

The SHORT WAVE Magazine

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KW ELECTRONICS

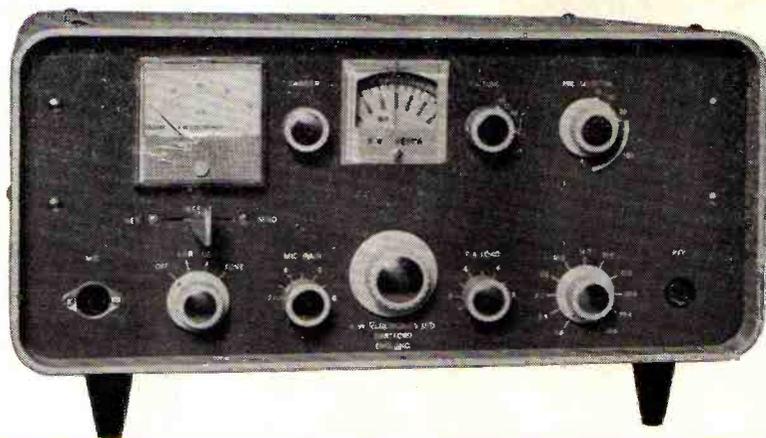
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Power supply £25



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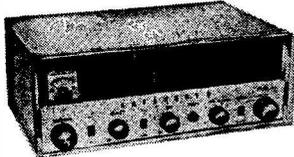
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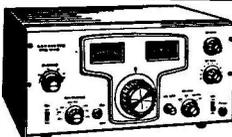
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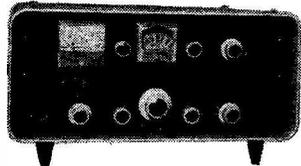
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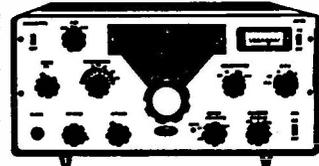
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108-136 Mc/s. High selectivity and sensitivity. Incorporates 2 RF stages including 6CW4 Nuvistor, 8 tubes for 11 tube performance, solid state power supply, adjustable squelch control, slide rule dial, built-in 4" speaker and front panel phone jack, 220/240v. AC. Supplied brand new and guaranteed. £19/7/6, carriage 10/-.



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108-176 Mc/s. Ground Plane Antenna, 59/6.

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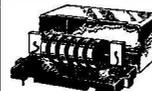
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100-0-100µA	27/6	50mA	22/6	2A DC	22/6	150v DC	22/6	500v AC	22/6
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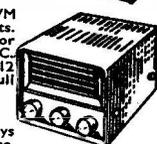
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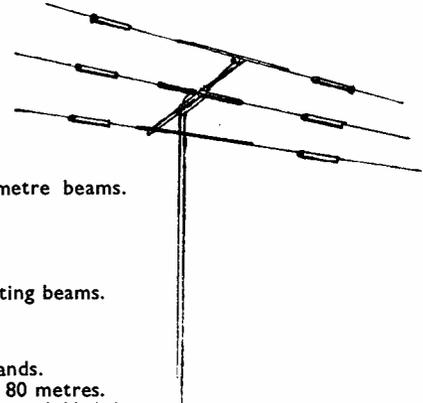
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V-4-8



TA-33

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(Tubes extra)

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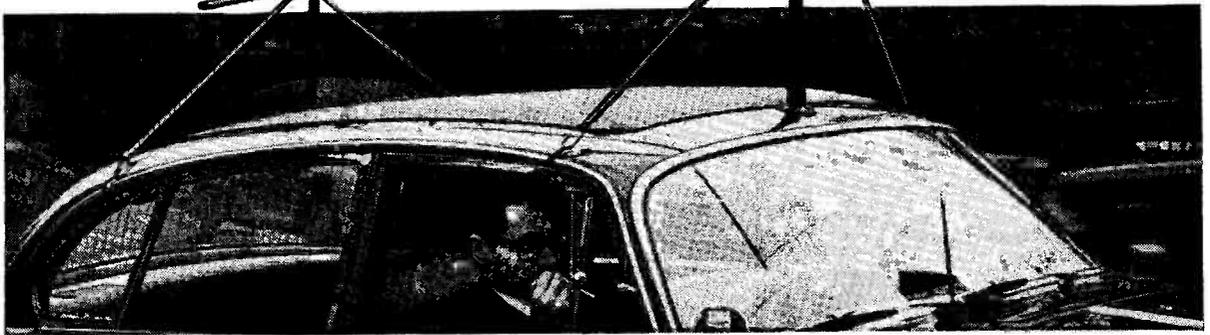
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KW

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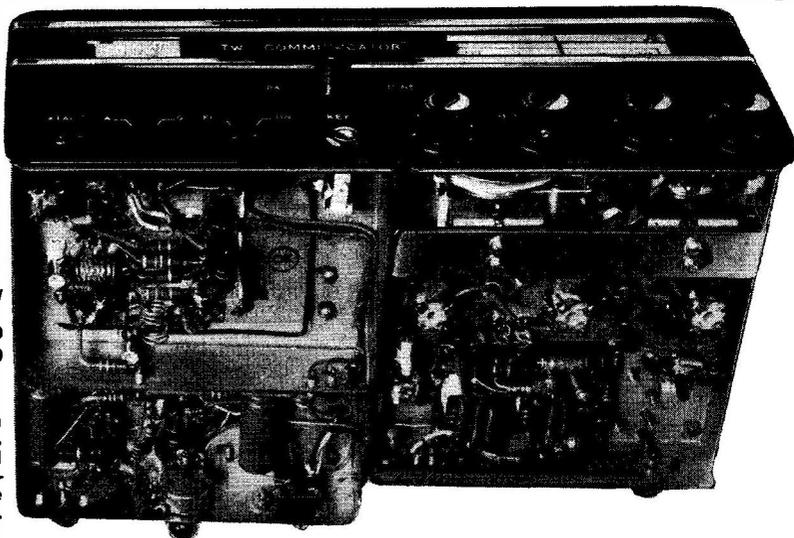
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SHORT WAVE MAGAZINE

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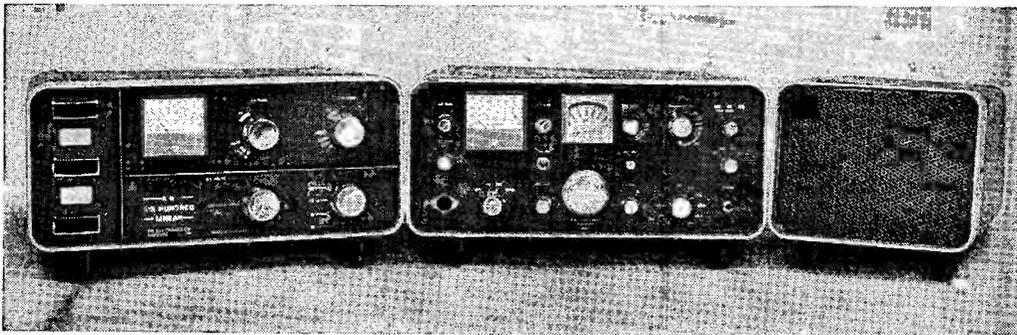
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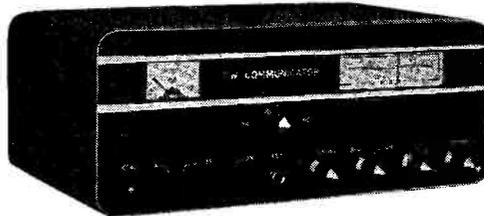
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The SHORT-WAVE Magazine

EDITORIAL

Clubs *The keen radio amateur anxious to make progress with his hobby studies its literature with avidity, but often overlooks an equally important means of gaining knowledge and a certain amount of practical experience—the joining of a radio club.*

If there is an active club organisation in your locality, and you are not already a member, we would strongly advise you to consider becoming one. Most clubs welcome new members irrespective of their qualifications or standard of knowledge, and many are organised to give practical assistance to the beginner. While much knowledge can be acquired by a study of the literature of short wave radio, fortified by practical experience with one's own equipment, club membership is always a great help in that discussion with other enthusiasts will often provide the quick answer to a particular problem. It is indisputable that progress is much slower when one is on one's own than when one has the advice and experience of a number of similarly-minded companions to which to turn.

Those who are keen on Amateur Radio represent a true cross-section of the whole community—which is one of the charms of the hobby, and the average local club often plays a very important, if unobtrusive, part in making possible social contacts and encouraging friendships for which there would otherwise be no opportunity.

It may well be that there is no club yet formed in your district; but what is certain is that there will be several SWL's (and possibly some transmitters) who would like to belong to a club if there was one. So why not pursue possibilities a bit further? A notice in the local paper will usually set the ball rolling, after which it is a matter of calling a meeting and appointing a secretary; he will be by far the most important member, for on his ability and enthusiasm (not necessarily in the technical sense), the success or failure of the whole venture will ultimately depend.

*Austin Foxgk,
G6FO.*

TRANSISTORISED TOP BAND CONVERTER

WITH BANDSPREAD — FOR OPERATION WITH TRANSISTOR PORTABLE

W. K. MONTFORD (G3JZL)

REQUIRING a portable Rx for Top Band and having a transistor radio covering the usual medium and long-wave bands, a first attempt was made by realigning this receiver for 1.8-20 mc. But sensitivity was poor and the whole of Top Band was covered in a few degrees of the tuning control. Something better was obviously necessary, so it was decided to build a proper converter and feed it into a link winding on the (ferrite rod) aerial of the portable Rx. The IF chosen for the converter was 670 kc, this being mid-way between the strong Third Programme transmission on 647 kc and the equally powerful Northern Home Service at 692 kc. For this, the (tunable) oscillator frequency came out at 1130-1330 kc, working 670 kc below signal frequency.

The following notes on the converter may be useful to others with a similar problem. It was built and tested as three separate stages—oscillator, mixer and RF—each on a strip of *Veroboard* (layouts are shown in Fig. 2). The circuit is given in Fig. 1, and is fairly conventional, except that the RF stage is passive and is simply to minimise IF break-through, and C7, C12 are not ganged; main tuning is carried out on C12, with C7 for peaking the signal.

Oscillator

With C12, of 500 $\mu\mu\text{F}$, set at minimum capacity and the fixed band-set C11, 150 $\mu\mu\text{F}$, across it, L3 was adjusted to give 1330 kc, as nearly as possible. The oscillator frequency (at minimum capacity C12) will determine the IF of the converter; if the highest frequency is, say, 1320 kc, then the IF (or main Rx setting) must be 680 kc in order to tune up to 2.0 mc. With the given values, to obtain the 200 kc swing to tune Top Band on C12, the coil L3 should be resonated at approximately 1330 kc.

The coil used for the oscillator was an old RF choke—and, of course, on first test the frequency was too low. A few turns had to be taken off and the coil tried back in circuit several times until near-enough 1330 kc was hit, this adjustment being carried out roughly against the dial calibration of a MW receiver; a more accurate check was obtained by listening to the oscillator harmonics on the station main Rx at 2.66, 3.99 and 5.32 mc. For this check a two-turn link winding from L3 to the aerial-earth points on the main Rx may be necessary—it depends what local pick-up you get.

It was then found that varying C12 from minimum towards maximum lowered the frequency by 200 kc, or roughly 225 to 265 metres, as shown on the MW Rx dial.

Frequency Changer

The coil L2, with C8 band-set of 220 $\mu\mu\text{F}$ across it, was then adjusted till it tuned over 2.0-1.8 mc, with C7 of 100 $\mu\mu\text{F}$. The resonating of L2 was carried out by coupling the collector side of the mixer *via* coax, as shown in the circuit diagram, into the station Rx set at 2 mc. For a pick-up aerial about 10ft. of wire through 50 $\mu\mu\text{F}$ was connected to the top of L2,

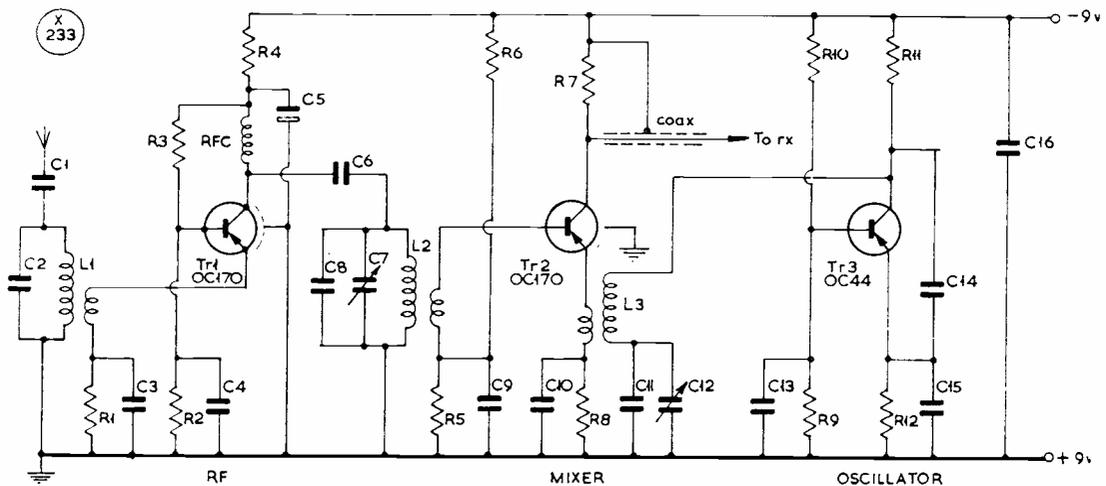


Fig. 1. Circuit of the 160-metre converter discussed in the article, and intended to work with a transistor portable receiver of the usual type, covering LW/MW ranges. By using a miniaturised construction, in unit form, the converter could be built into the portable Rx. Adjustment is discussed in the text, and all values are given in the table opposite.

and as the mixer circuit came to resonance an increase in the strength of background noise was obtained. For this adjustment the emitter was wired direct to the 680-ohm resistor R8, the oscillator being completely out of circuit.

When using the MW portable (previously realigned for Top Band, as already mentioned) to check the tuning of L2, this Rx having no RF stage, it was noticed that a rise in background noise could also be obtained on the Rx *image* frequency—a point to watch when using this method to align such a circuit.

With L2 correctly resonated, the oscillator was injected into the mixer through a two-turn link at the earthy end of L3. The step-down ratio for L2, primary to mixer base, was made 8 : 1, and has been found satisfactory.

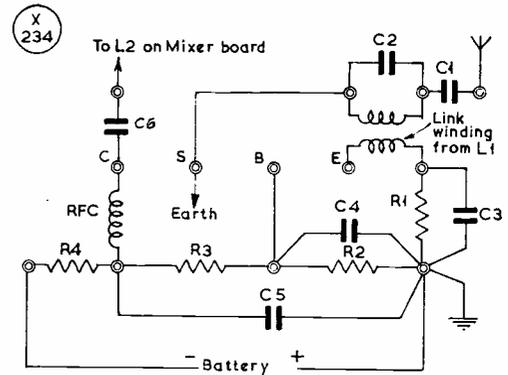
The RF Stage

Using only about 10ft. of aerial clipped to L2, the mixer and oscillator stages were tested and found to give reasonable sensitivity and good band-spread—but as L2 was the only tuned circuit actually on Top Band, naturally enough break-through occurred at IF. As no more tuning controls were wanted, a grounded-base RF amplifier circuit was chosen (to isolate the mixer input). This arrangement has a low input impedance of 40 ohms or so (and is thus wide-band), and at 1000 kc it has a relatively high output impedance. Thus, no input tuning was required, and the output side could be easily coupled into the mixer base—see circuit.

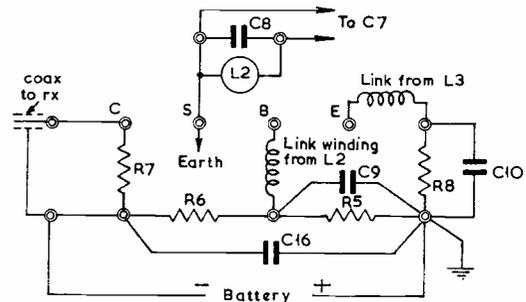
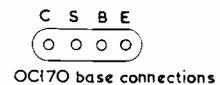
Again, the coil used for L1 was trimmed RF choke, adjusted to resonate at mid-band, 1900 kc, with C2, 300 $\mu\mu\text{F}$, across it. The original inductance of the choke (found in the junk box) was about 700 μH . The link winding into the RF stage emitter was 10 turns tightly coupled to the earthy end of L1. The final adjustment was to reduce the sensitivity of the ferrite rod aerial on the portable to minimise direct reception (which would appear as IF break-through), this being done by fitting the 2K resistor R7 in the mixer collector. Obviously, the aerial circuitry of the portable Rx has greater bandwidth, but for the practical purpose of Top Band reception, the selectivity of the receiver IF side was found to

be adequate.

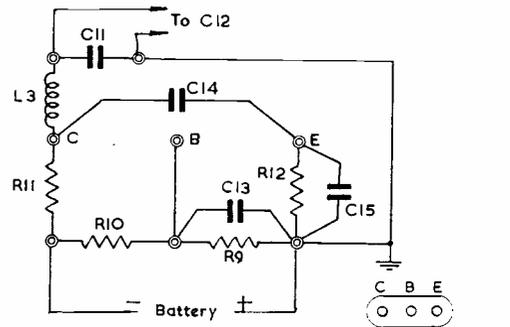
The total current consumption of the converter as described is but 3 mA, obtained from a 9v. PP3 battery held in position by a Terry clip.



RF AMPLIFIER LAYOUT



MIXER LAYOUT



OSCILLATOR LAYOUT



Table of Values

Fig. 1. Circuit of the Transistor Converter

C1 = 50 $\mu\mu\text{F}$, mica	R2, R12 = 5,000 ohms
C2 = 300 $\mu\mu\text{F}$, mica	R3 = 33,000 ohms
C3, C4, = 0.05 μF	R4 = 1,800 ohms
C5 = 10 μF , elect.	R5 = 8,200 ohms
C6 = 0.1 μF	R6 = 47,000 ohms
C7 = 100 $\mu\mu\text{F}$, var.	R7 = 2,000 ohms (see text)
C8 = 220 $\mu\mu\text{F}$, mica	R8 = 680 ohms
C10, C13, = 0.1 μF	R9 = 10,000 ohms
C11 = 150 $\mu\mu\text{F}$, mica	R10 = 82,000 ohms
C12 = 500 $\mu\mu\text{F}$, var.	R11 = 6,800 ohms
C14, C15 = 680 $\mu\mu\text{F}$, mica	Tr1,
R1 = 1,000 ohms	Tr2 = OC170, or equiv.
	Tr3 = OC44, or equiv.

Notes: Variables C7, C12 are not ganged. C2 is a fixed capacity (untuned aerial). Ceramic types should be used for the fixed condensers not marked "mica."

Fig. 2. The RF, mixer and oscillator sections as laid out on strips of "Veroboard." The units can be built and tested separately and when the three sections are wired together, C16 is connected across the battery supply.

END-FED LONG WIRES

ARE YOUR FEEDERS REALLY NECESSARY?

L. H. THOMAS (G6QB)

SO many amateurs use, or have used, a long wire in some form or another, that it is rather surprising that so few have bothered to experiment with the very simplest form, in which no feeders as such are needed. The end of the aerial is simply brought into the shack (not too far in, please!) and connected on to a suitable matching device such as an ATU.

This practice is looked on with horror by the pundits, even though one of the many handbooks and manuals on the subject of aerials states that it has no disadvantage, provided that the total length of the wire is six half-wavelengths or more.

In pre-war days such aerials were very common; in the 'twenties one didn't have to visit many shacks before finding a wire (of indeterminate length) literally hung on the *tank coil* by means of a crocodile clip. And those who have never seen a red-hot croc clip belong to a more enlightened age.

The main objection raised against the more legitimate way of arranging things today, with a properly-coupled and matched ATU, is "we don't want all that RF flying around the shack". This pre-supposes that the wire that comes in the window looks like an extremely high impedance, is voltage-fed (as we would have said at one time) and is absolute murder to all TV sets in the vicinity.

Taming the Feed-Point

The impedance of a *very* long wire is never all that high. That of a dipole can run up to several thousand ohms at the ends, but the more dipoles you string on it, end to end, the higher the impedance at the centre of each dipole will go, and, conversely, the lower the end impedance.

This is guesswork, but it seems after much experimental work that the end impedance of a 270ft. wire, when resonated at 20 metres, is around 1,000 ohms if the wire is accurately cut. If you add, or subtract, five or six feet, this will drop to a figure between 300 and 500 ohms and there is no disadvantage provided that your ATU will match into it.

All the long wires used at G6QB over a period of years have deliberately been made either too long or too short, and a compromise has usually been found by which a convenient impedance between, say, 300 and 800 ohms has resulted on all bands from One-Sixty to Ten.

One-Sixty is a special case, because a wire cut to be an accurate half-wave on that band will be too short for all the other bands except, perhaps, the phone section of Eighty. So you may find, after carefully pruning a wire for optimum conditions on

Twenty or Fifteen, that it has (accidentally) become an *exact* half-wave on One-Sixty. This need not matter, though, since 10 watts won't produce much in the way of a corona! Nor will TVI often be a problem.

Tuning Arrangements

The well-known ATU shown in Fig. 1 is unbeatable. It is fed from any conventional *pi*-tank circuit through 72-ohm coax (via the SWR Bridge, which is an absolute necessity) and separate coils are used for each band, each with its own link winding. The aerial is attached, as shown, at one end of the ATU coil, and the earth tap is, in effect, moved up and down the coil by the capacity-potentiometer effect of the two variable condensers.

The greater the value of C1, and the lower the value of C2, that is necessary to achieve an SWR of 1:1, the lower the end impedance of the aerial. Thus you only have to adjust the two condensers for a 1:1 SWR reading, and then to pop outside and loosely connect, say, five extra feet of wire to the aerial (at either end); go back into the shack and see which way you have to move the condensers to regain your 1:1 figure; and you will know at once whether you have raised or lowered the end-impedance of the wire.

If you are trying things out on Twenty, and your wire is as long as 270ft., you will probably have to change its length, one way or the other, by 3 feet or more before you notice any difference. Needless to say, if adding a few feet should *increase* the impedance (which it will if the wire was previously too short to be a multiple of a half-wave), then you can reverse the tactic and prune some wire off, or even leave it as it was.

An impedance bridge would be a valuable instrument, but not many of us possess one which will

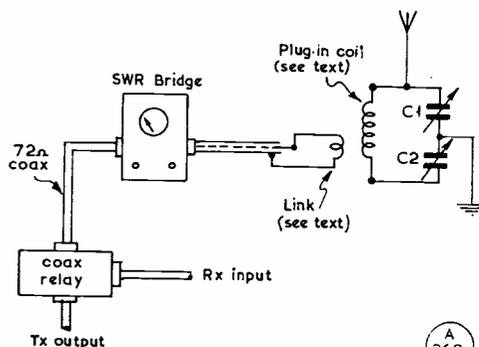


Fig. 1

Fig. 1. The well-known ATU, using two condensers in series, is link-coupled to the transmitter output, probably a *pi*-tank circuit, and also to the input of the receiver, through the SWR Bridge and a coax relay. The receiver will normally require a 72-ohm input, so receiver and transmitter matching should both be satisfactory when the best standing-wave ratio is shown. This type of ATU will match a great variety of impedances at the end of a wire — certainly from 1000 ohms down to a very low value. (At G6QB the ATU will accommodate anything from a 270ft. wire to a 6ft. whip.)

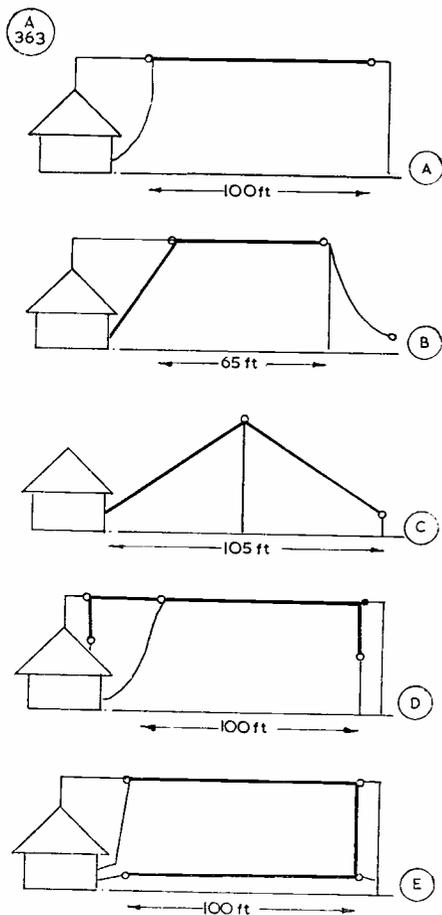


Fig. 2

Fig. 2. The first four examples show how a 135ft. wire can be accommodated in gardens of various lengths. (A) is the common inverted-L; (B) has been allowed to droop beyond the far support. The shorter the garden, the greater the length of wire that must droop; (C) is the inverted-V, discussed at some length in the text; (D) uses a Windom type of feed (roughly one-third the distance along the wire, which is allowed to droop vertically at both ends; and (E) shows a method of accommodating a 270ft. wire in a 100ft. garden by doubling it back upon itself. This arrangement does work surprisingly well on Top Band.

deal with single-ended arrangements such as we are discussing.

All Shapes and Sizes

A rather surprising thing is that the end impedance of a long wire seems to be very little affected by its actual disposal around the grounds. Not many of us have room for the much-coveted 270ft. (although a little ingenuity with "invisible wires" will often make possible this very thing), but large numbers of people could accommodate 135ft. in their garden. Fig. 2 shows some of the configurations that have been used at G6QB at various times,

and they have all worked. Perhaps the best, on the whole, has been the inverted-V shown at (C), which we will discuss later. It seems logical to feed such a wire at the end, which would be tapping on the shack window in any case, even if the thing were conventionally fed by feeders running out across the garden and up to the centre.

Yet another approach—how many people who have decided that they can't get a 135ft. length into their 120ft. garden have thought on these lines? They *could*, by raising the centre instead of the ends. With a 40ft. pole supporting the centre of a 135ft. wire, the length of the garden need only be about 105 feet . . . try it and see, or draw it on a bit of squared paper. Or ponder this: The universal 3:4:5 right-angled triangle occurs when the most height is 39ft., the base-line 52ft. and the wire itself (the hypotenuse) 65ft. Double this, and assuming you have the 39ft. pole, you will find yourself with a 130ft. wire in a 104ft. garden. One end is at the lead-in tube of a ground-floor shack, the other on the fence at the far end. If you have more space, you have still more flexibility.

The one point to watch seems to be this—if you bend the wire around, try to avoid bends as sharp as a right-angle. Certainly don't go for anything more acute than this, and keep it less so if possible.

The examples shown in Fig. 2 all represent dispositions of 135ft. wires except the last (E) which is an exercise in cramming a Top-Band half-wave into an inadequate garden. Given a garden length of anything from 100ft. upwards, and pole heights of over 36ft., arithmetic will show you that 270ft. can be accommodated. And if you can arrange so that the centre comes in the vertical portion, so much the better—surprising results have been ob-



" . . . He insists that the garden must be at least 135 feet long . . . "

tained from this "G8ON" type of aerial on Top Band.

Matching Two Wires

For the lucky ones who have lots of space, two wires running in different directions are highly desirable. And the space need not all be your very own, as many have proved. At G6QB there have been two or more wires up at all times during the last twenty years, but the garden has never been big enough to accommodate them. There has always been a useful—but unused—field adjoining the garden, and this has happened at two different QTH's. This, of course, is sheer good luck which will not come the way of many, but neighbours' gardens can often be crossed with inconspicuous wires. (The essential thing in such cases is for relations to be amicable, and this, of course, involves our old enemy TVI! Once that has reared its ugly head, the opportunity has passed.)

With two wires somewhere out there, it is highly desirable that they should be *instantly* switchable—otherwise the directional benefit will not be fully exploited. It has always been found that two wires cut accurately to the same length *can* be instantly switched, without any retuning of the ATU, even if one is higher than the other, or if one has bends and the other hasn't, but one can visualise some circumstances in which (after initially cutting carefully to the same length) one or other of them might have to be pruned by a foot or so to get that desirable 1:1 figure to occur at precisely the same tuning point.

But it is possible to go even better than this. At the moment, there are two wires out, one of 270ft. and the other of 135ft. (only approximately). It is possible to switch straight from one to the other and to maintain matching accurately on all bands except One-Sixty, where, of course, one is a half-wave and the other a quarter, and no one would expect the tuning to remain the same! But the pruning method, as already described, will work on the other bands, and possibly Eighty is the best one on which to carry it out. Patience is needed. If you get 1:1 with one wire and find that it rises to, say, 1.4:1 on the other, determine (a) which is the longer and (b) whether it is better to shorten that one or lengthen the other. But a whole morning, or even a whole day, spent on tracking this down is well rewarded when you eventually find that on all the bands from Eighty downwards you can switch from one wire to the other with no further adjustments. (Perhaps you can allow a reading of 1.1:1 as a tolerance—this makes the job quite a lot easier.)

