The SHORT WAVE Magazine

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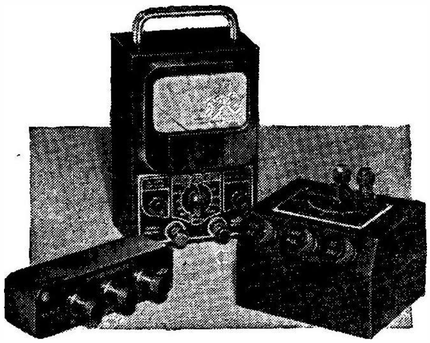
VOL. X JANUARY, 1953 NUMBER 11



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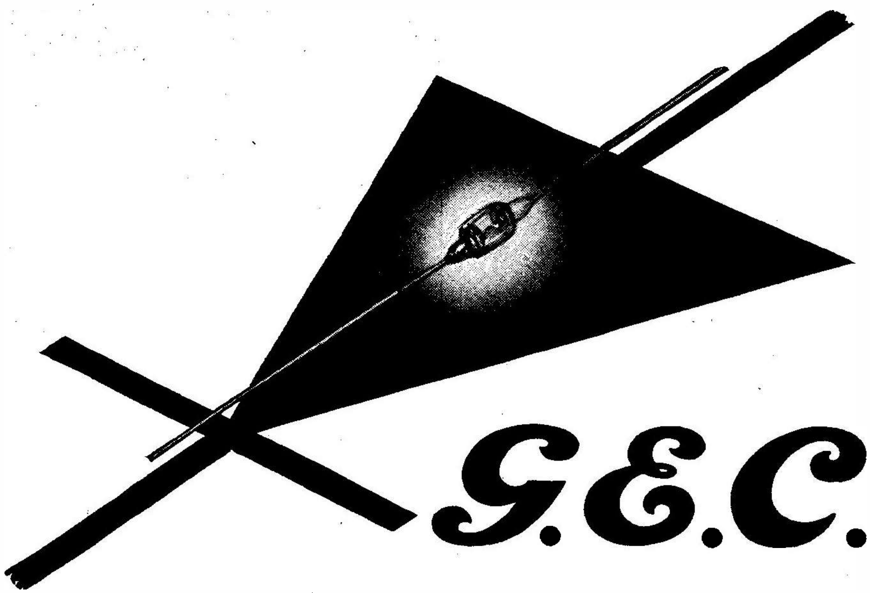

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GEX 54	High back resistance diode	£1.0.0
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GEX 54/4	150 V diode	£1.10.0
GEX 54/5	200 V diode	£1.15.0
GEX 66	100-1000 Mc/Sec Mixer	12/6d.
GEX 64	Telephone modulator	£1.0.0
GEX 34	Set makers version of GEX 44/1	—

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CONTENTS

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

FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT-WAVE Magazine

EDITORIAL

Resolutions

It is again the season for Sound Advice and Good Resolutions—and it hardly needs saying here that in our world of Amateur Radio much useful advice could be given and a long list of excellent resolutions could be catalogued.

But as always, amateurs will remain as individuals who pursue a great hobby as the spirit moves them—they are not really much concerned about what others may be doing or thinking.

Now, the interest may be DX and the thrill of beating the other man to a new contact. Later, it may be the interest of building a new piece of equipment. Or coming up on QRO phone for the first time—or trying QRP after years of working with full power. Or breaking out on a new band. Or the supreme satisfaction of helping a newcomer to obtain his first results. Or a hundred-and-one other possible lines of activity.

The very fact that there are so many aspects of Amateur Radio is one of the reasons why it always remains so fascinating, even after years of activity and a long experience on the air.

So instead of offering advice for the New Year to those who may glance over this page, we would simply say that we wish all our readers, all over the world, the best of luck, happiness and good fortune for the coming year, and success in whatever direction their amateur activities may lead them.

Austin Forsyth
G6FO.

Switched Multi-Band Exciter Unit

STABLE VFO—OUTPUT ON ALL AMATEUR BANDS—FULL COVERAGE ON EACH BAND—ONE TUNING CONTROL ONLY—CW/PHONE OPERATION ON TOP BAND

PART I

W. N. STEVENS (G3AKA)

This is a practical article describing in detail the design and construction of a modern Exciter Unit giving RF drive output on six bands switched. Each band is fully covered, with 180 degrees dial spread automatically on switching; there is no panel tuning control for the multiplier stages; no plug-in coils are involved; HT is cut to valves not in use on any particular band; cheap and easily obtainable valves and parts are used throughout; and a small CW/Phone transmitter is incorporated at the 1.7 mc level. The general design and construction can be varied to suit individual requirements, or the Exciter complete can be built as described and illustrated.—Editor.

AFTER the upheaval resulting from a change of QTH, it was decided to hold a one-man board meeting on the subject of the transmitting equipment now safely installed in its new shack. This quiz was frank and to the point (and at times rather brutal) and it appeared that the six-year-old transmitter could be greatly improved by a suitable application of blood, toil and the rest.

Naturally the drive unit was the centre of attention and this article will describe the Exciter devised as a result of those meditations. The main interest of the writer is in the HF bands, though this has been in the past due partly to circumstances — poor situation for aerials; too short a run for really *long* wires for the LF bands and no scope for rotary beams for VHF. Now that the aerial question is decidedly more hopeful, all band coverage is anticipated—that is, from Top Band to 28 mc.

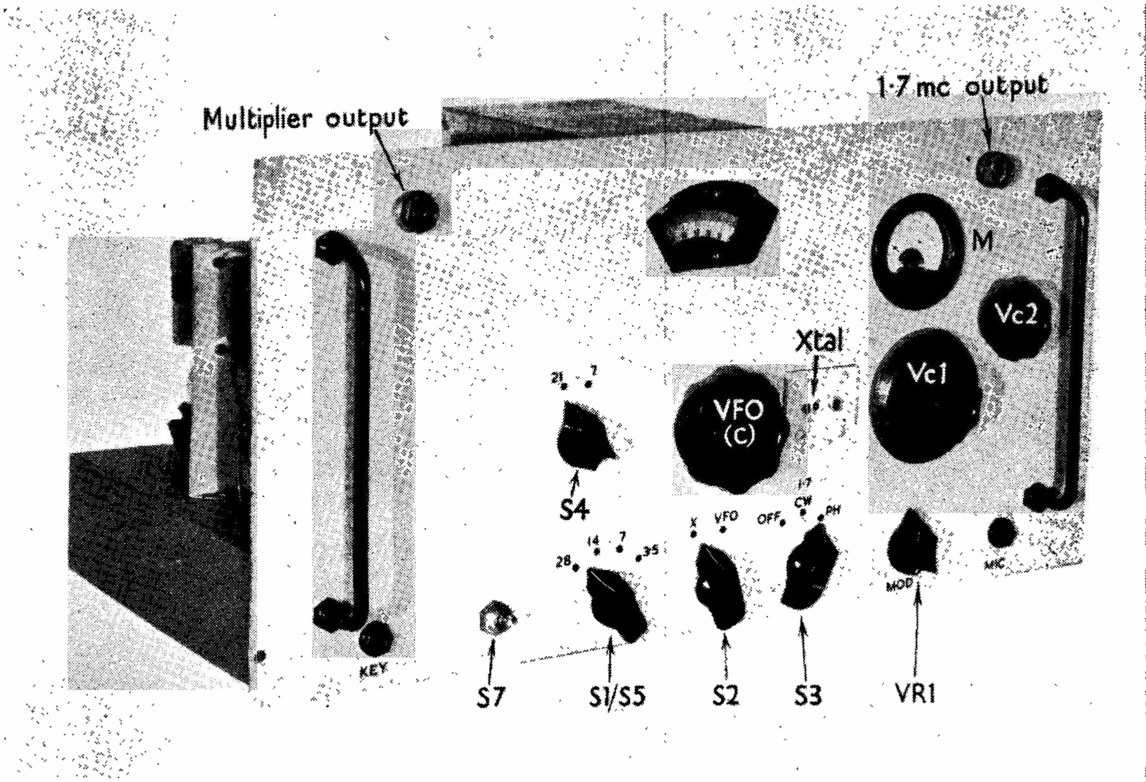
The first consideration, then, was for an all-round Exciter. The second was for fully switched band-changing—apart from the slight inconvenience of plug-in coils there is the question of TVI and, as in the writer's case, when a transmitter is built into a completely enclosed metal rack assembly plug-in coils would mean unbolting everything to change bands. The third feature was to be the elimination of panel controls for the frequency multipliers, to simplify operation. Another desirable refinement was to obtain the full bandwidth on the main VFO tuning control for each amateur band automatically on switching.

With these ideas in mind a versatile unit has been designed and built. The block outline is shown in Fig. 1; the VFO drives a string of doublers to 28 mc, with a tripler from 7 mc for the 21 mc band. As for One-Sixty, it was considered that as the final input on this band is limited to 10 watts it would be convenient to incorporate the 1.7 mc PA in the same unit —it would be faintly ridiculous to have a separate unit for that stage! And, although the writer does not use 'phone a great deal, there was sufficient space left to include a simple modulator for Top Band, thus providing another string to the bow.

So much for general considerations. Although the Exciter is somewhat more elaborate than many, the work has been well worth while. For instance, it is possible to switch from the panel to any amateur band (except of course VHF), and there will be RF drive for the PA practically constant over the whole band. And, moreover, whatever band is selected can be fully covered (no more, no less) by the main VFO tuning control. Frequency multipliers not in use are automatically switched out and changing to 1.7 mc cuts them all out. Phone and CW for Top Band is also selected by suitable switching.

The VFO

Various oscillators were tried out, but the parallel-tuned Colpitts proved the most satisfactory for the job in hand. It goes off easily, is no trouble to adjust and provides a substantially linear output. The basic circuit is quite conventional and so there is little point in going into detail. The choke L3, however, may call for comment. It is, of course, to "float" the heater for RF and may be wound as specified in the table or can be interwound on the tank



Front panel view of the Multi-Band Exciter described in the accompanying article. It gives RF drive output on all bands 1.7 to 28 mc.

coil at the earthy end. It is claimed that the latter system gives somewhat better stability and less warm-up drift, but there seems to be little to choose between the two methods and a separate choke is, moreover, easier constructionally.

The switching system should be familiar to most readers. It is a bank of parallel and series condensers similar in principle to trimmers and padders in a superhet receiver. These are so arranged that the main tuning condenser C will cover varying bandwidths according to the switch selection.

As a start, all the required bands must be reduced to a "common factor"—that is, their Top Band equivalents. For instance, the full 80-metre band has a 160-metre equivalent of 1750-1900 kc, the 20-metre band an equivalent of 1750-1793.75 kc. These represent bandwidths of 150 kc and 43.75 kc respectively. The trimmers and padders, then, are so adjusted that the main tuning condenser C will tune over a band of 150 or 43.75 kc depending on whether the selector switch is set to "80" or "20."

The main tuning condenser is large (250 $\mu\mu$F) because we have both large and small bandwidths to accommodate. By inserting a pre-set capacity of 250 $\mu\mu$F in series with C, the sweep will be reduced to 125 $\mu\mu$F; by putting in a 100 $\mu\mu$F series condenser the sweep becomes only 70 $\mu\mu$F. It is merely a matter of finding the correct value of series condensers to enable any bandwidth we require to be selected.

This is only part of the story, however, because by using such an arrangement—as an example for a sweep of 1750-1900 kc—any further doubling will end at 1900 kc (the HF end). It is the LF end which must be constant, because all bands have an LF-end equivalent of 1750 kc.

The reason is easy to see. The capacity sweep of the main tuner (in series with the bandwidth control pre-set) is varied by increasing or decreasing the value of the pre-set condenser, but the minimum capacity (high frequency) variation will be negligible — the main variation being at the low frequency or high capacity end. Unfortunately, our amateur bands are such that the LF ends are harmonically related, but the HF ends are not. Therefore it becomes necessary to subtract or add a small trimming capacity to enable each band to terminate at the correct HF limit.

If the reader is not clear on this, the sketch of Fig. 2 will clarify the system. L and Cf represent the inductance and fixed capacity in the grid circuit, C is the main tuning condenser with the series condenser (Cs) and parallel condenser (Cp) comprising the part-pre-set tuned circuit. Cs is the bandwidth control, regulating the capacity change of C, and Cp enables the necessary adjustment to set the HF limit.

In practice, the total capacity in circuit is exactly the same in any switch position when the tuner C is set to maximum capacity (the LF end of the bands).

To obtain full coverage of all five bands (forgetting 21 mc, which will be taken care of later) there must be five switch positions. However, when the writer came to build up the unit diligent searching amongst the radio shops failed to reveal any suitable switches. Such switches would have to be five-way, of ceramic insulation, and suitable for ganging. The best that could be managed were only four-way. But Top Band is not used a great deal here and so a compromise was made: 160 and 80 metres were considered as one switch position, which gives full coverage on 3.5 mc and a range of 1750-1900 kc on Top Band. This is no serious disadvantage, as it does indeed cover a good deal of the 1.7 mc band; but readers who want full sweep on Top Band can obtain this easily enough provided they have, or can obtain, suitable five-way switches.

Reduced to the "common factor," the various amateur bands are shown in the Table.

BAND	TOP BAND EQUIVALENT	BANDWIDTH	SWITCH POSITION
1.7 mc	1750-1900 kc	150 kc	1
(full band:	1715-2000 kc)	(285 kc)	
3.5 mc	1750-1900 kc	150 kc	1
7 mc	1750-1787.5 kc	37.5 kc	2
14 mc	1750-1793.75 kc	43.75 kc	3
21 mc	1750-1787.5 kc	37.5 kc	2
28 mc	1750-1875 kc	125 kc	4

So far as the VFO is concerned, 7 and 21 mc are on the same fundamental switch position. This assumes certain future development. The full 21 mc band, for instance, is 450 kc wide (equivalent: 1750-1787.5 kc or 7,000-7150 kc) and the bandwidth has been worked out accordingly. It seems likely that we may be lucky enough to retain the full 150 kc on 40 metres (as provided for Region 1 by the

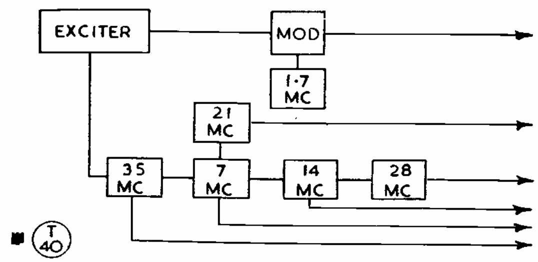


Fig. 1. Block schematic of the VFO Exciter Unit, showing electrical layout for all-band output.

Atlantic City Convention). If so, this means that both 7 and 21 mc have the same relative bandwidths, which to say the least is rather convenient!

Should we get less than the full 150 kc then some quick thinking will be necessary if the Exciter unit is to provide what it set out to do—give the exact coverage of each band. There would be two ways of overcoming this:

As 21 mc cannot be "doubled," the most convenient method of getting RF on that band is to triple from 7 mc, which has been done in this unit. A switch has been provided to change from 7 to 21 mc. Now, the two possibilities are *(a)* A separate position on the main

COIL AND CHOKE DATA

Tank Coils

	COIL	NO. OF TURNS	SPACING	FORMER SWG	DIA.
L1	Oscillator grid	30	close-wound	26	1⅛"
L5	Buffer anode	70	close-wound	22	1⅛"
L10	1.7 mc PA	70*	close-wound	22	1⅛"
L12	3.5 mc doubler	32	close-wound	22	1⅛"
L13	7 mc doubler	22	close-wound	22	1⅛"
L16	21 mc tripler	6	spaced to 1"	16	**1¼"
L18	14 mc doubler	10	one-turn spacing	22	1⅛"
L19	28 mc doubler	4	spaced to ¾"	16	**1¼"

* *Tapped at 30 turns, if power doubling on 3.5 mc is required.*

** *Self-supporting. All other coils on polystyrene or ceramic formers.*

Chokes

L2, L4, L6, L8, L9, L11, L14, L15, L17, L20	2.5 mH RF choke.
L3	¼" diameter x 4" long, close wound 22 SWG.
L7	20 turns close wound 22 SWG on ¼" former.

selector switch for use when needing the 21 mc band, or *(b)* Some extra positions on the "7-21 mc" switch.

Suggestion *(a)* is quite straightforward and requires only the extra switch position and condensers. Suggestion *(b)* is more involved, but must be considered if switches with enough positions for the extra 21 mc bandwidth and trimming condensers cannot be obtained. A suggested arrangement is shown in Fig. 3; on 7 mc, a smaller capacity is switched in series with the bandwidth condenser to enable whatever range we get (maybe 100 or even 50 kc) to be obtained and an extra amount of trimming capacity is put into circuit to retain the HF limit. This scheme would require very careful thought in constructional detail if put into use.

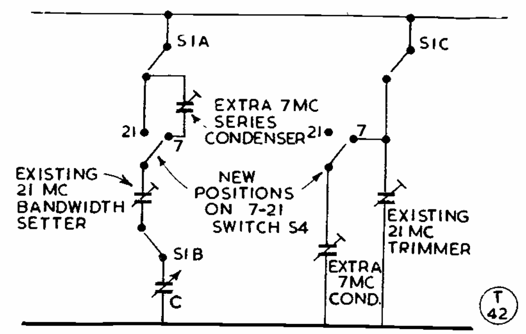


Fig. 3. Method of accommodating different bandwidths in the VFO tuner to cover the 7 and 21 mc bands.

The Buffer

V2 is a conventional buffer amplifier which can either be driven by the VFO or used as a crystal oscillator by means of S2. It takes an SP61 valve, mainly because a number of these were lying idle in the spares box; other similar valves could be used here equally well. No key click filter has been shown as this will depend on individual requirements. Resistors R5 and R6 are the usual parasitic stoppers. In the interests of simplicity in construction, the anode tank condenser is returned to chassis, as it is in all subsequent stages, thus dispensing with the need to fit insulating brackets or panel bushes. All HT electrodes in the VFO section are fed by stabilised voltages.

The Top Band PA

The buffer stage is capacity coupled to the 1.7 mc RF amplifier stage, which is an 807. A smaller valve would, of course, be suitable, but by keeping the HT down to 300 volts and applying heavy bias, the input can be reduced to the allocated 10 watts—which is more than you can say for some "ten watt" 807 rigs!

The actual amplifier is quite orthodox and the normal precautions against self-oscillation are taken, *e.g.*, the anode and screen stoppers and the VHF choke in the signal grid lead. Even when unloaded there is no trace whatsoever of any spurious emissions, but some trouble in this direction was experienced without the choke L7 which seems to be the most effective component in eliminating squegging.

The RF output is fed through the blocking condenser C14 to a pi-coupler. This simple coupler is suitable for use with almost any random length of aerial and meets the purpose admirably, as it eliminates the need for external aerial tuning arrangments. The switch S6 is an optional feature, but in the closed position it enables the 807 to operate as a power doubler to 3.5 mc; a useful feature so far as the writer is concerned as 80-metre QRP has always been of considerable interest—and Eighty is a band on which low power work can produce some surprising results, as those who have tried it will testify.

Having a little space remaining on the chassis, some audio was provided to allow for occasional phone working. As this need not be elaborate, Clamp-tube modulation was decided on as it also protects the 807. There is no need to dwell on the theory of this type of modulation as it has been covered on numerous occasions in *Short Wave Magazine*. The variation on the theme used can be seen from the circuit diagram.

When operated on CW, the voltage developed across the grid leak R7 biases back the Clamper valve when drive is applied, so that normal screen grid voltage appears on the 807. When the drive is taken off, the Clamper (V4) takes current so that the 807 screen grid voltage is dropped to a low figure. In phone working, the Clamper valve is biased back by the audio voltage from the modulator.

The modulator is simply a 6SN7 worked as two triode amplifiers—nothing fancy in any

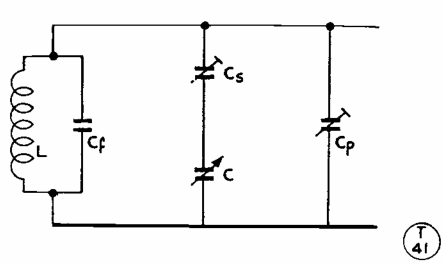


Fig. 2. Basic circuit of the VFO tuning system in the Exciter unit described in the article.

way. A 6SL7 could be used as an alternative, although the bias resistors should be increased somewhat (*see* the usual valve data); the gain will be greater, but is not really necessary as the 6SN7 provides adequate voltage to bias the Clamp valve to requisite degree. Both magnetic and carbon microphones have been tried with comparable results. The writer by no means claims that this is the ideal kind of low-level modulation, nor that the quality is of BBC standard, but it is simple to get going, requires but few components (and no bulky choke or transformer) and can be run off the existing power supply. You can't have your bun *and* eat it ! And the communication-quality speech is quite good enough for the occasional phone excursion on Top Band indulged in by the writer. Perhaps others would prefer to play around with negative feedback and what-have-you, but one difficulty will be the fact that the 807 is run only at 300 volts maximum whereas for really satisfactory Clamping a rather higher operating voltage is required.

The switch S3 (three-pole, three-way) has these positions: CW, Phone, Off. In the CW position the Clamp valve grid is switched to 807 grid circuit and on Phone to the modulator output; HT and drive from the buffer is applied on both these positions. On the " Off " position, the HT supply for the PA, Clamp valve and modulator is cut out and transferred to the frequency multipliers. At the same time, the RF drive from the buffer is also taken into the multipler section.

The Frequency Multipliers

V6 and V8 provide four cumulative stages of frequency doubling, giving RF drive at 3.5, 7, 14 and 28 mc. The valves are 2C34's (also known as RK 34's) and were chosen for several reasons. In the first place twin triodes conserve quite a lot of valuable space; secondly, the type chosen is eminently suitable for the job; thirdly — the 2C34 is at the present moment almost being given away in various radio shops in Town ! At the time of writing, they are being offered at 2/3 each ! So for just under five shillings one can obtain the main ingredients for four doubling stages which is about the cheapest proposition possible. (Needless to say, the writer has laid in a stock of 2C34-RK34's.) Just one point to prospective buyers: These valves come in various versions. There are the Raytheon and National Union 2C34's and the anonymous surplus types named CV18. Both are quite suitable, especially the CV18 which has a ceramic base and is to be preferred on this account. (Some may be marked by the British designation VT61, which is the same thing). All these versions are UX based. Steer clear, however, of the " British RK34's " with a *five pin* base; they have 12 volt heaters — although some valve books make the common mistake of listing them as having 6.3 volt heaters. The writer speaks as one who found out the hard way !

The doublers are quite straightforward and in operation gave no trouble at all. The grid leak of the first doubler is a bit large—this being necessary owing to the rather lower drive applied at this point. Triodes are not normally used in low power multiplying circuits owing to their drive requirements, but even the first stage provides more than enough output at 3.5 mc despite the very small RF drive given by the buffer amplifier. In subsequent stages the grid leaks are of normal value, as there is more drive available.

No neutralising is necessary, of course, since the anode and grid circuits are at different frequencies and there is no interaction between

Table of Values

Fig. 4. Circuit complete of the Exciter Unit.

Resistors :

R1, R19	= 2.2 Megohms, $\frac{1}{4}$ watt
R2	= 1,000 ohms, $\frac{1}{2}$ watt
R3	= 68,000 ohms, $\frac{1}{2}$ watt
R4	= 150 ohms, $\frac{1}{2}$ watt
R5, R6, R11	= 50 ohms, $\frac{1}{4}$ watt
R7, R21	= 33,000 ohms, 1 watt
R8	= 50 ohms, 1 watt
R9	= 5,000 ohms, 10 watt
R10, R22, R25, R27	= 470 ohms, 1 watt
R12	= 10,000 ohms, 1 watt
R13	= 68,000 ohms, $\frac{1}{2}$ watt
R14	= 220,000 ohms, $\frac{1}{2}$ watt
R15	= 47,000 ohms, $\frac{1}{4}$ watt
R16	= 470,000 ohms, $\frac{1}{4}$ watt
R17	= 2,200 ohms, $\frac{1}{2}$ watt
R18	= 6,800 ohms, $\frac{1}{2}$ watt
R20	= 100,000, ohms, $\frac{1}{2}$ watt
R23, R24	= 47,000 ohms, 1 watt
R26, R28	= 22,000 ohms, 1 watt
VR1	= 500,000 ohms, potentiometer.

