wire spaced its own diameter on a 2-in. former of good quality. The tap for the tuning capacity C1 is about 15 turns from the ground end and may easily be adjusted to give the amount of band-spread required.

Table of Values

Modified Clapp Oscillator

C4, C5 = 100 μμF, silver mica
C6 = ·0001 μF, mica
C7 = ·01 μF, mica
R1 = 100,000 ohms
L2 = RFC
V1 = 6C5 or 6J5



Circuit devised by G2RX to obtain wider frequency coverage with the Clapp oscillator, which has exceptionally stable characteristics as a VFO driver.

Inexpensive Driver Unit

T9 VFO for the 25-Watter

By G. MOORFIELD (GW3DIX)

This VFO driver was primarily designed for operation with the complete five-band 25-watt transmitter described in detail in our issue for January, 1947. GW3DIX's circuit is, of course, equally applicable to any transmitter capable of accepting VFO drive.—Ed.

HAVING taken stock of the situation on initial licensing in February this year, it was found—in common with a large number of fellow amateurs—that although enthusiasm was available without limit, space and the "wherewithal" were not so plentiful ! A definite plan of attack had therefore to be formulated, and as far as a transmitter was concerned, a most satisfactory compromise was obtained in the construction and operation of the 25-watt rig described in the *Short Wave Magazine* for January 1947.

This transmitter achieved all that its designer claimed, besides being inexpensive and compact. But after an initial period during which as much as possible was done to attain a reasonable amount of practical experience in operation, a desire was felt for the ability to make use of those tantali ing "quiet spots" in the bands, which never seem to appear on the frequencies for which one's crystals are ground. Work was accordingly started on an 80-metre VFO unit in keeping with the requirements of the station, with the accent on economy, simplicity, and, most of all, stability and quality of note.

The result was the simple Hartley-connected VFO, the circuit of which appears in Fig. 1. Its operation is so conventional as not to require further description. It might be noted, however, that the "high-C" tuned circuit does a very great deal towards producing a high quality note ; indeed, in two months of constant operation on the 80-, 40-, and 20-metre bands, only two reports of T8 have been received, both on 20 metres from W's on nights when extremely bad conditions prevailed. All other reports have been consistently T9, including one very recently from a VK7.

Construction

One or two constructional details may be worth noting, and many will view with satisfaction the fact that one side of the tuned circuit is solidly earthed, thus making for ease of construction. But too much stress cannot be laid on the importance of taking all sub-chassis earth leads to one single earth tag, and attention to correct wiring layout and screening is essential. The only chassis deck components should be the valve, coil, and tuning condenser (which must have a good slow-motion drive) and a screening box should be constructed around these as well. The cathode tap should be taken to a spare pin on the former, which is as standard 4-pin plug-in type.

The capacity Cx consists of a silver mica condenser soldered across the pins of the coil holder ; the value of this condenser will vary from rig to rig. Its function is to determine the limits of the band in which the VFO tunes, and in the prototype, with this capacity at 150 $\mu\mu$F, the unit tuned smoothly and accurately between 3·0 mc and 4·0 mc. Trial and error may be found necessary, however, before satisfactory coverage is obtained, but no undue difficulty should be experienced.

Keying

With the VFO driving the transmitter, keying may be arranged in any of the usual ways, but as the writer's particular interests devolve around break-in working, the oscillator itself is keyed, with eminently successful results. To do this, a separate and stabilised source of HT is necessary for the VFO, and the circuit employed is shown at Fig. 2. It should be noted that the value of R1 is very critical, and that shown has proved to give the best results. The voltage regulators S.130 (Cossor) have also been chosen as giving the most satisfactory regulation, and the key-up/key-down currents are *identical* when the component types and values are as shown. The keying method at present in use is that commonly known as grid-blocking, by means of an old HT battery, but the solution to this problem is purely a matter of personal preference.

With the VFO in operation as described above, no drift, chirp, or ripple has ever been experienced on any of the bands, and ample drive is available at all times for the succeeding stages when the unit is substituted for the crystal oscillator circuit of the transmitter. An absorption wavemeter

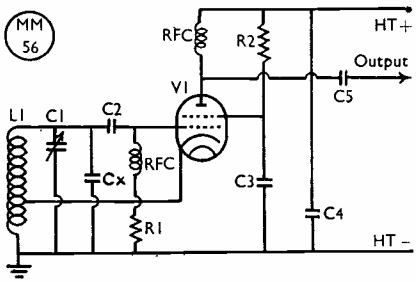


Fig. 1. The oscillator circuit for a VFO driver to work with the *Magazine* All-Band 25-Watt Transmitter. This oscillator design is by GW3DIX, who has been operating very successfully with the transmitter originally described by GW3ALE in our issue for January, 1947.

Table of Values

Fig.1. Oscillator-Driver for 25-watt Transmitter

C1	=	100 $\mu\mu$F
C2, C5	=	100 $\mu\mu$F, silver mica
C3	=	0·1 μF, mica
C4	=	·001 μF, mica
Cx	=	*See text*
R1	=	35,000 ohms
R2	=	10,000 ohms
L1	=	16 turns 18 SWG enam., on standard 4-pin former : cathode tap 5 turns from earthy end
RFC	=	Transmitting type RF choke
V1	=	6V6GT

is of course an essential requirement, to ensure selection of the correct harmonic when tuning up.

The flexibility of operation possible with this unit makes its construction very much worth while, and other operators who have tried the circuit all agree that in practice it compares most favourably with that of some more complicated and expensive oscillators.

The writer would be interested to hear from anybody who is sufficiently interested to try out this VFO, and reports on resultant success (or otherwise) will be welcomed.

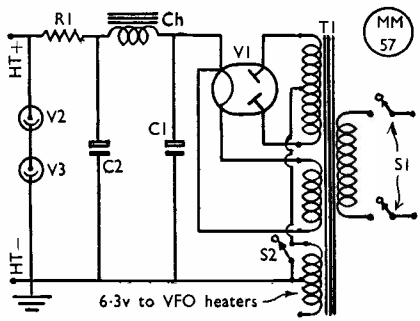


Fig. 2. A stabilised power supply unit suitable for running GW3DIX's VFO driver.

Table of Values

Fig. 2. Stabilised Power Unit

C1	=	8μF, 600 v. wkng.
C2	=	16 μF, 600 v. wkng.
R1	=	3,000 ohms, 50-watt
Ch	=	10-henry 120 mA choke
T1	=	Transformer 350-0-350 volts, 80 mA, 5v. and 6·3 v. c.t.
S1	=	Mains switch
S2	=	VFO on-off, HT
V1	=	U52
V2, V3	=	Cossor S130 voltage stabilizers

CALL BOOK—SUMMER EDITION

This is another "monster production" of some 320 pages. The G's now listed total about 4,300 and include all those appearing in our "New QTH's" up to and including the June issue of the *Magazine*. This figure compares with 3,700 G's shown in the Summer 1939 edition ; of the latter total, however, about 1,000 were AA calls, *i.e.* holders of what were known before the war as non-radiating permits. On this basis, the increase in fully-licensed G's listed is about 1,600. But the Call Book is still over 2,000 behind with the British permits actually in issue at the present time. The *Radio Amateur Call Book* is obtainable on annual subscription only (four quarterly issues) through Dale International Publications, Ltd., 105 Bolsover Street, London, W.1, of whom all enquiries should be made.

COLLECT YOUR CARDS !

Your call is here because we do not know your address for sending on the card(s). Please let us have a large stamped addressed envelope, with name and callsign ; send to BCM/QSL, London, W.C.1 ; the cards will be forwarded on the next G clearance. And if you would like your address and call to appear in our "New QTH" section, please mention that at the same time.

G2BPF, 2CNX, 2COC, 2COH, 2FWM, 2HKR, 3AMD, 3AOJ, 3ASX, 3AZW, 3BMD, 3CLT, 3CWB, 3CZB, 3DBG, 3DEQ, 3DFE, 3DLF, 3DMM, 3DPE, 3DSZ, 3DTQ, 3DZR, 3EFR, 3EJN, 3FZ, 3OD, 4HM, 6AI, 6NJ, 8AU, 8BJ, 8DL, GC3EBU, GI2HUL, 3BAH, GM3ASY, 3COQ, 3DPL, 3DRX, GW2BLW, 3BJZ, 3CDP.

DX COMMENTARY

ON CALLS HEARD, WORKED & QSL'd

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

It seems that the DX season is wide open once again, and all our DX bands are bearing a heavy load. Early Transatlantic contacts on 3·5 mc have already been made ; 7 mc sees almost daily QSO's with W and VK ; 14 mc covers the world, as usual ; and as we write there are more ZL 'phones coming through on 28 mc than we have ever heard before. So take your choice—or for preference use all four of them.

With a view to awakening a little interest in this laudable object, the new DX table is being called "The Four-Band DX Club." Last month claims were requested of countries worked on the various bands, and quite a number of them have come in, as you will see. We propose to juggle with this little table each month ; this month the contestants are listed merely in order of call-signs, but in future one of the bands, or the total, will be used to give the order of merit—and we shall not say which one.

Those of you who still show a "Zero" in one column had better hurry up and work something on this missing band, or you will no longer qualify for the "Four-Band DX Club."

No Grief, No Grievance

We really haven't the heart to expound any "Hot-Under-Collar" stuff this month, after reading a letter from G3AAE (Bournemouth). He writes "DX Commentary last month looked like war. Nothing but moans, groans, nasty remarks, distrust, envy and so on. If that is the 1948 spirit of Amateur Radio, I'll take up philately." Now, considering that the letters coming in for this feature are nearly always quite tolerant and friendly in tone, we have come to the conclusion that *we* must be the disillusioned and disgruntled ones. So we are going on a Course ; we are going to forget DX-chasing and just take what comes. We shall be pleasantly occupied by listening to the Parade of the Little Spivs every now and then, but we refuse to fight for our honour any longer. The 28 mc band is quite a pleasant spot to work in, even now, and we will make full use of it and leave 14 mc to the more aggressive types. And we will not make things sound any worse than they are.

"More Detail, Less Blarney."

One of the regular correspondents weighs in with a remark containing a good deal of sense. He says, in effect, that he is no longer interested in reading that G9BF has worked KH6IJ KL7LE, ZD9AA and ZD2RGY. It merely makes him say "So what?" What he would like to know is *when* he worked them and on what frequency, so that he can get in there and work them himself. It is not proposed, on the strength of this one letter, to cut out all the gossipy stuff about what people have worked, but we would be glad if you would give more detail about *times* and *frequencies*. Neither is it intended that this Commentary shall gradually turn into a list of times and frequencies for catching DX stations, but those that are at all unusual will be welcomed and reproduced.

THE *CQ* DX CONTEST

We now have available the Rules and log-form for this Contest, reproduced by arrangement with *CQ*. If you are thinking of taking part, please send immediately a large stamped addressed envelope, with a card marked "CQ Contest Rules," to the Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1. To prevent delay and confusion, it is essential to keep your request quite separate from any other correspondence—then we can let you have the rules by return ; they are free of charge, of course.

News From Overseas

ON4JW (Brussels) is awaiting his WAZ certificate, having worked his 40Z and 172C, of which 140 are confirmed—very nice work, too. He, with many others, has winkled out VU4AC (Laccadive Islands), of whom more details later.

G4HC, Colchester, runs a 25-watt outfit, CO 6V6-807, with an HRO receiver and 6J7-6C5-P/P 6L6 modulator ; the aerial is as described in our issue for February, 1939. G4HC is unusual in that AC is obtained from a 400-watt rotary converter run off the DC supply.

ON4JW adds that there are now about 210 ON's "officially" on the air.

G3CHN writes from Curacao to report on conditions in the Gulf of Mexico and the West Indies. On 7 mc, the only signal from Europe has been the BBC Overseas Service, but on 14 it is a full time job to keep track of all the CW. Regarding British 'phone, 'CHN comments on the "superlative" transmissions from G6BY and GM8MN ; there are dozens more which can be recognised as English voices, but those two, he says, are always terrific. The 28 mc band has opened up since he wrote, so his comments on that are hardly worth quoting. 'CHN is bound for the U.K. and promises to listen on the LF bands from Bermuda onwards, so we may expect some interesting Calls Heard shortly.

ZC1CL (Amman) is increasing his score nicely and says that two more stations are now operating in T-J. They are ZC1FW and W2TEA/ZC1. 'CL says that he called "CQ Pacific" several times and had replies from all over the place, so he called "CQ Mars" and was pleased to get three replies. The Martian call-signs, he tells us, are allotted on a similar system to those on Earth, as G3xxx, UA3xx and I1xx came back!

G3BRJ, formerly of Bath, has moved over to Singapore and hopes to be on the air from there shortly. His address is 120 Kings Avenue, H.M. Naval Base. G2CUR, in Kenya, has now officially collected the call VQ4CUR and operates nearly every day on 14, 28 and 58 mc, 'phone and CW.

ZB1AI went QRT some little time back and is now in the U.K. awaiting a G call-sign. QTH is Sedbergh, Yorks. EP3H likewise went QRT for good on August 20, and hopes to be on again shortly "with an even more exotic call"—but he keeps the location dark. VS9AL (QTH given last month) is on the air but asks people *please* to refrain from calling him when he is in QSO with someone else (he adds that G's are pretty well behaved in this respect).

We recently mentioned the call-signs MD7QRQ, 7QRL and 7QRP and asked "could anyone allot worse calls?" In reference to this, a letter has arrived from the Middle East Services Radio Association, pointing out that such calls were *not* allotted, the stations quoted are operating illegally, and steps have been taken to trace them, close them down and confiscate their equipment. (So there should be some nice BC-610's going before long).

The MD2 series of call-signs has now gone into two letters—quite a long way in, in fact, as we have heard direct from MD2BU. He is not on the air yet, but asks us to advertise the call-sign and its legality.

ON4FT (Brussels) has had a letter from AR8AB, now on leave in France, saying that he has of course received heaps of QSL's for AC4AE, AC4AA and the other AC4 'phoneys who said "QSL *via* AR8AB". They *are* 'phoneys, and no return QSL will be forthcoming. But AR8AB is hanging on to the cards in case one of the said 'phoneys might possibly turn up to collect them !

G6NJ is now QRT in this country and will be on the air with a VQ4 call some time in the future.

VS1CR (Singapore) works under difficulties, having to pack his rig away every morning and bring it out again at night. The aerial, fortunately, remains up ! He says conditions have been very poor there, with static hitting the high spots.

VS2CJ (Johore) has been operating for nearly two months, and says that 14 mc now produces an S9 from the U.K. at about 2030 GMT. He runs 25 watts to an 807 and is looking for more G contacts in spite of QRM from J2, J9, HL, KG6 and so on. VS2CJ's father is G6BW, who has a paragraph to himself farther on.

By a queer coincidence the next letter is from G3DBJ at Aden. *His* father is G6FS! 'DBJ sends quite a nice list of G's heard, but in view of the fact that they are on 14 and 28 mc we are not reprinting them. (Any heard on 7 or 3·5 however, would be more than welcome.)

D2KW (Berlin) is now restricted in power, but is working regularly on 3·5, 7 and 14 mc with QRP. Since he wrote official notification has been received of the licensing of the German (national) amateurs with the prefix DL ; the power limitations are 50 and 25 watts and the licence conditions are based on our own. At the same time, we hear a rumour that the Russians are letting loose some stations in their Sector with the call-signs "US1, 2, 3" and so on, using unlimited power. Holders of the licences are said to be former members of the German Communist Party. Not having heard any of these US affairs up to the present, we refrain from comment.

ZONES WORKED LISTING

POST-WAR

(***Starting Figure :* 30 Z**)

Station	Z.	C.	Station	Z.	C.
'Phone and CW			'Phone and CW		
G8KP	40	179	G2YS	35	90
ON4JW	40	172			
G6QB	40	170	G5WC	34	110
G2AJ	40	167	G8PL	34	105
G2WW	40	163			
G3DO	40	159	G3DAH	33	103
G4CP	40	159	G5HH	33	92
G2AVP	40	142			
G3AAE	40	128	G3ACC	31	99
G8IP	40	119	G2BJY	31	96
D2KW	39	158	GM3CSM	30	78
G2VD	39	154	G3BNE	30	74
G3BI	39	131			
ON4MS	39	130			
G4AR	39	128	'Phone only		
G5CW	39	126			
G3AAG	39	124			
G5MR	39	108	G2ZB	39	144
G6PJ	39	79			
			G3ZI	37	136
G3ATU	38	135	G3DO	37	123
G8KU	38	115			
G2AO	38	114	G6BW	36	130
			G2BXP	36	81
G3AKU	37	124			
G5FA	37	115	G8QX	34	113
G8LO	37	104			
			G3DAH	31	91
G6BB	36	99			
G2BXP	36	95	G2VJ	30	79

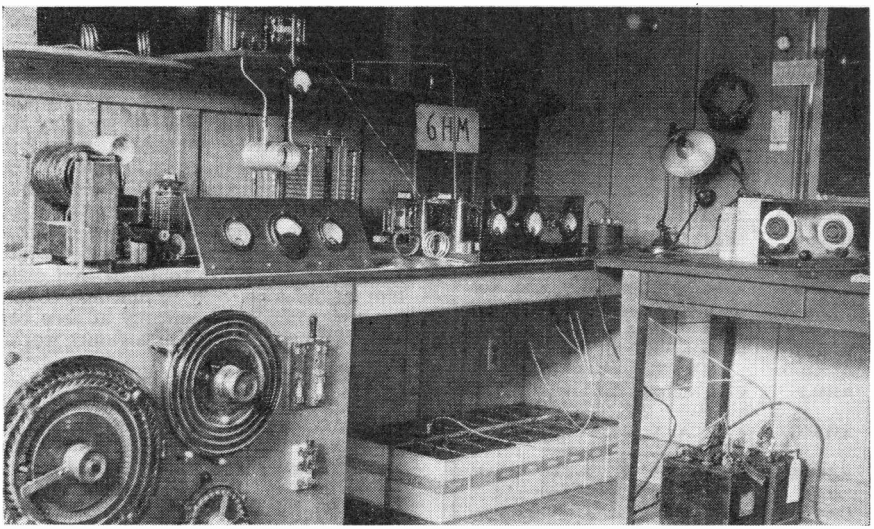
Under-Cover *de Luxe !*

Direct from Germany comes information that the under-cover station DA7AA, which came on the air on October 24, 1947, has since achieved the following results : WAZ, WAS, WAC 90 times, and 132 Countries ! WAC was scored on 28, 14 and 7 mc, and very nearly on 3·5 as well. Once more, no comment.

Zonal Ambiguity

Last month we remarked that UAØPA was at Ulan, which, on our map, is in Zone 23. Since then we have been shown several of his QSL's, all clearly marked "Zone 18." This is bad news for G2VD (Watford) who was hoping that he might claim his 40th. 'VD, however, has been doing very well on 14 mc with FI8ZZ (1710), ZD9AA (2130). TG9JK (0550), EA8AO (2355) and many others. He also worked I1PL/M1, who was genuinely a portable in San Marino and does QSL—his card is on our wall, and it is worded "Hello G6QB You have got a new country on 21/8/48 . . . ."

G2VD was not lucky with VU4AC but listened to several QSO's. QTH was given as Minikoi, Laccadive Islands, and VU4AC said he was unlicensed but would QSL. One little grouse from 'VD—the 28 mc band is 2000 kc wide, the CW operators use roughly one twentieth of it, but even *that* little bit is being encroached



The late Colonel Clair Foster, of Carmel, California, was one of America's most famous amateurs ; here is a view of his station 6HM in 1925 (no official international prefix in those days !) with the 200-watt 45-metre transmitter often heard over here on an 0-V-1. The whole station was home-built, and batteries and heavy voltage regulators are much in evidence.

on by 'phones, who don't seem to think 95 per cent. of a band is sufficient for them. Why ?