If the receiver is designed for a 72-ohm input, there is every possible advantage in feeding it through the ATU, with a coax relay positioned as shown in Fig. 1. After adjusting the whole system to match the transmitter at 72 ohms, you will at least know that you have optimum conditions for the receiver also.

And the true assessment of the directional characters of the two aerials will come from the

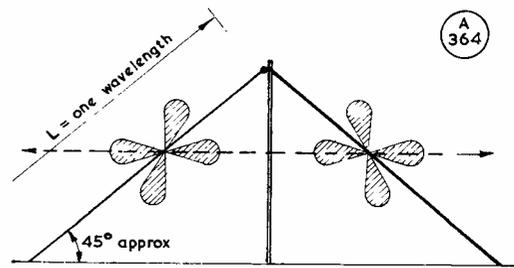


Fig. 3

An inverted V, with each leg one wavelength long (66ft. on 20m., for example) will give a lower angle of radiation in the plane of the wire than a horizontal run, because the main lobes of the two halves will reinforce each other. In theory, the optimum angle with the ground should be 54° , but most authorities agree that a smaller angle is preferable, and will merely change the horizontal (azimuthal) angle at which the lowest angle of radiation occurs.

receiver rather than the transmitter. Tune in a signal, flip the aerial selector switch (which, of course, is between the ATU and the wires themselves) and if there is any marked advantage on one wire compared with the other, that is naturally the one to use on the transmitter.

There are various relays on the market which are suitable for a single-pole change-over operation such as this—choose one with low capacity and a reasonable spacing between the two change-over contacts, *not* the GPO pattern, which is quite unsuitable for high-voltage RF! A type which was freely available on the surplus market a few years back came from an American "Antenna Control Unit," and had a throw of about one-third of an inch. It would operate on 12v. DC, and one has been doing just that in G6QB's shack for fifteen years or more.

Special Case

Now back to the inverted-V shown in Fig. 2 (C). If each leg is 65ft. long, this is simply an 80-metre dipole, fed at one end. As such it will radiate best in the broadside directions. But when used on 20 metres it becomes a special case, since each leg is a full wave on that band.

Advantage may now be taken of the polar diagram of a full-wave wire, with lobes inclined at 54° to the plane of the wire. Fig 3 shows how these lobes will line up in a *vertical* plane, and if the angle between the wire and the horizontal is around 45° , or even less, a very favourable condition exists. The horizontal lobes of each leg of the aerial will reinforce each other in the vertical plane, and will give increased low-angle radiation along the plane of the wire. This, of course, is at right-angles to the best direction when it is used on Eighty. (In practice, it also makes a very effective DX aerial for Fifteen and Ten, and lucky is the man who can put up two of them at right-angles, or even inclined to each other at almost any angle.)

Semi-vertical dipoles, conventionally fed at the

centre, or even fed with open-wire line to make multi-band operation possible, are quite popular, but this convenient method of end-feeding them does not seem to have been exploited very much (judging from the expressions of incredulity when the scheme is mentioned. The usual reaction is "Of course, it won't work, will it?" . . . But it does!).

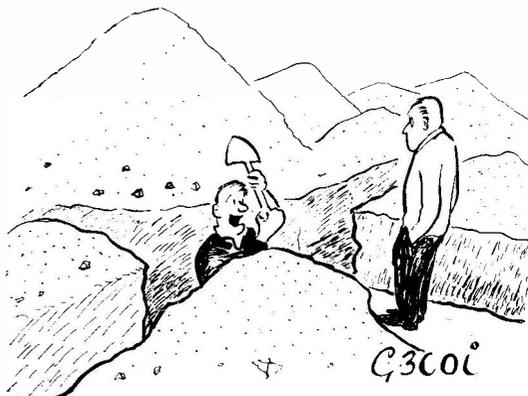
One could say a lot more about inverted V's, but since this article is intended only to discuss various end-fed arrangements, we will make no further comment on them here.

Test of Ingenuity

The whole business of how to feed an aerial is largely governed by circumstances beyond one's control. There must be many amateurs whose shack and garden is so located that they simply can't change the circumstances in order to be purists and use centre-fed types. It is pretty seldom that one comes across a garden with a pole at each end and a convenient shack in the middle . . . quite the reverse is usually the case, with the shack at one end and a choice of location for a pole—either at the other end or in the middle.

These are ready-made cases for trying end-feed, whether in the form of a straight wire or an inverted V. One has, unfortunately, to cut the wire to suit the location; never to tailor the location to suit the wire one wants.

And one final hint—a single sloping wire, failing all else, is not to be despised. If the shack is at ground-floor level and only one pole is available, it



" . . . And if this doesn't improve my Top Band signal, I shall go permanently VHF . . . "

is the obvious thing. And in such cases use can be made, again, of the vertical polar diagram of *one half* of the wire in Fig. 3. A tilted full-wave (optimum angle of tilt, 36° to 45°) can be made to perform quite well. If it is longer than a full-wave the best tilt angle will be less and less, as the wire is made longer and longer.

Final final . . . if you can't do *any* of the things suggested, there's always the self-supporting vertical, and if *that's* not end-fed, what is?

ARRL HANDBOOK, 1966 EDITION

Now in stock, this is again a very fine compilation, covering the whole field of Amateur Radio—theory, design, construction and practice, from HF to VHF/UHF, including mobile, sideband, antennae, receivers and all the rest, right up-to-date in the radio engineering sense. For more than 40 years the *ARRL Handbook* (as the *Radio Amateur Handbook* is known) has been the guide and "bible" for Amateur Radio. Revised every year, it is never out-of-date and, though an American publication, is just as practical for the British radio amateur. It can be recommended as the standard manual and to keep up with progress, most people seriously interested in Amateur Radio technique get the latest one about every three years. The price is 42s. 6d. post free (or 52s. 6d. in hard covers, the "library edition") and is obtainable from our Publications Dept., at Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. Delivery is ex-stock, despatched on receipt of order.

Sq. Ldr. W. H. C. Jennings, G2AHB, RAFVR(T), with his M.B.E. recently received for service to the Air Training Corps (A.T.C.) in the London area. (And if anyone feels inclined to say "Oh, the MBE," let it be said that for real service it is nowadays a distinction very difficult to earn, whatever you may think about The Beatles). Apart from this, G2AHB has his own niche in Amateur Radio as the founder, and for some years the first hon. secretary, of the Grafton Radio Society, now one of the most active Clubs in the country.



DISCUSSING SINGLE SIDEBAND

POWER AMPLIFIERS FOR SIDEBAND WORKING — THE LAFAYETTE MECHANICAL FILTER

Part VI

B. A. WATLING (G3RNL)

POWER Amplifiers are the root of many troubles with SSB rigs. Incorrect tuning, and the feeding into a reactive load are some of the causes of an almost unintelligible signal. Overdriving the PA causes many a heated moment to adjoining QSO's. One of the main reasons for going on to SSB is to decrease the bandwidth of the transmitted signal, thereby making room for everybody. This is no good whatsoever if the transmitted signal is broadened by bad usage of the PA. All the trouble or expense over a filter to eliminate the unwanted sideband can be wasted if the PA is not truly linear. It can cause signals to appear in the unwanted sideband region. Let's take an example: Assume a signal with a carrier at 3500 kc and sideband stretching to 3503 kc. If two tones, one at 1 kc and the other at 2 kc are fed into the microphone socket, the transmitter output should be 3501 kc and 3502 kc. That will be so if the PA (and, of course, all previous amplifying stages) are perfectly linear. Assume that only those two frequencies are appearing at the grid of the PA but the PA is being driven beyond its normal operating level and therefore into non-linearity. As soon as this happens the stage will act as a mixer. The two frequencies will add and subtract as well as their harmonics. Some of these will fall close to the required output frequencies and therefore "splatter" will result. Let's consider some of these new frequencies produced. The second harmonic of 3502 kc when subtracted from the third harmonic of 3501 kc gives 3499 kc. The third harmonic of 3502 kc when subtracted from the fourth harmonic of 3501 kc produces 3498 kc. These two frequencies (3499 kc and 3498 kc) are right where the *unwanted* sideband would have been had you not taken all that time and trouble to suppress it! This effect is termed Intermodulation Distortion and is similar to Cross Modulation applied to non-linear receiver front ends.

Check Procedures

When using linears the most satisfactory method of checking whether you are overdriving is with a 'scope by viewing the output waveform and advancing the Tx audio gain to the point just before the peaks flatten. The unfortunate thing about sideband is that the full scale deflection of the anode current meter is a little over the peak current drawn by the PA. The psychological effect on the operator is for

him, when modulating, to kick the meter up as much as possible. Those with 'scopes will see that if you talk the PA up until the peaks just begin to flatten, the anode current meter will be registering about half the peak current. One says "about half" because it will vary depending on the class of operation the PA is operating in and also the time constant (response) of the meter.

Let's take an example. The most popular valve for low power PA's is probably the 6146. This valve has been designed specifically for operation in Class-AB1. This means that it requires no driving power except that needed to overcome circuit losses. The makers state that the zero signal anode current should be 12 mA if the anode voltage is 750v. and that the maximum signal anode current should be 110 mA. The p.e.p. input is the maximum signal anode current multiplied by the anode voltage, i.e. $110 \text{ mA} \times 750 \text{ v.} = 82.5 \text{ watts}$. With an AB1 PA the maximum signal anode current quoted coincides with the point when the control grid begins to draw current. When the PA is correctly loaded any further increase in grid current should not cause the anode current to increase, except for perhaps one or two milliamps. If it does increase then there is something wrong with the load the PA sees. It could be the aerial reactive or it could be the PA tank components.

On speech the audio gain should be advanced until the grid current meter just, and only just, lifts off its stop. This indicates that the PA is being driven to maximum on peaks. The anode current will be averaging about 30 mA and peaking to approximately 55 mA to 60 mA. Advancing the audio gain will certainly produce more average DC input and more apparent output but the peak output will not increase; only the splatter! The only possible way of increasing the average anode current without overdriving the PA is to use some form of compression. The problem that arises here is the over-

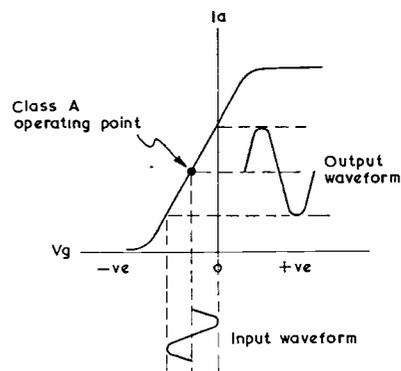


Fig. 1. Anode current, I_a , plotted against grid voltage, V_g , showing the Class-A operating point—this is situated at the centre of that portion of the curve which is near-enough a straight line, extending to the point where the grid voltage is zero.

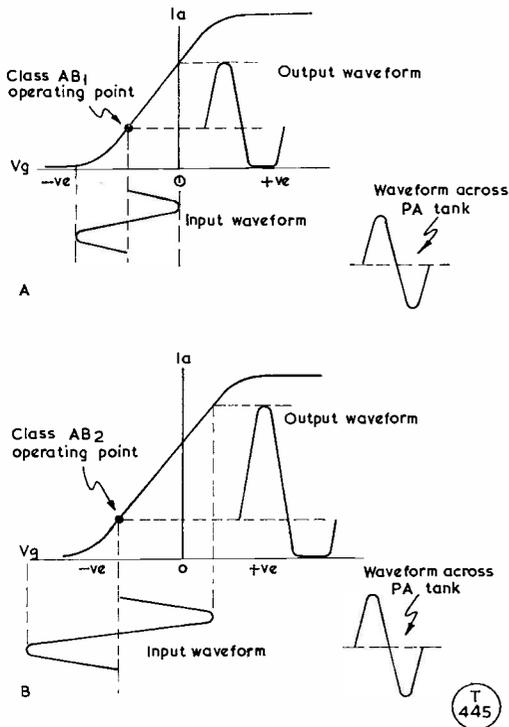


Fig. 2. I_a/V_g curves to show typical operating conditions for Class-AB1 and Class-AB2—notice that in AB2 the grid is driven positive, hence grid current will flow.

running of the PA. The peak input is well beyond the continuous rating of the valve. The reason that it can run like this is because the valve is driven at syllabic rate and therefore its average input does not exceed the rating. Too much compression therefore could mean a substantial decrease in the valve life.

A rough guide then for those without an oscilloscope is to determine the maximum signal anode current of the particular PA you are using and then talk the anode current up to only *half* that value on peaks. Please don't shout when you're calling DX. (The choice piece 5 or 6 kc away will be missed by somebody else !)

In order to decide which PA will suit your particular purpose it is necessary to understand the classes of operation and what they have to offer. Fig. 1 shows a typical curve of anode current plotted against grid voltage. A portion of this curve is approximately linear. If the valve is biased such that the standing anode current is in the centre of that straight line portion then the valve is said to be in Class-A. The required bias can be achieved either by applying a negative standing voltage to the grid or, more usually for Class-A stages, to use automatic bias by inserting between cathode and earth a resistor which will raise the cathode voltage so that the grid

is negative with respect to it by the required amount. Applying a signal now to the grid will either aid or oppose the bias on alternate half cycles and therefore vary the anode current. The output waveform will be an exact replica of the input.

The Class-A amplifier requires no driving power because the grid is never driven positive and hence no grid current is drawn. The disadvantage is that the theoretical efficiency is only about 50 per cent but in practice it's more like 25 per cent.

If we were designing an audio output stage the answer would be to use two valves in push-pull, each being biased such that it only amplifies one half cycle. This could be done with RF but it's cumbersome. The advantage we have is in using a tuned circuit at the output. This has a sort of flywheel action in that if, say, one cycle of a *sine* wave is applied to a tuned circuit, providing the tuned circuit is of high enough Q, the oscillation will be sustained after the signal has been removed. The higher the Q (i.e., the lower the loss) the longer will these oscillations remain. Using this effect for linear amplifiers we must put into the tuned circuit at least half of a cycle to "tell" it exactly what shape of signal we want out.

Class-AB1 and AB2

The next category of PA operation is AB. This means that anode current will flow for just more than a half cycle. There are two types of AB operation; Class-AB1 indicates that grid current *does not* flow during any part of the input cycle and Class-AB2 means that grid current *does* flow for some of the time. Fig. 2 shows the I_a/V_g curve indicating the operating points for these classes.

With the majority of valves up to 25 per cent more output can be obtained by running them in class AB2 but there is a disadvantage. Because grid current is drawn during part of the input cycle this means that the stage requires driving power. In addition the load presented to the previous stages varies,

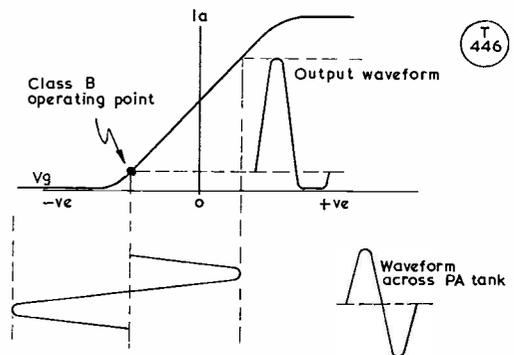


Fig. 3. I_a/V_g curve showing operating conditions in Class-B—the valve is driven well into the grid current region, hence high drive power is required. But efficiency approaches 70 per cent.

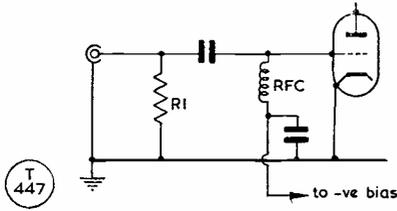


Fig. 4. Circuit for a grid driven linear amplifier using the "passive grid" arrangement.

which again could cause non-linearity there. Certain valves, the 6146 being the most common, have been designed specifically for Class-AB1 working. Very little extra output can be realised by driving them into the grid current region. The advantages with AB1 operation is then that no driving power is necessary, therefore a small driver valve, such as an EF80, is all that is required. The efficiency one can realise in practice with an AB1 stage is about 50 per cent. It varies with the type of valve used. A separate negative bias supply is needed which complicates matters; however it need only be a low current rating supply and it can also be used for transmitter (and receiver) muting.

Finally, Class-B operation. This is the most efficient we can use; the figure approaches 70 per cent in practice. With no input the valve is biased such that the anode current is almost zero—Fig. 3 illustrates. Grid current will be high and will flow for an appreciable portion of the input cycle hence the driving power required is high. Class-B is generally used for high power linear amplifiers following excitors with an AB1 PA capable of delivering about 50 watts or so.

After deciding on the class of operation best suited to your needs, it is next necessary to decide upon the configuration of the PA, either grid driven or cathode driven. PA's in Class-AB1 or AB2 are generally grid driven, while Class-B operation is more commonly found as a cathode driven amplifier. The cathode driven or grounded grid amplifier requires more driving power than the grid driven version but it has the advantage that some of the driving power is fed straight through and appears at the output along with the amplified signal. In fact almost all of the extra power required to drive the grounded grid amplifier appears at the output, so little is lost. This is no consolation if the drive available is low. However, if the exciter has say one or two 6146's in the final then grounded grid offers most advantages—one of these being that the input impedance is low and therefore the exciter will feed straight in, no matching being required. By careful choice of valves, Class-B operation with zero bias can be utilised. This means no negative supply is required and no stabilised screen voltage is needed (this is earthed along with the grid); nor is neutralising required. These advantages mean that a compact high power linear can be constructed at little cost.

Driving A Linear

Feeding a grid-driven linear from an existing exciter with a 75 ohm or 50-ohm output is a little awkward. If the drive from the exciter is limited then the only way of doing it is to feed into a link winding of a tuned circuit in the grid of the PA. This is not too disadvantageous for a single-band amplifier but for multiband work the bandswitching becomes cumbersome. Where adequate power is available a "passive grid" circuit can be employed, i.e. a resistor placed in the grid circuit instead of a tuned circuit, as shown in Fig. 4 R1 in this circuit should be non-inductive and ideally should have a resistance to match the output of the exciter, e.g. 75 ohms or 50 ohms. The difficulty here is that grid driven valves require a fairly large voltage swing on the input. Let's assume that 50 volts is required. Then the power necessary to produce this voltage across a 50-ohm resistor is 50 watts. Added to this of course is the power required to drive the PA, which means two 6146's are required. However, providing the connecting coax between exciter and

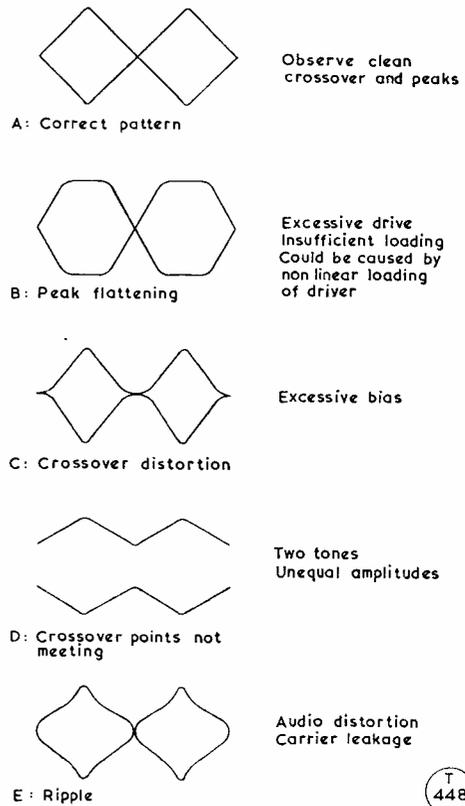


Fig. 5. The oscilloscope trace to be expected when using the two-tone test.

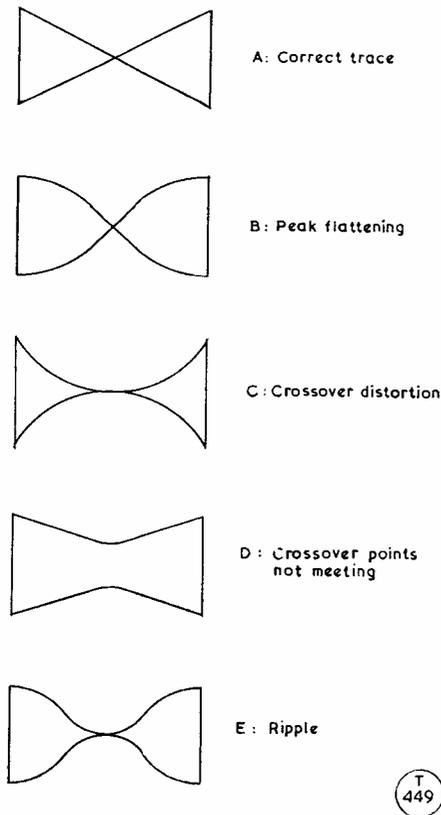


Fig. 6. When using the trapezoidal display, these are the traces to be expected when using two-tone for testing.

linear is short then R1 can be increased to 100 ohms and perhaps a little higher; 100 ohms in the grid of a PA requiring 50 volts to drive it mean 25 watts *plus* the power required to drive the stage. A single 6146 can handle this comfortably. What a waste, though! 25 watts of useful power being dissipated in a resistor which does nothing but warm up the shack (or the components under the chassis hence reducing their life). The choice is yours, which may well be dictated by the valves available.

Oscilloscope Checks

Once you have decided upon and built a PA it is necessary to evaluate its performance. Efficiency can easily be checked by measuring the power output with a dummy load and an RF ammeter. The most important thing you want to know is whether or not the PA is linear. This is where the magical "two-tone test" rears its head. Linearity of the PA cannot be checked with a single tone or single frequency into it. No matter how many harmonics of that frequency are present they will be so far removed from the output frequency that they will

not show up on the 'scope. (They may show up on your neighbour's TV Rx but this sort of test is not recommended.) At least two frequencies must be applied to the PA in order to determine whether these are mixing. The two frequencies must be *sine* waves of equal amplitude separated by about 1 kc and not harmonically related. They can be derived either by using an audio oscillator producing these two frequencies fed into the microphone socket, or an audio oscillator producing one *sine* wave while the second frequency is supplied by inserting carrier. Care must be taken in setting these up. They *must* be sine waves and they *must* be of equal amplitude. The output of the Tx should be connected to the vertical plates of an oscilloscope, a convenient method being by means of a low capacity probe across the dummy load. Fig. 5 shows the traces that you should and shouldn't get.

This method of viewing the output of the linear has disadvantages in that it becomes difficult to see small non-linearities; a straight line indication would be more useful. A method used to monitor AM transmissions in the trapezoidal display. This also can be used for SSB by connecting the exciter audio to the horizontal deflection plates and the RF to the vertical plates. The display will then be a double trapezoid. Fig. 6 shows typical traces. This method can be permanently left in and will provide a useful monitor on voice modulation. A further method, considered by the writer to be most useful, uses two envelope detectors, one at the input and one at the output of the amplifier under test, as shown in figure 7. The amplifier input detector is fed to the horizontal plates of the scope while the output detector is taken to the vertical plates. The resultant trace will (or should, if the PA is linear) be a straight line. Fig. 8 shows typical traces.

PSU Considerations

Before going on next month to actual designs of linear amplifiers it is as well to consider the requirements of a power supply unit. The anode supply has to provide a varying current to the PA. Non-linearity will occur if this voltage varies when modulating. Large smoothing capacitors are there-

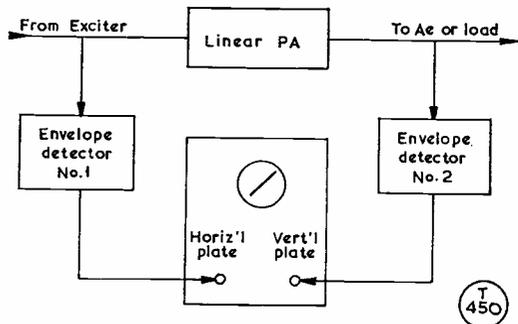


Fig. 7. The set-up to obtain straight-line linearity traces when checking on an SSB rig.

fore necessary, generally in the order of 100 μ F.

The screen grid potential is very critical. Variation of this again can cause distortion products to occur. Stabilised supplies are therefore necessary. Grid bias supplies should also be "stiff." Variation of this changes the operating point and hence distortion can occur. Transformer ratings should be worked out on average current drawn by the PA. This means that a PA drawing say 110 mA on maximum signal needs a transformer rated only at about 60 mA.

(To be concluded)

THE LAFAYETTE
MECHANICAL FILTER

(Obtainable from G. W. Smith & Co. (Radio) Ltd.

RECENTLY a Lafayette mechanical filter came to hand and the following is an assessment made under the same conditions as for the other mechanical filters described in Part 4 (April, 1966) of this series.

This filter, type MF-455-10AZ27, comprises a mechanical filter and associated input and output matching transformers, all mounted on a printed circuit board measuring 2 $\frac{1}{2}$ in. by 1 $\frac{1}{2}$ in. The matching RF transformers are only $\frac{3}{4}$ in. square by 7/16in. high, while the mechanical filter itself is 1 $\frac{1}{2}$ in. long by 19/32in. square. A lot of space on the printed board is therefore unused, which may be thought to defeat the advantage of such a small filter.

Table 1 gives an extract from the specifications of the Lafayette Filter, while Fig. 1 shows an actual plot made of the passband showing figures for side-band attenuation with the carrier placed 300 c.p.s. beyond the 6 dB points. The manufacturers recommended method of connecting the filter into circuit is shown in Fig. 2. At Fig. 3 is shown a circuit of the filter. With any circuit used however the capacity shunting either the input or output of the filter must be kept to a minimum—certainly not greater than 30 μ μ F, otherwise the RF transformer will not tune to the centre of the passband.

This point about tuning the RF transformers leads on to another observation. The adjustment is quite critical because if they are not set up correctly

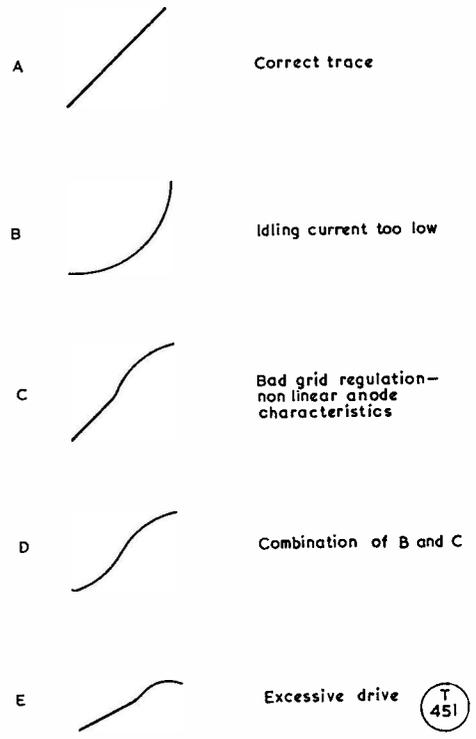
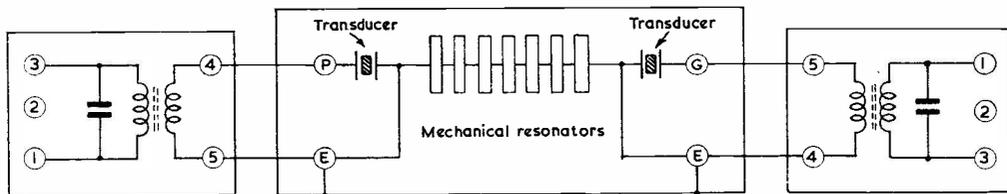


Fig. 8. What you can expect to see when using the set-up shown in Fig. 7.

then the top of the passband ripple can be quite high—about 6 dB to 8 dB at worst. The writer's observation is that the alignment called for is about the same as that required to align a home-built filter. It took as long, in fact. However, this point is probably outweighed by the unit's size in comparison to a home brew type.

Finally the carrier positioning. The makers quote one specific frequency for upper sideband and another for lower sideband (453.5 kc and 456.5 kc).



Internal arrangement of a Lafayette Filter Type MF-454-10AZ27.

T 454

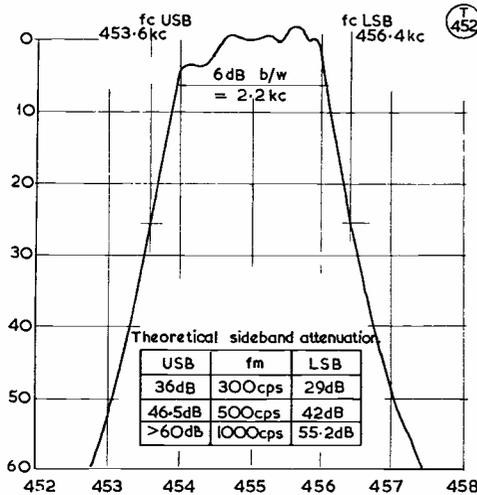


Fig. 1. Plot of a Lafayette mechanical filter—as supplied by G. W. Smith & Co. (Radio), Ltd. at £9 19s. 6d.—under type number MF-455-10AZ27. Observe that the carrier frequencies are those to give an audio response of 300 to 2,500 cycles.