Fixed Condensers :

C1	= 300 μμF (including, if possible, 60 μμF — or more — in negative temperature coefficient capacity).
C2	= 100 μμF
C3	= 300 μμF
C4	= 500 μμF
C5, C9, C10, C11, C13, C15, C18, C19, C29	= 0.01 μF
C6, C7, C12, C14, C17, C22, C23, C25, C26, C27, C30, C31, C32	= 0.001 μF
C16, C21	= 50 μF, 50 V DC wkg.
C20	= 8 μF, 350 V DC wkg.
C24, C28, C34	= 0.002 μF

Variable Condensers :

C	= 250 μμF
Cp1	= 300 μμF
Cp2, Cp3, Cp5	= 70 μμF
Cp4, Cp6, Cp7	= 170 μμF
Cp8	= 100 μμF

(Cp1—Cp8 may consist of 70 μμF variables, the extra capacity being made up with fixed condensers)

Cp9	= 120 μμF
Cp10	= 70 μμF
Cp11	= 50 μμF
Cp12, Cp13, Cp14	= 25 μμF
Vc1, Vc2	= 250 μμF

Valves :

V1	= 6AC7, 6AG7 (as triodes), or 6J5
V2	= SP61, EF54 or similar
V3	= 807
V4, V7	= 6V6
V5	= 6SN7, 6SL7
V6, V8	= 2C34, RK34

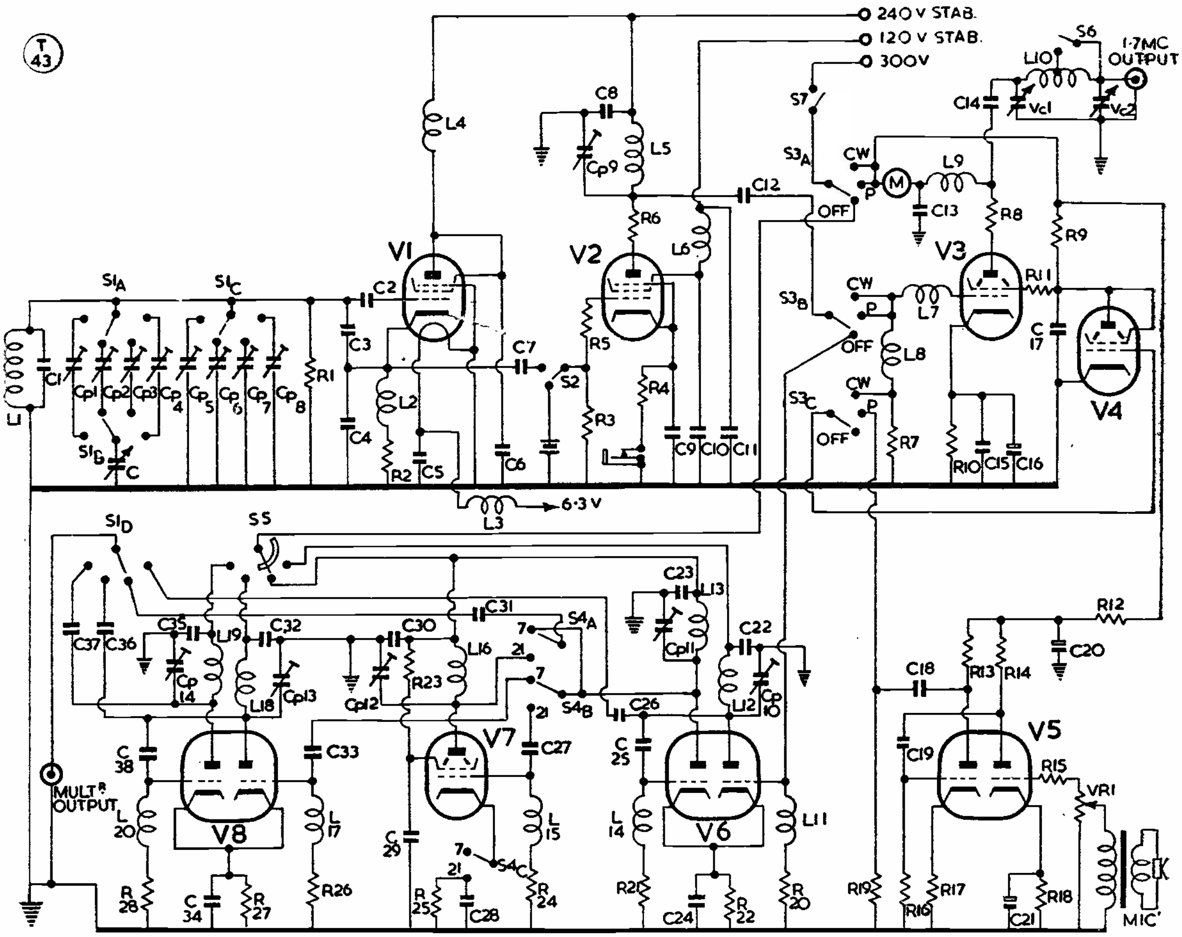


Fig. 4. Circuit of the Exciter Unit, as described and illustrated in the accompanying article.

the twin triodes despite the proximity of the various electrodes. The cathodes are made common as this saves a few components and does not have any noticeable effect in practice. The cathode by-pass condensers are kept on the low side to obtain maximum efficiency. Should a greater RF output be desired the by-pass condensers can be made even smaller, but this should be done carefully because when the condenser is as low as about 100 $\mu\mu$F self-oscillation becomes possible—in fact—it did in the original model. Experiments with a low value by-pass can be very profitable, the idea being that at a certain optimum value, feedback at the output frequency takes place, thus increasing RF output and overall efficiency. But it is a dangerous practice unless satisfactory means are available to check on self-oscillation—the frequency of which could be on anything but the right one.

Actually, it is sometimes advisable to neutralise a triode multiplier; not for the normal reason but due to the fact that the anode-grid feedback will provide a small amount of regeneration with beneficial results. (No drive voltage is neutralised in this case owing to the different operating frequencies of the anode and grid circuits.)

None of these "gimmicks" were considered necessary, however, and are only mentioned for future reference when more output is required from triode multipliers.

A few words on the switching arrangements for these stages. S1d is simply another section of the main VFO selector assembly and switches into circuit the output of the appropriate multiplier. S5 is ganged to the S1 assembly and is of the "progressive shorting" type. On position 1, for instance, HT is applied only to the 3.5 mc doubler—all other

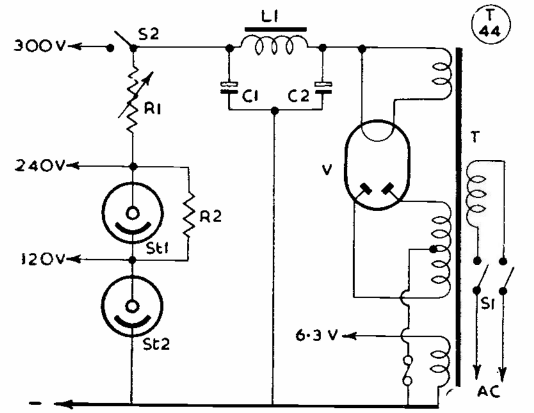


Fig. 5. Circuit diagram of a power pack suitable for the Multi-Band Exciter Unit.

Table of Values

Fig. 5. Circuit of the Power Pack for the Exciter Unit.

V	= 5U4	R1	— 10,000 ohms, 10 watt, with slider
T	= Secondaries : 320-0-320 at 150 mA (minimum) ; 5 V at 3 Amp; 6.3 V at 5 Amp (see text)	R2	220,000 ohms
		L1	= 10 Henrys, 150 mA
		S1	- Mains on/off, DPDT.
		S2	-- Main HT on/off SPST.
C1	= 16 μF, 450 V DC wkg.	St1,	
C2	= 8 μF, 450 V DC wkg.	St2	= S130 or similar

doublers being inoperative. On position 2, HT is applied to both this and the 3.5 mc doubler : on position 3, HT is applied to the 3.5, 7, and 14 mc triodes and on position 4 all triodes have HT on.

In this way, with the 1.7 mc switch S3 in the "off" position, a flick of the main selector switch serves the following functions:

(1) Selects the correct bandwidth for the band in question by means of the pre-set VFO condensers.
(2) Switches on HT to the valve or valves required, leaving others inoperative.
(3) Taps off the required RF output.

Although the valves not being used could be left running, the addition of S5 is certainly a worth-while refinement. An alternative would be to switch the cathodes, but this would mean separate resistors and by-pass condensers.

For 21 mc, a 6V6 is used as a tripler from 7 mc. Unfortunately, this calls for another switch, but it cannot very well be avoided, and since, as we have previously seen, the bandwidths are likely to be the same on both bands at the fundamental VFO frequency it is a convenient arrangement.

The 7-21 mc switch is S4, a three-pole two-way unit. On the 7 mc position, the tripler cathode is out of circuit rendering the valve inoperative, and the 7 mc output goes right through to the output terminal. On the 21 mc position, the cathode is in circuit, the drive from V6 is fed to the tripler grid and the output of V7 goes to the output terminal which serves for 7 or 21 mc as the case may be.

Power Supply

To complete the story, the circuit of the power supply built for this unit is shown in Fig. 5. Having several "surplus" S130 stabilisers (still in reasonable supply for a few shillings each) these were pressed into service as shown. Three output voltages are provided: (1) A 300-volt supply for the 1.7 mc valves and the multipliers ; (2) A 240-volt stabilised supply for the VFO and buffer anodes ; and (3) A 120-volt stabilised supply for the buffer screen-grid.

The heater consumption is rather heavy—5 amps—and it may be necessary to fit a separate heater transformer to supply this current. An alternative is to switch off the 1.7 mc valves when using the doublers, and *vice versa.* In each case there would be a saving of something like 2 amps. Of course, more economical substitutes could be found for V2, V5 and possibly V7, but this would not be of material benefit.

The HT drain will depend on the band being used since not all the valves are in operation at the one time. The maximum HT current (when using 28 mc) will be in the region of 150 mA. For 21 mc and Top Band the load will be somewhat less, and for 3.5 and 7 mc in the region of 90 mA. The transformer should preferably be rated at 150 mA or more.

In the power pack circuit R1 is the normal series resistor to limit the voltage applied to the stabiliser. It should be of the high-wattage type fitted with an adjustable slider—this being adjusted on test so that the stabiliser is just glowing when taking the full load as this condition is that of maximum effectiveness. When

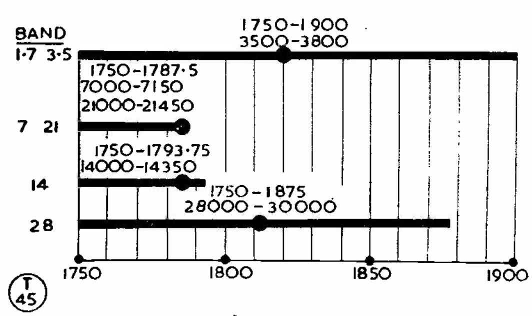
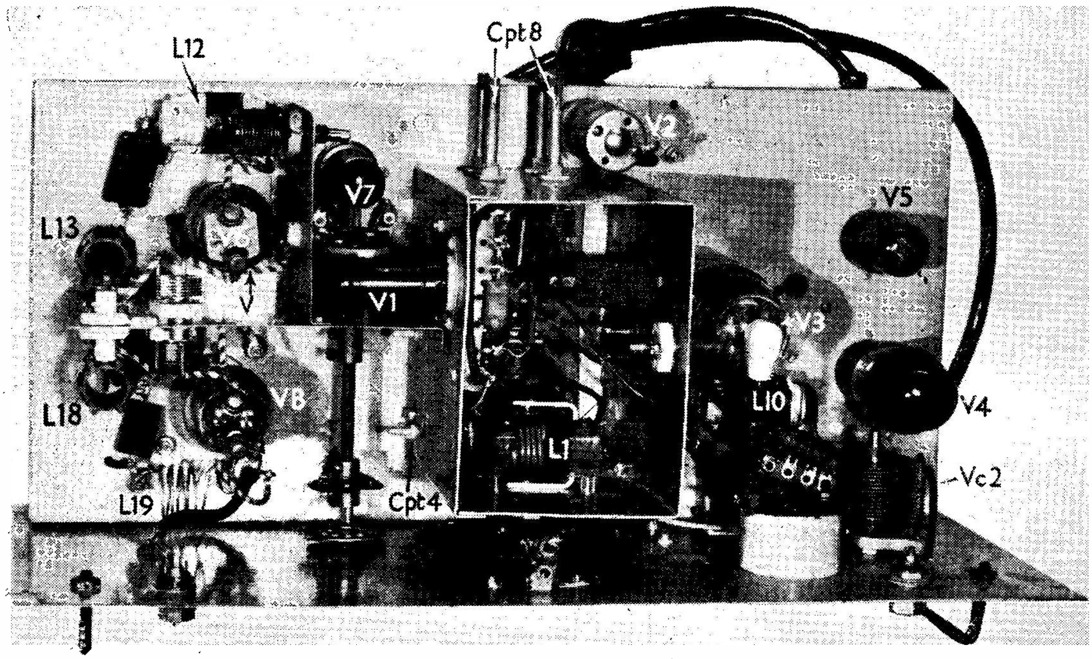


Fig. 6. This diagram shows the six bands covered by the Exciter, giving the frequency relationship, band-to-band, based on the fundamental tuning range.



Behind-panel construction of the Exciter, showing main parts. In this view, "Cpt8" refers to padder condensers Cp5-8 (see text) and "VB" is V8 in the circuit of Fig. 4.

using stabilisers in series or parallel arrangements there is always the possibility of the striking and operating voltages being slightly different owing to variations in characteristics. For this reason the resistor R2 is shunted across St.1 to ensure even striking. When setting up, it is very advisable to set R1 at maximum resistance otherwise some damage may be caused to the stabilisers due to excess current flow.

If alternative stabilisers are used, the value of R1 can be computed from the following formula:—

$$R1 = \frac{1000\,(Vs\text{-}Vr)}{I}$$

where Vs = the supply voltage ; Vr = the regulated output voltage ; I = the maximum permissible stabiliser current in mA.

No mains filters are shown in the circuit as these are fitted to the common mains supply lead from the rack.

It will be noticed that a switch has been included in the main HT line. This is to enable the transmitter valves to be warmed up before the HT is applied ; so far as the 807 is concerned this is a necessity otherwise excessive screen current during the warming-up period could damage the valve and impair its emission. The Clamp valve must be heated before any HT is switched on.

In any case this is a desirable feature for the other valves as well. A chart has been drawn up showing the operating currents of the constituent valves in the Exciter unit as a guide to would-be constructors of this transmitter, either to check the figures with the original model or in the case of some fault developing.

(To be concluded next month)

Short Wave Magazine is an Independent Publication with a World-Wide Circulation

Reliable Modulation Indicator

MEASURING AUDIO VOLTAGE

V. G. P. WILLIAMS, M.A. (G3FYY)

This is a useful and interesting device for checking on the depth of modulation under given operating conditions. The author describes in detail his approach to the problem of obtaining this indication visually.—Editor.

IT is rather astonishing how few amateurs appear to take any steps to ensure *measurement* of correct depth of modulation, and are content to rely on reports from others; in many cases the latter procedure is merely a case of the blind leading the blind!

Therefore, the writer determined, while waiting for his phone ticket, that he would be independent of any uncertainty in this direction and that a reliable indicator would be incorporated in the transmitter.

After various experiments, the arrangement shown in the diagram was evolved; it has been in constant use for two years and has had no alterations whatever made to it. It will be observed that what is actually measured is the audio voltage developed across the modulation transformer secondary, and the indicator is therefore quite independent of the radio frequency of the transmission. This is a great advantage, because modulation indicators which work on the RF principle never seem to be accurate on more than one band, judging from tests which have been made.

But it must be emphasized that this arrangement *is accurate only if the input to the PA remains constant,* so it is not suitable for conditions under which input is being constantly altered. The writer runs a 25-watt rig, but the idea would be quite suitable for 150-watt transmitter if the voltage rating of C were increased, and a higher resistance used for R1. With some types of meter at M, it may be necessary to fit a damping circuit to prevent the fluctuations of the needle being too violent; but this was not found necessary with the meter in use, which is a Ferranti, measuring 3¼ inches across the front flange, easily obtainable on the surplus market.

Table of Values

Modulation Indicator by G3FYY.

C	4µF, 1000v. wkng for up to 500v. at anode	T	Modulation xformer
R1	100,000 ohms, 1-watt	MR	1 mA meter rectifier
R2	1 megohm carbon track potentiometer	M	0-500µA meter

Calibration

This depends on the fact that, when a carrier is modulated 100%, the RF current in the load is increased by 22.5%. It is therefore necessary to have

(a) A dummy load, fitted with an accurate thermo-couple meter,
(b) An audio oscillator.

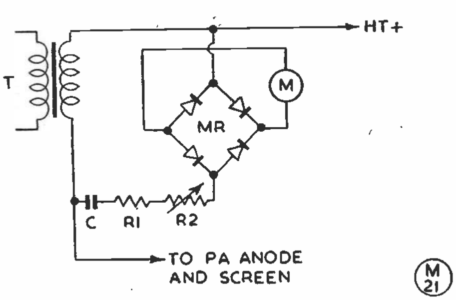
As regards the dummy load, this is a very useful accessory, which in the case of G3FYY is built up on a small chassis, with an 80-ohm carbon resistor of 50 watt rating, a 500 mA thermo-couple meter (both still obtainable on the surplus market), and a co-ax socket.

The audio oscillator can be constructed on the "bread-board" principle if one cannot be borrowed, but the audio output of the signal generator is the ideal. The meter should be prepared by taking it out of the casing and drawing a red line radially through the 400 µA mark, to represent 100% modulation.

Then connect up the PA output to the dummy load, the audio oscillator to the input of the modulator, and adjust the indicator potentiometer to its maximum value. Switch on the HT to the transmitter (but not to the audio oscillator) and carefully tune for maximum RF output into the dummy load.

Adjust the swinging link on the PA to give a convenient reading in the dummy load, say 400 mA. When fully modulated the RF current will be increased by 22.5%. That is, to 490 mA.

Reduce the gain control of the modulator



Circuit of the modulation indicator described by G3FYY in the accompanying article. Values are for 25-watt operation—see Table.

to minimum and switch on the HT to the audio oscillator. Gradually increase the gain control of the modulator until the RF current in the dummy load is 490 mA (see above).

Reduce the resistance of the indicator potentiometer progressively until the meter needle rests on the red mark which you have drawn. The indicator is now calibrated and to prevent it being accidentally upset, the knob on the potentiometer should be removed. Actually, the writer cut a slot in the spindle and adjusted it with a trimming tool; no knob was used.

Results

As an example of the accuracy of this indicator, the writer likes to relate an incident which occurred a few nights after starting on 'phone. On 10 metres, a well-known operator who works for a very large and famous company of radio manufacturers, was raised: he is a very clever fellow with a big array of gear, including an oscilloscope.

The writer told him a test was wanted and said he was going to inject an audio oscillator into the modulator. This was done and the gain turned up until 100% modulation was indicated. He came back with the report that his oscilloscope showed an almost perfect sine wave, with the exception of a tiny kink in one of the skirts (thus indicating almost perfect quality in the modulator) and that the modulation was exactly 100%. He was then told about the modulation indicator in use at G3FYY, and he agreed that the test bore out the claims made for it.

It may be objected that the output of the meter rectifier is not linear, and that the calibration of the indicator would be accurate only at the particular audio frequency used in calibration (400 cycles per second, in this case).

But by playing various notes on a violin in front of the microphone, starting with the open G string (about 180 cycles per second), no perceptible difference could be found in the current in the dummy load when the indicator registered 100% modulation, no matter what the note was.

It can truthfully be said that the signal from G3FYY has never been described as either undermodulated or overmodulated, though it must be admitted that when Top Band was first tried, with the input reduced to 7 watts, he was a little at sea to commence with. But it was soon learned to make the necessary allowance on the indicator to compensate for the alteration to the PA input.

THE RONETTE B.110 MICROPHONE

We have recently had on extended test a production model of the Ronette Microphone, Type B.110, which is indeed a very pleasing job.

It consists of a crystal cell and annealed, corrosion-resisting diaphragm in a shielded casing, built into an ivory-finished moulding. The B.110 can be used in all applications in which a crystal microphone is normally employed.

Though designed for the standard 5/8-in. threaded mounting stand, the Type B.110 is quite suitable for hand operation, as it is extremely light and the housing is comfortably shaped. Two-point connection is by a neat screw fitting accommodating any type of shielded cable up to ¼-in. maximum diameter, and no solder joints are necessary.

As with most high-grade crystal microphones, the audio response is somewhat dependent on the load resistance — that is, the value of the resistor across grid-cathode of the first AF amplifying stage. Resistors of between 0.25 megohm and 5 megohms were tried. The lower the value, the greater the bass attenuation, and for good quality natural-sounding speech, 2 megohms was found to be about right.

Test Results

The output of the B.110 was slightly up on that of two other makes of crystal microphone against which it was tested, and the frequency response distinctly better. The response overall is 30-13,000 c.p.s., level from 30 to about 1,000 c.p.s., with a rising characteristic from that point, peaking between 4,000 and 5,000 c.p.s., falling away to 10,000 c.p.s. and dropping off sharply after about 13,000 c.p.s. The actual value of load resistor effects this curve somewhat, which is typical with 3 megohms across the grid of the first stage.

Used with screened cable and a properly shielded connection to the speech amplifier, there is no hum pick-up whatever, either in hand operation or with a metal stand mounting.

In brief, the Ronette Type B.110 is pluggable with any other type of crystal microphone and — subject to the adjustment of the load resistor, or the use of tone correction in the amplifier itself — will give excellent results in comparison with its contemporaries.

Ronette piezo-electric products, microphones and pick-ups, are factored in this country by E. & G. Distributing Corporation, Ltd., 33 Tottenham Court Road, London, W.1. In addition to the B.110 general-purpose instrument reviewed here, there are other Ronette microphones specially designed for tape and disc recording, studio work, high quality reproduction, and "low impedance" types (with built-in line transformer) for use with long cable runs, as required for live reporting and public address work.

Terminated Tilted Folded Dipole

OPERATING NOTES AND DESIGN DATA ON THE T2FD SYSTEM

N. P. SPOONER (G2NS)

This is an interesting and unusual multi-band aerial array which has been finding favour in the States, particularly as it is suited to confined locations. Our contributor describes his method of constructing a "T2FD" from the original design by W3HH, and the results obtained with it on the 20-metre band.—Editor.

WHILE it is true that quite 75% of a station's performance depends upon its aerial the question of siting also has a considerable bearing upon the matter. A sky-wire that works the world with apparent ease from one QTH will often fail to uphold its radiating reputation when duplicated a few hundred yards down the road at another address. This being the case it pays to try out every conceivable type of aerial until one better suited to the existing location than all previous ones is joyfully discovered.

To give further impetus to this commendable quest the reader's attention is directed to the three-band omni-directional aerial described by W3HH in the November, 1951, issue of *CQ*. For the amateur surrounded by bricks and mortar it may perhaps render unnecessary further dreams of unattainable aerial-farms in the country, while for the flat-dweller it may perhaps banish DX-despondency in no small measure. With an average station operated with average skill the securing of contacts at a distance is admittedly tied up closely with the amount of operating time available, and instead therefore of furnishing a list of the DX worked Fig. 3 combines the RST reports received when using an input of 50 watts, together with a pictorial representation of the actual directions in which the T2FD was found to radiate under varying conditions on 14 mc during its first brief testing period; this consisted of only eight afternoons and two evenings. The stated contacts were made by answering stations heard calling from the required directions only, hence the slowness of making 13 contacts in 10 operating sessions. However, this purposeful procedure not only proved to a promising degree the truth of W3HH's contention that the aerial is reasonably omni-directional for reception as well as for transmission but it also gave evidence to further the realisation of his hope that the T2FD may become better known and adopted in amateur circles.

Space Consideration

After studying Fig. 3 some readers may say why be bothered, the old full-wave aerial already radiates in all the directions indicated by the present version of the 40-20-10 metre T2FD. This will be perfectly true for many sites but a full-waver nevertheless still requires two points of high suspension against only one needed for the T2FD, and it demands moreover something like 67 feet measured along the ground in which to maintain itself. The version under discussion is comfortably accommodated over only 47 feet of ground. Confirmed dipole and folded dipole enthusiasts may likewise be reminded that they are confined to single-band working and to fairly broadside radiation,

Table 1.

THREE-BAND	APPROX. LENGTH OF LEG AB	APPROX. SPACING XY
80—40—20	47ft.	2ft. 10in.
40—20—10	23ft. 3in.	1ft. 5in.
20—10	11ft. 9in.	8½in.

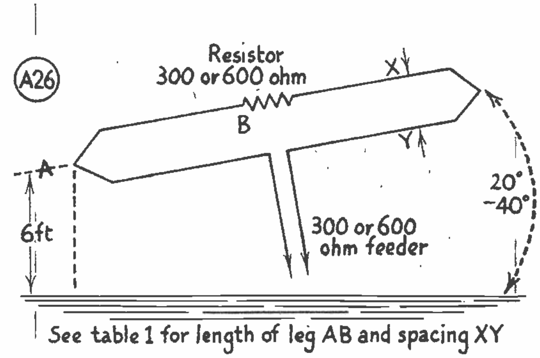


Fig. 1. Electrical layout of the "T2FD" aerial as described in the accompanying article. Dimensions for the sections to cover various band combinations can be found in the table.

whereas with the tilting and terminating of the T2FD folded dipole they can spread their wings and enjoy three-band working and more or less all-round radiation.

The aerial is described as a "Terminated Tilted Folded Dipole" (hence its title T2FD) and as any angle of tilt chosen between 20 and 40 degrees is non-critical appreciable space is thereby saved ; the low end can be conveniently dropped down into any back-yard, garden or fore-court because this particular end has to be fixed six feet from the ground. The one single point of high suspension that is needed can then be any suitably placed weather-board, gable, chimney or pole—not to mention the possibilities of a flat-topped city building.

Design Data

With the version now under discussion a 30 ft. garden pole and a wall-hook fixed at a point in the house brickwork six feet above the ground were used. For easy reference Table 1 gives the writer's rough band-edge calculations, good for complete coverage owing to the broad characteristics exhibited ; for those readers who wish to cut more exactly for the centre of the lowest frequency band they propose to use the formula given by W3HH states that the space between the folded dipole wires in feet is equal to 3,000 (three thousand) divided by the frequency in kilocycles and the result multiplied by 3.28 (three point two eight). The length of each leg in feet from either end to the centre insulator or resistor is equal to 50,000 (fifty thousand) divided by the frequency in kilocycles and the answer multipled by 3.28. This will give a system that will perform equally well over three popular and adjacent bands such as 80-40-20, 40-20-10 or 20-10 metres.

A Top Band-Eighty-Forty version should work well if the space can be found for it and it is not too unwieldy, but that is not considered here.