G3ATU (Sunderland) has been doing well, his high spot being the collection of both VR5PL and VR2BD one morning. The latter, in particular, has been very consistent throughout the month—best time, 0800 GMT, frequency about 14050. Others from 'ATU were VP8AI (midnight, 14080) and XZ2TT (14100).

1948 MARATHON

(Starting Figure: 25 Z)

Station	Z.	C.	Station	Z.	C.
'Phone and CW			'Phone and CW		
G2EC	40	152	G2DFR	30	61
G3AAE	40	108	G5MR	30	43
G8KP	39	131	G2BJY	29	89
G4CP	39	136	G2AO	29	80
G8KP	39	131	G8LO	29	73
G3DO	39	118			
G2AVP	39	108	GM3CSM	28	69
G3BI	39	108	G3BNE	28	69
			G2BXP	28	66
G3ATU	38	114			
G2AJ	38	110	G6XX	26	52
G8IP	38	90			
			G5HH	25	62
G2VD	37	123	G3ACC	25	53
ZC1CL	36	109	'Phone only		
G3AAG	36	103			
			G3DO	35	98
G2WW	35	112			
G5FA	35	107	G3ZI	32	81
G2DC	35	92			
			G3DAH	31	86
G8KU	34	95			
G8PL	34	95	G2BXP	28	65
G3DAH	33	102	G2VJ	27	64
G4AR	31	88	G6CB	25	54

A 'Phone Record ?

We have for a long time known that G2ZB (Boscombe) was doing great things on 28 mc 'phone, but we had not realised until his own note arrived that he only wants a UAØ in Zone 19 for WAZ ! On 28 mc 'phone G2ZB has worked 39Z and 144C (125 confirmed). He says this has been done without calling CQ DX on any occasion. Very fine work, we should say.

G3DAH (Herne Bay) was recently been on a trip which took in ZB1, ZB2, VS9, ZE2, VQ4, MD4, MD7, VU7 ST2, MD5 and SU ! He promises to let us hear more of this. (Has anyone "Visited All Zones" yet ?)

G5FA (London, N.11) has a hunch that he will be back on 7 mc ere long, judging by the state of the DX up there. All the same, he has acquired some nice new ones on 14. G3DO (Sutton Coldfield) now works with a 3-element rotary on 28 mc and a 2-element on 14. His grand total is up to 159 countries, and he reports that the QSL from ZC6LA (Israel) has arrived, also three cards from UAØKGA (all for the same contact !)

G2DFR (Newbury) breaks into the

DX QTH's

C1BC	C. P. C. Wen, Box 409, Shanghai.
EA8AN	J. R. S. Montero, Triana 76, Las Palmas, Canary Islands.
FO8A	Tahiti Radio Club, Papeete, Tahiti.
HC2KQ	Box 1453, Guayaquil, Ecuador.
HK1DZ	Box 59, Barranquilla, Colombia.
HP1BR	Bob Rowley, Box 1098, Panama, R.P.
HZ1A	c/o British Civil Air Mission, Taif, Saudi Arabia.
KG6CS	W. Roberts, VR-6, Navy 943, c/o FPO, San Francisco.
KH6LF	C. H. McInnis, Box 1377, Honolulu, T.H.
KW6AG	c/o C. A. A., Wake Island, Central Pacific.
KZ5MB	Staff-Sgt. V. H. Beaver, USAF, France Field, Canal Zone.
OA4AP	Cesar Benites, Box 538, Lima, Peru.
PJØX	H. J. Schrier, Naval Base, Parera, Curacao, N.W.I.
VP3ACS	Bill Garner, 184 AACS Sqdn., APO 857, c/o PM, Miami, Fla.
VQ4ALF	Box 3024, Mombasa, Kenya Colony.
VR2BD	RNZAF, Laucala Bay, Suva, Fiji.
VU2BF	N. Lane, R. Sigs., GHQ Sig., New Delhi.
XZ2TT	28 Windermere Road, Rangoon, Burma.
ZE2JK	Box 80, Umtali, Southern Rhodesia.

WAZ Lists and is probably unique in one respect. He works one band with one crystal only ! He sits permanently on 14090 with a full-wave aerial 33 feet high, and works the odd DX like KL7KV, KH6ES, UAØVB, YN1MH, CM2WD, ZD2RGY and PK4VD with 24 watts to an 807. Spivs, take note.

G3AKU (St. Ives) says he is sitting on 14050 waiting for VU4AC. He has collected ZP3AW and HP1BR, among others, with his 807 and 30 watts. 'AKU tells us that MP4BAB is VS9GT with his new call.

G3DCQ (London, E.4) describes himself as "one of those who plod quietly along and never do anything sensational. If DX comes my way I take it, but the aim of this station is to make every QSO 100 per cent. of intelligent conversation." (We can think of many worse aims than that.)

Funny one from G8OJ (Manchester) is EY1A, QTY given as "Malo." Other 14 mc DX included VS6AE, VS6BD, HL1BA, VS9AL, UN1AB and VR2BD.

Top Band DX ?

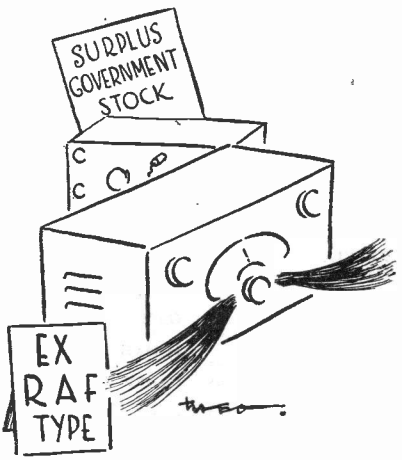
G2YS (Coventry), sending in his score for the Four-Band DX Club, asks "Why despise the **Top Band?**" and shows 10 countries worked thereon. Can anyone beat this, post-war ? 'YS says rightly that Spivvery could be put down easily if the DX stations would take a firm stand—but they don't. Listen to VR2BD, for instance. He usually sends "LM" several times, but it is often a station *on his own frequency* that gets the contact. Many a time we have hastily wound down to 14001 and called him on the edge, only to find him coming back to someone practically at zero beat with his own 14050. It's a funny world !

Voice From The Past

G2DC (Bulford) is a very old-timer who has just completed a year in England and seven months on the air after being away for ten years. (We worked him as "Y-DCR" in India 'way back about 1927-8!) In his seven months he has acquired 35Z and 92C, and he says that he *prefers* to be a G station. He finds it refreshing to have to get down to competitive work rather than just sit at the key and "send a CQ now and then to keep the QSO's going."

GW3ECH (Trecwn), having had his ticket for one week, comes on parade with 18 countries including W, PY and YV, mostly with 25 watts on 14 mc. He hopes to hand in some "juicier" ones, as he says, next month.

G3AGQ (Benson) wishes WAZ, DXCC and so on had never been invented ! He says that every time he leaves the comparative calm of 7 mc for 14 he becomes disgusted and goes back. In any case, he has been working VK's and ZL's on 7 mc.



'AGQ suggests that when 21 mc is opened up and the inevitable marathon starts, 14 mc may become more matey again. We still think the only way is to use 'em all and take what comes. As regards the Competitive Stuff, it is intended to continue the WAZ Listing and the Four-Band DX Club, which we should like to see on the increase. After that, anyone can invent competitions, but we don't propose to join in. (We await, with interest, a competition for the First YL to WAZ on 1·7 mc.)

From G8PL (London, N.W.3) comes the remark that a very pleasant feature of early-morning DX on 14 mc has been the relative absence of W's. We have noticed that, too. One morning there was literally nothing on the band but VR2BD, VR5PL, and a few KL7's—but that was when "Aurora conditions" were in evidence. KH6IJ comes up every morning at about 0800 with a crash, and about one morning in two the VK's and ZL's are good. But W's (even 6's and 7's) are rare. Now and then, as 'PL says, TI, OA, and CM make a surprise appearance, as does the odd VE8.

G3BDQ (St. Leonards) is on the air with a 2-element fixed beam "in the back-yard," the reflector-director ending just inside the shack with a shorting link to change its properties. On this strange array he has collected VP5AS, ZD1LQ/EL, EK1FP, PJ8XP, AP4A and other DX—so it does work—but in what direction?

Very small Hot-Under-Collar comment from G3AAG (Richmond). He had just suffered from 49 minutes of "tuning-up" on his frequency by an unidentified station, and was waiting to see if a call-sign emerged, when he wrote his letter. At the time his temperature was such that if the station was within reasonable distance of London he was assured of a personal QSO at very short notice. 'AAG was attempting to work FY8AD and FM8AD at the time this particular pest started up, and consequently his remarks about people who (*a*) tune-up on the air with DX coming in and (*b*) don't give a call-sign, and (*c*) don't listen on the frequency are somewhat pointed. And quite right, too. Anyone like that should be deprived of his ticket for a year, if not for good.

FOUR-BAND DX CLUB

Station	Countries Worked					Power
	3·5	7	14	28	Total	
G2VD	15	27	146	48	154	150
G2VJ	4	6	48	36	79	25/150
G2YS	18	21	89	12	90	150
G3AGQ	18	33	18	—	44	50
G3AKU	21	10	121	—	124	30
G3ATU	21	27	125	32	125	10/150
G3BDQ	9	12	101	—	101	25/150
G3CSE	26	34	56	—	60	15
G3DCQ	15	20	10	—	26	25
G3DO	10	14	132	82	159	150
G5WC	1	43	110	12	112	18/45
G6QB	26	48	138	103	170	150
G8LO	10	27	104	10	104	150

Note: Next month only those will be listed who can enter a figure in *all four* columns.

QRP Achievements

G6NB (Chertsey) went on holiday with a portable rig. The PA was an EF50 with less than 5 watts input, but it worked CN, EP, LU, KP4, CP, VE3, W2, W8 and VK. Some of them were on 'phone with cathode modulation! ZS1T was worked on 28 mc 'phone, and the total bag was 36 countries in a week. 'NB is back home with 150 watts, but is quite certain that he won't do any better.

G5WC (London, S.E.19) asks what we are to do about Zone 26 "now that there are no XZ's on the air." Funnily enough, we worked XZ2EM on the day his letter arrived. And XZ2TT's QTH appears in the list. G5WC would very much like to know the whereabouts of Ken Vickery, ex-VS1AE—can anyone help?

Another Good Man Gone....

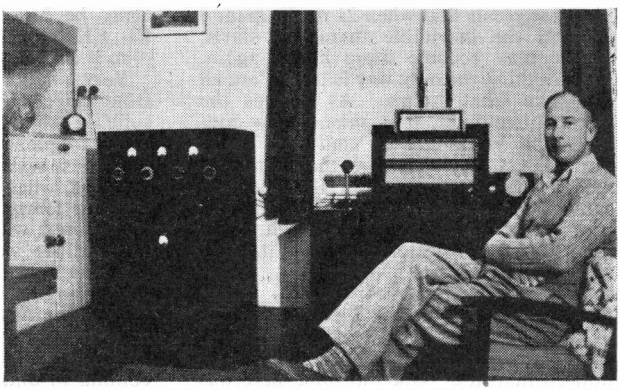
Ben Wallich of G6BW (Churchill, Som.) is on his way to New Zealand, and will be on the air with a ZL call as soon as he can, manage it. We hope to hear of his doings very soon. One of his last jobs was the removal of 8,300 QSL cards from the walls and ceiling of the shack! But he will soon be putting some new ones up.

Pirates' Corner

G2FST (Oldham) is receiving cards for 7 and 14 mc 'phone, which he does not use.... G2FKS (London, S.E.6) is also getting them for 14 mc contacts, and he is not at present on the band.... Both suggest that the persons concerned might choose different calls or, better still, get some of their own.

G3AKO (Tiverton) makes an excellent

suggestion—a week-end of operating *minus* CQ calls. He reminds us that ex-marine operators well know the value of the International Three Minute Silence every half-hour, which used to show up the astounding DX possibilities of 600 metres. The CQ-less week-end might be very difficult to arrange but if we could guarantee, for instance, that everyone reading this Commentary would co-operate that would be quite something.



If you hear or work ZL1GW, Arapui, New Zealand, this is a view of the station and its operator. He is a 28 mc man with a 3-element beam and a 3-stage 100-watt transmitter using an HK54 final ; the Rx is a 361A.

G2FTK (Coventry) is still working the DX on 7 mc and says that most of the trouble on the band lies with the operators. (Isn't that true of all the others too?) 'FTK has worked EK, OX, PY, ZL, SU, and many others to give a total of 37 countries on 7 mc.

CQ DX Contest

Copies of the rules for this Contest are now available from us. If you intend to enter, send a stamped addressed envelope right away to 49 Victoria Street, London, S.W.1, with a card marked "CQ Contest Forms" and please keep the application quite separate from any other correspondence. The dates are October 30, 0200 GMT to November 1, 0200 GMT for the 'Phone Contest, and November 6, 0200 GMT to November 8, 0200 GMT for the CW Contest. Note that *CQ*'S own schedule erroneously refers to November 1 and November 8 as Sundays, but they are, of course, the two *Mondays* on which the Contest ceases at two in the morning !

Quickies

A listener in Durham reports an interesting phenomenon on 28 mc, whereby two G stations, one with a punk receiver and the other with a punk transmitter, assist one another to work DX. . . . G6BB (Streatham) worked VK3NC, who was using 6 watts to a rhombic and was the loudest VK on the band . . . . G3DER (Compton Bassett) has winkled out RY5RI, UA1KEC (Franz Josef Land), OY3IGO, LX1FR and YU7RR—not DX, as he says, but all nice ones. . . . ZD4AM is again *en route* for the Gold Coast. . . .

G3DCC (London, N.8) now uses a folded dipole with a 17-foot top and the rest hanging down, and has worked quite a good lot of DX on it . . . . G6QB (Bexhill) raised FO8A (T8, chirpy, 14100) at 0830 on the day of writing this. He sounded extremely phoney, but we worked ZL2BD just afterwards and he said the FO was perfectly genuine—he has his QSL. But why did no one else call the FO? QTH in panel . . . . "KC5I" is YR5I ; "KD4AW" is D4AWK. But who, or what is YQ5E ?

Deadline for next month's reports is first post, October 13, at *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. Look at that Four-Band DX Club Table, and if you're not already in it, there's a vacancy for you next month. If everybody tries to use four bands there may be more room on all of them at any given time ! (That's not logical, but we don't mind). 73, BCNU, and Good Hunting.

More on the "AT" Code

A Reply to Criticisms

By W. OLIVER (G3XT)

The AT Code, devised by G3XT, was first discussed by him in our issue for February, 1948. We asked for a general opinion on it, and of those who commented about half—nearly all newly-licenced operators—were "for" the ATC. Here, G3XT argues some of the criticisms which have been received, in particular G3ANQ's article in our July issue. The whole matter having now been thoroughly ventilated, from this point we propose to let it rest, though recommending that the AT Code be given a fair trial. The full list of abbreviations and meanings appeared on p. 731 of the February *Short Wave Magazine*.—Ed.

AT long last, a worthwhile criticism on the AT Code ! As you may have seen on p. 327 of the July issue of the *Short Wave Magazine*, it comes from G3ANQ. He is the first operator, among all those who have commented on the AT Code, to put forward an argument *against* it that will even bear consideration.

The questions involved go deeper than a mere discussion on the *pros* and *cons* of two different procedure codes ; they involve points which are of importance to the continuance of amateur operating under the present-day conditions of ever-increasing interference. That is why I feel justified in prolonging the discussion !

Moreover, G3ANQ's comments have brought to light several grounds for possible misunderstanding, which may have deterred other operators also from using the new AT Code. So I will start by clearing these up.

Using Both Codes

G3ANQ, in common with some other operators, seems to have missed the point of the AT Code. It was never designed to be a complete substitute for the Q Code ; I never claimed that the meanings of all the AT signs were entirely new, original or not covered by any other code. Nor did I ever suggest that any operator had got to make a choice between total use of the AT Code and total use of the Q Code.

My intention was that both codes should be used side-by-side where necessary, but that the AT Code, being designed expressly for the needs of amateurs, gradually supersede the Q Code for purposes where the Q Code is more cumbersome, less effective, harder to remember, liable to misuse, less explicit and altogether less convenient than the short and snappy AT Code.

G3ANQ says "there is no need to create a fresh code for this purpose, of which 13 items are direct duplicates of existing Q signals." But he overlooks the fact that the AT abbreviations are shorter and quicker to send in Morse than the corresponding Q code signs, thus eliminating superfluous signalling and consequent interference ; and, unlike the Q abbreviations, the ATC meanings are "self-evident."

To draw a parallel in the newspaper world, I agree that the headline "Canine Quadruped Suffering from Hydrophobia bites Juvenile Harrovian" means much the same as "Mad Dog Bites Harrow Boy"—but I should like to hear what an Editor would say to a reporter who handed in the former mouthful ! When one remembers that space on the amateur bands nowadays is almost as precious as space in rationed newsprint, one realises the advantage of a short concise code.

Misusing the Q Code

G3ANQ freely admits that modern amateurs "know little of the symbols or application of the Q Code." That is true. For every amateur who uses the Q Code properly, there are scores who misuse it. Take but one example : the sign "QRT" in its proper sense is a peremptory order to stop transmitting. One hears it used on the shipping bands when distress traffic is being passed and some operator, not realising that an SOS has gone out, unwittingly comes on and causes interference. A coastal station will tell him in effect, to "Shut up" by sending the sign "QRT SOS."

But the vast majority of amateur stations send QRT as an indication that *they* are about to close down. I have heard several first-class operators misusing it in this way.

The AT Code was not drawn up hurriedly or thoughtlessly. The idea was first conceived before the war, and the final form of the new code, published in the February 1948 issue of the *Short Wave Magazine*, was a carefully thought-out system for conveying, as concisely and clearly as possible, the whole of the information contained in normal amateur routine messages. To make the code so short and simple that every operator, including absolute beginners, could memorise it quickly and easily, I restricted myself to 26 abbreviations—one for each

letter of the alphabet and made them all self-evident.

Advantages of AT Code

I claim—and no one has yet been able to disprove it—that the AT Code, intelligently used, meets ordinary amateur needs for routine messages and normal procedure. I claim also that no other code has yet been devised which does this with such ease, speed and simplicity. Moreover, I claim that the whole of the AT Code can be learnt as easily, and perhaps remembered more easily, than the 24 miscellaneous abbreviations in the list appended to G3ANQ's comment.

G3ANQ includes in his list a number of Q abbreviations which are hardly ever heard on the amateur bands, and when I have tried using any of them myself, I have immediately found that they have caused confusion, mainly due to the fact that so few amateurs know them.

"999" Redundant ?

A number of competent commercial operators have suggested to me that the complete and proper use of the Q Code by amateurs would fulfil all needs and render the AT Code redundant. To this I would reply that the complete and proper observance of the law by everyone in the country would render the police force redundant !

So if one disregards counsels of perfection and comes down to earth with a grasp of present reality—taking things as they are and not as they might be—it is perfectly evident that existing amateur procedure, including the use and misuse of the cumbersome Q Code (designed for cleared commercial channels and not on our overcrowded bands) leaves much to be desired.

As for the shortened (two-letter) Q Code advocated by G3ANQ, this would probably cause even greater confusion. The shortened form of QGE, for instance, could be mistaken for the amateur abbreviation "GE" ("Good evening !") ; that of QTU could be mistaken for "Thank you" and so on. Moreover, some of the miscellaneous two-letter abbreviations appended in G3ANQ's list are identical with the shortened Q Code ones, but totally different in meaning—for example, TR and QTR. *What* a muddle !