These frequencies are the same for every filter. This means that with the spread of tolerances (± 300 c.p.s.) from the nominal centre of 455 kc, the audio response could be (for a 2 kc wide filter) 200 c.p.s. to 2.2 kc at one extreme of the specifications, or 800 c.p.s. to 2.8 kc at the other extreme. Assuming that the filter described here is typical, i.e. a bandwidth of 2.2 kc, then at the extremes of the specification the audio response could be 100 c.p.s. to 2.3 kc or 700 c.p.s. to 2.9 kc. It is therefore recommended that the carrier crystals be chosen 300 c.p.s. beyond the 6 dB points to give consistently good audio response, as mentioned in Part 4 of the series. Figures for sideband attenuation in Fig. 1 are quoted for those carrier positions. Carrier suppression over that obtained from the balanced modulator is approximately 25 dB.

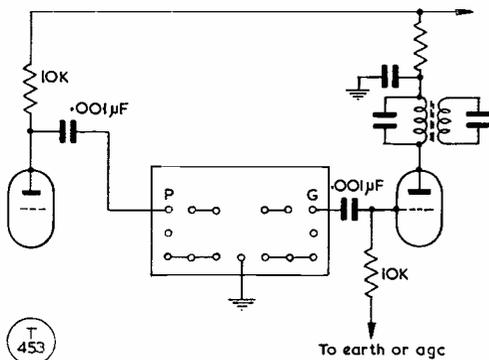


Fig. 2. The method recommended by the manufacturers of the Lafayette mechanical filter for connecting the device into circuit.

TABLE I

Extract from specifications of Lafayette filter type MF-455-10AZ27

Figures in brackets are actual figures from individual data sheet supplied with the assessed filter.

Centre Frequency:	455 k \pm 0.3 kc (0)
6 dB Bandwidth:	2 kc min. (2.2 kc)
60 dB Bandwidth:	6 kc max. (4.79 kc)
Insertion Loss:	3 dB to 8 dB (5 dB)
Termination Impedance:	10,000 ohms
Recommended Operating Parameters	
Signal input voltage:	0v. to 15v. r.m.s.
DC Current:	10 mA max.
DC Voltage:	250v. max.

MATERIAL FOR PUBLICATION

The Editor is always interested to see articles of Amateur Radio interest, and other similar material, that may be suitable for publication in SHORT WAVE MAGAZINE. Manuscripts should be prepared with care and with a proper regard to our normal setting convention, e.g. PA and not P.A., p.a. or pwr. amp.; mc or kc, and not mc/s, kc/s, Mc, Mc/s or kc's; mA, kV, DC, AC and not Ma, ma's, mills., Kv, D.C. d.c., or A.C. All this can be determined by a careful reading of any technical article in any issue of SHORT WAVE MAGAZINE. Articles should be written on one side only of quarto or foolscap sheets, with wide margins and lines double-spaced. Each drawing or diagram should be on a separate sheet, identified only by a Fig. number, with the appropriate table of values also shown separately and identified by the Fig. number and brief title for the diagram—in fact, just as you see it in any issue of the Magazine.

All acceptable material is paid for at generous rates, immediately on publication. And potential contributors should read the note "Authors' Mss." appearing on the Contents page in any issue. Address to: The Editor, SHORT WAVE MAGAZINE, BUCKINGHAM. This is a full and sufficient address, and the only one for Magazine editorial correspondence—but if you have any doubts, use the Post Office recorded-delivery service.

ANOTHER REMINDER

While thanking those readers who have responded to the note in a recent issue about letting us know, when sending in details for the "New QTH" page, whether they are direct subscribers or newsagent buyers, we are still getting a proportion of ambiguous notifications—that is to say, the card-index has to be searched, often unnecessarily, which is of course a waste of valuable office time. It is only necessary to remark, on your new QTH or change-of-address slip, either "I am a direct subscriber" (meaning that you get your copy of the Magazine by post direct from us), or "I am not a direct subscriber". It will save a great deal of time at this end. Thank You!

RTTY Topics

LATEST OPERATING NEWS — CONTEST COMMENT — TUNING FORK STANDARD AGAIN

W. M. BRENNAN (G3CQE)

This is a bi-monthly feature for those interested in radio teleprinter operation and technique on the amateur bands. It discusses technical matters as well as activity and results. The British Amateur Radio Teleprinter Group is the organised body, now with a large and increasing membership.—Editor.

RTTY has, almost overnight, become a recognised and indeed a most desirable activity in the eyes of the various organisations governing and serving Amateur Radio throughout the world. As far as Europe is concerned, the IARU Region 1 Division is urging its member societies to foster the growth and use of RTTY. In other parts of the world, various groups meet in order to organise schedules for radio teleprinter operation sometimes, it seems, with little or no reference to those who actually do the operating!

It is now a very far cry from the days when few wanted to know about, much less encourage, RTTY. At one time it seemed that in this country Amateur RTTY would be banned altogether. This merely served as a challenge to the enthusiasts.

Today the RTTY man faces a much greater challenge—that of improving this communication technique, both from a technical and an operating standpoint. It is a fair bet that in ten years' time RTTY methods will have progressed beyond all recognition—a quick glance at recent development in the commercial RTTY world is sufficient to confirm this. RTTY is at present a very lusty infant. It must now grow and become an adult. As VE7KX once said: "If you are not on RTTY now, you had better climb aboard quick—before it gets too complicated!" In the meantime, who could grudge the handful of original rebels a quiet chuckle over their keyboards?

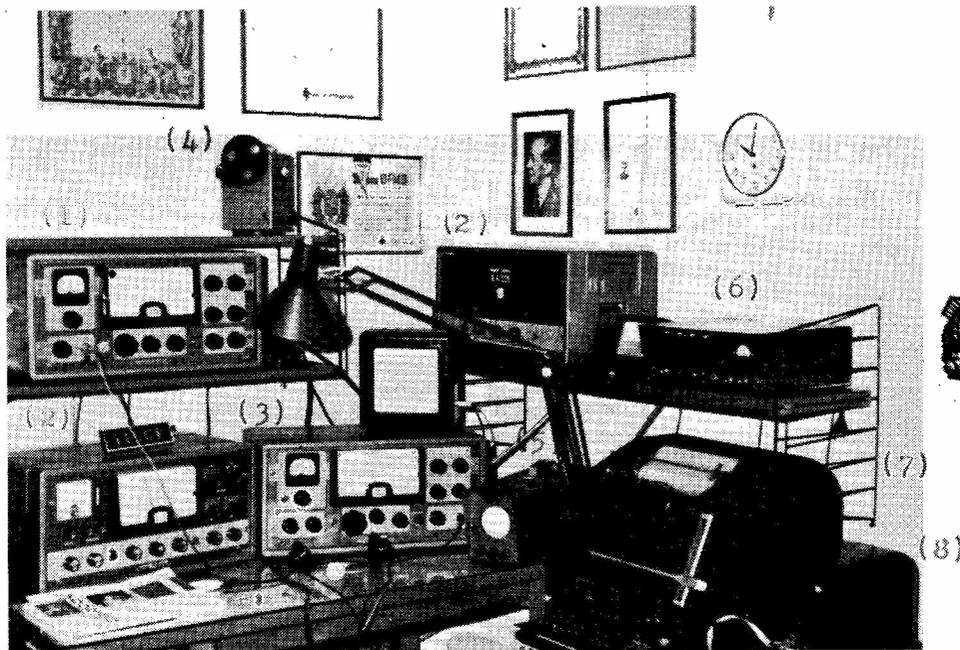
The DX Picture

These days the bulk of the activity is certainly on this front and it can be truthfully said that the level, day-to-day, has never been higher. With the increasingly good conditions we can expect for the next few years on the HF bands the DX operator is going to obtain the highest QSO-to-

operating-hour ratio of them all. Whether you are a country hunter or an inveterate ragchewer, you will be missing something if you can't work these bands. For the country collectors Bermuda is now available; VP9BY added this one by making his debut with W3DKF recently. VP9BY runs a Teletype Model 19 set-up and his HT-32B Tx with a Mosley TA33 beam puts a nice workmanlike signal over to Europe. FG7XT also reports working VP3AA (British Guiana) which adds another country to the list and incidentally topped up FG7XT's score to 53C. Another operator who habitually comes up with new ones is K3GIF and his latest find is KH6BCB/KS4 on Swan Island. KG3IF's total is now at the sixty mark. Another newcomer is SU1KH (Cairo) operating on 20m. Still another country turned up during the B.A.R.T.G. Contest and this is the Dominican Republic with HI8RR and HI8JFT running the same station. Ex-KZSHA is now signing KG6AJP on Guam and is available at weekends on 15 and 20m. VS6AZ (Hong Kong) can also be found on 20m, and whilst this is not the first activity from there, it is the first for several years. FB8XX is now said to be on again after having a bout of Tx trouble on Kerguelen. A husband-and-wife team now active are PY2CQ and PY2SO respectively, and yet another YL operator is UB5GS in the Ukraine. EL2F (Liberia) has been joined by EL2S and EL8B who should help to ease the strain caused by the demand for QSO's. In Japan KA2RJ and KA2LD now have KA9AK with them—he is an operator better known as KR6AK, an old-timer on RTTY, who was active when there were only about three DX stations using the mode! The KA stations are still limited to 10 metres only for RTTY, but W6CG reports that KA9AK and VK3KF have been working cross-band 10 to 15m. FG7XT is reported to be embarking on another of his very welcome Caribbean tours this summer and may be calling at some even more exotic spots. Nearer home, rumour has it that we may see a DX-pedition to the Channel Islands in August and this would put another new country on the air if only for a brief period. G3OUF is said to be behind the idea and if it comes off it is hoped to give more details in the next "RTTY Topics."

Other News

The ARRL has recently recommended that "The use of RTTY emission be converted as quickly as possible to 170 c/s shift in order to achieve better communication efficiency and promote more economical use of spectrum space." No one will argue with the aims of this recommendation but there may be those who would question whether 170 c/s shift is in fact superior to 850 c/s. However, many well-qualified operators will testify that it is provided that at the receiving end the receiver bandwidth can be adjusted to the 250 to 300 c/s necessary in order to take advantage of the narrow shift and give the improved signal-to-noise ratio, along with the greater discrimination against



The RTTY station of IILCF, operated by Dr. Franco Fanti, Via Alberto Dallolio 19, Bologna, Italy, who runs Geloso transmitters (types 220 and 225), the T/P machine being a TG7B Teletype with auto-transmitter head. His main receiver is a Geloso R.209. He also has an automatic "CQ-caller" for RTTY.

unwanted signals. Another requirement is that the frequency stability of both transmitter and receiver must be quite a lot better for 170 c/s than it need be for 850 c/s. A frequency drift that could go unnoticed at 850 might prove a real nuisance at 170 c/s. It may therefore take a little time to convince amateurs who have been quite happy with their results on 850 c/s FSK that they must now set about improving and changing filters, VFO's and the rest. Perhaps a "Narrow Shift Only" contest would help to set the trend?

The supply of secondhand T/P's and associated gear is now very much easier in this country than it was two or three years ago. Even a number of more up-to-date machines, such as the Creed Models 54 and 75, are beginning to find their way into a few shacks these days. The latter is a nice compact piece of apparatus that takes up only a little more space than the average office typewriter. This is something that most amateurs are looking for, since the Creed Model 7 and its later development the 54 are quite large and noisy without their silence covers—but very large if nice and quiet with them. Even those fortunate individuals with unlimited shack space look forward to owning a small noiseless T/P. Apart from the Creed 75, Siemens also produce some very compact machines. The smallest, however, must be those manufactured by the MITE Corporation of the U.S.A. One of these, the AN/TG 14A (V) is, as its number might

indicate, intended for military use. It is the size of the usual "semi-portable" typewriter and can be carried in one hand and it will operate over the temperature range 55 to -55 degrees C. Still smaller is their Model 119, described as a "Micro-Miniature Teleprinter." The overall dimensions of this receiving-only T/P are 4½in. x 4-7/16in. x 10-43/64in. As might be expected, a machine of this size does not print a normal-sized page. It is in fact half the normal page width and the machine is described as a "half-page printer." For obvious reasons this type of T/P cannot have a normal-sized keyboard either, and so it is unlikely to appear as a send/receive model! However, the AN/TG 14A (V) is small enough to turn a RTTY expedition into more of a pleasant outing than the weight-lifting exercise it is at present!

By the time you read this the second "Alexandra Volta RTTY Contest," organised by the SSB and RTTY Club of Como (Italy), will have taken place. In common with other magazines having an interest in RTTY, the rules for this event were received much too late to be printed in advance of the contest date. This is a great pity, particularly as the rules were changed this year and few of those who would normally participate actually knew the rules, or even the date! The Italian boys put a good deal of work into this contest, especially in the final analysis of the results. Contests, expeditions and all special activities thrive on advance publicity and this is usually readily

available. Unfortunately, unlike newspapers, technical magazines like the one you now have in your hand are not written and printed overnight and four to eight weeks advance notice of such events is often required if it is to appear in print in time. Since most of these events are in fact planned well in advance anyway, just a little more effort can make all the difference. . . .

The BARTG Newsletter now runs to some 28 quarto pages—some "letter," in fact. Solely responsible for the writing, printing and mailing of this magazine is G2FUD. In addition to this he conducts a service which informs members when and where various items of T/P gear are for sale and also answers a great deal of correspondence relating to all manner of RTTY matters. Add to this a family and a garden (plus the fact that he has to work for a living, too) and small wonder that G2FUD is now looking for a source of 48-hour days! It is just conceivable that he could use a little help—even if only in the garden!

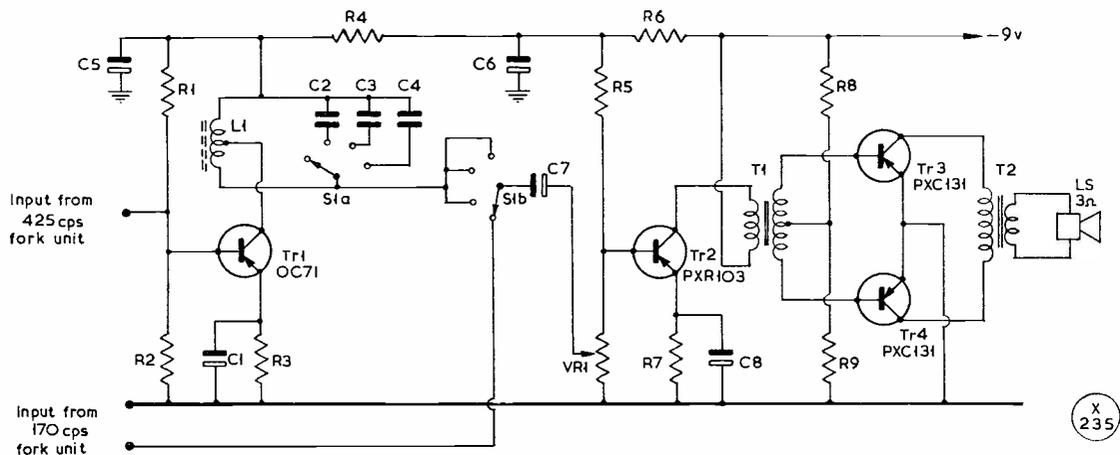
The ARRL is seeking permission for U.S. amateurs to use RTTY in the lower 500 kc of the 28 mc band. At present they are restricted to the portion above 28,500 kc. Since on all other bands they are permitted to use the CW section it seems only logical that this should be the case for ten metres also—even more logical in this case because when Ten is really open the ratio of phone to CW is quite high and the change in the rules would permit better utilisation of this part of the band; 28,090 kc seems a nice frequency for RTTY operation, anyway.

BARTG RTTY Contest

At the time of writing the full scoresheet has not been received but the main facts of the event are

available—and see later. The Contest took place during the week-end March 12-14 and was well supported by stations throughout the world. According to most of the entrants, conditions were good all through the period. The leading stations made use of all five bands allowed, although the contacts on 10m. were generally restricted to short skip, because of conditions on this band. 20 metres was still the main band used but 15m. came a close second. Eighty was also very popular and 40m. did in fact produce a number of DX contacts. Several of the contestants remarked that this band could have been used a great deal more than it was.

The overall winner of the contest was W2RUI who is a real veteran of RTTY contest operation and one who has been hard on the heels of the leading stations in such contests for the last few years. His final score was the record one of 90,720 points. These were collected from some 32 different countries in all Continents. In accordance with the rule that the same country can be claimed once on each band the actual countries score was 42C. Congratulations to W2RUI for a splendid performance. DJ6ZBA came second with 81,060 points and I1ORS took third place with 78,702. Again, G3MWI was the leading U.K. station being placed sixth with 69,498 points. The station making the highest number of QSO's was K8MYF, who had 130 contacts and came fourth with 78,660 points. Stations that worked all Continents were W2RUI, DJ6ZBA, K5OLU, I1KG, WA6WGL and LA6J. The leading Canadian station was VE3AYL who took ninth place with 57,176 points. As the call suggests VE3AYL is operated by a YL and one who is obviously extremely competent with a keyboard. Entries were received from KW6DS, HL9KF, HA5KBP, XE1YJ, OK1KUL and VK3KF. A total of 55 entries was



Circuit of a multiplier-amplifier suitable for the tuning fork standard discussed in the text. Values are: C1, C7, C8, 10 μ F; C2, 0.4 μ F; C3, .006 μ F, and C4, .033 μ F (see text); C5, C6, 15 μ F; R1, 56K; R2, 10K; R3, 1.2K; R4, 500 ohms; R5, 47K; R6, 500 ohms; R7, 470 ohms; R8, 2.7K; and R9, 68 ohms. T1 is 3.5 : 1, and T2, 9 : 1 (see text). Coil L1 is an 88 mH toroid. See text for full discussion.

received, also three check logs. G2HIO, the Contest Manager, mentions a particularly good check log submitted by one SWL from the other side of the Curtain, namely UQ22317/UD6, who printed some 49 QSO's by 27 stations in 14 countries. It is estimated that about 200 stations actually took some part in the Contest and around 40 different countries were available at some time or another. The full score-sheet will be published when it becomes available.

The DL6EQ T.U. Again

A letter from G3LZN brings to light a possible snag that could be encountered by those building the DL6EQ from the printed circuit board—see *SHORT WAVE MAGAZINE*, August, 1965. He writes that on the board he received, pin 1 of both the EL84 valve bases was connected to earth. He points out that with this type of valve pin 1 is internally connected to pin 2 which is the control grid pin! The board used by the writer had had the copper surrounding the pin 1 connected removed and no doubt for this reason. This is therefore a point well worth looking out for and future constructors of the unit can remedy this fault either by clearing the copper away from this pin and leaving it unsoldered or alternatively by snipping off the pin 1 solder tag from the valve base before mounting it on the board. G3LZN's cure was simple and effective, if a little drastic—he merely snipped off pin 1 of both EL84 valves! He goes on to say that although at the time of writing he had only been able to carry out a limited number of tests with this T.U., all these support the encouraging results which other readers have reported. G3LZN has also sent along the circuit of a small PSU for the bias and HT supply to the two keyer valves. This utilises one of the *Radiospares* miniature mains transformers and this circuit will be included in the next "RTTY Topics," in August. As a footnote, the price of these printed circuits and the various extras for this T.U. have recently been increased and those interested should make enquiries before buying—check p.348, August, 1965.

More About the Tuning Fork Standard

On p.19 of the March issue of *SHORT WAVE MAGAZINE*, a simple tuning fork oscillator was described and mention made of additional units from which could be derived a high-level AF output at the 2nd, 5th and 7th harmonics of the original 425 c/s oscillator. In addition a separate fork standard for 170 c/s could also be obtained. The construction of the latter is similar to that already described for the 425 c/s unit and little further comment is necessary except to state that the larger fork will require a slightly greater clearance between the pole faces of the pickup coils and the times of the fork. This may

call for a slight adjustment of the base bias of the OC81 transistor in order that the oscillator is self starting. When buying the fork for this unit, one of a lower frequency should be chosen rather than a higher one since with these larger forks it is easier to increase the resonant frequency than to lower it. The diagram shows the rest of the unit after the two fork oscillators. It consists simply of a harmonic amplifier tuned to either the 2nd, 5th or 7th harmonic of the 425 c/s fork and this is followed by a simple AF amplifier and output stage. The latter is switched to the 170 c/s output when this is in use. The tuned circuit in the harmonic amplifier consists of the well-known 88mH toroid, which is in fact two windings in series. Normally the centre tap between the two windings is not used, but in this case the collector is fed to this point. The toroid is tuned by the appropriate capacitor for the frequency in use. The amplifier is straightforward. The transistors can be of the OC81D and OC81 variety; the ones mentioned were used because they were at hand. The volume control VR1 is a 10K pot. The interstage and output transformers are readily available from many sources. Negative feedback may be added to improve the frequency response if desired; this can consist merely of a 120K resistor connected from one side of the secondary of the output transformer to the base of the driver transistor. The other side of the secondary winding must then be taken to earth via a 10 μ F capacitor.

The whole unit is a very useful addition to the shack and well worth spending a little effort on since it can save a lot of time which would otherwise be wasted trying to hit the right amount of shift!

That must be all for the present—*figs UE and CU 73 de G3CQE.*

SOME CONTEST COMMENTS

BARTG, MARCH 12-14, 1965

"Five new countries—wish the Contest announcements could precede the rat race by at least a month"—W2RUI. Thanks again for a good contest.—WB6RXXM. "I enjoyed the Contest this year even more than last year"—K8JTT. "It was an excellent Contest with plenty of activity, good conditions and plenty of DX"—K3GIF. "Suggest that extra points be awarded for narrow shift. Contest very enjoyable"—W1OUG. "Had a lot of fun in the Contest"—W0HAH. "PA transformer went up in smoke!"—G3LDI. "Civilised hours complete with NAAFI breaks were worked"—G3EJF. "Sure enjoyed the first Contest on RTTY, only wish that I had built up a better T.U. in time"—VP9BY. "Thanks for a nice Contest, it is a very enjoyable and wonderful event"—K8MYE. "Copied many Europeans, HASKBB S9 on 20 metres"—W6AEE. "I will now start clearing paper out the shack"—PA0FB. "Thanks for my first RTTY Contest. I promise to take part in the future"—OK1KUL. "See you next time"—G3MWI. "Conditions on all bands generally poor—consistently strong stations, OK1KUL and HASKBB"—YK3KF. "This was one of the best Contests it's been my pleasure to operate—'Murphys Law' left me alone"—W46WGL. "Il y avait beaucoup de stations et beaucoup de DX sur l'air"—F2LV. "It was a great pleasure for me to join your Contest, hope this will not be the last"—D6ZBA. "I was very proud to work Europe on 80, even though the contacts counted the same as the ones 200 miles away with the U.S.A."—VE2HL.

"Short Wave Magazine" covers the whole field of Amateur Radio, has been established for nearly 30 years, is independent and unsubsidised, and circulates in 80 countries outside the U.K.

Miscellany

That item in the April instalment, about sub-carrier detectors and commercial-free music, as advertised in American journals, is now explained, thanks to Ralph Anderson, W3NL. In the States, standard broadcast FM stations are allowed to "piggy-back" a second channel on the same carrier as is used for their regular programmes. On this second channel, background music for restaurants, hotels and so on, is carried, free of commercials, and the station is permitted to charge users for this service. There is never any announcement or interruption, since station identification is made on the primary channel. As the secondary channel cannot be tuned in on an ordinary receiver, the sub-carrier detector (so-called) is necessary for the "program of commercial-free music."

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The same Ralph Anderson, W3NL, writes on notepaper that is an education in itself. His headquarters is "The Anderson Basement Laboratory," of which he is president, vice-president, janitor and labourer. "No Work Solicited, Nothing Guaranteed" is the slogan, with the extra remark "We tackle anything (even if we know nothing about it, which we usually don't). "And we can't help feeling that anyone who can make that boast probably knows a lot more than some concerns with more pompous stationery and titles.

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The average amateur is 38 around the chest, 40 around the waist, 117 around the golf course and a nuisance around the house (especially during a band opening).

("Auto-Call," Washington, D.C.)

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WWV, that indispensable station of the National Standards Bureau, is being moved from Washington, D.C., to Boulder, Colorado, whence it will be in operation from July 1, 1966. The transition from a "W3" to a "W0" will probably mean that signals are not so strong, or so reliable, in the U.K., but one can see that it will have certain advantages in the U.S.A.

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A sinister affair known as the "mob-curdler" or "people-repeller" was among the security devices recently shown at an exhibition in London. It is guaranteed to put the most ugly mob to flight, and to make armed men drop their weapons in order to

COLUMN IN WHICH ALMOST ANYTHING CAN TURN UP

protect their ears. The output is described as a "pulsing penetrating wail which ranges in pitch from 2,000 to 3,500 cycles, the waveband most unpleasant to the human ear." (But isn't that just what we have been suffering from on 80 metres, day after day, for years and years?)

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It is not generally realised that SSB (single sideband, suppressed carrier) is officially classified as a form of AM (amplitude modulation). The clue is on our own licence forms, where the Class A emissions are all recognised as AM, and the Class F emissions as FM. The Radio Regulations published for the ITU, Geneva, and also the FCC Rules and Regulations in the U.S.A., go a stage further and actually use the words "Amplitude Modulation" as the heading for the column of Class A emissions, so as to leave no doubt. (While one thinks of it, CW is a form of AM, too!) Another respect in which the official list differs from the list on U.K. licences is that Class A0 is mentioned. We are not allowed to use it. What is it? Why, continuous carrier with no modulation. Neither, presumably, are we allowed to use A3B (two independent sidebands).

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Last month it was noted in this column that "some OM's who are 2 kW at the office are nothing but 1 watt at home." We have since been informed that there are quite a number of reciprocal cases—people who are 2 kW (p.e.p.) at home and just about as potent as a BC-221 at the office!

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Dorking Radio Society will shortly be taking the air with their new mobile station, housed in an *ex-GPO* van which they have acquired for the purpose. Intriguing possibilities here?

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Under fire again—the unnecessary use of CW abbreviations and Q-signals by 'phone operators. Quote from *Collector and Emitter* (Oklahoma):—"He's never operated CW and wouldn't recognise his own call at 5 w.p.m." . . . "Then why all the radio-telegraph 'pro-words'?" . . . "Oh, he's just got the usual case of lidity. He throws those words into his conversation to try to make everyone think he's a hot-shot brasspounder, even though it takes twice as long as to say it as in plain English. Always making a simple thing complicated and mysterious—a hangover from childhood, I guess."

COMMUNICATION and DX NEWS

ANY writer of a monthly feature who attempts to predict, or even comment on band conditions has a rough time of it these days. Last month this column started with a description of rather poor bands, but before it was completed a really superb set of conditions was in force. These, however, didn't even last until publication date, and since then they have been up and down again several times.

The fact is that any article strongly orientated towards DX ought to be circulated weekly (or even daily!) during these times of erratic behaviour. Luckily we have the "Communication" aspect going well, now, and the pure DX content (what a joke—ever imagined "pure" DX?) is less and less important.

And need we stress the fact that this is because we know that for every reader interested in putting his score up from 300 to 301 (or 250 to 251) there are hundreds who either don't know what their "score" is, or don't care, or don't even know what it means.

Month after month the majority of our correspondents have something interesting to say (and, we hope, to read) about the normal run-of-the-mill use of the HF bands, where the thing that matters is a good, sensible QSO without any thought of the competitive spirit at all. There are plenty of contests of all kinds, which can serve as an outlet for competition, aggressiveness, and so-called status. The bands, taking them as they come day by day, have far more to offer than the chance of a ten-second "contact" with a supposed "new one." In future there will have to be a clear distinction between "contacts" and "QSO's."

That said, it is time to state that all bands have been up and down so much, during the past three weeks or so, that sensible comment is scarcely possible. From

various professional predictors we gather that the new sunspot cycle is rising, but at a very slow pace indeed; that by the autumn the sunspot number will be, perhaps, twice that of last autumn; but that even this increase may make little difference to the state of the bands, as immediately obvious to the average 'chaser. Short-skip phenomena will of course increase during the summer months, and aurora conditions will be on the up-swing as well, compared with the past few years.

All of which boils down to the fact that there will usually be plenty to work on all bands, but that if you hope to work a particular country, on a particular band, at a particular time, you will need plenty of luck as well as judgment.

Have you ever thought of the word "serendipity" in connection with our unique outlook on life as radio amateurs? A modern dictionary, published in 1965, defines it as "Gift of finding valuable things in unexpected places by sheer luck." Next time you find that ZK2 on Ten metres at breakfast time, work out your serendipity constant. (Your conductor's is virtually zero.)

Skeds and Chance Meetings

In direct contrast to the last paragraph we have the remarkable phenomenon of the *sked*, which makes possible all sorts of contacts that one would otherwise dismiss as impossible. In fact one can go so far as to say that it's the haphazardness of Amateur Radio that makes it so darn diffi-

cult! If you arrange to listen for a signal on a certain day, at a certain time, on a certain frequency, the chances are that you will make it. Not long odds, perhaps, but certainly better than evens.