With a 300-ohm feeder line the value of the terminating resistor must be 300 ohms and the wattage rating suggested by the originator is 35% of the input to the final stage of the transmitter. With 600-ohm feeders a terminating resistor of 600 ohms should of course be used. The extreme simplicity of the whole array rendered unnecessary any detailed constructional description by W3HH and as this point is left to individual tastes and resources it was decided in the present case to make-do with whatever the junk-box disgorged.

The dipole wires accordingly found themselves to be of the 3-strand insulated house-wiring variety and the resistor (that should

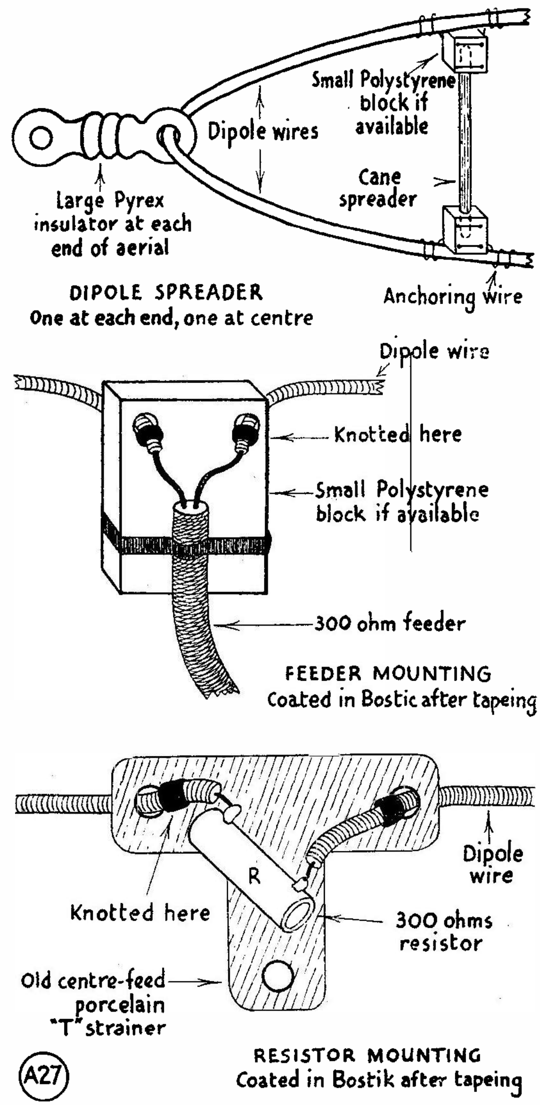


Fig. 2. Necessary constructional details for the Terminated Tilted Folded Dipole system described by G2NS.

perhaps theoretically have professed non-induction) became instead a 50-watt surplus wire-wound vitreous one of 6500 ohms with a miraculously opportune tap at 300 ohms. Some odd pieces of 300 ohm Telcon ribbon were soldered together and the joints liberally coated with Bostik ; instead of conventional strain-joints where the dipole wires met each side of the resistor and the feeder, a knot tied in the insulated wire answered the purpose. Fig. 2 is purposely given for encouragement and to show that even a lazy temporary construction can work quite promisingly. The resistor and

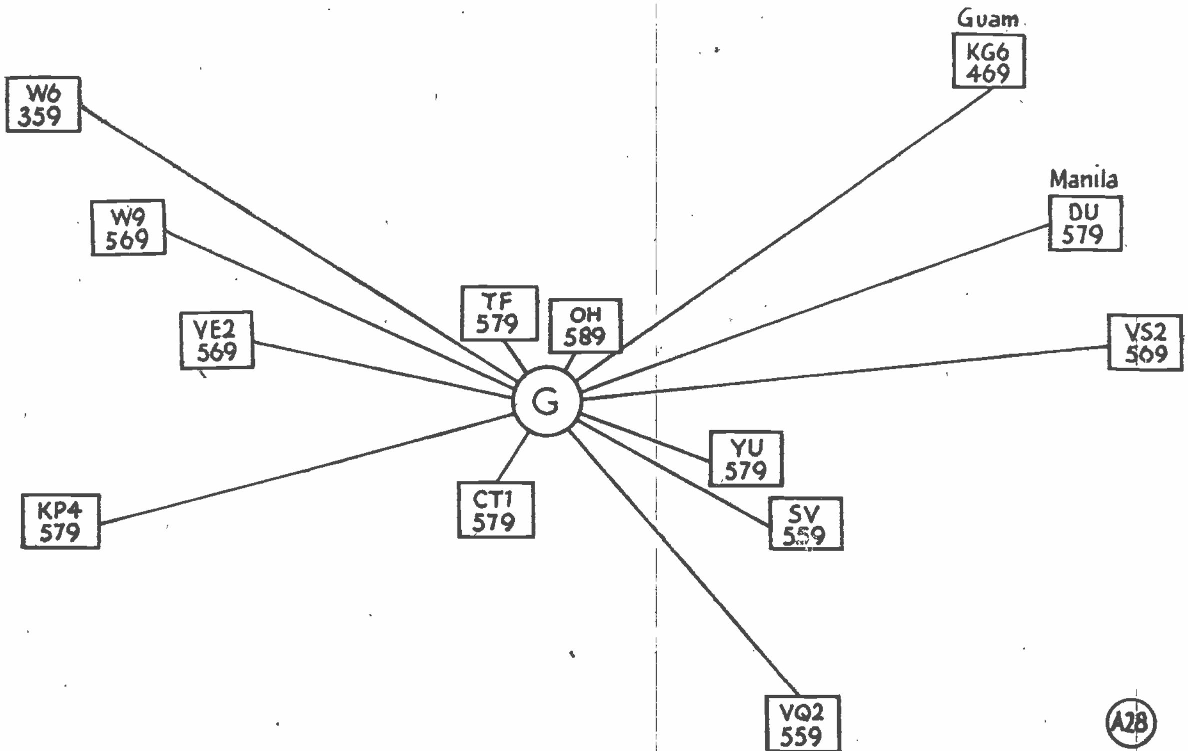


Fig. 3. Results obtained by G2NS under actual test conditions using the " T2FD " aerial described in this article. Transmission was on the 20-metre band for ten operating sessions and the directions shown here are roughly great circle paths in each case.

its mounting and also the feeder mounting and its connections should be smothered in Bostik just before being pulled up into position, which is the time when the extreme ease of handling an aerial that has one end fixed only a few feet above the ground will be fully appreciated.

The three spreaders suggested at the two far ends and the centre respectively were cut from thin garden canes and, for the sole reason that they were found idling in the junk-box, some polystyrene blocks were drilled and used to tip the cane spreaders which are needed to keep the dipole wires equidistant along their entire length.

Coupling

Coupling to the cold end of the PA tank coil was made with a three-turn loop and during a QSO this method will be found very convenient for rapid insertion and removal from the tank coil when comparative RST reports are being collected for the T2FD and then for the previous station aerial which should be left up in position for this purpose.

For reception, a separate T2FD with a small-wattage terminating resistor can always be erected if it is considered undesirable to break up the 300-ohm line and insert a change-over relay for Send-Receive. The strength of many incoming signals will probably be noticeably increased even if this is only due to a better match between receiver and aerial brought about by virtue of the 300-ohm line.

For all these reasons the T2FD certainly merits a trial, especially in cramped quarters, and while the writer's immoderate haste to get one up was prompted by curiosity to see if it worked at all, his results suggest that a careful comparison over a reasonable period of time between the T2FD and another aerial may quite likely show that the T2FD puts down the consistently stronger signal of the two at widely scattered distant points. This in itself will be considered a sufficient reward by those who are really keen on DX. Full acknowledgements are due in conclusion to W3HH and the publishers of *CQ* for introducing yet " another one " to try out.

An All-807 Transmitter for the HF Bands

PART II

SETTING UP, PHONE OPERATION, VFO/CC WORKING, TVI SUPPRESSION

J. N. WALKER (G5JU)

The first part of this article, dealing with the circuitry and construction in general, appeared in our December issue. Here our contributor discusses the operation of the Transmitter, and the important question of TVI suppression.—Editor.

TO begin with only the 300-volt supply should be switched on and HT removed from the screen of V2 by temporarily disconnecting the lead.

The oscillator should " fire " without trouble and all that is necessary is to set the coverage. Individual experiment will be required here according to the amount of bandspread desired. With the bandspread condenser specified (60 $\mu\mu$F max.) connected directly in parallel with C1, the fundamental coverage is 2333 kc to 2433 kc, the output thus being 7000 to 7300 kc. This is admittedly rather wide. Connecting C2 to the cathode and adding a 50 $\mu\mu$F ceramic condenser across C1 results in a coverage of 7000 to 7100 kc and this may suffice in many cases. An intermediate coverage can be obtained by varying the size of C2 and perhaps by increasing the number of turns on L1 slightly.

A 100 kc crystal calibrator should be used to calibrate the oscillator, in conjunction with a receiver which is tuned for preference to the harmonics on 28 mc. If the receiver is a superhet, it is well to make sure one is not listening to the image signal !

Next, the wide-band transformer has to be adjusted and, with V2 still inoperative (high anode current is liable to flow unless C14 happens to be tuned to resonance), a voltmeter with a range of 100 volts or so is connected across the grid resistor (R5) of V2. For rough adjustment, the 7 mc harmonic of the oscillator is tuned in on the receiver—it will probably be fairly weak to begin with. Then the primary trimmer in the transformer (it will have HT on it) is screwed down until the signal peaks up in strength considerably. A further increase, or at least some positive variation, will be noticed when the secondary trimmer is screwed down to bring the circuit to resonance. The voltmeter will now be giving a reading and fine adjustment is made by setting the primary for maximum indication with the oscillator near the LF end of its range. The VFO is moved towards (but not fully to) the HF end of the range and the voltmeter again brought to a maximum by adjustment of the secondary trimmer.

The final voltage shown on the voltmeter will depend on the degree of bandspread—if this is great (synonymous with a narrow bandwidth), the voltage will probably exceed 100, but if the *bandwidth* is wide, the voltage will be nearer the 60 mark.

Voltage is now restored to the screen grid of V2, which valve becomes fully operative and no time should be lost in tuning C14 to resonance, as indicated by grid current being registered in the grid meter. Again the actual grid current will depend on the bandspread, but no difficulty should be found in obtaining 6 to 8 mA on 14 and 21 mc and about 4 mA on 28 mc. These values will drop when HT is applied to the final amplifier.

As explained under " Coils," slight adjustment to the couplings of the intermediate coils may be necessary to obtain optimum grid current. Should the latter exceed 10 mA, the couplings should be slackened off to bring the reading below this figure.

PA Stage

The PA should be tested for instability by switching off the 300 volt supply and switching

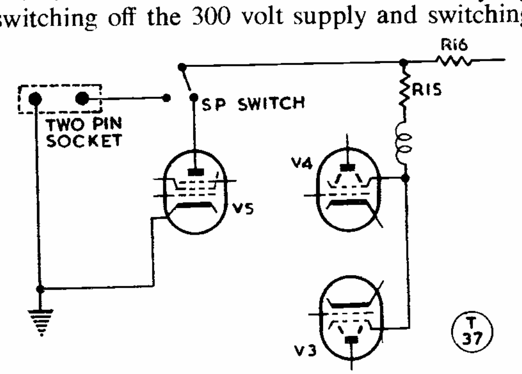
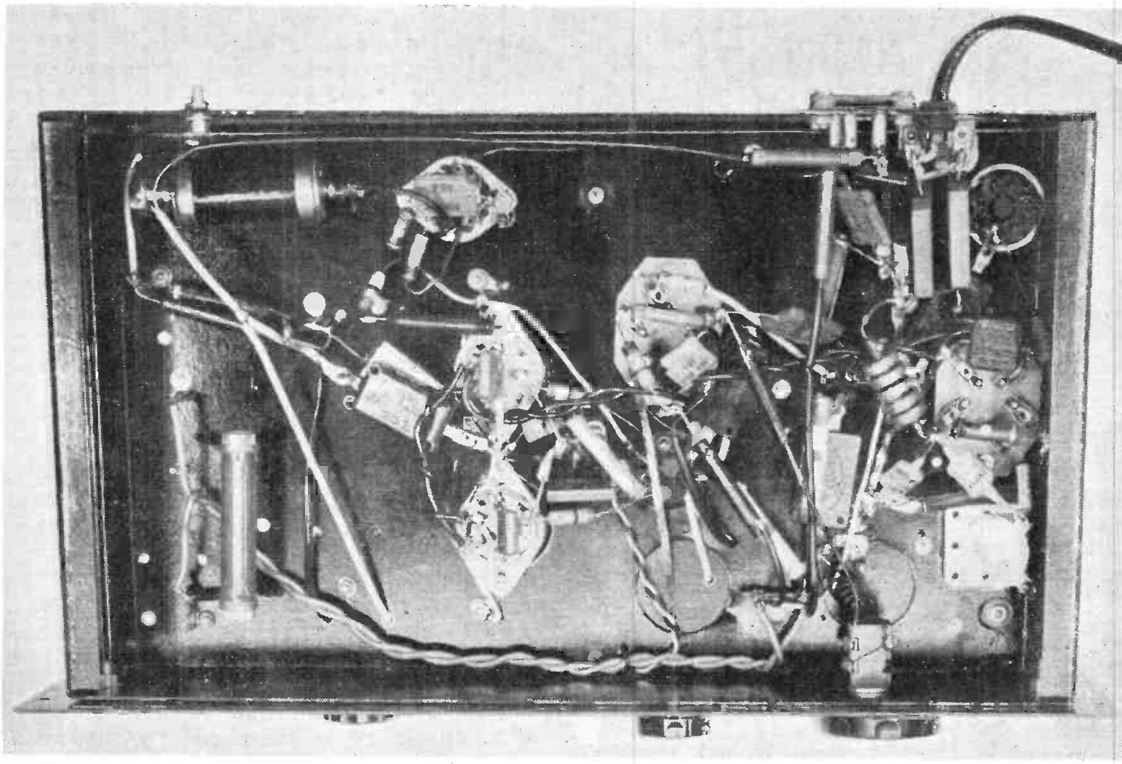


Fig. 3. When a separate Clamp modulator is used, a change-over switch and two-pin socket, wired as shown here, should be fitted to the chassis wall near V5. Only two connections are then required between modulator and transmitter, and a length of coax is ideal.



Underneath the chassis of the All-807 HF transmitter. Resistors R4 and R16, which develop some heat, are mounted well away from the oscillator stage.

on HT to the final—this should not exceed 500 volts to begin with and something less is to be preferred. C19 is swung and there should be *no sign* of RF in the tank circuit, nor any reading on the grid current meter. If instability is present, a slight movement of the neutralising wires, nearer to or away from the valve envelopes, will cure it.

By the way, the leads from C19 to the anodes of V3 and V4 are of different lengths—one is about twice the length of the other—this being made necessary by the construction of the split-stator condenser; it may account for the fact that no sign of parasitic oscillation has been observed although no resistors have been inserted in the anode leads (there are resistors in the grid leads).

After connecting a 100 watt, 230 volt mains lamp to the coaxial socket to act as an artificial load, drive may be applied and C19 tuned to resonance, when the lamp should light up to a fair brilliance. The anode current will depend on the applied voltage and on the degree of loading—it should be found possible to load up to about 150 mA whilst still obtaining a dip at resonance, on 14 and 21 mc, and up to about 120 mA on 28 mc. Also the actual input power will of course follow the HT voltage—a maximum of 600 volts is recommended.

The value of R16, which drops the voltage to the screens of the PA valves, calls for adjustment according to the final HT voltage. It should be 10,000 ohms for 400 volts or less, 15,000 ohms with 500 volts and 20,000 ohms with 600 volts. The standing current in the absence of drive will be in the region of 60-80 mA, representing a dissipation less than the maximum 50 watts permissible.

Telephony Operation

High level modulation is recommended, using a modulator giving up to 60 or 70 watts audio output and arranged to work into an impedance of some 4000 ohms. The modulator also could well employ a pair of 807 valves with 600 volts applied to the anodes. The fact that the total capacitance of the by-pass condensers in the anode circuit is .004 μF, which will limit the high frequency response, need cause no concern unless a wide audio bandwidth is required, in which case the values of C20, C21, C22 and

C26 should be reduced to .0005 μF.

If the HT applied to the final stage exceeds 500 volts on CW, it should be reduced to the 500 volt level when operating on telephony.

Alternatively, the design lends itself to Clamp modulation and it is suggested that the Clamp modulator described by G3DZW in the September, 1952, issue of *Short Wave Magazine* could be adapted without any difficulty. This design of modulator will call for a separate filament transformer—a small one will suffice and can be mounted on the chassis—but the HT can be drawn from the 300-volt supply used with the transmitter. A change-over switch, wired as shown in Fig. 3, should be mounted on the rear of the transmitter chassis near V5, where there is ample room for it. On 'phone, V5 will become inoperative with HT removed from anode and screen, and the other connections can stay put.

Power Supplies

Standard types of power units are suitable for use with the transmitter and, if not already in existence, the power components could be built into the same make of cabinet, the latter being placed either alongside or below the transmitter, thus completing a compact assembly having a most presentable appearance.

Whilst choke input smoothing filters are always to be preferred on account of the improved regulation, condenser input filters can be used in this instance because a standing current flows in both supplies (one to the oscillator valve, the other to the PA valves), and this factor improves the regulation in any case.

The secondary voltages of the mains transformers will depend on which method is used. For the 300-volt supply, a 275-volt secondary will be required for condenser input and 400 volt for choke input, delivering 70 mA, or a little more if Clamp modulation is employed. A 750-volt transformer will serve excellently for the final stage, using choke input and a 5R4Y rectifier. A 5Z4G valve is suitable in the first unit. The filament transformer should have two outputs, both well insulated, and giving 5 volts 3 amperes each. One switch, common to the primaries of both HT transformers, will act as the standby/transmit control and an extension lead to a remote switch is a useful refinement.

TVI Filter

The harmonic output, measured on a sensitive indicator, is very small and *no interference* is caused on the home television receiver. But note that this receiver is itself fitted with a high-pass filter at the aerial input socket, without which fundamental blocking is sometimes evident—and undoubtedly in many cases of TVI it is simply fundamental blocking which is causing the trouble.

There are two ways in which the harmonic output can be attenuated in cases where this is essential. The first is to insert between output socket and aerial tuning unit (or aerial) a low-pass filter which passes frequencies up to 30 mc with negligible loss but which attenuates *all* frequencies higher than the cut-off frequency—designs for such filters have appeared in *Short Wave Magazine*.

However, a simpler solution presents itself. It will be conceded that in the area served by any one television station, one particular harmonic can cause trouble and the others do not matter much. For example, in the London area, it is the 42 mc harmonic which must be removed, usually from a 14 or 21 mc transmitter (third and second harmonic respectively). Or, in the case of Holme Moss, it is the 56 mc harmonic.

Very considerable attenuation *over a small frequency band* will be achieved by inserting in the coaxial cable (as near as possible to the transmitter) a filter constructed as shown in Fig. 4. The electrical circuit, in Fig. 4(a), will be seen to be very simple—a series resonant circuit tuned by a variable condenser of small capacity. The one sketched in Fig. 4(b) is a cut-down Eddystone microdenser, having two fixed vanes and one moving vane. The construction is important and the unit should be built in a fully screened metal box—the Eddystone Cat. No. 650 diecast box, with close fitting lid, is ideal for the purpose. The coil should be either self-supporting or else wound on a low-loss former, and experiment may be necessary with the number of turns, according to the diameter. As a guide, a coil of seven turns, 14 gauge self-supporting, one inch outside diameter, will cover 54 to 62 mc. About nine turns should prove correct for 42 mc. The tuning of the unit will need care—it can be carried out roughly with a grid dip meter but the final setting should be done whilst observing the strength of the harmonic either on a detecting instrument or on the television screen. At one point the interference should disappear completely and care should be taken thereafter not to upset the condenser adjustment. [over

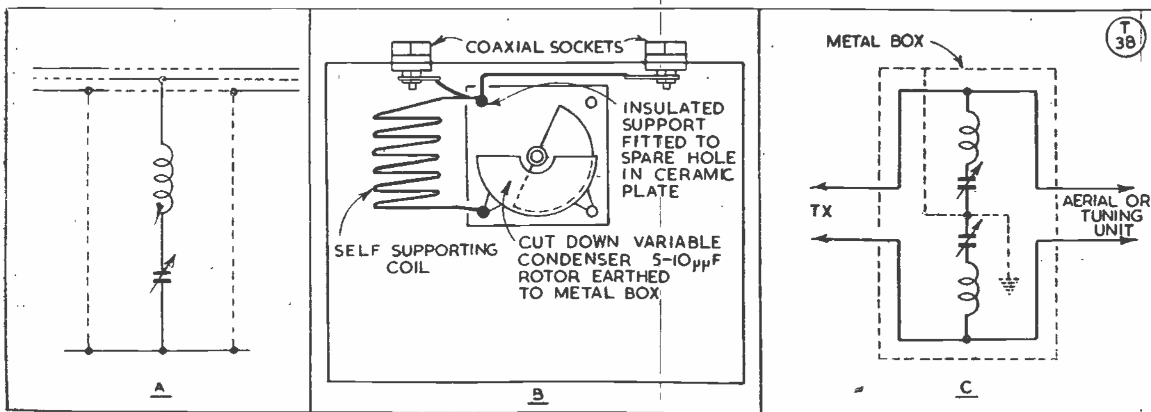


Fig. 4. Theoretical circuit (A), and practical construction (B), of a TVI filter designed to attenuate one particular harmonic with negligible effect on the fundamental output. The unit is contained in a fully-screened diecast box and the condenser is a cut-down miniature variable. A second tuned circuit (C) has to be added if the output line is of the balanced type.

The condenser spacing (.02 inches) is adequate for a low impedance feeder, but the device will also prove of service at higher impedance points, with higher RF voltages present, if a condenser of wider spacing is employed.

As shown in Fig. 4 (a) and (b), the filter is suitable only for an unbalanced line, for example, one using coaxial cable. If the feeder is of the twin balanced type, the series coil/condenser combination should be duplicated. the electrical circuit then being as in Fig. 4(c).

Since the transmitter was photographed in its cabinet, a further step has been taken in the interest both of electrical efficiency and of a tidy appearance. The filter unit (painted black) has been bolted to that side of the cabinet nearer the PA stage and the output leads go straight from the coil-holder into the box instead of to the coaxial socket.

Crystal Control

The transmitter has been tested with a crystal in place of the VFO and it works very well indeed. However, it will not do just to remove or disconnect the variable oscillator components and place the crystal across grid and cathode of the valve, unless one is prepared to discard the wide-band transformer and insert a normal tuned circuit in the anode of V1.

A circuit which functions well is given in Fig. 5(a). It "kicks off" irrespective of the setting of the trimmers in the wide-band coupler (although of course the latter has to

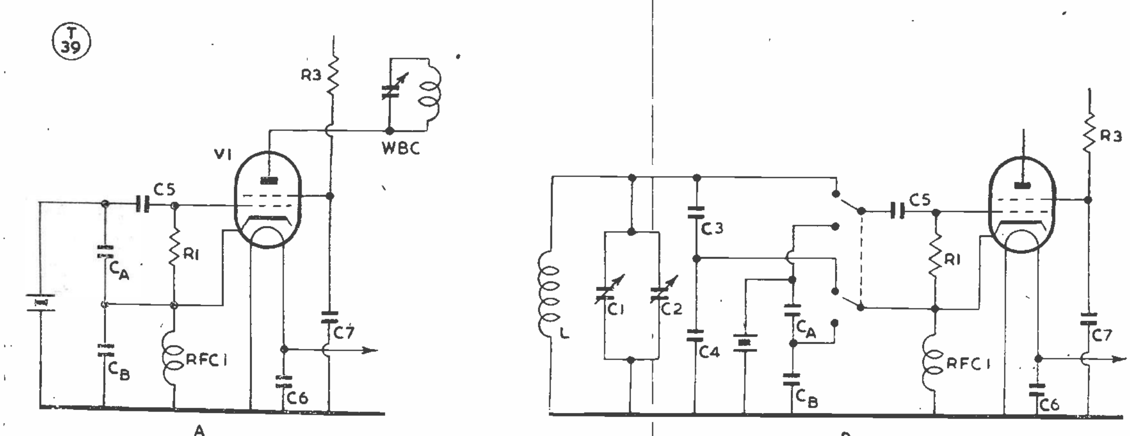


Fig. 5. The transmitter can easily be converted to crystal by changing the "front end" to correspond to (A) above. Ca is 20$\mu\mu$F a Cb 40$\mu\mu$F, other values being as in Fig. 1. Crystal or VFO control is possible by the throw of a switch if the circuit at (B) is adopted.

be adjusted as described earlier), if anything gives a greater output than the self-excited oscillator and, whilst normally intended to take a 7 mc crystal, a 3.5 mc crystal also works, albeit with a reduced degree of drive.

For those who would like to have the refinement of having available both crystal and VFO, the circuit to adopt is shown in Fig. 5(b). It is suggested that the crystal holder be mounted through the panel and the front wall of the chassis, to enable quick change of frequency, with the double-pole change-over switch fitted alongside.

Final Notes

The anode current of the first valve approximates to 20 mA and that of the second to 30-35 mA, the latter varying to some extent with the frequency. The screens of V1 and V2, and the standing current through V6, together account for some 20 mA.

The voltage on the screens of V3 and V4 should be around the 220-250 mark with drive applied, dropping to between 80 and 100 volts when the drive is removed.

If an LF choke forms part of the keying filter, it should possess moderately low resistance (200 ohms or less) since a bias voltage will be developed across it and applied to the control grid of V2, with a possible slight reduction in output.

The chassis and cabinet should be well " held down " to earth by connecting a heavy strap from the terminal provided to the normal earth system. Otherwise the whole chassis may develop an RF potential above earth. The black cabinet is a good radiator of heat, but some holes in the top of the cabinet, above the 807 valves, may be found desirable to increase ventilation.