G3ANQ claims that the versatile use of these abbreviations is one of the fine arts of operating. I would say that carrying six or eight men, standing on each other's shoulders, on one motor-cycle is one of the fine arts of travel, and is practised successfully by highly-trained despatch riders in the arena at a military tournament. But as a versatile accomplishment for the ordinary motorist who wants to take the XYL and small chirps out on the public roads, it is best left alone.

Another criticism of the AT Code put forward by G3ANQ is that it perpetuates the "oddities" which have become a tradition of Amateur Radio. For instance, he claims that "R" ("Received") is an *exact* equivalent of ATP. Oh, no ! it isn't—not by a long way ! The commercial operator is probably only concerned with whether his message has been received complete at the other end. He is not particularly interested in whether the receiving operator was able to copy it with perfect ease, or whether he had to stop the clock, hold his breath and kick the cat to prevent it purring while he was straining his ears to hear the signals.

"R" simply means that the message has been received intact and that no repetition is required. But "ATP" means that perfect copy has been obtained with ease. It is equivalent to "R OK SOLID FB" and much briefer !

No Valid Criticisms

In drawing up the AT Code, I tried to think of every possible drawback, difficulty and criticism that might arise. So far, the criticisms have been negligible—and the really valid ones practically *nil*. Despite this, the fact remains that the AT Code has not yet proved popular with the majority of amateurs. About fifty per cent. seem to be against its adoption. If they can find no valid points of criticism, why won't they use it ?

I think the main reasons are apathy and long-standing habit which makes them stick to the Q Code ; and a shyness about trying anything "different" or unorthodox. I still believe that the vast majority who are not in favour of the code have rejected it without a fair trial, and possibly without any trial at all. Why not learn it, try it out on the air, and then form a sound practical judgment on whether to use it in future ?

Not All Fun

Avoid That Nervous Breakdown !

By N. F. JOLY (G3FNJ)
(ex-SV1RX)

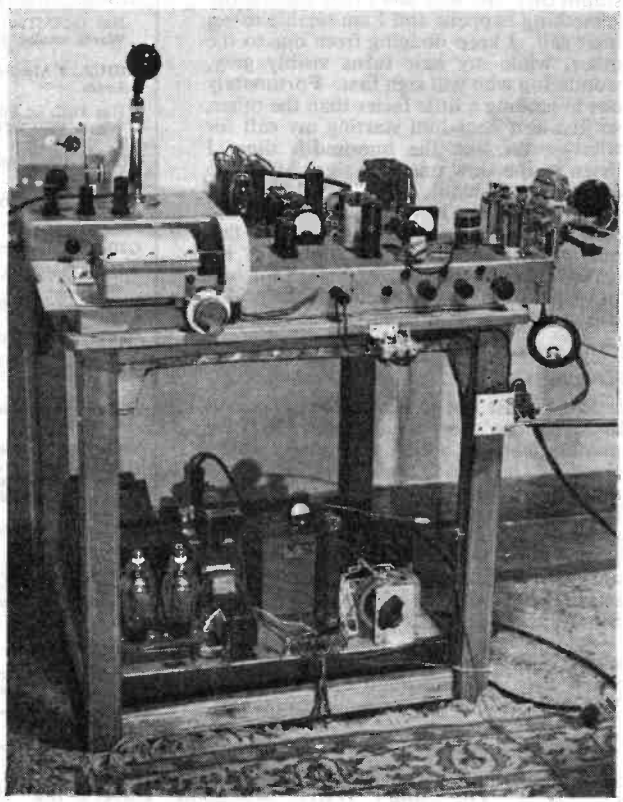
Read this, and think of all the rare DX stations you have ever tried to work. The writer of this article is a G3 himself now, and in twelve months' time will be able to give us his impressions from a different view-point ! —Ed.

ON many occasions during the last twelve years when I have operated a station from Greece—still a relatively "rare" country—I have had the fellow at the other end telling me something like this : "How lucky you are to have a rare call and just sit back and listen to the whole band calling you."

Many operators who have had the experience will agree that this is a very rash and thoughtless statement, and will nod their heads in sympathy with me. One or two examples will serve to illustrate my point, but before giving them I should like to say that I doubt whether G6QB, in his June "DX Commentary," knew how near he was to the truth when he said : "Watch the others collecting their nervous breakdowns and duodenal ulcers, but take it easy yourself."

I have not had a nervous breakdown but I have certainly developed a duodenal ulcer during the last six months which has been caused, I am sure (and so is my doctor), by high nervous tension arising from chasing DX, especially during meals frequently consisting of a hasty snack swallowed at the operating position with one hand on the key—and long sleepless nights after a full day's hard work at the office. And of course my "luck" in being a "rare DX station."

"It's nice to get up in the morning, but it's nicer to stay in bed," wrote a realistic song-writer many years ago. Yet the indescribable urge to work early-morning DX has often given me the energy and determination to throw off the bed-clothes, put my head under the cold water tap and then totter sleepily on to the air. Through the cobwebs of lingering sleep I listen on the band and hear some of that weak and watery stuff. For a moment I waver, playing with the idea of crawling back into my still warm bed. But *there may be something interesting coming through*, so I take another listen over the band.



G3FNJ ran this outfit while working as SV1RX in Athens during the past two years ; under that call he gave many operators their first Greek contact, and his feelings as a "rare DX station" are described in the accompanying article.

DX, Pse !

Suddenly I am wide awake ! There, as large as life, is VR6AA coming through at R9 *plus* (well, S6 on the meter). He's working W1FH so it's no good waiting to get a word in edgeways. Extreme long skip seems to be prevailing, and hush, there is *no European QRM*. The time in Athens is 04.45 (02.45 GMT) so who could be mad enough to be up at this unearthly hour? I have the band to myself ! A few precious minutes are lost while I listen for some faint CQ which will make the blood in my veins QRQ. But I don't hear it, and as the Europeans can't hear me (or so I think) I start a two-minute CQ DX at about 8 w.p.m. signing my "rare" call frequently. The least I can hope for is to hook a VR5 or even a ZK1. Yes, *two* faint signals are there, calling SV1RX slowly—intolerably slowly. How stupid they are, why *don't* they sign before something happens and I am unable to get their call. I keep dodging from one to the other, while my hair turns visibly grey, wondering who will sign first. Fortunately one is sending a little faster than the other, so just as I hear him starting my call for what seems like the hundredth time, I listen to the slow one who signs after two minutes—G3 blank blank blank. By a miracle I do not burst a blood vessel but tune hurriedly to my last hope, the fast one. He is already in the middle of his call and I listen with bated breath for him to repeat it so that I should get the prefix. Yes, you're right, it is an OK1.

Keeping Calm

But I must not lose my temper. Good amateurs *don't* lose their temper (?). I try another method. I QSY to a quiet spot on the band (ha ! ha !) and put out a snappy CQ DX on the bug at 20 w.p.m. concluding, not with my call, but with the very clear and definite request : "Not European stations pse DX only pse K," and land another G3-plus-three who thinks he's starting the day well by snagging *his* first SV while all the other G's are still in bed.

And so it goes on. Right through the night, during the eight months of the year when they come through on 14 mc, the W's have frequently driven me crackers. If I heard a station that several dozen W's were not calling smack on his frequency, and gave him a shout, the moment I went over to listen they would start calling *me* on the DX station's frequency, without at least giving me the satisfaction of knowing that he did come back to me, even if they wouldn't let me work him. Yes, it's not all fun, I assure you.

XTAL XCHANGE

Following are this month's offerings. Negotiations should be conducted direct. Insertions for this space, which are free in respect of *exchanges of crystals only*, should be sent in on a separate slip set out as below, and headed "Xtal Xchange—Free Insertion."

G2DDM, 34 Birch Avenue, Romiley, Cheshire.

Has QCC Type P crystal, 7070 kc, mounted. Wants similar 3750 kc, or near.

G2DUZ, 1 Munster Avenue, Bispham, Blackpool, Lancs.

Has 1882 kc Edison crystal in low-loss holder. Wants 7050-7150 kc crystal in holder.

GI3BVB, Cosy Lodge, Culmore Road, Londonderry, N.I.

Has 500 kc crystal, holdered. Wants similar 100 kc bar.

G3DJQ, 131 Church Lane, Birmingham, 20.

Has 1736, 3580, 7024 and 7059 kc crystals, all mounted, ½-in. pin spacing. Wants any frequencies 3500-3535 or 7312-7500 kc.

G3DKR, 2 Chestnut Close, Southgate, London, N.14.

Has QCC 3594 kc crystal, mounted. Wants any frequency in 1·7 mc band.

GW3DOF, 29 Victoria Street, Cwmbran, Mon., S. Wales.

Has dual frequency 7275-7290 kc crystal unit, thermostatic 6·3v. heater, octal base fitting. Wants two crystals, ½-in. pin spacing, in CW area 7 mc band.

GW3ECH, 28 Rectory Road, Trecwn, Pembs., W. Wales.

Has 7280, 7310, 7360, 8360, 8410 and 8610 kc crystals, ½-in. pin spacing : 1000 kc, ¼-in. : and 1000 kc, octal mounting. Wants any frequency in 1·7 mc band, 3500-3530 kc, and near 7010 kc.

G8GG, 25 Abbey Road, Blackpool S.S., Lancs.

Has 7040 kc crystal, mounted. Wants similar crystal 1750-1800 or 1860-1930 kc.

Crystallizing the Type 27 Converter

Obtaining High Stability and Improving Bandspread

By I. PAUL (G3CYY)

HAVING used a Type 27 converter on five metres for several months the writer came to the conclusion that it was a very sensitive receiver that suffered from drift and lack of band spread.

By using a high stability fixed oscillator and tuning the intermediate frequency (the main receiver) these disadvantages are overcome. There are, however, a few snags which these notes may help prospective constructors to avoid.

General Design

The big difficulty was the necessity to screen the main receiver (a BC-348) from direct pick up on the intermediate frequency. To overcome this it may be necessary in some receivers to insert RF chokes and by-pass condensers in the power supply leads if an external power pack is used, or in the mains lead if the pack is internal.

It is strongly advised that the oscillator unit be constructed on a separate completely screened chassis, since the writer's first unit (which was squeezed into the back of the Type 27) resulted in all harmonics of the crystal frequency being injected into the frequency changer, thus causing signals to be heard which were neither in the 58·5 mc band nor on the intermediate frequency !

The IF coil in the RF unit appears to have a band-width of about 2 mc and in the writer's version the centre of the band was on 7 mc. It was therefore decided to make 7 mc the IF for a signal on 59 mc. This indicated an oscillator frequency of 59 mc ± 7 mc and since it was desired to make the HF end of the scale on the BC-348 the HF end of the 58·5 mc band the 52 mc frequency was chosen. If it is required to cover a wider range than 2 mc the IF coil should be replaced by a standard short wave choke.

As it was also desirable that the 59 mc point should correspond exactly with the 7 mc point on the BC-348 dial (in order that frequencies could be read directly) it followed that the crystal frequency had to be an exact division of 52 mc. A search in the crystal box brought forth a 5,730 kc crystal which was ground to 5,777·7 kc, the 9th harmonic of which is 52 mc. If it is not desired to read frequencies directly, there is no need to grind a crystal ; for instance, the 5730 kc crystal could have been used, its 9th harmonic being 51·570 mc which would give an IF of 7430 kc for a signal frequency of 59 mc.

The crystal frequency should of course be chosen so that none of its own harmonics fall in the 58·5-60 mc region.

Here is yet another valuable modification for the now-famous Type 27 Converter, making it into a VHF receiver unit of high efficiency. G4LX adds a note on the application of G3CYY's method to the Type 25 equipment.—Ed.

The Circuit

EF50's were the obvious choice for oscillator and frequency multiplier stages because of their efficiency and economy in HT current. Two of these valves are used in a trebling-tritet-into-trebler combination. All parts are standard receiving types, the tuning condensers being type ASP 30 $\mu\mu$F air dielectric trimmers. All coils are wound on $\frac{1}{2}$-in. diameter formers and the whole unit is constructed on a chassis measuring $3\frac{1}{2}$ in. × 5 in. × 2 in. To ensure complete isolation of the 52 mc frequency from the other harmonics two tuned circuits are used, one inside the oscillator box and the other in the converter. These circuits are link coupled by means of light flexible co-axial cable, and a single turn loop around the earthy ends of both coils. The heater choke may be unnecessary in some cases, but was found to be an advantage in suppressing beat notes in the receiver ; it is made of about 30 turns of 20 SWG wound round an iron-dust core. The supply and output leads from the oscillator were formed into a cable and connected to a four-pin valve base which plugs into the back of the Type 27.

Modifications to the Type 27

A $1\frac{1}{8}$ in. diameter hole was cut in the back of the converter to take the holder

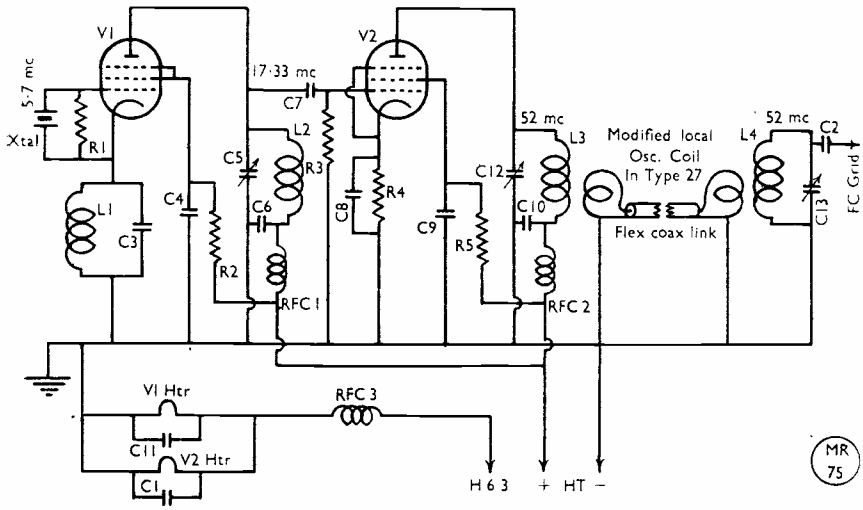


Fig. 1. G3CYY's circuit for a 52 mc local oscillator unit for the Type 27 converter. Such a unit can be used with any other kind of VHF converter with a 7 mc IF, or the IF of the converter itself can be changed.

for the four-pin base. Wires were run from this holder to the HT and heater connections on the back of the Jones plug and a thick earth wire to one of the bolts securing the metal screen above the chassis. The link circuit was extended from the four-pin valve holder through one of the holes in the chassis to the oscillator coil. If the coils have not been modified they should be rewound to the usual 6¼ turns on the oscillator and 7¼ turns on the RF and FC coils.

The 20 $\mu\mu$F oscillator grid condenser and the connection from the bottom of the oscillator coil to the tuning condenser were removed. This latter coil ending was then connected to the earth tag beside the sub-chassis 4-21 $\mu\mu$F trimmer. This left the oscillator coil tuned by this trimmer with one end earthed and the other connected to the FC grid *via* the 2 $\mu\mu$F injection condenser. A one-turn link was then wound around the earthy end of the coil, and connected one side to earth and the other to the centre of the oscillator input cable.

Lining Up

The first step is to make sure that the crystal is oscillating; this can be done by tuning to the fundamental on the station receiver and listening for the beat note. Should there be no oscillation when the crystal is known to be in working order it is probable that the cathode circuit is tuned to a frequency lower than that of the crystal. This can be remedied by either reducing C3 or taking a few turns off the coil.

The anode circuits can be lined up by two methods:

(*a*) By loosely coupling the coils L1 and L2 in turn to a receiver tuned to the

Table of Values

Fig. 1. Oscillator unit for the Type 27

C1, C6, C8, C9	=	500 $\mu\mu$F
C2	=	2 $\mu\mu$F (existing FC grid condenser)
C3	=	100 $\mu\mu$F
C4, C11	=	·001 μF
C5, C12	=	30 $\mu\mu$F
C7	=	50 $\mu\mu$F
C10	=	200 $\mu\mu$F
C13	=	4-21 $\mu\mu$F (existing osc. trimmer)
R1, R3	=	100,000 ohms ½ watt
R2	=	25,000 ohms ½ watt
R4	=	500 ohms ½ watt
R5	=	50,000 ohms ½ watt
RFC1	=	Standard short wave choke
RFC2	=	VHF choke
RFC3	=	*see text*
L1	=	26 turns 24g. enam. close wound
L2	=	20 turns 22g. enam. close wound
L3	=	6 turns 22 g. enam. spaced 1 wire dia.
L4	=	*see text*
		(***Note***,—Coils L1, L2, L3 wound on ½-in. dia. formers.)
V1, V2	=	EF50's

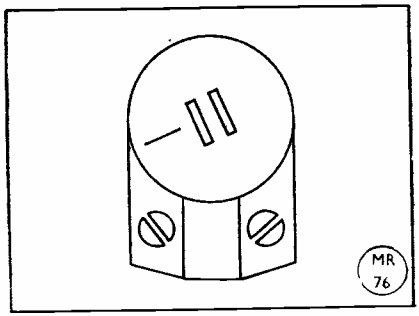


Fig. 2. Actual setting of trimmer C13 in the RF 27 Unit for operation on 52 mc, as discussed in the text.

desired harmonic and adjusting the condensers until the output peaks, or

(*b*) By inserting a milliammeter in the anode circuit of each valve in turn and tuning for a minimum current, checking the frequency by means of an absorption wavemeter.

Next the oscillator circuit (L4-C13) in the converter must be tuned to approximately 52 mc; this can be done by setting C13 to the position indicated in Fig. 2. Should the RF and FC circuits have been previously aligned for the 58 mc band it is but necessary to set the Type 27 dial to this band, couple the converter to the main receiver tuned to the correct IF, adjust condensers C12 and C3 for maximum noise output and you are ready to go.

If, however, the 27 has not been lined up for 58 mc the following procedure should be adopted: Set the dial to 60 deg and the RF and FC sub-chassis trimmers to half-mesh and adjust the screen mounted trimmers to obtain maximum noise level. The two 52 mc circuit should then be readjusted to maximum noise level and the converter is ready.

Results

The converter has proved very satisfactory, stability and bandspread being so good that it is possible to hear a signal one night and return the next to find it in exactly the same spot—indeed, the writer's method of calling G4LX is to set the dial to his frequency, call him, then sit back and wait! During the initial try-out a rock-steady 20 cps beat note was maintained with G4LX for half an hour. The sensitivity is every bit as good as that of a normal Type 27 and the signal-to-noise ratio seems slightly better. With 240 volts HT the oscillator draws 8·2 mA, which should impose a negligible extra drain on the Rx power supply.

FURTHER NOTE BY G4LX

The writer having tested the crystal-controlled oscillator and modified Type 27 converter built by G3CYY, and being very enthusiastic about its performance, decided to adapt a Type 25 converter. A brief description of the necessary changes follows.

Alterations to the Type 25

Remove the local oscillator section completely, including the cathode injection circuit into the mixer stage. Remove also the five-position wave change switch, four of the five trimmers from the RF section,

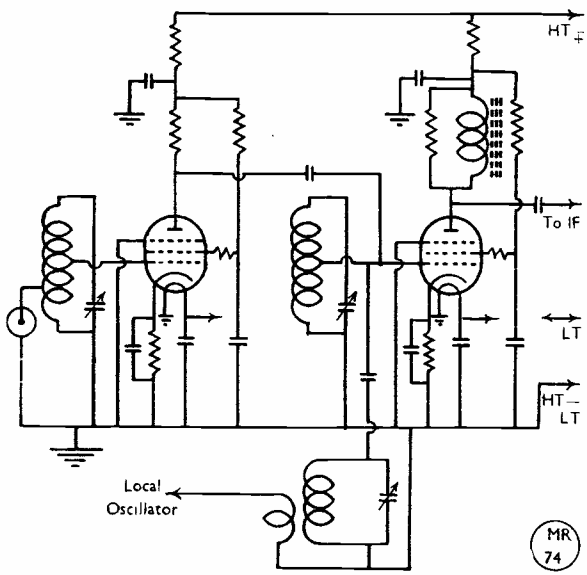


Fig. 3. G4LX applied the CO unit designed by G3CYY for the Type 27 to a Type 25, as described in the text. The suggested conversion of the Type 25 for CO injection is very easily done.

and four of the five trimmers from the mixer section. Remove one turn from the RF tuned inductance at the "hot" end, and move the grid tap to 2½ turns from the "hot" end.