Time and time again, on a very long-running sked between G6QB and W6EBG, the band has sounded quite useless—full of S9 Europeans and so on, with not a trace of a single W6 coming through. Yet, on the dot of WWV's time-signal and smack on the pre-arranged frequency, there he has been, and a contact has resulted. And this, mark you, at a time which has been known to be quite unsuitable, but the only time convenient at both ends.

Many G stations have now been running DX skeds for literally several years—with VK, with ZL, with W and so on—and they will all confirm that the QSO's usually come off, even in the most unpromising circumstances. If you want regular contacts and a certain amount of independence concerning conditions, fix a sked. If it's serendipity you want, just come on blind and see what's doing. (You might even call CQ, if it's a dead band. If it isn't, you'll merely be joining about a couple of hundred Eastern Europeans all doing the same thing.)

(It was when he had reached this point that G6QB had his seizure.—Editor.)

A 'PRENTICE hand must now take up the narrative, and if you detect anything uneven or uncertain in the touch, you will know the reason why . . .

The tables have been brought

L. H. THOMAS, G6QB

Readers of this feature, and his friends everywhere, will be distressed to hear that Tommy has suffered a sudden and very severe stroke, which for the time being has left him almost totally incapacitated. This attack occurred on May 14, when he had only just started work on his features for this issue. At the moment of writing, G6QB is still in St. Helen's Hospital, Hastings, on the dangerously-ill list. We can only hope for better news in due course.—A.J.F.

up-to-date with all claims received—but, for the benefit of some newcomers, it should be explained that the countries-total is *not* the aggregate of the figures under each band heading, but the number of countries worked taking all bands together, 10-80m., *i.e.*, you only count each country once. To get into the five-band tables, you do not need actually to work on all bands—quite a healthy total can be compiled by running two or three bands only. And another point: The thing is not intended to be even mildly competitive; the idea is simply to record progress, so that those who merely communicate and take their contacts as they come can get some idea of what is possible, band by band. For instance, in the New Cycle Five-Band, it is interesting to note that G3UML (Ilford) leads not only by countries, but he also has the best score on 28-21-14 mc, while G3IGW (Halifax) shows what can be done on 40m. The first column in each table changes from time to time—as shown this month compared with last—so that anyone with a decent score on one band has a chance

for the lead position. The New Cycle also indicates that there is a lot of room for improvement on 28 mc (on which there have been one or two good openings recently).

Looking at some of the individual reports, G3IAR (Sevenoaks) remarks: "I tried an experiment when 15m. was open and worked 45 W's in 2½ hours—on checking I found I had covered 21 States, nearly half-way to a WAS, though I'm not saying that six hours would have produced WAS!"

G3PQF (Farnborough) is also keeping a watchful eye on Ten, on which band G3UDR (Guildford) shows some progress. And on May 15, G3OOZ (High Wycombe) knocked off VP8CY, ZP5KT, VQ3TY, VQ9TC and—ZL2EQ; just like that, all on AM Phone, using only a dipole!

A letter from 6Y5FH (Kingston, Jamaica) recounts his Top Band experiences during last season. Though much was heard that could not be raised, he did work DL1FF as best-DX, with G3RAU, G3RPB and G3TLY logged regularly when the band was open—all called many times,

but no joy. A listener report from GM disclosed that 6Y5FH was being heard in Scotland, and was missing calls made to him—the trouble then being the very high level of static noise, always troublesome on the LF bands in those latitudes. However, through all the pother, Frank did work all U.S. districts (except W6/W7, heard only) and VE2, as well as locals (to him) like HI, CO, ZP1 and KZ4—so he feels fairly happy with his results on 160m. It was his last opportunity, anyway, as 6Y5FH is being closed down towards the end of the year, on return to the U.K.

G3DBH (Hythe) reports that VP8IK is now on from a new base in Grahamland, running 180w. p.e.p. SB and looking for G contacts each Friday evening from 9 p.m. clock, on either 14-18 mc, 7-09 mc or 7-12 mc. (Any G who does raise him is asked to send a card mentioning the fact to Brian Barnes' parents at 55 Grove Way, Esher, Surrey. And this is not "third-party" working—what you must not do is to pass messages.) QSL cards for VP8IK can be forwarded via G3DHB, Col. D. H. Baynam, Signal Wing, School of Infantry, Hythe, Kent—but confirmation may take up to eight months.

From Haroldswick, Unst, Shetland, GM3SVK writes: "Over the next 12 months I shall be operating from the most northerly point in the British Isles." He is running a Heathkit DX-40U, an AR88D receiver and an aerial arrangement consisting of an inverted-V beam for 15-40-80m., a ground-plane for 20m., and a vertical aerial for Top Band—and the location is 800ft. a.s.l. He has already got going well and has worked a lot of DX, presumably on 20m., though in his letter the band is not mentioned.

Oddly enough, the very next report on the file is from GM3KLA, also of Haroldswick, but a couple of miles nearer London than GM3SVK. He writes to explain GM5ABY /DJ5DT, mentioned on p.166 of last month's offering. Apparently, the operator of this station was absolutely genuine, being a student of the esoteric

FIVE-BAND DX TABLE

(New Cycle)

Starting Date: January 1, 1966

Station	Countries	28 mc	21 mc	14 mc	7 mc	3.5 mc
G3UML	164	33	55	140	25	29
G3NMH	141	23	39	128	—	—
G3LZQ	131	2	52	110	24	16
G3IGW	100	1	48	55	44	42
G3IAR	79	3	39	50	36	32
G3UDR	76	5	20	46	2	18
G3UBI	49	2	10	26	5	25
GM3RFR	47	1	11	45	4	1
G3PQF	47	3	5	6	34	24
9V1LP	35	14	22	24	21	21
G3VDL	30(?)	—	1	21	12	5
G13GTR	15	1	3	10	6	7

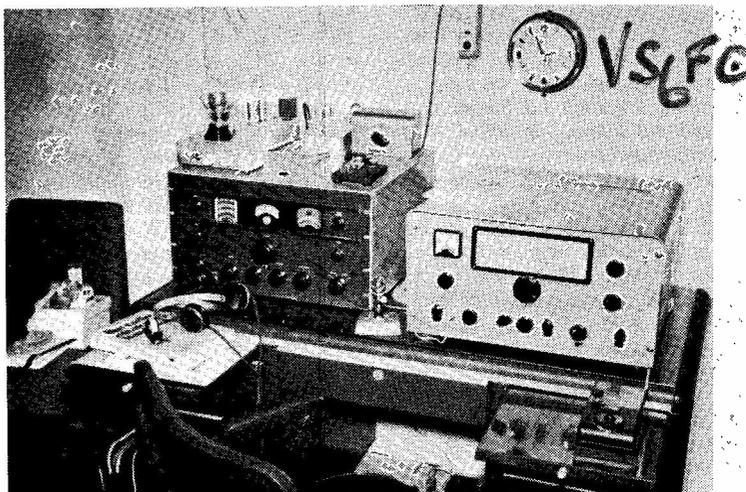
Note: Placings for this month are indicated by "Countries" column.

subject of geophysics, on a short attachment to Lerwick Observatory; being a keen type and (says GM3KLA) a very fine operator, DJ5DT put in for a reciprocal licence, and was able to be on for the seven weeks he spent in the Shetlands.

An amusing comment from GM3VCQ (Fraserburgh): "I have had my licence for about two months now, but I'm having considerable difficulty in getting out, despite my brand-new gear—what with impedance-matching, TVI and other traps for the unwary, I'm just about climbing the wall! But I'm gradually getting genned up to these subjects . . . how about an article or two on these beginner problems . . ."

G3IDG (Basingstoke) is one who agrees that it is worth persevering with 10 metres—he heard a good selection of interesting stuff during the month, and mentions May 1st as a particularly good day, with the band open from early morning till late afternoon. It is quite something to find Ten like this, and an astonishing experience for any newcomer—it is just the DX there, with little or no European QRM, though of course the EU's are on just the same, and can make things difficult at the DX end. G3IDG says "Having fixed the SWL boys up with SLP's, how about a little contest for the followers of C DX N? I suggest a QRP affair, to run for one week on any band(s), scoring to be on the simple basis of the number of stations raised multiplied by the countries worked. This could be a not-too-serious affair in which the SWL's could join." Well, it's an idea, at that.

G3VEK (ShIPLEY, Yorks.), obviously not long on the air, and on Top Band only, says that he is amazed to read about W, VE, VO and ZL being worked on 160m. With borrowed gear, from a good /A location, it took him all his time to raise OK1AS,



VS6FO, of Flat 3, 5 Shouson Hill Road East, Deepwater Bay, Hong Kong is Peter Pitt, G3ICH and ex-DL2SU, ZC4PN. The U.K. call came through in 1951, but postings about the world since has meant that it has in fact been little used. Out in VS6, the gear consists of a K.W. Viceroy transmitter, and AR88D receiver with HF-band preselector (built from a "Short Wave Magazine" article in our November 1964 issue), with dipoles for 21-28 mc and a ground plane for 14 mc. Activity is mainly using CW on 14 mc and since VS6FO was established in October last, more than 120 countries have been worked. In hand is a beam array for 10-15m., and it is intended to pay more attention to Ten before returning to the U.K. in August next year.

though quite nice reports were exchanged. So G3VEK has come to the conclusion that there must be a lot of improvement on the Rx side before he can claim even 10 countries worked on Top Band.

On p.164 of the May issue, Tommy mentioned G3HAL as having had a W6OXJ card for an 80m. QSO that never happened. Now G3HB (Pinner, Middx.) writes in to report the same phenomenon, with time, date and everything—all quite imaginary. So it looks as if there's something phoney going on. Of course, in theory at least, it is possible for anyone to come up with any callsign he cares to dream up—but it would be very difficult to get away with it from almost anywhere in the U.K., because a local signal can always be identified as local by its punch (and there are few places in Britain where there are not

intelligent listeners on the amateur bands within ten miles), and no operator who is regularly heard by anybody can conceal his identity, on either CW or Phone, merely by changing his callsign. But fishy things do happen—and sometimes the desperate communicator goes odd merely to get someone to answer his CQ! (Though this does not explain the "W6OXJ" aberration, since no contact took place).

G3NOF (Yeovil) reports on the three HF/DX bands. On 10m. the openings were (for him) extremely patchy, and confined to a small DX area at any one time. His most cogent remark about Ten is "the band appears dead, then it opens suddenly for a short while, and then it fades out"—it is these openings you have to catch. As regards 21 mc—and 15 metres can also perform in a mysterious and unexpected way at this stage in the cycle—G3NOF says that this band can fade out around 9.0 p.m. and then open again, later in the evening, for strong signals from South America; in the mornings, after breakfast-time, VK's can be heard, and before breakfast, DX like W6/W7, easy to work and

Reporting the HF Bands

clear of botheration by Boris, Vlad or Ivan. G3NOF has at last, thanks to the good conditions recently, achieved the distinction of having Worked All States and Worked All Zones; in effect, this is world-wide coverage—nice going for an amateur station in Yeovil, Somerset.

While we all know that for the Big Boys—those who have been on the amateur bands for years, use colossal power and every trick there is to nail a desirable contact (and how many tricks there are)—a result like WAS/WAZ is the basic stuff, chicken feed, from which you start to build your Ladder Reputation, in fact for 95 per cent of the world's radio amateurs, WAS/WAZ amount to quite something. WAS means "Working All States of the U.S.A.," 50 in all, from Alaska round to Hawaii and back across the West Coast (the W6/W7 area, DX in anybody's language) to the comparative locals in the Eastern U.S., about 3,000 miles away across the Atlantic (and you even have to get *them* through the

barrage of squashy T6 signals from UA, LZ, YU, and the rest of the CQ-pumpers from behind the Iron Curtain). Even more difficult, and much trickier in the DX sense, is WAZ, which means "Worked All Zones," a yardstick of achievement cooked up some years ago by the DX Dept. of our distinguished American contemporary *CQ Magazine*. By this, the world is arbitrarily divided up into 40 zones, clearly identified geographically and by prefix within each zone, the idea being that you work one station in each of these zones to qualify for the WAZ distinction—well, it means finding contacts you can prove from Alaska to the Antarctic, and from Tasmania to Outer Mongolia. None of these areas is impossible but some are very difficult, and can take years to achieve. If you are interested (and this is *not* a sales plug, because we constantly have to reprint it anyway), all about WAZ is made clear by the latest edition of our *DX Zone Map*, which has the additional merit and advantage of being a

great-circle Map of the World centred on the U.K.; in effect this means that you know on which bearing to head your beam to work any part of the world (Vlad, Boris and Ivan permitting) and also gives you a quick and accurate measure of distance. The *DX Zone Map* discloses much else of interest in the DX sense. It is a DX-aid of which we are a little proud, because it is uniquely British and (to save the postage and inquiries from those who may like to have one to put up on the shack wall) it costs 14s. 9d. from our Publications Dept. at Short Wave Magazine, 55 Victoria Street, London, S.W.1. This is *not* an advertisement, but merely a statement of fact for those who may be interested.

General Chat

G5NN (Bletchley) is a very old-timer who, since he received his licence more than 40 years ago, has never worked on 14 mc—until April this year. His third contact (they were all VK's) was with VK5NN and his fourth with VK2NN! A day to remember, as he says . . . and the gear behind it was a NCX-5 and a ground-plane.

G3BHT (Formby) reports that he will be signing G3BHT/M/LX during the period June 18-July 2, with a KW-2000 on the HF bands. He and G3ORK, who is going with him, are also awaiting their ON8 calls.

G3VCM (Leicester) passes on the word that 4X4AC is in the U.K. for about a year, and his QTH is: Avenue Cottage, Warblington Avenue, Havant, Hants. Not being on the air, he hopes for some personal contacts with those who have worked him.

VS6FO writes to say that four "CW stalwarts" are leaving Hong Kong—VS6BJ *en route* for ZD8, and 6FC, 6FE and 6FF all returning to the U.K. Three sidebanders also expecting to leave: VS6DS, 6FM and 6FQ. Pete discloses that the QRM out there from JA-land is just about what we suffer from Eastern Europe, while Radio Peking has colossal harmonics on 14, 21 and 28 mc. TVI, too, is touchy between 5 p.m. and mid-

FIVE-BAND DX TABLE

(All Time)

Station	28 mc	21 mc	14 mc	7 mc	3.5 mc	Countries
G3IVJ	181	263	319	103	83	325
G2DC	170	291	317	170	112	329
G3NOF	132	193	270	34	39	287
G3IGW	123	133	157	119	74	195
G8DI	67	98	141	74	43	162
G3IDG	60	71	54	27	18	102
G3LZQ	55	122	165	57	29	200
G3UML	47	102	203	50	33	219
G3UDR	29	76	122	4	38	152
G3RJB	11	26	113	50	2	120
G3KMQ	10	99	212	101	55	237
G3UBI	10	22	79	10	42	103
G3PQF	9	25	39	63	46	89
VP8HJ	8	57	174	26	11	178
GM3RFR	7	57	101	39	15	117

Note: Placings for this month are indicated by "28 mc" column.

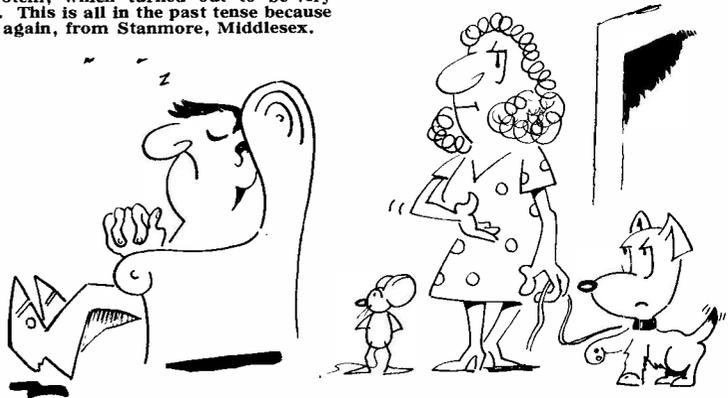


Probably the first G operator with a reciprocal licence, this is G3SBP/KV4, who is also VP2VD and has been 5N2RDG—so David Gynn, Cable & Wireless Ltd., Box 27, St. Thomas, U.S. Virgin Islands, has been getting about a bit. The basis of his KV4 station was a Hallicrafters SR-150 transceiver, with the Mosley CM-1 Rx as a stand-by and for cross-band working. The aerial system, which turned out to be very successful, was a Mosley five-band trap doublet. This is all in the past tense because by the time this appears, G3SBP will be on again, from Stanmore, Middlesex.

It is Tommy who should have been telling you all this. It is on this rather sad note that your 'prentice hand signs off, hoping that the ground has been covered and that you are not too much disappointed by what you have read under this month's heading of "Communication and DX News." For the July issue, pse direct all your news, views, ideas, comments and criticisms to: CDXN, SHORT WAVE MAGAZINE, BUCKINGHAM, ENGLAND—which is a full and sufficient QTH from anywhere in the world—to arrive by not a day later than **Monday, June 13**. For those who signal by airmail, the closing date for August issue will be **July 18**. Keep the heat on Fifteen and Ten, and regard the blank spaces as useful listening time. 73, es tnx for your attention.

night local time.

Hong Kong is a very difficult location to work from, because of the local terrain. If you're south of "The Peak" you can't raise Europe; if you're north of it you can't get out southwards. (And there's nobody on the top of it!). Pete is actually thinking of trying Top Band next winter, although (for no reason that they can discover) the VS6's are limited to 10 watts. In compensation, maybe, they have "a bit of the 6-metre band"—but no activity at present, the same applying to VHF.



TOP BAND LADDER		
(G3T-- and G3U-- stations only)		
Starting Date, January 1, 1966		
Station	Counties	Countries
G3UAN	64	13
G3UTS	64	10
G3UBW	57	16
G3TXZ	55	11
G3TTK	43	12
G3UMK	39	7
G3UCS	36	?
G3USE	30	5



"... Just heard that Ten's wide open ..."

SOME ERRORS HAVE CREP' IN

In his article on p.143 of the May issue, G3HMO points out that the transistor types OC71 and OC171 should of course have been described as p.n.p. (Line 6 and Fig 2 refer). Likewise, the last paragraph refers to reverse polarity transistors, which are n.p.n. And G3RZP mentions that, in connection with the multi-meter itself, certain types do not exhibit the polarity as stated by G3HMO.

G3MYT writes to say that, in his article "Transistorised Converter for Two Metres," also in the May issue, on p.139 the inner diameter of coil L1 should have been given as 3/8in. and transistor Tr3 in the circuit diagram drawn as an n.p.n. (arrow pointing away from base), with the *emitter* side connected to R8/C7, and not as shown.

SPECIALLY ON THE AIR

This space is available for those radio amateur groups who are installing a demonstration station for some public occasion. Much of this sort of thing goes on, up and down the country, especially during the summer months, and is very important in giving the great British public some idea of what Amateur Radio is all about—for it is only too true that the GBP has very little idea, our art being regarded by many people as something vaguely mysterious, or even a little cranky.

Groups wishing for publicity here are asked to set out their notices as shown below.

G3PAF/P, June 11 : At Cantley Manor Doncaster, on the occasion of 58th (Bessacarr) Scout Troop gymkhana. Bands worked will be 15-160m. QSL's and details: G3PAF, *QTHR*.

GB3MC, June 11-14 : Operating in connection with the Malvern College Commemoration Weekend, on all bands 70 cm. to 160m. Skeds on VHF/UHF are specially requested and can be arranged with G8ADU, *QTHR*. Further information from: C. Angell, Bericote, Malvern, Worcs.

GB3RCS, June 25-26 : Operating on the occasion of the annual Royal Signals Reunion at Catterick Camp, Yorkshire, with simultaneous working on all HF bands, and two metres. Contacts with past and present members of Royal Signals will be specially welcomed, and all stations worked will be QSL'd. J. E. Hodgkins, 2 Sqdn., 8th Signal Regiment, Catterick Camp, Yorkshire.

GB3DCL, July 2-10 : At the Sports Pavilion of the Distillers Co., Ltd., Saltend, near Hull, Yorkshire, in connection with their Annual Gala Day, and arranged jointly by the D.C.L. Amateur Electronics Section and the Hull & District A.R.S. Operation from noon to midnight on all suitable bands 10-160m., AM/CW/SSB. Calls G3PJR and G3UIF will also be used. For QSL's, skeds and

details, write: M. Ellis, G3PJR, 351 Willerby Road, Hull, Yorkshire.

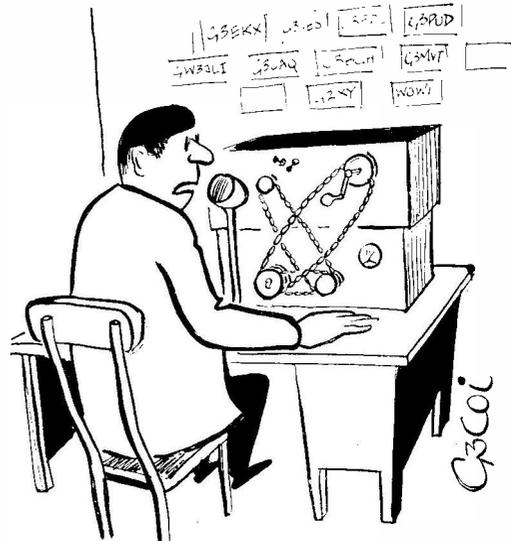
GB3PAS, July 19-21 : At Peterborough Agricultural Show, a demonstration station working 80m. and other bands. All visitors welcome at the Sports & Hobbies section. Further details from G3KPO, *QTHR*.

GB3WIJ, July 29-August 7 : Operated by the Salisbury & District Short Wave Club for the Wiltshire International Jamboree at Ogbourne St. George, when about 2,000 Scouts from several countries will be present. Contacts and skeds will be welcomed, and can be fixed with: D. Hobbs, G3OBW, 5 Norfolk Road, Salisbury, Wilts.

GB3FRC, August 13-15 : Organised by the Fylingdales Radio Club in connection with the Amateur Radio exhibition at Spa Gates, Whitby, Yorkshire N.R., running commercial gear on all bands 15-80m. All contacts will be QSL'd with special care and visitors will be made very welcome. Details from: W. Burton, hon. secretary, Fylingdales R.C., 14 Westbourne Road, Castle Park, Whitby, Yorkshire.

It is very much regretted that, due to circumstances outside our control, it has not been possible to present the usual "VHF Bands" feature this month. It is hoped to make the next offering in the July issue, for which the closing date is June 18, to SHORT WAVE MAGAZINE, BUCKINGHAM. A.J.D.

"... and of course we're following the modern trend and using a transceiver ..."



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GD6UW, ISLE of MAN

ANOTHER VACATION SAGA

J. A. LUSH (G3TGY)

IN several previous years the Cambridge University Wireless Society has run an expedition to the Isle of Man with the main idea of giving a new prefix to as many stations as possible. A group of this year's freshmen decided that this was a tradition worth reviving, and began to make plans accordingly. Some manufacturers were approached about the loan of equipment, and by the start of the Lent Term several favourable replies had been received. We planned to stay at the same boarding-house as the previous expeditions, and to set up the HF-band station there. VHF operation was to be from the Ministry of Aviation radio station on top of the island's highest peak, Snaefell.

Despite a last minute hitch which resulted in many 'phone calls and transatlantic cables, most of the equipment was on hand by the end of the term. A 264-foot long wire had been cut, and an 80 metre/40 metre parallel dipole arrangement made up and tested. These antennae were wound, complete with feeder on to old cable drums. A liberal supply of coax was taken along, and it found many uses other than those for which it was intended!

It was decided that the expedition would travel in two parties. The first group, of five, was to go over to the Island on March 10, in time to operate in the 'phone section of the ARRL DX Contest the following weekend. The remaining four people would bring the VHF gear over during the next week.

On the Air

The boarding-house turned out to live up to its name of "Grand View" in all directions but the West. A rapid survey of the area around the house revealed an almost disused allotment field at the back, well-provided with climbable trees. Within an hour of leaving the boat the dipole was up, and the 264-foot aerial followed after a much-needed meal.

Quick tests showed that nothing was greatly amiss, and before long G3UJ's Top Band rig was busy with a string of G's. G6UW's ancient Eddystone S.640 performed remarkably well on this band. The NCX-3, on 80-metre SSB was proving rather troublesome on change-over from transmit to receive, but it was soon realised that this was being caused by low mains voltage, and the trouble cleared on changing the tap on the auto-transformer. We were pleasantly surprised by the lack of interference between the two stations, except, of course on close harmonic frequencies. By 0200 the next morning the call of our beds had, for most of us, become stronger than that of the DL's on Eighty, but G3VBL, who did stay, up, was rewarded by working across to the U.S.

The following morning no time was lost in putting up the Mosley trap vertical. This was lashed

to a gutter, some thirty feet above ground. The aerial loaded very well, but before long it was realised that we were having great difficulty in working the States. Plenty of other stations were coming in at good strength, however, and we were never short of calls. Several positions were tried, but we soon came to the conclusion that the two-hundred foot rise at the back of the house was cutting off the vital low-angle radiation. We had also been lent a TA-33Jr. beam, but unfortunately we had no means of getting it up high enough to be of any use.

Portable

Ever since our first night in the Isle of Man we had received a great deal of help and advice from the local amateurs and with their help a 20m. portable station was set up one afternoon near Kirk Michael, on the western side of the island. Some twenty stations were worked on the key, using GD3PRO's KW-2000. This certainly confirmed our suspicions about the hill at the Douglas QTH.

We had also learned the importance of first-class earthing if more than one station was to be used at the same time. After the installation of a switching system for the various aerials severe interference was experienced, and this could only be cured by running a length of the ubiquitous coax to the landlady's kitchen tap.

ZB2/GD "First"

The total number of contacts from GD6UW was 863, of which 359 were on 80 metres; 282 on Top Band; 159 on Twenty; and a mere 63 on 40m. Operation on Top Band was mainly CW; on the other bands the majority of contacts were on SB. States-side contacts were rare on Twenty, and we worked almost as many W's on Eighty!

The main achievement on 160m. was the ZB2/GD "First" on this band. ZB2AM was RST-349 with us, and gave RST-559. (19/3/66; 0155).

On Snaefell

The second party arrived on time, and within 24 hours had the VHF station fully operational. Most of the gear was borrowed from the Pye Amateur Radio Society in Cambridge. An EC-10 on loan from Eddystone Radio was used as the tunable IF for both the two and four-metre stations. On four metres we ran 40 watts to a QQV06-40A, feeding into a J-Beam, three-element array. The two-metre rig ran 30 watts to a QQV03-20A, feeding a six-over-six slot beam from the same manufacturers.

The call-sign used was GD3SKT/A, in order to permit operation at the same time as the Douglas station, about ten miles away.

The limiting factor on the VHF receiving side was external hash. Undoubtedly we missed many QSO's because the signals were masked by the QRN. A fair number of skeds had been set up for both bands, and most of them were successful. One of the notable exceptions was that with ON4FG—nothing heard at either end, so we shall have to wait until next year for another try for the ON4/GD "First." Another such that was missed—although

by a very narrow margin—was GC/GD on four metres. We in fact heard GC3OBM on sked peaking RST-439, but unfortunately we missed our report, although GC3OBM was hearing us RST-559.

VHF Summary

In all, 66 stations in 21 counties were worked on four metres, and 77 stations in 24 counties on two metres. The best DX on Four was G3OUF and G3SKR at 260 miles, and on Two was G5MR at 310 miles.

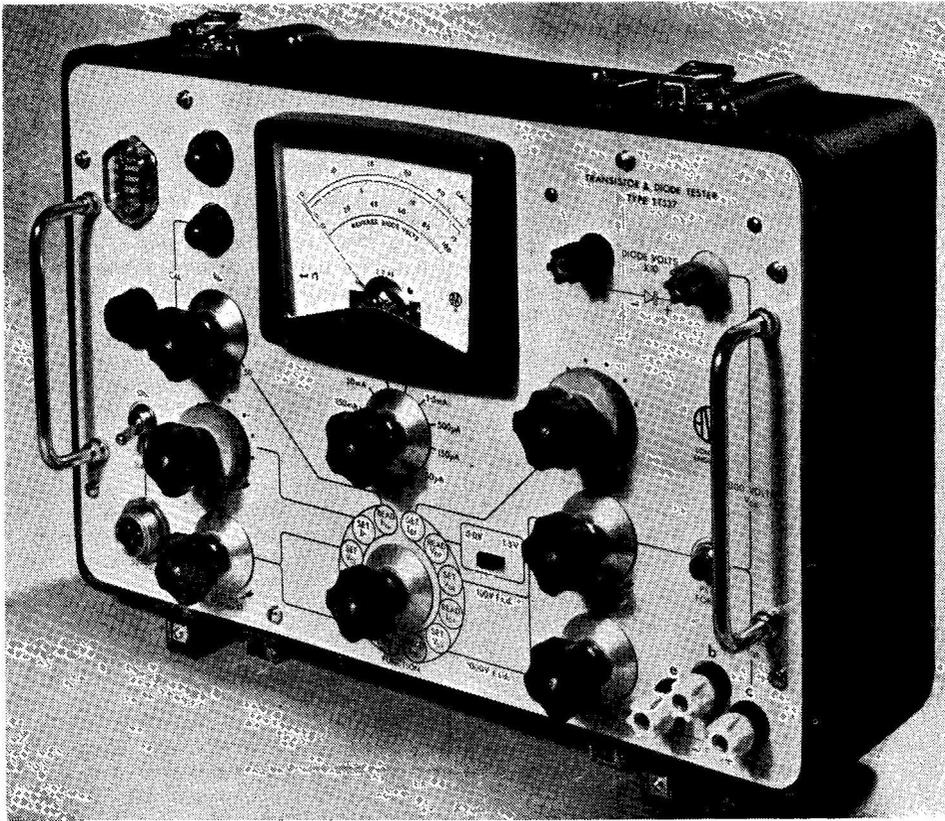
Since about one-in-three of the two-metre stations worked asked for a 70 cm. QSO, an effort will be made next time to take along some equipment for this band.