A number of CW contacts have been made with the transmitter, both on 14 and 21 mc (28 mc is very quiet at the time this is being written) and reports have been T9 every time.

THE FIFTH FOC DINNER

Another of the very enjoyable series of FOC Dinners was held on November 29 at the Strand Brasserie, with some 40 members and friends present. " Hamish " Catt, G5PS, was in the chair, with Mrs. Catt, G5PS/2 on his right, presenting members with a brand-new disposition of call-signs at the top table for this (or any other) event! Unfortunately, Fergie (G2ZC) was once again absent on account of ill-health. G5PS paid a handsome tribute to the new joint secretaries (G2DPY and G3JZ), saying that no one could have noticed any difference in the way the Club was run since he and G2ZC retired ; everything worked smoothly, efficiently and with an absence of fuss. G2QB proposed the toast to Absent Friends, and other members made short speeches. Most of the evening, however, was set aside for a get-together and informal ragchew, which was still going strong some four hours after the time of meeting.

COMMERCIAL MANAGER, MULLARD EQUIPMENT DIVISION

Capt. R. T. Paul, C.B.E., A.M.I.E.E., R.N. (retd.), has joined the Equipment Division of Mullard, Ltd., as Commercial Manager, co-ordinating the activities of the three product groups—radio, telephone and electronic equipment.

Capt. Paul's career in the Royal Navy included serving as Chief Signal and Radio Officer to the Allied Naval C.-in-C., Expeditionary Force (ANCXF), and he was responsible for the Navy's signal, radio and radar organisation for the Normandy invasion. Later, he was in charge of the naval wireless network and was the first chairman of the Western Union Communications Committee (Naval). His last naval appointment was as Captain in command of the R.N. Air Station at Yeovilton and Henstridge, during which period he flew jet aircraft and added practical knowledge of air radio techniques to his long experience of land and sea communications.

CORRECTION — " ALL 807 TRANSMITTER "

In the first part of this article, in our December issue, the number of turns for the oscillator coil (in the VFO stage) was inadvertently omitted by the author. Sixteen turns, 22 gauge enamelled wire, are close-wound on a former $1\frac{1}{8}$in. diameter.

In the circuit diagram Fig. 1, the arrow indicating the position of RFC5 should point to the RF choke above and to the right of the final anode coil, and not to the latter itself. RFC5 is an Eddystone type 1011 choke, RFC6 is a 1022, and RFC7 a type 1011. The list of parts should be amended accordingly.

CARDS IN THE BOX

Operators listed below are asked to let us have a large stamped addressed envelope, with name and call-sign, for the delivery of cards held for them in our QSL Bureau. And if appearance in the *Radio Amateur Call Book*—both versions—is also desired, this should be mentioned at the same time, as we are agents for the U.K. and Europe for the *Call Book*, the only world-wide directory of amateur stations. Our Bureau address is: BCM/QSL, London, W.C.1, which is a full and sufficient QTH from any part of the world, and can be given as a G QSL address when in QSO.

G2BAU, 2FJK, 2HAI, 3CWB, 3FGE, 3GIR, 3HXE, 3IIN, 3ILL, 3INQ, 3INR, 3IOH, 3IOZ, 3IQB, 3IRK, 3JWB, 3UG, GM3GSN, 3IBA, GW3IHL.

DX COMMENTARY

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

A YEAR ago we had to report that November and December, 1951, were about the worst DX months experienced since the war. Now we may as well cancel that statement, for the last two months of 1952 have surely touched a new low. But look on the bright side — DX can't get much worse, and how nice it will be to find things getting better every month, with a four or five-year climb in front of us. (When do we start ?).

The chief show of interest in this month's correspondence has been the Top Band, with the Ten-Metre Activity Sunday running it pretty close. Twenty has been just mediocre ; Forty has provided one or two new ones for those with enough patience to look for them ; and the other bands have been just workable, if you didn't expect too much from them. A sorry picture indeed, and a state of affairs that must have led to a rise in the sales of Good Books.

So here we go, with a rather disgruntled survey of the bands, and a feeling of gratitude for those regular correspondents who have spared a little of their time to write and tell us that they haven't achieved anything at all !

G3GUM

CALLS HEARD, WORKED AND QSL'd

The Ten-Metre Party

An observer at the right sort of distance must have wondered what on earth was happening on December 7, when a dead ten-metre band suddenly filled up with G phones.

G3HCU (Chiddingfold) found it a bad day for DX, and although a few distant stations were heard in the morning, he had no luck with them. He estimates that about 70 stations were active, in and around London and the Home Counties. 'HCU started the day early, running an emergency " fog schedule " with G3GKF (Purley), due to spend the day with him. (As it happened he also had to stay the night !).

During the day G3HCU worked 33 stations and heard 9 others. Among the latter were PAØMJX, TA2EFA, VQ4RF, ZC4RX and W2MAK/MM. The stations worked were all in the Home Counties except G3APP (Gloucestershire).

As a p.s. G3HCU gives his 1952 figures for the 10-metre band. Total QSO's, 1214 ; G stations worked, 327 ; DX stations worked, 234 in 59 countries. (Hardly the figures for a " dead band," are they ?).

G4SM (London, S.W.16) also thought the day an unqualified success. He was glad to find that those who took part didn't regard it as a contest (which it was not), but could all spare time for a proper report, details of who was about, and a final 73. 'SM found about 40 stations on the band (mostly crammed into the lower half) and almost enjoyed the experience of being QRM'd for a change. Using a power doubler and a vertical dipole hung from the main aerial, G4SM had fifteen contacts ; he wants to thank G3HCU for thinking up the idea in the first place.

G3FYY (London, N.W.2) says he made quite a few contacts but would have made many more if operators had listened on their own frequencies instead of starting their tuning at the HF or LF edges of the band. (Whoever thought of digging out this ancient technique again ? It must be that some stations at least are CC). 'FYY points out that it is not in accordance with the terms of the licence, anyway, and also that if a QSO is carried out on two different frequencies there is a double chance of QRM spoiling it. So it would appear that (for inter-G work, at any rate) we should standardise on calling the other man on or near his own frequency.

G2CBA (Rochester) was on for

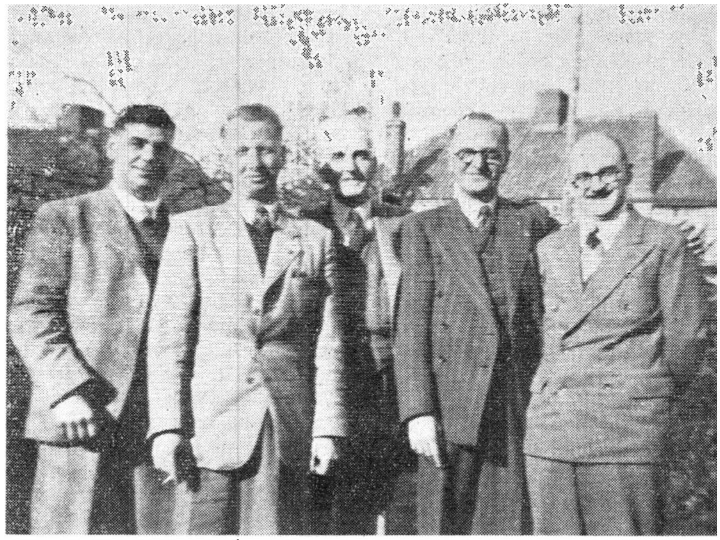
about three hours and was delighted to find himself "nattering to old friends whom I had not worked for many years." But he had some trouble with the rig and was only on for a comparatively short time.

Now for the SWL's point of view. D. E. Bootman (London, N.W.7) sends a list of 48 calls heard—46 G's, ZB1L and W2MAK/MM. He missed the morning DX and thinks conditions were poor all round. But he heard W2MAK/MM say that "the band was full of G's," and that he hadn't heard anything like it for a long time.

H. L. Mellor (Herne Bay) thoroughly enjoyed the day, and says "How different from conditions on 80," where people natter for hours about everything *except* Amateur Radio. He won't forget December 7 for a long time, and says it was the kind of day to make any SWL feel "I would like to get my ticket."

G. Smith (London, S.W.11) sent a calls heard list of 47 stations to G3HCU, and was another who voted it an interesting day.

The closing date for this issue was very tight and no doubt that accounts for the relatively few reports on this Party. But there was no doubt about the activity, with everybody remarking how pleased they were to find so many stations on! It is proposed to run another of these Activity Sundays in February or March, and we hope for even better support — and much more reporting after the event.



One of the 80-metre morning nets (0700-0800, 3754 kc) is known as "The Skylarks." Left to right in this group, they are: G2HLF, GW3GYY, G3FQU, G2AON and GW3HMA. The photograph was taken at the QTH of G3FQU, Twickenham.

Top Band Topics

From Ten to One-Sixty — still on the local theme, and hoping that we shall be excused for mixing up all these local and semi-local contacts with what should be a DX feature. The lack of DX is sufficient excuse, maybe.

The quest for WABC on the Top Band is gaining impetus, and here, again, everyone appreciates the fact that it is not treated in too much of a cut-throat fashion. The Top Band is not assuming the aspect of a Hit-and-Run battlefield, and contacts for the purposes of amassing Counties are still friendly QSO's.

Last month we credited GI3HFT (Belfast) with the really solid achievement of collecting the first WABC Certificate. Since then the claims have been rolling in nicely, with the result that the WABC list now looks like this:

1. GI3HFT (Belfast).
2. GM3IGW (Alloa).
3. GI6YW (Belfast).
4. G6AB (Holland-on-Sea).
5. G5LH (Horbury).
6. GM3OM (Larbert).

Note that the little list consists of two GM's, two GI's and two G's. Hearty congratulations to the latter, who must have found it harder going than the others, not being so much in demand! Now who will be the first GC, GD and GW to send in 60 cards?

Incidentally GI6YW has since forwarded three more to stake his claim for a position on the Ladder. Please note that we shall be starting, *next month*, a Ladder for Top Band Counties (*a*) Worked, and (*b*) Confirmed — since January 1, 1952. So you can claim a rung thereon, whether you have already collected your WABC or whether you are still one of the hopeful ones. Let's have those scores — Counties Worked, and Counties Confirmed, in time for next month's "Commentary." Some rare ones for WABC appear in a panel elsewhere in this piece.

GM3IGW puts in a word of appeal for OH3NY. As all the Top-Band types know, Matti is giving lots of G's their first OH contact, and he is dead keen on making WABC himself. But unfortunately it seems that the OH QSL Bureau doesn't work properly, as Matti says he has only received *one* card that way during the last six months! To give OH3NY the encouragement he deserves, will all those who have worked him, especially from the more infrequent counties, please QSL again to him, this time *direct*. GM3IGW has now worked 68, with 65 confirmed, and ought to appear at the top of that Ladder. He adds that MF2AG is on the band, around 1900 kc, and has raised some G's. Also, as we know, W1LYV has worked quite a few, and things look quite promising for the Trans-Atlantic Tests.

GI6YW (Belfast) says there ought to be three WABC Certificates — one for doing it, another (with gilt

TRANS-ATLANTIC TESTS

The third World Series of 1.7 mc Trans-Atlantic Tests has now started; the next test dates are Sundays, January 11 and 25. For frequencies and operating procedure, see p.605 December issue. Please report in detail to "DX Commentary" immediately on the conclusion of each Test Period.

edges) for getting the cards, and a third (in Technicolor) for those who had already done it before 1952 but had to do it all over again *and* persuade people to send a second QSL. Sorry, chaps ! But the idea of starting again in 1952 was purely a matter of stirring up some extra activity on the band — and it seems to have worked !

G5LH (Horbury), the second G to qualify, says he only started using One-Sixty in March this year, and from March to September worked only 6 counties. Then he made up his mind to get cracking, and the rest followed in the September-November period. He wants to thank all the stations that QSL'd so promptly.

G3ESY (Hereford) is a fairly rare bird himself, and is well on the final stretch. He has worked 53 counties in a very short period of time.

Another nice new one is now on from Lockerbie — none other than GM3AAU, ex-G3AAU. Those who need Dumfries should look out for him on 1830 kc, where he wields a 6L6 CO and a 200-ft. end-fed aerial.

G. C. Allen (Thornton Heath), always a very keen SWL on the band, tells us that VS9AW is on, and is said to have made some G contacts already. MF2AG was heard working G's, and W1LYV has been logged several times. W6AM has stated that he will be on the band during the ARRL Contest, but refuses to be more specific. G. C. A. tells us that his Counties Heard score is now 76, with 71 confirmed ; he hopes to make the full 97 before his beard gets tangled with the controls . . .

There's not so much activity from GC and GD as there was last year ; but there are promises (rather vague) of signals from ZC4, CN2, EA9 and CT2, not to mention a couple of VP7's. Perhaps our visions of a Top Band DXCC some time during this century were not so crazy after all.

Nice to see all this enthusiasm about a band on which one can *always* get a worthwhile contact, whatever the sunspots are up to. And certainly the standard of operating has the others beaten.

For Your WABC

SOME RARE ONES THAT MAY HELP

Isle of Man :	GD3FLH, GD3FBS
Antrim :	GI3HFT, GI3ILK
Down :	GI2ARS, GI3IOS
Armagh :	GI3ILV
Aberdeen :	GM3ALZ, GM6UV
Angus :	GM3COQ, GM4NR
Argyll :	GM3GZC
Banff :	GM3GAY
Caithness :	GM3JDR
Clackmannan :	GM3IGW
Dumfries :	GM3AAU
Dumbarton :	GM3EDU, GM3EFS
Fife :	GM3GUS
Kincardine :	GM2CAS
Lanark :	GM3EHI, GM8MJ
Midlothian :	GM8FM
Moray :	GM3HXT
Orkney :	GM3FSV, GM3HXC
Renfrew :	GM3CAR, GM6FB
Ross :	GM3AWF/A
Stirling :	GM3HHB, GM3OM
Shetland :	GM3HTH
Denbigh :	GW3HHF, GW3IHL
Caernarvon :	GW3ENY, GW3GWX
Flint :	GW3GCZ, GW8WJ
Glamorgan :	GW3CIJ, GW3GXL
Hereford :	G3ESY

Doings on 21 mc

The 21 mc band has fallen off badly since last month, real openings being very few and far between. Those who have the patience to stick it out, however, generally get some small reward for their trouble. Here, again, we know of people doing worthwhile work who never think of writing to tell us about it, so we can only chronicle the doings of those who are good enough to keep us posted.

G3FXB (Hove) worked AP2L, VP6, VE and VS7 on phone, as well as ZL, VK, OQ, OE and ZB1 for new ones on CW. G3GUM (Formby) put his score up to 58 by working such nice ones as OA4C, TI2TG, EA9AP, HE9LAA, IS1FIC and AP2L. On November 16 he " worked every VK and ZL in sight." 'GUM says that everyone is actually eager to help others to find new ones, and that all the " knuckle-duster and bicycle-chain stuff " seems to have been left behind on 14 mc.

21 MC MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
W4COK	61
G3GUM	58
G2BJY	55
G8KP	50
G6QB	49
G5BZ	44
G3FXB	38
G2YS	37
G6GN	36
G8OJ	32
GC3EML	31
G6QX	28
G5FA	20
G3ABG	17
G8VG	9
G2DHV	6

W4COK reports, *via* G3GUM, that his latest are GD3UB, EA9AP, VQ2DT and CP1BX, giving him a score of 61. G5BZ (Croydon) collected TI2TG, KZ5IF, ZL4GA, VQ2DT, OA4C, KP4KD and VP6SD — the latter on phone.

G6QX (Hornchurch) added OH, ZB1, VK, ZL and YU to his collection, and overheard G6ZO telling ZL4GA that he had now worked 65 on the band. G2BJY (West Bromwich) managed ZL4GA, VK3PG, EA9AP, CN8AF and W's on the key, plus VP6SD, ZE3JK and FF8AR on phone.

G3BKF (Witham) raised TI2TG, OQ5CP, TA3AA and VK's, and also heard AP2K and IS1FIC. G3GIQ (London, W.5) upholds the honour of the phone fraternity by telling us of QSO's with VS1AY and 7WA, VP6SD, ZE2JV, YI2AM, TA3AA and several more local ones. G3ABG (Cannock) records his only QSO on the band — with ZE3JP.

One or two week-ends have been very disappointing for the U.S.A. and Canada in spite of a cracking strong signal from WWV on 20 mc, so it looks as if activity over there is dying out because of the generally

Station of ZE3JJ, Salisbury, Southern Rhodesia, who has been on the air since early 1950. The Tx is 6V6-807-807 running 60 watts, with optional CC or VFO control using a TT11 in an ECO circuit. Modulation is by a pair of 6L6's, and the aerial for Ten a 2-element rotary beam ; on the 21 mc band, ZE3JJ gained the world's first WAC, using a vertical Zepp. The Rx is an Eddystone S.640.

poor conditions. However, we predict that 21 mc will be a Big Noise in the Spring and Autumn of the coming year.

DX on Twenty

Although there *has* been some good stuff on Twenty from time to time, it has needed a lot of finding ; and those who have done so are few and far between. Just for a change we will begin with the Phone exploits, since last month's remarks stung up a few new correspondents. G2ALO (London, N.W.2) operated between 0645-0745 and 1815-2000 GMT, and mentions contacts with ZL's, YI, HZ, ZD4, VQ4 and SU in the mornings, and with ZS, VQ2, CR6, ZE, ZS3, CR7 and Marion Island (ZS6ZU/P) in the evenings. He wonders whether the last-mentioned QSO (December 2) could possibly have been the first with G on phone ?

GM2DBX (Methilhill) collected his WNACA Certificate for Phone Only, but has not been very active of late. Countries worked on phone now total 160. G3GIQ (London, W.5) sends a Phone list that includes VP6SD and 6FO, and ZS3N. He lost AP2L twice in the same morning! CW brought in CR7CN, FQ8AP, HH2FL and some lesser lights. Finally, phone rewarded him with ZS6ZU/P, who, he says, uses 100 watts and a rhombic.

Still in the Phone band, G3TR (Southampton) says he has put up a rotary " ZL Special " and finds it very good. Rushing to the defence of phone, he says that *of course* the bulk of DX is worked on CW, but mainly because there are CW operators in so many more countries. Some of the rare ones have no phone operators at all. He agrees that it is a great pity that some of the best phone men should be so excessively modest about their activities.

G3FJU (Welling) is the first of our CW reporters, and has worked JY1BB, VK6GU, HC2OT, CR7CH and 7LU, and plenty of the more usual stuff. He has found the band patchy and the noise level very high. G5BZ raised JA3AA, HH2FL and HR1RL, but thought conditions " the worst ever."

G3BKF worked VK1PN and 1JC (both Heard Island), also KA5DM. Stations heard but not worked were ZS2MI, ZS9I and FB8ZZ. G3FXB also worked VK1JC, as well as TI2TG, OQ5CP, FP8AP and W7KVU.

And, believe it or not, that's the extent of our 14-mc reports this month. Undoubtedly the thinnest ever. What will the band be up to by next month ? It could hardly get worse.

Forty-Metre News

Precious little on Forty, either,

but there have been one or two worth-while news flashes. G8FC (Locking) worked FM7WD (ex-FM8AD) at 0015. G5BZ followed G6BS (Great Shelford) with a contact with KC6QY (0800 GMT). G6BS gave the KC6 his first European QSO. 'BZ heard him again in the evening (1930) but couldn't raise him. Others worked were VP4, FM7, VQ2, EA8, ZS, ZB2, PY, VK, ZL and the like. G3FXB worked ZS2A, FF8AG and AP2K.

G3BKF was able to raise FF8AG, LU5DEA, YI2AM, PX1YR, ZS3HX ZD2DCP and a VK, as well as the usual ZL's. The list of Gotaways includes MP4BAU, AP2K, ZS's and 4UAG. And thus we proceed to Eighty !

WAZ MARATHON, 1952

Station	Zones	Countries
G5BZ	36	153
G8FC	36	114
G3FXB	35	134
G6QB	35	128
G2VD	35	119
G3FXA	35	100
G6QX	34	101
G2DPY	33	126
G3GUM	33	107
G3DOG	33	104
G6YR	33	103
G3FPQ	32	85
GM2DBX (Phone)	31	101
G3BDQ	27	98
G5FA	27	77
G3CMN	27	55
G2BW	25	87
G3TR (Phone)	25	82
G3ABG	24	86
G3HDL	23	68
G2FJU	20	52
G3HZL	18	56
G3IGZ	16	59
G2CMQ (Phone)	14	44
G2BAM	13	48
G6TC	12	37
G3FPK	11	31
G3IHI	11	33
G2VJ (Phone)	8	12
DL2SU	5	28
G4QK	4	7
G2BP	3	17
G3GVY	2	11

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

The DX on Eighty

Not nearly as much doing on this band as at this time last year, but, all the same, it is worth watching — if you have the time and patience. G3FXB used it during the European Contest and snagged KP4KD, EA9AP and sundry W's and VE's.

G3BKF found a very nice one in the shape of YN1AA — heard but not worked ! Contacts were the usual W's, VE's and ZL's. 'BKF also tells us that G6ZO has heard VR2CG on the band.

No one else even refers to Eighty except with a few derisive remarks. Certainly it goes bad on us late at nights, with an incredible number of foreign Service and commercial stations ploughing it up. Why can't these Things (that's the only word for most of them) put out a signal that compares with the average *amateur* transmission ? Chirps, creeps, clicks, wobbles, rough notes — anyone ever heard a good one ? We have heard UA amateurs with better signals !

The Overseas Mail

DL2SU writes as G3ICH from Rochdale, but is returning and will be a DL again by now. He has been operating under his G call for the first time but lacks a good aerial.

VK4HR (Brisbane) writes to say that the cards for our WFE Certificate (both CW and Phone) are on the way. He has worked 46 countries on 21 mc and is hoping to clean up his WAE Award shortly. 'HR can muster up a half-wave vertical for 7 mc, which should help. Paper already on the wall includes DXCC (phone and CW), EDXC (phone and CW), WAS, WAZ, AAA, DUF3, WAP (phone and CW), Canal Zone Award and all the easier ones. WFE and WNACA should help to fill some spaces !

SU1FX had a month's leave at home, returning to SU to find that burglars had been in ! All that was stolen was a small case, but it contained *all* his QSL cards. The HRO was untouched and the Tx was " not available." 'FX wonders if those who have worked him would be so good as to QSL again to start him off with his new collection. He hopes to be active on Eighty before long.

GW3ALE has left India, where his ticket never did catch up with him, and is now in Ceylon. Here, the boys tell him, he should have his VS7 call in very quick time. (Two years of negotiations in VU failed to produce a result !) If you hear VS7BR on the bands, you will know who is behind it. Then in March he comes home on leave and hopes to return with " a decent rig."

Contests and the Like

The 1952 Marathon is on its last leg, and next month's issue will show the final result. It is very doubtful whether anyone can catch G5BZ, who has a handsome lead in Countries.

It is not intended to run a Marathon in 1953 except for the 21 mc ladder which we began when the band was opened. However, it might be interesting to put up a ladder for Five-Band DX contacts — meaning, of course, with individual stations. To start the thing going we can throw in the following: G6QB/KP4KD, G6QB/VQ4HJP, G6QB/ZE3JP and G6QB/ZC4XP. (In each case on the five bands from 28 to 3.5 mc). From this arises the query — has anyone made a Six-Band DX contact ? Those who have worked W, VE, ZC4 or EK (now CN2) on the Top Band might well be able to show one. It would be interesting to know. Six-Banders *should* be possible with W, VE, CN2, OH and ZC4, to mention a few. We might even have some of the VHF boys breaking in with seven- or eight-band affairs, but we doubt it. (And it occurs to us that GW3ZV might even claim a Six-Band contact with ZL1AH one of these days).

Strays

G3GUM passes on the news that the Chilean Navy have not yet fixed the date for CE3AG's trip to Easter Island, but it should be in January . . . G8VG (Dartford) tells us that his son Peter (VS7XG) is returning to Colombo in January. Father and son have matched pairs of crystals for each band . . . G3HDL (Liverpool) is out of hospital after a successful operation and hopes to be as good as new by the time you read this. He will be using his

Short Wave Magazine

DX CERTIFICATES

THE MAGAZINE DX AWARD

For Conditions, see p. 25, *March,* 1951.

WORKED ALL BRITISH COUNTIES

WABC, for 60 *or more U.K. counties worked on* 1.7 *mc band only. Certificates issued to date,* 6.

THE FOUR BAND AWARD

FBA, for 20 *countries confirmed on four different bands. Certificates issued to date,* 6.

WORKED NORTH AMERICAN CALL AREAS

*WNACA, for confirmed contracts with W*1-Ø ; *VE*1-8, *including Yukon and N.W.T.; KL*7, *Alaska ; VO, Labrador ; and VO, Newfoundland. Certificates issued to date,* 24.

WORKED FAR EAST AWARD

WFE, for 18 *different countries confirmed out of the* 23 *listed on p.* 225, *June,* 1952, *issue Certificates granted to date,* 3.

Claims for any of these Certificates must be accompanied by the appropriate batch of QSL cards, with a check list, sent by registered post to :

" DX Commentary "
Short Wave Magazine
55, Victoria Street
London. S.W.1.

All Claims accepted will be notified by listings in " DX Commentary." Cards will be returned with the Certificate.

indoor aerial (now improved and augmented) on most bands.

The Trans-Atlantics

Don't forget the dates at which you ought to be out of bed by 0500 ! January 11 and 25, February 8 and 22 ought to offer some interesting possibilities. There should be plenty of activity from the other side, and the steady appearance of W1LYV's signal ever since November suggests that conditions are at least as good as last year — possibly a little better. (Full details appeared last month on p. 605).