Rewind the mixer inductance to five turns and tap the grid lead at its centre. The trimmer is then wired across the whole of the inductance, one end being earthed and the other floating.

Wire the injection from the RF stage on to the centre tap of the mixer inductance.

Fit a five-turn coil and trimming condenser in the old oscillator section of the chassis in corresponding positions to those in the RF and mixer sections. Couple the "hot" end of this circuit through a very small capacity of about 2 $\mu\mu$F to the grid of the mixer. Link couple this tuned circuit to the output of the crystal-controlled local oscillator.

Cut a hole in the back of the converter case and fit a suitable socket. Wire up this socket as in the modified Type 27 converter.

Operation

The alignment procedure and the method of operation are exactly the same as that described by G3CYY in his article on the modified Type 27 Converter. On test, the writer found the equipment every bit as efficient as the Type 27 and would not hesitate to recommend it to anybody wishing to explore the VHF bands for the first time.

In the accompanying circuit diagram, no values have been given as all components are as in the original Type 25 converter. The circuit shows the final changes adopted.

MEDWAY TOWNS RADIOLYMPIA

An enterprising event is being arranged for the period November 24-27, at the New Corn Exchange, Rochester, Kent. This looks like being the largest radio exhibition ever staged outside London itself, and good Trade support is promised. The Amateur Radio interest at this Exhibition will be covered in the January issue of the *Short Wave Magazine*. Write S. A. Howell, G5FN, Hon. Secretary, Medway Amateur Receiving and Transmitting Society, 39 Broadway, Gillingham, Kent, for further details.

DENCO CATALOGUE

In the trade for the supply of Amateur Radio equipment before the war, Denco became large manufacturers of RF components for the Services during the 1939-45 period. They are now in a position to supply a wide range of necessary parts, and have developed various specialities—notably the products branded "Maxi-Q," covering coils, formers and IF transformers. Other items in the Denco range include coil turrets, variable condensers, RF chokes and stand-off and feed-through insulators.

Also available, at 3s., is a roneoed technical bulletin describing applications of Denco's Maxi-Q coils, with design and constructional data for a superhet receiver and VHF converter. Messrs. Denco (Clacton), Ltd., 355-9 Old Road, Clacton-on-Sea, Essex.

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TVI IN AMERICA

In a very interesting letter, Peter Lovelock (ex-G2AIS of Loudwater, Bucks.) comments on the current situation in regard to television interference in New York and its vicinity. There are three separate TV stations serving this area, operating every day, with evening (and sometimes afternoon) programme periods lasting till 10 p.m. The New York roof tops are becoming a forest of TV receiving aerials, and due to the steel-frame buildings, reflected waves are a great problem, requiring the use of much more elaborate arrays than the ordinary two-element type seen in this country.

To a number of W2's in this congested area TVI has become a very real problem of the greatest magnitude, and one particular difficulty is the allocation, to WCBS-TV in New York, of a channel in harmonic relation with the 14 and 28 mc amateur bands ! Another difficulty is the fact that American television operates on the single-carrier system, with the video amplitude modulated and the sound frequency modulated, suitable separating circuits being used in the receiver. Hence, the band-width is considerable and the interference problem correspondingly more serious.

On the other hand, as ex-G2AIS says, TVI as a problem as yet exists only in a very restricted area compared with the country as a whole—but many American amateurs see it as a potential threat to the very existence of Amateur Radio.

THE VHF BANDS

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

145 mc Activity Reports—Two-Metre DX Record; G5BY/G6OS, 287 Miles, September 17—Channel Isles Worked on 58 mc—New 13-Centimetre Record—420 mc Open October 1

WHO made the first 145 mc contact on September 1 will probably never be known. Truth to tell, the honour was shared by a large number of VHF operators and we are not going to attempt to list them here, if only because there would be further calls to add to the list next month!

Following the initial contacts came a lull, with complaints of inactivity, but this was in part due to the troposphere letting us down; the one or two days when the weather has been favourable proved that stations are there. In fact, keeping pace with the 2-metre DX record has been a hectic business.

On September 1 we think G2BMZ/G6LK had it; on September 5 it went to G5MQ/G2AJ/P; then G2BMZ/G8GX seized it on September 9, and on September 14 it passed to G5BY/G5MQ. But within less than 45 minutes G3APY had worked G5BY to increase the distance by a few more miles, and since then G2IQ and G6OS have worked G5BY at still greater distances.

G5BY/G6OS (2103 on September 17) is 287 miles and that was certainly the 2-metre GDX record at the time of writing this.

That such distances should have been covered within three weeks only of the release of the band for amateur operation reflects the greatest credit on all concerned and the congratulations of all VHF operators will go to those who have held the record, even if only for a few minutes!

We must also mention the first G/PA contact, G6DH having worked PAØPN at about 120 miles on September 14; PAØPN was on 144·7 mc. ON4FG is active on 144·1 and I1AS is on 144 exactly.

As spor-E is an unlikely means of contact on the 146 mc band, any European QSO's made will almost certainly be by tropospheric propagation and it is therefore considered that the 2-metre DX record listing should be a general one in the sense that contacts with Continental stations will count provided the exact QTH of the station is beyond dispute. This will tend to make geographical location of less importance in the establishing of records. If other means of propagation occur, the DX distance listings will be divided into appropriate sections.

So far, our own impression of the 2-metre band agrees fairly well with the forecasts. The normal ground-wave range is somewhat less than on 5 metres, while signals at horizon distance are of comparable strength. When tropospheric bending occurs the signals from 60 miles and beyond rise to strengths which may be as good as on 5 metres. Fading has, however, been very prevalent, though that may be because up to the present, no really settled period of "VHF weather" has been experienced.

Two-Metre DX Stations

Worked	Station
Over 250 miles	G5BY, G6OS
200 to 250 miles	G2IQ, G2OI, G3APY, G3BY
150 to 200 miles	G2AJ, G2BMZ, G5US, G6LK, G6VX, G8GX
100 to 150 miles	G2XC, G6DH, G8DM, G8DV

It is good to be able to report that those pessimists who anticipated an outbreak of self-excited oscillators and generally unstable transmissions on the new band have been well astray in their forecasts and almost all the signals heard have been T9. Again, CW has presented no great difficulties on the reception side and converters working into the usual selective communication receivers have proved entirely satisfactory. Although some stations are using crystal-controlled converters, our own experience with the normal SE oscillator in the converter has shown that the CC job is a luxury rather than a necessity on the Rx side.

Activity and achievement summaries are given elsewhere in these pages and it is obvious from these that once activity rises to a high level some really big logs of calls

heard and worked will be forthcoming. The best dates so far (*i.e.*, up to mid-September) have been September 5, 9, 14 and 16.

Individual "Two" Reports

G2BMZ (Torquay) using an 8-element beam (4 directors and 3 reflectors), and Rx consisting of push-pull 6AG5's, push-push 6J6 mixer, 6J6 osc. (72 mc and doubling) has had some good DX contacts. He finds most 145 mc signal reports, both in and out, about 2 S-points down compared with 5 metres. G5US (Camberley) has erected an 8-element beam at 40 ft, and has had good results. The Tx uses 815 final, while the Rx is only temporary. G2BMZ and G5US hope to resume on the 2-metre band the nightly schedule previously maintained on 5 metres.

G5BY (Bolt Tail, Devon), who shares the 2-metre DX title with G6OS, has a 5-element beam about 40 ft. up, while the Rx uses two 954 RF stages, 954 mixer, and 955 osc. on 73·3 mc with 6C4 doubler, to feed into the 1·6 mc range of the main Rx. His Tx is surplus Admiralty gear. In all, G5BY has worked 6 stations at over 200 miles, which is is a clear indication of what can be done. G5MQ (Woolton, Lancs), who has held the DX title more than once so far, thinks he probably reached his practical limit when he worked G5BY; but with Continental activity this may not be so. G5MQ has an SCR-522 which he has noticeably improved by adding an RF choke in the plate feed to the 832 tripler. The Rx is 4 stages of wideband 954 RF, 954 mixer, 955 osc., with output on 30 to 32 mc into an AR88. A 4-element c.s. beam is 6-ins. above the 5-metre beam.

We need say little here of the Tx at G6VX (Hayes, Kent) for readers have had the opportunity of seeing a description of his fine two-metre gear in the *Magazine* during the past few months. G6VX's receiver employs 6AK5's in a CC converter; the beam is 4-element w.s. G6LK (Cranleigh) is using a 5-element w.s. beam and a 4-acorn converter; the Tx ends in P/P VT62's. He suspects there are some very poor receivers about and appeals for an increase in activity. Well, these are still early days and although one or two who had promised to be on the band have not yet put in an appearance, compared with the first few months of 5-metre working in the post-war period, 145 mc has made a pretty auspicious start—and G6LK, himself, has worked 9 counties.

". . . So, yesterday, I put up the rotary . . ."

G2AJ (Hendon) provided some of the northern stations with their first DX by working them from the top of Dunstable Down while /P in early September. From the home QTH, some good contacts have been obtained after initial troubles with the Rx. A 5-element beam is in use, and the EC91-6J6 converter feeds into an SX28. G8GX (Northwood Hills) has an 832 PA running at 15 watts with a 3-above-3 w.s. beam in the loft. His Rx has IF of 29-30 mc and is tuned. Occasional break-through is experienced from the 10-metre band, and on one occasion a weak two-metre CW signal was QRM'd by a W6 on ten !

G2IQ (Sheffield) has spent much time on Rx design and emphasises the superiority of triodes on 145 mc for RF and mixer positions. His latest circuit includes two GGT stages; he notices a pronounced build-up in 145 mc conditions around midnight. G3APY (Kirkby, Notts) has a 4-element beam mounted above his 3-element 5-metre beam in the roof-space. The Rx consists of CV66 RF, EF54 (triode connected) as mixer, and 9002 osc., with IF on 13 mc to AR88. G6OS (Hull) is surprised at the strength of signals from

THE SHORT WAVE MAGAZINE

V HF Contest

RULES

(1) The periods of the Contest will be Friday, November 12, 1800-2359, clock time ; Saturday, November 13, 1200-2359 ; Sunday, November 14, 0900-2359.

(2) Points will be claimed for inter-British Isles working only from the home location, using the 58·5-60 mc and 145-146 mc bands.

(3) Exchange of RST, reference number and QTH will constitute a contact.

(4) Contacts may be made on either 'phone or CW, but no extra points will be allowed for 'phone QSO's as distinct from CW contacts.

(5) Every contestant will allot himself or herself a three-figure reference number, different for each band, which will remain unchanged for that band during the period of the Contest. This reference number will be sent before the RST or QS report in the following manner : 342RST569, or 342QSS7 in the case of a 'phone report. The reference number *must* be given with the report outwards in every counting QSO.

(6) Scoring will be on the following basis :—

(*a*) For contacts with stations up to 25 miles (Zone A), one point.
25-50 miles (Zone B), two points.
50-75 miles (Zone C), three points.
75-100 miles (Zone D), five points.
100-150 miles (Zone E), eight points.
150-200 miles (Zone F), twelve points.
200 miles and over (Zone G), twenty points,
plus five points for each additional ten miles of distance ; proportions of these additional 10-mile distances will not count for points in proportion.

(*b*) Stations in all Zones may be contacted *once* on *each* band for points.

(*c*) For each station in Zones A, B, C and D which is worked on both bands, five bonus points will be scored. For each station in Zones E, F and G which is worked on both bands, ten bonus points will be scored.

(*d*) No bonus or multiplier points will be scored on a county basis.

(7) Point-to-point distances will be taken from the Ordnance Survey " Ten-Mile " Map of Great Britain, or calculated from the National Grid References when these are known.

(8) No Contest QSO may be prearranged, nor may contacts be passed on from one station to another. These practices will be grounds for disqualification.

(9) The exchange of reference numbers *prior* to the Contest is forbidden, and will be reason for disqualification.

(10) Results should reach us, addressed E. J. Williams, G2XC, *The Short Wave Magazine*, 49 Victoria Street, London, S.W.1, by November 22, 1948, latest, set out as follows:—

(*a*) *Separate* running logs for each band covering the period of the Contest, showing only contacts claimed to count, with time of working, reference number in, RST in, RST out, QTH of station worked, distance, zone and points claimed. The contestant's own reference number for the band used should be clearly marked at the top of each log sheet, and the total score for the band at the end of each log.

(*b*) A list of stations worked on both 5 and 2 metres, with claim for bonus points.

(*c*) The final combined total of points claimed.

(*d*) National grid reference of contestant's station, if known.

(*e*) A short description of equipment used and notes on impressions and experiences of the Contest.

Results of the Contest in full will be reported in the January, 1949, issue of the *Short Wave Magazine* with a preliminary comment in the December issue.

G2IQ and G3APY at about 60 miles; both as good as on 5 m. G6OS is active daily on 145·5 from 2100 to 2200 BST. G3MY (Sheffield) is another with a CC converter. He has CV66 RF, and 6AK5 triode-connected mixer. His Tx runs a 829B final and he hopes to be /P in Derbyshire soon. A 16-element array is being planned.

In the Midlands G2ATK (Birmingham) has an 18-valve Rx, including 5 RF stages (two CV66 and three EF54). The first three stages are built as a separate pre-selector; series tuning enables coils of up to 7 turns to be used. A 5-element c.s. beam (directors 37¼ ins. reflector 30¾ ins. driven element 38 ins.) is soon going up to 35 ft.; this beam is very narrow in its angle of coverage and careful searching is necessary. G4LU (Oswestry) has heard G2AK and asks for CW signing after 'phone QSO's to enable identification of weak carriers—the old trouble again. His Rx is CV66, EF54, RL16, with osc. from 16·75/17 mc through doubler stages, and is very stable.

G5RP (Abingdon) has a converter (954, 6AK5, 6C4) into an HRO on 14 mc, but a CC converter with osc. output on 116·1 mc from a 7740 kc crystal is being considered. G8DM (Watchfield) is using MCW and 'phone, but is willing to work CW stations (!) His Rx converter is CV66 RF, 6J6 mixer and crystal osc. A 3-element beam is at 45 ft. G8DV (Farnham) is running 20 watts to an 832 and using a 4-element w.s. His Rx is two broadband 6AK5 RF, 6AK5 mixer, 6J5 osc. on 33 mc with 9002 quadrupler. He has recently moved his QTH from the top to some way down the northern slope of a ridge and finds results on two metres to the north superior to five when he was on top of the ridge.

Others active in the South include G8DL (Christchurch) 5 watts to 6AK6 on 145·9 .... G5TZ (Newport, I.o.W.) QVO7/40 and 6-element beam up a step-ladder 5 ft. high; he hopes to be at G5TX soon .... G6CB (Wimbledon) 3 watts to pair of VR135's quintupling from 29·1 mc .... G3BLP, G5BM and G6NF all preparing.

In Cambridgeshire, G2FLC (Cheveley) has SCR522 on 145·08 and 145·6 and a Type 27 converter. His beam is 4-element vertical which probably accounts for lack of signals so far .... G6MN (Worksop) and G5CP (Sale) also have the 522 Tx. .... G3CSC/A (Stockton) has 522 Tx and 6AK5, 6AK5, 6AK5, 9002 converter. He asks for information on modifying the 522 receiver side .... G2OI (Eccles), on 145·35, wants schedules .... G3ABA (Coventry) has 22 watts to an 832 and a 4-element beam with an acorn converter for Rx.

In Scotland, GM3EDQ made his Amateur Radio *debut* by coming on 145 mc at zero hour on September 1! Others active up there are GM2DI, GM5VG and GM6KH. Some queer beam directions, possibly due to reflections from nearby objects, have been encountered. GM2DI has a modified T1131 to an 8-element beam and an S27 Rx with GG pre-amp... GM3EDQ has the 522 Tx and Rx, to 3-element beam.... GM6KH also has a 522 Tx and 3-element beam.... GM2DI (Wishaw) is operating the following schedule (beam direction as shown):

Mon. and Tues.	2100 E, 2115 S, 2130 N, 2145 W.
Wed.	2200 S, 2230 W.
Thurs.	2130 E, 2145 S, 2200 N.
Fri.	On 3·5 mc 2200 to discuss 145 mc.
Sat.	2100 to 2300.
Sun.	2030 onwards.

He calls for 5 minutes and listens for 10.

In Northern Ireland GI2HML has worked cross-band with other GI's on five metres. A 6-element w.s. beam is in use with a converted 522.

Five Metres

It is hoped that those who have remained faithful to five metres will forgive us for having used so much space this month for two-metre news. Five-metre activity appears to have been at a low ebb, except for the September 4/5 week-end. There have, however, been one or two spells of

VHF CENTURY CLUB

NEW FULL MEMBERS

G3DA	A. B. Boswell (Handforth)
G2OI	W. Lucas (Eccles)
G5GX	M. Rix (Hull)
G8TS	J. Ruddock (Farnham)
G5JU	J. Walker (Birmingham)
G8UZ	A. J. Marriott (Sutton-in-Ashfield)
G3DCV	A. R. Watson (March)
G4RO	A. E. Read (Welwyn)
G6HD	T. L. Herdman (Beckenham)

G2AJ has 200 and G5BD 170 cards.

NEW ASSOCIATE MEMBER

G2HDY	J. Ballard (Roehampton)

Total: 30 *Full Members*

fairly good conditions. GC5OU (Jersey) and G3TN (Portland) were in QSO for the first Jersey /G contact on September 19; GC2AWT (Jersey) also heard G3TN and was received by G3HW/A. GC5OU is on every Sunday at 1030-1100, for schedules. All this follows on the news of the first G/Guernsey contact between G2AVF and GC8OK.

Among the station reports is a welcome one from G8IC (Doncaster), who has just completed a new PA using LS50. He enters the Counties and Countries tables. G5GX (Hull) claims the first G/OE on five, with OE1CD at 1703 on July 2—somewhat earlier than G3KX/A, to whom we incorrectly awarded the honour last month. G6SM (Sanderstead) resumed 5-metre activity, after a 10-year break, on July 21, using 14 watts to an 807 PA and a Type 26 converter for Rx. G3BUR (Birmingham) is now active from his home QTH, in a poor location, although results appear to be fairly good. He thinks he may be working DX by landline as some telephone wires pass just a foot over his beam! G3WW (Wimblington) has erected a 51-foot tower made from scrap metal and has his 5-metre beam on top of it. G3EEZ (Wolverhampton) is a newcomer to the band. G4LX (Newcastle) heard G2BB on August 15, and also found September 4 good. He is willing to arrange 5m schedules for any time until December 31 (*'phone Newcastle* 54514).