All contacts are being QSL'ed and all the cards should be well on their way by the time this is in print.

As it happened, all the members of this year's expedition were licensed—one since just a week before the start of the expedition. The operators were G13FCB, G3RUZ, G3SKT, G3STQ, G3SUC, G3TGY, G3UDI, G3VBL and G5AAE/K9ALP: Lou, the last mentioned was truly glad to have a chance of operating CW without the cumbersome call-sign.

Acknowledgements

We should like to express our gratitude to the manufacturers who made the trip possible—Eddy-stone Radio, K.W. Electronics, Mosley Electronics; and to the Pye A.R.S. for the loan of the VHF gear, and to G3UJI for his 80/160m. Tx. Last, but by no means least, our sincere thanks to the BBC and Ministry of Aviation staff on Snaefell, to all the GD's and to Mrs. Jordan, our long-suffering landlady.



The new AVO Transistor and Diode Tester, type TT537, provides for comprehensive diode and transistor evaluation, with the measurement of the reverse characteristic at voltages up to 1000v. (under current limiting conditions). The circuitry and control arrangements are such that accurate measurements can be quickly made with the minimum of setting-up. The controls are labelled in such a way that operation of the instrument is largely self-explanatory. Circuit protection is built in, so that Type TT537 can be used by unskilled personnel. The collector voltage allowed for is 0-12v., stabilised and metered, and the collector current is 0-1 amp., also metered, on a 10-range meter, reading from 1 microamp. upwards. The general finish and appearance are characteristic of the high quality of AVO products.

“NOT GUILTY, Mrs HOGSBY”

A CAUTIONARY TALE

G. DOBBS (G3RJV)

THERE I was, sitting at the table enjoying my tea after a hard day's work. Fortified by egg and chips, cheered by my favourite Eccles cakes, and thirst quenched by a strong cup of tea, I was carefully trying to spread as much strawberry jam as possible on to a piece of bread and butter when the door-bell rang.

“I'll get it,” said my mother. So I returned to the problem of evolving a method to increase the viscosity of strawberry jam thereby improving its loading properties on bread.

“It's Mrs. Hogsby, for you.” “For me?”

My heart sank as I thought of Mrs. Hogsby, she of the over-modulation and 807 figure.

“What have you bin doing with your wireless stuff!”

She struck me on my most sensitive spot. She must have heard how I hated the term *wireless*, conjuring up pictures of jam jars, accumulators, and men wearing whiskers and headphones. But to call my station “stuff” was the final crunch. It would not have been so bad had it been Government surplus or even commercial gear, but it was home-built and the pride of my life.

“Nothing,” I choked, my mouth full of bread and jam.

“You must be, there's lines on me telly.”

I thought of making a snide remark about going to BBC-2 and increasing the aesthetic nature of the picture, but looking at her red face I decided against it.

“Little white bars across Alan Freeman's face,” she said.

“But I've been eating my tea.”

“Well, you must have just switched off an' started tea.”

I was going to begin an amusing and intimate description of how I had switched off my station, gone down stairs, washed my hands, eaten my egg and chips (remains still on the plate), demolished a cup of tea (exhibiting empty cup) and spread my bread with jam—all in the two minutes she had taken to travel from her set to my tea table. However, I had to decide that humour was out with Mrs. Hogsby.

“I'll come round and look at the picture; if I'm in the room when it happens it can't be me.”

Mr. Hogsby looked up from his television set and repeated the charge.

“Look what you're doing to our telly, lad.”

Sure enough the offending patterns were flashing on and off the screen accompanied by a *brr-brr* from the speaker.

Brr-brr-brrr-brr-brr-brrr-brrr-brrr-

“See it's Morse, it must be you!”

“But I'm here! I can't be in this room and next

door at the same time, can I?”

“Well it's ruining my telly picture,” said Mr. Hogsby, switching off with the ritual flourish that such a serious action demands. But the CW *continued* in subdued sound! *Brr-brr-brr.*

“What's that noise in the next room?” I asked.

“Must be Kevin.”

We went into the next room and found Kevin, a spotty-faced lad of serious demeanour, learning his Morse. He pounded with slow deliberation at a large plastic pump-handle, listening to his efforts on a particularly harsh buzzer.

“That, Mrs. Hogsby, is your interference.”

“But Kevin's only practising his Morse for Scouts.” After a suitable explanation with experimental evidence, I talked myself out of the situation. However, that night I did not go on the bands. I was not afraid of TVI, but instead I made an audio oscillator for Kevin. He soon picked up Morse, he's very keen, a bit too keen, if you ask me—because if he gets a ticket he'll be right next door.

“DO YOU KNOW THAT”

The flow of ideas suitable for this feature having diminished somewhat, we would remind readers that we are still interested in seeing them for possible publication under the “Do You Know That” heading. The requirement is for some practical idea or suggestion that can be described in two or three sentences—no drawings or diagrams. A good sample of the sort of thing we can use appeared in the April issue of the *Magazine*. Payment is by 10s. 6d. postal order, on publication. Address to: Editor, SHORT WAVE MAGAZINE, BUCKINGHAM, on a separate slip marked “D-Y-K-T,” with name, QTH and call.

“ADVICE FOR BEGINNERS”

This is a constantly recurring theme—and is as difficult as ever to satisfy. Our first advice is always: Join the local radio club, if you can and there is one. To find out, enquire at either the Citizen's Advice Bureau, or the local office of the Education Authority, or the town's newspaper office—that is, if you have already searched the Club Secretaries' address panel in “Month with The Clubs” in any issue of the *Magazine* and failed to find your locality mentioned. You can almost always make contact with other enthusiasts in the neighbourhood by a discreet advertisement in the local paper.

For reading, we can confidently recommend the *Guide to Amateur Radio* (5s. 7d.); *Radio Amateur Examination Manual* (5s. 9d.); *Radio Amateur Operator's Handbook* (5s. 6d.); *Short Wave Radio and the Ionosphere* (11s. 9d.); *Amateur Radio* (31s. 6d.); and the *Radio Amateur Handbook*, 1966 Edn., pp.650 (42s. 6d.). Prices quoted are post free and all titles are obtainable, from stock, of the Publications Department, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1. In general, orders are despatched by return.

• • • The Mobile Scene • • •

The A.R.M.S. event on May 22 at Barford took place under near-storm conditions, preceded by a large-scale power failure the evening before. However, it was well supported, with a big trade show—more details next issue, as we are now right on the deadline.

June 5: Pembroke & District A.R.S. annual party at the Regency Hall, Saundersfoot, Pems., with talk-in on 1876 kc and two metres. Events include a D/F contest and (tide and Wx permitting) a boat trip round Caldy Island, also /M rig competitions, and a £5 prize for the amateur making the longest journey for the Rally. Further information (s.a.e.); J. Allen, GW3TUD, Coles Corner Café, Saundersfoot, Pembrokeshire.

June 19: Northern Amateur Radio Mobile Society's annual Rally at Harewood Park, near Leeds, opening at 12.00 noon, with talk-in on 160m. by G3OGV/M and on two metres by G3GJV/M. There will be the usual competitions and raffles, as well as a number of trade stands, with refreshments available on site. Details from: D. Binns, G3MGI, 80 Gipton Wood Road, Leeds, 8.

June 26: Hunstanton (Norfolk) bucket-and-spade party, meeting on the sea-front. Details from: J. G. Taylor, G3SAW, 42 Station Road, Heacham, Kings Lynn, Norfolk.

June 26: Ninth annual West of England Mobile Rally at Longleat House, near Warminster, Wilts. (where the lions are now in residence), with talk-in on the 2-4-160m. bands. Information: J. Thorn, G3PQE, 6 Plumtree Close, Winscombe, Somerset.

July 10: Wessex Amateur Radio Group Mobile Rally at Hurn Airport, near Bournemouth, in conjunction with the British Aircraft Corporation Radio Club. There will be plenty to see and do, as this is also the B.A.C. Open Day. For information apply: W. G. West, G3MKN, 23 Palmer Road, Poole, Dorset.

July 10: South Shields (Co. Durham) Mobile Rally (details later).

July 17: Worcester & District Amateur Radio Club Mobile Picnic (details later).

July 24: Cornish R.A.C. annual Mobile Rally at Pentire Headland, Newquay, Cornwall, opening at 11.00 a.m. with talk-in on 2-80-160m. Close to safe and sandy beaches, with adequate cover if wet. There will be an equipment display and what are described as "sideshows." Details from: M. J. Harvey, Oak Farm, Carnon Downs, Truro, Cornwall.

August 14: Derby & District A.R.S. Mobile Rally, at Derby (details later).

August 28: Bromsgrove & District A.R.C. Mobile Picnic (details later).

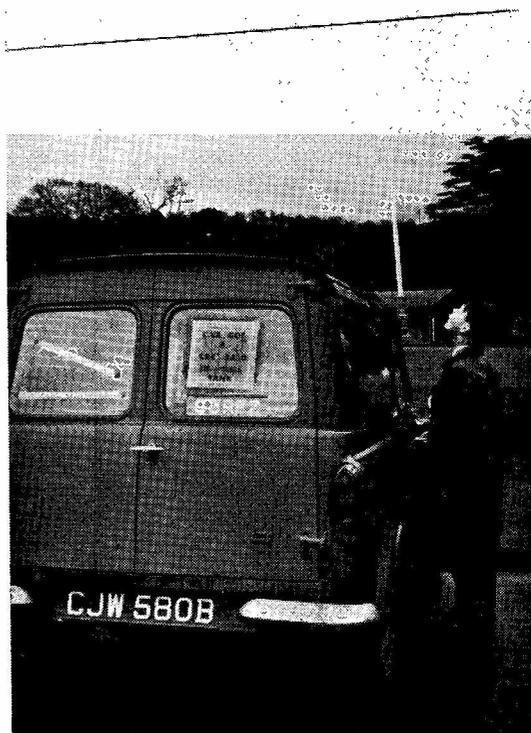
August 29: (Bank Holiday). Peterborough Mobile Rally, with talk-in on 1980 kc and the 2-4m. bands. Plenty of free parking and picnic space, on the river bank. Information from: D. Byrne, G3KPO, Jersey House, Eye, Peterborough, Northants.

September 4: Swindon & District A.R.C. Mobile Picnic at Lidiard Park, just outside Swindon, Wilts. (details later).

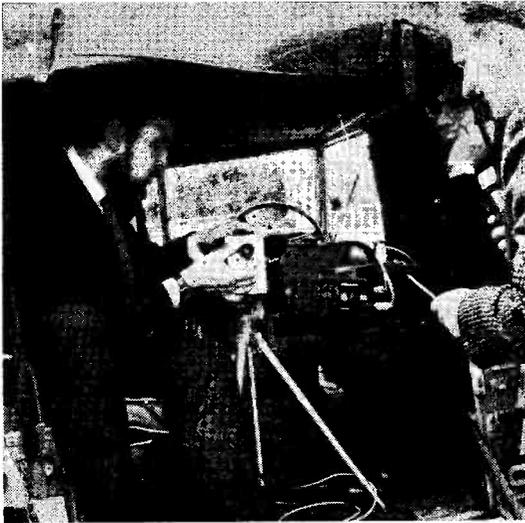
September 11: RSGB booking, Woburn.

September 16-18: International Amateur Convention and Mobile Rally at Knokke, Belgium, with three-day programme of meetings, demonstrations, parties and tours, at all-in prices. Further details later. U.K. amateurs will be able to obtain full information in due course from: J. C. Foster, G2JF, Wye College, near Ashford, Kent.

September 25: Harlow Mobile Rally.



At the Trentham Mobile Rally, the new CSE 2A10 equipment was fitted in this van, complete with the very handy aerial installation. It is understood that a receiver to match the 2A10 is in course of production.



The Slade Radio Society (Birmingham) had an amateur TV demonstration at the Trentham Mobile Rally, under the leadership of G3JZF/T. Their Land Rover was equipped to transmit sound and vision simultaneously while fully mobile round the ground, reception being on the Society's stand in the gallery of the exhibition hall. The operator here is G6ABH/T, who has the rare distinction of holding a /M permit for A/TV—and actually uses it. The Slade team is completed by their very competent lady-interviewer, Grace Wilson, who has developed a technique of her own for these events.



One of the local groups supporting the exhibition at Trentham was the Lichfield Amateur Radio Society, with G3LNN standing guard over an SSB exciter built by G3PLD, and an HF-band linear amplifier by G3NLY.



One of the talk-in stations for the Trentham Rally was G3GBU/A, operated by the Stoke-on-Trent Radio Society on 160 metres. Many mobiles were talked in, and when this picture was taken the operator was G3TZW.

IDEAL FOR PORTABLE/MOBILE

A motor-cruiser on the Broads, or anywhere on our system of inland waterways, is just about ideal as a base for portable operation—particularly if you already have, in the car, /M gear that can easily be taken out. All Broads cruisers have a hefty 12-volt lighting and starting battery, charged from the main engine, which would be quite capable of running an LF-band mobile rig, particularly if it were

transistorised. Even a transceiver with a 12-volt PSU, such as the KW-2000A, would be a possibility—though in this case the battery load would of course be much heavier, and it might be necessary to carry a second large acc., or to run the main engine for charging while moored. (Not really recommended, because of noise and the petrol consumption!) A

mobile whip type of aerial is easily contrived on a boat—and, of course, you have a perfect earth by dropping a copper or aluminium sheet over the side, on a length of heavy rubber-covered cable. On inland waters, operation of this kind is quite permissible under the terms of the ordinary U.K. "A" Licence, using the /P suffix.

THE EDDYSTONE 888A

SOME MODIFICATION NOTES

In the January issue of SHORT WAVE MAGAZINE, on p.678, there was mention of certain improving modifications to his 888A carried out for SWL G. Haynes (Hythe, Kent). As there are many 888A's in general use, the notes herewith—covering some easily-applied alterations—will probably be of interest.

Looking at the diagram, at (A) is the silicon diode PSU arrangement, made up as a plug-in unit for the original V10 valveholder. The purpose of this modification is to give a better HT output with less heating.

To eliminate possible spike effects, a filter can be fitted to the main transformer primary, as shown in sketch (B). The circuitry at (C) is described as a "stabiliser valve unloader," fitted to divert current from V11 and reduce general receiver heating.

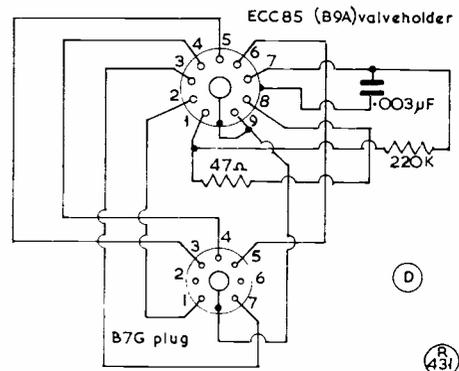
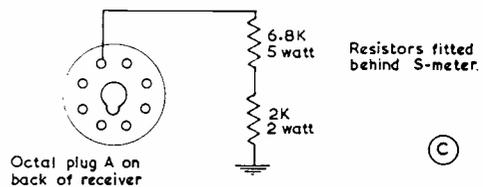
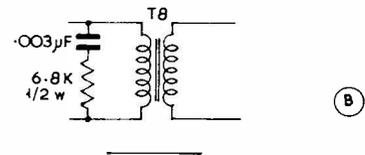
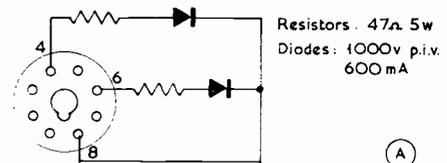
Finally, at (D) is a cascode front-end, to improve signal-noise ratio, particularly on the 10-20m. and to eliminate cross-modulation effects on the LF bands. This modification consists of an ECC85, fitted on a B7G mount to plug into the V1 valveholder. A standard cascode circuit is used, as given in the *Handbooks*.

We are told that the actual modification work discussed here was carried out by G3OIZ (New Romney, Kent). Any 888A owner wishing to incorporate these circuit arrangements should, of course, refer to the Eddystone 888A manual before making any alterations.

THE "NEW QTH" PAGE

This is available to any U.K. amateur—whether direct subscriber, newsagent buyer of casual reader—who wishes to notify the issue of any category of British amateur transmitting licence, or a change of address on an existing callsign. Notifications are also accepted under the DL2/EI prefixes. The point is that appearance in the "New QTH" page also guarantees publication in the U.K. section of the *Radio Amateur Call Book*, the international directory and guide to the amateurs of the whole world, for which we are European agents. Indeed, the G listings in the current (Spring) edition of the international *Call Book* are the most up-to-date in print, and the U.K. entries achieve a very high standard of typographical accuracy. Both sections of the *Radio Amateur Call Book*

are always obtainable from us, as advertised on p.000 of this issue. It should also be mentioned that, while we only actually publish G/DL2/EI callsign-addresses in the "New QTH" page, we accept QTH's from any quarter for onward transmission to the American publishers of the international *Radio Amateur Call Book*, with our own quarterly lists.



SEQUENTIAL SWITCHING FOR RECEIVER PROTECTION

KEEPING RF OFF TRANSISTOR FRONT ENDS

A. R. HIRST (G3SIC)

WITH the possibility in the near future of using UHF transistor RF amplifiers at G3SIC—and, in the past having blown several A.2521's with transmitter RF—it was decided that something had to be done about Rx front-end protection. With this in mind, the sequential switching circuit shown here has been evolved. In conjunction with a good coax relay, it should provide ample protection.

Looking at the diagram, S1A-S1B form a manual DPST transmit-receive switch to effect the change-over motion. The contact A1 is controlled by RLA, contact B2 by RLB and C1 by RLC.

The requirements of the switching system are as follows: (1) The Rx must be muted (off) before the Tx is live; (2) all aerial switching must be done "cold," i.e., no RF on the transmitter feeder; and (3) the Tx must have a load on, with the receiver muted, before it is switched on.

Operation

With the system resting at "receive," closing the C/O switch S1 (which can be a panel control at the operating position) clicks in RLA, muting the Rx by closing A1, which applies voltage to RLB, opening B3 and also changing over the Ae. (B1) and, depending on the coax relay used, also earthing the Rx

input. At the same time, B2 closes, operating RLC, which switches up the Tx (C2) and closes C1.

Thus the switching-on sequence is: Rx off (B3)—aerial over (B1)—Tx on (C2).

On changing from "transmit" to "receive" (opening S1), the secret of the reversal of the sequence lies in contact C1, which holds RLA on momentarily till RLC drops out, putting the Tx off (C2); this is followed by RLA (C1 opened by RLC) which switches on the Rx when A1 opens; this also operates B1, to change over the aerial.

The switching-off sequence is thus: Tx off (C2)—Rx on (B3)—Ae. over (B1).

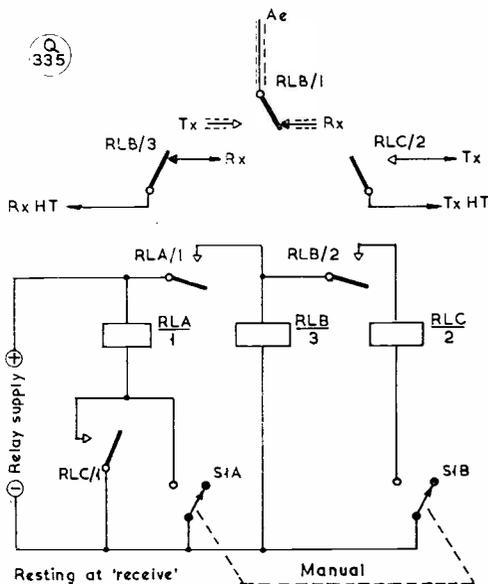
It should be noted here that Rx action could be obtained a shade earlier in the sequence by controlling the receiver from another pair of contacts on RLA. Also, of course, that RLA could be slugged (to give it more time for opening and to operate) and the action of RLB accelerated a little by reducing the spring tension. Alternatively, condensers or resistors can be used to control the relay characteristics more closely—see *D-Y-K-T* item p.343, August issue. However, these expedients would not be necessary if the system gives the sequential effect required.

The Coax Relay

Perhaps a word on the aerial coax relay (controlled by contacts on RLB) would be helpful. That used at G3SIC is the 75-ohm version of the Dow-Key DK60-G-2C which, though rather expensive, has an excellent performance factor.

With the internal electrostatic shield in this relay, the makers claim an isolation better than 100 dB. Thus, with 100 watts RF output, the power at the receiver input should be of the order of a fraction of microwatt. This power level, together with sequential switching to prevent RF pulses reaching the receiver, should not worry even the fussiest low-noise transistor.

The control relays RLA, RLB and RLC can be the P.O. 3000 type, with contacts as required, noting that RLB will have to operate the coax aerial change-over relay if one is used.



KEEP IN MIND

That we are always glad to see, for possible publication, good photographs of Amateur Radio interest. These should be glossy black-and-white prints—not colour, nor can we process diminutive negatives—and though the actual size is not important, about post-card is preferred. Do not write the details on the back of the print—simply identify it, lightly in pencil, with a letter or a number, with the descriptive matter on a separate sheet. The professional way of doing it is to gum one edge of the slip of notes lightly along one side of the back of the photograph, and fold the slip over the face of the print, so that the two can be easily separated. Payment is made for all photographs used, immediately on publication. Send to: Editor, SHORT WAVE MAGAZINE, BUCKINGHAM.

MODIFYING THE ALA-2 PANORAMIC INDICATOR

FOR TWO-METRE DISPLAY

S. F. BROWN (G4LU)

THE ALA-2 Panoramic Indicator, made by Hallcrafters for the U.S. Forces, has become available recently on the surplus market for a very reasonable price. This equipment displays on an oscilloscope signals in a bandwidth of plus and minus five megacycles about a centre frequency of 30 megacycles. Basically, the indicator comprises a receiver and an oscilloscope on one chassis, the former consisting of an RF stage, mixer, IF stage and diode detector. The rectified output from the detector is fed to a DC amplifier and presented on the "Y" plates of the oscilloscope. A simple time-base consisting of a gas triode (R.C.A.884) and a DC amplifier supply the "X" plates of the CRT and a reactance valve connected across the oscillator tuned circuit. The IF channel is 6.5 mc, with a bandwidth of about 100 kc.

Unfortunately for the amateur, the indicator was designed for use with "high-cycle" aircraft supplies and consequently the first modification one must carry out is to get the unit working from a 50-cycle mains supply. The simplest way to do this would be to change the transformer for a similarly-rated mains frequency component but these usually take up much more space than their higher-frequency counterparts. However, by discarding the 6X5 low voltage rectifier and the 1B3 high voltage rectifier in favour of solid-state replacements sufficient space is made available for a larger transformer. It may then be necessary to

cut a bigger hole in the chassis so that the new component projects into the base of the unit. The particular transformer used by the writer had secondary ratings of 250-0-250 volts at 100 mA, 6.3 volts at 4.5 amps., and 6.3 volts at 1 amp. for the tube heater. The low voltage rectifier was replaced by a pair of BY100 silicon rectifiers, with suitable limiting resistors, and were wired between tag strips mounted in place of the fuse board at the rear of the underside of the chassis. If the replacement transformer has a high-voltage winding capable of supplying 1000 volts at 2 mA for the tube, so much the better; then, only a single selenium EHT rectifier of correct rating will be needed but failing this a multiplier type of EHT supply can be used. The total cost of the extra components required and a standard transformer will probably be no more than a special transformer with an EHT winding.

The modified rectifier unit is shown in Fig. 1. This provides negative 1000 volts for the tube and positive 290 volts low-voltage HT. The latter, although slightly less than the 300 volts given by the original PSU, is quite adequate except that the resistor supplying the stabiliser valve needs reducing in value. The "Westeht" components (for the circuit used here) are fitted on a tag-board mounted between the transformer and the "Y" amplifier valve. The additional EHT smoothing necessitated by the lower mains supply frequency is shown in Fig. 2, with the original circuit references.

Modifications for Use

The RF and IF circuitry in its original form is not completely satisfactory for two-metre use, although it would no doubt be adequate for the higher frequency bands of 420 mc and above. At G4LU, the first IF from the converter is 24-26 mc,

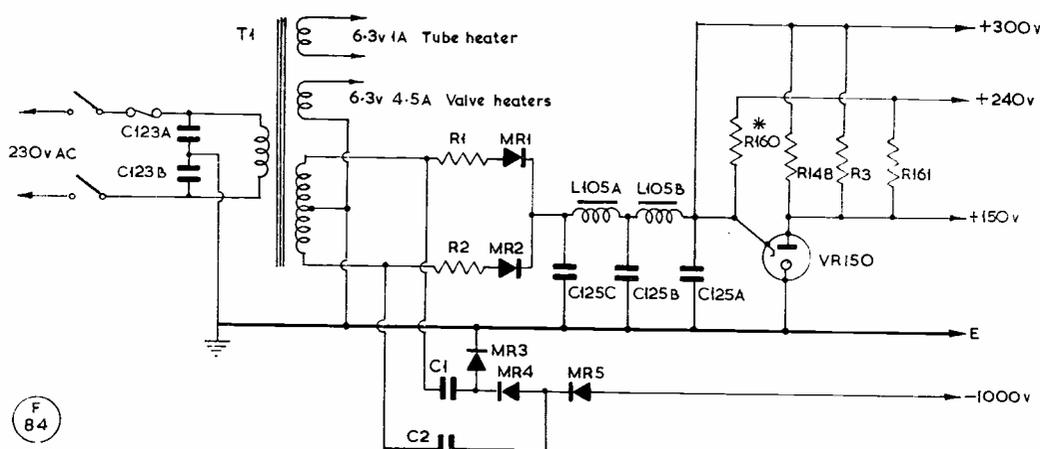
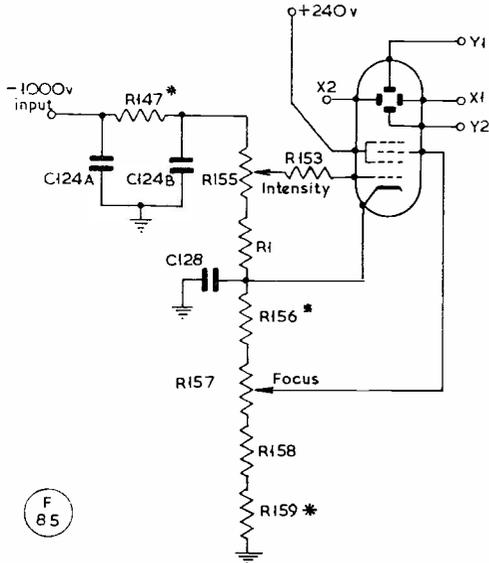


Fig. 1. Since the ALA-2 comes with a "high-cycle" PSU, some modifications are needed for the normal 50-cycle supply. These are the low-voltage and EHT circuits, in which C1, C2 are 0.1 μ F, rated 1000v. DC working; R1, R2 are 33 ohm, 5w.; R3, 8.2K, 10w.; R160 should be changed to 150K; T1, 250-0-250v., with LT's; MR1, MR2, BY100 or equivalent; MR3, MR5, K8/10 Sentercel; and MR4, K8/40 Sentercel. Original circuit references have 3-figure numbers, and circuit value changes are shown asterisked in all diagrams given with the article.



F 85

Fig. 2. The CR tube and EHT smoothing circuit. R1, 22K, 1w., and resistors R147 should be changed to 220K, 1w.; R156 to 680K, 1w.; R159 to 1 megohm, 1w. These circuit references are as the original nomenclature.