W6NIG is well known as a successful DX operator.

The main recipe for success seems to be the throwing out of as much wire as possible — even without being too particular about its height and direction. After all, there are very few who have the space for a real half-wave aerial hung up at a good height and properly fed ; but quite a number *could* sling out an end-fed half-wave by a bit of judicious trespassing and the utilisation of trees, garden fences and what-have-you. Making the attempt is half the battle, and liable to be almost as interesting in failure as in success. Get cracking *now* . . .

Many thanks to all who have sent in seasonal greetings, either in the form of Christmas cards or just the odd rude message in a letter. May 1953 be a good year for everyone who reads this paragraph and, in particular, may the sunspots start co-operating again.

Deadline for the next issue is **first post, January 14,** and the following one first post, *February* 11. Watch these dates for February and March issues — they are both very early. Address all your DX news, views and claims to : " DX Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1.

So 73, BCNU, and a Very Happy New Year.

TRANS-ATLANTIC TESTS

The third World Series of 1.7 mc Trans-Atlantic Tests has now started ; the next test dates are Sundays, January 11 and 25. For frequencies and operating procedure, see p.605 December issue. Please report in detail to " DX Commentary" immediately on the conclusion of each Test Period.

PIRACY REPORTS

We continue to receive reports of pirated calls—unlicensed stations using the call-sign of another operator—but there is nothing we can do about it unless the afflicted operator has already reported the facts, with all relevant details, to the Post Office. It is for the authorities to take what action they can in such matters. We can certainly publish pirated call-signs, with information as to the bands used, but the only immediate result is that the pirate changes to someone else's call-sign! Whereas if the authorities are informed, without publicity, they can effect an interception and obtain a conviction against the offender. In these days, pirates deserve no quarter, as they offend against the whole body of licensed amateurs.

Amateur Transformer Winding

HOME CONSTRUCTOR DETAILS

I. E. HILL (G6HL), *S/Ldr., R.A.F.*

Among the lost arts in Amateur Radio is that of winding one's own chokes and power transformers. With skill, care and the experience gained by the production successfully of a few of low wattage ratings and voltages, the amateur who would like to be able to say "I made it all myself" can embark with confidence on the home construction of high-power plate transformers to his own specification. This article contains a great deal of practical information on the whole subject.—Editor.

TRANSFORMERS for use in power supplies are still fairly plentiful on the disposals market, but the price is gradually rising. New transformers for higher voltages now represent quite a considerable cash outlay which may deter many from operating with maximum licensed power.

Transformer winding can be quite an interesting, if somewhat tedious, pastime. Nevertheless, it is probable that most amateurs consider transformers as a means to an end and would tackle home construction only as an economy.

Ignoring the entertainment value of home construction and considering only economics it is probably not worth while to home-wind transformers of less than 50-watt rating unless they are intended only for low voltage supplies.

If all components are to be purchased new it is questionable whether transformers of between 50 and 100 watt rating will show a saving in cash outlay. Above the 100-watt rating the reduced expenditure can be quite considerable almost irrespective of the source of materials.

If disposal materials, old transformers and so on are used, and assuming some judicious preliminary purchasing, a considerable saving can be effected; the "financial gain" increases with the wattage and voltage of the transformer —but again the reasonable starting point is about 50-watts rating.

Individual Requirements

More often than not the amateur is compelled to build round the materials available or obtainable. But even at that it is worth making a clear summary of the transformer outputs required before any materials are purchased or construction work commenced. Commercially made transformers are usually designed to give the maximum possible facilities at the minimum constructional cost and in consequence a host of different windings are often grouped on one core. For home winding, unless space is a major consideration, it is worth separating the loads and making two transformers share the work of one. For instance, a commercial 500-volt transformer will normally have a 650-0-650 volt winding, a 5-volt winding for the rectifier and one or more 6.3 volt windings for heaters. For home construction it is rather more convenient to have the low and high voltage windings on separate transformers. If a core size is used equivalent to that of the commercial transformer, more winding space is available to allow the use of non-specification materials while still giving adequate insulation and performance. The slightly increased electricity bill should not necessitate a reduction of the housekeeping allowance!

Materials

Obviously the most likely source of economical material is from old transformers, but if the latter have all the virtues a high price will be demanded. It will therefore probably be necessary to buy a miscellaneous collection and separate the good from the bad; one transformer giving the core and clamps and another the wire. When rummaging the following points are worth keeping in mind:

(1) The most suitable type of core is the shell (Fig. 1). Choke cores can in many cases be reassembled without the air gap and are thus usable as power transformers.

(2) Impregnated transformers are not very pleasant to dismantle, although the materials are usually in good condition.

(3) A rusty core can be perfectly serviceable. The final application of a little paint will hide any imperfections in appearance.

(4) Transformers from airborne radar equipment, recognised by relatively small cores and windings for the rated output and usually impregnated, operate at 80 volt ± 1000 cycles and are valueless for 50-cycle mains operation. Core stampings from the larger ones can sometimes be grouped together, but in general these transformers are best rejected.

Fig. 3. Transformer Winding Table

TOTAL WATTAGE	CROSS SECTION OF CORE SQ. INS.	TURNS PER VOLT	PRIMARY Taps 5-0-200, 210, 220, 230, 240, 250 Volts: TOTAL TURNS	5 VOLT TAP	10 VOLT TAPS	CURRENT CAPACITY	WIRE SWG	SECONDARY TURNS Size of wire determined by intended max. current load: 5 VOLTS	6.3 VOLTS	250 VOLTS	500 VOLTS	750 VOLTS	1000 VOLTS	1250 VOLTS	1500 VOLTS
50	1.5	5.4	1377	27	54	0.25	24	27	34	1350	2700	4050	5400	6750	8100
100	2.0	4.0	1020	20	40	0.5	22	20	25	1000	2000	3000	4000	5000	6000
150	2.5	3.2	816	16	32	0.75	20	16	20	800	1600	2400	3200	4000	4800
200	3.0	2.7	689	13	27	1.0	18	13	17	675	1350	2025	2700	3375	4050
250	3.5	2.3	587	12	23	1.25	18	12	14.5	575	1150	1725	2300	2875	3450
300	4.0	2.0	510	10	20	1.5	18	10	12.5	500	1000	1500	2000	2500	3000
350	4.5	1.8	459	9	18	1.75	18	9	11.5	450	900	1350	1800	2250	2700
400	5.0	1.6	408	8	16	2.0	16	8	10	400	800	1200	1600	2000	2400
450	5.5	1.5	383	7	15	2.25	16	7	9.5	375	750	1125	1500	1875	2250
500	6.0	1.4	357	7	14	2.5	16	7	9	350	700	1050	1400	1750	2100

Fig. 3. Table for determining transformer windings for various wattages and voltage ratings.

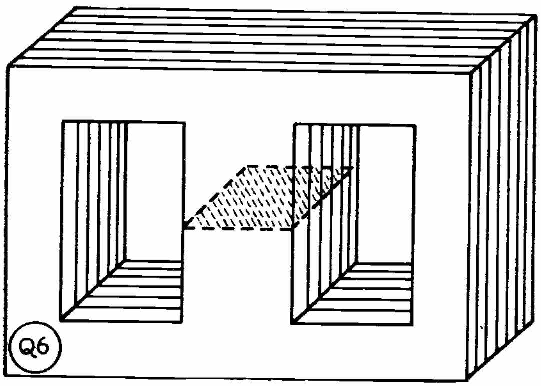


Fig. 1. Shaded portion shows cross-sectional area referred to in text. The width of the centre arm is exactly double the width of the sides, and there is no air gap.

(5) Core clamps are a necessity. The most suitable are brass or alloy castings. Good clamping is essential if transformer hum is to be avoided.

(6) In general it is best to select cores having large windows giving a good winding space.

(7) A transformer which has had an overload burn out—detected by appearance and smell—will be of value only for the core. Do not attempt to re-use wire from an old transformer previously over-cooked ; the insulation will be brittle and crack or rub off during re-wind.

(8) Occasionally one can find an old energised loud speaker, the field coil of which is a useful source of wire.

(9) In many cases old transformer winding formers can be re-used, but new ones can best be constructed from thin (3/32in. or over) paper, or cloth-based paxolin. (Fig. 2).

(10) Insulation material will be required between layers. The most suitable is oiled silk or paper, but waxed paper is a good substitute. The covering from cereal cartons has often been used for this purpose. For insulation between windings Empire cloth or waxed card is preferable. Under no circumstances should paper having absorbent properties be utilised.

Design

Core. The first consideration is the wattage of the transformer. The maximum load should be determined by adding the products of voltage (volts) and current (amps) required from each of the intended windings. Add 25 per cent. and then determine the cross sectional area of core required by reference to Fig. 3. The next stage is to look through the available core stampings and find some which can be built up to give the requisite core cross-sectional area.

A point to remember is that the centre core should be as nearly square in cross section as possible and in any case the ratio of one side to the other should not exceed 3: 2.

e.g. transformer output required 1000 volts, 0.160 amps ∴ wattage = 160 watts
add 25 per cent. = 200 watts
cross-sectional area of centre core = 3 sq. ins.
Suitable core size – 2in. x $1\frac{1}{2}$in.

The added 25 per cent. is intended to account for transformer losses which, however, do not normally exceed 10 per cent. The additional 15 per cent. will not materially affect efficiency but it will ensure that larger core stampings are utilised and a slightly larger winding space is available to the amateur winder.

Winding Former

The winding former must occupy the minimum possible space, but also provide adequate insulation. The form of construction shown at Fig. 2 is fairly self-explanatory and should present no difficulties. The material used is 3/32 in. paper or cloth based paxolin. Waxed cardboard can be employed, but it is not recommended.

To facilitate winding and keep the former together, a wooden plug of the same cross section should be inserted in the former. A hole drilled through its centre will take a length of threaded $\frac{1}{4}$ in. rod which, by means of large washers or discs, can be used to secure the former end plates and provide a convenient mount for use during the winding process.

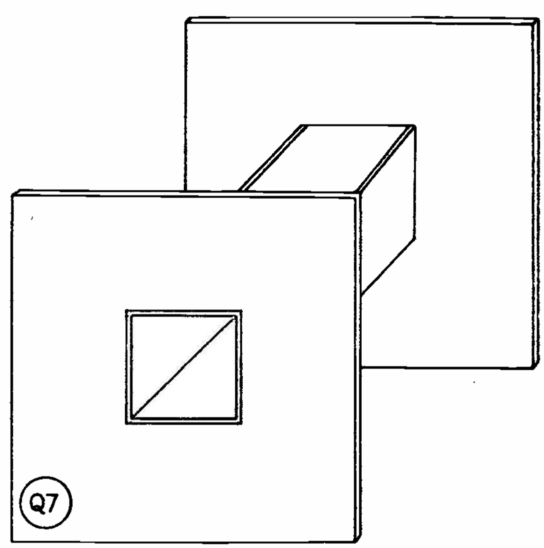


Fig. 2. Winding former for home-built power transformers. The material can be thin paxolin sheet and the laminations of Fig. 1 are built up on this core after it has been wound—see text.

Windings—Number of Turns

The first information required is the number of turns per volt. Once found this number applies to all windings on the transformer.

The requisite number of turns per volt is directly related to the cross sectional area of the core. The greater the area the less turns required. For operation at 50 cycles the number of turns required can be determined by:

$$\text{number of turns per volt} = \frac{8}{\text{cross sectional area of core in sq. inches}}$$

e.g. 200 watt transformer

$$\text{number of turns per volt} = \frac{8}{3} = 2.7$$

Primary Winding

Having determined the number of turns per volt the total primary and secondary turns can be calculated by simple multiplication. Mains voltages vary in different localities, therefore if an accurate output voltage is required it is good practice to provide for input to the primary of any voltage between say 200 and 250. By providing taps at each end of the primary winding it is possible to obtain 5 volt variation with the minimum number of taps. A 5 volt tap is provided at one end of the primary and several 10 volt taps at the other, calculated from the 2.7 turns per volt ratio.

Secondary Winding

Secondary winding turns can be determined in the same manner as for the primary, *e.g.*, 1000 volt output from a full wave rectifier will require a 2000-volt centre tapped secondary, *i.e.*, 5400 turns with a tap at the 2700th turn.

It should be noted that the voltage required from the transformer will depend on the type of rectifier and rectifier filter utilised. The method of calculating the winding turns will however be identical.

Wire Sizes and Types

Obviously the wire used must carry the maximum current applicable to continuous operation. As the primary may operate with 200 volt input the current should be determined by dividing the transformer wattage by 200, *e.g.*

$$\text{250 watt transformer, primary current } \frac{250}{200} = 1.25 \text{ amps.}$$

From wire tables it will be found that 18 SWG wire is required to carry this current.

Wire Table

SWG	MAX. CURRENT
30	0.11
28	0.14
26	0.20
24	0.35
22	0.5
20	0.85
18	1.5
16	2.75
14	4.5
SWG 12	7.0 amps.

Fig. 4. Table of wire gauges for use in home-constructed power transformers, showing current-carrying capacity.

Thicker wire can be used with no loss in efficiency, but it must be remembered that the thicker wire will take up much more room in the winding space. Similarly if wire of the correct gauge is not available the primary can be wound using two or even three thinner wires together. If this is done care must be taken to ensure that the wires will jointly carry the requisite primary current. Also the wires must be laid flat to minimise winding space and great care must be taken to ensure that one individual wire does not have a turn more or less than the remainder.

Taps

If the wire size is small it is best to solder a connection from the winding to a length of flexible insulated wire. Insulate the joint with empire cloth and anchor the joint within the winding area. For larger wire sizes it is optional to use the actual winding wire or solder in a piece of flex.

Insulation

It is common practice to wind transformers with the primary as the first winding. In this way the insulation from the core to the winding will not be required to withstand voltages in excess of 250 AC (350 peak volts). If the high voltage secondary windings are put on the outside they are more easily insulated from the core. Care must, however, be taken to ensure that the winding former is not too full and the outside of the winding rubbing or in close proximity to the core stampings. The centre of a winding used for plate supply will be earthed but the two ends of the winding must be capable of withstanding, in the case of a 1000-0-1000 winding, 2000 volts AC (2800 peak volts) between the ends of the winding.

Low voltage windings used for heater supplies will not normally require insulation in excess of that used for the primary.

Low voltage windings for rectifier heaters in the case of plate supplies will need a high order of insulation comparable with that required for the high voltage secondary.

In supplies used for bias purposes or high voltage for cathode ray tubes the low voltage supply to the rectifier is at earth potential and consequently necessitates less insulation. However, the whole of the high voltage winding will be at high potential to earth and will require more adequate insulation.

As the voltage between adjacent turns of the same layer in a transformer is always low, insulation can be of a low order and enamel is quite adequate. The voltage between turns of adjacent *layers* can, however, be high. Care must therefore be taken to ensure that insulation between layers is adequate and that it is extended beyond the end of each layer of winding.

This does not imply that poor insulation between adjacent turns is acceptable. Far from it. A short between adjacent turns can ruin a transformer. In a transformer of say 300-watt rating the winding will be of the order 2 turns per volt. The voltage between adjacent turns will therefore by 0.5 volts. If a short occurs between adjacent turns 0.5 volts are applied to one complete turn of almost negligible resistance. The result is inevitably rather a lot of amps and the transformer will be none the better afterwards.

Winding Procedure

Few amateurs will have access to a coil winding machine; more primitive methods must therefore be improvised. For years the writer has wound cores by hand using a centrally positioned threaded ¼ in. rod to support the cores. The latter is supported from the bench by metal brackets.

Care should be taken to wind each layer evenly and to avoid gaps between turns. The winding should start ¼ in. from one end of the former and finish ¼ in. from the other. Winding must be continuous left to right, then right to left, the coil being rotated in the same direction. The ¼ in. gap left at either end of the coil should be filled in level with the winding by use of a suitable insulated material—empire cloth, adhesive tape or waxed paper. Inter-layer insulating material should cover the full width of the former. Insulation between layers should comprise sheets of empire cloth or waxed paper, the amount of insulation being appropriate to the voltages involved.

Inter-Winding Screening

It is sometimes desirable to provide an electrostatic screen between windings. This can be done most efficiently by use of a sheet of copper foil to which is soldered a flexible earthing lead. The foil is cut to fit round the former and must be long enough to overlap about 1 in. when wound round the winding to be screened. When put in position insulating material must be wound on with the foil such that the overlapping ends are not in contact. When using an interwinding screen consideration must be given to the additional insulation necessary between adjacent windings and the screen.

An alternative to the copper foil screen is to wind on a single layer of wire either close or open spaced, taking one end of the winding to earth. This method is not as effective as using copper foil.

Winding Terminations

Amateur transformers find their way in and out of a variety of different rigs. It is therefore preferable that all transformer windings terminate on suitable tag strips. The method of terminating is a matter for choice providing proper consideration is given to insulation between leads and between leads and earth. In general, it is best to isolate primary connections in one group, high voltage windings in another and low voltage windings separately.

Core Clamps and Mounting

There is nothing more unpleasant than a

humming transformer, particularly if the station operates phone. This evil can be eliminated by ensuring that transformer cores are always of adequate size for the wattage, that the core stampings are rigidly clamped together and the transformer securely mounted. Possible loose stampings within the winding former can be secured by insertion of a wedge-shaped piece of insulating material before fitting the clamps. Care should be taken that excessive force is not used during this operation as the coil former may be cracked or distorted. When locating a transformer in the gear it is worth remembering that the generation of some heat within the windings is unavoidable. Sufficient ventilation should therefore be provided.

Auto Transformers

Generally speaking auto transformers find favour in amateur circles only for use in competition with the Minister of Fuel and Power, whose directives sometimes cause line voltage to fall below the usable (and legal !) limit. The core and wire size turns per volt are determined relative to the total intended load. Taps are then provided for intended input and output voltages.

A somewhat more economical method of adjusting line voltages is to utilise a small low voltage output transformer and connect the secondary, which can be tapped and connected to a switch, in series with the main supply. If this is done the secondary winding must be capable of carrying full load mains current: additionally, care must be taken to ensure that the switch contacts are heavy and spaced such that adjacent contacts are not shorted as the switch is operated. Refer Fig. 5.

Impregnation

It is current commercial practice to impregnate transformers to obviate failures owing to ingress of moisture. Few amateurs will have convenient facilities or materials for impregnation, but providing careful attention has been given to the various factors referred earlier failures should not occur. For tropical usage, of course, impregnation is essential.

Wrinkles

It sometimes happens that a transformer is in use and it is desired to run a valve of different heater rating, *e.g.*, a 4-volt winding is available, but it is desired to use 6.3 volt heater valves. If it is inconvenient to disturb the transformer in order to adjust the 4-volt winding, a small additional transformer can easily be constructed having a 4-volt input to the primary and 6.3-volt secondary. In this application it should be noted that the wattage available at the 6.3-volt secondary will not exceed a figure 10 per cent. less than the wattage available from the 4-volt winding on the original transformer.

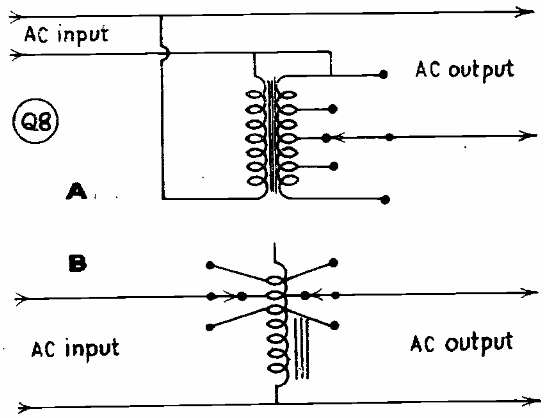


Fig. 5. Two methods of adjusting supply voltage; in (A) a small transformer would be quite adequate.

Although not good practice, a transformer for use with a full wave rectifier can be built up by using two identical transformers with primaries connected in parallel and secondaries in series. If this is done secondary insulation must be good. (While in Canada the writer reduced dollar expenditure by using a main power pack built up in this way to give 750 volts at 250 milliamps.)

If separate high and low voltage transformers are used variable HT can be obtained by tapping the primary. If the lowest tap is the correct design for the transformer this will give normal maximum output with optimum regulation. Other taps putting additional turns on the primary will provide a convenient means of reducing power. The switch used must be heavy and its operation must not short adjacent contacts. When winding a transformer with additional turns on the primary, due allowance must be made for the requisite additional winding space.

"THE MONTH WITH THE CLUBS"

Will all Club secretaries kindly note that reports for the February issue should be with us by January 14, addressed "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. For the March issue, the closing date is February 11.

Telescopic Wooden Tower

DESIGN, CONSTRUCTION AND ERECTION

D. MORGAN (G3SM)

This article will give many readers, thinking over the problem of supporting a VHF beam head and its rotating mechanism, practical ideas on the construction of a wooden tower for their particular location. Suitable timber is now quite readily obtainable, and is much easier to work and to handle than metal, as well as being electrically the better material to use. The design suggested, and successfully adopted, by the author provides for the essential requirement of being able to get at the beam head itself without undue difficulty or danger; in other words, this tower is a structure which can be raised or lowered so that the beam head becomes accessible.—Editor.

HOW often do you hear over the air the following remark: "I will have to take my beam down, old man, and make the necessary adjustments some time, but it is a big job and I don't fancy it at the moment"?

It was with this sort of difficulty in mind that it was decided not to tolerate any such types of structures or towers for the next two-metre beam.

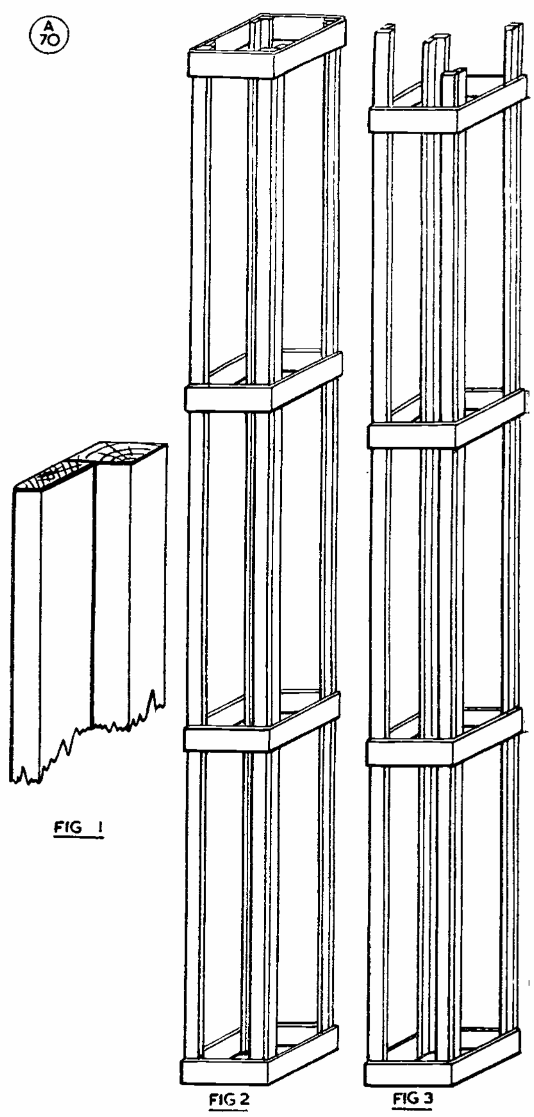
The writer was prompted to design and construct a tower that could be put up or down without trouble, could be easily serviced, and on which alterations—which are a factor in aerial design for the VHF bands—could be carried out with the minimum amount of trouble or delay.

After surveying the back of the house, it was decided that the best proposition was to make a wooden tower, which would *not* be in one complete section, so as to avoid the extra strain-and-push involved in getting it up each time. After going into the various ways and means of building beams and towers which would be suitable for the location, and with due consideration for the position of the radio room, it was finally decided to construct a trellis tower with the inside section telescopic. The idea was to be able, without much additional help, to manipulate the tower up or down without unreasonable difficulty.

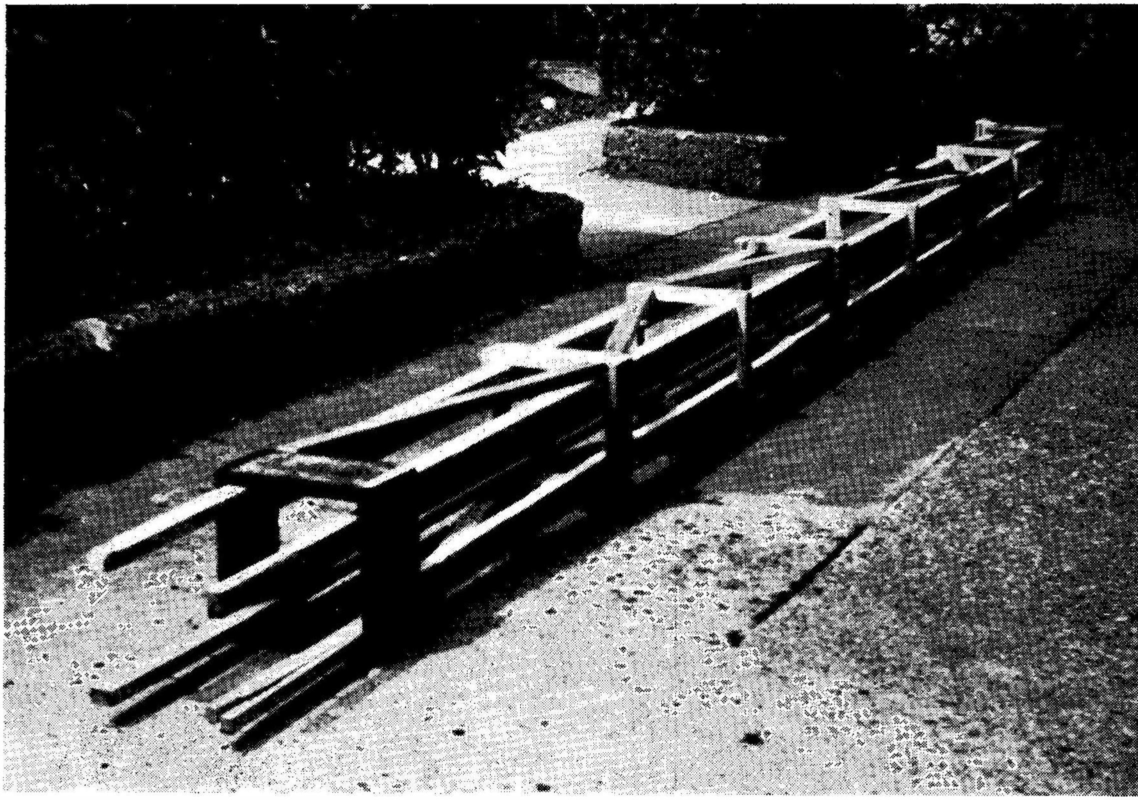
General Design

Provision had also to be made for fixing the main drive to the beam, which normally comes through the wooden window frame to the geared rotary mechanism; this rests in a weather-proof box in the section of the telescopic part of the tower opposite the window, with the necessary arrangements for detaching the driving rod from this mechanism when swinging the tower down.