G5QA (Exeter), to quote his own words, "a very old ham, but a newcomer to 58 mc," heard some of the Aurora DX and being active at week-ends (1800 to 2300), appeals for some DX calls from the old stagers. G2KI (Walton-on-Thames) has worked F8GH and has climbed up the tables with some excellent GDX. G3ABA (Coventry) brought in G3CXD in Newcastle to help him up the list, while

FIVE-METRE COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH only

Worked	Station
42	G3APY (210)
41	G3BLP (245), G5WP
40	G6CW
39	G2AJ (317), G2ADZ, G2OI (186), G5BD (225)
38	G3ABA (170)
37	G3DCV (140), G5MA
36	G8UZ
35	G2CIW (214), G2MR, G5YV (179)
34	G2RI (150), G5VB, G5BM, G6LK, G6OS (176), G6VX
33	G5BY, G5GX (147), G6MN (147), G6XM
32	G2XC (320), G3IS (141), G4LU, G5BJ (114), G6OH
31	G3BXE (126), G5PP, G5RP, G8KL (145)
30	G2NH (251), G3WW (113), G5PY (241)
29	G2KI (165), G2IQ, G4AP, G5JU (144), G8WV
28	G3PZ, G5MQ
27	G3BBA (127), G4IG
26	G3KX/A, G6HD (157), G6NF (170), G6YU (126), G8SM (157)
25	G2AOK/A, G4RX, G5LC (111), G8UR
24	G4RO, G6VC (137), G8GX
23	G3BOB, G3DA (104), G5LQ (190)
22	G2ATK, G2HLF (134), G3CGQ, G5IG
21	G2KF (121), G2QY (124), G6KB (152), G8KZ, G8WC
20	G2BMZ, G2YL, G3BW, G3CWW (168), G5CP, G6LC, G6SM (104), G6TF, G8AL, G8PX, G8VN
19	G2NM, G6ZQ, G8LY
18	G2ADR, G2AUA, G3BK, G2HDY, (135), G5HN, G5MR, G6UW
17	G2HDJ, G3WS, G5UM (127)
16	G2LC (123), G3COJ
15	G3AEZ, G6CB, G6VD, G8TS (170)
14	G8IC, G8JO

Note: *Figures in brackets after call are number of different stations worked. Starting figure,* 100.

SUMMARY OF EUROPEAN ACTIVITY AND RESULTS

All times are GMT. All stations on 58·5-60 mc unless otherwise stated.

August 12 to September 20

August 18

G2BB heard F3JB (2000). G2XC worked OK1AA (1800-1840). G5BM worked I1ANJ. OK3RR heard G2RI, 3AVF, 3YH, 4LU, 6LK, 6RQ, 6UH, 6XM, 6XX, GI6VU, PAØBU (1800-1900).

August 21

G2XC worked OK1FF and heard D. G5BM worked HB9AT. G4LX worked I1UE (1900). G3CYY worked I1ANJ. G5LC worked D4ADD, OK2HX, 2MV, and heard I.

August 25

G5LC and G6UH worked FA8BG.

September 11

G4LX heard commercial on 58·9 mc (2105). G2XC heard interference to TV sound (41·5) from Continental station (2000-2150).

G3KX/A (Banwell) found August 28 and September 5 outstanding days. G2LC (S. Ruislip) obtains contacts much more easily now he has his rotary beam up. G2AJ/P (Dunstable) had over 150 five-metre QSO's during his recent portable session there. G3HW/P (Teignmouth) has been operating at 800 ft. a.s.l. ; a w.s. 4-element has been used, fed from an 832 at 15 watts input. The Rx is a much modified R.1481 with 2-stage pre-selector (EF54's). He has a Saturday midnight schedule with G8UR (Wolverhampton) and is active daily, 0730 to 1000. On August 30 he worked GC8OK and on September 14, G5BD—both excellent contacts. Ex-D4ATO reports a whole flock of G's heard in Konstanz, S. Germany, on July 4 under spor-E conditions.

420 mc

The influx of 145 mc news this month prevents discussion of the possibilities of 420 mc working, but with the release of that band from October 1 we anticipate having a new set of DX records to publish next month ! As it is unlikely that G2XC will be able to get on 420 mc for some time yet, we must rely on your reports, so please send along the fullest details possible in good time. Amongst those preparing for the new band are G2HDJ (Thrapston) who hopes to have P/P 15E's as Tx.

New 2350 mc Record !

Just as this was being closed for press, news came in of a new record on our 13-centimetre band. On September 19, G3CBN and G8IH journeyed down to Brighton with their gear (see *Short Wave Magazine*, p. 335, July) and set up a fixed station at High Salvington. This worked to a mobile rig first at Lancing (5 miles) and then at Race Hill, Brighton (about 13 miles) ; good two-way communication was obtained, in the presence of some 16 members of the Brighton & Hove Group, though an attempt to increase the distance to 20 miles (High Salvington-Newhaven)

TWO-METRE ACTIVITY REPORT

G2AJ, Hendon, Middlesex.

Heard or worked: G2AXG, 2AHC, 2CIW, 2MR, 2HDY, 2XC, 2FMF, 3BPM/A, 3CQ, 4CG, 4DD, 5BY (184), 5IB, 5KH, 5MQ, 5PY, 5TP, 5US, 5XA, 6CB, 6LK, 6PG, 6VX, 8DV, 8GX, 8KZ, 8SK.

G2BMZ, Torquay, Devon.

Worked: G2XC (110), 5BY, 5US (136), 6LK (141), 6VX (167), 8DM (113), 8DV (129), 8GX (156).

Heard: G2AJ, 2MR, 5MQ, 5TP.

G2CIW, Brentwood, Essex.

Heard: G2AJ, 2MR, 3CQ, 5TZ, 6PG, 6VX.

G2OI, Eccles, Lancs.

Worked: G3AAB, 3BY, 3DA, 5BY (234), 5CP, 5MQ, 6DP.

G2XC, Portsmouth, Hants (N.G.R. 41/670069).

Worked: G2AJ, 2BMZ (110), 2MR, 5RP, 5TZ, 5US, 6DH (116), 6LK, 6PG, 6VX, 8DM, 8DV, 8GX.

Heard: G5BY, 5MQ, 6ON.

G3APY, Kirkby-in-Ashfield, Notts.

Worked: G2IQ, 3MY, 4DS, 5BY (220), 6OS, 6VX (133).

Heard: G2AJ/P, 3DYZ, 5GX, 6CW, 6DP, 6PG, 8DM.

G3CQ, Havering-atte-Bower, Essex.

Worked: G2AXG, 2BRH, 5AA, 5IB, 6PG, 8GX, 8TL.

Heard: G2AJ, 2MR, 2WS, 3BPM/A, 4CG, 5VS, 6VK, 6VX.

G5CP, Sale, Lancs.

Worked: G2OI, 3DA, 3BY, 5MQ, 6DP.

G5BY, Bolt Tail, Devon (N.G.R. 20/688388).

Worked: G2AJ (184), 2IQ (226), 2OI (234), 3APY (241), 3BY (238), 5MQ (221), 6LK (159), 6OS (287), 6VX (186), 8DM (185), 8DV (148).

Heard: G2MR, 5US.

G5GX, Hull, Yorks.

Worked: G2IQ, 3ZK, 6OS.

Heard: G2CGL, 2CJO, 3ALD, 3APY, 6BX, 6DF.

G5MQ, Woolton, Liverpool, Lancs.

Worked: G2AJ/P (144), 2JT, 2OI, 3BY, 3DA, 3AAB, 5BY (221), 5CP, 6DP, 6LK (186), 6VX (186).

G5RP, Abingdon, Berks.

Worked: G2XC, 4AP, 5TP, 5US, 6LK, 6VX, 8DM, 8DV.

G5US, Camberley, Surrey.

Worked: G2AJ, 2BMZ, 2XC, 3CQ, 5BY (155), 5RP, 5TP, 6LK, 8GX, 8DV.

Heard: G5PY, 5TZ, 8TS.

G6CB, Wimbledon, Surrey.

Heard: G2AJ, 4CG, 5IB, 5PY, 6VX.

G6LK, Cranleigh, Surrey.

Worked: G2AJ, 2AXG, 2BMZ (141), 2MR, 4CG, 5BY (159), 5MQ (186), 5RP, 5TP, 5TZ, 5US, 6VX, 8DV, 8GX.

Heard: G2JU, 5XA, 6DH, 8DM.

G6PG, Dartford, Kent (N.G.R. 51/524736).

Worked: G2AJ, 2XC, 3CQ, 3AUA, 4CG, 5IB, 6DH, 6PA, 8GX.

Heard: G2AXG, 2FMF, 2IQ, 2MR, 2WS, 3BBL, 3BPM/A, 5AA, 5GP, 6VX, 8TL, 8UJ.

G6SM, Sanderstead, Surrey.

Heard: G2AJ, 2AJ/P, 2AJG, 2AXG, 2BRH, 2FMF, 2MC, 2MR, 2MQ, 2WS, 3CQ, 4CG, 4DD, 5AA, 5IB, 5KH, 5PY, 5TP, 5XA, 6CB, 6PG, 6SK, 6VX, 8GX, 8KZ, 8SK, 8TL.

G6VX, Hayes, Kent.

Heard in First Hour: G2AJ/P, 2BHR, 2MR, 2WS, 3BPM/A, 5AA, 5IB, 5RP, 5TP, 5XA, 6HD, 8DM, 8GX.

G8DV, Farnham, Surrey.

Worked: G2AJ, 2BMZ (129), 2FMF, 2XC, 5BY (148), 5RP, 5TP, 6LK, 6VX, 8DM, 8GX.

Heard: G2MC, 2MR, 4AP, 5TZ

G8GX, Northwood Hills, Middlesex.

Worked: G2AHC/P, 2AJ/P, 2AXG, 2BMZ (156), 2FMF, 2MR, 2XC, 3CQ, 4CG, 5AA, 5TP, 5TZ, 5US, 5XA, 6LK, 6PG, 6SB/A, 6VX, 8DV.

Heard: G2JU, 2MC, 3BPM/A, 5BY, 5KH, 5RP, 8DM, 8MG.

was unsuccessful. Anyway, it is another milestone passed, and a noteworthy contribution to progress on our highest-frequency band. We hope to hear of more results on 2350 mc.

The Clubs

A second circular will be sent to all members shortly, but we would like to record here that G3APY, G5RP and G5YV have been appointed members of the Fiveband Club Advisory Committee. A London area member will be named shortly. Members writing to these area representatives should enclose S.A.E. if a reply is desired.

The Fiveband Club Contest was won by G3BLP (most stations worked) and G2ADZ (highest score). Full details will be given in the next circular.

We should like to remind those interested that the VHF Century Club is open *only* to members of the Fiveband Club. Certificates for both clubs are now in hand and will be issued shortly.

In Conclusion

Once again thanks for the big mail. Several last-minute arrivals have had, unfortunately, to be held over. Please try to send your reports in good time, otherwise the tables become a mass of alterations, which is a sore point with the Editor, who then has to pacify the printers.

Latest date this coming month is October 14, and the address is E. J. Williams, G2XC, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. Really important late news—such as new 145 or 420 mc DX records—can be taken by 'phone (Abbey 2384) or telegram up to October 20. But all routine items by the 14th, *please*. CU on November 3.

Transmitter for 420 mc

Adapting the Unit Type 105

Notes by G4LU

Even on 420 mc it is questionable whether self-excited oscillators are necessary. But some useful experimental work is possible with equipment of this type on our newly-opened 70 cm. band, and the article below shows how to get such an oscillator into operation for local working.—Ed.

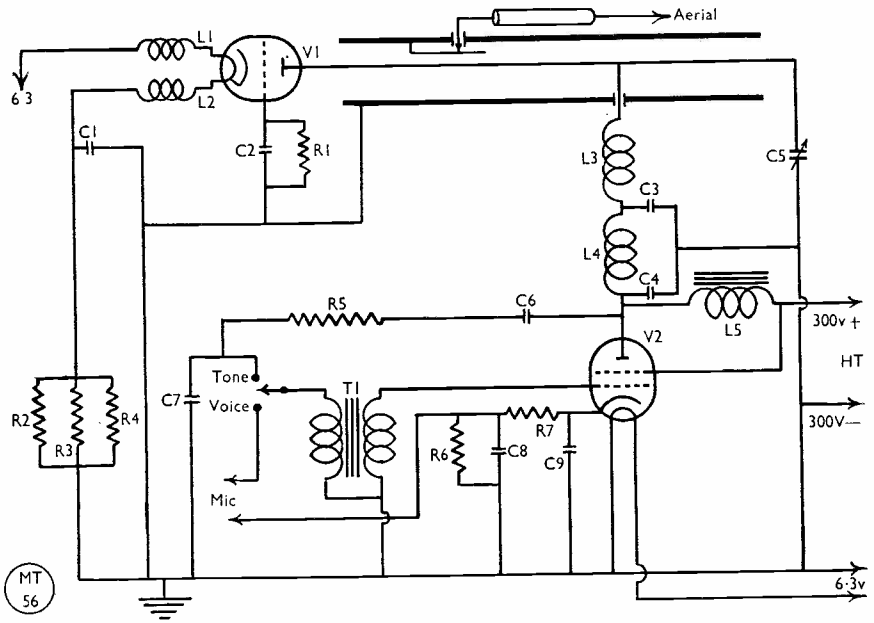
IT seems from published information that the 420 mc transmitter may have to employ a self-oscillating circuit until such time as amplifying valves, with power and voltage ratings suitable for amateur purposes, become available. Although the self-oscillator is to be deplored there is no easy alternative at the moment and good frequency stability therefore becomes a matter of using high Q-factor circuits and a rigid mechanical construction.

The first of these requirements is met by employing concentric-line circuits which have zero radiation loss and also heavy silver plating on all conductors carrying RF currents to reduce ohmic losses. For those who do not feel inclined to carry out the necessary constructional work there are suitable British and American war surplus equipments which can be easily adapted for amateur purposes. These equipments were used either in altimeters or IFF gear and generated output powers between one and five watts. Some form of mechanically-operated device was usually employed for sweeping a band of frequencies periodically and this can in most cases be modified to form the tuning control of the transmitter.

Type 105 Design

The R.A.F. RF Unit Type 105 is just such a piece of equipment. The unit consists of a silver-plated box, which contains the valve and the main portion of the concentric line tank circuit, and from which an extensible portion of the line protrudes. The line works in a half-wave mode, but is shorter than a physical half-wavelength because of the effect of the valve capacity at one end and the tuning capacity at the other. The latter capacity consists of an earthed flexible metal vane housed in a small compartment mounted on the end of the extensible portion of the line ; the separation between the vane and the centre conductor can be varied by applying pressure to an insulated rod working in a bush fitted to the front face of the compartment.

It was evidently intended that the rod should be operated by a cam device but for amateur use a screw working in a saddle bracket mounted round the front



G4LU's circuit for speech-tone modulation, as applied to the Type 105 Oscillator adapted for 420 mc operation. If a carbon microphone is used, it can be energised by bleeding off a proportion of the modulator cathode current.

Table of Values

Fig. 1. The 420 mc Transmitter

C1, C2, C3, C4 = By-pass condensers, *see text.*
C5 = Vane tuning condenser, *see text.*
C6 = Blocking condenser, 1 μF, 400 volt working.
C7 = Audio tuning condenser, 1 μF, 200 volt working.
C8 = Decoupling condenser, 20 μF, 12 volt working.
C9 = Cathode by-pass condenser, 5 μF 12 volt working.
R1 = Grid leak, 1500 ohms, ½ watt.
R2, R3, R4 = Filament dropping resistors, 10 ohms, ½ watt.
R5 = Feedback resistor, 68,000 ohms, 2 watt.
R6, R7 = Modulator Cathode resistors, 200 ohms, ½ watt.
L1 = Cathode choke, 2 turns ¼ in. dia., ⅜ in. long.
L2 = Heater choke, 4 turns ¼ in. dia., ⅜ in. long.
L3 = Anode choke, 5 turns ¼ in. dia., ⅜ in. long.
L4 = Anode choke, 9 turns ¼ in. dia., ⅝ in. long.
T1 = Microphone transformer.
V1 = CV82
V2 = 6V6

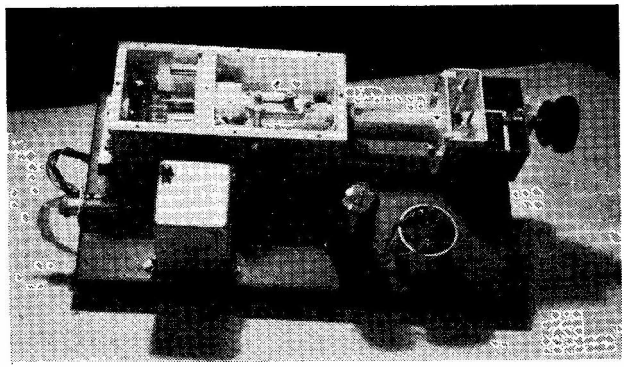
of the compartment is suggested as a means for adjusting the capacity. The anode voltage is fed to the centre conductor through RF chokes somewhere in the vicinity of the current antinode and the aerial is coupled in at the same point by an adjustable loop. The valve employed is a CV82 (ST & C 3A/147J) which is a grounded-grid triode with a disc seal. Grid leak bias is employed on the oscillator and the grid is maintained at zero RF potential with a by-pass condenser formed by the disc seal, as one plate, separated from the box partition by a mica sheet.

Modification for 420 mc

To get the unit working through the band 420-460 mc all that is required is to extend the line as far as possible and to insert a sheet of mica between the tuning vane and the centre conductor of the line. The mica sheet as well as increasing the tuning capacity also prevents a short circuit of the anode supply when the vane is in its extreme low frequency position.

The circuit of the unit, with the modulator applied by the writer, is shown in Fig. 1. The tuning condenser is designated C5 and the grid by-pass condenser C2. The by-pass condensers C1, C3, C4 consist of small washers separated from the case by discs of mica or polystyrene. Although the valve is a grounded-grid triode, oscillation is possible because the CV82 is designed with a much larger anode-cathode capacity than a similar type of valve used in amplifying applications. Feed-back coupling between the anode and cathode circuits is obtained by this

capacity, the excitation voltage being maintained in the cathode circuit by the impedance of the chokes L1 and L2. The constants of the CV82 are listed in Table 1.



General view of the Type 105 Oscillator unit and its modulator, with the top cover removed from the RF section.

Power Supply and Operation

For convenience, the oscillator and modulator are run from a common 6·3 volt filament supply, the voltage being dropped to 4 volts by R2, R3, R4 in parallel. The modulator is quite conventional, choke coupling to the oscillator in the familiar Heising circuit being employed, although transformer coupling would give a more exact load resistance to the 6V6 valve. Self-bias is provided by resistors R6, R7, and a portion of the voltage is tapped off to provide excitation for a carbon microphone. The transmitter can be tone-modulated by converting the modulator valve into an audio oscillator. This is arranged for by throwing the SPDT switch which automatically connects the feed-back circuit and tuning condenser to the primary winding of the microphone transformer, T1. The note frequency will depend on the constants of the transformer and the value of the parallel condenser C7. (The secondary winding of the transformer must of course be connected round the right way to obtain audio oscillation.) The purity of the tone will depend on the quality of the transformer and the amount of feed-back employed, which can be varied by using different values for resistor, R5, but too much attention need not be paid to this since a modulated oscillator is not capable of good quality reproduction unless the percentage modulation is kept very low.

The provision of tone modulation should prove to be an advantage during initial testing on the new band, enabling a lower frequency QSO to be kept going while the distant station is tuning and searching for the VHF signal. It is a great help, too, in the local testing of receivers since this work can then be carried out by one operator. On the latter grounds alone the cost of the few extra components is justified.

Table 1

OPERATING DATA FOR CV82

Filament Voltage, 4V.
Filament Current, 0·7A.
Amplification Factor, 35
Mutual Conductance, 6 mA/V.
Capacities, Cag 1·4 $\mu\mu$F. Cac 0·4 $\mu\mu$F. Cgc 4·2 $\mu\mu$F.
Maximum Anode Voltage, 350V.
Maximum Anode Current, 28 mA.
Maximum Anode Dissipation, 6W.
Maximum Grid Dissipation, 0·5W.

Efficiency at 450 mc, 30 per cent. Spade terminal on filament lead is common with cathode and painted red.