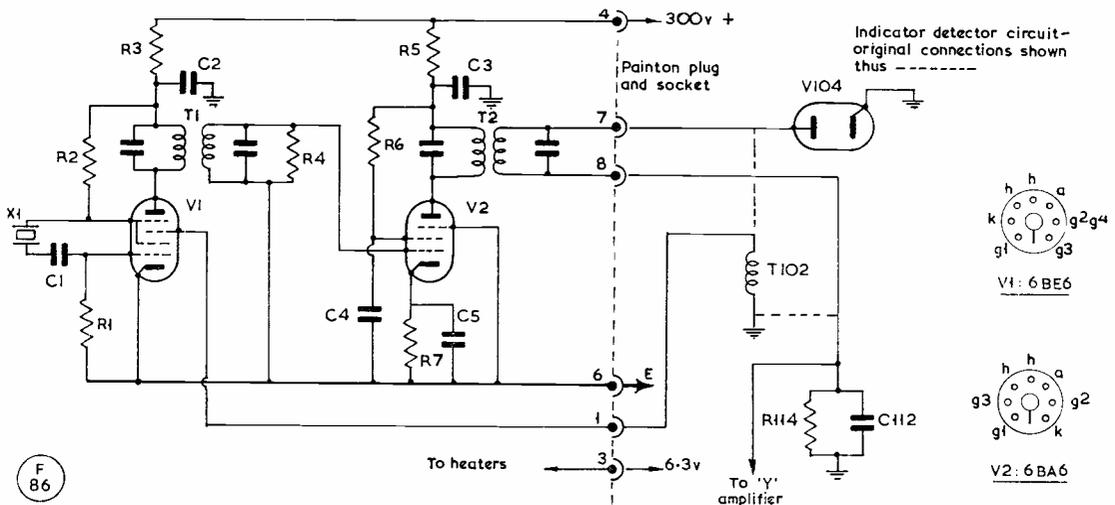
which means that the RF and local oscillator circuits have to be adjusted to suit. Sufficient range was available on the coil slugs to meet this requirement, except that an additional 6.8 μF condenser was required across the mixer grid circuit to bring the tuning condition away from an extreme position of the slug. The sweep of the oscillator was reduced

by adjustments of the "Sweep Limit" control inside the unit, but it was found that to get a linear sweep over the two megacycles of the two-metre band, both the "Centre Frequency" and "Sweep Limit" controls as well as the oscillator coil slug needed to be adjusted all together. To get the best presentation some experiment with these three controls will be well repaid. The "Sweep Width" control is, of course, placed at its 0.2 setting to preserve the graticule calibration.

Bandwidth Modification

The modifications so far described are the minimum necessary to get a working unit, but other changes can be made to improve performance. The IF bandwidth, for instance, is much too wide to separate signals working close together on the two-metre band and some thought was given to overcoming this disadvantage. Ideally, one would prefer a final IF bandwidth as sharp as possible, but there are limits to which one can go, for the narrower the bandwidth the slower must be the sweep speed if ringing of the circuits is to be avoided. The lower limit of sweep speed will be determined not only by the practical values of components one can employ in the time-base circuits but also by the persistence of the oscilloscope screen. The fundamental relationship involved is formulated in the equation, $X = Sf/B^2$, where X is the sweep-bandwidth factor, S is the sweep width in cycles, f is the time-base frequency, and B is the half-power bandwidth of the final IF.

The sweep-bandwidth factor, X, should preferably be less than 0.5 for negligible distortion of the trace and certainly no greater than 2 if gain is not to be lost and the response broadened unduly. It is an obvious advantage to have a jitter-free trace by



F 86

Fig. 3. A suitable mixer-amplifier unit for the ALA-2 — see text. Values are: C1, 100 μF ceramic; C2, C3, C4, 0.1 μF, rated 300v. DC; C5, 0.1 μF, 150v.; R1, 22K, 1/2w.; R2, 47K, 1w.; R3, R5, 3.3K, 1w.; R6, 68K, 1w.; R7, 68 ohms, 1/2w.; T1, T2, 465 kc IF transformer; V1, 6BE6; V2, 6BA6; and crystal can be FT-243 type.

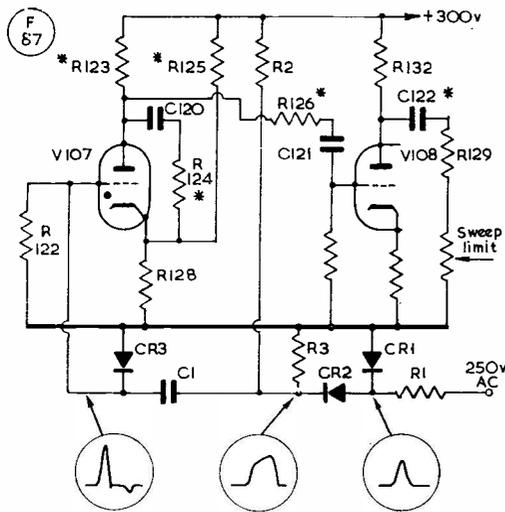


Fig. 4. Time-base and synchronising circuit for the ALA-2. C1 should be made 390 $\mu\mu\text{F}$, 500v. DC rating, C122 changed to 0.1 μF , 500v. DC. Other values are: R1, R2, 100K, 1w.; R3, 15K, 1w.; and resistors changed as follows — R123 to 3.3 megohms; R124 to 39 ohms; R125 to 86K; and R126 to one megohm. CR1, CR2, CR3, can be GD5 or similar. These changes should be read with the text.

locking the time-base to mains frequency; this limits the repetition frequency to multiples or sub-multiples of 50 c/s. Trace persistence of the particular tube employed would set a lower limit of 25 c/s for the time-base. Since it is desired to sweep two megacycles, setting the value of "X" to its upper limit of two gives:—

$$2 = \frac{2 \times 10^6 \times 25}{B^2}$$

from which $B = 5 \times 10^3$ c.p.s., or 5 kc. A bandwidth of this order can be provided conveniently by a 465 kc IF amplifier, in fact an experimental unit comprising a mixer and amplifier to convert the 6.5 mc IF down to the lower frequency gave a bandwidth of about 8 kc. When built in its final form as a compact unit, slight regeneration sharpened the bandwidth to about 3 kc. A damping resistor was shunted across the first IF transformer to broaden the response to 5 kc.

Practical Circuit

Lack of space in the indicator unit made it necessary to build the mixer-amplifier outboard, as an assembly to plug on to the outside of the case, power and IF connections being made on an eight-way *Painton* plug and socket. The socket was mounted on a small brass plate fastened to the side drop of the chassis and a rectangular hole in the outer case allowed access for the plug fastened to the side of the mixer-amplifier chassis. The circuit of the mixer-amplifier is shown in Fig. 3.

A 6BE6 valve is used as a self-oscillating mixer followed by a 6BA6 amplifier. To keep the number of components to a minimum, and to make the outboard unit as small as possible, it was decided to use an untuned oscillator circuit for the conversion frequency. The oscillator electrodes of the 6BE6 are therefore used in a Pierce type of crystal generator. The crystal frequency can be above or below 6.5 mc, depending on choice or availability (a unit of 6.035 mc fundamental frequency being preferred), but in the prototype unit it was found that a surplus FT-243 type of 5.975 mc functioned satisfactorily if the 6.5 mc circuits were "pulled" to suit.

Time-Base Modification

Modification of the time-base to operate at 25 cycles instead of its original frequency of 35 c/s seemed from study of the circuit diagram to be a simple matter—but in practice it did not turn out to be quite so straightforward. Basically, all that was needed was a change of value in one of the components of the RC charging network R123, C120 (Fig. 4). The value of R123 was therefore changed from 2.2 to 3.3 megohms. In order to stabilise the frequency against mains voltage variations it was also decided to return the bias feed resistor, R125, of the 884 valve to the 150-volt supply, and some experimentation in finding the correct value was needed since this resistor affects the repetition rate of the time-base. Simple synchronisation of the time-base to half mains frequency was attempted—by connecting the grid of the tube to the filament supply through a resistor—but a firm "lock-in" could not be obtained every time the unit was switched on. This is always one of the problems of trying to synchronise to a sinusoidal waveform since the peak of the wave is relatively flat—it is much better if a stepped wave of short duration can be used.

The circuit as finally developed is shown in Fig. 4, along with the other alterations. The output voltage from one side of the mains transformer HT secondary is fed through a high resistance, R1, to a diode, CR1, which eliminates the negative half-cycle. The positive half-cycles are squared by clamping them to approximately 50 volts by the diode CR2 and the potentiometer, R2/R3, across the HT line. The wave is then differentiated by C1 and R122, the latter being the original grid leak of the time-base valve. The negative-going spike of the differentiating process is almost completely eliminated by the diode CR3. All the diodes used were surplus point-contact types (similar to the GD5), but there is no reason why selenium rectifiers or junction diodes should not function equally well.

Some slight changes were also necessary to the input side of the time-base amplifier and the sweep limit circuit to obtain good linearity of waveform. These are also shown in Fig. 4. Adjustments to the time-base can best be observed on a separate oscilloscope connected across the "Sweep Limit" control, or alternatively a 50-cycle signal can be displayed on the unit's own tube, in which case component changes and synchronisation adjustments are made so that a linear jitter-free trace of two complete cycles at mains

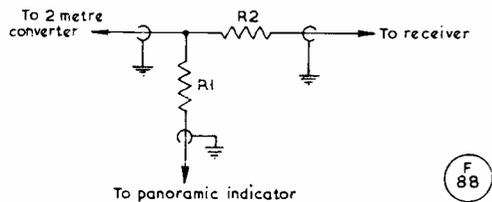


Fig. 5. The inter-connection between ALA-2, Converter and Receiver. The values of R1 and R2 can only be determined experimentally, but would be between 200 and 600 ohms.

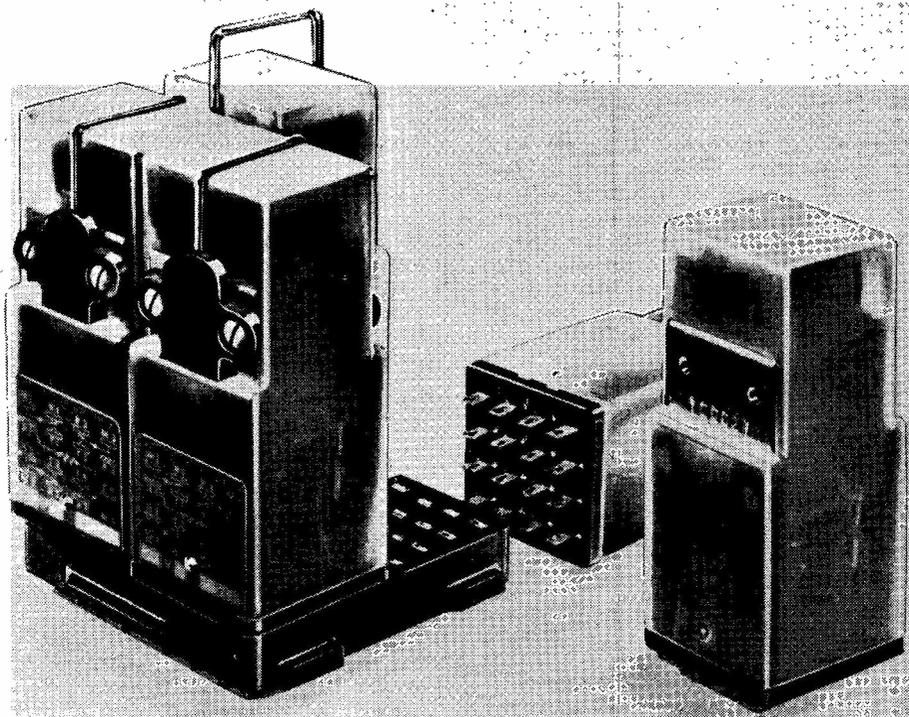
frequency is obtained.

The final modification is optional but highly desirable. A new panel was made from $\frac{1}{8}$ in. aluminium using the old one as a template for most of the holes. The mains plug was discarded and its space taken by a Belling-Lee fuse holder, but this will not require any alteration in the cable form to the panel if care is taken in tracing out the leads to the mains switch and transformer. Spray painting with a car touch-up *Aerosol* and sign-writing in Indian ink using *Uno* stencils gave a professional finish to the job.

Setting up the unit in conjunction with the con-

verter and main receiver should present no problem. For this purpose a resistive pad, shown in Fig. 5, built into a screened box was used. This served two purposes—it prevented the aerial circuit trimmer of the station AR88D receiver from affecting the amplitude of the indicator response, and it also attenuated the “blip” produced by the AR88 local oscillator (which admittedly was stronger than one would have expected). Final alignment is carried out with one-megacycle marker signals applied to the converter input, the indicator sweep range and linearity being adjusted so that the 145 mc “blip” falls on the centre-line of the screen and the 144 mc and 146 mc “blips” come at the appropriate outer calibration points. Trimming of the RF and IF circuits is done to give maximum and equal responses throughout the displayed range. Sensitivity is such that converter noise can give a sizable deflection on the screen but normally the gain control is adjusted so that noise is only just visible.

The panoramic indicator will be a useful addition to the two-metre equipment at any station. It enables activity to be judged instantly and should avoid missing answers to CQ calls due to the time taken to tune the band—provided, of course, that the calling station is strong enough to produce a clear response.



The French Chauvin Arnoux (Paris) range of OK Relays is now being manufactured under exclusive licence by Paintons of Northampton, who for many years have been producing a wide variety of specialised electronic components, selling all over the world. These relays are of particular interest because new design and construction techniques keep the action in permanent adjustment; they have a maximum current rating of 10 amps. per contact with four change-over motions; can be relied on for a mechanical life of several million operations; are available in both AC and DC versions; are suitable for socket mounting or push-on type connections; and are built into a standard transparent dust-proof case.

GUY WIRE TENSIONERS

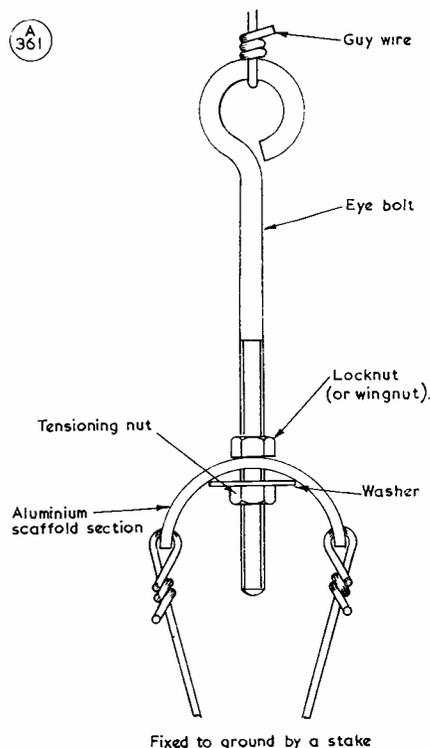
PRACTICAL AND EASILY
CONSTRUCTED

J. R. WALKER

DUE to gale force winds the writer was compelled to restore the aerial mast to its rightful vertical position, and it was decided to use a heavier gauge of guy wire to lessen the risk of the mast blowing down again this Spring. The use of this heavier gauge wire meant that some method of taking up the slack on the guys had to be used. As commercial bottle screws—the correct thing to use for tensioning—are so expensive, the guy-wire tensioner described in this article was devised instead.

After building the house, a short length of aluminium scaffold pole was left behind. This is nearly two inches in diameter with $\frac{1}{4}$ in. thick walls and is made from hardened aluminium. For each pair of tensioners a piece of tube $1\frac{1}{2}$ inches long was cut off and sawn in two diametrically. In either end of each of the resulting pieces an $\frac{1}{8}$ in. diameter hole was drilled to take the 12g. wire, as shown in the diagram. A larger central hole was drilled to take the eye-bolt, its eye being attached to the guy itself. The size of this hole depends on the size of the eye-bolts, which are obtainable from either a good hardware shop or builders' supply merchant. The hole should be the clearance size for the bolt.

Construction of the tensioners is simple and obvious from the diagram. They are held to the ground by a loop of wire through a hole in a stake in the ground, and fixed to the guy by the eye-bolt. The guys need only be cut to within two inches or so, as the slack is taken up by the tensioning nut. Any tendency for this to vibrate loose is curbed by using another nut or a wing nut as a lock, as shown. All nuts and the bolt should be heavily galvanized to avoid corrosion.



Sketch to show the general arrangement of the tensioning device, which takes the place of the much more expensive bottle screws. The general idea will be self-explanatory.

These tensioners are easy to set up initially and if the mast needs lowering at a later date the position of the lock nuts on the bolt marks the place to tighten the tensioners to when re-erecting the mast. And, of course, the same principle can be applied using other materials. It is only necessary to arrange for the eye-bolt to be tightened against the guy and a ground anchorage.

TRANSISTOR Q-MULTIPLIER

CIRCUITRY, ADJUSTMENT AND
OPERATION

G. J. BENNETT, Ph.D., B.Sc. (G3DNF)

AS a means of improving the performance of a receiver, the Q-multiplier is deservedly popular. In its simplest form it enables an IF bandwidth of several kc to be reduced to the point at which phone becomes unintelligible—an obvious attraction for the CW enthusiast. Improved versions also provide a “notching” facility whereby signals on adjacent channels can be phased out. This can be

very useful in the reception of AM and SSB, and when the receiver selectivity is already adequate for CW, but no “phasing” control is provided. If the receiver is highly selective and already has a phasing control, it should not need a Q-multiplier.

The circuit shown was developed as the result of a change of tactics. The components having been purchased for the construction of a valve version (SHORT WAVE MAGAZINE, Nov. 1962, p.497) it was then decided to use the inductances in a transistor version. This has made possible the construction of a small, self-powered accessory which has only one external connection—the coax lead to the receiver. All components are readily obtainable.

Description of Circuit

The circuit is basically a Colpitts oscillator with variable regeneration. “Peak” and “Notch”

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for July Issue: June 11)

(Please address all reports for this feature to "Club Secretary," Editorial Dept., SHORT WAVE MAGAZINE, Buckingham.)

AN excellent idea, and one which might well appeal to many other clubs, has been brought to notice by **Purley**, together with **Wimbledon** and the **South London Mobile Club**. These three bodies have maintained friendly relations for some time past, and the three committees have now agreed to form a "Southern Amateur Radio Association" (S.A.R.A.).

All three clubs will publicise the meetings and events held by the others and help each other in any way possible. Members of any club can become associate members of the other two; and if they choose to (this is optional) they may pay an extra 2s. 6d. a year to the parent club, to receive an association membership card admitting to all meetings and events held by the other two.

Purley ask us to make it clear that this is in no way an amalgamation of clubs, each one remaining entirely independent. In the agreement there is a clause allowing any club to opt out at three months' notice. So far the support for the scheme, from some 200 members, has been virtually unanimous, and other local clubs are known to be interested. For the time being, though, it will operate as a pilot scheme with just the three original clubs taking part, although others may well be invited in at a later date.

No club belonging to the Association would ever have to close down owing to financial difficulties, because the extra half-crowns from members will be held in reserve for an emergency of any kind.

We will be watching this project with great interest, and shall be somewhat surprised if similar arrangements are not eventually made elsewhere. It seems that clubs who form such an alliance have nothing to lose and possibly a great deal to gain.

ACTIVITY REPORTS

Spen Valley will be active at the Model Boat Regatta and Exhibition in Batley Park on June 16; June 30 is their "Open and Final Meeting"; and on July 14 the AGM will be held. On their "supplementary syllabus" they list a talk by G3KEP on June 9, and a Discussion Night on June 23. A full month, we should say.

St. Helens Electronics Society is a newly-formed body, with about 30 members. They have already held several meetings, but say that the support from local licensed amateurs has been disappointing. On June 14 there will be a demonstration of "A Light Tx and Rx," by B. Williams, and on the 28th a "Natty Novelty Night" with a prize for the best exhibit.

Meetings are on alternate Tuesdays, 7.30 at the IVS Centre, 55 College Street, St. Helens.

West Kent will hear a progress report on their constructional project, from G4IB, on June 3; on the 17th, a talk by G3NPU on Aviation Radio; and on July 1 G3PAH will speak on Teleprinters. The constructional project is a 2-metre transceiver designed for easy production by G4IB, and it is expected that about ten members will be building them. On July 3 it is hoped to hold a picnic at Gatwick Airport.

Acton, Brentford & Chiswick will hear a talk on Facsimile Transmissions, by G3SSM, on June 21—7.30 p.m. at 66 High Road, Chiswick. **Dorking** report a successful Junk Sale in April, and add that their mobile station will be going on the air very shortly.

Wolverhampton give advance notice of a "Mystery Trip" to be held on June 20. All they disclose is that this will be a non-radio event. **Derby** have a Radio and Component Quiz on June 8; a Film Show on the 15th; a D/F Practice on the 22nd; and a visit (limited to 30 members) to the Radiotherapy Unit at Derbyshire Royal Infirmary on the 29th. Normal meetings are at 119 Green Lane, Derby (Room No. 4) at 7.30 p.m.

Northern Heights report a successful AGM and a current membership of over 40, 30 of whom are licensed. On June 8 they pay their annual visit to the Manchester club; on the 11th they will be running a station at the Halifax Charity Gala; on the 22nd G3IGW will talk about "One Man's Interest in Amateur Radio."

Surrey (Croydon) also report their AGM and some recent meetings. Their usual midsummer Treasure Hunt is no longer feasible, owing to the new regulations concerning car rallies. For the future, though, they have arranged talks by G2YL (August 9) on her visit to W and VE, with slides; and by G6CJ, complete with aerial demonstration kit.

Swindon will hold their AGM on June 29, at the Rodborne Cheney Old Scout Hall. A good attendance

SPECIAL NOTICE

Honorary Secretaries are asked to note that the deadlines for the next few issues will be June 11, July 16 and August 13. Material received after these dates cannot be taken into the issue in preparation. The sole address is: "Club Secretary," Short Wave Magazine, Buckingham.

is hoped for. Later, on September 4, the club will be running a Mobile Picnic at Lydiard Park, and have decided to invite all amateurs in the area. Talk-in facilities and entertainments will be provided. Among their members are G3AYL/W4, also operating as VP1RP, and G3PRR, who has just returned from three weeks in 5Z4-land.

Torbay, at their AGM on April 30, elected G5SY president, G3LHJ chairman, SWL's D. Hind and P. Hunt secretary and treasurer. (We are unable to give the secretary's QTH in the panel, as it has not yet been sent to us.)

From up North, a report about the Club at R.A.F. Station **Leuchars**, where they sign GM3UZF, and are on the air on 80m. most weekends and on Monday evenings; the present membership is just ten, with room for many more, especially SWL's, as they have six members who have just taken the R.A.E.

For **Echelford**, the June meeting will be on the 29th, 8.0 p.m. at the Links Hotel, Fordingbridge Road, Ashford, Middlesex, at which visitors would be very welcome. The Club will be signing G3UES/A on the afternoon of June 18, from the B.P. Research Station at Sunbury.

Crystal Palace, one of the most active of the London clubs, with a varied programme and plenty of membership support, recently had a talk by G3RNL (who is doing the SSB series in the *Magazine*) on mechanical filters. In their recent quiz contest with Clifton, the Palace boys came out on the right side by the small margin of 146/142 points. Next meeting, June 18.

One of the clubs meeting monthly is **South Birmingham**, who sign G3OHM and take an active part in most competitive events; they are now all set for the Field Day, taking place this weekend (June 4-5). Their June lecture will be by G3LNN, on Sideband.

Maidenhead will be sure of a large gathering on June 21, when they hold a junk sale. Forthcoming dates for **Wirral** are June 15 (*post-mortem* on Field Day), and July 6, when G3CSG will discuss a six-band Tx. Their *Newsletter* for April/May is a very worthy compilation of five meaty pages.

The Amateur Radio Club of **Nottingham** have a technical film show on June 14, and on the 21st a talk by G3JYG entitled "A Poor Man's Guide to SSB"—something we would all like to know about! At **Mid-Warwickshire** they have a talk on Rx Servicing scheduled for June 13, and on July 4 what is described as a "bumper junk sale": the Club now has its own all-band SSB transmitter, home built.

Potentially a rather amusing event is that to be held at **Saltash** on June 3—a "Boaster's Evening," when members will be allowed ten minutes to stretch their imaginations (or recount some real achievement); it is said that the best entertainer will get a prize of "less than £100."

Edgware report a successful D/F contest on May 8, won by G3SJE in very bad Wx conditions. There was a record attendance at the fortnightly meeting on May 9, when the subject was Amateur TV and VHF Technique, taken by G3RNK/T. Next meeting after



At the Hong Kong Amateur Radio Society's annual dinner recently, VS6DS (left) presented their Drake Trophy to VS6EK. The trophy itself consists of a large pump-handle key handsomely mounted on a plinth, with an inscribed plaque.

Field Day is on June 13, 8.0 p.m. at the John Keble Hall, Church Close, Deans Lane, Edgware, at which prospective members will be particularly welcome.

In the **Hereford** area there are about 12 licensed amateurs, who meet fairly frequently, and an R.A.E. course at the local Tech. College enrolled 25 students, of whom eight actually took the recent exam. The nearest active groups are in Worcester and Gloucester, about 30 miles away, so Hereford are somewhat in the blue; they would welcome more local membership, and SWL's in particular are assured of a welcome.

At **Dudley** they have been having regular fortnightly sessions (Friday evenings, at the Art Gallery), though the programme secretary is finding it increasingly difficult to lay on an attractive programme; one interesting event recently was a tape-lecture by ex-member G3OMY who is now VK6OM, describing band conditions and so forth in his new part of the world. The **Coventry** programme includes a talk by G2WS on June 3; a film made in the States by G3NVA, June 10; a visit to Rugby Signal Box (from which much of the new Euston-Crewe electrified main line is controlled), June 17; and on June 24 they hold their constructional contest and bring-and-

buy sale.

Though admitting to having been "in the doldrums for some time," **East Worcestershire** are now back in the swim again, and have a paid-up membership of nearly 30, with a strong core of keen SWL's. A vigorous committee has planned a good programme for the next 12 months, including not only lectures on subjects of current interest, but also two Club constructional projects—a single-band Tx and a Sideband rig. It is hoped that some previous (licensed) supporters of the Club will come in again. Meetings are on second Thursday each month, at the Old People's Home, Park Road, Redditch, at 7.45 p.m., the next being on June 9 (Field Day *post-mortem*), and on July 14, when G3AYJ will discuss Interference Suppression in the /M context.

Halifax are known to be active but report only past meetings, at the R.A.O.B. Club, Clare Road. **Basildon** also report briefly.

The **Bristol** Amateur Radio Club is a constituent group of the University Settlement, meetings being held monthly on Monday and Thursday evenings, 7.0 to 10.0 p.m., at the Club-rooms, 41 Dulcie Road, Barton Hill, under the chairmanship of G3SJM, with a strong committee of seven members which includes two SWL's. They also have their own callsign, G3TAD. The next sessions are on June 16, when G3OLB will talk about Transistors in Home-Brew Gear, and on July 7, when the subject will be

Modulators.

The Morse Test has produced another operator, G3VGX, for **Magnus** Grammar School R.S., and full participation in Field Day has been planned. **Paddington** gather on June 8 to hear a talk by G3MHQ entitled "Top Band Transceiver on a Shoe-string," this being by way of initiating the Club constructional project. Signing their own call G3PAD, they now have a multi-band aerial for full frequency coverage; meetings are every Wednesday, 7.30 p.m., at Beauchamp Lodge Settlement, 2 Warwick Crescent, Paddington.

Stratford were rather dubious when they saw the Wx on the day of their first Mobile Picnic—however, a maximum of 50 people showed up in spite of the deluge, and the event turned out a great success—they even made some profit out of the junk sale. Meetings to come are: June 17, with G5BJ on a 9 mc filter for SSB; and on June 25 they have a visit to GBR, the world-famous GPO station at Rugby.

The programme for **Loughborough** is an Equipment Sale on June 10; a Mobile Treasure Hunt on June 17; and a slide lecture by G3PXP on June 24. On July 1/3 they will be busy with portable VHF gear, and July 8 is the AGM.

Reigate report firmly "the last meeting was a sale of surplus equipment—there's no junk in Reigate"! Club funds benefited accordingly. Interest in UHF is

Names and Addresses of Club Secretaries reporting in this issue :

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
 BASILDON: C. Roberson, G8AAO, Milestone Cottage, London Road, Wickford (2462), Essex.
 BRISTOL (Club): E. J. Davis, G3SXY, 72 North View, Westbury Park, Bristol 6.
 BRISTOL (Group): J. Thorn, G3PQE, 6 Plumtree Close, Winscombe (2023), Somerset.
 CARDIFF: E. F. Taylor, G6W3SQX, University Hall, Penylan, Cardiff.
 CHESHUNT: A. Webb, 3 Roseneath Walk, Enfield, Middlesex.
 COVENTRY: W. F. M. Hahn, G3UOL, 11 St. Patrick's Road, Coventry.
 CRAWLEY: R. G. B. Vaughan, G3FRV, 5 Filbert Crescent, Gossops Green, Crawley (23359), Sussex.
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23 (FO Rest Hill 6940).
 DORKING: J. Greenwell, G3AEZ, Eastfield, Henfold Hill, Beare Green, Dorking.
 DUDLEY: R. W. Fisher, G3PWJ, 63 Swan Crescent, Langley, Oldbury, Birmingham.
 DURHAM: D. Hampton, G3UHU, 4 Ferens Close, Gilesgate, Durham City.
 EALING: A. P. Teale, G3SGT, 10 Whitestile Road, Brentford, Middlesex.
 EAST WORCESTERSHIRE: R. M. Davies, G3RUK, 17 Silver Street, Wythall (3105), Worcs.
 ECHELFORD: A. G. Wheeler, G3RHF, 88 Village Way, Ashford (55265), Middx.
 EDGWARE: G. S. Fitton, G3RAA, 18 Beverley Drive, Edgware, Middx.
 GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
 HALIFAX: V. Reeve, G3SJM, 10 Rock Place, Bonegate, Brighouse, Yorkshire.
 HEREFORD: B. R. Edwards, G3RJB, 5 Powys Walk, Hereford.
 LEUCHARS: Sgt. H. James, G3UPZ, Sgts. Mess, R.A.F. Leuchars, Fife.
 LOUGHBOROUGH: D. A. Winters, G3IPL, 52 Walton Street, Leicester.
 MAGNUS: R. Wallwork, G3JNK, Magnus Grammar School, Newark, Notts.
 MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead, Berks.
 MID-WARWICKSHIRE: K. J. Young, 180 Northumberland Court, Leamington Spa.

NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
 NOTTINGHAM: N. E. Down, G3SRX, 23 Lady Bay Road, West Bridgford, Nottingham.
 PADDINGTON: A. E. Copperwaite, 1A St. Mary's Mansions, St. Mary's Terrace, Paddington, London, W.2.
 PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye, Peterborough, Northants.
 PLYMOUTH: E. J. Fallon, G3SGV, 8 Queens Road, Plymouth.
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey.
 REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey.
 ST. HELENS: *Hon. Secretary's QTH wanted.*
 SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.
 SCOTLAND (R.C.): A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.
 SHEFFORD: C. R. Cobb, G3IXG, 75 Amptill Road, Shefford, Beds.
 SOUTH BIRMINGHAM: A. E. Bishop, 30 Cecil Road, Selly Park, Birmingham 29.
 SOUTHGATE: R. Wilkinson, G3TXA, 23 Ashridge Gardens, Palmers Green, London, N.13 (Palmers Green 4592).
 SOUTH LONDON MOBILE: B. Negri, G3LXN, 17 Voltaire Road, London, S.W.4.
 SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
 STRATFORD-UPON-AVON: M. Webb, G3OOO, 14 Townsend Road, Tiddington, Stratford-upon-Avon, Warks.
 STOKE-ON-TRENT: T. Cotton, Smithfield Hotel, Lower Street, Newcastle-under-Lyme, Staffs.
 SURREY (Croydon): R. Morrison, G3KGA, 33 Sefton Road, Addiscombe, Croydon, Surrey.
 SWINDON: *Hon. Secretary's QTH wanted.*
 TORBAY: *Hon. Secretary's QTH wanted.*
 VERULAM (St. Albans): G. Slaughter, G3PAO, 6 Leggatts Wood Avenue, Watford, Herts.
 WESSEX: P. Penel, 85 Wimborne Road, Bournemouth.
 WEST KENT: R. Trevitt, G3SSE, 28 Delves Avenue, Tunbridge Wells, Kent.
 WIMBLEDON: *Hon. Secretary's QTH wanted.*
 WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral, Cheshire.
 WOLVERHAMPTON: J. Rickwood, G3JJR, 852 Stafford Road, Fordhouses, Wolverhampton, Staffs.

CLUB PUBLICATIONS

We acknowledge, with thanks, the receipt of the following Club publications:

Wolverhampton (*Newsletter*, April); **AERE, Harwell** (*QAV*, April); **Cornish** (*Cornish Link*, May); **Cray Valley** (*QUA*, May); **ISWC** (*International Short Wave Radio*, April and May); **Midland** (*News Letter*, April); **North Kent** (*Newsletter* No. 99); **Plymouth** (*QUA*, May); **RAIBC** (*Radial*, April); **Surrey** (*SRCC Monthly News*, May); **Swindon** (*Wiltshire Hams*, May-June); **Verulam** (*News Sheet*, April); **Wimbledon** (*QRK-5*, May); **Southgate** (*Newsletter*, May); **Coventry** (*Newsletter*, May); **R. C. Scotland** (*GM Magazine*, April); **Plymouth** (*QUA*, May); **Purley** (*Splatter*, May); **Reigate** (*Feedback*, April); **Saltash** (*Tamar Pegasus*, May); **South Birmingham** (*QSP*, May); **Wirral** (*Newsletter*, April/May); and **Echelford** (*Newsletter*, May).

Overseas: Foundation for Amateur Radio (*Auto-Call*, April); **Aeronautical Center, Oklahoma** (*Collector and Emitter*, April).

growing rapidly; four members are already on 70 cm. and another six are building for that band; a 23-cm. project is also under way, led by G3BBR. At their meeting on June 23, the talk will be on Lasers.

Forthcoming events for **Shefford** include a lecture on the History of Radio Navigation; a Mobile demonstration; and a talk by G2DPQ on Getting Started in Amateur Radio. The club meets weekly and welcomes visitors and prospective new members.

Peterborough organised a second D/F contest on May 6, with G3EEL well hidden—however, he was found by two SWL members in quick time. **Purley** have had an instructive talk on /M operation by G3LXN of the well-known South London Mobile Club; next most important date for Purley is June 17, the AGM, when the past year will be surveyed and future plans sorted out; no doubt that the regular Club nets—Sunday mornings on 1980 kc and Wednesday evenings on 70-32 mc—will be among the subjects for discussion.

The boys at **Crawley**, busy with Field Day by the time you see this, now have three new G3V - - calls in the register. A new venture for them is the setting up of a regular 4-metre net on 70-15 mc, with five active stations, and more on the way. Their next meeting is on June 22, when Arthur Milne, G2MI, will be giving forth on the (rather dreary) matter of QSL bureaux; this is no denigration of G2MI, who is a master of the subject and has been doing a tremendous job for U.K. amateurs since before Hitler's War.

From **Plymouth** comes a report that their chairman, G3SVZ, was able to say (at their recent AGM) that "the past year had been very successful, with a big increase in licensed members, and a record year for social activities." No less than 40 members attended to hear all this good news, together with a statement by the committee that "a very comprehensive programme is planned for the coming year." The Club callsign is G3PRC; they publish a very competent newsletter, called *QUA*, running to five pages and including a cross-word in the strictly Amateur Radio context—which must involve a lot of work for whoever cooks it up.

Separate from the **Bristol Amateur Radio Club**, already reported, is the City & County of **Bristol Group**, running a show of their own, with the next meeting on June 24 at what is described as the "usual venue"; by a bit of detective work (the compiler of this piece having, as it happens, operated from Bristol in the late 1930's), this could be the Victoria Rooms up the Clifton Road—though we are not actually told so, on the highly decorative notepaper on which the notes are scribbled. (We do our best to sort things out in the interests of all concerned, but there are times when it gets a bit too difficult.)

GRAFTON CONTEST NOTE

Back in London, we are told that the **Grafton Radio Society** continue to meet each Friday evening at Montem School, Hornsey Road, Holloway, London, N.7, at 7.30 p.m. Programme details are given out on the Grafton Net, at 10.0 p.m. every Wednesday evening on the Top Band frequency of 1970 kc; listen-in to this, as visitors are always most welcome at any Grafton meetings. The recent Grafton Top Band Contest produced, as the overall winner, G3IGW with 144 points, the runner-up being G3LYW just four pips behind and the leader in the telephony section.

Taking an effective part in the big Mobile Rally at Trentham the **Stoke-on-Trent Amateur Radio Society** report that some 300 mobiles were checked in for the occasion, "an enjoyable time being had by all."

The June meeting for **Cheshunt** will "feature a junk auction" and will be held at the Methodist Church Hall at 8.0 p.m. on June 3 (the evening of the day on which you should be reading this).

At the **Cardiff Radio Contest Club**, the idea is that the emphasis should be on actual transmitting and receiving, though the constructional side is not neglected. Anyone interested locally is invited to be at the Griffin Inn, Lisvane, by 8.0 p.m. on June 6, for the next meeting; SWL's and prospective members will be made very welcome. For **Durham City Amateur Radio Society**, the AGM will be on June 16, when new members will be cordially welcomed.

At **Ealing**, they get together each Tuesday at 7.30 p.m. at the Northfields Community Centre, Northcroft Road, and it is stated that "the Club station should be on two metres very shortly."

Now publicity boy for the **Verulam Amateur Radio Club**, (St. Albans, Herts.), Brian Grist, G3GJX, reports that owing to the rise in membership and ever-increasing attendances it has been necessary to search around for more commodious premises; these have been found at the Cavalier Hall, Watford Road, St. Albans, for sessions to be held on the third Wednesday of each month, at 7.30 p.m.

And so we come to the end of "Month with The Clubs" for this issue. Hon. secretaries are asked to note the following dates as absolute deadlines for the next few issues: June 11 (*July issue*); July 16 (*August issue*); August 13 (*September issue*). Address to "Club Secretary," **SHORT WAVE MAGAZINE**, BUCKINGHAM.

THE OTHER MAN'S STATION

G3HRH

THIS month we illustrate the station and the background of a callsign well known in VHF and UHF circles. The location is at 73 Warren Way, Digswell, 2 miles north of Welwyn Garden City, in Hertfordshire, the operator is Ray Hills, and the callsign G3HRH.

An interest in Amateur Radio was awakened in 1949 while still at school, and this was greatly encouraged by three local stations G3ENE, G3EWG (now ZS5WG) and G5UM (who is also very well known on VHF). Ray's early operation was as an SWL on 160m. and 20m., using an R107. The R.A.E. was taken and callsign G3HRH allocated in August, 1950, while still in the VIth form of the local Grammar School (aged 17). Operation in those days was confined to the LF bands from the parental home in Welwyn Garden City, using the ubiquitous 807, and a very random piece of wire.

In 1951 Ray went up to Bristol University for a three-year course in Electrical Engineering, and during this period operated -/A on 160m. CW from various "lodgings" in that fair city.

Activity at home resumed in 1954, initially on 160m. but soon moving on to VHF in 1955, running 100 watts to a QQV06/40, a cascade converter into a BC-348 and a home-built 5/5 Yagi. Equipment for the expected 70 mc band was constructed in time to be ready for the "opening day" and G3HRH made some of the earliest contacts on that band, working G5KW, G8KW, and G3CLW on November 11, 1956. For those contacts Ray used a QQV06/40

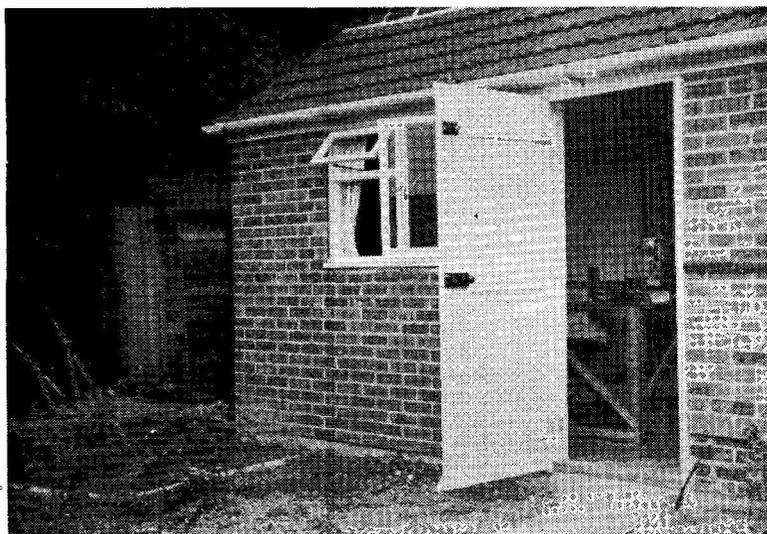
running at 50 watts input, a grounded grid CC converter and a home-built 5-ele. Yagi.

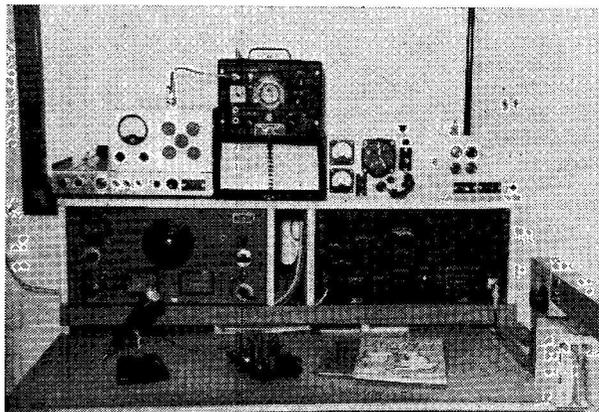
Interest in 160m. rapidly diminished, and all operation on the LF bands ceased early in 1956—apart from a short spell on 10m. during sunspot maximum conditions in 1957. In October of that year, Ray went out to Nigeria on business for four months, and there operated the station at ZD2FNX on 10m. and 15m., from Lagos. Operation in the U.K. recommenced in 1958, strictly on VHF, and principally on two metres. Interest also extended to a little mobile operation on that band as well.

In the autumn of 1959, Ray married, and moved out of Welwyn Garden City to the present site on the high ground to the north of the town. A certain amount of care went into the choosing of the position of the new home, not uninfluenced by the desire to improve on VHF performance!

Operation was resumed from the new QTH using a shack built in the loft space of the bungalow, and initially restricted to 2m. In 1963 activity commenced on 70 cm. as well, using a 25w. Tx and an 8/8 slot beam just above the roof of the bungalow. On this were worked 11 counties and two countries in six months. At this stage the arrival of a son-and-heir necessitated vacating the roof space which was converted to a spare room for domestic use, and the present outdoor shack was built as an extension to the separate garage—see photograph. Apart from divorcing the radio activities from the living side, this also produced a bonus by more than halving the

General view of the shack, G3HRH. It is built as an extension to the garage, in brick, with cavity walls. Bottom right can be seen the incoming 230v. AC armoured cable, from the bungalow, taken as a spur on the domestic ring-main. At bottom left one stay anchor for the 30ft. lattice mast is in view.





At right is the main operating position, with the two-metre receiver unit arranged to work into either main Rx. On the left is the main transmitter cabinet, containing the air-cooled QY3-125 push-pull two-metre PA (top) and its exciter immediately below, giving 5-channel selection by crystal. The other panels contain the necessary power supply and control circuitry. The right-hand Tx cabinet carries, at top, the aerial and change-over relays, with continuous metering of output power and an overload trip. The main modulator runs a pair of 811A's in the output.

lengths of feeders to the aerial system, on a tower at the end of the garden.

Present Accommodation

The shack is brick-built with cavity walls, and has a tiled roof lined with insulation board. The inside walls are plastered and the concrete floor tiled with heavy duty plastic tiles. Power is brought from the bungalow on a buried armoured cable, and immediately split into "technical" and "services" supplies. The latter cover the fluorescent lighting, thermostatically controlled background heating (to combat any damp), and an infra-red radiant heater as optional boost. Several auxiliary outlets are also available on this supply for such items as a vacuum cleaner (*yes*—the floor is kept relatively clean), and for portable power tools in the shack and in the garden. The technical supplies have a master isolator beside the door, and serve the outlets on the workbench, and the adjustable wall-lamp. They also feed the primary of a 5 kVA auto-transformer, the secondary taps of which are selected on a metered switch at the operating position, to give a controlled supply for the radio equipment, independent of the voltage drop in the supply cable from the bungalow or variations in the voltage of the incoming supply mains.

Tie lines are run in steel trunking between the workbench and operating position, and thence to the main transmitter cabinets and the aerial patching box (located behind the Tx cabinets). These provide screened audio, RF coaxial and general open-wire circuits between the different pieces of equipment, and permit alternative and temporary inter-connec-

tions to be made without a maze of trailing cables. The wall-mounted speaker can also be switched at the operating position to any of the receivers and monitoring points, the unused apparatus being automatically terminated in a resistive load by the same switch.

The Gear

The main two-metre transmitter—with power supplies, modulator, aerial T/R relays and reflectometers for 2m. and 70 cm.—is housed in a two-unit enclosed standard rack, with space for a projected new 70 cm. transmitter and an SSB exciter unit also available. The 2m. transmitter runs push-pull QY3-125's modulated by 811's in Class-Bzb and the projected 70 cm. transmitter is a 4X150A, using the same modulator, which is relay switched between bands together with the appropriate primary circuits of the various power supplies. The 2m. receiver is a home-built converter with the following line-up: 6CW4 RF—($\frac{1}{2}$) 6BQ7A mixer—6AK5 (IF)—($\frac{1}{2}$) 6BQ7A cathode follower output, 6J6-6J6 crystal oscillator.

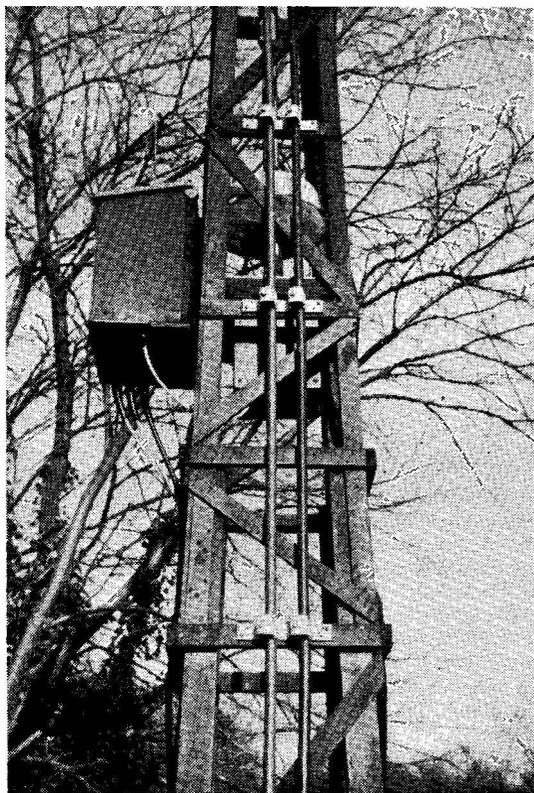
The IF tunes 10-12 mc *exactly* on a BC-348, or a modified BC-455. The frequency is set against GB3VHF, using incremental tuning adjustment.

The aerial system for two metres is two 8/8 Yagis stacked vertically, with the 70 cm. 8/8 between them. All aeriels are carried on a cantilever alloy scaffold pole, running in plain bearings inside a 28ft. wooden lattice tower, and rotated by a two-speed cowl-gill motor, coupled through a chain drive, and controlled from the operating position. The aerial heading is repeated indoors using a magstrip system. For additional

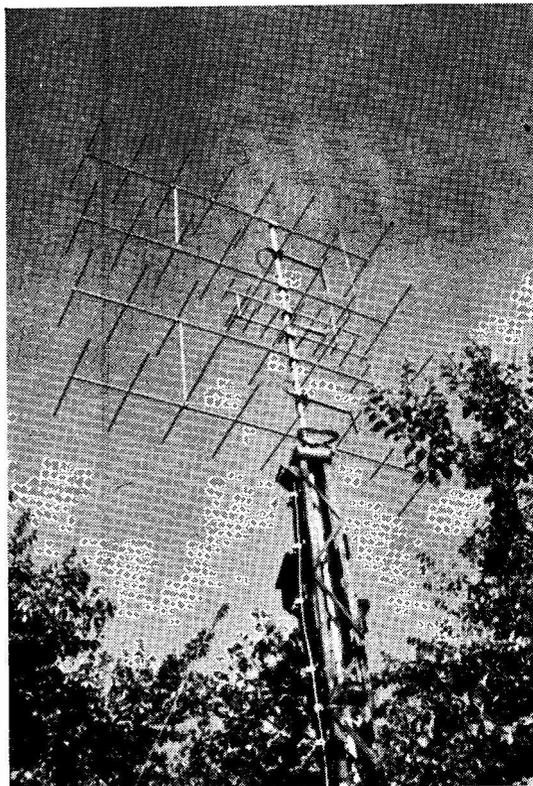
stability the tower is stayed at two levels, and has a ladder on one face and a platform at the top for inspection and maintenance of the aerials. The main feeders (UR17 for 2m. and HM6ALH for 70 cm.) are cleated down the opposite tower face and then run underground, entering the corner of the shack through a 4½ in. dia. earthenware pipe let into the concrete foundation.

The aerial for four metres is a 4-ele. Yagi mounted on a 15ft. scaffold pole attached to the garage wall beside the shack door and rotated by the "Armstrong method." The 4m. transmitter is a modified Pye PTC-703 base station running 25 watts to a QQV03/20A, and a home-built CC converter with a 6CW4 RF stage, tuning at 10·2-10·8 mc on the HRO receiver, available as an alternative to the BC-348 main station receiver.

The 70 cm. transmitter is at present a QQV03/20A running at 25 watts, and using the power supplies of the main 2m. equipment. This is due to be replaced by a 150-watt unit using a 4X150A. The receiver is an A2521 RF stage in front of a IN21B mixer and



The motor drive for beam rotation. The cowli-gill motor is housed in the box, and drive is through a chain reduction. The main shaft rests on a thrust roller bearing, with a magslip transmitter for heading indication. The motor is fed AC through a step-down transformer, with two speed settings, all controlled from the operating position.



The beam aerial system at G3HRH consists of two slot-fed 8/8 Yagis at a mean height of 35ft., the feeders being UR17 1in. solid dielectric coax. The 8/8 for 70 cm. is mounted between the two-metre pair, and likewise fed from the aerial patching box inside the shack.

6BQ7A IF amplifier. This also tunes 10-12 mc, on either the BC-348 or HRO.

Since space is rather limited a certain discipline of tidyness in the permanent installation has been a necessary and desirable result. So far as operations go, the current All-Time scores for the VHF bands are as follows: 4m., 25 counties, 3 countries; 2m., 74 counties, 17 countries; and 70 cm., 18 counties, 2 countries, all worked from the QTH as described here since October, 1959.

The site is 380ft. a.s.l. and some 25 miles north of London, in rolling countryside, with an excellent path to the south and south-east, and average to good in other directions except east and north-east, where the ground rises sharply for a further 50-80ft. and maintains that height for several miles.

Professionally, G3HRH has been engaged in broadcast radio and television engineering since 1954, and is now involved in the provision of UHF television transmitting aerial systems in the U.K. He holds an Honours Degree in Engineering and is an Associate Member of both the I.E.E. and the I.E.R.E.

NEW QTH's

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

- G3SHY/A**, R. Cottrell, c/o Geraldine Staff Club, Geraldine Road, Malvern, Worcs.
- G3UPL**, T. Codling, 42 Highfield Estate, Saxilby, Lincoln. (Tel. Saxilby 482.)
- G3UUE**, N. Carter, 84 Queens Crescent, Sunderland, Co. Durham.
- GM3UVL**, W. Bourke, 96 Rowan Drive, Bearsden, Glasgow, Scotland.
- GM3VAR**, Dr. A. J. M. Campbell, 15 Greenlaw Drive, Paisley, Renfrewshire. (Tel. Paisley 7710.)
- G3VBX**, R. M. Luther, 55 Grange-side Avenue, Hull, Yorkshire.
- G3VCM**, I. H. Mochrie, 68 Rowlatts Hill Road, Rowlatts Hill, Leicester.
- GM3VCQ**, D. J. Wilson, The Studio, 28 Cross Street, Fraserburgh, Aberdeenshire. (Tel. Fraserburgh 57.)
- G3VDC**, Name?, South Lodge, Bolney, Haywards Heath, Sussex.
- G3VDL**, L. Millward, Oak Tree Cottage, Ashgate, Chesterfield, Derbyshire. (Tel. Chesterfield 68117.)
- G3VDV**, N. R. F. Brinnen, 23 Springwood Road, Sheffield, 8, Yorkshire. (Tel. Sheffield 53712.)
- G3VDY**, J. M. Pass, 4 Regent Avenue, Horsforth, Leeds, Yorkshire.
- G3VEB**, R. E. Bridson, 14 Zig-Zag Road, Liscard, Wallasey, Cheshire.
- G3VEK**, S. C. Holden, 239 Bingley Road, Shipley, Yorkshire.
- GD3VEM**, F. H. Knight, 3 Queens Drive, Ramsey.
- G3VET**, M. C. Langwade, Mival, 9 folkes Drive, Kings Lynn, Norfolk.
- G3VFB**, A. R. Matthews, Giza Coy., Royal Military Academy, Sandhurst, Camberley, Surrey.
- G3VFG**, G. H. Kaye, 29 Bainbrigge Road, Headingley, Leeds, 6, Yorkshire. (Tel. Leeds 57692.)
- GW3VFZ**, M. Hughes, Minffordd, Bangor, Caerns. (Tel. Bangor 2893.)
- G3VGI**, J. S. Webb (ex-G8AFD), Stone Cottage, Theale, Slinfold, Horsham, Sussex.
- G3VGJ**, S. C. Webb (ex-G8AGW), Stone Cottage, Slinfold, Horsham, Sussex.
- G3VGR**, D. J. Aldridge, 38 North Crescent, Southend-on-Sea, Essex.
- G3VHA**, M. G. D. Skelding, 17 Summercourt Square, Kingswinford, Brierley Hill, Staffs. (Tel. Kingswinford 4258.)
- G3VHK**, J. M. Robinson, 162 Camden High Street, London, N.W.1.
- GM3VOX**, A. J. T. Thomson, 109 Hyndland Road, Glasgow, W.2.
- G5AAQ/W5TWD**, R. F. Fisher, 44 Primrose Gardens, London, N.W.3.
- G6ACH/T**, D. J. Long (G3PTU), 16 Low Poppleton Lane, Acomb, York.
- G8AOJ**, G. R. Smith, 121 Kemble Wick, Cirencester, Glos.
- G8APK**, A. J. D. Cooke, 3a Falcon Road East, Sprowston, Norfolk, NOR.88R.

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- GM3DJT**, J. M. Mitchell, 79 High Street, Loanhead, Midlothian. (Tel. Loanhead 636.)
- G3JEJ**, W. B. Hartog, The Moorings, Grimsby Road, Louth, Lincs.
- G3JFO**, R. W. Flintham, 86 Newland Park Drive, Hull Road, York.
- G3JKN**, M. C. Sparrow, Dietikon, Old Mill Road, Denham, Bucks. (Tel. Denham 2229.)
- G3KFB**, K. Parkinson, 60 Westbeck Gardens, The Avenue, Middlesbrough, Yorkshire.
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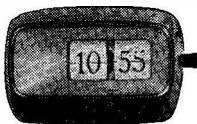
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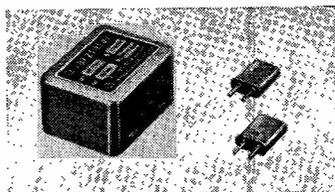
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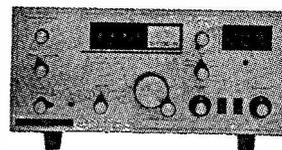
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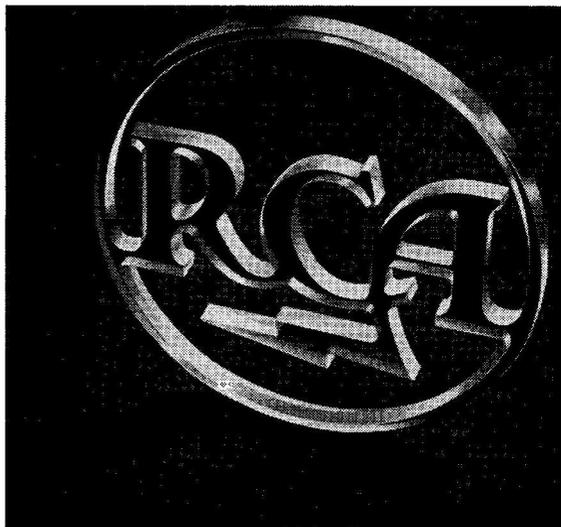
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CSE 2A10 — see p.198

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SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: Eddystone S.640 receiver, in good condition, with spare valves, price £15.—J. A. Lush, G3TGY, Queen's College, Cambridge.

FOR £16 ONLY, The Buyer can collect: A mint TCS-12 receiver, with PSU and speaker; a 160m. transmitter; two PSU's; a GDO with PSU; mains transformers, meters, SCR-522 transformers; and the junk box, also 80 copies "Short Wave Magazine" and 80 "Bulletins." For another £16, an Eddystone S.640 with matching speaker.—Woodward, G3GYR, 77 Sandbach Road, Rode Heath, Stoke-on-Trent, Staffs.

SALE: Transmitter, range 4 to 16 mc, 300 watts; and a three waveband receiver covering 60 kc to 4.5 mc, AC/DC, 230v. mains or battery. For further details contact.—R. Ramsay, Cardryne Farm, Drumore, Wigtownshire, Scotland.

FOR SALE: Olympic T.150 AM/CW Tx, 150 watts, coverage 10 to 160m.; also KW-500 Linear Amplifier; both in excellent condition, £40 each. Buyer must collect.—Finlay, Benvrackie, Foulford Road, Cowdenbeath (3128), Fife, Scotland.