The rotating drive section itself is made of



Sketches showing the construction of the tower sections—see photographs and text for details of finalised layout.



Photograph A. Showing how the near end is made to slide into the next box section. The essential feature of this design is that the tower can be elevated to its full height after having been raised to the vertical.

broom handles (which are of soft light wood) joined together with metal sleeves made from round dural tube, or brass, a slit being cut in each sleeve so that the wooden handles can be pushed in and screwed up tight. Broom handles were used instead of metal or dural, because these are each 3 ft. 6 ins. long, are cheap and can be easily obtained ; also, the fixing of this system as described is simple and neat, and furthermore, it can easily be taken apart for alteration.

This " length of handles " is then joined together, and fixed into the top section of the telescopic tower through three ball races suitably mounted in pieces of wood $4\frac{5}{8}$ ins. x $4\frac{7}{8}$ ins. x 1 in. and spaced at equal distances in the inside sections ; the first bearing should be right at the top and after the ball race assemblies have been put in, it is a good idea to fit rain shields consisting of discs of round aluminium, which can be pushed over the broom handles to about $\frac{1}{4}$ in. from the bearings; then with adhesive tape wound round each side, and painted, the rain is prevented from running down into the bearings.

Tower Construction

Details of the main wooden tower are: Four 12 ft. lengths of 2 in. x $1\frac{1}{2}$ in. timber cut to 1 in. x $1\frac{1}{2}$ ins. and screwed together (*see* Fig. 1) to make the four uprights for the bottom part of the tower ; when these are ready they should be laid out side by side on a straight surface and measured off equally for the sections to be fitted.

When these two sections are fitted together with eight cross pieces measuring $10\frac{3}{8}$ ins. x 1 in. x 2 ins., and eight lengths 9 ins. x 1 in. x 2 ins. added, together with four pieces at the bottom—two 9 ins. x 1 in. x 8 ins. and two $10\frac{3}{8}$ ins. x 1 in. x 8 ins.—they make up into a boxed section, and the structure when screwed together, should look like Fig. 2. Eight more cross pieces measuring $10\frac{3}{8}$ ins. x 1 in. x 1 in. and eight of 9 ins. x 1 in. x 1 in. can then be interposed between the main cross pieces for extra strength, and finally with the fitting of the cross trellis work, the main bottom section of the tower is completed—*see* photographs.

Telescopic Section

The next step in the work is the wooden telescopic section. This entails sawing down eight 12 ft. lengths of the same size timber as before ; these are again laid out four at a time, and then carefully measured, as these are the sections which are to slide *inside* the section shown in Fig. 2. The cross pieces are, in this case, naturally cut much smaller ; one set of eight measures 7 ins. x 1 in. x 2 ins. and the other eight pieces are 6 ins. x 1 in. x 2 ins. Special care must be taken to note, during the boxing operation, that the positioning of one set at the top of this section is different from the other (*see* Fig. 3) ; again, there are four 6 ins. x 1 in. x 4 ins. and four 7 ins. x 1 in. x 4 ins. pieces at both the top and bottom of this structure.

After this stage is completed, the smaller cross pieces 7 ins. x 1 in. x 1 in. and 6 ins. x 1 in. x 1 in. are fitted in the same way as in the main tower.

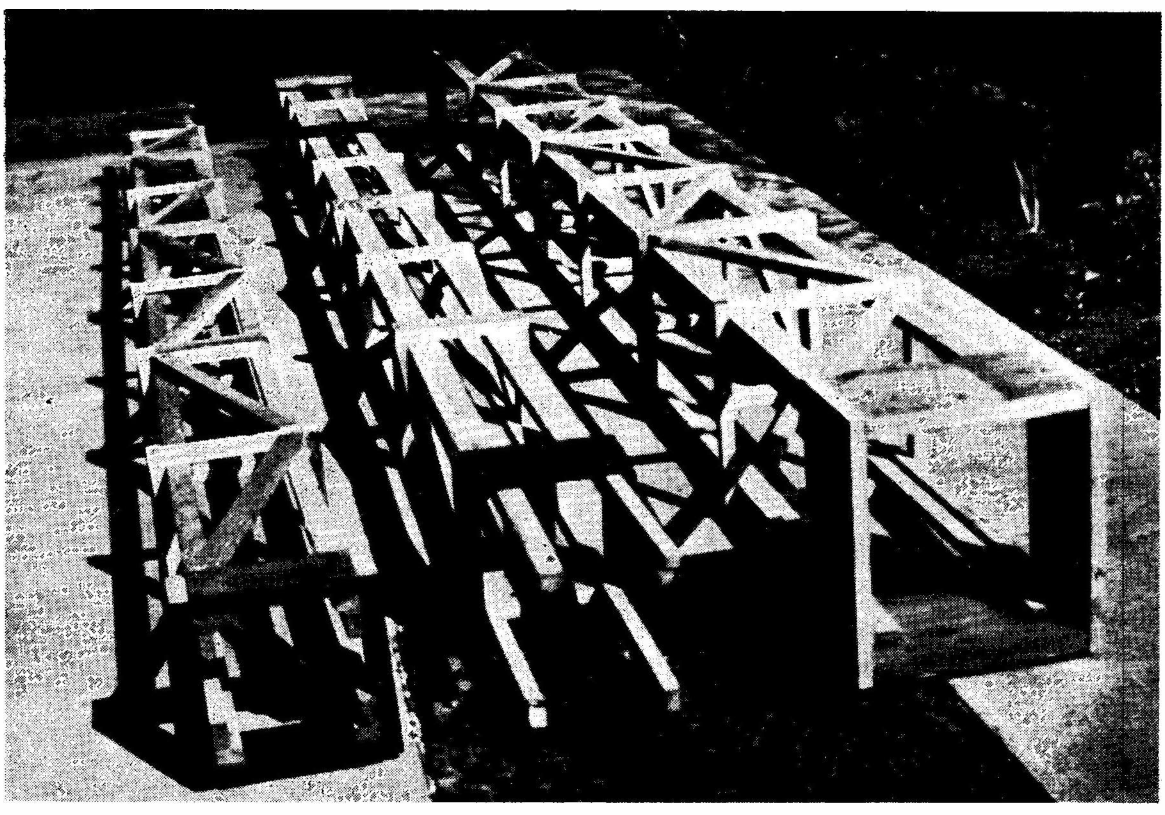
It should be noted from the photograph "A," and drawings in Fig. 3, that one foot of each section of the joined 12 ft. lengths is cut out so that when the two telescopic parts are made and boxed, they slide into one another. As soon as this has been completed, they can then be screwed together to make the main 23 ft. tower (*see* photograph " B ").

When the sections of this part of the tower have been finished, the trellis cross pieces can be cut and screwed into position.

Weather Proofing

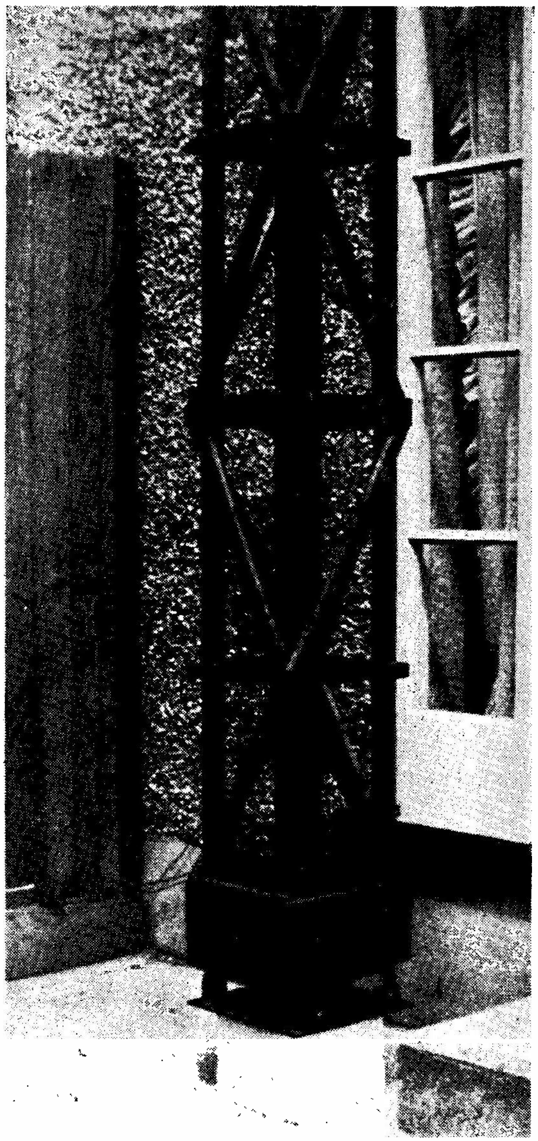
Before assembling the main drive connections into the inner tower, the whole structure should be well painted or creosoted. This can best be accomplished by taking one side section off each part of the tower. If, however, nails are used instead of screws (and brass screws should be used throughout if these can be obtained), the operation of painting must be undertaken at an earlier stage, preferably before the trellis work is put on.

In the author's case, the foundation for the structure had to be a turn-table at the bottom

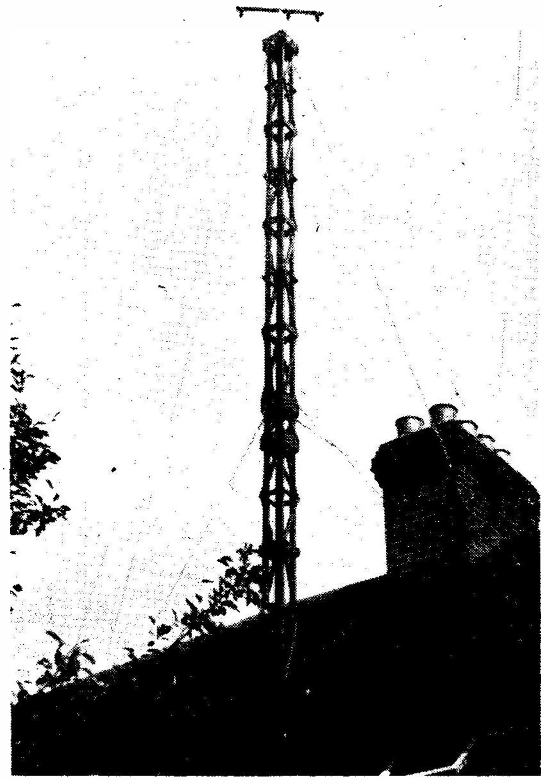


Photograph B. The three sections ready for jointing—see Photo A and text.

of the tower, because of a tree which was in the way: so, when the tower is pushed up it starts at an angle and when straightened up is turned into position on the turn-table. This comprises a 12 ins. x 11½ ins. x ¼ in. plate, bolted into a centre plinth of concrete to facilitate tightening up: four pieces of 9 ins. x 1 in. x ⅜ in. steel are used for the hinging arrangements to push the tower up. These are bolted on to the bottom box at the foot of the tower (*see* photograph "C") and complete the base.



Photograph C. Showing the base assembly, consisting of a steel plate on a concrete block. By removing the two rear bolts and loosening the front pair, the tower can be lowered with the foot pivoted about these bolts.



Photograph D. An impression of the whole assembly, as constructed and described by G3SM in his article, showing the guy-wire layout.

If it is felt that the description given is not sufficiently detailed, reference should be made to the photographs, as the structure described was designed for the particular location at G3SM and may not therefore, in some instances, be practicable for other surroundings. Alterations can be made accordingly — for instance, in some circumstances the turn-table notion could be discarded if there are no trees or other obstacles in the way for a straight push-up for the tower.

Telescoping

When pushing up or taking down the inside telescopic section, it is lifted and helped by two pulley wheels, which are bolted into pieces of oak 9 ins. x 3 ins. x 1 in.; these attachments are screwed into the top of the main outside tower.

Strong rope or light cable is then attached to the bottom of the telescopic part, down the inside of the bottom 12 ft. tower for lifting.

Before fitting guy wires to the tower, it is best to give earnest consideration to the type of wire to be used ; in this connection the ordinary galvanized wires are not suitable owing to their relatively short life. Covered wire of the stranded steel type has been used in double lengths on this tower, as past experience has shown that this reveals very little deterioration even after three years' use.

After the inside telescopic section is raised to the required position, it is bolted securely to the top of the main tower ; then, with guy wires in position and fixed securely, the tower is ready for the rotary mechanism to be fitted into the tower opposite to the side of the window from where the drive enters the station.

When boxing this in it is necessary to remember to have a collar-and-grub screw attachment to the gear mechanism so that it can be easily disconnected from the beam drive when taking down for alterations or overhauls.

Extra support for the main tower can be achieved by fitting two pieces of 24 ins. x 1 in. $\frac{1}{8}$ in. steel to each side of the tower and attaching these to the window-sill ; this does improve the support, which in this case, is 12 ft. from the ground. Supports can also be fixed under the eaves in a similar way if required.

In raising the tower, the top section may have to be assisted by a guy wire over the house, as in the writer's case. This will then eliminate any extra strain on the assembly during the initial lifting. Permanent guys should, of course, be placed at the points where the inner telescopic section is joined, as well as at the top, because this section is the weakest point of the inner structure and needs steadying.

The completed assembly is shown in photograph " D." The telescopic tower as described and illustrated here is giving entire satisfaction at G3SM, with a 3-over-3 Yagi beam head which is controlled manually from the operating position.

CABINETS AND METAL-WORK

Chase Products (Engineering) Ltd. are a firm who have profited greatly from their experience in Government sub-contracting work on electronic instruments, and they are now experts in producing metal cases and chassis for all types of scientific and electronic instruments. In addition to which, they carry out a large amount of precision sheet metal work for the engineering trades, as well as the electrical and sign trades.

One of the chief advantages of dealing with a firm like Chase Products is that they are equally well equipped to carry out a small prototype job or to go into quantity production.

It says much for the quality of their work and service that the business has so expanded in six years that it has been necessary to take an additional factory to cope with the amount of work on hand.

★ ★

NEW 150-VOLT STABILISER FOR ELECTRONICS EQUIPMENT

In response to the demand for a very high performance stabiliser, working at 150 volts, the Communications and Industrial Valve Department of Mullard, Ltd., have recently introduced the 150B2, which is of the miniature B7G construction.

This stabiliser sets a new standard in the design of power supplies for use with both communications and industrial electronics equipment. This is particularly true in the portable instrument field, where the small size and simplicity of the ordinary neon stabiliser circuit has decided advantages over the larger and more complicated series valve-regulated supply. Under these conditions (and particularly where a comparatively constant load current is taken) the 150B2 will provide the stability and freedom from sudden large jumps in output voltage which are so vital in all measuring equipments. For wherever large variations of mains voltages occur, only an adequately regulated HT supply enables the instrument designer to achieve the high degree of stability necessary in modern electronic measuring equipment.

The 150B2 is intended to be used as a simple stabiliser over the current range of 5 to 15mA, where the " stability with time " is the most important consideration. In this new design the Mullard sputtered-metal technique ensures freedom from trouble caused by the liberation of contaminating gases from the walls of the tube.

As regards burning voltage, the temperature co-efficient is low and the stability at any one current is better than the exceptionally good figure of ± 1 per cent. during life of tube.

The principal characteristics of the 150B2 are as follows:

Minimum voltage necessary for ignition	180v.
Burning Voltage (Variation from tube to tube)... ...	143-147v.
Current Range	5-15 mA.
Incremental Resistance (max.)	500 ohms.
Temperature Co-efficient of Burning Voltage	10mV/°C.
Ambient Temperature Limits	− 55 to + 90°C.

Further technical details can be obtained on request from the Communications and Industrial Valve Department. Mullard, Ltd.

VHF BANDS

A. J. DEVON

Conditions and Activity—
Cambridge/London on 430 mc, G2FKZ/G2XV, 50 miles—
Some Regular Schedules—
New Stations Still Appearing—
The Thursday QSO Party—

WHAT with the wintry weather and another "short" month, VHF activity would seem to have been at rather a low ebb since we last appeared—it is significant that less than 12 movements are claimed in the Tables. However, in spite of the fact that there was barely a week between the publication date of the last issue and the dead-line for the present offering, we have a total of 22 individual reports in hand, and many of them make distinctly interesting reading.

For some time, G2XV and the other Cambridge stations on 430 mc have been trying to get outside the local area on that band, the idea being to work into the London zone where, relatively, there is now a high level of activity on Seventycems. This was duly achieved on Sunday, December 7, when G2XV succeeded in working (through that fog) G2FKZ on 70-cm phone—actually, they had three separate QSO's at different times, with an estimated RF output of less than half-a-watt at the Cambridge end! The distance air-line is not less than 50 miles, which makes the contact of great interest and importance to all who are now active on the 430 mc band, particularly in view of the weather conditions which prevailed at the time. Anyway, there it is, and it is hoped that now there will be many more 70-centimetre contacts between these two areas of activity; the distance is just about right for some really useful and interesting experimental work, especially as some of our best-equipped VHF operators, with between them a lot of the know-how, are functioning regularly on 430 mc.

During the month to December 7, the G3EHY/GI3GQB schedule was conscientiously maintained, the results being two-way contact on 13 occasions; GI3GQB heard but unworkable 6 times; G3EHY heard only in Belfast, 10 evenings. This gives a 33% "reliability of contact" over the 268-mile path, and bears out Louis' own contention that conditions have been good for GDX on a number of occasions during even this bleak period. He has now opened another GDX schedule, with G2CYN in Birkenhead, over a distance of approximately 150 miles. Though the latter operates with an indoor (12-element) stack only, results to date have been 90% successful, and he is a consistent signal in Banwell. For those who may be interested, the time of this schedule is 1930 each evening, and G2CYN is on 144.500 mc.

From still further north, GM3EGW (Dunfermline) reports that he and G2FO (Stockton-on-Tees) are now running a regular schedule, which is giving a reliability of about 90% (not fully checked against missed evenings) over a distance of 140 miles—and the path is mainly across some of the highest ground in the country. GM3EGW runs 70 watts, with 10-15w. at G2FO. So here again we have consistent working being attempted over a useful distance, and in due time G2FO and GM3EGW should have some valuable data to offer on winter propagation in that part of the country.

Best conditions during the period under review obtained on the evenings of December 4 and 5, when stations in all directions were workable at GDX distances, especially to the north. Though the southern part of the country was still under snow, and it was freezing hard, a warm front was coming slowly down from the north-west (it was milder in Scotland and northern England at this time), so that the met. conditions were right for long-distance working. It was on the evening of December 4 that G2FO was able to work both GM3EGW and GM3FGJ (Edinburgh) comfortably on phone, for good GDX contacts. And G3BLP was heard by GI3GQB.

Other evenings when 150-mile distances could be covered were on November 10, 12, 14, 16 and 30; stations on the band during these periods were making some good contacts.

Thursday QSO Parties

At this writing it is only possible to say that, judging from the results reported for the first occasion, December 11, and from what we have heard on the two-metre band since, this idea has met with a fair degree of success; at least, nearly everybody who did come on found several stations to work during what is normally a dead period—2000 to 2230. The band was not jam-packed with signals, but depending on what part of the country is being considered, there was always anything from one to a dozen stations to work.

The general feeling is that Thursday evenings on the VHF bands should be kept as a regular date, with as many stations as possible up for the 2½-hour session during TV, and using either the two-metre or 70-centimetre band. We would be very glad to hear from all interested correspondents as to the results they get, with lists of calls heard and worked.

A number of new stations are being regularly reported — or reporting themselves — on both bands, and most operators are able to keep steadily adding to their totals of "different stations worked"; increases in these totals are, indeed, a feature of the claims for the All-time Table this month.

VHF Century Club

We are glad to notify the election of two new members of the VHF Century Club: G2FCL, Shipley, Yorks., No. 136; and G6CI, Kenilworth, Warks., No. 137. It is interesting to find that G2FCL's list contains no less than 54 G3-plus-3 call-signs, a number of whom have only recently been licensed.

Claims for VHFCC membership are accepted from all operators able to show QSL cards for 100 or more stations worked two-way on the VHF bands. A certificate accompanies the acceptance of each claim, and elections to membership are notified in these columns. The cards, with a check list, should be sent in to the office by registered post, addressed A. J. Devon, "VHF Bands."

Some Station Reports

G3IOE (Newcastle-on-Tyne, 3) writes to "report for duty on Two," and remarks that it is his ambition to be the first of the locals up there to work G3WW, often heard in the Newcastle district, but never yet QSO'd, in spite of many attempts and much schedule-keeping. Gear at G3IOE is an S.44OB modified with 15 watts to an RK34, the receiver a G2IQ converter into an S.640, and the beam a 4-ele Yagi. Though the QTH is 200 ft. a.s.l. according to the contours, it is surrounded by higher ground at close quarters; nevertheless, two-metre signals can be heard from all directions, and among the consistent ones at G3IOE are G3WW, GM3BDA, GM3EGW and G6LI. (We might add here that until quite recently G3IOE was an active VHF SWL, with a nice total of 77 stations heard in 24 counties, and ON4BZ as best DX).

THURSDAY VHF SESSION

Every Thursday evening all VHF operators are asked to come on for a QSO Party to be held between 2000 and 2230 GMT. There will be activity on both bands, Two and Seventy Centimetres. Make It A Date!

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are particularly requested for this section, set out in the form shown below).

G3ION, Tetbury, Glos.
WORKED: G3CGE, 3EUP, 3FAN, 3FUM, 3GOP, 3HWF, 3HXJ, 3IRA.
HEARD: G3DLU (*November 7 to December 8*)

G3IRA, Swindon, Wilts.
WORKED: G2BUJ, 3EUP, 3FUM, 3ION 3IOO, 4AP, 8DM, 8MW.
HEARD: G8IL (*November 14 to December 6*)

G2HIF, Wantage, Berks.
WORKED: G3EUP, 3FUM, 3IRA, 3ZI, 4AP, 8DM, 8VP.
HEARD: G2BUJ, 3HWF, 3IEI. (*2000-2230, Thursday December 11 only*)

G3YH, Bristol.
WORKED: G3BLP, 3DLU, 3IFV 6NB.
HEARD: G2BUJ, 2XV, 3EHY, 3FAN, 3FRY, 3HSD, 3HWF, 3IAI, 3ION, 3IRA, 3WW, 4DC, 4SA, 8DA, GW8UH. (*November 14 to December 9*)

G5DS, Surbiton, Surrey.
WORKED: G2AIW, 2ANT, 2FNW, 2FZU, 2HCG, 2HDZ, 2UN, 2XV, 3CAT, 3FAN, 3FUL, 3GBO, 3GHO, 3GHU, 3HZK, 4AU, 5BC, 5DT, 5LK, 5UD, 6LR, 6NB, 8OU.
HEARD: G2AHP, 2DTO, 2RD, 3BLP, 3EYV, 3GHI, 3HWJ, 3IAI, 3IIT, 3IOO, 3MI, 3SM, 4DC, 4MW, 5QB, 5RW, 5UM, 6GR, 6TA, 8MW (*November 12 to December 11*)

G3DLU, Weston-Super-Mare
WORKED: G3FRY, 3YH, 6NB, 6WU, 8AO/MM, 8DA, 8DM, GW3BNQ, 8UH.
HEARD: G2BUJ, 2HIF, 3BLP, 3FMI, 3FUM, 3HWF, 3ION, 3IRA, 4GR (*November 11 to December 11*)

G3EHY, Banwell, Somerset.
WORKED: G2CYN, 2FXK, 2NV, 3ANB, 3BOC, 3EPW, 3FMI, 3IER, 3IOO, 3YH, 8DA, 8MW, GI3GQB, GW2ADZ, 3EJM, 8UH.
HEARD. G2FZU, 2HCG, 2XS, 3FRY, 3HWF, 8IL (*November 11 to December 7*)

G2HIF (Wantage) devotes his report this time to the first Thursday session and says there were a few more stations on than he had expected to hear, though the response from London and the Midlands—within reliable range—was disappointing. However, like several others, G2HIF was able to keep in QSO continuously for more than 2½ hours, working seven stations.

On November 14, G3IRA (Swindon, Wilts.) received his licence, brand new. Before the day was out, he had worked his local G4AP on 70 cm, the transmitter using EF50-7C5-832-832, and the receiver being a trough crystal mixer with 955 oscillator and 717A IF on 30 mc; the 430 mc aerial is a 4-element arrangement with a wire-netting reflector. On Two, the receiver is a Cascode into a home-built receiver and the beam a 4-element Yagi at 35 feet. G3IRA's operating frequency is 145.35 mc, and on the good evening of December 4 he was able to work G3IOO for Shropshire and G8MW for Notts., both at over 100 miles, with S8-9 reports—very nice, too. Naturally, G3IRA is on the look-out for new counties (six so far) and wants to get into the Tables as soon as he can.