Operation

In operation the unit is adjusted in the usual fashion of self oscillators, all the necessary precautions being observed. The frequency is set up initially using a wavemeter or Lecher wires. The coupling to the aerial can then be increased until a reasonable output consistent with good frequency stability and freedom from frequency jumping is obtained. The frequency can then be checked again so that any change due to the load circuit can be remedied. It should be remembered that the aerial is in effect *part of the oscillating circuit* and, to reduce the possibility of frequency instability, it should by constructed very rigidly.

With a 350-volt anode supply the unit delivers a power output of between two and three watts which, in conjunction with an aerial system of good gain (such as a dipole in a corner reflector) will provide an ample signal for local working up to a distance of about 10 miles over suitable terrain.

Q-Max B4/40

Self-Contained Transmitter for Five Bands

Magazine Test Report

FOR some time we have had in operation a Q-Max B4/40, which is essentially a five-band self-contained band-switching CW/'Phone transmitter, running inputs of up to 40 watts CW and 30-35 watts on telephony.

The RF section consists of a three-stage TT11-EL32-KT8c arrangement, direct-coupled throughout, but with link-coupled output on the RF side. The KT8c PA is modulated by a pair of 6L6's, and the speech amplifier is designed for crystal microphone input. The power pack provides HT for all stages, RF and modulator, and by means of a metal rectifier tapped off the main power transformer also a stabilised bias supply for the BA/Doubler and PA valves.

Switching

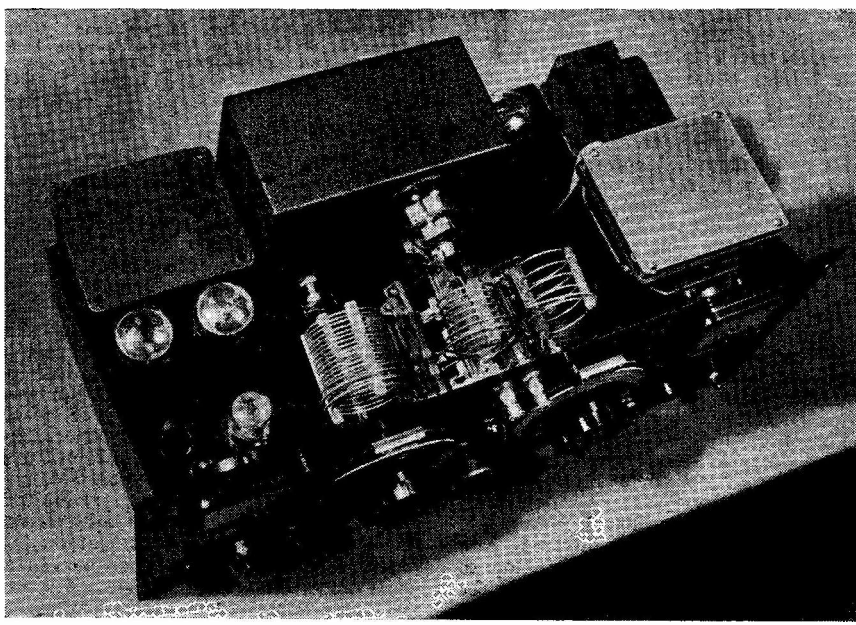
The mode of operation (any band 3·5-28 mc, CW or 'phone) can be quickly selected from the front panel, which carries all tuning controls and the band-selector switch. This operates both a Q-Max four-band coil turret and also on the coil assembly in the BA/Dblr plate, thus giving output on any desired band literally by "the flick of a switch".

Metering is provided in all essential stages—PA grid, FD plate, PA plate and modulator plate—by suitable selector switching.

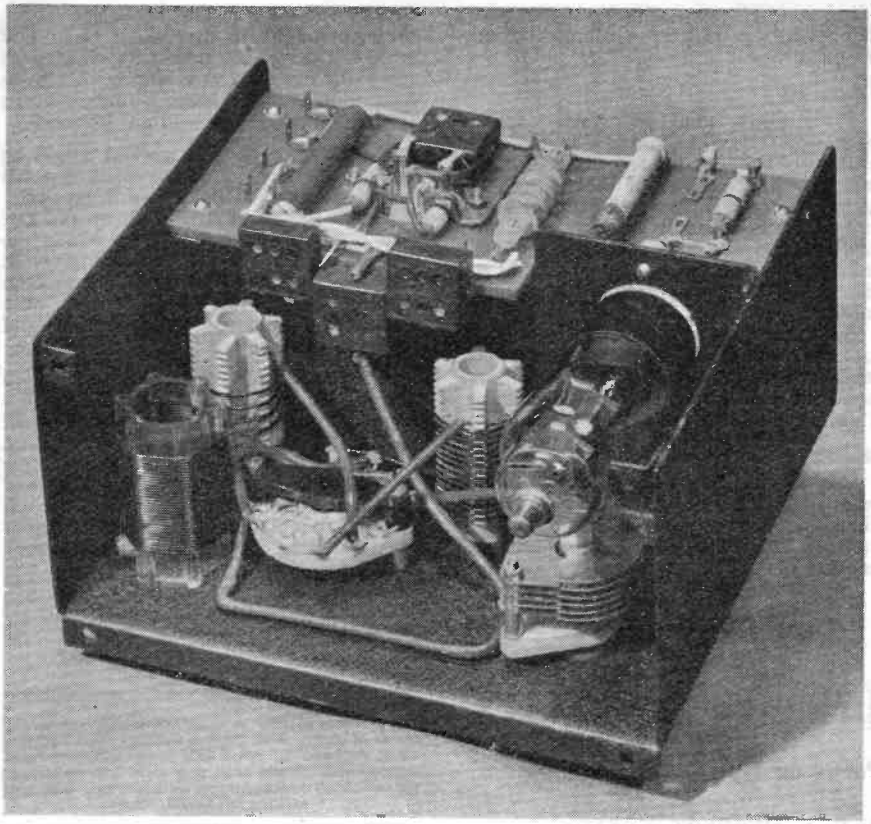
Frequency Control

Primary frequency control can be either crystal or VFO—in the latter case the drive is applied direct to the grid side of the second (EL32) stage through a loop link coupling on the oscillator plate coil. A modified Pierce crystal oscillator circuit is employed and is "sure-fire" with all crystals having any life in them at all.

Keying is provided in the cathode of the first (CO-TT11) stage and under key-up conditions the static bias cuts off plate current to the succeeding stages.



Inside the B4/40, a completely self-contained five-band CW/'Phone transmitter.



The FD Stage of the B4/40, which allows quick changing from band to band. The Tx requires only a power point, key, microphone and aerial coupling unit to put it on the air.

Modulation

With any standard type of crystal microphone, the speech amplifier-modulator section gives ample control of the carrier with the PA loaded for optimum RF output on any band. Indeed, the degree of modulation obtainable and the general performance of the transmitter on 'phone is one of its outstanding characteristics.

The RF output can be taken off directly to a dipole fed through low-impedance line or, preferably, into a separate external link-coupled aerial tuning unit if an "all-band" type of radiating system is used —as should be so with a transmitter having the wide frequency coverage of the B4/40. Two feed-through insulators on the front panel serve to couple in the RF load.

General Construction

The B4/40 is very well built, and designed to fit compactly into an attractive crackle-finished steel cabinet, suitable for table mounting; dimensions are 19 in. × 10 in. × 10 in., the front panel size being 19 in. × 9½ in.

Electrically, the design is excellent and the layout and inter-stage screening such as to ensure stable operation. First quality components are used throughout and dissection of the transmitter into its various units showed that nothing has been skimped.

The Tx tends to run rather warm under full-load conditions with the modulator in operation, and though louvre ventilation is provided, it is advisable to keep the

cabinet lid open during sustained periods on the air.

Operation

With either VFO or crystal control, operation is quite simple and rapid band-change is an easy matter. It is not the intention here to describe the tuning procedure in detail since a well-produced and fully illustrated instruction manual accompanying the set gives the user all the information he could possibly require on the setting up and operation of the transmitter.

Suffice it to say that working from crystals only we were able to calibrate our model for all bands in less than half-an-hour, the dial settings then being noted as a guide for operation with a VFO.

Results

The B4/40 was tested from a good country location under practical conditions on all bands covered (except 21 mc) and gave an extremely satisfactory account of itself on CW and 'phone—though one criticism might be that when using CW with CO drive, the note may tend to be chirpy unless the FD tuning is very carefully adjusted. This effect is inherent in the CO circuit used, but need not be serious.

A catalogue of DX worked would be quite meaningless, since so much depends upon operator ability, location and conditions. But using CW both on the DX and domestic communication bands the transmitter did all that could possibly be expected for the power available, and on telephony all reports received were uniformly good both as regards quality and depth of control.

To put it into operation, the B4/40 requires only a 200-250 volt AC supply, a key, microphone and aerial tuning panel —or just a dipole feeder line for one-band operation. All in all, it is a good example of well designed commercial low-power transmitting equipment and can be recommended for amateur-band operation under what in these days are "medium-power" conditions.

Bringing in the DX

Points on Operating Procedure

By **S. A. HERBERT (G3ATU)**

The problem of how to work DX looms large in the minds of many. One thing is certain—blind buffeting about the band will result only in disappointment and exasperation. These notes may assist and encourage the newcomer making his first sorties on our busy and exciting DX bands.—Ed.

OF all aspects of Amateur Radio, working DX (or trying to work it) commands increasing attention. More and more stations are after that elusive Zone or new country, with the result that the DX bands are rapidly becoming areas of terrific activity, colossal QRM and keen, sometimes too keen, competition.

The newcomer hearing G6—working everything going, plunges eagerly into the fray, and often becomes a sadder but not much wiser man.

Some stations, seemingly, work DX without effort—indeed, some work nothing else. Others, with the band wide open, can't work a thing. Why? Is it power, or lack of it? Is it location, luck, or just experience *plus* good operating?

In normal conditions, the man who knows what he is doing and how to do it must have more success than a beginner, and while experience itself is the best teacher, there are one or two points which, if followed, should make DX seeking more profitable.

Listening

We all have a receiver, yet how many of us bother to use it properly? Remember the old adage (and the terms of your licence) and *listen before you transmit.* You'll find out what's cooking that way, and you won't make yourself popular calling CQ DX slap on top of AC4YN.

The next thing is to decide what you want in the way of DX. There is usually plenty of "ordinary" DX coming through at a comfortable S6, but have you ever really listened, picked out that watery little signal about "so high"? Weak, may be, but it is surprising how many satisfying QSO's can be had even when the local boys come on for their QRO cross-town chats.

A so-called "dead band" can often provide some really worthwhile signals.

Strange countries have a habit of popping up, and there they are, all on their own, calling "CQ Europe," unaware that Europe and his XYL are QRT and have gone to the pictures.

Broadly speaking, with the exception of the 28 mc 'phone band (which now seems to embrace the entire band width), it is very little use answering a station more than a few kc away from one's own frequency, unless that station is using band search procedure. It is an unfortunate fact, in these days of VFO's, that very few stations do use QLM, so it's too bad for the one-rock man and good hunting to the VFO, in whoever's hands it be.

When replying to a station using band search procedure, notice should be taken both of the frequency difference between the two stations and the amount of activity on the band. Obviously with activity at a high level, it will take longer to tune a given range than when few stations are on.

Break-In

Perhaps the best and most efficient of all methods is to use break-in procedure, coupled with QLM, and remember, even if you are not equipped for break-in, you can still "BK" the other station and save time, and temper, as well as reducing interference.

Several simple and effective methods of achieving break-in have appeared in the *Short Wave Magazine*. As regards the transmitting side, two points seem to stand out. If you are a CW man, and you send good CW with a good note, you'll get more QSO's than John Q. Kilowatt with his shaky 30 w.p.m., and a note like a buzz-saw.

It doesn't matter whether you send at 12 w.p.m. or 25—as long as you are sending nice, rhythmic, 100 per cent copy. Once you over-run your capabilities and send too fast, anything may happen. Then, too, you *may* get a reply, and ten to one it will be faster than your call! "Sri om, heavy local QRM, pse QRS"! A good operator, too, will always suit his speed to the fellow at the other end. It may sound fine to hear your own bug doing thirty, but poor old G9XX at the other end doesn't think so—good job you don't know just what he *is* thinking!

There are one or two operating practices which never fail to cause loud applause and shouts of joy from all concerned. Perhaps the number one favourite is the clot who calls CQ for minutes at a time punctuated by short bursts of diddly dits, long dahs and VE's, plus an occasional "test." He then signs and waits virtuously for a call. What a hope!

The same type has been known to repeat the performance except that he eventually closes down without giving his call at all. The real joke is, of course, that someone always listens to the bitter end. In fascinated horror, presumably.

The sign SK is being used rather loosely on occasion. A station may sign with a definite SK, and continue chatting for another hour, leaving perhaps several stations calling him and/or gnashing their teeth.

Likewise, the practice of "going QRT" and then carrying on another QSO. Very funny, unless you have been lying in wait for an hour or so, then, having heard "QRT," you switch off the Tx just in time to hear your DX busily chatting with your hated rival!

Finally a word to the "CQ'ers" and "non-CQ'ers." Some stations rarely, if ever, send CQ. They just wait, listen and work the DX. As has been said before, calling CQ DX is no way to achieve DXCC, but it is still fun and you never know. Besides if you QLH, you may gladden the heart and raise the blood pressure of some rock-bound "W" with *his* first DX.

NEW QTH's

This space is available for the publication of the addresses of all holders of new callsigns, or changes of address of transmitters already licensed. All addresses published here are automatically included in the quarterly issue of the Call Book in preparation. QTH's are inserted as they are received, up to the limit of the space allowance. Please *write clearly* and address on a separate slip to QTH Section.

G2BTD S. Vinicombe, 2 Elmore Road, Horfield, Brstol, 7.
G2CFS R. Howard, 34 Bouverie Road, West Harrow, Middlesex.
G2DPA R. C. Parnaby, 29 Willow Grove, Beverley, E. Yorks.
G2FCI A. J. White, Little Pleasance, Western Road, Ashburton, S. Devon.
GM2FKG J. Kean, 47 Crow Road, Glasgow, W.1.
G2HCJ R. C. Taylor, The Lodge, Higher Walton, Warrington, Lancs.
G2UX G. Edwards, The Bungalow, Chapel Street, Barford, Nr. Norwich, Norfolk.
G2UX/A G. Edwards, Wymondham Secondary School, Norwich Road, Wymondham, Norfolk.
G3ACP A. F. Padfield, 24 Church Rise, Chessington, Surrey.
G3ALQ H. E. Pointeer, 39 Blundell Road, Edgware, Middlesex.
G3AXP D. Cullen, Woodlands, Baldock, Herts.
G3CDC C. S. Harrison, 5 Upton Drive, Sherwood, Nottingham.
G3CEW W. Sansom, Wales Farm, Plumpton, Lewes, Sussex.
G3COP D. Iles, 29 Russell Avenue, Kingswood, Bristol.
G3CQX Sgt. T. Clark, Sgts' Mess, R.A.F., Fairford, Glos.
GM3CVL R. D. Andrew, 240 St. Clair Street, Kirkcaldy, Scotland.
G3DBV J. Hedges, 83 Victoria Road North, Southsea, Hants.
G3DBV/A J. Hedges, c/o Technical Workshop, Royal Marine Signal School, Eastney, Southsea, Hants.
G3DDX G. A. Woodhouse, 14 Wentworth Way, Sanderstead, South Croydon, Surrey.
G3DGV E. N. Chawner, 58 Wyngate Drive, Leicester.
G3DHE N. Nelson, 607 Sqdn., R.A.F. Ouston, Newcastle-on-Tyne.
G3DKN T. Straughan, 21 Second Avenue, Blyth, Northumberland.
G3DOJ W. J. Omer (*ex-D2GG*), 1 Waterbeach Road, Slough, Bucks.
G3DON D. W. Cocks, 104 Falconwood Avenue, Welling, Kent.
G3DQC J. L. Salter, 6 Peterborough Avenue, High Wycombe, Bucks.
G3DRS N. H. Brown, B.Sc., A.R.I.C., 63 Corporation Road, Audenshaw, Manchester.
G3DTG E. W. Clary, 105 Grovelly Lane, West Heath, Birmingham, 31.
G3DUJ E. N. Meakin, 17 Scotland Road, Carlisle, Cumberland.
GC3DVC E. Banks, B.Sc., 8 Havre des Pas, Jersey, Channel Islands.
GM3DVX J. Gorrie, 81 Parkhead Loan, Edinburgh, 11.
GM3DWV J. Gray, 19 Haig Avenue, Kirkcaldy, Scotland.
G3DXY B. O. Leach, 25 Clevedon Road, Gloucester.
G3DYA K. T. Bold, 129 Moseley Road, Bilston, Staffs.
GM3DZB A. I. Duncan, Gordon Castle Farm, Fochabers, Morayshire, Scotland.
GM3DZQ J. I. A. Smith, 171 Dunnikier Road, Kirkcaldy, Scotland.
G3EAC H. Pratt, A.M.I.Mech.E., A.M.I.P.E., 21 Sollershott West, Letchworth, Herts.
G3EAW J. Rigby, 50 West Drive, Tintwistle, Hadfield, Manchester.
G3EBH G. C. Newby, 35 Chaucer Drive, St. Giles, Lincoln.
G3EBN L. Cliff, 4 Crompton Avenue, Blackpool, S.S., Lancs.
G3ECB J. J. Jardine, 80 Roundwood Road, Northenden, Manchester, Lancs.
G3ECC A. Martin, 21 Clifton Gardens, Goole, Yorks.
GW3ECH R. J. Price (*ex-SU1VL*), 28 Rectory Road, Trecwn, Pembrokeshire, W. Wales.
G3ECM P. W. Bowles, 47 Braemore Road, Hove, 3, Sussex.
G3ECU W. W. King, Broom Hill, Landford, near Salisbury, Wilts.
G3ECX A. P. Newport, 71 Micheldever Road, Lee, London, S.E.12.
G3ECZ K. Robinson, 20 Church Avenue, West Sleekburn, Choppington, Northumberland.
G3EDG W. G. Pitfield, 4 Devonshire Street, Brighton, 7, Sussex.
GM3EDU J. B. M. Stewart, 37 Dillichip Terrace, Bonhill, Alexandria, Dumbartonshire.
G3EEH J. G. Watkinson, Church Lane, Hedon, Hull, Yorks.
G3XI E. Williams, 19 Rivercourt Road, Hammersmith, London, W.6.
G4ND H. Marshall, 14 Greenway Close, Sale, Manchester.
G4RH R. W. Westmorland, A.M.I.E.E., 9 Bloxam Gardens, Rugby, Warks.
G4WS W. Stanworth, 4 Tewkesbury Avenue, Pinner, Middlesex.
G4ZU Capt. G. A. Bird, 94 Shirley Way, Croydon, Surrey.
G5WC/A N. Vaus, Station House, New Milton, Hants.
GM8MA J. Hearn, Rose Cottage, Bank Park Crescent, Tranent, E. Lothian, Scotland.
G8UG J. K Coomber, 22 Russell Road, Mitcham, Surrey.

CHANGE OF ADDRESS

G2CKQ Major R. S. Trevelyan, 91 St. Georges Road, Cheltenham, Glos.
G2HHX C. L. R. Bullock, 52 Bunbury Road, Northfield, Birmingham, 31.
G2KU R. M. Herbert, 9 Baldwin Avenue, Eastbourne, Sussex.
G3AKH D. G. Lucas, 66 Whitley Road, Whitley Bay, Northumberland.
G3BJQ W. H. Tanser, 29 Wheatfield Road, Old Bilton, near Rugby, Warks.
G3BMC D. C. Gray, 36 Godfrey Street, Chelsea, London, S.W.3.
G3CLM Dr. B. G. Wells, Little Orchard, Lee-on-the-Solent, Hants.
G3CXW R. F. Hall, 88 Woodbank Road, Downham, Kent.
G3NA E. H. D. Coates, 21 White Horse Square, Hereford.
GW3VL P. R. Jenkins, 2 Mackworth Road, Porthcawl, Glam.
G4OV A. R. Osborne, Four Winds, Mount Joy, Bridport, Dorset.