NEW VALVES: 4X150A, 50s.; 829B, 30s.; 2E26, 5B/255M, QQV03-10, 17s. 6d. each; 5763, 7s. 6d. **TRANSISTORS:** OC201, ACY19, BSY95A, 5s. each. Clevite BPF 455 kc type TL4D9A, 4 kc bandwidth, £3. Cathodeon 10-7 mc crystal filter Type BP50, £3.—Box No. 4311. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

OFFERING: A K.W. Viceroy Mk. II with a KW-500 Linear, in good condition, package deal at £125.—Neil, G2ABB, Beckbury Cottage, Beckbury, Nr. Shifnal, Shropshire.

RADIO MAST: Triangular section, 30ft. high, galvanised commercial model standing on ball base; breaks down into 10ft. sections for easy transport; with built-in ladder. Will support any aerial array. Complete with guys and rust-resisting bolts; two years old; cost £36. Will accept £20.—Taylor, 51 Edward VII Avenue, Newport (64927), Mon., South Wales.

SALE: R.C.A. AR88LF, in excellent condition, with S-meter and manual, £40. Green & Davis converter for range 136-139 mc (satellites, etc.), IF 2.4 mc, £6 10s.—Owen, 76 Cowleigh Road, Malvern (4402), Worcs.

SELLING: Creed 7B Teleprinter, £12. Type 7B with tape attachment, £11. Series 50,000 7B with silence cover, £13. Two-metre 1985 Tx/Rx, £6. Press Wireless 05/FR FSK Exciter, mains, rack mounted, 3.5 to 3.8 mc, with manual, £10 post free.—Spence, 16 Firwood Crescent, High Spenn, Rowlands Gill, Co. Durham.

WANTED: Olympic ATU, 250w. or 500w. type. Also V3 or V3-Jr. Mosley ground-plane system, or other make; and a Joystick.—van Brenkelen, c/o 165 Loreny Drive, Shortlees, Kilmarnock, Scotland.

GOING SSB: Major Shack Reorganisation. Selling an immaculate Eddystone 840C, at £45; speaker plinth, new, 35s.; Class-D Wavemeter and attachments, new, 50s.; pair Jap walkie-talkies, as new, £16; Heathkit Q-multiplier, unused, £6 10s. Offers for R.1155 with PSU: R.1132 with PSU; 38 Set Tx/Rx; and 18 Set Tx/Rx.—Thexton, G3URE, 78 Greenfield Road, Brunton Park, Newcastle-on-Tyne 3, Northumberland. (Tel. Wideopen 3044.)

WANTED: A BC-312-342 in average to very good condition; also one in condition suitable for spares etc. Details please.—Box No. 4308. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: An Eddystone 888A, £75; matching S-meter, 50s.; Eddystone 840C, £38. The two together, £110. Both in excellent condition, with manuals. Delivery by arrangement.—G3UKM, QTHR (Tel: Leeds 51582).

WANTED: A Linear Amplifier, must be in mint condition **SELLING.** KW-160 Top Band CW/AM Tx, mint, £17. Coils for Z-match, 12s. 6d.—Steed, 2 Cliff Road Gardens, Leeds, 6.

STEPHENS-JAMES LTD.

Appointed North Western Agents for KW Electronics Ltd.

Full KW range now in stock

KW2000 Transceiver, £173. A.C. P.s.u., £32. D.C. P.s.u., £32
 KW2000A Transceiver, £195. A.C. P.s.u., £40. D.C. P.s.u., £40
 KW Vespa Transmitter, £110. A.C. P.s.u., £25
 KW600 Linear, £115. KW Vanguard, £73/10/-
 KW SWR Bridge, £8/10/- KW Balun, £1/15/-

CODAR Equipment		"JOYSTICK" Distributors	
	£ s. d.	The full range of Joystick antennas and tuning units. Trade supplied.	
AT5 Transmitter ...	16 10 0		
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AT5 Mobile P.s.u. ...	11 5 0	SR550 Receiver ...	65 0 0
Mobile Control Unit	2 7 6	SR600 Triple con- version ...	95 gns.
T28 Mobile Receiver	15 10 0	HA350 Dual con- version ...	75 gns.
PR30 Preselector ...	5 10 0	HA55 Aircraft receiver ...	19 10 0
PR30X Self powered	7 4 0	KT340 receiver kit	25 gns.
RQ10 "Q" Multiplier	6 15 0		
RQ10X Selfpowered	8 8 0		

NATIONAL and EDDYSTONE equipment supplied

	£ s. d.
FR-100B Sommerkamp Sidebander Receiver, 80-10 metres	110 0 0
FL-100 Sommerkamp Transmitter. SSB/AM/CW, 120 watts PEP	130 0 0
Matching units complete with internal P.s.u., can be used as a transceiver.	
Panda Cub Transmitter	30 0 0
Eddystone 840C, mint condition	48 0 0
National NC121 Receiver	45 0 0
Morse Keys	6 0 0
Semi-automatic Bug Key	4 12 6
New G3FIF Mk2 Mobile whips	7 7 0
Extra coils available all bands	4 0 0

See G3FIF demonstrating these at the Harewood Mobile Rally, June 19th on our stand.

70 PRIORY ROAD, ANFIELD, LIVERPOOL 4 (ANFIELD 3141)

SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: CR-100, in good condition. Price £15, buyer collects, or delivery locally.—Jones, 5 Manor Crescent, Hitchin, Herts.

SALE: R.C.A. AR88LF, with case and in good condition, £32 or near offer. Offers invited for receiver Type CG-46068, coverage 60 to 80 mc.—Shaw, 55 Augustus Road, Edgbaston (2465), Birmingham.

OFFERING: A Two-Metre Station: Cascode converter, six-channel 15w. Tx, modulator, AC/PSU, metered, with all switching, self contained in TU5B case, £18. **HRO Receiver**, miniature valves, general coverage coils, internal PSU, price £15. **Mobile DC Power Unit**, Aveley transistors, 12v. in, 300v. or 600v. out at 120 watts, with relays, meters and fuses, £18. All open to offer, or £45 together, carriage extra.—G3HRH, QTHR.

SALE: Heathkit DX-100U transmitter with SB-10U Sideband Adaptor, only 9 months old, price £77 10s., delivered anywhere in England. Reason for sale: Gone Transceiver.—Crowther-Watson, 73 Frenchgate, Richmond, Yorkshire.

FOR SALE: Immaculate K.W. Victor (PA 2/6146), from sole owner, price £50.—Rayer, G3OGR, Reddings, Longton Heath, Upton-on-Severn (312), Worcs.

SELLING: A Hallcrafters HT-40 Tx, circuit similar to Heathkit DX-40U, but smaller, 110v. AC input, complete with auto-transformer U.K. mains, price £24 or near offer.—G3TLH, 10 Langdale Drive, Flanshaw, Wakefield, Yorkshire.

CSE 2A10 — see p.198

WANTED: In mint condition, Hammarlund HQ-170A receiver, London or near.—Box No. 4309, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: PSU for 19 Set Tx/Rx; also standard wire gauge. OFFERS invited for Oscillator Type 145, MO/Xtal, 807 and 4/CV45, 4003A, coverage 2.0 to 7.5 mc, with PSU 2/CV54, and spare valves; suitable for Technical College. Also many years issues of "Bulletins", "Short Wave Magazine", and "Practical Wireless". South London district.—Box No. 4310, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Codar PR-30X Preselector, price £4 10s. Also T.W. two-metre converter, transistorised, with battery, IF coverage 4 to 6 mc, £5.—Norton, 9 Paisley House, Laisterdyke, Bradford 3, Yorkshire.

OFFERING Minimitter Mobile Tx, 40-80-160m., with control unit, £10. PSU, 12v. transistor or mains, £5 each. Rack-mounting type HRO, with PSU and four GC coils for 10 to 160m., £9. Pye Ranger, unmodified, £4 10s. Near offers considered for any item. Delivery by arrangement.—Wilson, G3DSV, 14 Edgumbe Park Drive, Crowthorne, Berks.

SALE: Oscilloscope, 3in., by Industrial Electronics, for 240v. AC input, price £8. BC-221 on 8½in. rack panel, accurate on calibration, with stab. PSU, 240v. AC, £8. Power supply unit on 10½in. panel, enclosed, giving 500/600v. DC at 400 mA, 6v. or 12v. AC at 6 amps, £3 10s. Carriage extra.—Brooke, 6 Exeter Gardens, Ilford, Essex.

SELLING For 55s., Complete G3HSC four-guinea Morse Course, consisting of books and three records.—Crump, G3VGC, 80 Lennard Road, London, S.E.20.

WANTED: CR-100 or similar Rx. Details condition, any modifications, etc., and price.—Charman, 8 Grangewood Avenue, Rainham, Essex.

WORLD ATLAS, National Geographic, de luxe edition, size of maps 18in. by 24in., 300 pages including 150-page index for some 127,000 entries, as new (cost £9 in 1965), offers invited.—Watts, 62 Belmore Road, Norwich, Norfolk, NOR.72T.

G. W. M. RADIO LTD.

LOW FREQUENCY ADAPTORS for R206 Receiver, 50 to 600 kc/s. 230 volts A.C. power unit, £3/10/-, carriage paid.

AUDIO AMPLIFIERS N24, 4 watt. 230 volts A.C., £2/15/-, carriage paid.

HEAD AND MIKE sets for 19 or 22 set, 10/- or superior Chamois padded type, 15/-, both post paid.

FIELD STRENGTH METERS. 100-150 mc/s. Telescopic Chrome Aerial, 1 ma meter, 35/-, post paid.

CAR AMMETERS, 30 amps. Charge/discharge, 1½" dia., 10/-, post paid.

METERS, 100 ma. 3" round, 10/-, post paid.

SPEAKERS. 3" in diecast case, 12/6, post paid.

COSSOR GANGLING OSCILLATOR, £7/10/-, carriage paid.

CANADIAN MARCONI 52 RECEIVERS. 1.75 to 16 mc/s. New condition. Less outer case, £10/10/- or with ZE12 power unit for 230/115 volts A.C. and connecting cable, £13/10/-, both carriage paid.

10 watt MODULATION TRANSFORMERS suit pair 6V6 5000 ohms to 2500 ohms, 12/6, post paid. Ceramic insulated 3 gang Variables, 56 x 56 x 35 PF. 3/6, post 1/6.

TRANSMITTER OUTPUT TESTERS type 57. Ranges 0-15, 150 and 1500 watts. Made for Pulse Modulated Transmissions 150 to 250 Mc/s. 4" scale 0-1 Ma. meter. Power supply for 230 volts A.C. or 12 volts D.C. Complete with 50 ohm R.F. head, handbook with circuit, and connecting leads packed in transit case, £2/10/-, carriage paid.

SIEBE GORMAN Underwater Torches, solid brass. £2, post paid. Good used condition.

POCKET WATCHES, ex-Government, 15-jewel Swiss movement, 50/-, plus registered post, 2/6.

CLASS "D" WAVEMETERS, £3 5s., carriage paid.

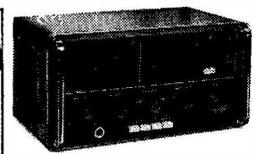
WHIP AERIALS. Eight 4ft. sections and heavy base. Will make up to 24ft. max. 35/-, carriage paid.

All equipment offered is complete but not tested unless otherwise stated. Carriage charges quoted are for England and Wales only. Telephone Worthing 9097.

Terms: Cash with order. Early closing Wednesday.

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J. B. LOWE 115 Cavendish Road, Matlock, Derbyshire

Tel.: Matlock 430

Let's continue to flog bits and watch Bill get fat on the fantastic profit he makes.

NEW SURPLUS

Blowers: Dandy little 2½" dia. centrifugal fan with 12v. D.C. motor. It'll suck or blow, well waddya know! 17/6, post free.

Capacitors: 500pF mica 2.5kv., 2/-, .01 mfd 600v, 1" tubular, 3d. each, 2/6 a dozen. 170pF variables single gang, 2/-, double gang, 170/170, 3/6. Air spaced trimmers, 20 and 30pF, 1/6.

Chokes: Ideal for Rx p.s.u., 2" x 1½" x 2½" high, 3/6. Fully shrouded 16H 120ma (very, very conservative), 4½" x 3½" x 4½" high, 7/6. Can't understand why these don't sell like hot cakes—they're really very good.

Coils: A couple of ½" x ½" slug tuned formers neatly mounted in an I.F. can, 1/-, 2" x ½" slug tuned former. Rigid chassis mounting in ½" hole, 2/-.

Keys: Fully adjustable, heavy duty and excellent value at 4/-.

Relays:

Type: SM6LV20. 1011HK. SM3LV115. SM3LV129. SM5H12. Starter T5 D.C.
voltage 12 6 6 or 12 24 12 12
Resistance 600 100 100/100 6500 670 —
Contacts DPDT 3p make 1p break DPDT 4p: 2 make 2 pole
Price 3/6 3/6 3/6 3/6 4/6 3/6
The SM5H12 is totally enclosed. Starter T5 is very heavy duty—pulls in with a sickening thud.

Resistors: Thousands and thousands of 1½ watt Welwyn 5% 470K, 1d. each. Boy! that was some salesman! Trade enquiries welcomed with open arms!

Switches: Single pole aerial c/o heavy duty knife switch, 2/-, D.P.S.T. push pull with knob, 2/-, Micro switches, 2/-.

Vibrators: 4-pin, 12 volt, 6d.

Terminal Boards: All shapes and sizes, 1/- each. Every shack should have a selection of 12 for 4/-. This will encourage you to build (and order more junk from me!)

Transformers: Miniature audio output, standard audio, R107 audio, AR88 LF crystal load. Modulation 1:1 or tapped 1:1, 4:3, 2:1, 4:1 about 2½" cube. All at 2/6 each.

Variometers: The guts of the 19 set variometer—with this at 7/6 and a cheap variable you have an antenna tuner which will do a power of good to your Rx. Not recommended for a kilowatt linear.

Sundry: Driver unit for R220 v.h.f. set. Nine resistors, 8 capacitors air spaced 10pF trimmer, 3 ceramic 7-pin v/holders, 2 coils (one slug tuned), hardware and a transformer all for 5/-.

Note: The above stuff is all BRAND NEW AND BOXED surplus. In addition I have some new stuff of current manufacture, which, as it is priced well below wholesale, should sell quickly, but it won't because you think there's a catch in it.

Resistors: Normal new colour coded ½w. 10, 22, 33, 56, 68, 82, 220, 390, 470, 560, 5.6K, 33K, 180K, 330K, 680K, 2.2M, 4.7M, 2d. each; 100 for 15/-, 5W. wire wound 200, 250, 300, 350, 500 ohms, 4d. each.

Capacitors: Ceramic—4.7, 10, 22, 47, 100, 500pF, 4d. each. Tubular—47, 150, 220pF, .022mF, .047, .22, .33, 3d. each. Disc ceramic—001, 6d., .01, 8d. each. High Voltage—001 15KV, 4/6, .001 20KV 6/-, .005 25KV, 10/-, .05 10KV 7/6, .1 7KV 5/-.

RECEIVERS, TX's, etc.

New, and all in stock: NCX5, Mk.2, Swan 350, KW2000, Codar AT5, PR30X, Lafayette HA-350, KT-340, Electroniques QP166, ham band front end, £12/12/-.

Filters: Mechanical 455 kc/s. as fitted to the HA-350, £9/19/6.

Crystal: 9 mc/s.—the fabulous XF-9A and XF-9B at 15 gns. and 19 gns. respectively. These are undoubtedly dead gemutlich, bags of kultur.

Second-hand: A selection of mint stuff. I was about to say "mint and faultless," but even the Collins has faults—what Rx hasn't?—so don't expect miracles from the poor old S3BE.

Collins 7551	£200	Halicrafters SX117	£125
DX100U and SB10U	£75	Halicrafters HT41 linear	£100
Eddystone 840C	£40	Halicrafters HAS V.F.O.	£35
Eagle Rx 80	£35	Halicrafters S38E	£8
Heathkit DX40U and VFU	£25	Heathkit RAI	£35
		RG1	£35

And also the following which do not quite meet my definition of mint, but are nevertheless perfectly good.

KW500 linear	£60	HRO MX, coils, speaker	£20
Panda Cub	£30	and p.s.u.	£20
KW76	£20	KW Valiant	£20

If you are looking for a Tx or Rx, or interested in a wide range of bits and pieces, a s.a.e. will get you the latest stock. Let's wheel and deal because I'm trading high to build up a stock of second-hand stuff.

H.P.—Certainly, a pleasure. The poor Credit Company are down to their last few paltry millions.

Tyros—tell me how much you want to spend and I'll tell you your best but without fear or favour, whether I can supply it or not. Experts—if you don't believe this, a s.a.e. will put me to the test!

Wanted: TFI44 sig. gen. and a Corsor ganging oscillator.

Postage: Please send plenty of extra cash with order to cover postage—I'll refund the balance. Remember that parcel post STARTS at 2/9!!! The G.P.O. make more on the deal than I do!!!

73 de Bill

SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: Complete Two-Metre Station, consisting of TW-2 transmitter, TW PSU/Control unit, TW nuvistor converter heaters wired 12v., ideal for mobile, £30. HRO-MX receiver, in good condition, with nine coils for 50 kc to 30 mc, bandspread on 10-20-40-80m., with matching PSU, £20. Q-Fiver, new and boxed, £6. Command Tx, 7 to 9 mc, 30s. Signal generator case, dial and coils, 15s. All plus carriage.—Earnshaw, Gerharden, Alkington Road, Whitchurch, Shropshire.

WANTED: Manual for Audio Frequency Response Curve Tracer Model 1900, by Industrial Electronics, Ltd. — Watts, 62 Belmore Road, Thorpe, Norwich, Norfolk. NOR. 72T.

WANTED: Cheap Rx and multi-band AM Tx, for G6UT Club Memorial Shack. Offers to:—G. O'Donald, G3TLJ, hon. secretary, Harlow and District Radio Society, Great East, Harlow Road, Roydon, Harlow, Essex.

WANTED: General coverage Receiver. **SALE:** Hallicrafters handbook for SR-150, and 1964 issue "World Radio and TV Handbook," 10s. each.—Box No. 4312, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: SB-34 Transceiver, £150. Geloso G.209, range 10 to 160m., £38. CR-300, £15. Parmeko xformer, as specified for G2DAF SSB Tx, 65s. Napoleon SWR meter, 60s. All carriage paid and OK. — G3MOE, QTHR.

SELLING: Heathkit galvanized tower, unused, £28 surplus carriage. Heathkit OS-1 'scope, £18. Heathkit QPM-1 Q-Multiplier, £5. Heathkit GD-1U GDO, with extra coils, £8. All in immaculate conditions. Offers? — Cross, 171 Fordwych Road, London, N.W.2.

MOBILE POWER: 60w. transformers for transistor DC/DC supplies, highly efficient, 12v. in to 300/600v. out, some with separate bias winding, ideal for B.44, etc., with full user data, price 35s. Two-metre 15/18w. Tx RF section, £6. Four-metre 50w. table top Tx, QQV06-40A PA, price £20. An AR88LF, in excellent condition, £30. Type 13A Oscilloscope, £25. Carriage extra, s.a.e. for details.—Sandall, G3LGK, 21 Dale View, Ilkeston, Derbyshire.

SALE: G. & D. Linear, with new 7094 valve, first reasonable offer around £50 accepted. Heathkit SB-300 receiver, professionally built and only 4 weeks old. Must sell. All in brand new condition.—Box No. 4313, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Heathkit OS-2 'Scope, £18 or near offer? Labgear two-meter converter, £3 5s. **WANTED:** Kokusai mechanical filter; small modulation transformer.—GW3UMD, 367 Gower Road, Killay, Swansea, Glam., South Wales.

EQUIPMENT of the Late G3JLF is being sold. Minimitter 150w. transmitter, 10 to 80 metres, plate/screen modulated, in good condition with, as spares, 2/866's, 4/807's, Minimitter low pass filter, complete at £40, or near offer. Three Electroniques Series II 85 kc IF transformers (one for diode), pre-aligned, HSO/85 BFO/C10 unit, with data sheets (lot cost 50s. new), selling at 25s. — Apply Hoban, G3EGC, 96 Ashworth Lane, Astley Bridge, Bolton (51502), Lancs.

SALE or EXCHANGE: AVO Electronic Testmeters, one in good condition at £16, also one at £8 10s., or the two together for £22, both with manuals, or EXCHANGE for Ferguson 3006 radio.—Sephton, 16 Bloemfontein Avenue, Shepherds Bush, London, W.12.

FOR SALE: R.107 front end, 10s.; 18 Set Rx, 5s.; RF-25 converter, 10 and 15m., 10s.; two vibrator packs, 5s. each; Command rotary converter, 5s.; Command receivers, 28 to 41 mc, £2; 6 to 9 mc, £3 10s.—Carlill, Garden Cottage, Hurst House, Hurst, Berks.

SMALL ADVERTISEMENTS, READERS—continued

BALUNS, for 10 to 160m., 50-80 ohms, 1:1 ratio, rated 1 kW p.e.p., G3HZP design, limited quantity 15s. each, including postage.—G3HZP, QTHR.

SALE: New Mosley V-46 vertical aerial system, with D-4BCA loading coil for 80m. (cost £24 15s.), bargain £16, plus carriage. **WANTED**: Mosley Tri-band Beam; Cossor sweep generator.—Coupland, G2BQC, 117 Burgh Road, Skegness (1883), Lincolnshire.

FOR SALE: National HRO-60 receiver, 20 valves including xtal calibrator, general coverage 1.7 to 30 mc, bandwidth 3.5 to 4.0 mc, 7.0 to 7.3 mc, 14.0 to 14.4 mc, 27 to 30 mc, 8w. push-pull output, with manual, £175. Buyer collects. **Would consider Drake-2B in Part Exchange**.—White, 90 Fog Lane, Didsbury (8971), Manchester, 20.

SELLING: Lafayette HE-73, combined preselector for 10 to 80 metres and converter for 10, 15, 20 metres, fitted standard coaxial sockets, £10. Codar PR-30X preselector, fitted neon indicator and cut-out switch, £5. Taylor Windsor 170A valve voltmeter, £5. Cossor Type 343 ganging oscillator, £3. Home built Bradley oscilloscope, £5. Command receiver, 80 metres, £2. All items in working order. Prefer buyers inspect and collect.—Torode, 42 Thackeray Buildings, Herbrand Street, London, W.C.1.

SALE: Eddystone 940 Rx, in first-class condition, with handbook, price £80 or near offer.—Brumfitt, 24 Hutchison Cottages, Edinburgh, 11, Scotland.

FOR SALE: Brand new transformers, 380-0-380v. 200 mA, 6.3v. 12 amp., with choke 10 Hy 200 mA, 27s. 6d. post free; 320-0-320v. 100 mA, 6.3v. 8 amps., with choke 10 Hy 80 mA, 20s. post free. Valves, tested and guaranteed: 6X4, EF91, 6J6, 12AT7, 1s. 3d. each, 10s. doz.; 12AU7, 12AX7, 2s. each, 18s. doz.; VR150/30, OA2, 6CH6, 5Z4, 6BW6, EL81, EF55, EF95, 2s. 6d. each; one pair 4X150A, 40s., postage extra. Oil-filled condensers, 8 mF 800v., 5s. 6d. post free.—Bos, 8 Barbrook Close, Tilehurst, Reading, Berks.

EXCHANGES: Eddystone 840A receiver, 1.4 to 30 mc, excellent in appearance and performance. 8 mm. movie camera, Bolex, 7 speeds, twin turret, 12.5 cm. and 36 cm. lenses, close-up prisms, pistol grip, cable release, shoulder bag. Hanorette editor, winder arms. Bell & Howell projector, three lenses, short-normal-long throw. Hunter spring-loaded roller screen. Extensive titling set, mock-up table with floodlights; all excellent condition (except table). Pair ex-Govt. walkie-talkies, each having 5 valves, with two headsets, two throat microphones, whip aerials, circuit diagram, all in working order but batteries needed. Pye transceiver, PTC-108D, 12v. DC input, internal rotary-converter HT, with handset. Rotary transformer, 12v. DC in, 250v. DC at 125 mA out. **WANTED**: Lafayette HE-80 receiver, or something better; VHF receiver, continuously tunable, maximum coverage; both for mains operation, in perfect condition, and ready to give. Multimeter. Cash adjustment either way on foregoing Exchanges. **Would prefer single deal, but genuine enquirers ring Potters Bar 58333 Monday to Friday 6.30 to 9 p.m. Single deal collection or delivery within 100 miles Potters Bar**.—Pank, 33 The Highlands, Potters Bar, Middlesex.

WANTED: A good AR88D, not rubbish. **SALE**: Transworld transistor Rx, 530 kc to 27 mc continuous coverage, with bandwidth, very sensitive receiver and only few months old, first £22 secures.—Box No. 4314, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Prop-pitch motor, the last one, electrically modified and sealed ready for mounting, otherwise brand new, first £15 secures. 4/811A's with bases, seen some life, but good for years, 25s. each. C-core transformer, 1100-0-1100v. 250 mA, 20s., plus postage. Offers for 5/4X250B's, one ceramic base and one p.t.f.e. base; 2/4X150's; 10H/9116710 with brand new 4X150.—James, G3HZP, Mayfield, Willingham (243), Cambs.

OFFERING: Dawe pulse generator, in good working order, £12 or near offer. Marconi beat-frequency oscillator, £4 o.n.o.? VHF Rx Type P.104, modified, range 100 to 150 mc, £3 o.n.o.?—Keeping, 11 Falcon Close, Langley Green, Crawley, Sussex.

FOR SALE: Panda Cub Tx, Mk. II, coverage 10 to 160m., runs 70 watts; one only built by Panda; unique transmitter for £40, or very near offer. Home-built Tx, copy of K.W. Vanguard, using Gelo 4/102 unit into 807 PA, with built-in modulator and separate PSU, runs 50 watts over 10 to 80m., £25 or near offer. Type 10 wavemeter, 40s. Buyers collect.—Page, G3UUM, 19 Boulsworth Crescent, Nelson (65142), Lancs.

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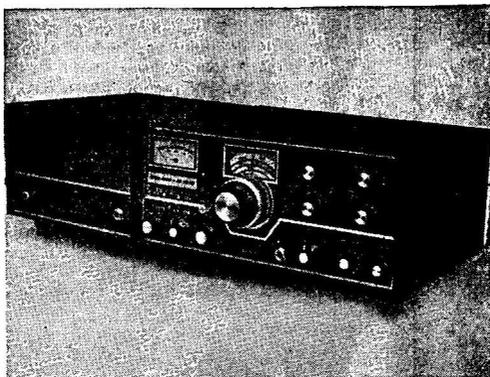
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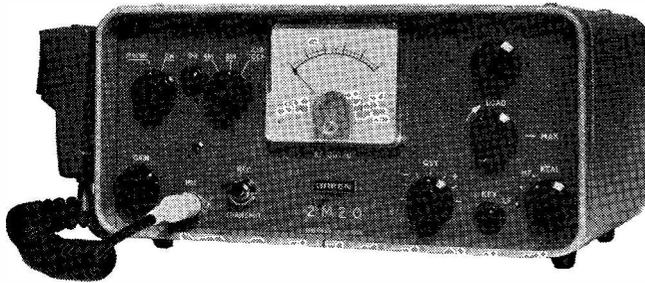
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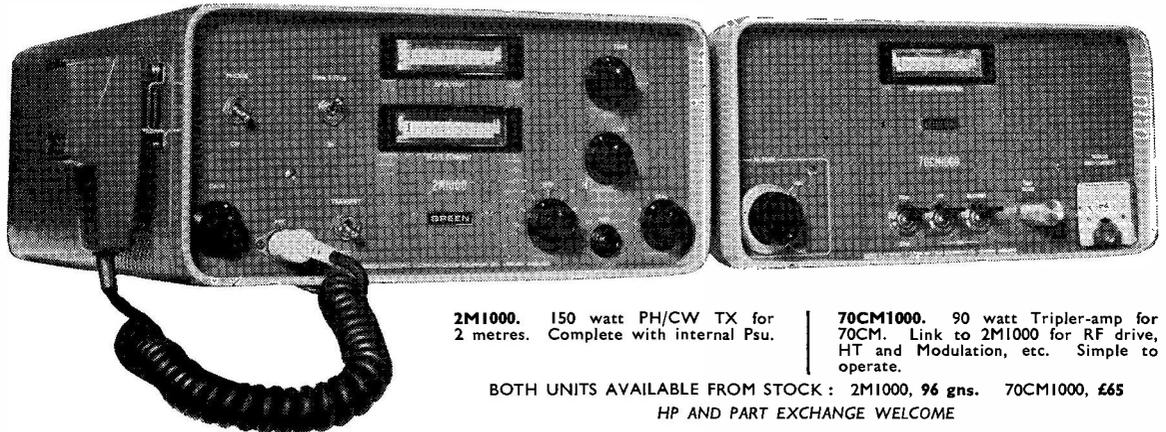
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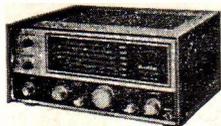
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