Sad news from G2BAT (Falmouth). As often mentioned in this space, he has practically no local activity to sustain him when the GDX is not coming through; having made several abortive sorties during the last month, and finding nothing to work on December 11 (the first Thursday session) he has firmly but reluctantly decided that his time would be better spent in building new VHF gear for next year. So G2BAT is now hibernating till further notice.

G5DS (Surbiton) goes up three in Annual Counties, and G4CI (Worcester Park) moves up in the All-Time table "thanks to G5MA." G5JU (Birmingham) came on for the first December Thursday, but could only find some weak phone carriers; he also moves in All-Time Counties. G6TA (Balham, S.W.12) managed no less than five new counties for the Annual table, and G3IOO for Shropshire in the All-Time.

On April 30, 1926, G6CI, of Kenilworth, worked G2XV, of Cambridge, on 45-metre phone. Their next QSO was 26 years later on two-metre phone—so it was a thrill and landmark for them both. Brian remarks that Jerry's S9 phone at about 80 miles was outstanding, and a clear indication that propagation conditions were much better than either the weather or the prevailing activity suggested—as he says, it is only by regular calling and listening that the state of the band can be *proved*.

G6YU (Coventry) is now ready to pump full bore on Seventycems, and has had successful two-way phone tests with G3BKQ (Blaby, Leics.) at 18 miles; G3HAZ, of Birmingham, at 22 miles, has been heard, but as yet no luck with

G2FNW. The G6YU 70-centimetre transmitter consists of his regular two-metre rig driving a QQVO6-40 as a tripler at 40w. input; the aerial is a 16-element stack, and the receiver consists of a crystal-controlled local oscillator, grounded grid triode RF stage, a crystal mixer in a concentric line circuit, feeding into a grounded grid IF stage, with the IF tunable over 22.5-28.5 mc on the main receiver.

A welcome budget of news from GM3EGW (Dunfermline), who—apart from items already mentioned earlier—reports several new stations active on Two in the Edinburgh area, with three stations on around Dunfermline; the call-signs he gives as worked are: GM's 3BBW, 3BQO, 3ENJ, 3FGJ, 3FYB, 5YW, 6SR, 6XI and 8FM. Others are known to be operating on 70 cm, and those concerned are asked to let us have details; GM3FYB and '3EGW himself should also soon be on this band. As more than 100 stations have now been worked by GM3EGW, and he is holding some 70 QSL's, he hopes that he will not have to work 150 stations to make VHFCC! Incidentally, he asks "Where are the Newcastle chaps?"—no QSO's have been made in that direction since mid-October.

GI3GQB, the other end of the G3EHY schedule, describes himself as a "Waif in the wilderness," with local activity at a very low ebb on Two, and nobody at all to talk to on 70 cm, for which band GI3GQB—surely one of our most enthusiastic VHF men—is also fully equipped. He asks that G's remember he is there each evening, and that they turn their two-metre beams his way; he hears weak phone carriers almost every night (he is on from 7.45-8.45 p.m. and then again from 10.15 p.m till after midnight, on 144.132 mc). If these unknown stations signed or were to call CQ on CW occasionally, they might not only "hear something to their advantage," but it would also help GI3GQB a lot. He runs 80 watts to a pair of 8012's and has two receivers with 12AT7's in the pre-amplifier stages; the beam is a 5-element Yagi at 50 feet. Much data are being gathered on the G3EHY schedule, which will in due course be put together with the hope of being able to draw some positive conclusions.

Down in the West Country, G3ION, of Tetbury, is on and runs a regular schedule with G3CGE (Southampton); this is at 10.0 p.m. every evening except Thursday and Saturday, and is very consistent with only 8 watts (into a 6J6, temporarily!) at G3ION, who is building a *pukka* job in the meantime. He has a good location, and earlier in the season was getting good fat signals from GDX stations in Kent and Cornwall; on December 6, he managed G3FAN (Isle of Wight) for a nice contact, and the evening before G3GOP (Southampton) was up to S8.

From Bristol, G3YH puts in another calls heard list, and from Weston-s-Mare not far away, G3DLU reports again. From November 11 to December 11, he was on for a total of twenty evenings, but—except for the Thursday QSO Party—found activity low and conditions, therefore, difficult to assess; modulated but unidentifiable carriers are frequently heard from the "London direction." (This is a phenomenon which has always been with us on the VHF bands, and over the years the phone men have been implored to slip in the key, if only on occasion, and let distant listeners know who they are). G3DLU has changed his 16-element stack for a 3-element Yagi 30ft. higher, as the stack was picking up too much local noise; as yet, it has not been possible to decide whether the change is for the better.

G3EHY (Banwell) reports a noticeable increase in activity during the early evenings, 1845 until about 2030, with a number of stations working short-haul contacts over 50 miles or so; three new stations were raised from G3EHY over the period—G2FXK (Aldridge, Staffs.), G3EPW (Bury, Lancs.) and G8MW (Mansfield, Notts.).

For the number of different counties from which one station has been operated fixed on Two, G3AVO/A must surely hold any record there may be—he is now on from R.A.F. Bassingbourn,

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
60	G3BW
58	G3BLP
57	G2OI (349)
56	G3EHY (365), G8SB
55	GW5MQ
54	G6NB
53	G2AJ (519), G5YV (364)
51	G3WW, G4CI
50	G2HIF (193)
48	G3ABA (282)
47	G2NH, G2HDZ, (331), G5DS (401), G5WP
46	G4HT (476), G5BY, G5MA
45	EI2W (132), G2XC, G5BM, G6XM (356), G6YU (195)
43	G3BK, G3COJ, G5DF
42	G4SA, G5BD
41	G2FQP, G3BA, G3DMU, G3FAN (295)
40	G3CGQ, G3HAZ, G4RO (256), G5JU, G8KL, G8OU
39	G2IQ, G3VM
38	G3APY, G8IL (300)
37	G2FNW
36	G3CXD, G3GHO (170), G3HBW, G6CB (312), G8IP
35	G2FZU (118)
34	G2AHP (321)
33	G2FCL (117), G3FZL, G6CI (134)
32	G2FVD, G5ML (131), G8IC, G8QY
31	G2FJR (103), G5RP
30	G5NF, G6TA (206)
29	G3AKU, G3BJQ
28	G3FIJ (143), G3HXO, GM3BDA, G8VR
27	G3AGS, G3BNC, G3DAH, G3GSE, G3HCU (152), G6GR
26	G3CFR (125), G3FIH, G3GBO (289), G4MR (189)
25	G5SK
24	G3FD, G3FXG
23	G3CWW (260), G5PY
22	G3AEP, G3ASG (150), G3BPM, G3GOP (122), G3HII, G5MR (128), GM3EGW
21	G6XY
20	G2HOP, G3EYV, G3FRY, G4LX, G6PJ
19	G3SM, G5LQ (176)
18	GM3DIQ
17	G3DLU
16	G2AOL, G3FEX, G3FRE, GC2CNC
15	G2DVD, G3IWA
14	G2DHV, G3GYY, G3ISA, G3YH

Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties are worked.

which is in Cambs, though the postal address is Herts.; so it makes six different counties for G3AVO/A! It may amuse him to know that Bassingbourn was bombed only once during the war—the night your A.J.D. happened to be visiting that station on duty! Anyway, G3AVO/A is there now with a 12-element stack at 28 feet, and uniformly flat country all round; a quick check on the band over a couple of evenings disclosed about 25 stations within range in all directions, so he feels it is going to be one of the best of the many locations from which his two-metre gear has been operated. A rebuild to QRO is in hand, the transmitter being EL91-EL91-EL91-832 into p/p 24G's, and the receiver is still the 2½-year-old Cascode. G3AVO hopes to find time to get going in 70 cm.; with the Cambridge group within easy range, it should be interesting and productive. And now that he is on again, G3AVO undertakes to show up for the Thursday evening sessions, too.

TWO METRES
COUNTIES WORKED SINCE SEPTEMBER 1, 1952
Starting Figure, 14

Worked	Station
42	G3WW
29	G5DS
27	G5YV
26	G3GHO
25	G2HDZ
23	G8IL
21	G4RO, G6TA
20	G2AHP, G3HBW
18	G6YU, G8DA
15	G3IOO
14	G2FCL

Note:* *This Annual Counties Worked Table opened on September 1st, 1952, and will run until August 31st, 1953. All operators who work 14 or more Counties during this period are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additions claimed need show only stations worked in each county as they accrue. A certificate is given for all VHF operators who work 40C or more in the year, for which QSL cards must be shown. Cards are not, however, required for entry into the Table.

The 72 mc Band

The French are lucky enough to have a useful band round 4 metres, and according to the "Chronique du DX" feature in *Le Haut-Parleur*, there are no less than ten stations in the Paris region on this band most evenings about 8.0 p.m. The frequencies given vary from 72.000 mc (F9NN) to 72.650 mc (F3CM), and for those G's who may have receivers to cover this frequency-area (such as an S.27), it would be interesting to know if anything can be heard of them, and whether any cross-band working is possible. Propagation characteristics on 72 mc would, of course, be very similar to what we used to experience on the old 56 mc band, and probably at this time of year even South Coast stations would have difficulty in receiving signals from Paris on 72 mc.

There is no official Region 1 amateur allocation in the 70 mc band, but these French stations have evidently been given space in the 72.0-72.8 mc area, marked in the Table of Frequencies as for "Fixed" and "General Mobile" stations.

THURSDAY VHF SESSION

Every Thursday evening all VHF operators are asked to come on for a QSO Party to be held between 2000 and 2230 GMT. There will be activity on both bands, Two and Seventy Centimetres. Make It A Date!

And that about squeezes the bag dry for this month. The sincere thanks of your A.J.D. not only to those who got in reports at such short notice, but also to those who sent their season's greetings with kindly words of Christmas cheer

Though this is being written before Christmas, it will not be read till early in the New Year—so it is for A.J.D. to offer *his* good wishes for 1953 to all whose eye may fall upon this piece, to thank so many of them for so much support during 1952, and with them to look forward to a happy and successful New Year.

Finally

The closing date for the February issue will be **January 16 certain**—not long after you see this. Please send all your VHF news, views and claims to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on February 6.

The Eddystone '750'

REVIEWING A MODERN COMMUNICATIONS RECEIVER

FOR several weeks we have had under test—in normal amateur station operation—a production model of the Eddystone "750" Communications Receiver, which is already in the hands of many transmitting operators.

The "750" has a number of interesting features: Good sensitivity at the HF end of the tuning range; continuously variable selectivity; separate RF, IF and AF gain controls; a noise limiter which works well on peaky interference; send-receive switching which does not affect oscillator stability; and a particularly fine tuning mechanism with flywheel action and smooth, positive operation.

Coverage and Tuning

Frequency coverage is 480 kc-32 mc in four switched bands with adequate overlap. The scales are arranged horizontally, with a vertical pointer travelling across the face of the dial. The condenser pack and dial indication are driven through a split spring-loaded gear train; coupled to this is the bandspread dial, divided 0-100, which by mechanical multiplication gives the necessary tuning coverage on each amateur band. As an instance, the 21-mc amateur band occupies 40 bandspread dial divisions; each division can be interpolated to fifths.

At any setting of the tuning mechanism, the main cursor reads off dial divisions to the nearest 100 and, in conjunction with the fine-tuning dial scaled 0-100, enables frequencies to be re-set or accurately selected.

The limits of the various amateur bands are clearly marked on each scale, and all bands 1.7 to 28 mc are covered. An interesting point is that the 500-kc (600-metre) international calling and distress wave falls within the coverage—most receivers have an IF gap at this point—so that medium-wave ship-shore working can be followed.

Circuitry

The receiver is, effectively, a 7-valve double-conversion superheterodyne, with one tuned RF stage. Four additional valves function as noise limiter, BFO, voltage stabiliser and mains rectifier, making 11 valves in all. The intermediate frequencies are 1620 and 85 kc, the first oscillator being an 8D3 and the second an ECH42 oscillator-mixer. The RF stage is a 6BA6, the first frequency changer an ECH42, the 85 kc IF amplifier a 6BA6, the demodulator and first LF amplifier a DH77, with an N78 in the output stage.

The switchery comprises: On-off, Send-receive, NL on-off, BFO on-off, all on the lower front panel. The variable controls are: RF gain, BFO pitch, Band-switch, Tuning, IF gain, Audio gain and Variable selectivity. A headset plug is arranged to cut the speaker and last audio stage when phones are used.

Finish and General Construction

The Eddystone "750" is one of the best laid out and constructed receivers we have seen. The RF section and tuning condenser pack are built on a separate die-cast chassis mounted in a central well, with the other sections of the circuit disposed on the main chassis round the tuning unit for short and direct wiring. The finish and general workmanship are excellent, and the layout, construction and appearance as a whole give the impression of a first-class engineering job.

The mains transformer is generously rated, getting only slightly warm after an hour's continuous working, and all other parts of the receiver also run well within their limits.

Performance

With us, the "750" has had six weeks' knockabout operation on all bands and has given excellent results in comparison with six or seven receivers of other makes and types with which it has been compared, directly or indirectly.

At the HF end of the tuning range—the 21- and 28-mc bands—the performance is better than most and there is always enough gain in hand on the 28-mc band. The receiver has performed well in terms of signal-to-noise ratio and sensitivity, and the variable selectivity control is particularly useful and effective. The noise-limiter cuts out staccato and peaky interference without affecting signal level, and the switching is quiet and positive. Drift is negligible on switching from send-to-receive (a severe test for most receivers) and the general "feel" of the receiver is that though the background is quiet it has plenty in reserve.

The "inherent screening" is such that, with no connection to the aerial terminal, nothing but a few isolated and exceptionally strong signals break through on the three HF bands with the gains full on; this is a feature of great importance to those who would be using the receiver as an IF/AF unit for a VHF converter, and is not to be lightly disregarded. In fact, not many receivers respond satisfactorily to such a test—which, in this case, was made with a normal (and quite a long) connection to the earth terminal. In other words, it means that the "750" gives a wide choice of IF when it is desired to use it with a two-metre or 70-centimetre converter.

One small criticism might be that the main tuning pointer is rather coarse—it would be better as a knife edge—and it would also be helpful to have the bandspread dial subdivided into fifths. In the model we had, calibration accuracy on the HF range left something to be desired, though this was only a matter of a few kc and with the usual methods of frequency checking available at most stations, a correction was easily applied.

No reader contemplating the purchase of a good modern communications receiver can afford to ignore the Eddystone "750." The manufacturers are: Stratton & Co., Ltd., Eddystone Works, Alvechurch Road, West Heath, Birmingham, 31—who have been in the business as designers and producers of short-wave receivers for nearly 30 years.

Random Jottings by the Old Timer

WE make no apology for returning to the subject of Samuel Morse's immortal code once again. Although a terrific amount of talking seems to pervade the bands, most of our communication is still carried out by way of brass-pounding, side-swiping, vibrating and electronic wobbling, and this leads to our point—namely, that slower sending and better characters would be a distinct help in some quarters. A well-operated station sending at a steady clip of 25 is a joy to listen to, but what can one say of those types who bash a bug about at any speed up to 30's when they are really incapable of sending well at half that speed? Here is a literal quotation from something we wrote down a few days ago, exactly as sent: "Irpst hr 5050 watth—5r conbx also dad—phe QHL to LZ . . . ." Nine mistakes in twelve words, we make that. And when this sort of thing goes on with each word *repeated*, as it often does, we wonder why people even try to send fast.

PHONETICS

It was, we think, our esteemed Editor who invented the phrase "Char-chip-char-chip char-char-chip-char" to describe an all too familiar type of signal. But lately we have been hearing much worse than this. A recent super-chirp could only be rendered as "Tchwarch - twitch - tchwarch - twitch," and much lesser ones have cropped up which have resembled "Twar-twit-twar-twit." A really good CW signal doesn't sound "Dar-dit-dar-dit" at all—it's more like "Par-pip-par-pip," surely? And then we have the good old-fashioned crystal note (with weak spacer-wave and ringing effect) going "Nahn-nin-nahn-nin nahn-nahn-nin-nahn" or thereabouts. Endless varieties could be invented to cover the various brands of exhibit, but we will content ourselves with two more, for your delectation. They are "Plop-plip-plop-plip" for the local fellow with key-clicks, and "Twerp-twip-twerp-twip" for the little twerp with the little chirp.

MORE PHONETICS

Strange how seldom you hear anyone being given a really scathingly bad report, however shocking his phone quality. We heard an all-but-unintelligible phone transmission the other day, and the operator asked for "a candid report." He got it! He was told that his speech was a cross between a pencil sharpener and elephants-on-the-gravel-path ; but he didn't appreciate it. He went back and said that his microphone was a good one ; that the speech amplifier would give five watts undistorted ; and that it sounded quite good on the monitor. So what? From where we were it sounded terrible. We ought to face the fact that there are lots of disgusting transmissions on our bands, and there is no reason why they should ever improve unless someone tells the owners how bad they are. Listen to that T7 CW station in a nice DX country, and note how everyone gives him T9. If he were about T1 they might be giving him T7! A chance here for a New Year's resolution—give some candid reports in 1953.

TOM, DICK AND HARRY

Is this Christian-name convention a Good Thing, or is it just a pestiferous nuisance? No one can say that we were less friendly in the old days, when an operator was "om" on CW or "old man" on phone. Nowadays the name is a matter of such importance that we frequently hear it given before the RST! If you don't keep a card-index system, you can't possibly remember all of them ; thumbing back through the log is a procedure that wastes time and patience ; and when it's all done, where have you got? Of course, we admit that groups of personal friends working in a net make it desirable, and so do old buddies making frequent CW contacts with each other. But otherwise it seems ridiculous and a little childish. And is anything worse than hearing a phone station come up with "Hullo Charlie, Jim, Bill and Frank—this is Ernie . . . . all OK from Bill, but I missed a bit of Jim's last . . . . " Use names by all means when you know the other chap personally (but in moderation even then), but *don't* use them as call-signs, or we will have to get out a new Call Book arranged in order of handles.

CHANGING OVER

One hears some very snappy send-receive switching these days. In fact, a replying station on phone occasionally gets his carrier on so quickly that it beats with the station going over (to the discomfort of casual listeners on the frequency!) But a bit of spoofing goes on among the CW boys, or are we wrong? We heard W1BUX sign over to someone the other day, and the replying station started up "UX." This was not the first time we had heard the phenomenon, either. Even so, the change-over was very snappy, which is always a good thing. If anything really annoys a good operator, it is to wait for the other man to fiddle with the necessary switches, send a long dash, a couple of "VE's" and then start with the call-signs (which he often sends far too many times). During a twenty-minute QSO about two minutes of "air-time" can be wasted by this completely non-productive and non-communicative procedure. Cut it out and reduce the QRM!

NEW QTH's

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

EI4F, S. McGonigle, Castle Street, Ballyshannon, Co. Donegal. *(Tel.: Ballyshannon 72).*

G2CAJ, A. Bryan, 14a Coleherne Road, London, S.W.10.

GM3EDL, W. H. F. Lamb *(ex-D2DL)*, 80 Broughton Road, Edinburgh, 7.

G3FFD, W. H. J. Brunning, 58 Cheadle Road, Forsbrook, Blythe Bridge, Staffs.

G3GTF, B. W. N. Harris, St. Martin's, New Brighton Road, Emsworth, Hants.

G3HER, J. O. Mann, Moorlands, Scoriton, Buckfastleigh, Devon.

G3HVH, E. Basilio, 111 Vale Road, Portslade, Sussex.

GI3HXH, Dr. J. J. Cosgrove, Stacumnie, Culmore Road, Londonderry.

G3HYE, Ribblesdale Amateur Radio Society, Back York Street, Clitheroe, Lancs.

G3IAM, F. H. Hearnden, Oakfield, London Road, Dorking, Surrey.

G3IGQ, Battersea Polytechnic Radio Society, Battersea Polytechnic, Battersea Park Road, London, S.W.11.

GW3IJE, M. J. Powell, Lynwood, Park View, Pontypool, Mon.

GW3IKK, J. H. Taylor, 92 Erddig Road, Wrexham.

G3IKS, K. Walton, 66 Carlby Road, Malin Bridge, Sheffield, 6.

G3IMV, J. Hunter, 5 Perrams Cottages, Arkley, Barnet, Herts.

G3INC, S. Aspinall, 72 Torrington Road, Ruislip Manor, Middlesex.

G3INE, R. Conway, 49 Shard End Crescent, Castle Bromwich, Birmingham.

G3INI, D. A. Import *(ex-DL2LM)*, 3 Waterloo Crescent, Apperley Bridge, nr. Bradford, Yorkshire.

GW3INO, D. C. Axtell, 34 Pen-yr-alley Avenue, Skewen, Neath, Glam.

G3IOB, M. J. Knowles, 4 Poplar Avenue, Wednesfield, Wolverhampton, Staffs.

G3IOE, A. H. Edgar, 15 Dene Terrace, South Gosforth, Newcastle-on-Tyne, 3, Northumberland.

G3IOL, A. Barlow, 49 Fir Street, Ramsbottom, Manchester, Lancs.

G3ION, G. A. Allcock, 34 Crudwell Lane, Long Newnton, Tetbury, Glos.

G3IOQ, B. L. Edwards, Roath Cottage, Camelsdale, Haslemere, Surrey

G3IOR, P. J. Gowen, 71 Links Avenue, Upper Hellesdon, Norwich, Norfolk.

G3IOS, A. Kenmuir, 71 Newcastle Street, Kilkeel, Co. Down.

G3IPB, S. C. Barrell, 12 Caenwood Road, Ashtead, Surrey. *(Tel.: Ashtead 503).*

G3IPC, J. W. Pike, 42 Staithe Road, Wisbech, Cambs.

G3IPI, A. E. Wright, 7 Derwent Avenue, Mill Hill, London, N.W.7. *(Tel.: Mill Hill 1755).*

G3IPL, D. A. Winters, 18 Frederick Street, Loughborough, Leics. *(Tel.: Loughborough 2492).*

G3IQF, R. A. Fowler, 1 Dedmere Road, Marlow, Bucks.

G3IQM, R. I. Sills, 29 Edingley Square, Sherwood, Nottingham.

G3IQN, N. Campbell, 68 Reynolds Drive, Edgware, Middlesex.

G3ISU, J. F. Lucas, 6 Selby Road, Ealing, London, W.5.

G3ITY, E. Yates, 38 Durham Road, Blacon, Cheshire.

G3IXZ, R. T. Bowden, Glenroy, Bracken Bank, Hutton, Essex.

G3JAB, D. A. Breeze, 61 Stafford Road, Newport, Shropshire.

G3JKF, 4067874 J/T Franklin K.V., R.A.F. Exminster, c/o R.A.F. Station, Exeter, Devon.

G3JKZ, F. W. Lynes, No. 1 Bungalow, Oxford Radio Station, Leafield, Oxon.

G4TX, F. H. Walker, 19 Netherton Road, St. Margarets, Middlesex.

CHANGE OF ADDRESS

G2CKK, P. King, 23 George Gurr Crescent, Folkestone, Kent.

GC2CNC, E. Banks, La Mabonnerie, States Experimental Farm, Trinity, Jersey.

G2DFR, F. N. Shelley, 162 Somerset Avenue, Harefield, Southampton.

G2IQ, W. J. Crawley, 6 Ringinglow Road, Sheffield, 11.

G3CCN, W/O H. Goodwill, c/o 5 Shawe Road, Flixton, Manchester.

G3CNY, G. L. Blunn, 23 Lichwood Road, Wednesfield, Wolverhampton, Staffs.

G3DNR, P. O'Brien *(ex-VS2BW)*, Top Flat, 58 Upper Dane Road, Margate, Kent.

G3GEU, E. H. Hildreth, 109 Westbrooke Avenue, West Hartlepool, Co. Durham.

G3GOX, Ann B. Walford, 1 The Grange, Water Street, Mere, Wilts.

G3GXN, R. Mapplebeck, 58 Cross Street, Morley, nr. Leeds, Yorkshire.

G3HAY, Maj. I. McAnsh, 6 (Boys) Training Regiment, R. Signals, Normandy Camp, Beverley, Yorkshire.

G3HQX, J. Brodzky, 6 Cambridge Road, Mitcham, Surrey.

G3HTT, W. T. Cheeseworth, 28 Broad Park, Launceston, Cornwall.

G3HZL, D. Walmsley, Flat 3, 270 Twickenham Road, Isleworth, Middlesex.

GW8WJ, J. P. Evans, 2 Ffordd ty newydd, Maes Hendre, Meliden, Prestatyn, Flints.

CORRECTION

G3ACC, Margaret Mills, 59 Upland Road, East Dulwich, London, S.E.22.