CORRECTION

G3BIU J. Dunn, Cape View, Sennen Cove, Land's End, Cornwall.

Here and There

Small Mistake

Reference Part II of G6HL's article on Aerial Design, Fig. 10 on p. 479 and its accompanying paragraph in the text should have made the vertical spacing half-wave, and not as shown. It was that little chap with the black pencil who dunnit !

Amateur Radio Exhibition

We shall again be on Stand 5 at the RSGB's Second Annual Amateur Radio Exhibition, opening on November 17 at the Royal Hotel, Woburn Place, W.C.1, and continuing till Saturday the 20th. The stand will be manned by various members of our staff throughout the period of the Exhibition, which is being supported by 26 firms operating in the Amateur Radio field. Come and see what promises to be an excellent show—and say hello to us.

Struck, Another Blow for "Freedom"

From Hungary comes official notification that all amateur activities have been co-ordinated under the M.R.R.E., or "Hungarian Shortwave Radioamateur League," with address Postbox 185, Budapest 4, which is also that of the HA QSL Bureau. This is of course on the Box 88, Moscow, theme and there is an illuminating remark in the notice to the effect that "Bureaux publicated in different papers and magazines have been in privat hands and exist no longer." In other words, toe the line or be liquidated. But it is only fair to add that the M.R.R.E. circular concludes with the hope (which we echo) that "international amaturism hand-in-hand will serve the matter of peace."

G2NM—Yachtsman

This has practically nothing to do with Amateur Radio in the strictest sense, but many of our readers fond of the sea or yachtsmen themselves will be very interested to hear that Gerald Marcuse, G2NM, of Bosham, Sussex, has gained another distinction. With his cruiser *Eirene II* he won the Motor Boat Challenge Cup, open to all comers, in the International Cruise Pavillon d'Or 1948. Nearly 100 yachts were entered for this event, a cruise to Holland, and judging was on the basis of the owner producing the best log. G2NM was accompanied by G5MR as crew, and for two radio amateurs to win this cherished trophy of the yachting world is a great achievement.

Eirene II is fitted with radio for operation on non-amateur frequencies, those assigned being 1650 kc (emergency), 2012 kc (ship-to-shore schedules), and 2135 or 2225 kc for inter-ship contacts. During the cruise, lasting some nine weeks, GNF North Foreland, was one of the land stations worked and the operators on watch enquired if the Grand Old Man of Amateur Radio was afloat again. He was —well done, Gerry !

R.A.E. Results

Consolidated results of the Radio Amateurs' Examination held in May last show that the total number of candidates, home and overseas, was exactly 700. Of these, 528 passed, giving a failure figure of about 24 per cent.—still too high, in our estimation, but a great improvement on the 1947 R.A.E., when 37 per cent. of the 326 candidates were failed.

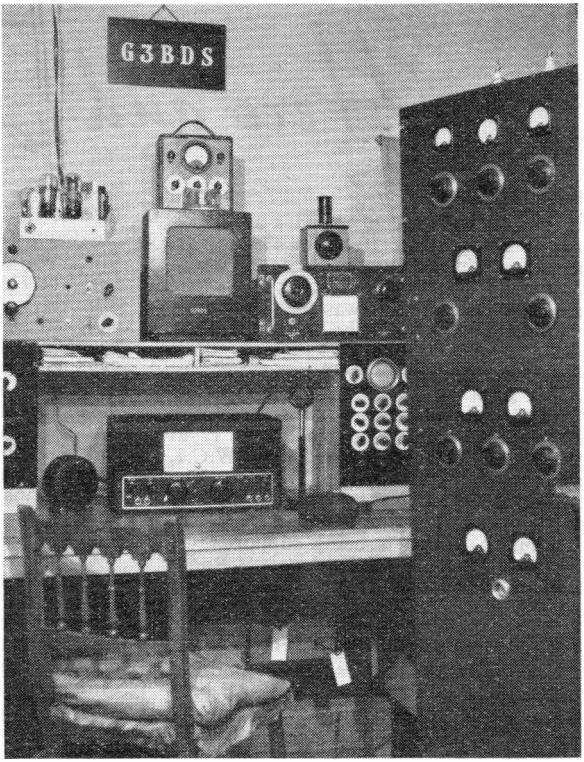
The Paper (which appears in full in the October issue of our *Short Wave Listener*) was again fair and reasonable, and this time the Examiner's Report to the Department of Technology, City & Guilds of London Institute, remarks as follows : "Candidates' work as compared with previous examinations was generally of a much higher standard both technically and the manner in which the questions were answered. It was apparent that more adequate preparation had been made for this year's examination. . . ."

Obituary

Mrs. C. H. Myler, G3GH, Knowle, Braunton, was well known on the air in pre-war days, though she had not resumed amateur activity when licences were re-issued. Known to many of us as "Gran'ma," and a great friend to all interested in Amateur Radio in North Devon, she was of the finest type of amateur. A cultured woman with a wide knowledge of the arts, in her earlier days she had been a concert violinist of distinction. Her passing at the end of August will be mourned by all who knew her—*Valete.*

The other man's station

G3BDS



Station G3BDS is owned and operated by K. T. Whithorn at 34 Tybridge Street, Worcester. Situated in a small spare room (lucky chap !), complete with work-bench, G3BDS is another outfit completely home-built except for the Eddystone 640 receiver and bug key.

Above the operating table is a stand-by 9-valve superhet, with speaker. The VFO/Frequency Meter is built into a TU6B unit, alongside which is its power pack and the modulation meter. To the left on the table is a switch panel which gives complete control of the station through relays. An oscilloscope, with a separate power unit, is also provided.

The QRO transmitter is 6V6-807-807-813 running 150 watts, built in separate units and housed in a 6-ft. rack, with the heavy power supplies in the two bottom positions. Next comes the modulator, using EF36-EF36-P/P 6L6's triode connected-P/P 807's as triodes, and arranged to plate-screen modulate the 813. Above the modulator panel is the CO-FD-FD section ; then the PA as one unit ; and finally the aerial tuning panel.

Aerials in use are 66-ft. with 600-ohm feeders, a 66-ft. dipole, and a 14-mc dipole running E-W. The aerials are brought in to a switch panel on the wall, for quick selection.

A small stand-by Tx is also available for 7 mc working, running 15 watts. To date, operation has been mainly with CW on 7, 14 and 28 mc, 'phone being used on 1·7 mc only. It is the intention to commence 'phone working on 14 and 28 mc, with the equipment as described above.

G3BDS is a good example of neat and compact station design, with everything in its place and to hand, making for easy and efficient operation.

THE MONTH WITH THE CLUBS

FROM REPORTS

The opening-up of the winter season is heralded by a great burst of activity among the Clubs, and reflected in the fact that we have received 37 reports for inclusion this month. The tale is the same everywhere—of interest on the increase once more, of better attendances, and of winter programmes full of promise.

By the time this is published, Club Secretaries who have reported to us during the last six months should have received the rules for the forthcoming *Magazine* 1·7 mc Club Contest (December 4-12), for which we hope to see a record entry. We are assured of hot competition from among last year's high scorers, but a little new blood will make things all the more interesting. Will secretaries please note that though MCC entries will be accepted up till December 3, we want to be able to print a full list of entrants in our December issue, for which the closing date will be November 12. Those Clubs that may get their entries in before October 15 will also be listed in the November *Magazine*.

Deadline for next month's reports is first post on October 15. Please address them, as usual, to Club Secretary, *Short Wave Magazine*, 49 Victoria Street, S.W.1.

South Manchester Radio Club.—Welcome to this newcomer, which had its first gathering on August 20, at the Northenden Church School Rooms. Meetings will be held there at 7.30 on October 15 and 29, November 12 and 26, and December 10. A full programme of events has been organised, with Morse classes, talks on Transmitter Technique and visits to places of interest. There are two licensed transmitters among the membership and several more "hopefuls."

Tees-side Amateur Radio Society.—Permanent headquarters are now at 400 Linthorpe Road, Middlesbrough, and consist of a club room, transmitting room and a workshop. A visit was recently paid to the local police station (officially, of course!) and the radio gear was inspected. Morse classes and a course in radio are about to open.

Catterick Amateur Radio Club.—This club is now meeting every Tuesday evening. Major Ken Ellis of MD5KW is back in Catterick, and ex-MD5JH is also there. Lectures during the past month have been on the TU5B Conversion and on the Principles of Frequency Measurement. Visitors or "transients" will be welcome "in the shade of that 72-ft. stick."

West Kent Radio Society.—Activities continue at a high level with a much-increased membership. Lectures, demonstrations, films and visits have all taken place recently, and new members from Sevenoaks, Tunbridge Wells, Tonbridge, Southborough and outlying districts will be welcomed.

Malvern and District Radio Society.—Twenty-six members attended the Junk Sale in September, and an informal discussion followed the main business. On October 6 G2AO is to talk on The Atlantic City Conference.

Warrington and District Radio Society.—Meets on alternate Mondays, 7.30, in the Sea Cadet Headquarters. Recent meetings have included a talk on High-Fidelity Reproduction, a film show, and a talk on VHF and Television Aerials. On October 16 a visit is being paid to the Port of Liverpool Radar Station.

Worthing and District Amateur Radio Club.—The former Worthing Group has reorganised under this new title, in order to widen the scope of the club and to admit more members. Meetings are on the first Thursday, 7.30, at Oliver's Cafe, Southfarm Road. New secretary's QTH in panel.

Wirral Amateur Radio Society.—Lectures were recently heard on radar (CR Tubes and Time-Bases), from Mr. D. H. McClelland. October meetings are arranged for the 6th and 20th, both 7.30, at YMCA, Whetstone Lane, Birkenhead.

Hi-Q Club, Giffnock.—Discussion during the past month has centred on 145 mc gear. The DX section are testing 21 mc equipment in readiness for the new band. GM3AEC, the original chairman, has changed his QTH and becomes an Honorary Founder Member. GM2KP, 3AKK and 4JO were recently present at a private showing in the university of "Atom-Splitting" with 30 million volts. (We gather that all returned safely.)

Reading Radio Society.—At a recent meeting members who had expected to remain mute in the audience were privily called on to the floor, without warning, to give brief descriptions of their stations and the gear used. The instructor of the local Technical College class on Radio for the Amateur also gave an interesting talk on modulation systems. In September a 5-metre DF contest was held, but results are not yet to hand.

Stourbridge and District Amateur Radio Society.—Members who attended the September meeting enjoyed a talk by G3CLG on Communications Receivers. The lecturer has been building them for nearly 20 years and knows his subject! In Octo-

ber there is to be a display of 145 mc gear and a discussion thereon, followed by a discussion on band-planning. Meetings are on the first Tuesday, Science Block, King Edward's School.

Radio Society of Harrow.—Recent talks have covered quality reception of FM broadcast, 5-metre aerial systems, and Wheatstone bridges. The society's transmitter is finished and tests will be carried out at future meetings. On October 19 there is to be a talk and demonstration by Denco. Meetings every Tuesday, 7.30, at Northwich Tea Rooms, Kenton Road, Kenton.

Solihull Amateur Radio Society.—A DF test was held at the end of August; many members participated and all had a good time. Meetings are held on alternate Wednesdays at Headquarters—the Old Manor House, Solihull.

Slade Radio Society.—October 1-8 represents Slade's 21st Birthday Week, and a special programme has been arranged. October 1—Lecture on the Cavity Magnetron; October 2—Visit to Droitwich; October 6—Demonstration of communication on 3·5 mc; October 8—21st Birthday Dinner. On October 15 there is to be a lecture on Photo-Electric Cells in Industry, by Mr. K. H. Varney, a member.

Kirkcaldy Amateur Radio Society.—A hearty welcome to another newcomer to these columns. The club meets on the first Tuesday and third Wednesday of each month in the Station Grill, Kirkcaldy, at 7.30. Morse instruction is given regularly, followed by talks and discussions; a visit to the BBC relay station at Falkirk is planned, among other trips. Membership stands at 40, and prospective members should contact GM3DWV, the Hon. Sec. (QTH in panel).

Mansfield District Radio Society.—This club, formed on May 1, meets monthly at the Swan Hotel, Mansfield. In September members visited Messrs. Whiteley's radio factory, and on October 10 a discussion on Band Planning will be held at 3 p.m. New members will be heartily welcomed to this meeting. Secretary's QTH in panel.

GEC Model Engineering and Electronics Society.—This society has a strong Amateur Transmitting Group, among whom are several licensed members and some eligible ex-Service types. The club hopes to put in an entry for the MCC in December, several of the members being anxious to try their hands on 1·7 mc.

Sutton and Cheam Radio Society.—They have just suffered a sad loss by the death of the late Secretary, Mr. B. J. Blount. The office has been taken over by Mr. L. Seaton

Herewith are the names and addresses of the Hon. Secs. of Clubs reporting this month. They will be pleased to give every assistance to prospective members:

BLACKPOOL. H. D. Ashworth, G4PY, 5 Albion Avenue, Blackpool.
BRADFORD. W. S. Sykes, G2DJS, 287 Popar Grove, Great Horton, Bradford.
BRIGHTON. F. Harrop, G3DVL, 12 Park Street, Brighton.
CARLISLE. J. Ostle, 2 Outgang, Aspatria, Carlisle.
CATTERICK. L/Cpl. B. G. Taylor, c/o 2 Sqdn., 1st T.R., Royal Signals, Catterick Camp, Yorks.
COVENTRY. J. W. Swinnerton, G2YS, 118 Moor Street, Coventry.
DARLINGTON. G. Walker, G2AWR, 7 Geneva Crescent, Darlington.
EDGWARE. R. H. Newland, G3VW, 3 Albany Court, Montrose Avenue, Edgware, Middx.
G.E.C. C. Edington Sutton, G3ANQ, Osram Valve Department, Magnet House, Kingsway, London, W.C.2.
GIFFNOCK (Hi-Q). J. D. Gillies, GM2FZT, 3 Berridale Avenue, Glasgow, S.4.
GRAFTON. W. H. C. Jennings, G2AHB, Grafton LCC School, Eburne Road, Holloway, London, N.7.
HARROW. J. R. Pikett, 93 Whitmore Road, Harrow, Middx.
HOUNSLOW. A. H. Pottle, 11 Abinger Gardens, Isleworth, Middx.
KINGSTON. A. W. Knight, G2LP, 132 Elgar Avenue, Tolworth, Surrey.
KIRKCALDY. J. Gray, GM3DWV, 19 Haig Avenue, Kirkcaldy.
LIVERPOOL. W. G. Andrews, G3DVW, 17 Lingfield Road, Liverpool, 14.
MALVERN. E. Cross, Dalvington, Priory Road, Malvern.
MANSFIELD. T. S. White, G4DS, Lyndene, Fern Street, Sutton-in-Ashfield, Notts.
NORTH-WEST IRELAND. D. R. J. Adair, GI3BVB, Cosy Lodge, Culmore Road, Londonderry.
READING. L. Watts, G6WO, 817 Oxford Road, Reading.
SLADE. C. N. Smart, 110 Woolmore Road, Erdington, Birmingham 23.
SOLIHULL. H. C. Holloway, 20 Danford Lane, Solihull.
SOUTHEND. J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend-on-Sea.
SOUTH MANCHESTER. M. I. Wilks, 57 Longden Lane, Northenden, Manchester.
SPEN VALLEY. J. Ackroyd, 128 Westgate, Cleckheaton, Yorks.
STOURBRIDGE. W. A. Higgins, G8GF, 35 John Street, Brierley Hill, Staffs.
SUTTON AND CHEAM. L. Seaton, 8 Croft Road, Sutton, Surrey.
TEES-SIDE. H. Walker, G3CBW, 9 Chester Street, Middlesbrough.
WANSTEAD. R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, London, E.11.
WARRINGTON. W. R. Murray, G3CUB, 56 Crow Wood Lane, Widnes.
WEST CORNWALL. R. V. Allbright, G2JL, Greenacre, Lidden, Penzance.
WEST KENT. R. L. Pluck, G4AY, 9 Prospect Road, Southborough, Kent.
WIRRAL. B. O'Brien, G2AMV, 26 Coombe Road, Irby, Heswall, Cheshire.
WISHAW. A. R. T. Williamson, 14 Coronation Road, New Stevenston, Motherwell, Lanarks.
WORCESTER. J. Morris Casey, G8JC, c/o Brookhill Farm, Ladywood, Droitwich.
WORTHING. F. T. Tooley, 62 Becket Road, Worthing.
YORK. G. W. Kelley, G5KC, 123 Kingsway West, Acomb, York.

A full programme of lectures and demonstrations has been arranged for the coming season. Several members with full licences have acquired 1746 kc crystals and "net" on this frequency soon after 10.30 p.m. Other clubs might well copy this scheme, but please note that "netting" *does* mean using one spot-on frequency and not spreading all over the band, as some have been known to do !

Coventry Amateur Radio Society.—At a recent meeting a talk on home-made television gear was followed by a display of members' own home-made apparatus of all kinds, from superhets to an automatic sender. Autumn lectures will cover subjects from Interference Suppression to Induction Heating. G3BJC, from Penzance, is among a number of new members.

North-West of Ireland Amateur Radio Society.—The club station, GI3CFH, is now licensed for 150 watts 'Phone and CW, and the 150-watt PA and Modulator are well in hand with their working parties. A BC348 receiver was also acquired recently. Membership is on the increase and several of the clan are well on the way towards their call-signs. There is a certain amount of interest in 5-metre work.

Liverpool and District Short Wave Club.—Attendance at recent meetings has been good; recent lectures have been on Radio Telephony, by the Chairman, G6KS ; and on the Eddystone 640 and the BC221 by Mr. W. Lawson, G4PF. The club wishes to express its appreciation of the regular attendances by the Treasurer, G8JU, in spite of his very arduous duties at Speke Airport.

West Cornwall Radio Club.—This club has now come out with its own publication, called *The Radio Link*. We have seen the first copy with interest, and learn from it that a Special General Meeting is being held shortly to discuss the future of the club, one of whose problems is the large but sparsely populated area (from the amateur point of view) with which it has to cope. Prospective members, whether from Falmouth, Truro, Redruth, St. Ives or Penzance districts will be equally welcomed by the Hon. Sec.

Photograph taken at the August meeting of the Derby & District Amateur Radio Society, when the lecturer was G5RW. Derby have their own clubroom and all Amateur Radio interests are covered.

Brighton and Hove Group.—Big things were planned for September 19, with an afternoon attempt on the 2350 mc record (between High Salvington and Lancing). This was to be followed by a Social. Unfortunately it will, of course, be past history as you read these notes, though an account of the 13 cm test *may* appear elsewhere in this issue. During October a Junk Sale is being arranged ; meetings are held on alternate Mondays at the Golden Cross Hotel, Western Road, Brighton.

Wishaw and District Radio Club.—This club has started the new season with a full programme. Meetings are held at the Marshall Street Institute, Wishaw (Friday at 7.30), but a search is being made for more suitable premises. The Secretary (QTH in panel) will be pleased to welcome newcomers.

Kingston and District Amateur Radio Society.—Fortnightly meetings at the Kingston Hotel have been resumed. An instructive lecture on Electrolytic Condensers was given by Mr. H. C. Daly at the last meeting, and a comprehensive programme of coming events has been arranged. Next meetings, October 7 and 21 at 7.30.