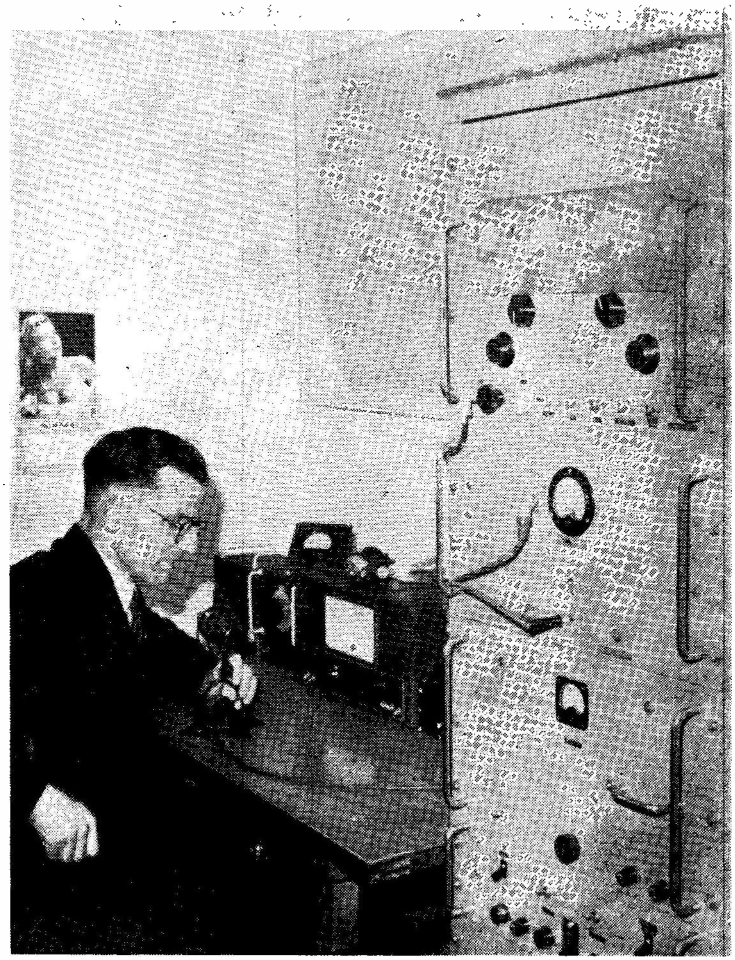
GM3AEC, A. J. Janes, The Dell, Stanley Drive, Brookfield, Renfrewshire.

G3HQ, C. C. Windley, Holmewood, Firtree Lane, Little Baddow, nr. Chelmsford, Essex.

G5VM, V. M. Desmond, The Chestnuts, Hanley Castle, Worcs.

G3GJF

The Other Man's Station



THIS month we discuss another in the G3-plus-3 series, stations which have been licensed for amateur band operation since March, 1946. G3GJF is owned and operated by G. J. Lyon at 125 Rokeby Road, Sheffield, 5, who gained his full licence in February, 1951.

The radio room here is "upstairs," and with the exception of the receiver, all the equipment is home constructed. From left to right in this view, we see the pre-selector for the receiver, a stabilised general-purpose power supply unit, the VFO, the main receiver, and the aerial direction indicator.

On the transmitter side, the VFO is a 6V6 in the Hartley ECO circuit, giving output on 7 mc. The first stage of the transmitter proper, to which the VFO is link-coupled, is an earthed-grid amplifier; this provides both isolation from, and constant impedance matching to, the grid of the 6V6 doubler. The latter is broad-band coupled to an 807 buffer amplifier which is capacity coupled to the 813 final amplifier. The PA is modulated by a pair of 811's. The station control unit is designed to provide full BK facilities with this transmitter.

From the top of the rack downwards, the units are the transmitter, the modulator, multi-output stabilised power supply, main control panel, power supply for the modulator, and high-voltage pack for the 813 PA.

Operation is exclusively on 14 mc phone, and a particularly interesting and important feature of G3GJF's station is that it is fully TVI-proof on both the Sutton Coldfield and Holme Moss TV transmissions. Thus, he is able to indulge his main interest and activity, which he describes as "Nattering on Twenty." The station record is more than 100 countries worked on phone.

The aerial now in use at G3GJF is a rotary "ZL Special"—as described in *Short Wave Magazine* for July, 1950—carried on a lattice tower which elevates the beam head well above roof level, with remote motor-drive and direction indication at the operating position. This is giving very satisfactory results, and G3GJF can be heard working the stuff with the best of them when the 20-metre band is open for DX. His station is a good example of modern "one-band planning"; he is one of the few operators using full power on 14 mc who is able to come on whenever the spirit moves without having to worry about TVI, and neighbours pushing rude notes under the door. And that is no mean achievement.

THE SEVENTH MCC

• *The Magazine Top-Band Club Contest* •

NOVEMBER 15-22 · 1952

A TIE for first place! For the first time since the inception of this Annual Contest, which has now become almost traditional, two Clubs end up with precisely the same score, after having passed through the fine filter of the scrutineers.

And so far ahead of all others were the winners that it seems almost incredible that they should have remained equal in the first position—but there it is. And here are the first three, duly honoured in the usual little box:

1st:	**Chester and District Amateur Radio Society, G2YS (797)**
	Neath, Port Talbot and District Amateur Radio Club, GW3EOP (797)
3rd:	**Clifton Amateur Radio Society, G3GHN (660)**

So it was a runaway win for *Chester* and *Neath*, with *Clifton* honourably heading a long list of scores, very close together, in the 500's and 600's. *Table I* shows the full analysis of results, with the 28 entries lined up in order of merit. (Incidentally, this is precisely the same number of entries as we had last year).

The Winners

Chester and *Neath* used remarkably similar gear, both Clubs having an AR88 receiver, a 270-ft. aerial and an 807 PA. Chester was mainly operated by John Swinnerton, G2YS, himself; and it was, of course, his own station that represented the Club, since the Clubroom was not available sufficiently often to be of any use during the week of the Contest.

Neath (GW3EOP) was operated by Dewi Davies, GW3FSP, heading a team consisting of GW3EPM, 2AVV, 2FRB, and 4CG/A. The winners' remarks on the Contest will follow in a later paragraph.

Clifton made it a Club affair and appear to have had several operators available, and SWL assistance.

Opinions

It will be remembered that last year's MCC was confined entirely to inter-Club contacts. This failed to please some of the participants and even kept others out of the Contest altogether because they did not approve of the rules. So, after a great deal of thought, it was decided to allow contacts with non-participating stations, but only once each during the entire week. Against this, Clubs could not only be worked every night, but scored three points each time. Thus the contest was very heavily loaded with incentive towards working Club stations as frequently as possible.

Judging by contestants' remarks, these rules just filled the bill perfectly. Never have we had such unanimity of opinion before; everyone seems to have been delighted with the way things went, and hardly a dissenting voice has been raised.

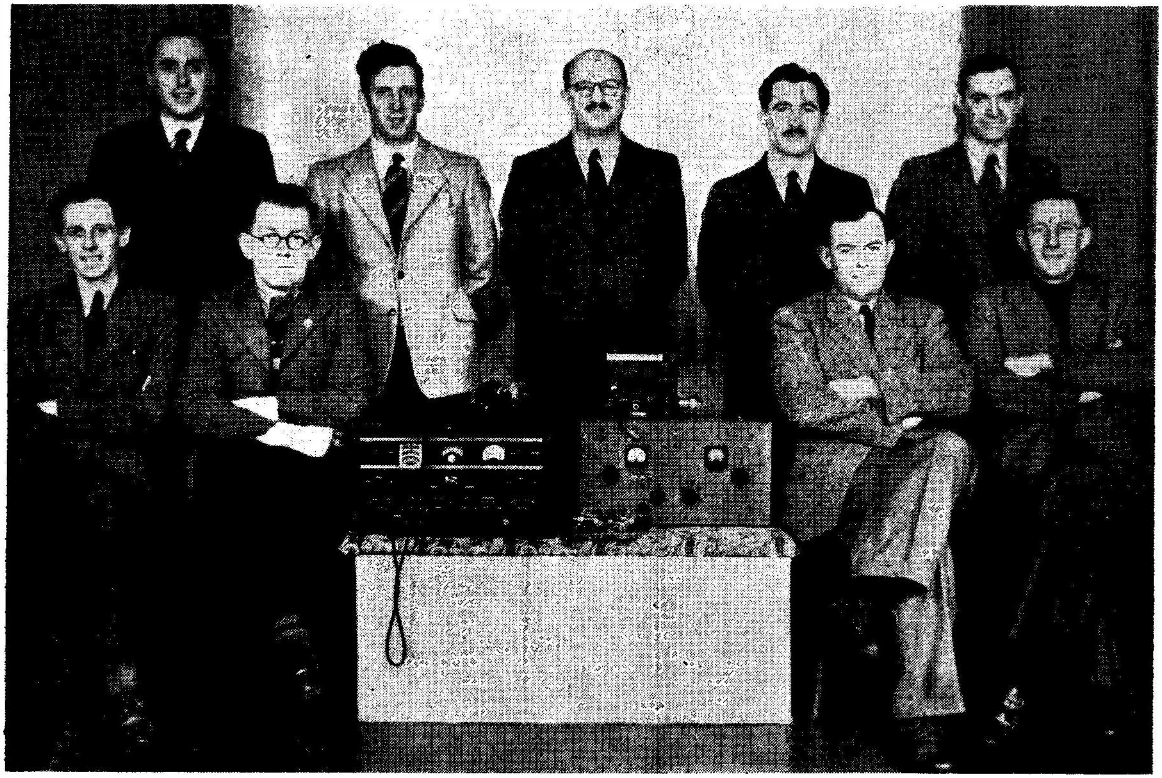
Here are some of the comments: "A sense of camaraderie between Clubs resulted from the daily contact—there were many amusing asides but no complaints of QSO-busting and no spiv tactics" (*Chester*) . . . . "Very enjoyable to the members of the Club, the large majority of whom took some part, either operating, logging or checking" (*Neath and Port Talbot*) . . . . "Thoroughly enjoyed and valuable operational experience gained by the very enthusiastic band of A/T's who were given special facilities by the C.O." (*AAS Radio Club*) . . . . "Scoring system and rules the best so far devised, and by far the fairest" (*Edgware*) . . . . "Voted by all seven operators, fifteen second-ops, and the many tea-makers as the best ever" (*Grafton*) . . . . "In spite of aerial blowing down and power-pack blowing up, the MARTS thoroughly enjoyed the contest" (*Medway*) . . . . "Scoring was the best method yet, and the rules seem to be very fair to all" (*Scarborough*).

Criticisms

Naturally, it is impossible to please everybody all the time, and there were one or two criticisms to off-set the enthusiasm shown in the foregoing paragraph. *Purley* felt that Clubs in a big town had an advantage, owing to the large number of stations to work within a small area (but note the locations of the winners!). *South Manchester* suggest we should pick warmer weather, as they were frozen from the knees down for the whole week! *Birmingham* would like some sort of bonus for the number of counties worked. *Kingston* found the single point for working non-competitors a nuisance, and said they enjoyed things better last year, working Club stations only.

Several Clubs found the 6.30 p.m. start a little inconvenient, and suggest that 7 p.m. would be quite early enough. Others would like to see the first or last Saturday cut out, giving a clear seven days. One suggests that the "QRA-QTH" differentiation was unnecessary, but another says that the word "Club" should follow "QRA," to make doubly sure of things.

As usual, many of the adverse criticisms of small points cancel



GW3EOP, Neath and Port Talbot, equal first with Chester in this year's MCC, the seventh Club 1.7 mc Transmitting Contest. Always a fine, steady signal, GW3EOP was operated to score and as our photograph shows was very much a co-operative effort—and it is not the first time they have appeared in this context, as Neath gained second place in the 1949 and 1950 Club contests.

each other out and only arise from personal preferences.

Operating

Nearly everyone commented on the satisfactory standard of operating. One or two Club naturally had novices on the key at times, but they could be recognised—and, after all, how can they gain contest experience if they don't start some time?

Neath suggest that one unwritten rule in procedure could have been followed more often by certain stations. If you answer a CQ and work the station, it is up to *you* to QSY afterwards and leave *him to* send "QRZ?" for other contacts. On the other hand (naturally), if you call CQ yourself and a station works *you*, you need feel under no obligation to move off the channel afterwards.

Lots of people ask why only a quarter of the band was used; certainly it appeared that nearly all the activity, as usual, was between 1850 and 1900 kc. This caused a lot of unnecessary QRM. Perhaps we shall award a bonus next year for contacts outside this section of the band!

Edgware remark on the bad quality of a few of the signals, possibly due to rapid QSY without careful re-tuning.

DX Contacts

Quite a few entrants were pleased to include contacts with

TABLE II

WINNERS OF PAST MCC CONTESTS

Year	1st	2nd	3rd
1946	Coventry	Cheltenham	Grafton
1947	West Cornwall	Warrington	Coventry
1948	Rhigos	Coventry	Wirral
1949	Rhigos	Neath	Coventry
1950	Rhigos	Neath	Coventry
1951	Coventry	West Cornwall	Surrey
1952	Chester / Neath	—	Clifton

OH3NY, OH7OH, OK1HI and OK2OBA, but these were the only DX operators found on the band. We had no GC, GD, GI or GM entrants this year, although GM6RI was active and worked by many of the Clubs. (No entry was received from him, however).

Other Clubs which were on the band but did not put in entries were G3HUG (Tees-side) and G3GKQ (Clitheroe). They were allowed to count as Club Contacts for scoring purposes.

Checking the Entries

The scrutineers, as always, were amazed at the optimism of some of the entrants, who lightheartedly put down all sorts of non-Club stations as Clubs, and proceeded to amass fifteen points by working them five times, when they were entitled only to one point for one contact. Had everybody done this with the same stations, one would have imagined that something misleading had been going on; but it was only one or two Clubs who were wildly enthusiastic in this respect. Stations claimed by some Clubs for three-point contacts were G2JF (Wye) and G8KP (Wakefield) — both privately-operated stations; but for three or four Clubs claiming them on several nights there were twenty who did not. Moral—make sure by *asking* the chap! (Next year we will have the word CLUB introduced somewhere though). But the fact remains that if twenty Clubs could put in clean and correct logs, the others could have done the same. In a few cases the claimed score was few cases the claimed score had to be knocked down by as many as 60 points.

The two leading stations both had very clean logs, but a lot of head-scratching was necessary before the result was finally arrived at. *Chester* had claimed G3GYQ (Swindon) as a Club; *Neath* had worked the station but only claimed one point. Then it was found that *Neath* had not claimed three points for G3GKQ (Clitheroe), whom Chester had worked four times. On the other hand, they *had* claimed three points for G3GEC, a non-participant. Then some non-checking RST's were found, and an incorrectly logged QTH or two. Eventually, try as they would, the judges could not separate them by more than one point (sometimes in *Neath's* favour, sometimes in *Chester's*), and as each move in the game demanded an arbitrary decision by the judges, who were not in a position to say whether a divergence in RST came from one end or the other, the only possible thing to do was to place them equal-first! (One point in 800 can't be lightly dismissed, when it might well be due to a slip-up in the other fellow's log and nothing to do with the leaders at all.)

TABLE I

POSITIONS AND SCORES

	CLUB	CALL	POINTS
1.	Chester Neath and Port Talbot	G2YS GW3EOP	797
3.	Clifton	G3GHN	660
4.	Surrey (Croydon)	G6LX	654
5.	Coventry	G2LU	645
6.	Gravesend	G3GRS	634
7.	Salisbury	G3FKF	624
8.	BTH (Rugby)	G3BXF	602
9.	AAS, Arborfield	G3HOS	584
10.	Edgware	G3ASR/P	563
11.	Sutton and Cheam	G2BOF	560
12.	Bristol	G3GIS/A	548
13.	Grafton	G3AFT	534
14.	Swanton Morley	G3GLJ	528
15.	Medway	G2FJA	523
16.	Isle of Thanet	G3DOE	517
17.	Albany	G3HPI	501
18.	Scarborough Wirral	G4BP G3AMV	398
20.	Walsall	G2FPR	396
21.	Torbay	G3GDW	360
22.	Kingston	G3ILC	350
23.	Baldock	G3CEU	339
24.	Liverpool	G3AHD	258
25.	Birmingham	G2BON	230
26.	South Manchester	G3HMF	181
27.	Purley	G3FTQ	168
28.	Yeovil	G3BEC	98

Strays

One or two Clubs have asked whether we could publish an analysis of how the scoring went, *night by night*. This would certainly be a man-sized task, and one that time does not permit. We have, however, carried out some researches into the happenings on the first night, with the following results.

Chester had amassed 102 points when they packed up at 2228 GMT on November 15; *Neath* were just behind, with 99. The rate of scoring at these two stations was very consistent, averaging just about 100 points each night.

The others ran like this: *Clifton,* 85; *Surrey,* 89; *Coventry,* 82; *Gravesend,* 85; *Salisbury,* 72; *BTH,* 76; *AAS,* 74; *Edgware,* 66; *Sutton,* 69; and so on, more

Chester and District Amateur Radio Society bracket equal first with Neath and Port Talbot in this year's MCC event—the first time in seven years that we have been unable to separate the leaders. Chester used call G2YS, and in our photograph G2YS himself is seated front, with (standing, left to right) G3HLP, G3FNV and G3ATZ. Between them, these four operators kept the Club station on the air, and gave a splendid account of themselves.

or less in the proportions of their final scores. It is obvious that scoring was very steady—if you could work, say, 25 Clubs each night you were sure of 75. If some of the Clubs were not worked, you had to make up on outside stations. (On the opening night *Chester* worked 28 Clubs, including G3GKQ and G3HUG, and 18 other stations, including OH3NY. By comparison, *Neath* worked only 24 Clubs, but 27 other stations—again including OH3NY).

The Summing-up

This seems to have been a very evenly-contested struggle, with the best men winning. No particularly heavy loading was placed either on private stations with one or

Clifton Amateur Radio Society of New Cross, London, S.E. 14, gained third place in this year's MCC. A comparatively "young" organisation, with strong competition in the London area, they did extremely well to get so near the front. This photograph was taken just before the Contest started, and shows G3IGZ (left) and G3GYZ ready to fire with an ECO/BA/PA transmitter, a National NC-120 receiver, and an electronic key. Other operators on the station at various times were G3HLX and SWL Veasey.

two operators, or on busy Club stations with lots of people milling around. In the middle-scoring group, where totals were so close, there were Clubs of both types. Probably good aerial systems were worth several points each night, but good operating was worth even more.

We do not propose to make any substantial alteration in the rules or the method of scoring, and hope that next year's affray will be enjoyed as much as this one apparently was.

Thanks to all the entrants for putting up such a fine show. Whether they finished at top or bottom of the list, they were all part of the organisation, and without a good batch of enthusiastic Clubs this event would fade out. Perhaps we can top the 30 mark next year.

The deadline for next month's reports for "Month with the Clubs" is **January 14, 1953.** Address them to "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

XTAL XCHANGE

This little feature was instituted for the convenience of those who may wish to offer a crystal in exchange for another of a required frequency. Insertions are free, but under the "Xtal Xchange" heading can be accepted only in respect of *exchanges* of crystals. The notice should be sent to us in the form shown in any recent issue under this heading. Naturally, we accept no responsibility for what may be offered, but in this connection it is perhaps worth mentioning that in the five years or so since "Xtal Xchange" was started, we have had only one complaint of a doubtful deal.

AMATEUR RADIO EXHIBITION

The annual Exhibition sponsored by the Radio Society of Great Britain has been supported by us since its inception, and this time we were again represented. There was an increase in the number of trade stands, and some very interesting equipment was on view, though not all of it directly Amateur Radio in application. As at the 1951 exhibition, the stands devoted to the display of amateur designed and built apparatus were most impressive ; in this category, the pieces of gear loaned for display by Maurice Mason, G6VX, were quite outstanding, in regard both to advanced design and fine construction.

The Society had GB3RS in operation during the period of the exhibition, November 26-29, 1952, and numerous contacts (QSL'd by a special card) were made on the communication bands.

We had the pleasure of meeting at Stand 28, many old friends and new readers of *Short Wave Magazine*, *Short Wave Listener* and members of the British Short Wave League. The total attendance was, however, noticeably down on previous years, and the RSGB must give attention either to a change of date for this Exhibition, or much wider advertising, so as to bring in more of the public interested in experimental radio and short wave activity.

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EDDYSTONE 740 and Radiovision Preselector; condition as new. Little used; £38 or nearest offer. (Might separate).—Four Oaks, Victoria Road East, Horley, Surrey. (*Phone 356*).

R.1155, modified, internal p/pack, separate AF and RF gain, complete with 160-metre convertor, as new, aligned, £14. 250v. 70 mA 6.3v. 3A p/pack, fully smoothed, £2. Tx 160, 80 and 40 m. Mod. or CW, 12w., complete with p/pack. Offers?—Thomas, 6 Coronation Road, Tetbury, Glos.

WANTED: Marconi Magnetic Detector; D.E. and Multiple Tuners; 101, 106, 107 and 112 Receivers; Fleming Valves; Coherers; and other early wireless gear, valves and literature.—FRANKLIN WINGARD, Rock Island, Illinois, U.S.A.

VFO All-Band 10, 15, 20, 40, 80, professional job; black wrinkle cabinet; in perfect order; £10. Power Pack R.A., 34 F/G: AC tapped 0-15 in ½-volts, 15 amps.; DC tapped 0-15 in ½-volt, 15 amps; DC tapped 0-1200 in 10-volt steps—400 mA thermal delay, blower and heating elements for 866A's, automatic overload cut-out in all circuits. Offers above £15. — G3HLS, Kenwood, 21 Park Avenue, Farnborough Park, Kent. (*Tel.: GRE.0051 (day), Farnborough 2470 (evening)*).

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: AR88D, plus matching speaker; Kent area; £50.—Box No. 1181, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

AR 88 CABINET required. — Offers with price to: Wilson, Altahammond, Whitehead, Co. Antrim, N. Ireland.

SCR522, less crystals, £15; require circuits, etc. Radiolab. workshop test set and 10-3000 metre oscillator.—Burgess, 65 Shakespeare Avenue, N.W.10.

EDDYSTONE "750" (unwanted), latest model just delivered; guaranteed under 10 hours' use; £60 plus carriage.—110 Church Lane, Handsworth, Birmingham

WANTED: Class-D Wavemeter in good condition. State price.—D. Baker, 2 Vale View, Swinderby, Lincs.

ET4336, new, unused, with Wilcox Gay VFO and Crystal Multiplier. Offers? Purchaser collects. —20 Skelmersdale Road, Clacton-on-Sea.

WANTED: Transmitting Valves, type RK28 or ATP100 or CV1372.—G3BXI, 55 Mount-pleasant Road, Chigwell, Essex. (*HAI. 4546*).

HRO Senior with Power Pack, BC221 with VR Power Pack, Cossor DB Oscilloscope 3339. Exchange Good Miniature Camera, or sell.—Brown, 31 Bamburgh Grove, Monkton, Jarrow-on-Tyne.

S. 640, as new, £18; 6ft. rack, £1/15/-; Power packs (2), 600v. 200 mA, £3/10/-; 832A (4), new, £2; all carriage extra. S.A.E. for list of bargains.—Box 1182, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

EXCHANGE: BC348N with built-in P/P, for BC221. S.A.E. for details.—G3HJT, Redstacks, Unwin Avenue, Cains Lane, East Bedfont, Middlesex.

ASB4, 500 mc, new, £6; R1355, modified for TV, with RF27, 230v. AC, £5; JV TV signal generator, GDO, 230v. AC, £5; R1132, modified 144 mc, 230v. AC, £5; all good condition. New 12AT7's, 10/-; 807, 6/-. Many other parts and valves. Stamp for lists.—G3HKV, Carol Cot, Stoke Abbott Road, Beaminster, Dorset.

SALE: Transmitter/Receiver, Type BP5; 6V6 CO, 829 PA; Receiver 6K8, 6SK7, 6SQ7, 6SC7. Original condition; black crackle case; complete with mike, crystal, key. Less power supplies. Absolute gift, £15 0s. 0d.—Box 1185, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

829B VALVES, guaranteed new and boxed, 70/- each, plus postage; 832 valves guaranteed, not boxed, 30/- each, plus postage.—Box 1183, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

WANTED: Two Wilcox Gay VFO. State condition and price.—32, Standlake Avenue, Birmingham, 34.

SMALL ADVERTISEMENTS. READERS—*continued*

WANTED URGENTLY: Hallicrafter S.27 RF Tuning Unit with tuning condensers, coils and wave-switch compl.—Conu, 5 Orchard Gardens, Putson, Hereford. *(Phone 2177).*

FOR SALE: Complete Transmitter, p/p 35T's PA, with Meissner Signal Shifter and crystals; also National 1-10 and 1155 Receivers. Quantity of other gear, including Resistance-Capacity Bridge, transformers, condensers, meters, etc.; the lot, £65; or would sell separately.—GW8IO, Hill Crest, Broad Oak, Northop, Flints.

TRANSMITTER BARGAINS: 10w., 50w. and 150w.; guaranteed perfect. Also brand-new TVI-proof five-band transmitter, 100w. phone. S.A.E. details.—124, Carr Road, Greenford, Middlesex.

FM ADAPTOR Unit, with self-contained speech amplifier and power pack. Will convert almost any rig to FM. Price £15 0s. 0d. Delivered free London area.—Box 1186, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SALE: Transmitter No. 12; brand-new condition, with key, microphone, spares and handbook, £20. Hallicrafters S20 Rx, £11; Avo-Minor AC/DC, £3; Eddystone speaker, 30/-. WANTED: S20R, MCR1.—G2DFH, Pendennis, St. Erth, Cornwall.

VALVES, new, guaranteed, in cartons; 5Z4G, 6V6G, X66, DH63, KTW61, 5/6; VR53-EF39, new, in cartons, 5/-. Surplus. All guaranteed, 6SN7GT, 6SL7GT, VR30/150, 6AK5, 5/-. — Box 1188, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

FOR SALE: RCA Transformer 2000-0-2000 volts at 800 mA, £6; Thermador filament transformer, 2.5 volts, centre tapped, 10 amps. twice, £2; Choke 15 Hy., 500 mA, £1; pair of 866's, £2; 813 and base, £2/10/-. Or the lot for £11, post paid.—Box 1190, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

BC639A, TS47 and TCS Handbooks wanted; buy or loan; good price paid. Supreme 504-A Valve Tester combined multi-range meter, as new, complete with handbook, etc., £20.—Box 1189, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

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