Darlington and District Amateur Radio Society.—Welcome to yet another addition to the ranks this month. They meet on alternate Thursday evenings, 7.30, at the Temperance Institute, Gladstone Street, but are hoping to acquire a suitable room where a more permanent HQ can be established.

Edgware and District Radio Society.—Membership is now over 70, and this club must surely hold the record for overseas visitors, who have included VK3TZ, VK2XM, ST2MP, VE3BKO, ZS6GH, VE7VO, SM5JN, F9BS, VK2IR, VQ4AWH and W4JBI. Weather rather spoilt the DF contest in September, but spirits were undamped and the transmitter was located. The Mullard series of

film strip lectures on The Radio Valve will be given as a monthly feature, beginning on October 13.

Grafton Radio Society.—This club meets every Monday, Wednesday and Friday at 7.30, and Morse instruction is given at every meeting. Lectures covering the RAE syllabus commence shortly, and a large stock of gear is in hand for the season's constructional programme. New officers were elected at the third AGM in September—the president for this session is GW3ALE. New members welcomed.

Blackpool and Fylde Amateur Radio Society.—A meeting room has now been found at the Chamber of Trade Hall, 53 Queen Street, and meeting night has been altered to the *third* Tuesday in the month. It is hoped that members who have not been regular attenders will now return and give the club their full support.

Worcester and District Amateur Radio Club.—The film lecture on The Radio Valve was given at the September meeting, and it is hoped to give the complete series later on. For the November meeting it is hoped that a discussion on The Multi-Range Electronic Testmeter can be arranged with the co-operation of The Automatic Coil Winder Co. Ltd. and the British I.R.E.

Southend and District Radio Society.—Next meetings are to be on October 15 and 29 at the Municipal College, Southend, 7.45. Radio activity in the district has increased enormously and there are now 43 licensed amateurs in the vicinity!

Wanstead and Woodford Radio Society.—The Woodford Fete went off with a swing, three transmitters being on the air. The Television Group is also under way, and the Transmitter Group is building a new transmitter for the MCC. Please note Secretary's change of address (in panel).

Hounslow and District Radio Society.—The autumn session opened on September 8 with a very successful meeting, during which three short talks were given: Neon Stabilisers for the BC-221, Frequency meters and Electronic Transmission of Movement. The club is having an evening "up west" on December 18.

Carlisle Amateur Radio Society.—As from October 1 meetings will be held on the first and third Fridays at the Trades Hall, Scotch Street, Carlisle. The first lecture, by Mr. J. Ostle, will be on Receiver Principles and Fault Finding. On October 15 there will be a Quiz, the questions for which will be sent in by members.

HAVERFORDWEST AND DISTRICT

It is proposed to form a club in Pembrokeshire with headquarters in Haverfordwest. Prospective members should contact R. J. Price, GW3ECH, 28 Rectory Road, Trecwn, Pembs.

Spen Valley Radio and Television Society.—Winter activities begin with a demonstration of PA equipment by the Chairman, followed by a lecture on Aerials. October lectures are both by visitors: G6KU on Amateur Radio, October 13, and Quartz Crystals, October 27. Meetings are at 7.30 at the Temperance Hall, Brook Street, Cleckheaton.

Bradford Amateur Radio Society.—The new season has opened, and on October 19 an Exchange and Mart will be held. November 2 sees a talk and demonstration on Disc Recording, by Mr. A. R. Land (G2UY). New members for the season will be welcomed.

York and District Short Wave Club.—The winter programme opened with a bumper Junk Sale and continues with progressive lectures. Slow morse practice is radiated by two members taking alternate nights, and a "round-town link" on 145 mc is being organised.

POINT ON THE 145

The Type 145 oscillator is very prone to frequency jumping and whisker effects due to the varying contact resistance of the runners on the variable inductances. This can be overcome by the modification described below.

First, saw through the arm connecting the vernier adjusting knob with the main dial; detach the vernier knob, remove the spindle with the sawn-through arm, and in the mounting hole remaining on the panel fit a small 100 $\mu\mu$F variable condenser, and wire it up to the grid coil. Then, fit pigtail leads to each end of the grid and anode rods, allowing enough slack for the rotation of the rod—the pigtail lead is taken to the tag wiring on its respective coil unit; this modification is to short out any possible bad connection which might be present in the bush end of the rod.

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★

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SHOP assistant required. Preference given to person with technical knowledge of radio, or amateur.—Apply Tele-Radio (1943), Ltd., 177A Edgware Road, W.2. *Pad.* 5393.

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SMALL ADVERTISEMENTS

READERS'—*continued.*

RGD 37 OSC. 22-70 mc, brand new, never used, 2 spare valves, instruction handbook, £10 (carriage extra). Vales, new, 35T, 832A, 20/-: 6AC7, 956, CV63, VR135, 6AG5, 9002, 9003, 9006, 2C26, 7/6. —Olley, 56 Hampton Road, E.7.

TRIPLETT Multi-Range Test Meter, brand new, worth £20, for £14 : National HRO, brand new, coils 480 kc to 30 mc, with power unit, £42 : BC221, brand new, spare valves and handbook, £12 : approximately 40 valves, including new 807's, 6L6's, EF50's, 5T4's, 6N7's, etc., £15. Eddystone parts, coils, bases and tuning condensers, all new and worth £2 10/-, 30/- the lot. Stripped T.U. units, including all parts, 3 to 15/-. Mains transformers ; 400-0-400, 350-0-350, 250-0-250, 4 for £3. BC348 mains transformer, 28v fil, brand new, 30/-. Contact in first instance, W. A. Sparks, 38 Lovely Lane, Warrington, Lancs.

AR88 excellent condition, with S-meter, B2 Rx/Tx with coils, both £52 or offer.—Peck, Whatton, Park Avenue, Carlton, Nottingham.

48 feet Tubular sectional steel concentric mast. Offer £5 or over. 803 with base, 810, 813 : all new. Offers ?—Box No. 382, London area.

BC348R perfect, mains, 'phones, converters, nearest £20—also BC221, valves, meters, etc.—S.A.E. to G3DCT, 38 Costead Manor Road. Brentwood, Essex.

HAMMARLUND Comet Pro, crystal model, 8 to 250 metres, 115/230 volt AC, condition as new, complete with circuit diagram and technical literature, £12/10/-.—Biltcliffe, 1 South Street, Watchfield, Swindon, Wilts.

AR88D· Rack mounting, in really first-class condition, £45. Transformer 1000-0-1000 at 300 mA, 85/-. Pair TZ40, unused, 30/- each. Complete 120-watt modulator and driver with 1000v supply, £20. Complete 200-watt 'phone Tx for 80, 40, 20, 15 and 10 : switched, slug-tuned exciter, fully metered and relay operated, 813 final, Mod. TZ40's. Offers over £50.—112 Commercial Road, Bournemouth. *'Phone* 5051.

BC342N New, 6-band, 1·5 to 18 mc, Xtal, BFO £16/10/-. Carriage paid.—Taylor, 75 Edgehill Road, Winton, Bournemouth.

BC348 Receiver, modified heaters for 6v, £14. Philips PCR1, new, £14. SP41's, 4/- each. —Haskell, 57 Seymour Avenue, Lipson, Plymouth.

AR88D· as new, £35. SCR522, brand new, £7. T1131 power packs, RF, £6 : Modulator, £7. BC-639 100-150 mc, 1 RF, 3 IF's, midget valves in RF circuits, air tested on 144 mc, £12. Must be collected or cases provided.—Write, G3DCV, 75 Elwyn Road, March, Cambs.

WILL swop Walkie Talkie, 58 Mark 1, complete with power pack and accumulators, for complete B2. —J. K. Bond, 23 Harding Street, Londonderry, N.I.

SUPER Marconi CR100, laboratory modified by expert, using two EF54's in RF stages, EF52 oscillator, S130 stabiliser on oscillator, S-meter fitted, crystal filter, band-pass filter, black crackle cabinet, chrome handles : comparison test better than HRO, or 88, A gift at £45. Buyer collects, or carriage extra. —Box 384.

MARCONI Comm./Rx, 1 RF, 2 IF, 550 kc-25mc, B'soread, Fine DX'er, 7 mc WAC, wanted power Pack, £12. Also Woden UM2, unused, £3/5/-.—Write, Fuller, 85 High Street, Chelmsford.

HAM selling up. Rack Tx CW/'phone 50 10/80 m, three power packs, separate 5v VFO with supply, meters in all stages, 25w mod., aerial tuner, £50. R107, perfect, book, £13. T.1154, complete, £4. Txt 30w CW/'phone 40/160m CO/VFO, with valves, £10. Transformers, 500-0-500v, 250 mA 2 × 6 3v 5a, 5v 3a £2/10/- : 300-0-300v, 200 mA, 6·3v 5a, 5v 3a, £1/10/- Hand generator, output 24v, ·175a, 300v, 40 mA PT15's, 10/- : EF50, 5/- : SP41, 5/-. Other from 3/- S.A.E. for details or list. Offers ?—Box No. 385.

SMALL ADVERTISEMENTS

READERS'—*continued*

A MARK III Suitcase Set wanted Condition and price to S. Read, Raneshill Training College, Ranskill, Retford, Notts.

FOR SALE.—Two new 35T transmitting valves, 25/- each.—Tomlinson, 18 Torquay Avenue, Shirley, Southampton.

HAM gear for disposal. Valves, condensers, speakers, Transformers, communication receiver, etc. Send S.A.E. for list to G3BNP, Rosenene, Roath Road, Portishead.

SALE.—Class D wavemeter, good condition, £4. Or exchange for small AC Power Pack, suitable BC221. —G3CPM, 49 Lime Tree Avenue, Broadway, Worcestershire.

SALE.—Hallicrafters "Sky Chief," £14. Trophy 8, with tuning eye. Both fine condition, £17. Exchanges.—45 Sipson Way, West Drayton, Middlesex.

R.1155 new and modified, would exchange for BC221. Wanted UM2, exchange for new 813.—G3BOI, 1 Raleigh Avenue, Hayes, Middlesex.

TWO serviceable T1154's for sale, complete valves, meters. No power supplies. Going QRT. London. Offers over £5 each. Sold singly.—Box No. 383.

EX RAF TR9, 20/80 meters Transmitter/Receiver battery operated, working order, £4, carriage paid. —J. Thewlis, 14 Silverdale Avenue, Denton, Manchester

AR88LF as new, £35. Hallicrafters S20 Sky-Champion, £15. RME DM36 convertor, 5-10 metres, £10. Speech amplifier and class B modulator, 50 watt, with 500 volt pack, £10. TU5B, 12/6. Eddystone 640, £22/10/-: also 504, £30. Both as new. SCR-522 in new condition, best offer GM3OL, Westland, Pleasance Avenue, Dumfries.

BRAND new unused BC 348, modified for 220v DC mains, perfect condition, £20 or nearest. Class D Wavemeter, with spares.—Offers Box No. 386.

813 VALVES, brand new and boxed, 32/6 each, post free.—A. Redwood, 30 Norwich Road, Thornton Heath, Surrey.

100-watt Modulator and Speech Amplifier, complete with power packs, two standard panels and chassis, 750v and 300v supplies, UM3 trans., as used by G3RK, £35, or exchange for good Rx.—Spashett's, Bungay, Suffolk.

EDDYSTONE 640. S-meter, speaker, £20: 50-watt Tx, 6L6, CO, 807 PA, Modulator, Power Packs, £25 or near offers.—Bird, 118 Woodpecker Road, New Cross, S.E.14.

G3AAB HAS THE FOLLOWING FIRST GRADE EQUIPMENT, SURPLUS TO REQUIREMENTS, FOR DISPOSAL: HALLICRAFTER MODEL ARR5 28-145 MC, S-METER, AM/FM, NOISE LIMITER, BFO, ETC., 14 VALVE RECEIVER, £15. AR88D, CABINET MODEL, GOOD CONDITION, £40. BENDIX BC640A 10-VALVE RECEIVER, 100-155 MC, S-METER, BFO, AVC, ETC., £12/10/-. HRO SENIOR, NEW, 5 COILS TO 28 MC, AND POWER PACK, £40. DUMONT MODEL 224A OSCILLOSCOPE, WIDE BAND AMPLIFIER, PROBE, ETC., SPECIALLY DESIGNED FOR TELEVISION AND FM SERVICING, NEW, £22/10/-, LISTED AT £70. COSSOR MODEL 339 DOUBLE-BEAM OSCILLOSCOPE, BLUE TRACE, £35. COSSOR MODEL 343 GANGING OSCILLATOR (WOBBULATOR) FM AND AM, £30. MODEL TS/275U MODULATED, CRYSTAL CONTROLLED, TEMPERATURE COMPENSATED, HETERODYNE FREQUENCY METER SIMILAR TO BC221, FREQUENCY COVERAGE 85-1000 MC WITH ACCURACY OF ·005 PER CENT., NEW, WITH SPARE VALVES, £18/10/-. RCA JUNIOR "VOLT-OHMIST" VALVE-VOLTMETER, NEW, £15. S.A.E. MUST ACCOMPANY ALL ENQUIRIES. WANTED, WIRE RECORDER. G3AAB, 144 PARK ROAD, GREAT SANKEY, WARRINGTON, LANCS.

R.103A as new, 100-250v AC, 1·7 to 7·8 mc, 8 valves, 6V6 output, S-meter, complete with speaker, £11/15/-.—G3AWQ, 81 Rye Hill Park, London, S.E.15. *New Cross* 0149.

SMALL ADVERTISEMENTS

READERS'—*continued.*

PE-110 Power Units. 500v at 400 mA, LT's, bias, etc., 5 rectifiers, input 110v, 50c. A super heavy duty U.S. Army job, brand new in crate, £8/10/-.—Taylor, 75 Edgehill Road, Winton, Bournemouth.

AR77E perfect condition, for sale, £30. New valves: EBF11, EF11 (2), EL11: what offers? 'Phone *New Cross* 4094 (after 6.0 p.m.) or write G3ACC, 59 Upland Road, S.E.22.

G2OO's announcements now appear in the Trade Small Advertisement column and on Page 595.

SALE.—Hallicrafters Sky Buddy, 550 kc-18 mc, recently overhauled, good condition, £10/10/-.—J. F. Acquier, Hillcroft, Station Road, Eynsford, Kent.

TROPHY Eight for sale, including speaker and 'phones, good condition, S-meter, AVC, 7 to 550 metres, £18.—42 Kings Road, New Haw, Weybridge, Surrey.

30 watt VFO/PA and Power Supply, £12: CO/PA and Power Supply £20: class AB-1 modulator, £15: BC342 and speaker, AC mains, £18/10/-: 5/10 metre superhet, £20: HMV electric gram-unit, £8/10/-: Class D wavemeter, £5. S.A.E. for details.—149 The Moors, Kidlington, Oxford.

R1155 as new, 6V6 output, power pack and 10-in. speaker, £12. T1154H, 20, 40, 80 metres, complete with valves and all components for power pack, £6.—Denell, 14 Lipson Hill, Lipson, Plymouth.

EDDYSTONE tropical battery "All World Eight" Receiver, 9-2000 metres, 7 coil units, highly efficient, cost over £30, as new, £16 or near offer.—Box 389

CRYSTALS, QCC in holders with certs, 1838, 7048, 7187 kc, 20/- each: 1196TR, with 9 valves, £2: new 3 cm. complete magnetron and klystron assembly with magnetron, 2 klystrons, 2 IN23 xtals, 2 6AC7, etc., £2: Radio-Aid Bug, £1: Labgear 4-band 150w coil-switch assembly, less coils, 12/6: BC433 Radio Compass, less valves, 30/-. Valves: CV63's, 5/-: RK715B, 60w RF tetrode, 10/-: VT62's (834), 25/-. AC/DC Avominor, £4/10/-. All guaranteed good or new, carriage paid.—G3UI, 30 Rugby Gardens, Ovenden, Halifax, Yorks.

ALMOST new Tx by G6US. Self-contained VFO, switched 80, 40, 20 metres—807 BA/DBLR-PP813 (75-300 watts), Class B TZ40's, 3 power packs, band-switching (except PA) relay controlled by remote switch, £90. Worth Double. One of best HRO's in "G", Band spread coils (not war-time model), power pack, £55. Cost more. Buyer collects above. New Eddystone 100/1000 kc xtal calibrator, £8. B2 Tx, Ex-RSGB scheme, new, at cost, £3/5/- (with coils). New G6HP oscilloscope, £6.—Wintons, Peasmarsh, Rye, Sussex. *Tel.: Peasmarsh* 243.

1155 pack, 10-in speaker, £15/10/-. Spare valves, 7/- each. EF50's, in ceramic holders, 4/-: six for 18/-. New 0-100 mA meters, 25/-. VR92's in holders, 5/- pair. 1200-volt pack, £10.—Westinghouse PPI, new, complete, swap for AR88, as new. S.A.E., list.—Box No 388.

BENDIX RA1B communications receiver, 150 kc-15 mc, good condition, £10. B2 receiver and power, pack, perfect condition, £7. 2 809's, 22/6 each. 6SU7, GTS, 10/6 each. All valves new boxes.—Smith, Close Burton, Christchurch, Hants.

COMPLETE, including D.104 mike, 50 watt CW/'Phone Tx; 7, 14, 28 mc, commercial job, rack and panel mounting, excellent condition, weight 120 lb. Bargain at £35: 7-valve single-signal ham band Rx, also excellent condition, £7. No reasonable offer refused. Must sell.—Box No. 387.

COMPLETE 10-metre 250-watt CW/'Phone station, P/P 35T's, TZ40 modulators, xtal mike, bug and straight keys, HRO receiver, speaker and power pack. Numerous spare receiving and transmitting valves, xtal sub-standard. Rotary beam and mast. Polished mahogany operating desk. Station built regardless of cost. Best offer over £150 for everything, including numerous spares. Seen London.—Box No. 390.

SMALL ADVERTISEMENTS

READERS'—*continued.*

SALE—R.A.F. R.1116 Receiver, with valves, case perfect, £8 or near offer.—Whittle, 10 West View Grove, Whitefield, Manchester.

R107 communications receiver, fine working order, complete with several extras. Price £15.—22 Chapter Chambers, Esterbrooke Street, S.W.1.

GOING Abroad. AR88, perfect working order, £38. 1155, new, with valves, £8. Buyer must collect. Write for appointment.—Richards, 4 Ewan Way, Leigh-on-Sea, Essex. *'Phone Hadleigh* 58981 after 8 p.m.

FOR sale.—R.1116 Rx, 15-1500 metres, double superhet, heard any time, £4/10/-.—Morley, 135 Everton Drive, Queensbury, Middlesex.

BRAND new Avo Oscillator for sale, £11/10/-.—3 Westmount Road, Eltham, S.E.9.

THE "Q-MAX" B4/40 TRANSMITTER

A complete 40 watt—Four Band Transmitter for Phone or C.W.

- Four Bands 80-40-20-10 metres at the turn of a single switch.
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- 40 watts C.W., 35 watts Phone to KT8C Final.
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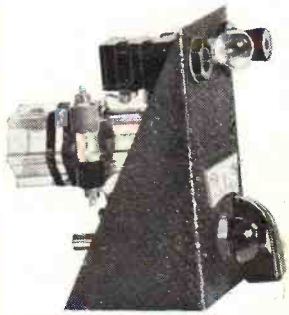

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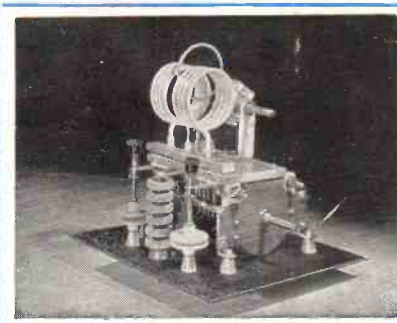

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Complete Unit as illustrated **£6 13 0**

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